

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-04104-OR

May 16, 2013

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

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STANDARD OPERATING PROCEDURE

Sample Receiving

MP-001, Rev. 12
Effective: 10/31/12
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Eberline Services – Oak Ridge Laboratory LABORATORY DATA SUPPORT CHECKLIST

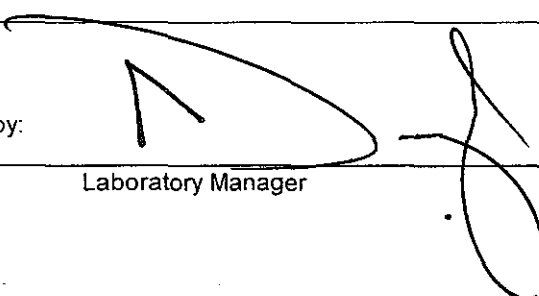
MP-001-3

Eberline Services Work Order # 13-04104

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

Date for Partial	Initials	Date	Initials	Checklist Items
		4/16/13	KC	Sample Log-In
		5/8/13	KBS	Data Compilation
		5/14/13	MLT	First Technical Data Review
		5/14/13	MSL	Second Technical Data Review
		5/15/13	MSL	Data Entry/Electronic Deliverable
		5/15/13	MSL	Case Narrative
		5/15/13	MSL	Electronic Deliverable Proof
		5/16/13	MSL	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		5/16/13	MSL	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by:  5/16/13
 Laboratory Manager Date

Copy No. _____

Radiochemistry Services

US EPA ARCHIVE DOCUMENT

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-04104

Lab Deadline

5/7/2013

Analysis

UUISO - 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	36	R1.0
	05	36	R1.0
	06	39	R1.0
	07	39	R1.0
	08	40	R1.0
	09	40	R1.0
	10	38	R1.0
	11	38	R1.0
	12	45	R1.0
	13	45	R1.0
	14	43	R1.0
	15	43	R1.0
	16	40	R1.0
	17	40	R1.0
	18	42	R1.0
	19	42	R1.0

US EPA ARCHIVE DOCUMENT

	Location (circle one)						Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/22/13 1430	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/23/13 1841	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/23/13 1841	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ORUS TRM	4/20/13	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ORUS	4/22/13	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ORUS	4/22/13	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-04104

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	36	R1.0
	05	36	R1.0
	06	39	R1.0
	07	39	R1.0
	08	40	R1.0
	09	40	R1.0
	10	38	R1.0
	11	38	R1.0
	12	45	R1.0
	13	45	R1.0
	14	43	R1.0
	15	43	R1.0
	16	40	R1.0
	17	40	R1.0
	18	42	R1.0
	19	42	R1.0

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/22/13 1430
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	4/23/13 1615
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JPD	4/23/13 1615
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0930 PM	4/29/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0930	4/22
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KBS	4/29/13 1626
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		

US EPA ARCHIVE DOCUMENT



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04104
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	36	R1.0
	05	36	R1.0
	06	39	R1.0
	07	39	R1.0
	08	40	R1.0
	09	40	R1.0
	10	38	R1.0
	11	38	R1.0
	12	45	R1.0
	13	45	R1.0
	14	43	R1.0
	15	43	R1.0
	16	40	R1.0
	17	40	R1.0
	18	42	R1.0
	19	42	R1.0

	Location (circle one)					Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room	JW	4/22/13 1430
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room	JW	4/24/13 1509
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	SPM	4/25/13 05W
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JW	4/26/13 1625
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	KB	4/26/13 1627
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	C	4/27/13 0842
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

US EPA ARCHIVE DOCUMENT



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-04104
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	36	R1.0
	05	36	R1.0
	06	39	R1.0
	07	39	R1.0
	08	40	R1.0
	09	40	R1.0
	10	38	R1.0
	11	38	R1.0
	12	45	R1.0
	13	45	R1.0
	14	43	R1.0
	15	43	R1.0
	16	40	R1.0
	17	40	R1.0
	18	42	R1.0
	19	42	R1.0

	Location (circle one)					Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room	JW	4/22/13 1430
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room	JW	4/24/13 1509
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JW	4/25/13 0520
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JW	4/26/13 1625
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	KB	4/26/13 1627
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	C	4/26/13 0148
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JW	4/30/13 1110
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	JW	5/13/13 1324
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		5/21/13 1720
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	KS	5/21/13 1751
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		

US EPA ARCHIVE DOCUMENT



Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order

13-04104

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	R1.0		
02	BLANK	0		WA	R1.0		
03	DUP	0		WA	R1.0		
04	PZ-103-SS TOT /	1		WA	R1.0	9.50	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	36
05	PZ-103-SS DIS /	1		WA	R1.0	0.00	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
06	PZ-114-AS TOT /	1		WA	R1.0	9.50	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	39
07	PZ-114-AS DIS /	1		WA	R1.0	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
08	FB PZ-201A-SS TOT /	1		WA	R1.0	9.50	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	40
09	FB PZ-201A-SS DIS /	1		WA	R1.0	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
10	PZ-201A-SS TOT /	1		WA	R1.0	9.50	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	38
11	PZ-201A-SS DIS /	1		WA	R1.0	0.00	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				38
12	PZ-204A-SS TOT /	1		WA	R1.0	9.50	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	45
13	PZ-204A-SS DIS /	1		WA	R1.0	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
14	PZ-205-AS TOT /	1		WA	R1.0	9.50	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	43
15	PZ-205-AS DIS /	1		WA	R1.0	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
16	PZ-205-SS TOT /	1		WA	R1.0	9.50	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	40
17	PZ-205-SS DIS /	1		WA	R1.0	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
18	PZ-206-SS TOT /	1		WA	R1.0	9.50	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	9.5000	42
19	PZ-206-SS DIS /	1		WA	R1.0	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42

*12/5
04/16/13*

Received by: Kristen Coulston

Date: 4/16/13

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

0010

US EPA ARCHIVE DOCUMENT

SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST

MP-001-2

13-04104

WORK ORDER # _____

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-35566

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 # 13-04104-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-103-SS TOT	13-04104-04	PZ-204A-SS DIS	13-04104-13
PZ-103-SS DIS	13-04104-05	PZ-205-AS TOT	13-04104-14
PZ-114-AS TOT	13-04104-06	PZ-205-AS DIS	13-04104-15
PZ-114-AS DIS	13-04104-07	PZ-205-SS TOT	13-04104-16
FB at PZ-201A-SS TOT	13-04104-08	PZ-205-SS DIS	13-04104-17
FB at PZ-201A-SS DIS	13-04104-09	PZ-206-SS TOT	13-04104-18
PZ-201A-SS TOT	13-04104-10	PZ-206-SS DIS	13-04104-19
PZ-201A-SS DIS	13-04104-11		
PZ-204A-SS TOT	13-04104-12		

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

US EPA ARCHIVE DOCUMENT

ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

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

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was acceptable for all samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234, Uranium-235 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC THORIUM

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

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

RADIUM-226

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

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

ANALYTICAL RESULTS CONTINUED

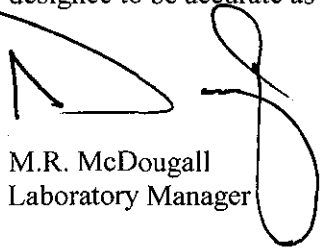
RADIUM-228

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

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

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 5/16/2013

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: 1304104
 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>
LCS13-04104-01	13-04104-01	04/29/2013 13:02:06	Radium-226	E903.0	9.72	1.09	0.17		pCi/l
LCS13-04104-01	13-04104-01	05/07/2013 12:37:55	Radium-228	E904.0	8.38	1.00	1.34		pCi/l
LCS13-04104-01	13-04104-01	04/29/2013 10:00:55	Thorium-228	HASL 300, 4.5.2	4.67	0.73	0.05		pCi/l
LCS13-04104-01	13-04104-01	04/29/2013 10:00:55	Thorium-230	HASL 300, 4.5.2	4.85	0.75	0.05		pCi/l
LCS13-04104-01	13-04104-01	04/29/2013 10:00:55	Thorium-232	HASL 300, 4.5.2	4.54	0.71	0.05		pCi/l
LCS13-04104-01	13-04104-01	04/27/2013 10:47:55	Uranium-234	HASL 300, 4.5.2	6.97	0.88	0.08		pCi/l
LCS13-04104-01	13-04104-01	04/27/2013 10:47:55	Uranium-235	HASL 300, 4.5.2	0.48	0.17	0.07		pCi/l
LCS13-04104-01	13-04104-01	04/27/2013 10:47:55	Uranium-238	HASL 300, 4.5.2	6.93	0.88	0.06		pCi/l
BLANK13-04104-02	13-04104-02	04/29/2013 13:02:08	Radium-226	E903.0	0.04	0.07	0.12	U	pCi/l
BLANK13-04104-02	13-04104-02	05/07/2013 12:37:56	Radium-228	E904.0	0.63	0.39	0.77	J	pCi/l
BLANK13-04104-02	13-04104-02	04/29/2013 10:00:57	Thorium-228	HASL 300, 4.5.2	0.00	0.03	0.07	U	pCi/l
BLANK13-04104-02	13-04104-02	04/29/2013 10:00:57	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.07	J	pCi/l
BLANK13-04104-02	13-04104-02	04/29/2013 10:00:57	Thorium-232	HASL 300, 4.5.2	0.02	0.03	0.05	U	pCi/l
BLANK13-04104-02	13-04104-02	04/27/2013 10:47:56	Uranium-234	HASL 300, 4.5.2	0.07	0.06	0.06	J	pCi/l
BLANK13-04104-02	13-04104-02	04/27/2013 10:47:56	Uranium-235	HASL 300, 4.5.2	0.00	0.03	0.08	U	pCi/l
BLANK13-04104-02	13-04104-02	04/27/2013 10:47:56	Uranium-238	HASL 300, 4.5.2	0.04	0.04	0.04	U	pCi/l
FB at PZ-201A-SS TOT DUP	13-04104-03	04/29/2013 13:02:03	Radium-226	E903.0	0.03	0.06	0.10	U	pCi/l
FB at PZ-201A-SS TOT DUP	13-04104-03	05/07/2013 12:37:56	Radium-228	E904.0	0.18	0.45	0.95	U	pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/29/2013 10:00:59	Thorium-228	HASL 300, 4.5.2	2.87	0.63	0.08		pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/29/2013 10:00:59	Thorium-230	HASL 300, 4.5.2	5.02	0.99	0.08		pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/29/2013 10:00:59	Thorium-232	HASL 300, 4.5.2	1.44	0.37	0.06		pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/27/2013 10:47:50	Uranium-234	HASL 300, 4.5.2	3.81	0.68	0.12		pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/27/2013 10:47:50	Uranium-235	HASL 300, 4.5.2	0.32	0.17	0.12		pCi/l
PZ-103-SS TOT DUP	13-04104-03	04/27/2013 10:47:50	Uranium-238	HASL 300, 4.5.2	4.92	0.82	0.11		pCi/l
PZ-103-SS TOT	13-04104-04	04/29/2013 13:02:04	Radium-226	E903.0	16.68	1.72	0.25		pCi/l
PZ-103-SS TOT	13-04104-04	05/07/2013 12:37:57	Radium-228	E904.0	5.28	0.74	1.01		pCi/l
PZ-103-SS TOT	13-04104-04	04/29/2013 10:01:01	Thorium-228	HASL 300, 4.5.2	2.96	0.64	0.09		pCi/l
PZ-103-SS TOT	13-04104-04	04/29/2013 10:01:01	Thorium-230	HASL 300, 4.5.2	6.03	1.16	0.09		pCi/l
PZ-103-SS TOT	13-04104-04	04/29/2013 10:01:01	Thorium-232	HASL 300, 4.5.2	2.47	0.55	0.09		pCi/l
PZ-103-SS TOT	13-04104-04	04/27/2013 10:47:51	Uranium-234	HASL 300, 4.5.2	4.47	0.63	0.05		pCi/l
PZ-103-SS TOT	13-04104-04	04/27/2013 10:47:51	Uranium-235	HASL 300, 4.5.2	0.36	0.14	0.06		pCi/l
PZ-103-SS TOT	13-04104-04	04/27/2013 10:47:51	Uranium-238	HASL 300, 4.5.2	4.77	0.66	0.05		pCi/l

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Project: West Lake OU-1
 SDG: 1304104
 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>
PZ-103-SS DIS	13-04104-05	04/29/2013 13:02:00	Radium-226	E903.0	3.89	0.71	0.18		pCi/l
PZ-103-SS DIS	13-04104-05	05/07/2013 12:38:01	Radium-228	E904.0	1.53	0.52	0.95		pCi/l
PZ-103-SS DIS	13-04104-05	04/29/2013 12:58:06	Thorium-228	HASL 300, 4.5.2	0.06	0.06	0.10	U	pCi/l
PZ-103-SS DIS	13-04104-05	04/29/2013 12:58:06	Thorium-230	HASL 300, 4.5.2	0.09	0.07	0.08	J	pCi/l
PZ-103-SS DIS	13-04104-05	04/29/2013 12:58:06	Thorium-232	HASL 300, 4.5.2	0.00	0.02	0.07	U	pCi/l
PZ-103-SS DIS	13-04104-05	04/27/2013 10:47:52	Uranium-234	HASL 300, 4.5.2	1.05	0.24	0.06		pCi/l
PZ-103-SS DIS	13-04104-05	04/27/2013 10:47:52	Uranium-235	HASL 300, 4.5.2	0.07	0.06	0.06	J	pCi/l
PZ-103-SS DIS	13-04104-05	04/27/2013 10:47:52	Uranium-238	HASL 300, 4.5.2	0.74	0.20	0.06		pCi/l
PZ-114-AS TOT	13-04104-06	04/29/2013 13:02:01	Radium-226	E903.0	0.43	0.21	0.15		pCi/l
PZ-114-AS TOT	13-04104-06	05/07/2013 12:38:01	Radium-228	E904.0	0.86	0.64	1.28	J	pCi/l
PZ-114-AS TOT	13-04104-06	04/29/2013 12:58:07	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.11	U	pCi/l
PZ-114-AS TOT	13-04104-06	04/29/2013 12:58:07	Thorium-230	HASL 300, 4.5.2	0.13	0.08	0.07	J	pCi/l
PZ-114-AS TOT	13-04104-06	04/29/2013 12:58:07	Thorium-232	HASL 300, 4.5.2	0.02	0.03	0.06	U	pCi/l
PZ-114-AS TOT	13-04104-06	04/27/2013 10:47:53	Uranium-234	HASL 300, 4.5.2	0.20	0.12	0.10	J	pCi/l
PZ-114-AS TOT	13-04104-06	04/27/2013 10:47:53	Uranium-235	HASL 300, 4.5.2	0.06	0.07	0.10	U	pCi/l
PZ-114-AS TOT	13-04104-06	04/27/2013 10:47:53	Uranium-238	HASL 300, 4.5.2	0.10	0.09	0.12	J	pCi/l
PZ-114-AS DIS	13-04104-07	04/29/2013 16:20:18	Radium-226	E903.0	0.18	0.15	0.19	J	pCi/l
PZ-114-AS DIS	13-04104-07	05/07/2013 12:38:02	Radium-228	E904.0	0.17	0.48	1.02	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/29/2013 12:58:02	Thorium-228	HASL 300, 4.5.2	-0.05	0.04	0.15	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/29/2013 12:58:02	Thorium-230	HASL 300, 4.5.2	0.07	0.07	0.10	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/29/2013 12:58:02	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.10	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/27/2013 10:48:21	Uranium-234	HASL 300, 4.5.2	0.08	0.10	0.13	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/27/2013 10:48:21	Uranium-235	HASL 300, 4.5.2	0.03	0.08	0.18	U	pCi/l
PZ-114-AS DIS	13-04104-07	04/27/2013 10:48:21	Uranium-238	HASL 300, 4.5.2	0.07	0.11	0.19	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/29/2013 16:20:19	Radium-226	E903.0	0.03	0.08	0.16	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	05/07/2013 12:38:03	Radium-228	E904.0	0.32	0.49	1.00	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/29/2013 12:58:03	Thorium-228	HASL 300, 4.5.2	0.02	0.05	0.09	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/29/2013 12:58:03	Thorium-230	HASL 300, 4.5.2	0.09	0.07	0.06	J	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/29/2013 12:58:03	Thorium-232	HASL 300, 4.5.2	0.01	0.02	0.06	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/27/2013 10:48:22	Uranium-234	HASL 300, 4.5.2	0.11	0.08	0.08	J	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/27/2013 10:48:22	Uranium-235	HASL 300, 4.5.2	0.00	0.04	0.10	U	pCi/l
FB at PZ-201A-SS TOT	13-04104-08	04/27/2013 10:48:22	Uranium-238	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l



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FB at PZ-201A-SS DIS	13-04104-09	04/29/2013 16:20:14	Radium-226	E903.0	-0.05	0.04	0.16	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	05/07/2013 12:37:54	Radium-228	E904.0	0.45	0.44	0.88	J	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/29/2013 12:58:04	Thorium-228	HASL 300, 4.5.2	-0.01	0.05	0.13	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/29/2013 12:58:04	Thorium-230	HASL 300, 4.5.2	0.05	0.05	0.07	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/29/2013 12:58:04	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.07	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/27/2013 10:48:23	Uranium-234	HASL 300, 4.5.2	0.06	0.06	0.06	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/27/2013 10:48:23	Uranium-235	HASL 300, 4.5.2	0.01	0.03	0.08	U	pCi/l
FB at PZ-201A-SS DIS	13-04104-09	04/27/2013 10:48:23	Uranium-238	HASL 300, 4.5.2	0.02	0.04	0.07	U	pCi/l
PZ-201A-SS TOT	13-04104-10	04/29/2013 16:20:15	Radium-226	E903.0	0.32	0.17	0.12		pCi/l
PZ-201A-SS TOT	13-04104-10	05/07/2013 12:37:54	Radium-228	E904.0	1.11	0.60	1.16	J	pCi/l
PZ-201A-SS TOT	13-04104-10	04/29/2013 12:58:05	Thorium-228	HASL 300, 4.5.2	0.04	0.08	0.14	U	pCi/l
PZ-201A-SS TOT	13-04104-10	04/29/2013 12:58:05	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.08	J	pCi/l
PZ-201A-SS TOT	13-04104-10	04/29/2013 12:58:05	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
PZ-201A-SS TOT	13-04104-10	04/27/2013 10:48:24	Uranium-234	HASL 300, 4.5.2	2.48	0.47	0.08		pCi/l
PZ-201A-SS TOT	13-04104-10	04/27/2013 10:48:24	Uranium-235	HASL 300, 4.5.2	0.13	0.10	0.08	J	pCi/l
PZ-201A-SS TOT	13-04104-10	04/27/2013 10:48:24	Uranium-238	HASL 300, 4.5.2	1.33	0.32	0.07		pCi/l
PZ-201A-SS DIS	13-04104-11	04/29/2013 16:20:16	Radium-226	E903.0	0.32	0.17	0.13		pCi/l
PZ-201A-SS DIS	13-04104-11	05/07/2013 12:37:55	Radium-228	E904.0	0.93	0.50	0.96	J	pCi/l
PZ-201A-SS DIS	13-04104-11	04/29/2013 12:58:51	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.13	U	pCi/l
PZ-201A-SS DIS	13-04104-11	04/29/2013 12:58:51	Thorium-230	HASL 300, 4.5.2	0.08	0.08	0.10	U	pCi/l
PZ-201A-SS DIS	13-04104-11	04/29/2013 12:58:51	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.11	U	pCi/l
PZ-201A-SS DIS	13-04104-11	04/27/2013 10:48:25	Uranium-234	HASL 300, 4.5.2	2.22	0.41	0.08		pCi/l
PZ-201A-SS DIS	13-04104-11	04/27/2013 10:48:25	Uranium-235	HASL 300, 4.5.2	0.15	0.10	0.07	J	pCi/l
PZ-201A-SS DIS	13-04104-11	04/27/2013 10:48:25	Uranium-238	HASL 300, 4.5.2	1.58	0.33	0.07		pCi/l
PZ-204A-SS TOT	13-04104-12	04/29/2013 16:20:17	Radium-226	E903.0	1.46	0.39	0.17		pCi/l
PZ-204A-SS TOT	13-04104-12	05/07/2013 12:40:04	Radium-228	E904.0	1.30	0.55	1.03	J	pCi/l
PZ-204A-SS TOT	13-04104-12	04/29/2013 12:58:52	Thorium-228	HASL 300, 4.5.2	0.37	0.19	0.17		pCi/l
PZ-204A-SS TOT	13-04104-12	04/29/2013 12:58:52	Thorium-230	HASL 300, 4.5.2	0.39	0.19	0.12		pCi/l
PZ-204A-SS TOT	13-04104-12	04/29/2013 12:58:52	Thorium-232	HASL 300, 4.5.2	0.12	0.10	0.12	J	pCi/l
PZ-204A-SS TOT	13-04104-12	04/27/2013 10:48:26	Uranium-234	HASL 300, 4.5.2	3.44	0.56	0.08		pCi/l
PZ-204A-SS TOT	13-04104-12	04/27/2013 10:48:26	Uranium-235	HASL 300, 4.5.2	0.32	0.15	0.09		pCi/l
PZ-204A-SS TOT	13-04104-12	04/27/2013 10:48:26	Uranium-238	HASL 300, 4.5.2	2.91	0.50	0.06		pCi/l



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PZ-204A-SS DIS	13-04104-13	04/29/2013 16:20:49	Radium-226	E903.0	0.67	0.26	0.14		pCi/l
PZ-204A-SS DIS	13-04104-13	05/07/2013 12:40:04	Radium-228	E904.0	0.46	0.46	0.94	U	pCi/l
PZ-204A-SS DIS	13-04104-13	04/29/2013 12:58:53	Thorium-228	HASL 300, 4.5.2	0.02	0.06	0.13	U	pCi/l
PZ-204A-SS DIS	13-04104-13	04/29/2013 12:58:53	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.08	J	pCi/l
PZ-204A-SS DIS	13-04104-13	04/29/2013 12:58:53	Thorium-232	HASL 300, 4.5.2	0.02	0.05	0.10	U	pCi/l
PZ-204A-SS DIS	13-04104-13	04/27/2013 10:49:17	Uranium-234	HASL 300, 4.5.2	3.10	0.52	0.08		pCi/l
PZ-204A-SS DIS	13-04104-13	04/27/2013 10:49:17	Uranium-235	HASL 300, 4.5.2	0.08	0.07	0.07	J	pCi/l
PZ-204A-SS DIS	13-04104-13	04/27/2013 10:49:17	Uranium-238	HASL 300, 4.5.2	2.46	0.45	0.08		pCi/l
PZ-205-AS TOT	13-04104-14	04/29/2013 16:20:50	Radium-226	E903.0	1.15	0.40	0.21		pCi/l
PZ-205-AS TOT	13-04104-14	05/07/2013 12:40:05	Radium-228	E904.0	1.81	0.54	0.96		pCi/l
PZ-205-AS TOT	13-04104-14	04/29/2013 12:58:54	Thorium-228	HASL 300, 4.5.2	0.31	0.15	0.11		pCi/l
PZ-205-AS TOT	13-04104-14	04/29/2013 12:58:54	Thorium-230	HASL 300, 4.5.2	0.36	0.16	0.09		pCi/l
PZ-205-AS TOT	13-04104-14	04/29/2013 12:58:54	Thorium-232	HASL 300, 4.5.2	0.10	0.08	0.09	J	pCi/l
PZ-205-AS TOT	13-04104-14	04/27/2013 10:49:19	Uranium-234	HASL 300, 4.5.2	0.30	0.14	0.07		pCi/l
PZ-205-AS TOT	13-04104-14	04/27/2013 10:49:19	Uranium-235	HASL 300, 4.5.2	0.05	0.07	0.10	U	pCi/l
PZ-205-AS TOT	13-04104-14	04/27/2013 10:49:19	Uranium-238	HASL 300, 4.5.2	0.06	0.07	0.08	U	pCi/l
PZ-205-AS DIS	13-04104-15	04/29/2013 16:20:46	Radium-226	E903.0	0.57	0.26	0.15		pCi/l
PZ-205-AS DIS	13-04104-15	05/07/2013 12:40:05	Radium-228	E904.0	1.04	0.49	0.94	J	pCi/l
PZ-205-AS DIS	13-04104-15	04/29/2013 12:58:55	Thorium-228	HASL 300, 4.5.2	-0.02	0.03	0.12	U	pCi/l
PZ-205-AS DIS	13-04104-15	04/29/2013 12:58:55	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.09	J	pCi/l
PZ-205-AS DIS	13-04104-15	04/29/2013 12:58:55	Thorium-232	HASL 300, 4.5.2	-0.01	0.03	0.08	U	pCi/l
PZ-205-AS DIS	13-04104-15	04/27/2013 10:49:14	Uranium-234	HASL 300, 4.5.2	0.18	0.11	0.08	J	pCi/l
PZ-205-AS DIS	13-04104-15	04/27/2013 10:49:14	Uranium-235	HASL 300, 4.5.2	0.08	0.08	0.09	U	pCi/l
PZ-205-AS DIS	13-04104-15	04/27/2013 10:49:14	Uranium-238	HASL 300, 4.5.2	0.15	0.10	0.07	J	pCi/l
PZ-205-SS TOT	13-04104-16	04/29/2013 16:20:47	Radium-226	E903.0	1.39	0.37	0.12		pCi/l
PZ-205-SS TOT	13-04104-16	05/07/2013 12:40:10	Radium-228	E904.0	1.31	0.61	1.15	J	pCi/l
PZ-205-SS TOT	13-04104-16	04/29/2013 12:58:56	Thorium-228	HASL 300, 4.5.2	-0.01	0.04	0.11	U	pCi/l
PZ-205-SS TOT	13-04104-16	04/29/2013 12:58:56	Thorium-230	HASL 300, 4.5.2	0.09	0.08	0.08	J	pCi/l
PZ-205-SS TOT	13-04104-16	04/29/2013 12:58:56	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.08	U	pCi/l
PZ-205-SS TOT	13-04104-16	04/27/2013 10:49:16	Uranium-234	HASL 300, 4.5.2	0.70	0.19	0.06		pCi/l
PZ-205-SS TOT	13-04104-16	04/27/2013 10:49:16	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.09	J	pCi/l
PZ-205-SS TOT	13-04104-16	04/27/2013 10:49:16	Uranium-238	HASL 300, 4.5.2	0.48	0.16	0.05		pCi/l

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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-205-SS DIS	13-04104-17	04/29/2013 16:20:56	Radium-226	E903.0	1.33	0.34	0.12		pCi/l
PZ-205-SS DIS	13-04104-17	05/07/2013 12:40:11	Radium-228	E904.0	1.13	0.50	0.94	J	pCi/l
PZ-205-SS DIS	13-04104-17	04/29/2013 12:59:21	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.08	U	pCi/l
PZ-205-SS DIS	13-04104-17	04/29/2013 12:59:21	Thorium-230	HASL 300, 4.5.2	0.06	0.07	0.08	U	pCi/l
PZ-205-SS DIS	13-04104-17	04/29/2013 12:59:21	Thorium-232	HASL 300, 4.5.2	0.00	0.04	0.09	U	pCi/l
PZ-205-SS DIS	13-04104-17	04/27/2013 10:49:24	Uranium-234	HASL 300, 4.5.2	0.44	0.14	0.04		pCi/l
PZ-205-SS DIS	13-04104-17	04/27/2013 10:49:24	Uranium-235	HASL 300, 4.5.2	0.05	0.05	0.05	U	pCi/l
PZ-205-SS DIS	13-04104-17	04/27/2013 10:49:24	Uranium-238	HASL 300, 4.5.2	0.40	0.13	0.04		pCi/l
PZ-206-SS TOT	13-04104-18	04/29/2013 16:20:52	Radium-226	E903.0	1.12	0.29	0.12		pCi/l
PZ-206-SS TOT	13-04104-18	05/07/2013 15:49:34	Radium-228	E904.0	1.10	0.67	1.31	J	pCi/l
PZ-206-SS TOT	13-04104-18	04/29/2013 12:59:22	Thorium-228	HASL 300, 4.5.2	0.10	0.08	0.06	J	pCi/l
PZ-206-SS TOT	13-04104-18	04/29/2013 12:59:22	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.08	J	pCi/l
PZ-206-SS TOT	13-04104-18	04/29/2013 12:59:22	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.07	U	pCi/l
PZ-206-SS TOT	13-04104-18	04/27/2013 10:49:21	Uranium-234	HASL 300, 4.5.2	0.20	0.11	0.08		pCi/l
PZ-206-SS TOT	13-04104-18	04/27/2013 10:49:21	Uranium-235	HASL 300, 4.5.2	0.02	0.04	0.08	U	pCi/l
PZ-206-SS TOT	13-04104-18	04/27/2013 10:49:21	Uranium-238	HASL 300, 4.5.2	0.05	0.07	0.12	U	pCi/l
PZ-206-SS DIS	13-04104-19	04/29/2013 16:20:54	Radium-226	E903.0	1.13	0.33	0.15		pCi/l
PZ-206-SS DIS	13-04104-19	05/07/2013 15:49:35	Radium-228	E904.0	0.72	0.73	1.48	U	pCi/l
PZ-206-SS DIS	13-04104-19	04/29/2013 12:59:19	Thorium-228	HASL 300, 4.5.2	0.05	0.05	0.06	U	pCi/l
PZ-206-SS DIS	13-04104-19	04/29/2013 12:59:19	Thorium-230	HASL 300, 4.5.2	0.10	0.07	0.06	J	pCi/l
PZ-206-SS DIS	13-04104-19	04/29/2013 12:59:19	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.05	U	pCi/l
PZ-206-SS DIS	13-04104-19	04/27/2013 10:49:22	Uranium-234	HASL 300, 4.5.2	0.20	0.11	0.08		pCi/l
PZ-206-SS DIS	13-04104-19	04/27/2013 10:49:22	Uranium-235	HASL 300, 4.5.2	0.04	0.06	0.09	U	pCi/l
PZ-206-SS DIS	13-04104-19	04/27/2013 10:49:22	Uranium-238	HASL 300, 4.5.2	0.08	0.07	0.07	J	pCi/l

US EPA ARCHIVE DOCUMENT

0023



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 

Date: 9/26/2012 0:00

QC Approval 

Date: 9/26/12



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

Principal Radionuclide <small>234, 235, 238</small> 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 

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

QC Approval 

Date: **9/26/12**

US EPA ARCHIVE DOCUMENT

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

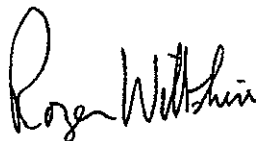
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO₃ solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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	<u>0.9760</u>	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 [Signature]
QC Approval [Signature]

Date: 12/13/2012 0:00
Date: 12/13/12

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

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

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

Radionuclide of Interest: 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**

QA/QC REVIEWED

Date 10/14/91 Initials ut

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

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

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

Description of Solution

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

Radioimpurities

See attached technical data sheet

Radioactive Daughters

See attached technical data sheet

Radionuclide Concentration

0.207 μ Ci/gram.

Method of Calibration

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

Uncertainty of Measurement

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

NIST Traceability

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

Notes

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



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

Date: 3/21/2013 0:00
Date: 3/21/13
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

Half Life, Years

Half Life, Days

²³⁰Th

7.540E+04

2.754E+07

Radionuclide ²³⁰Thorium

Reference Date 11/1/1991 0:00

Certified Activity 1.036E+00 μCi

Certified Concentration 1.036E+00 $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution

²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions:

Dilution Solvent Used

0.1N HNO₃

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360 μCi

Which Equals 2.300E+06 dpm at the date listed above

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

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

Expiration Date: March 4, 2014

Recertified By

Date: 3/21/2013 0:00

QC Approval

Date: 3/21/13

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CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	TMA EBERLINE
Half Life:	$(1.405 \pm 0.006) \times 10^{10}$ years	P.O.No.:	VH1632
Catalog No.:	7232	Reference Date:	November 1 1993 12:00 PST.
Source No.:	435-104-2	Contained Radioactivity:	(Th-232) 0.0933 μ Ci.
		Contained Radioactivity:	(Th-232) 3.45 kBq.

Description of Solution

a. Mass of solution:	11.9712 g (in a 10 ml flame sealed ampoule)
b. Chemical form:	Th(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:	$\pm 3.0\%$
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

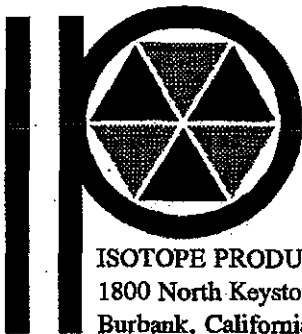
This calibration is implicitly traceable to the National Institute of Standards and Technology.

Leak Test(s)

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

Notes

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



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Anna U. Khan
QUALITY CONTROL

Nov. 8, 1993

Date Signed



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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 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 11/11/1993 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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Rev.8; 1/10/03
Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

Chemical Composition of Standard Solution
Th(NO₃)₄ in 1% HNO₃

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

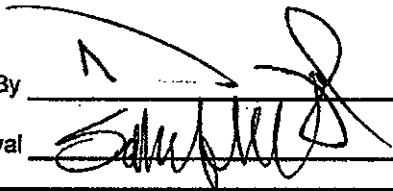

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: **500.0000** ml
Total Activity: **1.0366E+05** dpm Final Activity Concentration: **1.0366E+02** dpm/ml
Final Volume: **1000.00** ml

NOTES:

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

Expiration Date: **October 9, 2013**

Verified & Approved By 
QC Approval 

Date: **11/9/2012 0:00**

Date: **11/12/12**

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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 ²²⁹Th Half Life, Years 7.340E+03 Half Life, Days 2.681E+06

Radionuclide ²²⁹Th Reference Date 1/15/2002 0:00

Certified Activity 1.013E+00 μCi

Certified Concentration 1.013 $\mu\text{Ci per gram}$

Ampoule /Solution Gross	<u>8.7752</u>	Weight, Grams
Empty Ampoule	<u>3.7591</u>	Weight, Grams
Solution Net	<u>5.0161</u>	Weight, Grams
Total Activity In Ampoule	<u>1.0130</u>	μCi

Chemical Composition of Standard Solution

²²⁹Th(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+08 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 [Signature]

Date: 11/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM

MP-009

Rev.7; 9/29/99

Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # **MP-009**
IPL 867-54

Date **11/9/2012 0:00**
Solution # **Th-18a**

Principal Radionuclide
²²⁸Th

Half Life, Years
7.340E+03

Half Life, Days
2.681E+06

Radionuclide of Interest **²²⁸Th**
Parent Solution Conc. **2.25E+03** dpm/ml

Reference Date **1/15/2002 0:00**

Chemical Composition of Standard Solution

TH(NO₃)₄ in 0.1M HNO₃

Dilution Instructions:

Dilution Solvent Used **0.1M HNO₃**

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: **2.2490E+01** dpm/ml

NOTES:

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

Expiration Date: **October 9, 2013**

Verified & Approved By 

Date: **11/9/2012 0:00**

QC Approval 

Date: **11/12/12**

US EPA ARCHIVE DOCUMENT



National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

Ba-6
(+6a)

ORIGINAL

ORIGINAL

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM
QCP-009

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

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

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 **9/1/1993 0:00**
Certified Activity **1.318E+01** 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 

Date: **9/27/12**

QC Approval 

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

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

Chemical Composition of Standard Solution
¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used: 1M HCl


SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 25.0000 ml
Total Activity: 3.6950E+06 dpm Final Activity Concentration: 3.6950E+03 dpm/ml
Final Volume: 1000.00 ml

NOTES:

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

Expiration Date: September 20, 2013

Verified & Approved By: 
QC Approval: 

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

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

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 U. 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		Weight, Grams
Empty Ampoule		Weight, Grams
Solution Net		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

RA-11

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

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

ANALYTICS

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*

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03

Title: Radioactive Reference Standards Solutions & Records

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

SOLUTION REFERENCE # Analytics 62680-416

CURRENT DATE 4/16/2012 0:00

SOLUTION # Ra-11

Principal Radionuclide

Half Life, Years

Half Life, Days

²²⁶Ra

5.750E+00

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 [Signature]

Date: 4/16/12

Verified & Approved By [Signature]

Date:

QC Approval [Signature]

Date: 4/16/12

US EPA ARCHIVE DOCUMENT

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	UUISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	2.16	86.03%	14.50%	100.00%	3.60%	8.11E+00	2.92E-01	6.97E+00	1.01E+00	U-8a	3.52E+01	3.60E+00	5.11E-01
U-238	1.86	87.74%	14.50%	100.00%	3.60%	7.90E+00	2.84E-01	6.93E+00	1.01E+00	U-8a	3.44E+01	3.60E+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

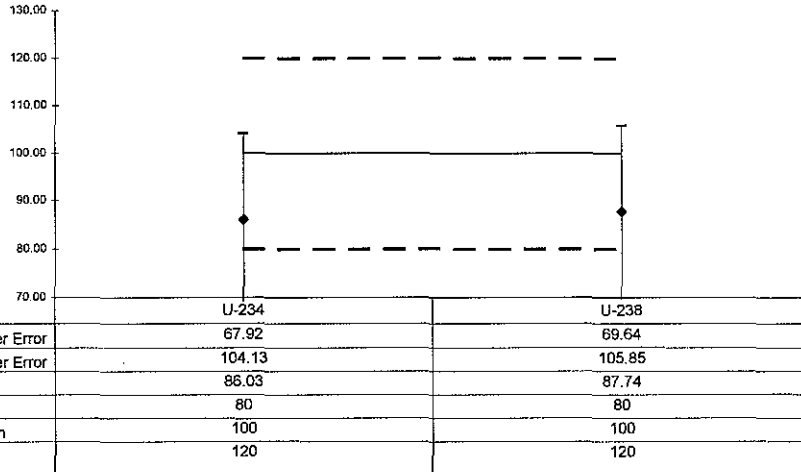
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	1.27	15.88	4.47E+00	7.06E-01	3.81E+00	7.29E-01	0.86	OK	OK			NA	OK
U-238	0.24	2.96	4.77E+00	7.44E-01	4.92E+00	8.88E-01	0.88	OK	OK			NA	OK
U-235	0.35	11.90	3.55E-01	1.44E-01	3.15E-01	1.68E-01		OK	OK			NA	OK

US EPA ARCHIVE DOCUMENT

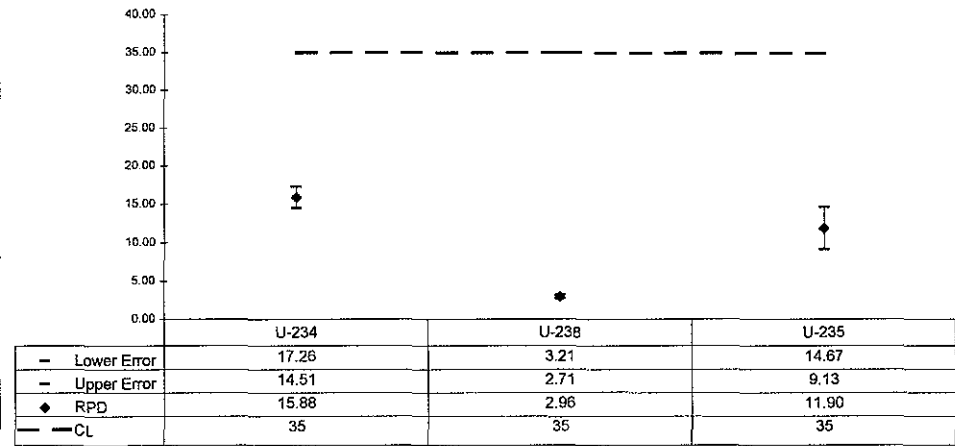
0043

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	UUISO	1	pCi	I	Engineering Management Support, Inc.

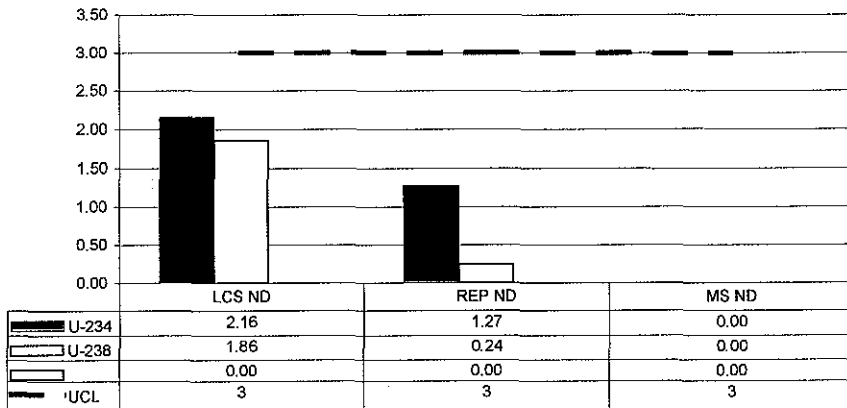
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

US EPA ARCHIVE DOCUMENT

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	ThISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
TH-228	0.20	98.19%	18.27%	100.00%	3.60%	4.75E+00	1.71E-01	4.67E+00	8.53E-01	Th-8b	1.04E+02	3.60E+00	1.02E-01
TH-230	1.15	89.49%	19.86%	100.00%	2.70%	5.42E+00	1.46E-01	4.85E+00	9.63E-01	Th-1b	2.35E+01	2.70E+00	5.11E-01
TH-232	0.51	95.50%	18.04%	100.00%	3.60%	4.75E+00	1.71E-01	4.54E+00	8.19E-01	Th-8b	1.04E+02	3.60E+00	1.02E-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

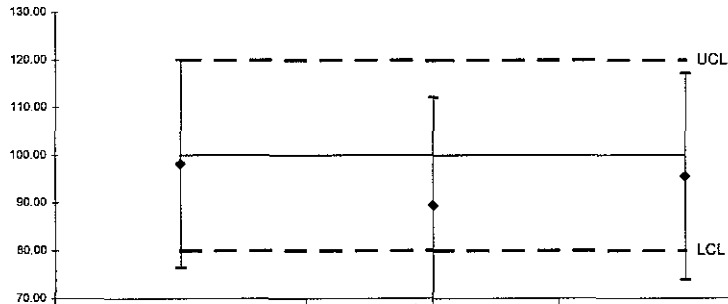
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
TH-228	0.18	3.16	2.96E+00	6.98E-01	2.87E+00	6.84E-01	0.98	OK	OK			NA	OK
TH-230	1.10	18.41	6.03E+00	1.38E+00	5.02E+00	1.17E+00	0.89	OK	OK			NA	OK
TH-232	2.83	52.52	2.47E+00	5.93E-01	1.44E+00	3.94E-01	0.95	OK	OK			NA	OK

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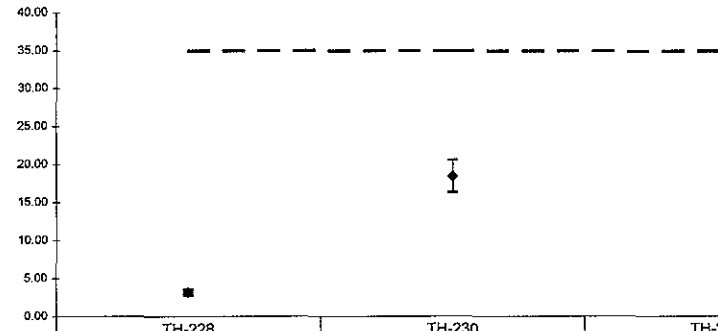
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



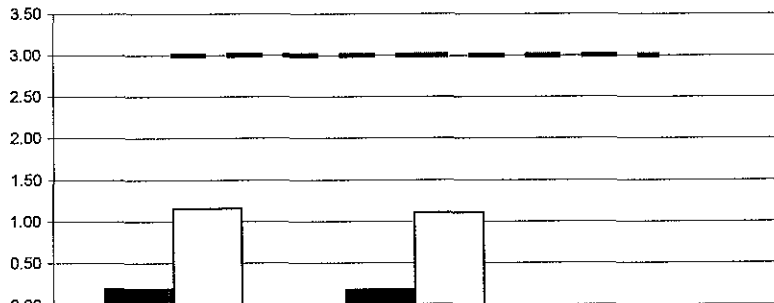
	TH-228	TH-230	TH-232
Lower Error	76.32	66.93	73.85
Upper Error	120.06	112.04	117.14
%R	98.19	89.49	95.50
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	3.53	20.53	59.14
Upper Error	2.78	16.29	45.90
RPD	3.16	18.41	52.52
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.20	0.18	0.00
TH-230	1.15	1.10	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	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	0.44	94.82%	23.94%	100.00%	4.60%	1.02E+01	4.71E-01	9.72E+00	2.33E+00	Ra-5b	4.41E+01	4.60E+00	5.16E-01

Matrix Spike

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

Replicate Sample

QC Summary

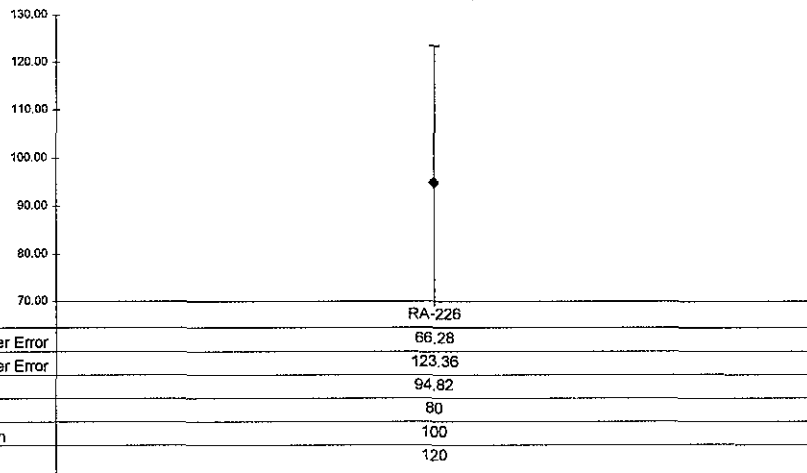
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.03	5.10	3.21E-02	7.75E-02	3.38E-02	5.76E-02	0.95	OK	OK			OK	OK

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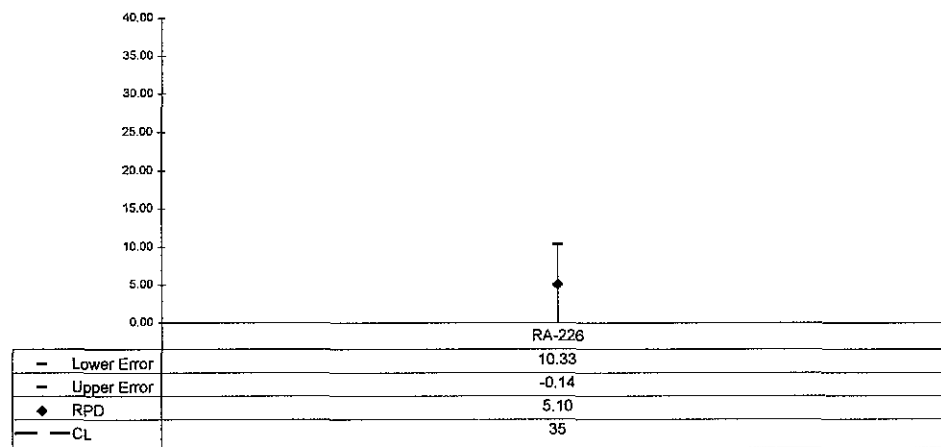
0053

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	Ra226	1	pCi	I	Engineering Management Support, Inc.

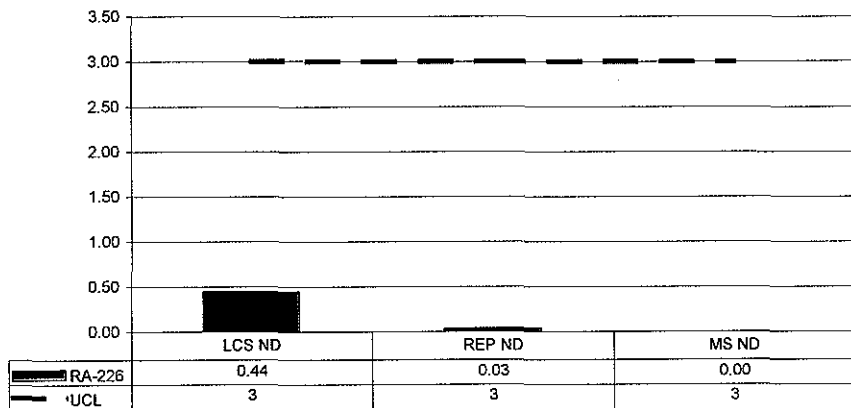
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

US EPA ARCHIVE DOCUMENT

0054

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	Ra228	1	pCi	1	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.53	93.45%	25.61%	100.00%	5.10%	8.97E+00	4.57E-01	8.38E+00	2.15E+00	Ra-11	3.90E+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

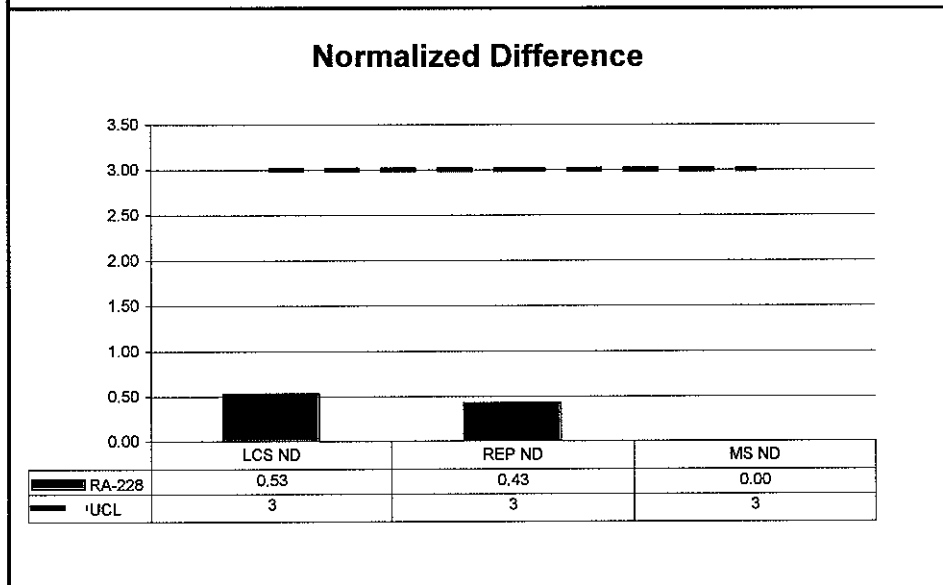
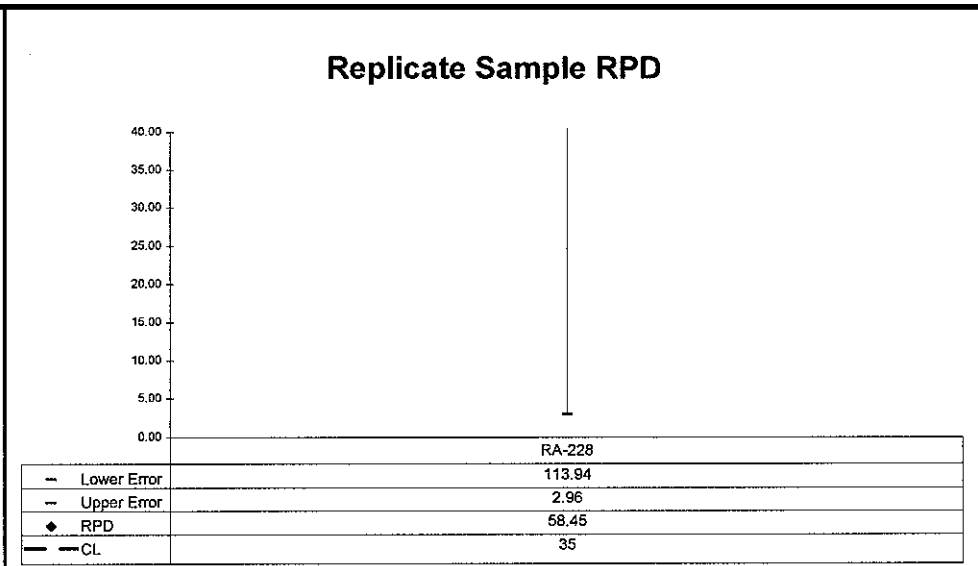
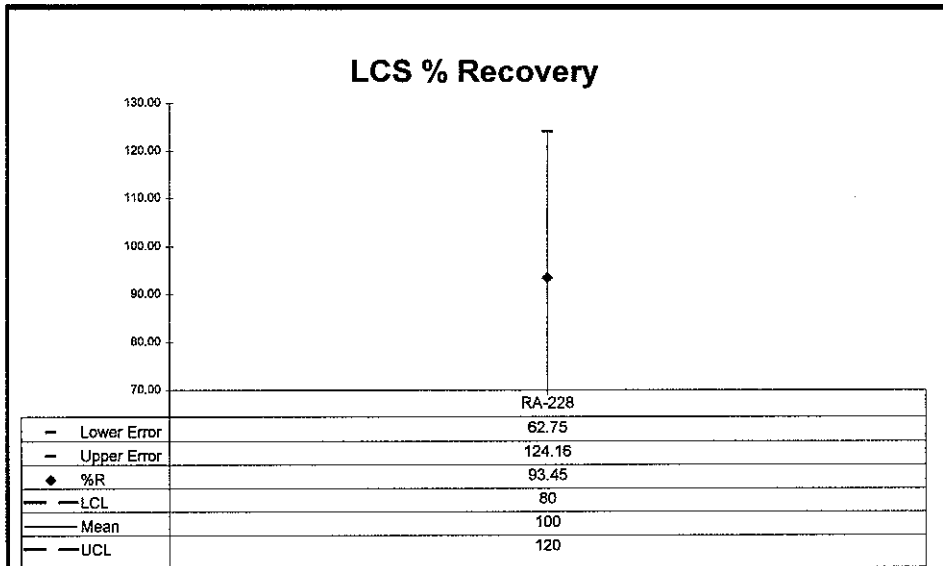
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.43	58.45	3.21E-01	4.91E-01	1.76E-01	4.53E-01	0.93	OK	OK			NA	OK

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055

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WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-04104	Ra228	1	pCi	I	Engineering Management Support, Inc.



No Matrix Spike

**SECTION VII
LABORATORY TECHNICIAN'S NOTES**


ISO U NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04104
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 05:44	PREP	JBARNARD	ALIQOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN

BJ
4/23/12


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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	13-04104
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 05:44	PREP	JBARNARD	ALIQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/25/13 16:49	CHEM	JDEMLAS	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.

J. Demelas
 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	13-04104
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 05:44	PREP	JBARNARD	ALIUQUOTED AND FILTERED DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PRESERVED SAMPLES WITH HNO3 AND DRIED SAMPLES DOWN
2	04/25/13 16:49	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	04/26/13 06:11	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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 4/26/13

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Reagents Used in an Analysis

Internal Work Order

13-04104

Analysis Code

Run

UUISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/23/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/25/2013
013782s	HCl - HF	6.5N - 0.04N	JDEMELAS	4/25/2013
013798S	HCl - NH4I	8N - 0.1M	JDEMELAS	4/25/2013
013675D01	Hydrochloric Acid	0.5N	JDEMELAS	4/25/2013
013712S	Hydrochloric Acid	6.5N	JDEMELAS	4/25/2013
013791S	Hydrochloric Acid	8N	JDEMELAS	4/25/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/25/2013
013246S	Carbon substrate	Solution	RMARTZ	4/26/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/26/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/26/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	4/26/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	4/26/2013

Alpha Bank #2

Date	Sample #	Client	Time	CT	Analysis	Final
4/24/12	1704176A(7-17)	URBEN CO	0749	2hrs	U4230	C
4/24/12	1704017A(7-8)	Eng. Lab	0857	2hrs	U4230	C
4/24/12	1704017A(7-7)	Eng. Lab	1157	2hrs	76230	C
4/25/12	Daily Pulse	LAB	0722	1hr	NA	C
4/25/12	1704081A(124)	Unitech	0817	2hrs	U4230	C
4/25/12	1704081A(11-7)	Unitech	0854	2hrs	Puzzo	C
4/25/13	1304103A(7-11)	Accubast	1156	2hrs	Rate	KB
4/26/12	Daily Pulse	LAB	0717	1hr	NA	C
4/26/12	1704117A(14)	Unitech	0902	2hrs	Unitech	C
4/26/12	1704117A(14)	Unitech	0907	2hrs	U4230	C
4/26/12	SECCAL	LAB	1202	2hrs	NA	C
4/26/13	System Bkqd	Lab	1458	16.40 hrs	+	KB
4/27/13	Daily Pulse	Lab	1028	10mins	NA	KB
4/27/13	1304104A(7-12)	Eng. Mang. Su	1048	2hrs	UN	KB

Alpha #1

Date	Sample #	Client	Function	CT	Time	Analysis	Send
4/24/13	Daily Pulse	LAB	0104	10	NA		
4/24/13	1704176A(1-6)	URBANCOR	0142	2hr	UWISO		
4/24/13	1704082A(1-2)	Engn	0857	2hr	ThISO		
4/24/13	1704085A(1-7)	HYPE	0856	2hr	UWISO		
4/24/13	1704087A(1-2)	Engn	0857	2hr	UWISO		
4/24/13	1704087A(3)	Engn	1157	2hr	UWISO		
4/24/13	1704179A(1-4)	UWON	1156	2hr	UWISO		
4/24/13	1704083A(1)	Engn	1156	2hr	ThISO		
4/24/13	Daily Pulse	LAB	0102	10	NA		
4/24/13	1704080B(1-7,8)	Engn	0852	2hr	UWISO		
4/24/13	1704081A(1)	Unitek	0857	2hr	UWISO		
4/25/13	1304103A(1-6)	Accutest	1156	2hr 50	Rate	KB	
4/25/13	1304113A(1-4)	UWON	1451	2hr 50	Rate	KB	
4/24/13	Daily Pulse	LAB	0117	10	NA		
4/24/13	SECCAL	LAB	0819	2hr	NA		
4/24/13	1704112A(1-4,8)	UWON	1055	2hr	Pulse		
4/24/13	1704117A(1)	UWON	1055	2hr	ThISO		
4/26/13	System Bkgd	Lab	1458	16.40 hr	2	KB	
4/27/13	Daily Pulse	Lab	1029	10 mins	NA	KB	
4/27/13	1304104A(1-6)	Eng. Manager	1047	2hr 50	UW	KB	

ISO TH NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04104
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/22/13 17:06	PREP	LWALKER	SPIKE AND TRACED BEAKERS-ALIQOT-FILTERED DISSOLVED FRACTIONS-DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.

J. Walker
4/22/13


US EPA ARCHIVE DOCUMENT

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04104
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/22/13 17:06	PREP	LWALKER	SPIKE AND TRACED BEAKERS-ALIUOT-FILTERED DISSOLVED FRACTIONS-DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	04/23/13 05:45	PREP	JBARNARD	PRESERVED SAMPLES WITH HNO3 AND BEFORE DRYING DOWN

Handwritten signature and date:
4/23/13


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	13-04104
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/22/13 17:06	PREP	LWALKER	SPIKE AND TRACED BEAKERS-ALiquot-FILTERED DISSOLVED FRACTIONS-DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	04/23/13 05:45	PREP	JBARNARD	PRESERVED SAMPLES WITH HNO3 AND BEFORE DRYING DOWN
3	04/26/13 17:25	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.

John Demelas
4/26/13

US EPA ARCHIVE DOCUMENT

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04104
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	04/22/13 17:06	PREP	LWALKER	SPIKE AND TRACED BEAKERS-ALIQUOT-FILTERED DISSOLVED FRACTIONS-DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	04/23/13 05:45	PREP	JBARNARD	PRESERVED SAMPLES WITH HNO3 AND BEFORE DRYING DOWN
3	04/26/13 17:25	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.
4	04/29/13 07:11	CHEM	RMARTZ	ADDED 0.75 ML 0.1MG/ML CERIUM CARRIER & 1 ML HF TO C-TUBES & LET SET SIT IN ICE BATH FOR ONE HOUR; SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

RA
4/29/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-04104

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/23/2013
013666P	Anion Exchange Resin	Reagent Grade	JDEMELAS	4/26/2013
013791S	Hydrochloric Acid	8N	JDEMELAS	4/26/2013
013675P	Hydrochloric Acid	Reagent Grade	JDEMELAS	4/26/2013
013787S	Nitric Acid	8N	JDEMELAS	4/26/2013
013624P	Nitric Acid	Reagent Grade	JDEMELAS	4/26/2013
013246S	Carbon substrate	Solution	RMARTZ	4/29/2013
013017S	Cerrium Carrier	0.1mg/ml	RMARTZ	4/29/2013
012809P	Ethyl Alcohol	Reagent Grade	RMARTZ	4/29/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	4/29/2013

Alpha Bank #2

Date	Sample #	Client	Final Time	CT Time	Analysis	Final
4/24/12	1704126A(7-12)	UPONCO	0743	2hr	UWZS	C
4/24/12	1704017A(7-8)	Eng. Lab	0857	2hr	UWZS	C
4/24/12	1704057A(7-7)	Eng. Lab	1157	2hr	7LZS	C
4/25/12	Daily Pulse	LAB	0722	1hr	NA	C
4/28/12	1704081A(24)	Unitel	0817	2hr	UWZS	C
4/28/12	1704081A(11-7)	Unitel	0854	2hr	Pulse	C
4/25/13	1304103A(7-11)	Accelast	1156	2hr 50m	Roll	KB
4/24/13	Daily Pulse	LAB	0717	1hr	NA	C
4/26/13	1704117A(14)	UWON	0902	2hr	UWZS	C
4/26/13	1704117A(14)	UWON	0907	2hr	UWZS	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	0729	1hr	NA	C
4/29/13	1704107A(7-12)	Eng. Lab	1000	2hr	UWZS	C
4/29/13	1304104A(11-16)	Eng. Manag. Su	1258	2hr 50m	Th	KB


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Alpha #1

Date	Sample #	Client	Location	CT Pin	Analysis	Result
4/24/13	Daily Pulse	WAB	0104	10	NA	-
4/24/13	1704176A(1-6)	URBANCIO	0142	2LR	UWZSO	-
4/24/13	1704052A(1-2)	Engln	0855	2LR	Thrs	-
4/24/13	1704057A(4-7)	HYPE	0856	2LR	UWZSO	-
4/24/13	1704057A(1-2)	Engln	0857	2LR	UWZSO	-
4/24/13	1304057A(7)	Engln	1157	2LR	UWZSO	-
4/24/13	1704174A(1-4)	UWON	1156	2LR	UWZSO	-
4/24/13	1704053A(1)	Engln	1156	2LR	Thrs	-
4/24/13	Daily Pulse	WAB	0104	10	NA	-
4/25/13	1704080B(1-7)	Engln	0852	2LR	UWZSO	-
4/25/13	1704081A(1)	Unitek	0853	2LR	UWZSO	-
4/25/13	1304103A(1-6)	Accutest	1154	2hr SOI	Rate	KB
4/25/13	1304113A(1-4)	UWON	1451	2hr SOI	Rate	KB
4/26/13	Daily Pulse	WAB	0117	10	NA	-
4/26/13	SECCAL	WAB	0119	2LR	NA	-
4/26/13	1704117A(1-4.9)	UWON	1055	2LR	Pulse	-
4/26/13	1704117A(1)	UWON	1055	2LR	Thrs	-
4/26/13	System Bkgd	Lab	1454	16.40 hr	2	KB
4/27/13	Daily Pulse	Lab	1028	10 mins	NA	KB
4/27/13	1304104A(1-6)	Eng. Manag. Sv.	1047	2hr SOI	UW	KB
4/29/13	Daily Pulse	WAB	0129	10	NA	-
4/29/13	1704105A(1-6)	Engln	0855	2LR	UWZSO	-
4/29/13	1304104A(5-10)	Eng. Manag. Sv.	1048	2hr SOI	Th	KB

US EPA ARCHIVE DOCUMENT


RA-226 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-04104
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 07:14	PREP	JBARNARD	ALIUQUOTED AND FILTERD SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS- DRIED FRACTION 4 DOWN AND DIGESTED BEFORE PRECIPITATING DUE TO SAMPLE BEING VERY DIRTY

JB
 4/23/13

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	13-04104
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 07:14	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS- DRIED FRACTION 4 DOWN AND DIGESTED BEFORE PRECIPITATING DUE TO SAMPLE BEING VERY DIRTY
2	04/25/13 11:37	CHEM	TSMITH	Dissolved samples from prep in EDTA.
3	04/26/13 16:25	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS (SYRINGE FILTERED- PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT) SUBMIT TO COUNT ROOM.

L. Walker
 4/26/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-04104

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/23/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/23/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/23/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/23/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/23/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/23/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/23/2013
013788S	EDTA	0.25M	TSMITH	4/25/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	4/26/2013
013377D01	Ammonium Sulfate	200 mg/ml	LWALKER	4/26/2013

US EPA ARCHIVE DOCUMENT

Alpha #1


Date	Sample #	Client	Instr. #	C.T. #	Analysis	Result
4/24/13	Daily Pulse	WFB	0104	10	NA	-
4/24/13	1704176A(1-6)	URBNCIO	0142	2hr	UWTSO	-
4/24/13	1704053A(1-7)	Eng. Man.	0855	2hr	Th	-
4/24/13	1704055A(4-7)	HY PE	0856	2hr	UWTSO	-
4/24/13	1704057A(1-2)	Eng. Man.	0857	2hr	UWTSO	-
4/24/13	1704057A(3)	Eng. Man.	1157	2hr	UWTSO	-
4/24/13	1704174A(1-4)	UWON	1156	2hr	UWTSO	-
4/24/13	1704053A(1)	Eng. Man.	1156	2hr	Th	-
4/25/13	Daily Pulse	WFB	0104	10	NA	-
4/25/13	1704080B(1-7.8)	Eng. Man.	0852	2hr	UWTSO	-
4/25/13	1704081A(1)	United	0853	2hr	UWTSO	-
4/25/13	1304103A(1-6)	Accutest	1156	2hr SOI	Rate	KB
4/25/13	1304113A(1-4)	UWON	1451	2hr SOI	Rate	KB
4/26/13	Daily Pulse	WFB	0117	10	NA	-
4/26/13	SECCAL	WFB	0819	2hr	NA	-
4/26/13	1704117A(1-4.8)	UWON	1055	2hr	Pulse	-
4/26/13	1704117A(1)	UWON	1055	2hr	Th	-
4/26/13	System Bkgrd	Lab	1456	16.40 hr	2	KB
4/27/13	Daily Pulse	Lab	1028	10 mins	NA	KB
4/27/13	1304104A(1-6)	Eng. Manag. Sec.	1047	2hr SOI	UW	KB
4/29/13	Daily Pulse	WFB	0125	10	NA	-
4/29/13	1304105A(1-6)	Eng. Man.	0919	2hr	UWTSO	-
4/29/13	1304104A(5-10)	Eng. Manag. Sec.	1258	2hr SOI	Th	KB
4/29/13	1304104A(7-12)	Eng. Manag. Sec.	1620	2hr SOI	Rate	KB

US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Location	CTDm	Analysis	Spec
4/27/13	1304104A(13-19)	Eng. Manag. Sv.	1049	2hr 50m	Uu	ICB
4/27/13	1304113A(1-4)	UCOR	1049	2hr 50m	Np	ICB
4/25/13	Devil Pulver	UCOR	0521	1hr	Uu	—
4/25/13	1304105A(17-19)	Eng. Manag. Sv.	1020	2hr	4470	—
4/25/13	1304104A(1-4)	Eng. Manag. Sv.	1000	2hr	7250	—
4/29/13	1304104A(17-19)	Eng. Manag. Sv.	1255	2hr 50m	TH	ICB
4/29/13	1304113A(4)	UCOR	1700	2hr 50m	TH	ICB
4/29/13	1304113A(4)	UCOR	1701	2hr 50m	THNT	ICB
4/29/13	1704104A(1-6)	Eng. Manag. Sv.	1701	2hr	R46	—
4/29/13	1304104A(13)	Eng. Manag. Sv.	KB 4/29/13	chr 50m	Rate	ICB
4/29/13	1304104A(13-19)	Eng. Manag. Sv.	1620	2hr 50m	Rate	ICB

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	13-04104
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 07:15	PREP	JBARNARD	ALIQUOTED AND FILTERED SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS- DRIED FRACTION 4 DOWN AND DIGESTED BEFORE PRECIPITATING DUE TO SAMPLE BEING VERY DIRTY

JB
4/23/13


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	13-04104
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 07:15	PREP	JBARNARD	ALIQUOTED AND FILTERD SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS- DRIED FRACTION 4 DOWN AND DIGESTED BEFORE PRECIPITATING DUE TO SAMPLE BEING VERY DIRTY
2	04/30/13 12:56	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/06/13 20:03	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
 5/6/13


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	13-04104
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	04/23/13 07:15	PREP	JBARNARD	ALIQUOTED AND FILTERD SAMPLES FOR DISSOLVED FRACTIONS- ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS- DRIED FRACTION 4 DOWN AND DIGESTED BEFORE PRECIPITATING DUE TO SAMPLE BEING VERY DIRTY
2	04/30/13 12:56	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	05/06/13 20:03	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 17 (CHEMICAL CLEANUP FOR RA 228)
4	05/07/13 12:44	CHEM	TSMITH	Followed steps 12.7 to 12.15 in AP-007 rev. 17 . (Precipitated samples, hot bathed, centrifuged, and discarded supernate. Dissolved precip, precipitated samples, hot bathed, centrifuged, and discarded supernate. Dissolved precip, precipitated and filtered samples, obtained final weights, covered with aluminum foil, and took to count room)

5-7-13
 JML

US EPA ARCHIVE DOCUMENT

 Reagents Used in an Analysis		Internal Work Order		
		13-04104		
		Analysis Code		Run
		Ra228		1
Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JBARNARD	4/23/2013
013575D01	Ammonium Sulfate	200 mg/ml	JBARNARD	4/23/2013
012766D14	Barium Carrier	1 mg/ml	JBARNARD	4/23/2013
012729D07	Lead Carrier	166 mg/ml	JBARNARD	4/23/2013
013624P	Nitric Acid	Reagent Grade	JBARNARD	4/23/2013
013416P	Perchloric Acid	Reagent Grade	JBARNARD	4/23/2013
009098P	Sulfuric Acid	Reagent Grade	JBARNARD	4/23/2013
011504D21	Ammonium Sulfide	2%	LWALKER	5/6/2013
012729D08	Lead Carrier	1.5 mg/ml	LWALKER	5/6/2013
013797P	Nitric Acid	Reagent Grade	LWALKER	5/6/2013
013690S	Sodium Hydroxide	10M	LWALKER	5/6/2013
013587S	Yttrium Carrier	9 mg/ml	LWALKER	5/6/2013
013624D03	Nitric Acid	1N	TSMITH	5/7/2013
013690S	Sodium Hydroxide	10M	TSMITH	5/7/2013
013065D04	Sodium Hydroxide	18M	TSMITH	5/7/2013
013686S	Nitric Acid	6N	TSMITH	5/7/2013
012717D04	Ammonium Oxalate	5%	TSMITH	5/7/2013

LB4110 REP

Date	Sample #	Client	Location	C/T/Time	Analysis	Result
5/16/12	ETFE	WS	0525	7m	LP	C
5/16/12	NUCOR	WS	0607	6m	LP	-
5/16/12	1704094546(8)	NY PE	0744	2m	SR904	C
5/16/12	1704094541(1)	NY PE	0744	7m	SR904	C
5/16/12	1704094546(8)	NY PE	0822	2m	SR707	C
5/16/12	1704108RA(1-9)	Eng	1017	2m	RA8	C
5/16/13	1305010CL(1-3,5)	UCOR	1450	30mins	CL36	KB
5/16/13	1305001CL(1-3,5,7)	UCOR	1451	30mins	CL36	KB
5/17/12	ETFE	WS	0114	7m	LP	C
5/17/12	NUCOR	WS	0150	6m	LP	-
5/17/12	1305010SL(2-4,6)	UCOR	0749	2m	SR707	C
5/17/12	170417051(7)	Eng	0749	7m	SR904	C
5/17/12	170501054(1)	UCOR	0751	7m	SR707	C
5/17/12	1705002RA(1-3)	UCOR	0851	2m	RA8	C
5/17/12	1704110NPL(1-9)	Eng	1001	10m	MP77	C
5/17/12	1705010NPL(1-4)	UCOR	1024	1m	MP77	C
5/17/12	1705007NPL(1-4)	UCOR	1024	10m	MP77	C
5/17/12	1704135NPL(1-4)	UCOR	1051	10m	MP77	C
5/17/12	1304170NPL(1-4)	Eng	1071	7m	MP77	C
5/17/12	1704170NPL(1-4)	Eng	1057	10m	MP77	C
5/17/12	1705007Ph(1-1)	UCOR	1110	2m	Ph210	C
5/17/12	17041104RA(1-11)	Eng	1775	2m	RA8	C
5/17/13	1304104RA(1-18-19)	Eng. Manag. S.	1537	2hrs	RA8	KB

Date	Sample #	Client	Location	CT Time	Analysis	Spec
5/6/17	PLUMAC	✓	0729	6m	LD	5
5/6/17	EYEE	✓	0672	7m	LD	✓
5/6/17	17040945N(12-7)	NYPE	0824	2m	SN907	0
5/6/17	1704148N(14)	MPT	1072	2m	RAY	0
5/7/17	PLUMAC	✓	0514	6m	LD	5
5/7/17	EYEE	✓	0619	7m	LD	✓
5/7/17	17041955N(12-11.6)	UWON	0746	2m	SN904	0
5/7/17	17041755N(11)	UWON	0746	7m	SN904	0
5/7/17	17041705N(11)	Brownson	0818	7m	SN904	0
5/7/17	1705001N(4.6)	UWON	0857	2m	RAY	0
5/7/17	1704170N(11.4)	UWON	0958	2m	RAY	0
5/7/17	1705018N(11.2)	Hudson	1100	7m	LD	0
5/7/17	1705018N(11.4)	Hudson	1131	7m	LD	0
5/7/17	1704104N(11.1)	✓	1778	2m	RAY	0

US EPA ARCHIVE DOCUMENT

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

US EPA ARCHIVE DOCUMENT

Work Order	13-04104	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	1	02	MBL	BLANK		04/16/13 00:00	1.0000E+00
Date Received	4/16/2013	03	DUP	PZ-103-SS TOT	36	04/08/13 11:15	1.0000E+00
Lab Deadline	5/7/2013	04	DO	PZ-103-SS TOT	36	04/08/13 11:15	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-103-SS DIS	36	04/08/13 11:15	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-114-AS TOT	39	04/08/13 11:45	1.0000E+00
Report Level	4	07	TRG	PZ-114-AS DIS	39	04/08/13 11:45	1.0000E+00
Activity Units	pCi	08	TRG	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.0000E+00
Aliquot Units	I	09	TRG	FB at PZ-201A-SS DIS	40	04/08/13 12:45	1.0000E+00
Matrix	WA	10	TRG	PZ-201A-SS TOT	38	04/08/13 13:22	1.0000E+00
Method	NAS NS-3050 Modified	11	TRG	PZ-201A-SS DIS	38	04/08/13 13:22	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-204A-SS TOT	45	04/08/13 13:26	1.0000E+00
Radiometric Tracer	U-232	13	TRG	PZ-204A-SS DIS	45	04/08/13 13:26	1.0000E+00
Radiometric Sol#	U-10a	14	TRG	PZ-205-AS TOT	43	04/08/13 13:36	1.0000E+00
Tracer Act (dpm/g)	19.095	15	TRG	PZ-205-AS DIS	43	04/08/13 13:36	1.0000E+00
Carrier		16	TRG	PZ-205-SS TOT	40	04/08/13 14:50	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-205-SS DIS	40	04/08/13 14:50	1.0000E+00
		18	TRG	PZ-206-SS TOT	42	04/08/13 15:00	1.0000E+00
		19	TRG	PZ-206-SS DIS	42	04/08/13 15:00	1.0000E+00

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

UUISO

Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6047	11.5		0.00								
02	MBL	0.6048	11.5		0.00								
03	DUP	0.6049	11.6		0.00								
04	DO	0.6061	11.6		0.00								
05	TRG	0.6057	11.6		0.00								
06	TRG	0.6051	11.6		0.00								
07	TRG	0.6044	11.5		0.00								
08	TRG	0.6079	11.6		0.00								
09	TRG	0.6038	11.5		0.00								
10	TRG	0.6047	11.5		0.00								
11	TRG	0.6044	11.5		0.00								
12	TRG	0.6024	11.5		0.00								
13	TRG	0.5989	11.4		0.00								
14	TRG	0.5968	11.4		0.00								
15	TRG	0.5998	11.5		0.00								
16	TRG	0.5982	11.4		0.00								
17	TRG	0.6015	11.5		0.00								
18	TRG	0.6005	11.5		0.00								
19	TRG	0.6003	11.5		0.00								

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.

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			04/22/13 19:33	LWALKER				
02	MBL			04/22/13 19:33	LWALKER				
03	DUP			04/22/13 19:33	LWALKER				
04	DO			04/22/13 19:33	LWALKER				
05	TRG			04/22/13 19:33	LWALKER				
06	TRG			04/22/13 19:33	LWALKER				
07	TRG			04/22/13 19:33	LWALKER				
08	TRG			04/22/13 19:33	LWALKER				
09	TRG			04/22/13 19:33	LWALKER				
10	TRG			04/22/13 19:33	LWALKER				
11	TRG			04/22/13 19:33	LWALKER				
12	TRG			04/22/13 19:33	LWALKER				
13	TRG			04/22/13 19:33	LWALKER				
14	TRG			04/22/13 19:33	LWALKER				
15	TRG			04/22/13 19:33	LWALKER				
16	TRG			04/22/13 19:33	LWALKER				
17	TRG			04/22/13 19:33	LWALKER				
18	TRG			04/22/13 19:33	LWALKER				
19	TRG			04/22/13 19:33	LWALKER				

US EPA ARCHIVE DOCUMENT

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	UUISO	Run	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	6.97E+00	8.80E-01	7.62E-02	8.11E+00	86.03	OK		OK	
02	U-234	MBL	BLANK	pCi/l	6.58E-02	5.65E-02	6.41E-02					OK	OK
03	U-234	DUP	PZ-103-SS TOT	pCi/l	3.81E+00	6.76E-01	1.23E-01				NA	OK	
04	U-234	DO	PZ-103-SS TOT	pCi/l	4.47E+00	6.30E-01	5.33E-02					OK	
05	U-234	TRG	PZ-103-SS DIS	pCi/l	1.05E+00	2.40E-01	5.97E-02					OK	
06	U-234	TRG	PZ-114-AS TOT	pCi/l	1.99E-01	1.23E-01	9.94E-02					OK	
07	U-234	TRG	PZ-114-AS DIS	pCi/l	7.90E-02	9.53E-02	1.34E-01					OK	
08	U-234	TRG	FB at PZ-201A-SS TOT	pCi/l	1.13E-01	8.32E-02	8.31E-02					OK	
09	U-234	TRG	FB at PZ-201A-SS DIS	pCi/l	6.17E-02	5.87E-02	6.33E-02					OK	
10	U-234	TRG	PZ-201A-SS TOT	pCi/l	2.48E+00	4.72E-01	8.41E-02					OK	
11	U-234	TRG	PZ-201A-SS DIS	pCi/l	2.22E+00	4.06E-01	7.58E-02					OK	
12	U-234	TRG	PZ-204A-SS TOT	pCi/l	3.44E+00	5.63E-01	8.36E-02					OK	
13	U-234	TRG	PZ-204A-SS DIS	pCi/l	3.10E+00	5.24E-01	8.00E-02					OK	
14	U-234	TRG	PZ-205-AS TOT	pCi/l	2.95E-01	1.42E-01	6.91E-02					OK	
15	U-234	TRG	PZ-205-AS DIS	pCi/l	1.80E-01	1.12E-01	8.09E-02					OK	
16	U-234	TRG	PZ-205-SS TOT	pCi/l	6.96E-01	1.95E-01	5.77E-02					OK	
17	U-234	TRG	PZ-205-SS DIS	pCi/l	4.43E-01	1.40E-01	4.31E-02					OK	
18	U-234	TRG	PZ-206-SS TOT	pCi/l	2.05E-01	1.05E-01	7.59E-02					OK	
19	U-234	TRG	PZ-206-SS DIS	pCi/l	1.97E-01	1.10E-01	7.67E-02					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-UUISO-1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	04/16/13 00:00	1.00E+00	141.80	0.00	0.00			
02	U-234	MBL	04/16/13 00:00	1.00E+00	127.82	0.00	0.00			
03	U-234	DUP	04/08/13 11:15	1.00E+00	80.88	0.00	0.00			
04	U-234	DO	04/08/13 11:15	1.00E+00	120.69	0.00	0.00			
05	U-234	TRG	04/08/13 11:15	1.00E+00	124.94	0.00	0.00			
06	U-234	TRG	04/08/13 11:45	1.00E+00	81.64	0.00	0.00			
07	U-234	TRG	04/08/13 11:45	1.00E+00	62.81	0.00	0.00			
08	U-234	TRG	04/08/13 12:45	1.00E+00	124.95	0.00	0.00			
09	U-234	TRG	04/08/13 12:45	1.00E+00	117.31	0.00	0.00			
10	U-234	TRG	04/08/13 13:22	1.00E+00	102.63	0.00	0.00			
11	U-234	TRG	04/08/13 13:22	1.00E+00	121.31	0.00	0.00			
12	U-234	TRG	04/08/13 13:26	1.00E+00	102.80	0.00	0.00			
13	U-234	TRG	04/08/13 13:26	1.00E+00	109.01	0.00	0.00			
14	U-234	TRG	04/08/13 13:36	1.00E+00	86.40	0.00	0.00			
15	U-234	TRG	04/08/13 13:36	1.00E+00	85.91	0.00	0.00			
16	U-234	TRG	04/08/13 14:50	1.00E+00	123.42	0.00	0.00			
17	U-234	TRG	04/08/13 14:50	1.00E+00	135.23	0.00	0.00			
18	U-234	TRG	04/08/13 15:00	1.00E+00	105.88	0.00	0.00			
19	U-234	TRG	04/08/13 15:00	1.00E+00	98.36	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	UUISO	Run	1
							

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	04/27/13 10:47		A_Spec	Alpha_003	170	6.50 E+02	9.00 E-03	17.5
02	U-234	MBL	04/27/13 10:47		A_Spec	Alpha_004	170.02	6.15 E+00	5.00 E-03	19.4
03	U-234	DUP	04/27/13 10:47		A_Spec	Alpha_010	170	2.28 E+02	1.00 E-02	19.7
04	U-234	DO	04/27/13 10:47		A_Spec	Alpha_011	170	4.01 E+02	2.00 E-03	19.7
05	U-234	TRG	04/27/13 10:47		A_Spec	Alpha_013	170	9.25 E+01	3.00 E-03	18.7
06	U-234	TRG	04/27/13 10:47		A_Spec	Alpha_014	170	1.13 E+01	4.00 E-03	18.5
07	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_018	170	3.32 E+00	4.00 E-03	17.8
08	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_022	170.02	8.15 E+00	5.00 E-03	15.3
09	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_024	170	4.66 E+00	2.00 E-03	17.1
10	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_025	170.02	1.66 E+02	4.00 E-03	17.4
11	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_027	170	1.75 E+02	5.00 E-03	17.3
12	U-234	TRG	04/27/13 10:48		A_Spec	Alpha_029	170	2.59 E+02	6.00 E-03	19.5
13	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_033	170	2.32 E+02	0.00 E+00	18.2
14	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_034	170	1.78 E+01	1.00 E-03	18.6
15	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_035	170	1.07 E+01	2.00 E-03	18.3
16	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_037	170	5.77 E+01	2.00 E-03	17.8
17	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_040	170	4.28 E+01	1.00 E-03	19
18	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_041	170	1.61 E+01	5.00 E-03	19.8
19	U-234	TRG	04/27/13 10:49		A_Spec	Alpha_042	170	1.35 E+01	3.00 E-03	18.5

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	UIISO	Run	1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/l	6.93E+00	8.75E-01	5.60E-02	7.90E+00	87.74	OK		OK	
02	U-238	MBL	BLANK	pCi/l	4.08E-02	4.21E-02	4.45E-02					OK	OK
03	U-238	DUP	PZ-103-SS TOT	pCi/l	4.92E+00	8.16E-01	1.09E-01				NA	OK	
04	U-238	DO	PZ-103-SS TOT	pCi/l	4.77E+00	6.62E-01	4.63E-02					OK	
05	U-238	TRG	PZ-103-SS DIS	pCi/l	7.41E-01	1.96E-01	5.94E-02					OK	
06	U-238	TRG	PZ-114-AS TOT	pCi/l	1.02E-01	9.31E-02	1.16E-01					OK	
07	U-238	TRG	PZ-114-AS DIS	pCi/l	6.61E-02	1.08E-01	1.89E-01					OK	
08	U-238	TRG	FB at PZ-201A-SS TOT	pCi/l	6.77E-03	2.82E-02	7.25E-02					OK	
09	U-238	TRG	FB at PZ-201A-SS DIS	pCi/l	1.74E-02	3.76E-02	7.43E-02					OK	
10	U-238	TRG	PZ-201A-SS TOT	pCi/l	1.33E+00	3.15E-01	7.10E-02					OK	
11	U-238	TRG	PZ-201A-SS DIS	pCi/l	1.58E+00	3.25E-01	7.12E-02					OK	
12	U-238	TRG	PZ-204A-SS TOT	pCi/l	2.91E+00	4.99E-01	5.52E-02					OK	
13	U-238	TRG	PZ-204A-SS DIS	pCi/l	2.46E+00	4.46E-01	7.97E-02					OK	
14	U-238	TRG	PZ-205-AS TOT	pCi/l	6.03E-02	6.55E-02	7.88E-02					OK	
15	U-238	TRG	PZ-205-AS DIS	pCi/l	1.49E-01	1.01E-01	7.03E-02					OK	
16	U-238	TRG	PZ-205-SS TOT	pCi/l	4.79E-01	1.57E-01	5.01E-02					OK	
17	U-238	TRG	PZ-205-SS DIS	pCi/l	3.99E-01	1.32E-01	4.29E-02					OK	
18	U-238	TRG	PZ-206-SS TOT	pCi/l	5.16E-02	7.30E-02	1.23E-01					OK	
19	U-238	TRG	PZ-206-SS DIS	pCi/l	8.24E-02	7.09E-02	6.96E-02					OK	

Client	Eberline Services Work Order	13-04104	Analysis Code	UUISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-UUISO-1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	04/16/13 00:00	1.00E+00	141.80	0.00	0.00			
02	U-238	MBL	04/16/13 00:00	1.00E+00	127.82	0.00	0.00			
03	U-238	DUP	04/08/13 11:15	1.00E+00	80.88	0.00	0.00			
04	U-238	DO	04/08/13 11:15	1.00E+00	120.69	0.00	0.00			
05	U-238	TRG	04/08/13 11:15	1.00E+00	124.94	0.00	0.00			
06	U-238	TRG	04/08/13 11:45	1.00E+00	81.64	0.00	0.00			
07	U-238	TRG	04/08/13 11:45	1.00E+00	62.81	0.00	0.00			
08	U-238	TRG	04/08/13 12:45	1.00E+00	124.95	0.00	0.00			
09	U-238	TRG	04/08/13 12:45	1.00E+00	117.31	0.00	0.00			
10	U-238	TRG	04/08/13 13:22	1.00E+00	102.63	0.00	0.00			
11	U-238	TRG	04/08/13 13:22	1.00E+00	121.31	0.00	0.00			
12	U-238	TRG	04/08/13 13:26	1.00E+00	102.80	0.00	0.00			
13	U-238	TRG	04/08/13 13:26	1.00E+00	109.01	0.00	0.00			
14	U-238	TRG	04/08/13 13:36	1.00E+00	86.40	0.00	0.00			
15	U-238	TRG	04/08/13 13:36	1.00E+00	85.91	0.00	0.00			
16	U-238	TRG	04/08/13 14:50	1.00E+00	123.42	0.00	0.00			
17	U-238	TRG	04/08/13 14:50	1.00E+00	135.23	0.00	0.00			
18	U-238	TRG	04/08/13 15:00	1.00E+00	105.88	0.00	0.00			
19	U-238	TRG	04/08/13 15:00	1.00E+00	98.36	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	UUISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-UUISO-1

US EPA ARCHIVE DOCUMENT

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	04/27/13 10:47		A_Spec	Alpha_003	170	6.49 E+02	3.00 E-03	17.5
02	U-238	MBL	04/27/13 10:47		A_Spec	Alpha_004	170.02	3.83 E+00	1.00 E-03	19.4
03	U-238	DUP	04/27/13 10:47		A_Spec	Alpha_010	170	2.96 E+02	7.00 E-03	19.7
04	U-238	DO	04/27/13 10:47		A_Spec	Alpha_011	170	4.30 E+02	1.00 E-03	19.7
05	U-238	TRG	04/27/13 10:47		A_Spec	Alpha_013	170	6.55 E+01	3.00 E-03	18.7
06	U-238	TRG	04/27/13 10:47		A_Spec	Alpha_014	170	5.81 E+00	7.00 E-03	18.5
07	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_018	170	2.79 E+00	1.30 E-02	17.8
08	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_022	170.02	4.90 E-01	3.00 E-03	15.3
09	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_024	170	1.32 E+00	4.00 E-03	17.1
10	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_025	170.02	8.97 E+01	2.00 E-03	17.4
11	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_027	170	1.25 E+02	4.00 E-03	17.3
12	U-238	TRG	04/27/13 10:48		A_Spec	Alpha_029	170	2.20 E+02	1.00 E-03	19.5
13	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_033	170	1.85 E+02	0.00 E+00	18.2
14	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_034	170	3.66 E+00	2.00 E-03	18.6
15	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_035	170	8.83 E+00	1.00 E-03	18.3
16	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_037	170	3.98 E+01	1.00 E-03	17.8
17	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_040	170	3.88 E+01	1.00 E-03	19
18	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_041	170	4.09 E+00	2.30 E-02	19.8
19	U-238	TRG	04/27/13 10:49		A_Spec	Alpha_042	170	5.66 E+00	2.00 E-03	18.5

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/l	4.80E-01	1.65E-01	7.46E-02					OK	
02	U-235	MBL	BLANK	pCi/l	-2.65E-04	2.80E-02	8.32E-02					OK	OK
03	U-235	DUP	PZ-103-SS TOT	pCi/l	3.15E-01	1.66E-01	1.16E-01				NA	OK	
04	U-235	DO	PZ-103-SS TOT	pCi/l	3.55E-01	1.42E-01	5.74E-02					OK	
05	U-235	TRG	PZ-103-SS DIS	pCi/l	6.77E-02	6.20E-02	5.85E-02					OK	
06	U-235	TRG	PZ-114-AS TOT	pCi/l	5.78E-02	7.48E-02	1.04E-01					OK	
07	U-235	TRG	PZ-114-AS DIS	pCi/l	3.38E-02	8.44E-02	1.76E-01					OK	
08	U-235	TRG	FB at PZ-201A-SS TOT	pCi/l	2.57E-03	3.59E-02	1.02E-01					OK	
09	U-235	TRG	FB at PZ-201A-SS DIS	pCi/l	1.08E-02	3.29E-02	7.81E-02					OK	
10	U-235	TRG	PZ-201A-SS TOT	pCi/l	1.26E-01	9.66E-02	7.67E-02					OK	
11	U-235	TRG	PZ-201A-SS DIS	pCi/l	1.51E-01	9.85E-02	7.47E-02					OK	
12	U-235	TRG	PZ-204A-SS TOT	pCi/l	3.19E-01	1.48E-01	8.59E-02					OK	
13	U-235	TRG	PZ-204A-SS DIS	pCi/l	7.95E-02	7.29E-02	6.87E-02					OK	
14	U-235	TRG	PZ-205-AS TOT	pCi/l	5.43E-02	7.03E-02	9.77E-02					OK	
15	U-235	TRG	PZ-205-AS DIS	pCi/l	8.00E-02	8.27E-02	8.71E-02					OK	
16	U-235	TRG	PZ-205-SS TOT	pCi/l	1.64E-01	1.03E-01	8.93E-02					OK	
17	U-235	TRG	PZ-205-SS DIS	pCi/l	4.88E-02	5.04E-02	5.32E-02					OK	
18	U-235	TRG	PZ-206-SS TOT	pCi/l	2.33E-02	4.43E-02	8.20E-02					OK	
19	U-235	TRG	PZ-206-SS DIS	pCi/l	4.49E-02	6.23E-02	9.46E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	UUISO	Run	1

US EPA ARCHIVE DOCUMENT

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	04/16/13 00:00	1.00E+00	141.80	0.00	0.00			
02	U-235	MBL	04/16/13 00:00	1.00E+00	127.82	0.00	0.00			
03	U-235	DUP	04/08/13 11:15	1.00E+00	80.88	0.00	0.00			
04	U-235	DO	04/08/13 11:15	1.00E+00	120.69	0.00	0.00			
05	U-235	TRG	04/08/13 11:15	1.00E+00	124.94	0.00	0.00			
06	U-235	TRG	04/08/13 11:45	1.00E+00	81.64	0.00	0.00			
07	U-235	TRG	04/08/13 11:45	1.00E+00	62.81	0.00	0.00			
08	U-235	TRG	04/08/13 12:45	1.00E+00	124.95	0.00	0.00			
09	U-235	TRG	04/08/13 12:45	1.00E+00	117.31	0.00	0.00			
10	U-235	TRG	04/08/13 13:22	1.00E+00	102.63	0.00	0.00			
11	U-235	TRG	04/08/13 13:22	1.00E+00	121.31	0.00	0.00			
12	U-235	TRG	04/08/13 13:26	1.00E+00	102.80	0.00	0.00			
13	U-235	TRG	04/08/13 13:26	1.00E+00	109.01	0.00	0.00			
14	U-235	TRG	04/08/13 13:36	1.00E+00	86.40	0.00	0.00			
15	U-235	TRG	04/08/13 13:36	1.00E+00	85.91	0.00	0.00			
16	U-235	TRG	04/08/13 14:50	1.00E+00	123.42	0.00	0.00			
17	U-235	TRG	04/08/13 14:50	1.00E+00	135.23	0.00	0.00			
18	U-235	TRG	04/08/13 15:00	1.00E+00	105.88	0.00	0.00			
19	U-235	TRG	04/08/13 15:00	1.00E+00	98.36	0.00	0.00			

	
Run	1
Analysis Code	UISO
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-UUISO-1

US EPA ARCHIVE DOCUMENT

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	04/27/13 10:47		A_Spec	Alpha_003	170	3.63 E+01	4.00 E-03	17.5
02	U-235	MBL	04/27/13 10:47		A_Spec	Alpha_004	170.02	-2.01 E-02	6.00 E-03	19.4
03	U-235	DUP	04/27/13 10:47		A_Spec	Alpha_010	170	1.53 E+01	4.00 E-03	19.7
04	U-235	DO	04/27/13 10:47		A_Spec	Alpha_011	170	2.58 E+01	1.00 E-03	19.7
05	U-235	TRG	04/27/13 10:47		A_Spec	Alpha_013	170	4.83 E+00	1.00 E-03	18.7
06	U-235	TRG	04/27/13 10:47		A_Spec	Alpha_014	170	2.66 E+00	2.00 E-03	18.5
07	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_018	170	1.15 E+00	5.00 E-03	17.8
08	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_022	170.02	1.50 E-01	5.00 E-03	15.3
09	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_024	170	6.60 E-01	2.00 E-03	17.1
10	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_025	170.02	6.83 E+00	1.00 E-03	17.4
11	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_027	170	9.66 E+00	2.00 E-03	17.3
12	U-235	TRG	04/27/13 10:48		A_Spec	Alpha_029	170	1.95 E+01	3.00 E-03	19.5
13	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_033	170	4.83 E+00	1.00 E-03	18.2
14	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_034	170	2.66 E+00	2.00 E-03	18.6
15	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_035	170	3.83 E+00	1.00 E-03	18.3
16	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_037	170	1.10 E+01	0.00 E+00	17.8
17	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_040	170	3.83 E+00	1.00 E-03	19
18	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_041	170	1.49 E+00	3.00 E-03	19.8
19	U-235	TRG	04/27/13 10:49		A_Spec	Alpha_042	170	2.49 E+00	3.00 E-03	18.5

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 18-29
 33-42

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	0.6047	11.5467		0.00		
02	MBL	BLANK	04/16/13 00:00	1.0000	0.6048	11.5487		0.00		
03	DUP	PZ-103-SS TOT	04/08/13 11:15	1.0000	0.6049	11.5506		0.00		
04	DO	PZ-103-SS TOT	04/08/13 11:15	1.0000	0.6061	11.5735		0.00		
05	TRG	PZ-103-SS DIS	04/08/13 11:15	1.0000	0.6057	11.5658		0.00		
06	TRG	PZ-114-AS TOT	04/08/13 11:45	1.0000	0.6051	11.5544		0.00		
07	TRG	PZ-114-AS DIS	04/08/13 11:45	1.0000	0.6044	11.5410		0.00		
08	TRG	FB at PZ-201A-SS TOT	04/08/13 12:45	1.0000	0.6079	11.6079		0.00		
09	TRG	FB at PZ-201A-SS DIS	04/08/13 12:45	1.0000	0.6038	11.5296		0.00		
10	TRG	PZ-201A-SS TOT	04/08/13 13:22	1.0000	0.6047	11.5467		0.00		
11	TRG	PZ-201A-SS DIS	04/08/13 13:22	1.0000	0.6044	11.5410		0.00		
12	TRG	PZ-204A-SS TOT	04/08/13 13:26	1.0000	0.6024	11.5028		0.00		
13	TRG	PZ-204A-SS DIS	04/08/13 13:26	1.0000	0.5989	11.4360		0.00		
14	TRG	PZ-205-AS TOT	04/08/13 13:36	1.0000	0.5968	11.3959		0.00		
15	TRG	PZ-205-AS DIS	04/08/13 13:36	1.0000	0.5998	11.4532		0.00		
16	TRG	PZ-205-SS TOT	04/08/13 14:50	1.0000	0.5982	11.4226		0.00		
17	TRG	PZ-205-SS DIS	04/08/13 14:50	1.0000	0.6015	11.4856		0.00		
18	TRG	PZ-206-SS TOT	04/08/13 15:00	1.0000	0.6005	11.4665		0.00		
19	TRG	PZ-206-SS DIS	04/08/13 15:00	1.0000	0.6003	11.4627		0.00		

Spike and Tracer Worksheet

Internal Work Order				Run	Analysis Code				Date				Technician				Technician Initials		Witness Initials	
13-04104				1	UUISO				4/22/2013 19:00				LWALKER				<i>JH</i>			
LGS & 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	4/22/2013	0.500	0.5107				8.11	0.292	0.00	0.000	0.00	0.000	0.00	0.000				
U-238	U-8a	34.350	4/22/2013	0.500	0.5107				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	19.095	4/22/2013	0.6047	0.6300										
02	U-232	U-10a	19.095	4/22/2013	0.6048	0.6300										
03	U-232	U-10a	19.095	4/22/2013	0.6049	0.6300										
04	U-232	U-10a	19.095	4/22/2013	0.6061	0.6300										
05	U-232	U-10a	19.095	4/22/2013	0.6057	0.6300										
06	U-232	U-10a	19.095	4/22/2013	0.6051	0.6300										
07	U-232	U-10a	19.095	4/22/2013	0.6044	0.6300										
08	U-232	U-10a	19.095	4/22/2013	0.6079	0.6300										
09	U-232	U-10a	19.095	4/22/2013	0.6038	0.6300										
10	U-232	U-10a	19.095	4/22/2013	0.6047	0.6300										
11	U-232	U-10a	19.095	4/22/2013	0.6044	0.6300										
12	U-232	U-10a	19.095	4/22/2013	0.6024	0.6300										
13	U-232	U-10a	19.095	4/22/2013	0.5989	0.6300										
14	U-232	U-10a	19.095	4/22/2013	0.5968	0.6300										
15	U-232	U-10a	19.095	4/22/2013	0.5998	0.6300										
16	U-232	U-10a	19.095	4/22/2013	0.5982	0.6300										
17	U-232	U-10a	19.095	4/22/2013	0.6015	0.6300										
18	U-232	U-10a	19.095	4/22/2013	0.6005	0.6300										
19	U-232	U-10a	19.095	4/22/2013	0.6003	0.6300										

Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04104	1	UUISO	liters	5/7/2013	LWALKER

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-103-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-103-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-103-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	FB at PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	FB at PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-204A-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-204A-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-205-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-205-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-206-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-206-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: *J. Walker* Date: *4, 22, 13*

C
4/29/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/26/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:55 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.2476 +/- 0.0126
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.4180 +/- 0.0771

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.855334 +/- 0.060773
 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	483.30	8.93	1.70	0.00E+000	41.3
U-234	4.728	650.47	7.70	1.53	0.00E+000	11.6
U-235	4.389	36.32	32.88	0.68	0.00E+000	3.0
U-238	4.147	649.49	7.69	0.51	0.00E+000	19.2

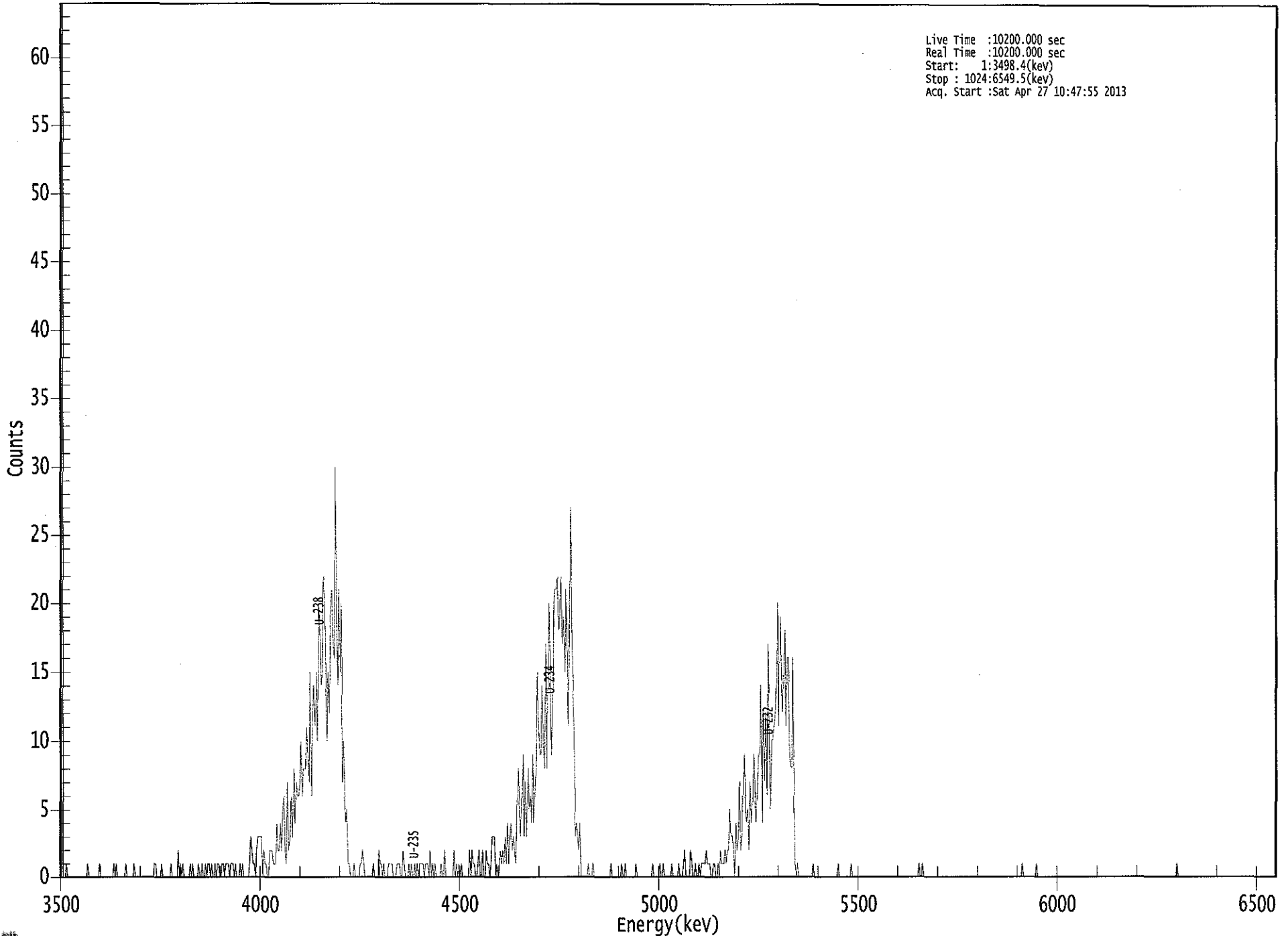
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.18E+000 +/- 5.19E-001	7.88E-002 +/- 7.88E-003
U-234	0.992	4761.50*	6.97E+000 +/- 8.80E-001	7.62E-002 +/- 7.63E-003
U-235	1.000	4385.50*	4.80E-001 +/- 1.65E-001	7.46E-002 +/- 7.47E-003
U-238	0.990	4184.40*	6.93E+000 +/- 8.75E-001	5.60E-002 +/- 5.61E-003

AG
4/29/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(keV)
Stop : 1024:6549.5(keV)
Acq. Start :Sat Apr 27 10:47:55 2013



US EPA ARCHIVE DOCUMENT

0106

ROI Type: 1

ROI Type: 3

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
41:	0	0	0	0	0	1	0	1
49:	0	0	0	0	0	0	0	1
57:	0	0	0	0	0	0	1	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	1
81:	1	0	0	0	0	1	0	0
89:	0	0	0	0	0	1	0	0
97:	0	0	0	2	0	1	0	1
105:	0	0	0	0	0	1	0	1
113:	0	0	0	0	1	0	0	1
121:	0	0	1	0	1	1	0	1
129:	0	0	1	0	1	1	0	0
137:	1	1	0	1	1	1	0	1
145:	1	1	0	1	0	0	0	1
153:	0	1	0	0	0	0	0	1
161:	3	2	1	1	0	2	3	3
169:	3	3	0	2	1	1	0	0
177:	2	2	2	1	1	1	4	2
185:	2	4	2	5	6	2	1	7
193:	2	3	6	3	8	4	7	6
201:	6	7	10	6	8	8	8	11
209:	9	7	15	6	12	14	11	15
217:	10	20	18	14	15	22	20	15
225:	10	15	12	20	21	17	16	30
233:	19	14	21	15	20	7	10	6
241:	4	5	1	1	0	0	0	1
249:	0	0	0	0	1	1	2	1
257:	0	0	0	0	0	0	0	1
265:	0	0	0	0	2	1	1	0
273:	1	0	0	0	1	1	1	1
281:	0	0	0	1	1	1	0	0
289:	2	1	0	0	0	1	0	1
297:	0	0	1	0	1	0	1	1
305:	1	1	0	1	1	1	0	2
313:	0	1	0	1	0	0	0	0
321:	1	0	0	2	0	0	0	0
329:	0	0	0	2	0	1	0	1
337:	0	1	0	0	0	0	0	0
345:	2	0	2	1	1	0	0	1
353:	2	0	0	2	0	0	2	1
361:	1	0	1	3	3	3	0	1

369: 0 1 2 1 2 1 3 1

Sample Title: 01

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

801: 0 0 0 0 0 0 0 0

Sample Title: 01

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

*C
4/29/13*

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/26/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:56 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.2480 +/- 0.0126
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 1.2782 +/- 0.0693

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	484.15	8.92	0.85	0.00E+000	32.2
U-234	4.784	6.15	85.19	0.85	0.00E+000	2.9
U-235	4.465	-0.02	10571.	1.02	0.00E+000	2.9
U-238	4.125	3.83	102.72	0.17	0.00E+000	2.9

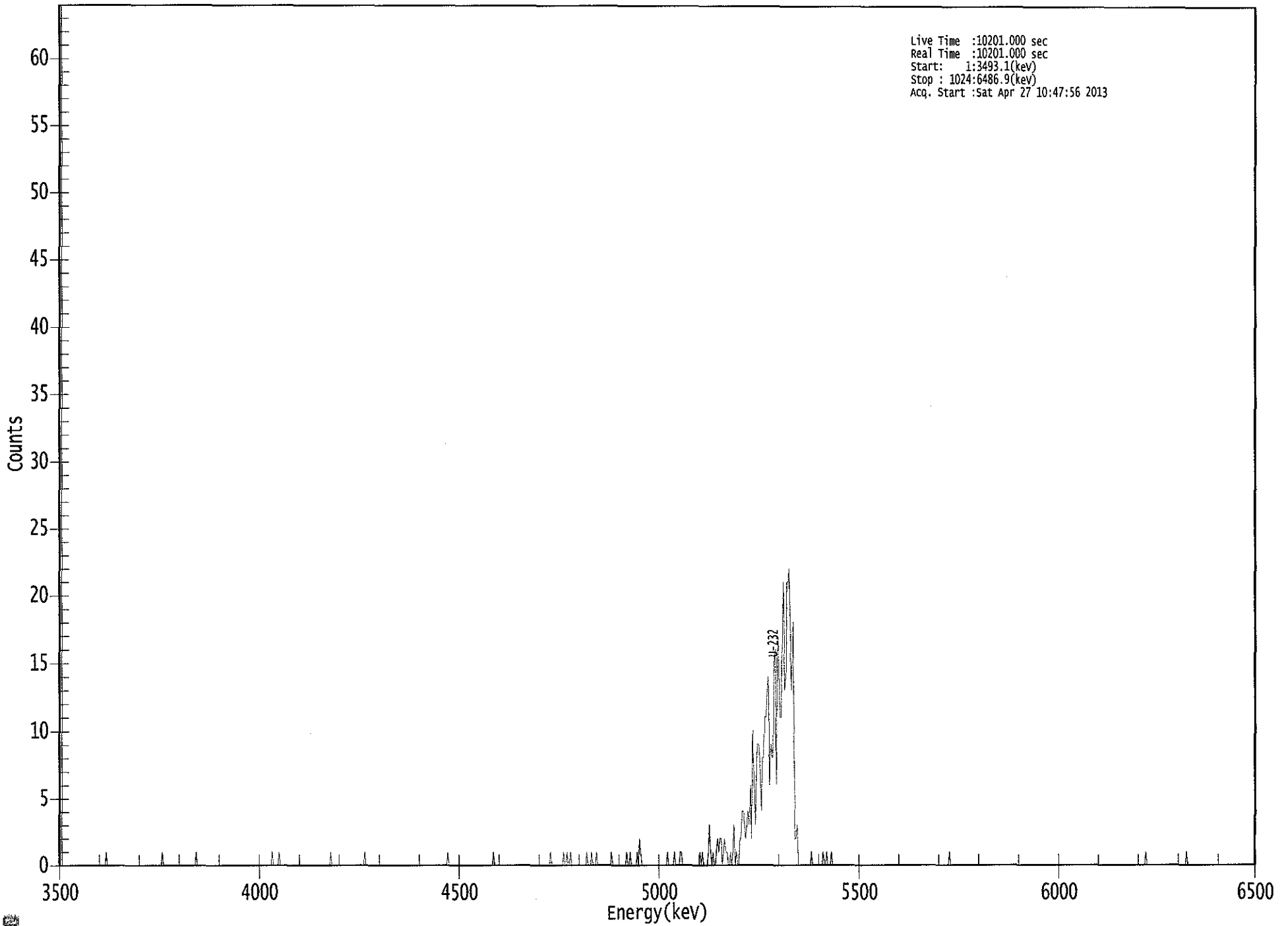
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.18E+000 +/- 5.18E-001	6.41E-002 +/- 6.40E-003
U-234	0.996	4761.50*	6.58E-002 +/- 5.65E-002	6.41E-002 +/- 6.40E-003
U-235	0.956	4385.50*	-2.65E-004 +/- 2.80E-002	8.32E-002 +/- 8.31E-003
U-238	0.975	4184.40*	4.08E-002 +/- 4.21E-002	4.45E-002 +/- 4.44E-003

*AG
4/29/13*

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3493.1(keV)
Stop : 1024:6486.9(keV)
Acq. Start :Sat Apr 27 10:47:56 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: 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:	1	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	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	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:	1	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	1	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 1 0 0 0 0

Sample Title: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

C
4/29/13

Sample Description: PZ-103-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:50 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.1591 +/- 0.0098
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.8088 +/- 0.0519

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	310.62	11.17	2.38	0.00E+000	3.9
U-234	4.743	228.30	13.03	1.70	0.00E+000	32.9
U-235	4.367	15.32	51.36	0.68	0.00E+000	8.8
U-238	4.154	295.81	11.42	1.19	0.00E+000	11.4

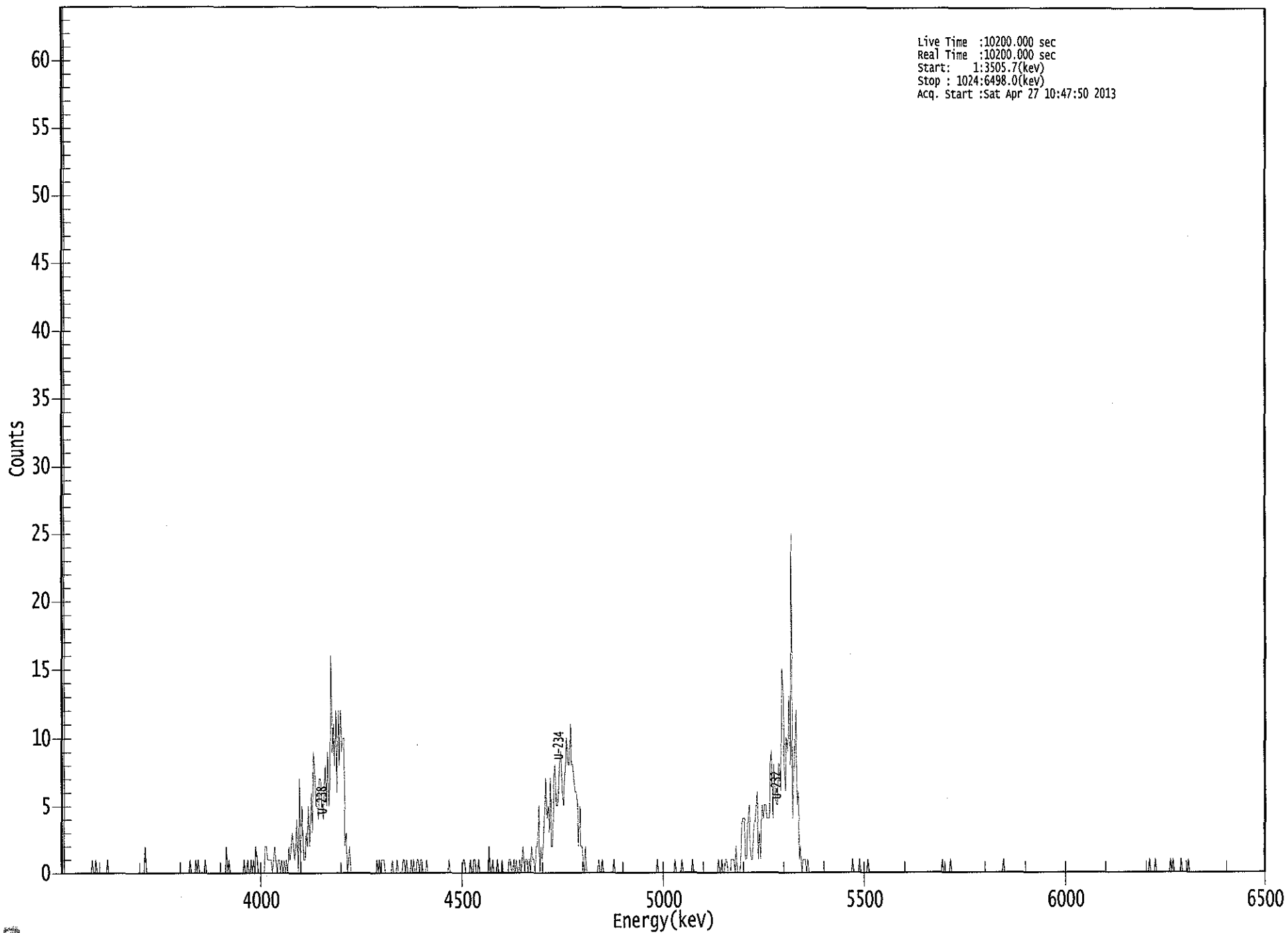
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.19E+000 +/- 6.25E-001	1.37E-001 +/- 1.65E-002
U-234	0.997	4761.50*	3.81E+000 +/- 6.76E-001	1.23E-001 +/- 1.48E-002
U-235	0.998	4385.50*	3.15E-001 +/- 1.66E-001	1.16E-001 +/- 1.40E-002
U-238	0.993	4184.40*	4.92E+000 +/- 8.16E-001	1.09E-001 +/- 1.32E-002

AG
4/29/13

0000056552.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Sat Apr 27 10:47:50 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: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	1	0	0	1	0	0
33:	0	0	0	0	0	0	0	1
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	2
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	1	0	0
113:	0	0	1	0	1	0	0	0
121:	0	0	1	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	2	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	1	0	0	1	0
161:	0	1	0	1	0	2	1	0
169:	0	0	0	0	0	2	2	1
177:	1	1	1	0	1	2	1	0
185:	1	1	0	1	0	1	0	1
193:	0	2	1	2	3	2	1	2
201:	4	0	7	0	5	3	1	1
209:	3	2	5	2	6	3	9	8
217:	5	5	4	7	7	5	4	6
225:	8	5	9	5	7	16	9	11
233:	8	12	6	12	8	12	9	10
241:	10	2	3	0	1	2	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	1	0	1	0
273:	1	1	1	0	0	0	0	0
281:	0	1	0	0	0	1	0	0
289:	0	0	1	1	0	1	0	0
297:	0	1	0	1	0	0	1	1
305:	0	1	1	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	1	0	0	0	0	0	0
337:	0	0	0	0	0	1	1	0
345:	0	0	0	1	0	0	1	1
353:	0	0	1	0	0	0	0	0
361:	0	0	0	2	0	0	1	0

369: 0 0 1 0 0 0 1 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	1	1	0	0
385:	1	0	1	0	0	1	0	1
393:	2	0	1	1	0	1	0	2
401:	1	1	0	2	2	5	0	2
409:	1	2	4	7	4	5	3	7
417:	2	2	7	8	5	5	6	8
425:	9	6	5	7	8	10	8	8
433:	11	8	8	7	6	6	5	2
441:	5	2	2	1	0	2	0	0
449:	0	0	0	0	0	0	0	0
457:	1	0	0	1	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	1	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	1	0
561:	0	1	0	0	1	1	0	0
569:	0	1	1	1	0	2	0	0
577:	0	1	4	4	4	1	1	4
585:	5	2	1	1	3	4	5	6
593:	1	3	1	5	4	5	5	4
601:	4	4	8	9	4	8	6	5
609:	5	8	8	6	15	13	8	6
617:	10	9	13	8	25	4	7	9
625:	12	5	6	1	2	0	1	1
633:	1	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	1	0	0	0	0	0	1	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	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	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: 1 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	1	0	0	0
929:	0	1	0	0	0	0	0	0
937:	0	0	0	0	0	0	1	0
945:	1	0	0	0	0	0	0	1
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
4/29/13

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:51 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.606 mL
 Effective Efficiency: 0.2381 +/- 0.0123
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Chem. Recovery Factor: 1.2069 +/- 0.0674

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.272	465.83	9.08	0.17	0.00E+000	6.8
U-234	4.730	400.66	9.80	0.34	0.00E+000	30.9
U-235	4.391	25.83	38.71	0.17	0.00E+000	2.7
U-238	4.149	429.83	9.46	0.17	0.00E+000	4.8

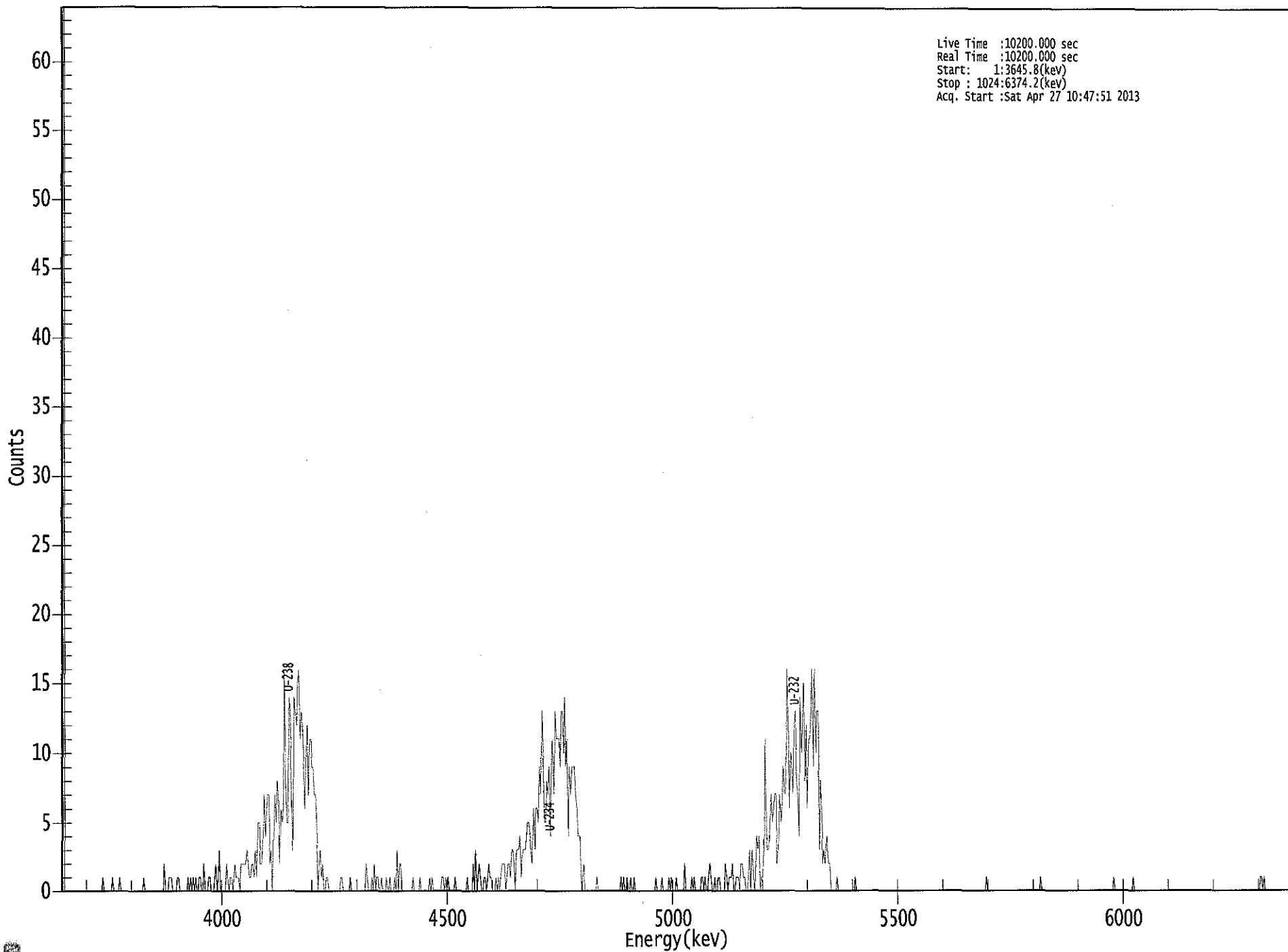
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.20E+000 +/- 5.27E-001	4.66E-002 +/- 4.72E-003
U-234	0.993	4761.50*	4.47E+000 +/- 6.30E-001	5.33E-002 +/- 5.41E-003
U-235	1.000	4385.50*	3.55E-001 +/- 1.42E-001	5.74E-002 +/- 5.82E-003
U-238	0.991	4184.40*	4.77E+000 +/- 6.62E-001	4.63E-002 +/- 4.70E-003

AG
4/29/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Sat Apr 27 10:47:51 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	1	0	0	0	0	0
41:	0	0	1	0	0	0	0	0
49:	1	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	2	0	0
89:	0	1	1	1	0	0	0	0
97:	1	1	0	0	0	0	0	0
105:	0	1	0	1	0	1	0	1
113:	0	0	1	1	0	0	2	0
121:	0	0	1	1	0	0	0	1
129:	2	0	1	3	0	0	0	0
137:	0	2	1	0	1	1	0	1
145:	2	1	1	1	0	2	2	2
153:	2	2	3	2	1	1	2	2
161:	1	3	1	5	5	2	2	3
169:	7	4	6	7	7	2	3	0
177:	4	7	5	8	7	2	6	5
185:	6	16	8	5	5	14	13	6
193:	3	14	13	12	15	16	11	13
201:	12	9	6	10	12	7	11	11
209:	9	9	7	7	4	0	2	3
217:	1	2	0	0	1	1	0	0
225:	0	0	0	0	0	0	0	0
233:	1	1	0	0	0	0	0	0
241:	1	0	0	0	0	0	0	0
249:	0	0	0	0	0	2	1	0
257:	0	0	1	0	2	0	1	1
265:	0	0	1	0	0	0	1	0
273:	0	1	0	0	0	1	0	3
281:	0	2	2	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	0	1	0	0	0	0	0
305:	0	0	1	0	1	0	0	0
313:	0	0	0	0	1	1	0	1
321:	0	1	0	0	0	0	0	1
329:	0	0	0	0	0	0	0	0
337:	0	1	0	0	0	0	2	0
345:	3	0	1	2	1	0	0	1
353:	1	0	1	2	1	1	0	0
361:	0	1	0	1	0	1	2	2

369: 2 0 1 2 2 1 3 3

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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

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Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 05
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:52 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.606 mL
 Effective Efficiency: 0.2335 +/- 0.0122
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 1.2494 +/- 0.0692

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.286	456.47	9.19	1.53	0.00E+000	7.0
U-234	4.744	92.49	20.45	0.51	0.00E+000	4.1
U-235	4.399	4.83	91.00	0.17	0.00E+000	2.8
U-238	4.162	65.49	24.33	0.51	0.00E+000	3.8

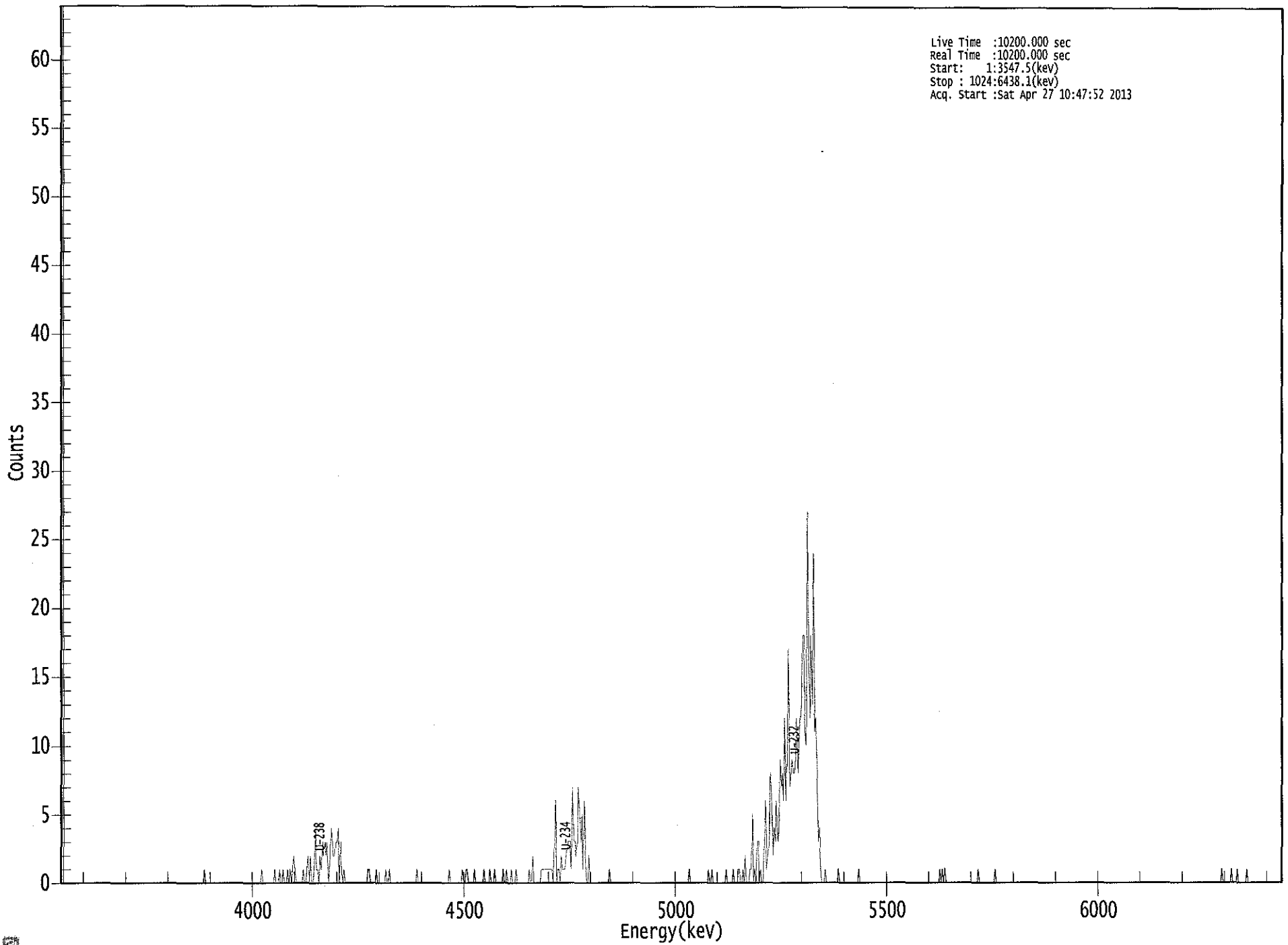
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.19E+000 +/- 5.32E-001	8.09E-002 +/- 8.28E-003
U-234	0.998	4761.50*	1.05E+000 +/- 2.40E-001	5.97E-002 +/- 6.11E-003
U-235	0.999	4385.50*	6.77E-002 +/- 6.20E-002	5.85E-002 +/- 5.99E-003
U-238	0.996	4184.40*	7.41E-001 +/- 1.96E-001	5.94E-002 +/- 6.08E-003

AG
4/29/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Sat Apr 27 10:47:52 2013



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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	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:	1	0	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	1
185:	0	0	1	0	0	0	1	0
193:	1	0	1	2	1	0	0	0
201:	0	0	0	1	0	0	1	2
209:	0	2	0	0	1	4	1	1
217:	0	2	1	3	2	3	2	3
225:	0	1	4	3	2	2	3	3
233:	4	0	3	1	0	1	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	1	1	0	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	1	0	0	1	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	1	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	1	1	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	1	0	0	0	0	1
361:	0	0	0	1	0	0	0	0

369: 0 0 1 0 0 1 0 0

Sample Title: 05

Channel	1	2	3	4	5	6	7	8
377:	0	1	0	0	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	2	0	0	0	0
401:	0	0	1	1	1	1	1	1
409:	1	1	1	1	0	3	6	0
417:	1	1	0	2	1	1	1	2
425:	3	3	3	1	7	3	3	2
433:	3	7	5	3	5	1	6	2
441:	0	0	2	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	1	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	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	1	0
545:	0	1	0	0	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	0	1	0	0	0	1
569:	1	0	0	1	0	2	0	0
577:	0	1	1	5	0	1	0	3
585:	3	0	1	0	0	3	6	1
593:	2	3	8	7	2	4	3	6
601:	3	4	9	7	8	6	12	6
609:	9	17	7	8	9	8	8	9
617:	12	8	10	12	13	18	18	11
625:	10	27	17	12	18	13	24	11
633:	12	8	3	4	1	0	0	0
641:	1	0	0	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	1	0	1	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 05

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	0	0	0	0
969:	0	0	0	0	1	0	0
977:	0	0	0	0	1	0	0
985:	0	1	0	0	0	0	0
993:	0	1	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
4/29/13

Sample Description: PZ-114-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 06
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:47:53 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.1507 +/- 0.0095
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 0.8164 +/- 0.0536

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.276	294.28	11.49	2.72	0.00E+000	20.4
U-234	4.700	11.32	60.27	0.68	0.00E+000	4.4
U-235	4.462	2.66	128.85	0.34	0.00E+000	2.9
U-238	4.128	5.81	90.53	1.19	0.00E+000	2.9

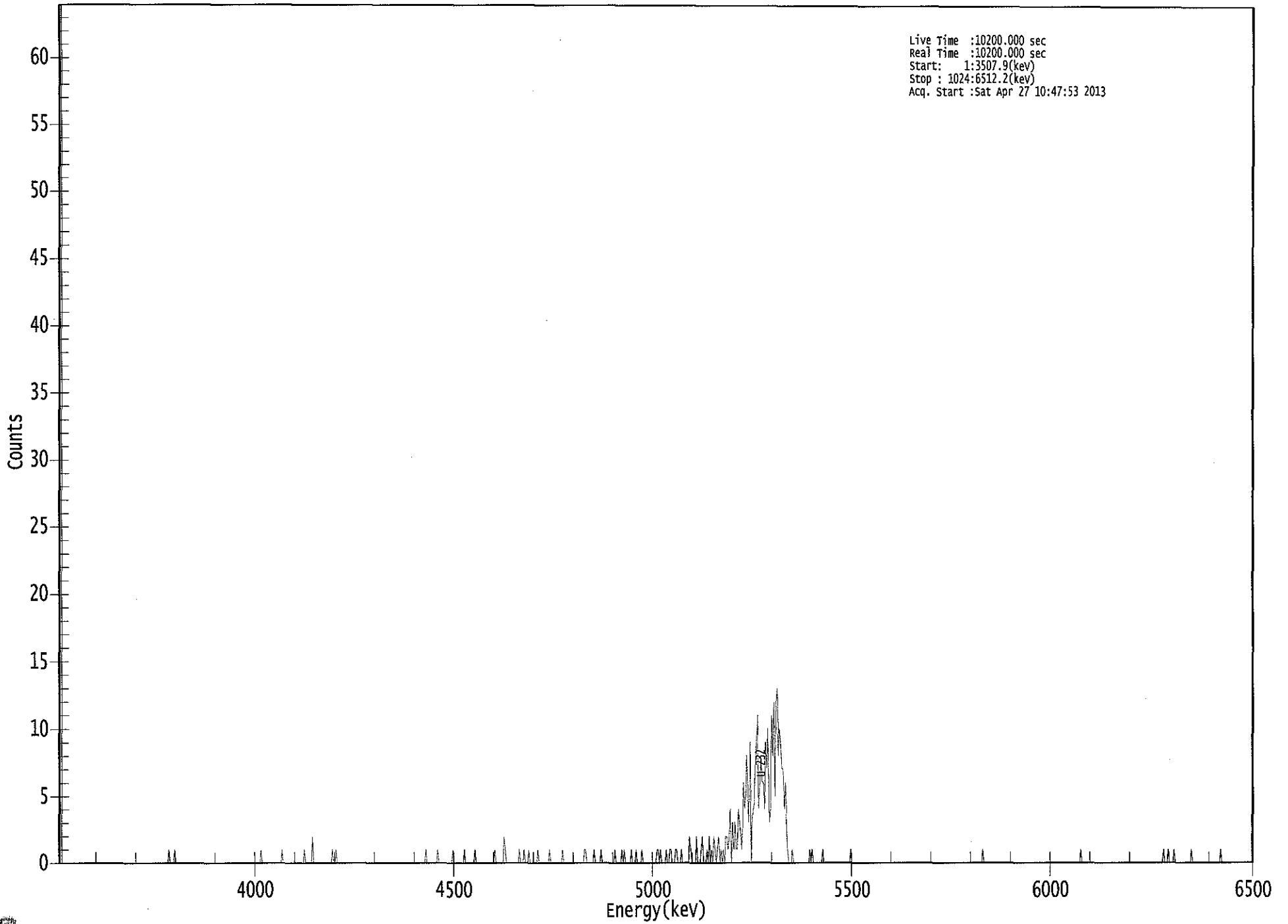
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.19E+000 +/- 6.40E-001	1.51E-001 +/- 1.87E-002
U-234	0.974	4761.50*	1.99E-001 +/- 1.23E-001	9.94E-002 +/- 1.23E-002
U-235	0.959	4385.50*	5.78E-002 +/- 7.48E-002	1.04E-001 +/- 1.28E-002
U-238	0.978	4184.40*	1.02E-001 +/- 9.31E-002	1.16E-001 +/- 1.43E-002

AG
4/29/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start : Sat Apr 27 10:47:53 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: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 0 0

Sample Title: 06

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

801: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	1	2	3	4	5	6	7	8	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	1	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	0
921:	0	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	1	0	0
953:	0	0	0	1	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	0	0	0	0	0	0	0
993:	0	0	0	1	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0	0

C
4/28/13

Sample Description: PZ-114-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 07
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:21 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: 0.1116 +/- 0.0080
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.6281 +/- 0.0466

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

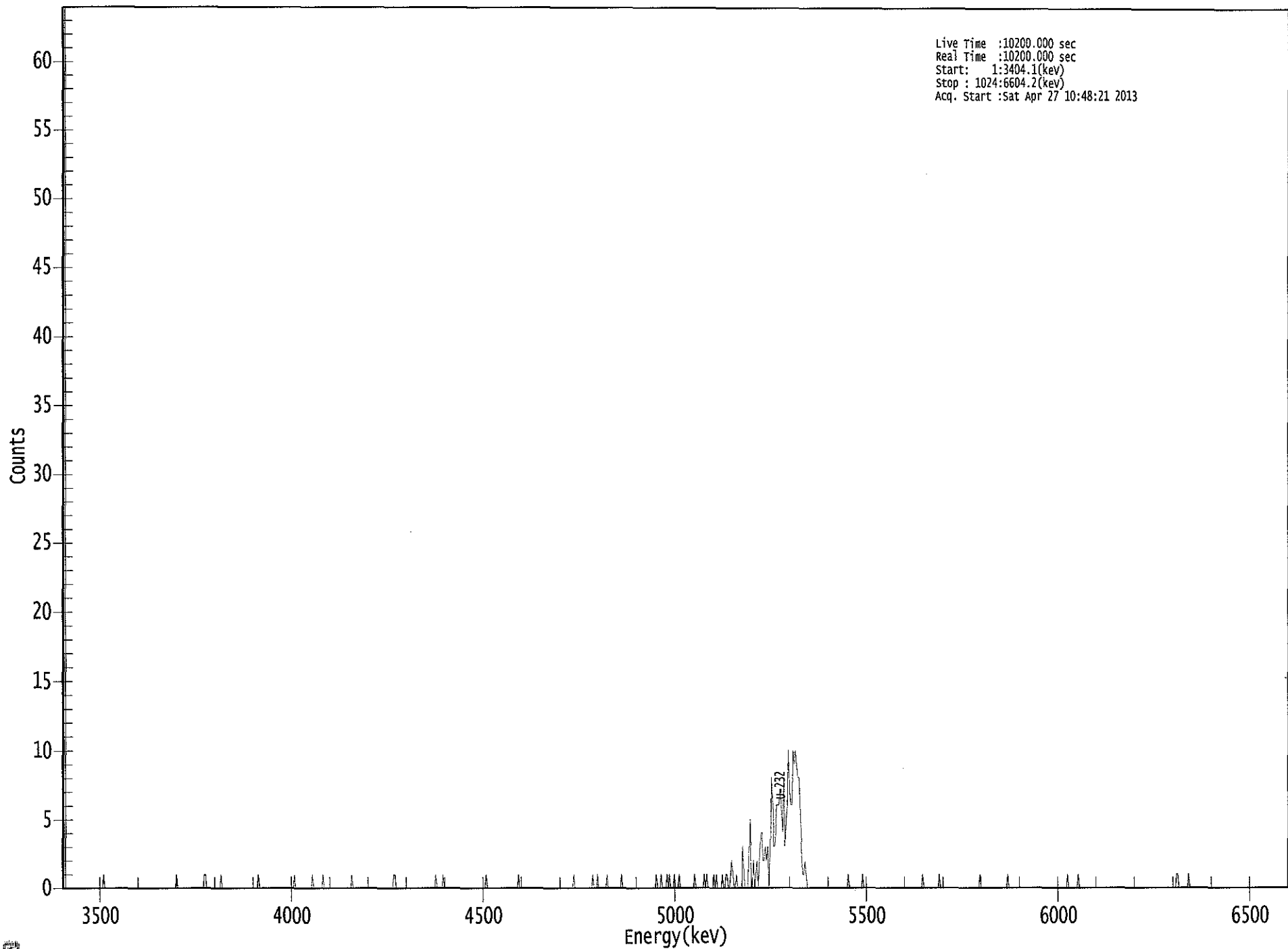
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	217.64	13.33	1.36	0.00E+000	37.5
U-234	4.787	3.32	119.77	0.68	0.00E+000	3.1
U-235	4.386	1.15	249.59	0.85	0.00E+000	3.1
U-238	4.114	2.79	162.88	2.21	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.18E+000 +/- 7.29E-001	1.63E-001 +/- 2.30E-002
U-234	0.995	4761.50*	7.90E-002 +/- 9.53E-002	1.34E-001 +/- 1.89E-002
U-235	1.000	4385.50*	3.38E-002 +/- 8.44E-002	1.76E-001 +/- 2.47E-002
U-238	0.966	4184.40*	6.61E-002 +/- 1.08E-001	1.89E-001 +/- 2.67E-002

AG
4/29/13



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Sat Apr 27 10:48:21 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	1	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	1
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	1	1
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	1	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	1	1	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	1
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	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 0

Sample Title: 07

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

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



C
41729117

Sample Description: FB AT PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 08
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:22 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.608 mL
 Effective Efficiency: 0.1914 +/- 0.0108
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.2495 +/- 0.0746

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.267	375.47	10.14	1.53	0.00E+000	18.1
U-234	4.700	8.15	72.72	0.85	0.00E+000	3.1
U-235	4.359	0.15	1398.6	0.85	0.00E+000	3.1
U-238	4.250	0.49	417.03	0.51	0.00E+000	3.1

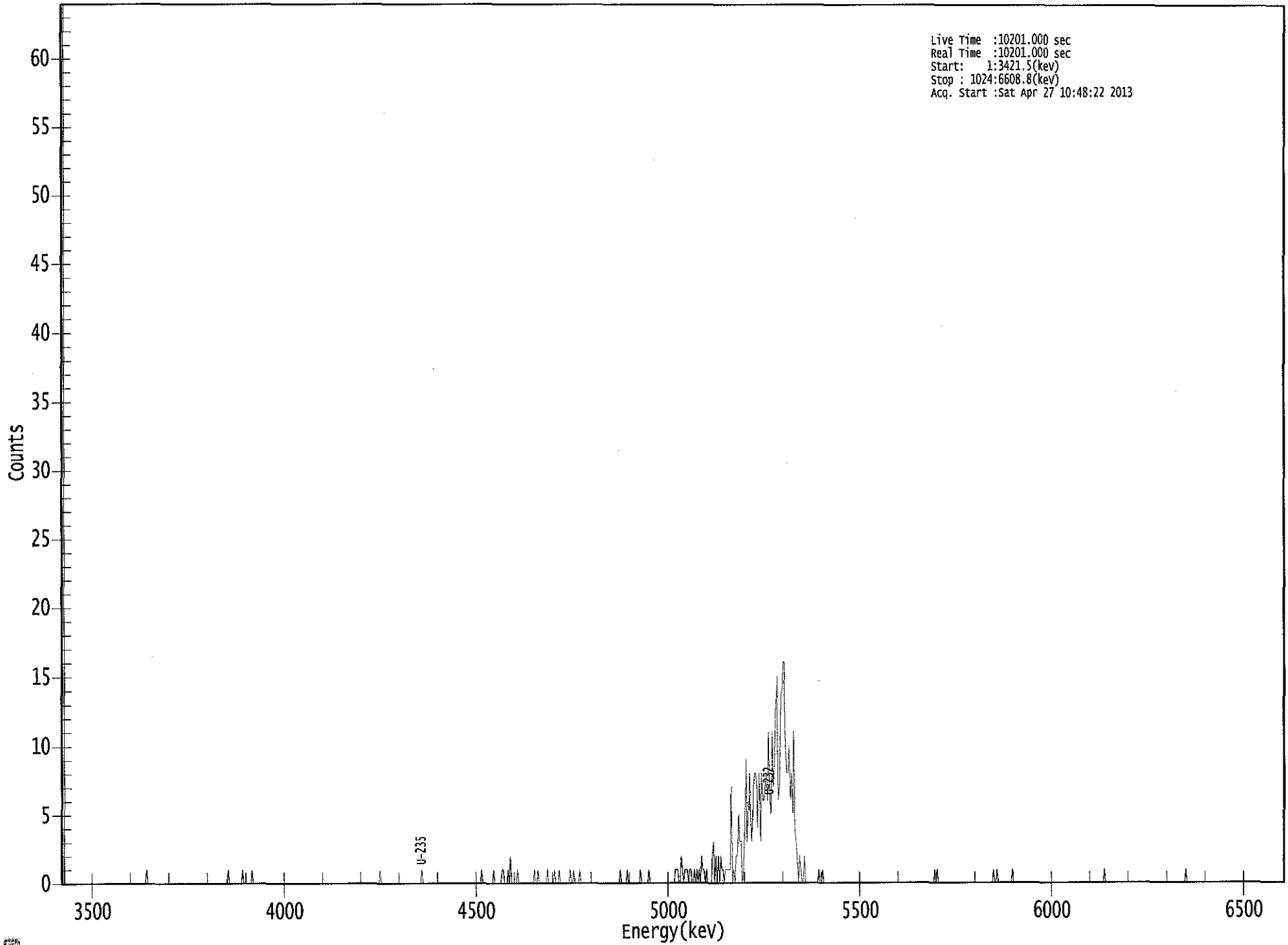
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	5.21E+000 +/- 5.78E-001	9.87E-002 +/- 1.09E-002
U-234	0.974	4761.50*	1.13E-001 +/- 8.32E-002	8.31E-002 +/- 9.22E-003
U-235	0.995	4385.50*	2.57E-003 +/- 3.59E-002	1.02E-001 +/- 1.14E-002
U-238	0.970	4184.40*	6.77E-003 +/- 2.82E-002	7.25E-002 +/- 8.04E-003

AG
4/29/13

US EPA ARCHIVE DOCUMENT



Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Sat Apr 27 10:48:22 2013

ROI Type: 1

ROI Type: 3

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

Sample Title: 08

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	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	1	0	0	0	0
145:	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	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	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369: 1 1 0 0 0 1 0 2

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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

C
4/27/13

Sample Description: FB AT PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:23 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: 0.2006 +/- 0.0112
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 1.1731 +/- 0.0688

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 5.258	390.98	9.93	1.02	0.00E+000	11.9
U-234	4.711	4.66	94.59	0.34	0.00E+000	3.1
U-235	4.414	0.66	305.43	0.34	0.00E+000	3.1
U-238	4.112	1.32	215.97	0.68	0.00E+000	3.1

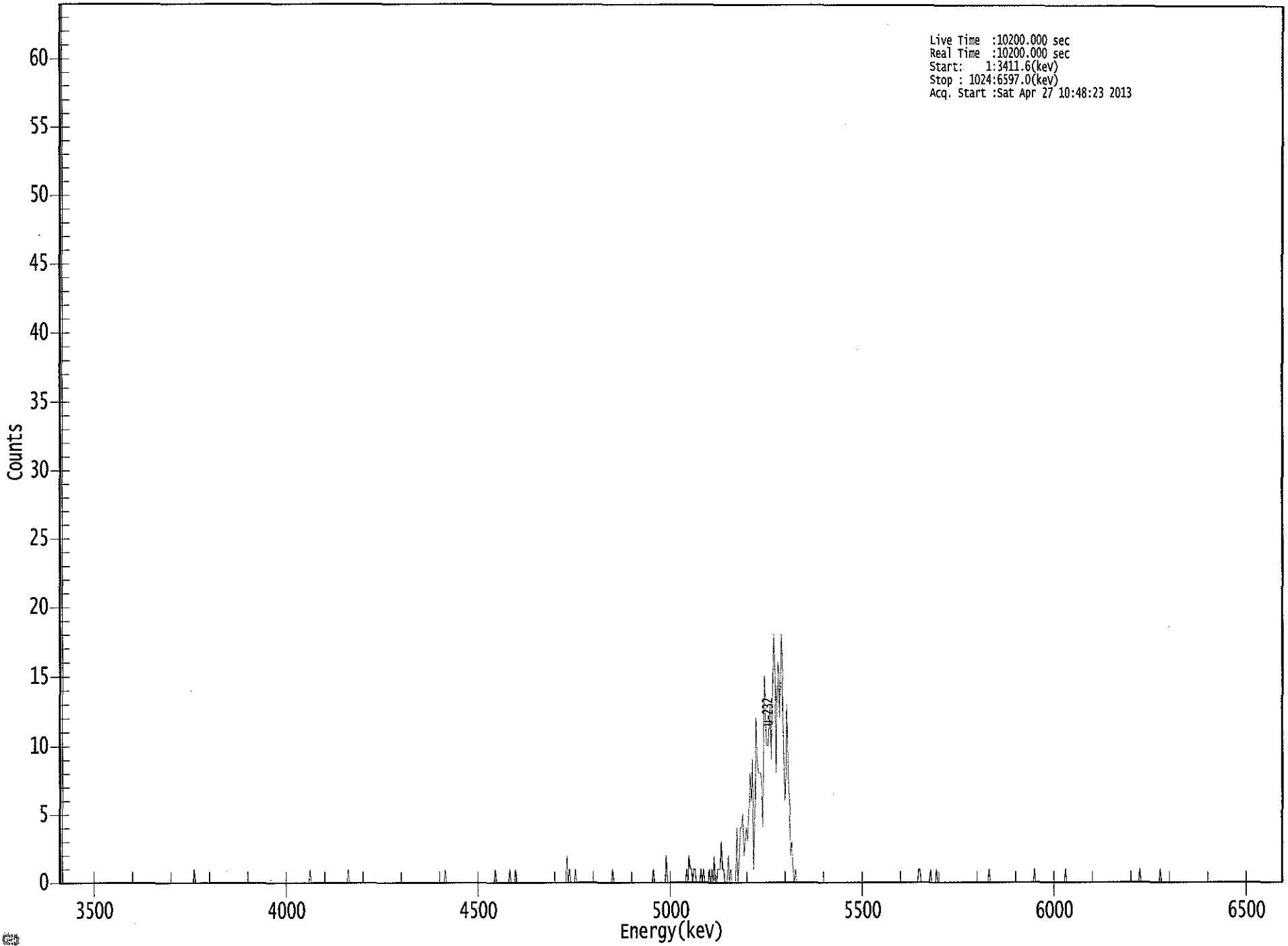
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.986	5302.50*	5.18E+000 +/- 5.64E-001	8.34E-002 +/- 9.10E-003
U-234	0.982	4761.50*	6.17E-002 +/- 5.87E-002	6.33E-002 +/- 6.90E-003
U-235	0.994	4385.50*	1.08E-002 +/- 3.29E-002	7.81E-002 +/- 8.51E-003
U-238	0.964	4184.40*	1.74E-002 +/- 3.76E-002	7.43E-002 +/- 8.10E-003

AG
4/27/13

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Sat Apr 27 10:48:23 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 09

Elapsed Live time: 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:	1	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	1	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	1	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	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	0	0	0
353:	0	0	0	0	0	0	0
361:	0	0	0	0	1	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 09

Channel	1	2	3	4	5	6	7	8	9
377:	1	0	0	0	0	0	1	0	0
385:	0	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0	0
425:	2	0	1	0	0	0	0	0	1
433:	0	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1	0
465:	0	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0	0
497:	1	0	0	0	0	0	0	0	0
505:	0	0	0	2	0	0	0	0	0
513:	0	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	1	0	2	1
529:	1	0	1	1	0	0	0	0	0
537:	1	0	1	0	0	0	0	0	1
545:	0	1	0	2	0	0	0	1	1
553:	1	3	1	1	0	0	0	0	2
561:	0	1	0	0	0	0	0	4	0
569:	2	4	4	5	2	3	4	4	3
577:	5	8	6	9	1	4	12	9	9
585:	8	8	8	7	4	15	12	10	10
593:	10	11	13	9	15	18	14	8	8
601:	16	15	12	18	16	10	6	8	8
609:	13	7	6	2	3	1	0	1	1
617:	0	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0	0
657:	0	0	0	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	1	1	1
721:	0	0	0	0	0	0	0	0	0
729:	1	0	0	0	0	1	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	1	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: 09

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



C
4179117

Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 10
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.1781 +/- 0.0104
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 1.0263 +/- 0.0629

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	347.66	10.52	0.34	0.00E+000	23.4
U-234	4.735	166.32	15.23	0.68	0.00E+000	23.0
U-235	4.407	6.83	76.08	0.17	0.00E+000	3.1
U-238	4.166	89.66	20.75	0.34	0.00E+000	5.5

T = Tracer Peak used for Effective Efficiency

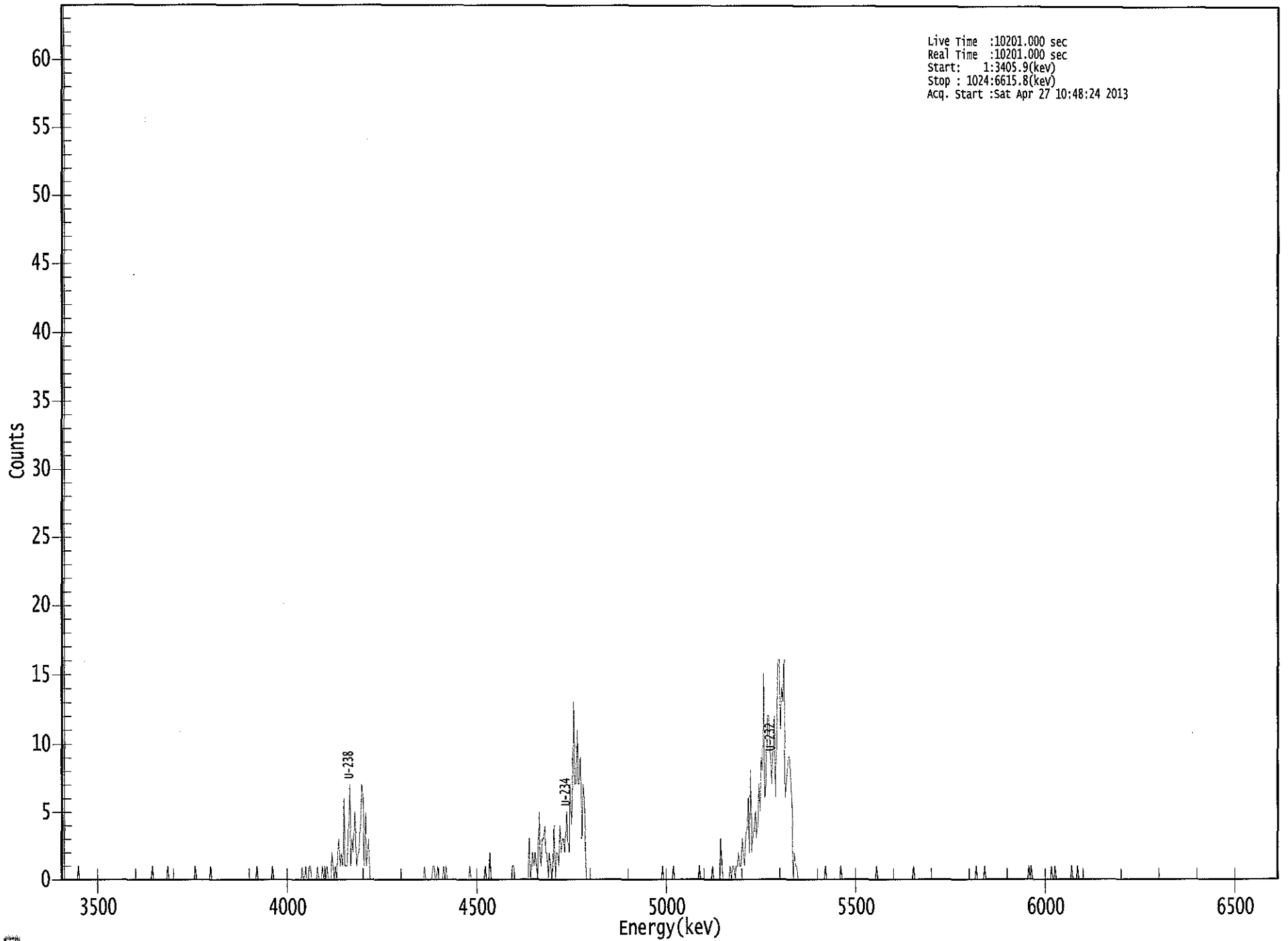
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.18E+000 +/- 5.93E-001	7.13E-002 +/- 8.16E-003
U-234	0.995	4761.50*	2.48E+000 +/- 4.72E-001	8.41E-002 +/- 9.62E-003
U-235	0.997	4385.50*	1.26E-001 +/- 9.66E-002	7.67E-002 +/- 8.78E-003
U-238	0.998	4184.40*	1.33E+000 +/- 3.15E-001	7.10E-002 +/- 8.12E-003

AG
4/29/13

US EPA ARCHIVE DOCUMENT

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Sat Apr 27 10:48:24 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: 10

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0
9:	0	0	0	0	0	0	1
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0
81:	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	1	0	0	0	0	0	0
121:	0	0	0	0	0	1	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	1	0	0
169:	0	0	0	0	0	0	0
177:	0	1	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	1	0	0	1	0
209:	1	1	0	0	0	0	1
217:	0	0	0	1	0	1	1
225:	0	0	0	2	1	0	1
233:	2	3	1	2	1	6	1
241:	1	4	7	1	3	2	5
249:	1	2	2	5	7	6	1
257:	1	2	3	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:	1	1	0	0	1	0	0
321:	0	1	0	1	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0
353:	0	0	0	0	1	0	0
361:	2	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 10

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	1	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	3	0	1	2	1	2	1
401:	0	5	2	1	3	3	4	2
409:	2	0	2	1	0	1	4	0
417:	2	2	1	4	2	3	3	2
425:	5	3	2	7	4	6	13	7
433:	7	11	7	7	9	3	7	6
441:	3	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	1	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	1	0	0	0	0
553:	0	0	3	1	0	0	0	0
561:	0	0	1	0	1	1	0	1
569:	1	2	1	1	3	2	1	3
577:	4	6	2	8	2	3	4	5
585:	3	4	7	5	9	8	15	6
593:	7	12	12	10	9	7	10	12
601:	6	12	16	16	11	14	13	16
609:	6	7	8	9	9	7	5	0
617:	2	1	1	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	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	0	0	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	1	0	0	0	0	0	0
777:	1	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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

Cynew

Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 11
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:25 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: 0.2096 +/- 0.0114
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 1.2131 +/- 0.0701

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.283	408.81	9.71	1.19	0.00E+000	34.4
U-234	4.730	175.15	14.85	0.85	0.00E+000	4.4
U-235	4.413	9.66	64.35	0.34	0.00E+000	3.2
U-238	4.152	125.32	17.56	0.68	0.00E+000	8.4

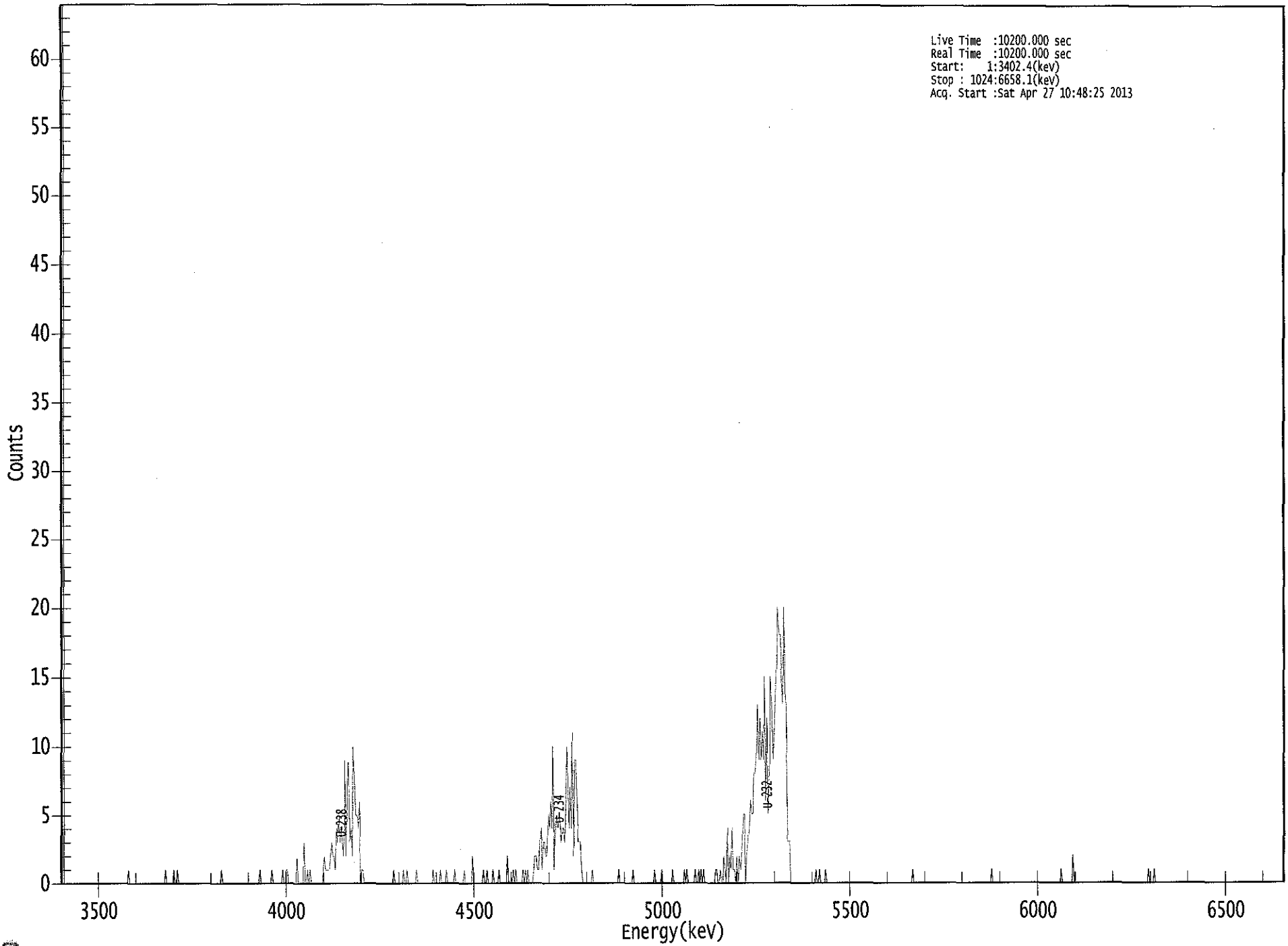
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.18E+000 +/- 5.55E-001	8.35E-002 +/- 8.94E-003
U-234	0.993	4761.50*	2.22E+000 +/- 4.06E-001	7.58E-002 +/- 8.12E-003
U-235	0.995	4385.50*	1.51E-001 +/- 9.85E-002	7.47E-002 +/- 8.00E-003
U-238	0.992	4184.40*	1.58E+000 +/- 3.25E-001	7.12E-002 +/- 7.62E-003

AG
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Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Sat Apr 27 10:48:25 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: 11

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 0 0 0 0 2 0 0

Sample Title: 11

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	1	0	0	0
385:	0	0	1	0	1	0	1	0
393:	0	0	0	1	2	2	1	1
401:	3	4	1	3	3	2	2	5
409:	4	6	4	10	1	4	5	4
417:	5	4	3	4	4	3	7	10
425:	4	7	4	11	2	9	9	6
433:	3	3	3	1	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	1	0	0	0	0	0
473:	0	0	0	0	0	0	1	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	1	0	0	0	0	0	1	0
505:	0	0	0	0	0	0	0	1
513:	0	0	0	0	0	0	0	0
521:	0	1	0	1	0	0	0	0
529:	0	0	1	0	0	1	0	1
537:	0	1	0	0	0	0	0	0
545:	0	0	0	1	1	0	0	1
553:	0	0	2	1	0	4	0	2
561:	1	4	1	1	0	2	0	2
569:	1	2	5	5	0	2	3	4
577:	6	5	5	8	8	9	13	9
585:	12	9	11	9	15	6	12	5
593:	8	15	13	9	11	13	16	20
601:	18	18	15	13	20	14	13	3
609:	3	3	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	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:	1	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	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	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: 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	1	0	0	0
841:	0	0	0	0	0	0	2	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	1	0	0
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	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
4/29/13

Sample Description: PZ-204A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 12
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:48:26 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: 0.2000 +/- 0.0112
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 1.0280 +/- 0.0604

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	388.81	9.96	1.19	0.00E+000	9.4
U-234	4.729	258.98	12.21	1.02	0.00E+000	5.0
U-235	4.385	19.49	45.07	0.51	0.00E+000	3.1
U-238	4.159	219.83	13.23	0.17	0.00E+000	13.7

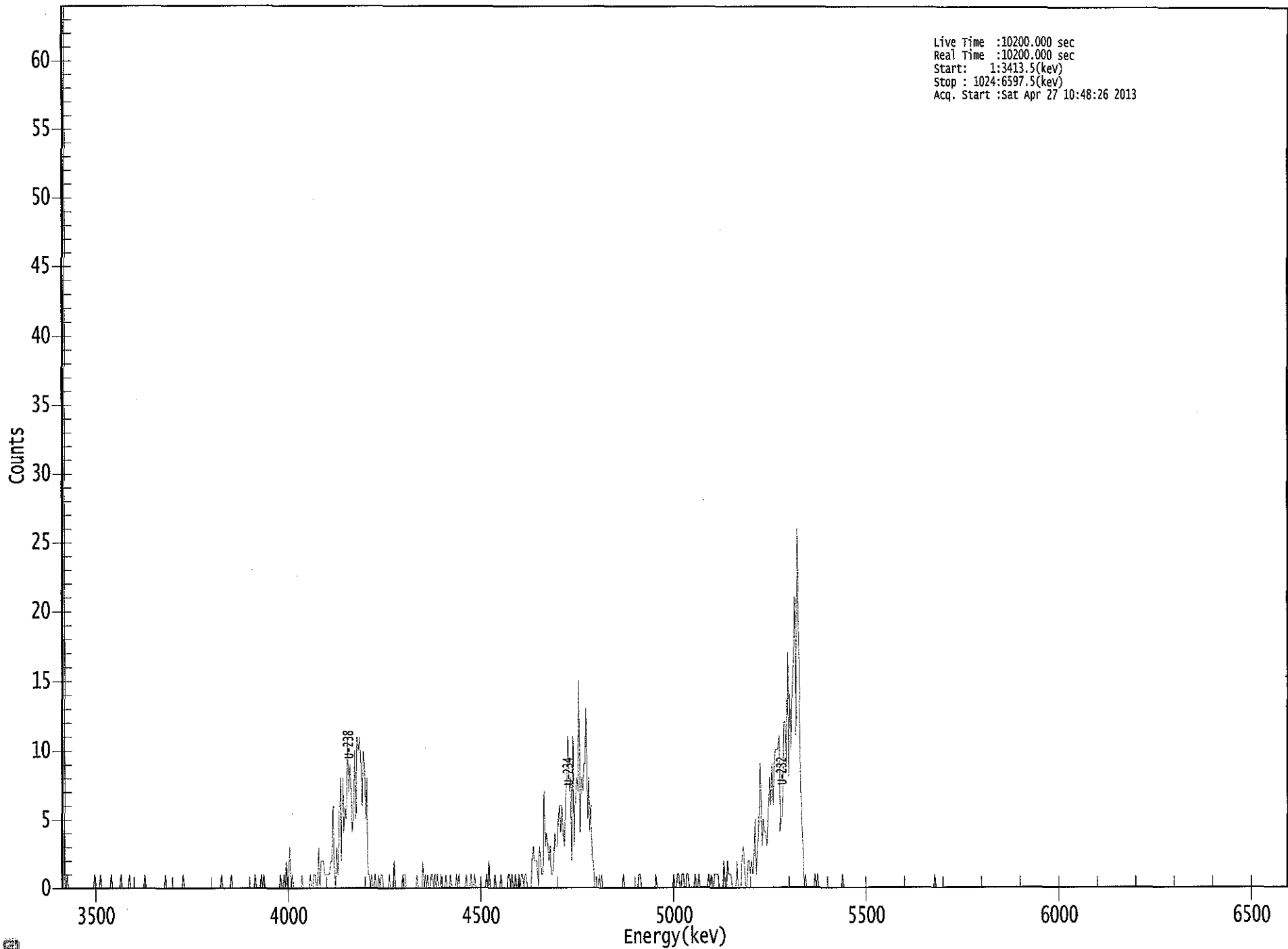
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.16E+000 +/- 5.65E-001	8.75E-002 +/- 9.57E-003
U-234	0.993	4761.50*	3.44E+000 +/- 5.63E-001	8.36E-002 +/- 9.14E-003
U-235	1.000	4385.50*	3.19E-001 +/- 1.48E-001	8.59E-002 +/- 9.39E-003
U-238	0.995	4184.40*	2.91E+000 +/- 4.99E-001	5.52E-002 +/- 6.03E-003

AG
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0000056563.CNF



Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(keV)
Stop : 1024:6597.5(keV)
Acq. Start :Sat Apr 27 10:48:26 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:	10200	10200	0	0	1	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	1	0	0	0	0
33:	1	0	0	0	0	0	0	0
41:	0	1	0	0	0	0	0	0
49:	0	1	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	1	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	1	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	1	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	1	0	0
137:	0	0	0	0	0	1	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	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	0	2	0	1	3	0
193:	1	0	0	0	0	0	0	0
201:	1	0	0	0	0	0	0	1
209:	0	0	1	1	0	0	3	0
217:	2	2	2	1	1	1	1	1
225:	2	2	6	1	0	3	1	4
233:	8	2	8	4	6	5	11	7
241:	9	7	4	5	10	5	11	10
249:	11	9	6	10	9	5	8	1
257:	1	0	1	0	0	1	0	0
265:	1	0	1	1	0	0	0	0
273:	0	1	0	0	0	2	0	0
281:	0	0	0	0	1	1	1	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	2	0	1
305:	0	1	0	0	1	1	0	1
313:	0	1	0	0	1	0	0	0
321:	1	0	0	0	1	0	0	0
329:	0	1	0	1	0	0	0	0
337:	0	1	0	0	0	1	0	0
345:	1	0	0	0	0	0	0	0
353:	0	0	1	0	2	0	0	0
361:	0	1	0	0	0	0	1	0

369: 0 0 0 0 1 1 0 1

Sample Title: 12

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	1	0	1
385:	1	0	1	1	0	0	0	0
393:	2	3	2	2	2	0	3	2
401:	1	1	7	3	4	3	2	3
409:	1	1	2	4	3	3	5	6
417:	4	6	4	3	7	8	11	7
425:	8	2	11	3	7	8	7	15
433:	4	8	7	9	9	13	5	8
441:	4	6	2	2	0	0	0	0
449:	1	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	1	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	1	1	0	0	0	0	0
489:	0	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	1	0
513:	0	1	1	0	0	1	1	0
521:	0	1	1	0	0	0	0	0
529:	1	0	0	1	0	0	0	0
537:	0	0	0	1	0	1	0	0
545:	1	1	1	1	0	0	0	0
553:	2	0	0	2	1	1	1	0
561:	0	0	0	2	0	0	0	2
569:	3	2	0	0	2	2	1	2
577:	1	2	5	1	3	4	9	6
585:	3	5	4	4	3	5	8	6
593:	9	6	9	10	10	10	11	4
601:	5	7	12	12	9	17	8	14
609:	10	15	17	21	11	26	20	14
617:	7	5	3	0	1	0	0	0
625:	0	0	0	0	1	0	1	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	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
4/29/13*

Sample Description: PZ-204A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 13
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:17 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.1989 +/- 0.0111
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Chem. Recovery Factor: 1.0901 +/- 0.0640

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.283	384.49	10.00	0.51	0.00E+000	12.6
U-234	4.736	232.00	12.90	0.00	0.00E+000	4.6
U-235	4.383	4.83	91.00	0.17	0.00E+000	3.0
U-238	4.168	185.00	14.45	0.00	0.00E+000	6.6

T = Tracer Peak used for Effective Efficiency

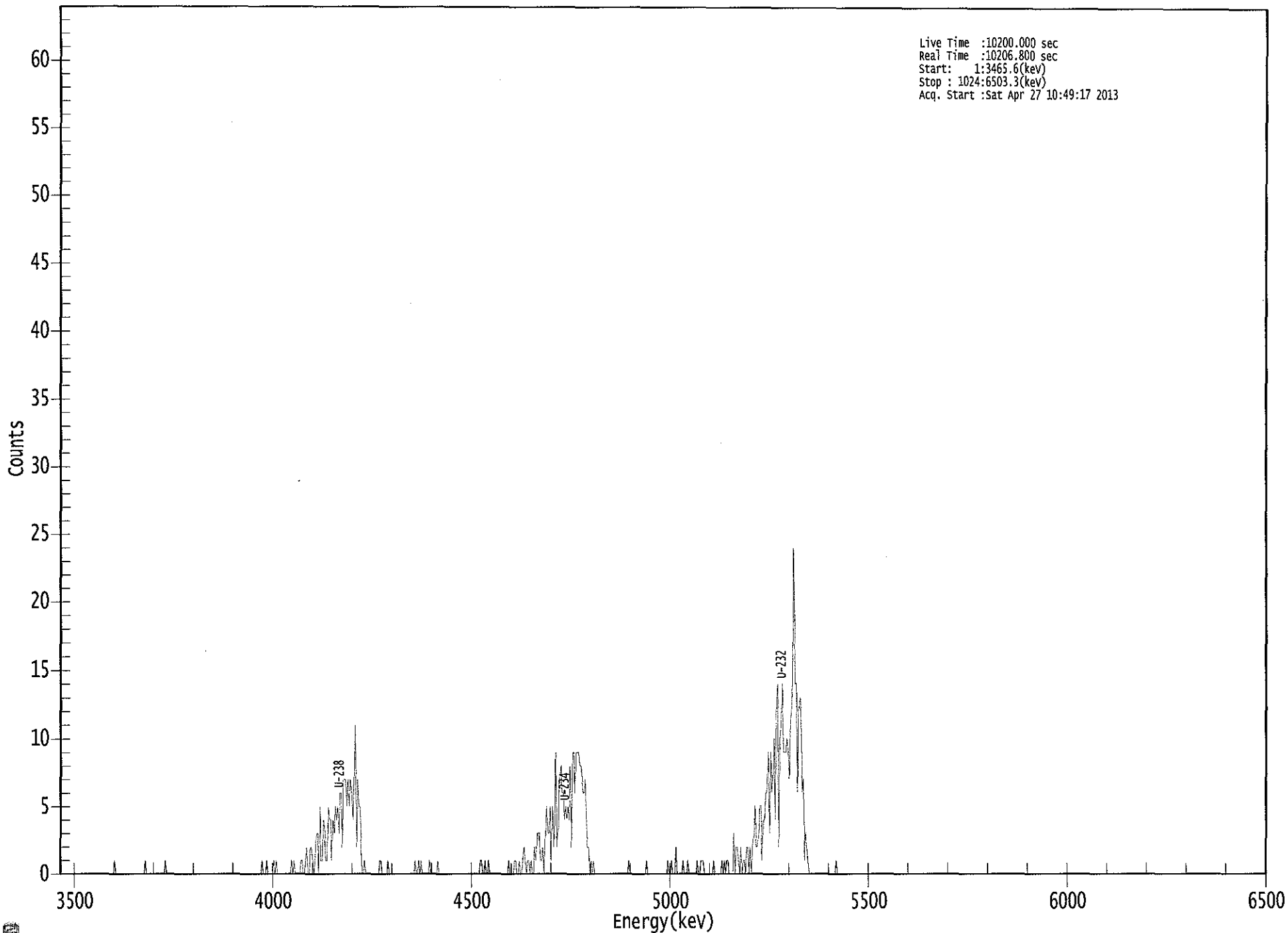
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.13E+000 +/- 5.63E-001	7.01E-002 +/- 7.69E-003
U-234	0.995	4761.50*	3.10E+000 +/- 5.24E-001	8.00E-002 +/- 8.78E-003
U-235	1.000	4385.50*	7.95E-002 +/- 7.29E-002	6.87E-002 +/- 7.54E-003
U-238	0.998	4184.40*	2.46E+000 +/- 4.46E-001	7.97E-002 +/- 8.74E-003

*AG
4/29/13*

US EPA ARCHIVE DOCUMENT

Live Time : 10200.000 sec
Real Time : 10206.800 sec
Start : 1:3465.6(keV)
Stop : 1024:6503.3(keV)
Acq. Start : Sat Apr 27 10:49:17 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: 10207

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	1	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:	1	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0	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	1	0	0	0	0	1
177:	0	0	0	0	0	1	0	0	1
185:	0	0	0	0	0	0	0	0	0
193:	0	0	0	0	1	0	1	0	0
201:	0	0	0	0	1	1	0	0	0
209:	1	2	0	0	2	2	1	0	0
217:	1	3	3	0	5	1	1	4	4
225:	3	1	1	5	4	4	1	4	4
233:	3	5	4	5	3	6	6	2	2
241:	7	7	7	5	7	5	7	6	6
249:	4	8	11	2	7	5	5	2	2
257:	0	0	1	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	1	1
273:	1	0	0	0	0	0	1	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	1	0	0	0
305:	1	0	1	0	0	0	0	0	0
313:	0	1	0	0	0	0	0	0	0
321:	1	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	1	1	0	0	0
361:	1	0	0	1	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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
4/29/13

Sample Description: PZ-205-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 14
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:19 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.597 mL
 Effective Efficiency: 0.1603 +/- 0.0098
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.8640 +/- 0.0551

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

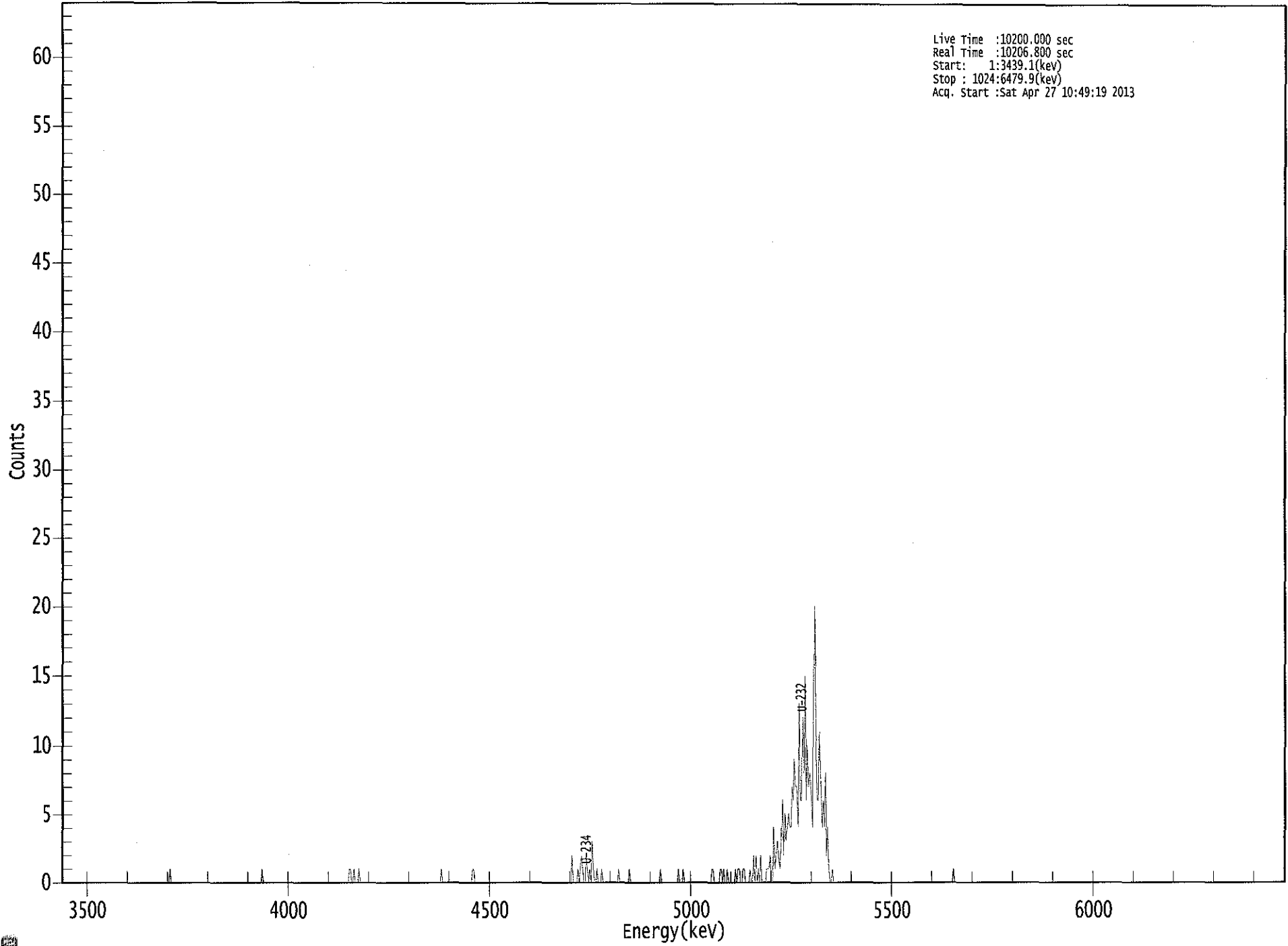
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	308.83	11.16	0.17	0.00E+000	7.5
U-234	4.745	17.83	46.68	0.17	0.00E+000	3.7
U-235	4.434	2.66	128.85	0.34	0.00E+000	3.0
U-238	4.162	3.66	107.87	0.34	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.12E+000 +/- 6.16E-001	6.91E-002 +/- 8.32E-003
U-234	0.998	4761.50*	2.95E-001 +/- 1.42E-001	6.91E-002 +/- 8.32E-003
U-235	0.983	4385.50*	5.43E-002 +/- 7.03E-002	9.77E-002 +/- 1.18E-002
U-238	0.996	4184.40*	6.03E-002 +/- 6.55E-002	7.88E-002 +/- 9.49E-003

AG
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Live Time :10200.000 sec
Real Time :10206.800 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Sat Apr 27 10:49:19 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: 14

Elapsed Live time: 10200

Elapsed Real Time: 10207

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	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:	1	1	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	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	1
345:	1	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: 14

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0	0
425:	0	0	2	0	0	0	0	0	1
433:	0	1	2	1	0	0	0	2	1
441:	0	1	0	3	1	0	0	0	1
449:	0	0	0	1	0	0	0	0	0
457:	0	0	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	0	0
473:	0	0	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0	0
505:	0	0	0	0	0	0	0	0	0
513:	0	0	0	1	0	0	0	0	1
521:	0	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0	1
545:	1	0	0	0	0	0	0	1	1
553:	0	1	0	0	1	0	0	0	0
561:	0	0	0	1	0	1	1	1	0
569:	0	1	1	0	0	0	0	0	1
577:	0	0	2	0	2	0	1	1	0
585:	2	0	0	0	0	1	1	1	1
593:	2	0	0	4	1	2	3	2	2
601:	1	3	6	2	5	3	4	5	5
609:	4	4	7	6	9	7	7	4	4
617:	13	6	6	12	8	15	6	10	10
625:	7	8	7	4	13	20	11	6	6
633:	6	11	8	4	6	4	8	2	2
641:	4	1	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:	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	1	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: 14

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

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Sample Description: PZ-205-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 15
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:14 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.1569 +/- 0.0097
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.8591 +/- 0.0552

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

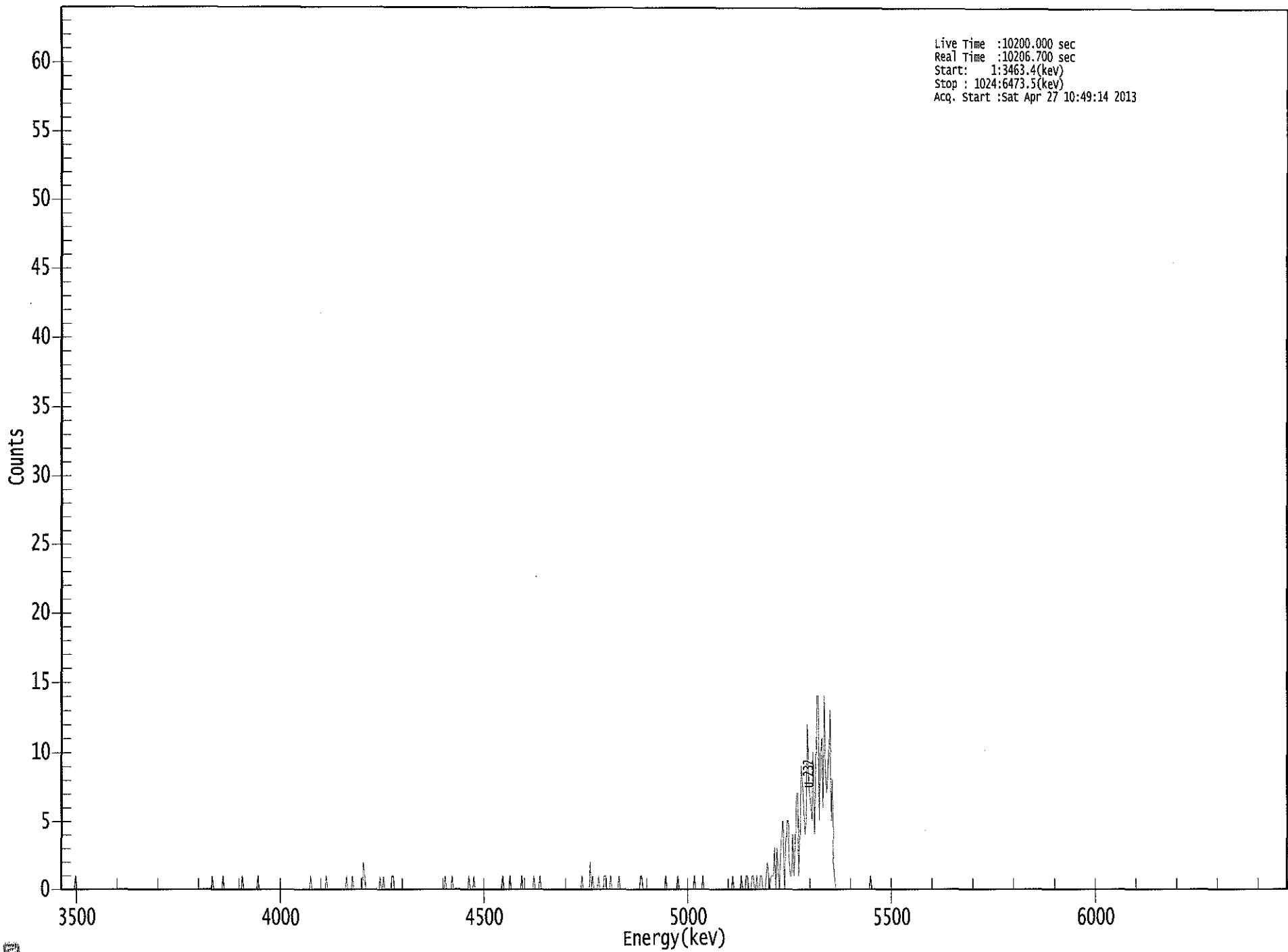
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.300	303.66	11.26	0.34	0.00E+000	8.9
U-234	4.755	10.66	61.14	0.34	0.00E+000	2.9
U-235	4.442	3.83	102.72	0.17	0.00E+000	2.9
U-238	4.183	8.83	66.70	0.17	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.14E+000 +/- 6.24E-001	8.10E-002 +/- 9.82E-003
U-234	1.000	4761.50*	1.80E-001 +/- 1.12E-001	8.09E-002 +/- 9.81E-003
U-235	0.978	4385.50*	8.00E-002 +/- 8.27E-002	8.71E-002 +/- 1.06E-002
U-238	1.000	4184.40*	1.49E-001 +/- 1.01E-001	7.03E-002 +/- 8.53E-003

AG
 4/29/13



Live Time :10200.000 sec
Real Time :10206.700 sec
Start: 1:3463.4(keV)
Stop : 1024:6473.5(keV)
Acq. Start :Sat Apr 27 10:49:14 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: 15

Elapsed Live time: 10200

Elapsed Real Time: 10207

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	1	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	1
137:	0	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	1	0	0	0
169:	0	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0	0
185:	0	0	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:	1	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	1	0	0
225:	0	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	1	0
241:	0	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	2	1	0	0
257:	0	0	0	0	0	0	0	0	0
265:	0	0	0	1	0	0	1	0	0
273:	0	0	0	0	0	1	1	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:	1	0	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	0	0	0
345:	1	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: 1 0 0 0 0 0 0 1 0

Sample Title: 15

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	1	0	0	0	0	1
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	0	0	0
441:	0	2	0	1	0	0	0	0
449:	1	0	0	0	0	1	1	0
457:	0	0	1	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	1	1	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	1	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	1	0	0	0	0	0	0	1
569:	0	0	0	1	1	0	0	0
577:	1	1	0	0	1	0	0	1
585:	1	0	0	0	1	2	1	0
593:	1	1	1	3	0	3	1	0
601:	3	5	4	0	3	5	5	2
609:	1	1	4	1	3	7	7	1
617:	4	9	8	6	4	5	12	8
625:	7	6	5	10	4	8	14	14
633:	5	10	11	6	14	9	7	8
641:	10	13	5	8	2	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	1	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 15

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

4/23/13

Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 16
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:16 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.598 mL
 Effective Efficiency: 0.2200 +/- 0.0118
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 1.2342 +/- 0.0701

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.259	424.83	9.51	0.17	0.00E+000	22.1
U-234	4.728	57.66	25.90	0.34	0.00E+000	5.1
U-235	4.409	11.00	61.72	0.00	0.00E+000	4.4
U-238	4.148	39.83	31.13	0.17	0.00E+000	2.9

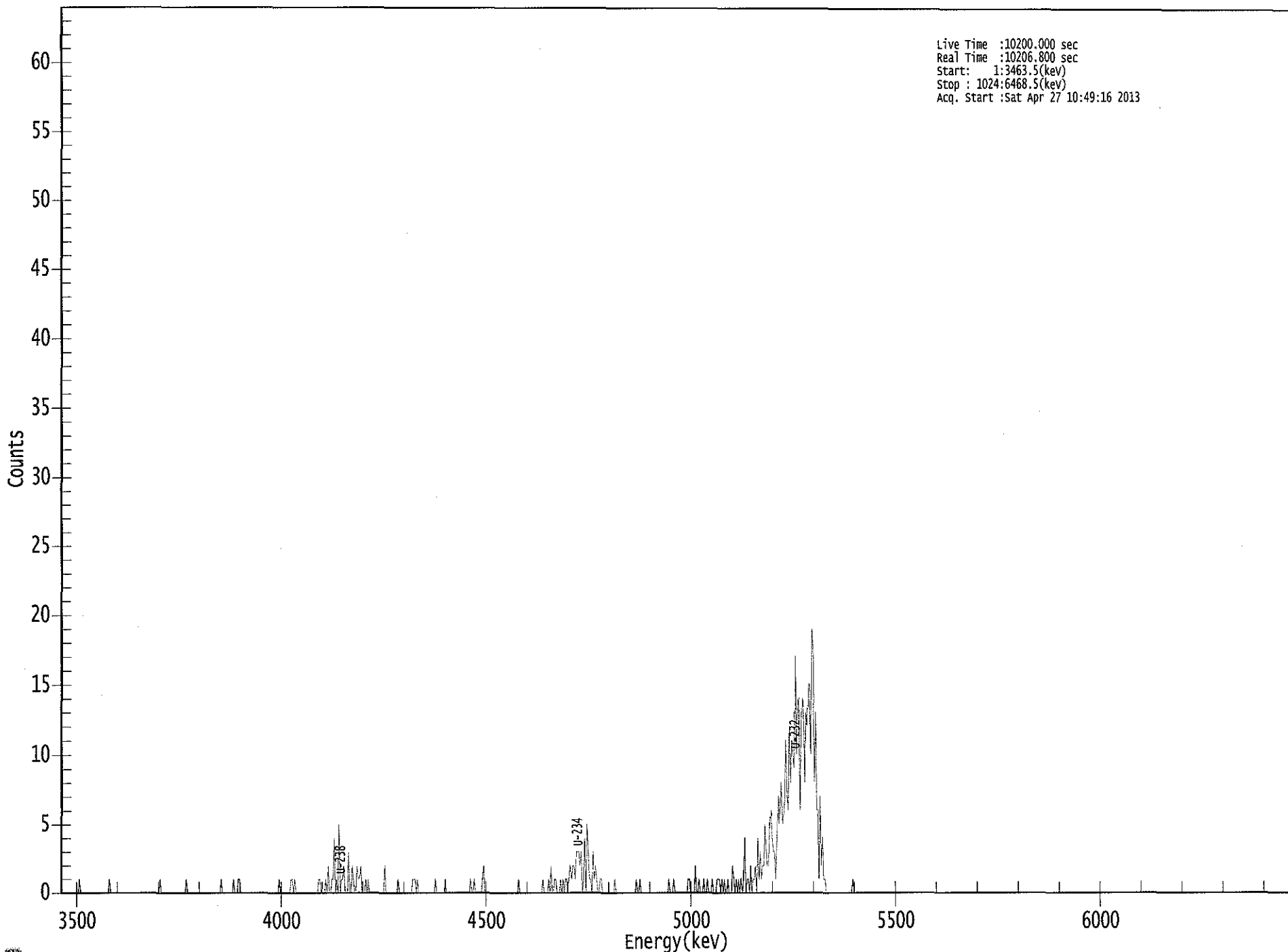
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.987	5302.50*	5.13E+000 +/- 5.40E-001	5.04E-002 +/- 5.30E-003
U-234	0.992	4761.50*	6.96E-001 +/- 1.95E-001	5.77E-002 +/- 6.07E-003
U-235	0.996	4385.50*	1.64E-001 +/- 1.03E-001	8.93E-002 +/- 9.40E-003
U-238	0.991	4184.40*	4.79E-001 +/- 1.57E-001	5.01E-002 +/- 5.28E-003

AG
4/29/13

0000056565.CNF



Live Time :10200.000 sec
Real Time :10206.800 sec
Start: 1:3463.5(keV)
Stop : 1024:6468.5(keV)
Acq. Start :Sat Apr 27 10:49:16 2013

ROI Type: 1

ROI Type: 3

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10207

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	1
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:	1	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	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:	1	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	1	0	0
137:	0	0	0	0	0	0	0	0	1
145:	0	0	0	1	1	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	1	0	0
185:	0	0	0	0	0	0	0	0	1
193:	1	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	1	1
217:	0	0	0	0	1	0	2	0	0
225:	0	1	1	4	0	1	0	0	5
233:	0	1	1	2	0	0	0	0	3
241:	0	0	2	1	0	0	2	0	1
249:	1	2	0	0	0	1	0	0	1
257:	0	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	2	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	1	1	1	0	0
297:	1	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0	1
313:	0	0	0	0	0	0	0	0	1
321:	0	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	0	1
345:	0	0	0	0	0	0	1	0	2
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: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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

Handwritten: 4/29/13

Sample Description: PZ-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 17
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.2570 +/- 0.0129
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.3523 +/- 0.0720

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	498.83	8.78	0.17	0.00E+000	16.8
U-234	4.732	42.83	30.02	0.17	0.00E+000	3.3
U-235	4.389	3.83	102.72	0.17	0.00E+000	3.0
U-238	4.164	38.83	31.53	0.17	0.00E+000	3.3

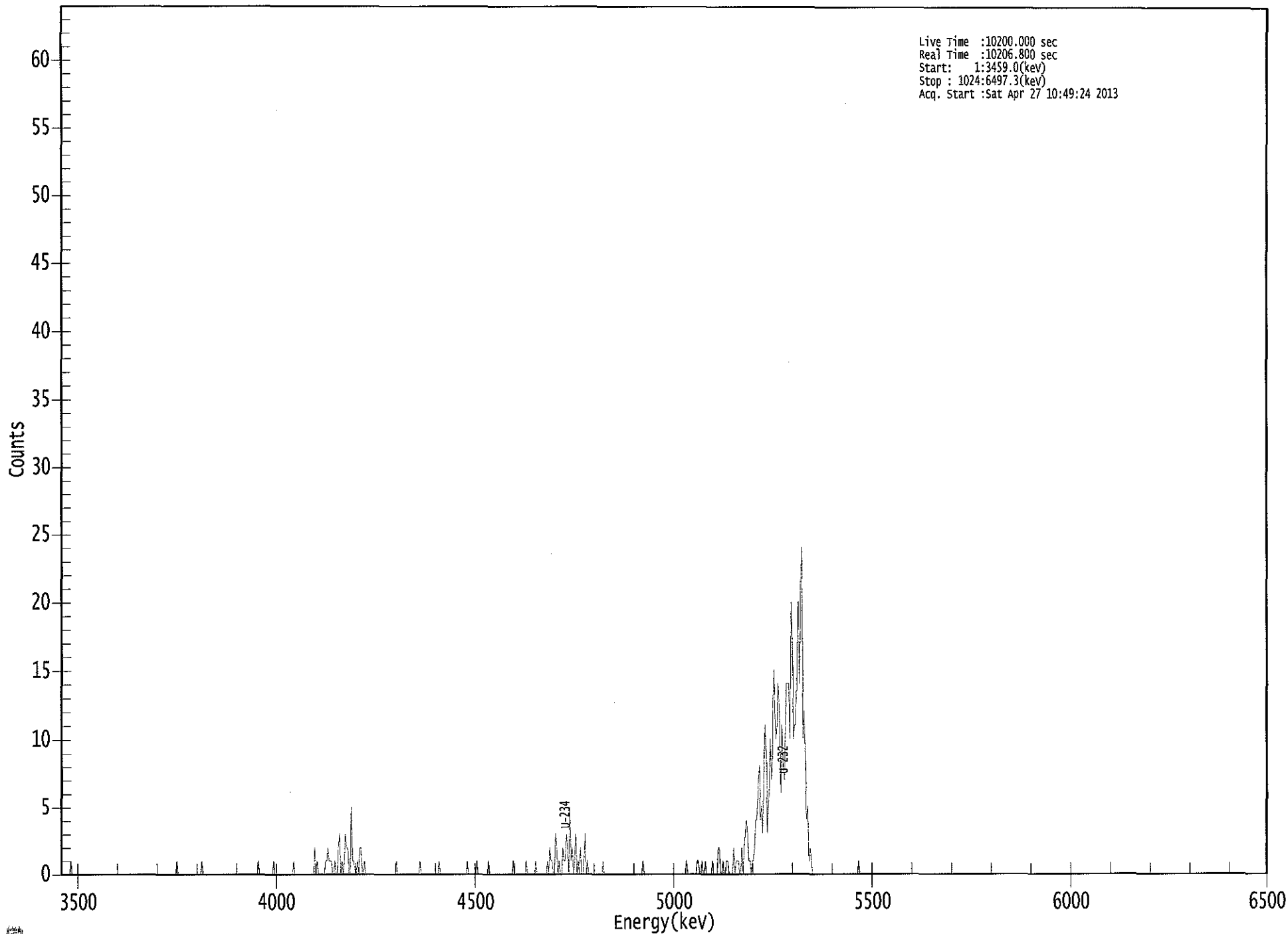
T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.16E+000 +/- 5.09E-001	4.31E-002 +/- 4.26E-003
U-234	0.994	4761.50*	4.43E-001 +/- 1.40E-001	4.31E-002 +/- 4.26E-003
U-235	1.000	4385.50*	4.88E-002 +/- 5.04E-002	5.32E-002 +/- 5.25E-003
U-238	0.997	4184.40*	3.99E-001 +/- 1.32E-001	4.29E-002 +/- 4.24E-003

Handwritten: AG
4/29/13

Live Time :10200.000 sec
Real Time :10206.800 sec
Start: 1:3459.0(keV)
Stop : 1024:6497.3(keV)
Acq. Start :Sat Apr 27 10:49:24 2013



 ***** 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: 10207

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	1	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	1	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	1
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	1
169:	0	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	0	0
185:	0	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0	2
217:	0	1	0	0	0	0	0	0	0
225:	1	1	2	1	1	1	1	0	0
233:	1	0	0	2	3	0	0	1	0
241:	1	3	2	2	0	0	0	5	1
249:	1	0	0	1	0	0	2	2	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	1	0	0	0
289:	0	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0	0
321:	1	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:	1	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0	0
361:	0	0	1	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	1
385:	0	0	0	0	0	0	0	0
393:	0	0	1	0	0	0	0	0
401:	0	0	1	0	0	0	0	0
409:	0	0	0	0	1	0	2	1
417:	1	0	0	3	2	0	1	0
425:	0	2	1	1	3	2	0	5
433:	1	2	0	1	3	0	1	0
441:	2	0	0	1	3	0	1	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	1	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	1	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	1	0	0	0	0	0
537:	0	0	0	1	1	0	0	1
545:	0	0	1	0	0	0	0	0
553:	1	0	0	0	0	2	2	0
561:	0	1	0	0	1	1	0	0
569:	0	0	2	0	1	1	1	0
577:	0	2	0	2	3	4	3	1
585:	1	0	1	1	2	4	4	7
593:	8	4	5	3	9	11	8	3
601:	6	10	7	9	15	12	10	11
609:	14	12	6	11	8	7	10	14
617:	14	14	10	20	17	10	11	11
625:	16	20	14	22	24	10	12	8
633:	4	5	1	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	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	1	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	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	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-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 18
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:21 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.2095 +/- 0.0115
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.0588 +/- 0.0608

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	406.00	9.74	0.00	0.00E+000	46.8
U-234	4.741	16.15	50.25	0.85	0.00E+000	4.5
U-235	4.406	1.49	190.02	0.51	0.00E+000	3.0
U-238	4.182	4.09	141.06	3.91	0.00E+000	3.0

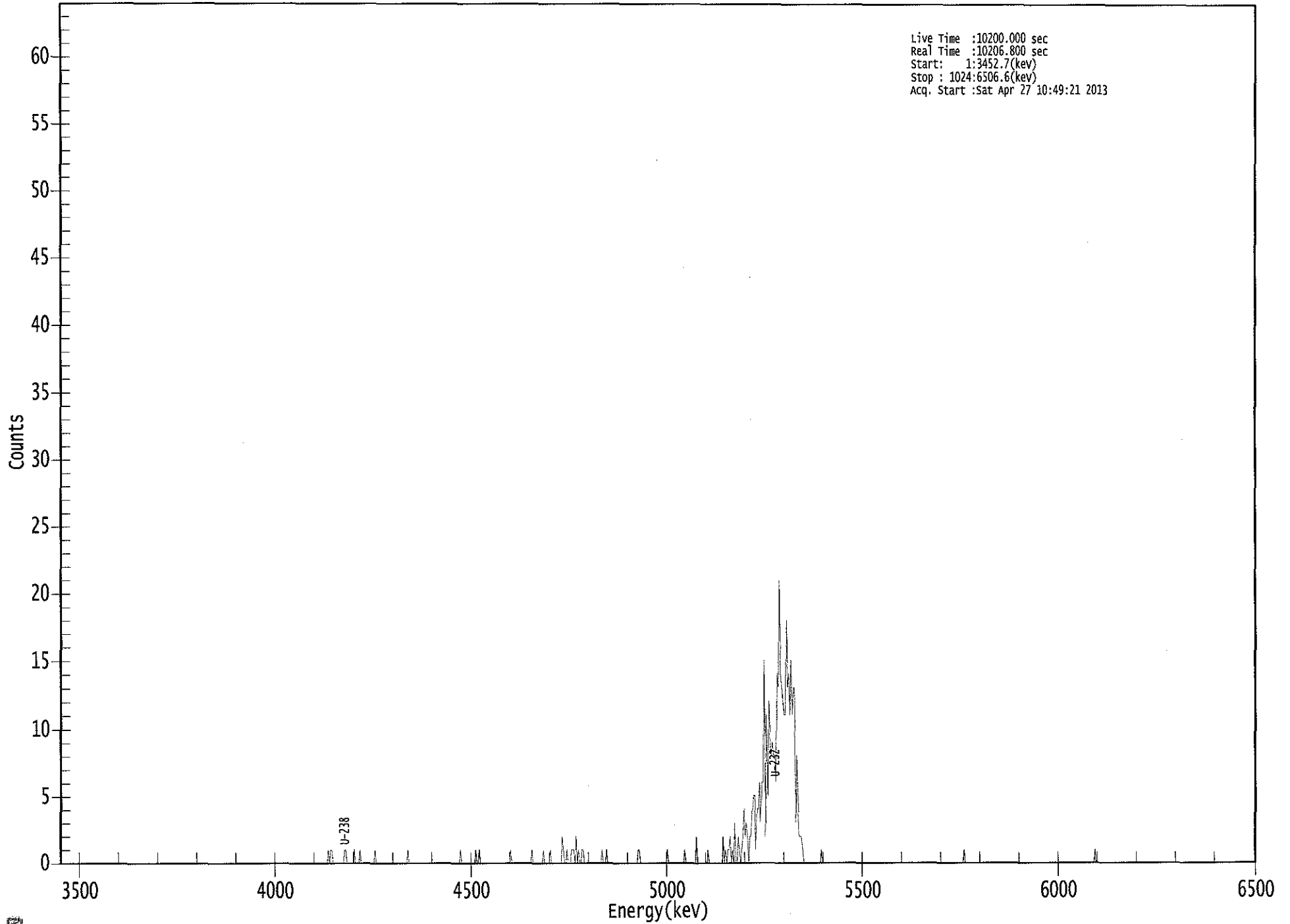
T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.15E+000 +/- 5.53E-001	7.60E-002 +/- 8.16E-003
U-234	0.997	4761.50*	2.05E-001 +/- 1.05E-001	7.59E-002 +/- 8.14E-003
U-235	0.997	4385.50*	2.33E-002 +/- 4.43E-002	8.20E-002 +/- 8.81E-003
U-238	1.000	4184.40*	5.16E-002 +/- 7.30E-002	1.23E-001 +/- 1.32E-002

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US EPA ARCHIVE DOCUMENT



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: 10207

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	1	0	1
233:	1	0	0	0	0	0	0	0
241:	0	0	0	1	1	0	0	0
249:	0	0	0	1	0	0	0	0
257:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	1	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	1	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	1	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	0	0	1	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	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	0	0	1	0	0	0	0
425:	0	0	0	0	0	2	1	0
433:	0	1	0	0	0	1	1	1
441:	0	2	0	1	0	0	1	1
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	1	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	1	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	2	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	0	0	0	0	0	0	2
569:	0	1	0	1	1	2	0	1
577:	0	3	0	0	2	1	0	1
585:	2	4	2	3	2	0	2	2
593:	4	5	5	1	4	4	6	3
601:	6	6	15	2	11	5	12	9
609:	8	9	8	8	6	14	13	21
617:	14	13	12	11	11	18	13	14
625:	11	15	11	13	13	3	8	4
633:	2	2	2	1	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	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	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	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-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000565
 Batch Identification: 1304104A-UU
 Sample Identification: 19
 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: 4/8/2013 7:39:23 AM
 Acquisition Date/Time: 4/27/2013 10:49:22 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.600 mL
 Effective Efficiency: 0.1816 +/- 0.0105
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.9836 +/- 0.0596

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

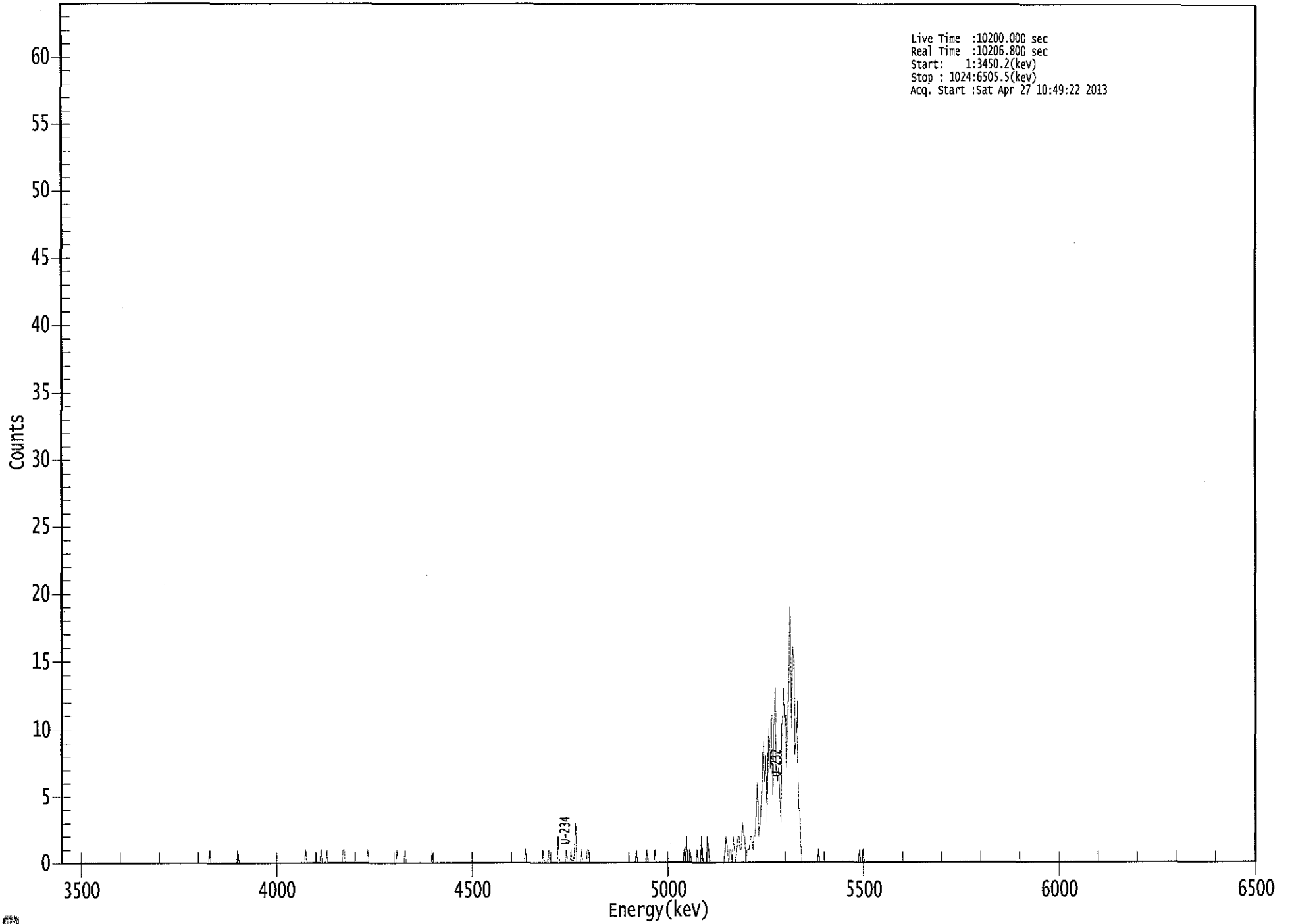
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.281	351.83	10.45	0.17	0.00E+000	18.4
U-234	4.741	13.49	54.53	0.51	0.00E+000	3.7
U-235	4.344	2.49	138.29	0.51	0.00E+000	3.0
U-238	4.149	5.66	85.23	0.34	0.00E+000	3.0

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*	5.15E+000 +/- 5.86E-001	6.10E-002 +/- 6.95E-003
U-234	0.997	4761.50*	1.97E-001 +/- 1.10E-001	7.67E-002 +/- 8.73E-003
U-235	0.988	4385.50*	4.49E-002 +/- 6.23E-002	9.46E-002 +/- 1.08E-002
U-238	0.991	4184.40*	8.24E-002 +/- 7.09E-002	6.96E-002 +/- 7.92E-003

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Live Time : 10200.000 sec
Real Time : 10206.800 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start : Sat Apr 27 10:49:22 2013

 ***** 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: 10207

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:	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	1
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	1	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	1	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	1	0	0
265:	0	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	1	0	0
297:	0	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	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: 19

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	1	0	0	0
417:	0	1	0	0	0	0	0	0
425:	0	2	0	0	0	0	0	0
433:	1	0	0	0	1	0	0	1
441:	3	0	0	0	0	1	0	0
449:	0	0	1	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	1	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	0	0	1	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	2
537:	0	0	1	0	0	0	0	0
545:	1	0	0	0	2	0	0	0
553:	0	2	1	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	2	1	0	1	1	0	2
577:	1	0	1	2	2	1	1	3
585:	2	2	0	1	1	1	2	2
593:	1	2	2	4	6	2	3	4
601:	6	9	6	8	3	8	10	7
609:	11	5	10	13	7	6	7	5
617:	3	10	13	10	11	7	11	15
625:	19	10	16	15	8	9	12	4
633:	4	1	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	1	0	0	1	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 4/27/2013
Time : 10:45:45 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/27/2013 10:28:41 AM
Alpha 004	21f	ALL	Passed	4/27/2013 10:28:42 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	4/27/2013 10:28:43 AM
Alpha 011	21f	ALL	Passed	4/27/2013 10:28:44 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/27/2013 10:28:45 AM
Alpha 014	21f	ALL	Passed	4/27/2013 10:28:46 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/27/2013 10:28:46 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/27/2013 10:28:47 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/27/2013 10:28:48 AM
Alpha 025	AIM730	ALL	Passed	4/27/2013 10:28:49 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/27/2013 10:28:50 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/27/2013 10:28:51 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	4/27/2013 10:28:52 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:28:53 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:28:55 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:28:56 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:28:58 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:00 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:01 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:03 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:06 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:07 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:11 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/27/2013 10:29:13 AM

APPROVED BY: ICBAPPROVAL DATE: 4/27/13

***** 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

**SECTION IX
ANALYTICAL DATA (ISOTOPIC THORIUM)**

Work Order	13-04104	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-103-SS TOT	36	04/08/13 11:15	1.0000E+00
Lab Deadline	5/7/2013	04	DO	PZ-103-SS TOT	36	04/08/13 11:15	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-103-SS DIS	36	04/08/13 11:15	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-114-AS TOT	39	04/08/13 11:45	1.0000E+00
Report Level	4	07	TRG	PZ-114-AS DIS	39	04/08/13 11:45	1.0000E+00
Activity Units	pCi	08	TRG	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.0000E+00
Aliquot Units	I	09	TRG	FB at PZ-201A-SS DIS	40	04/08/13 12:45	1.0000E+00
Matrix	WA	10	TRG	PZ-201A-SS TOT	38	04/08/13 13:22	1.0000E+00
Method	NAS NS-3004 Modified	11	TRG	PZ-201A-SS DIS	38	04/08/13 13:22	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-204A-SS TOT	45	04/08/13 13:26	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	PZ-204A-SS DIS	45	04/08/13 13:26	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	PZ-205-AS TOT	43	04/08/13 13:36	1.0000E+00
Tracer Act (dpm/g)	22.467	15	TRG	PZ-205-AS DIS	43	04/08/13 13:36	1.0000E+00
Carrier		16	TRG	PZ-205-SS TOT	40	04/08/13 14:50	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-205-SS DIS	40	04/08/13 14:50	1.0000E+00
		18	TRG	PZ-206-SS TOT	42	04/08/13 15:00	1.0000E+00
		19	TRG	PZ-206-SS DIS	42	04/08/13 15:00	1.0000E+00

0204

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

ThISO

Run 1

Internal Fraction	Sample Desc	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	0.4498	10.1		0.00								
02	MBL	0.2259	5.1		0.00								
03	DUP	0.2255	5.1		0.00								
04	DO	0.2255	5.1		0.00								
05	TRG	0.2236	5.0		0.00								
06	TRG	0.2249	5.1		0.00								
07	TRG	0.2248	5.1		0.00								
08	TRG	0.2244	5.0		0.00								
09	TRG	0.2253	5.1		0.00								
10	TRG	0.2246	5.0		0.00								
11	TRG	0.2240	5.0		0.00								
12	TRG	0.2247	5.0		0.00								
13	TRG	0.2232	5.0		0.00								
14	TRG	0.2229	5.0		0.00								
15	TRG	0.2230	5.0		0.00								
16	TRG	0.2228	5.0		0.00								
17	TRG	0.2235	5.0		0.00								
18	TRG	0.2229	5.0		0.00								
19	TRG	0.2227	5.0		0.00								

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

ThISO

Run 1

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep 10 Date/Time	Sep 10 By	Sep 11 Date/Time	Sep 11 By
01	LCS			04/22/13 16:35	LWALKER				
02	MBL			04/22/13 16:35	LWALKER				
03	DUP			04/22/13 16:35	LWALKER				
04	DO			04/22/13 16:35	LWALKER				
05	TRG			04/22/13 16:35	LWALKER				
06	TRG			04/22/13 16:35	LWALKER				
07	TRG			04/22/13 16:35	LWALKER				
08	TRG			04/22/13 16:35	LWALKER				
09	TRG			04/22/13 16:35	LWALKER				
10	TRG			04/22/13 16:35	LWALKER				
11	TRG			04/22/13 16:35	LWALKER				
12	TRG			04/22/13 16:35	LWALKER				
13	TRG			04/22/13 16:35	LWALKER				
14	TRG			04/22/13 16:35	LWALKER				
15	TRG			04/22/13 16:35	LWALKER				
16	TRG			04/22/13 16:35	LWALKER				
17	TRG			04/22/13 16:35	LWALKER				
18	TRG			04/22/13 16:35	LWALKER				
19	TRG			04/22/13 16:35	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.

0206

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-228	LCS	LCS	pCi/l	4.67E+00	7.31E-01	5.21E-02	4.75E+00	98.19	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	0.00E+00	3.35E-02	7.26E-02					OK	OK
03	TH-228	DUP	PZ-103-SS TOT	pCi/l	2.87E+00	6.28E-01	8.33E-02				NA	OK	
04	TH-228	DO	PZ-103-SS TOT	pCi/l	2.96E+00	6.39E-01	8.69E-02					OK	
05	TH-228	TRG	PZ-103-SS DIS	pCi/l	5.52E-02	6.44E-02	9.98E-02					OK	
06	TH-228	TRG	PZ-114-AS TOT	pCi/l	3.25E-02	5.91E-02	1.07E-01					OK	
07	TH-228	TRG	PZ-114-AS DIS	pCi/l	-4.67E-02	3.95E-02	1.50E-01					OK	
08	TH-228	TRG	FB at PZ-201A-SS TOT	pCi/l	2.39E-02	4.99E-02	9.49E-02					OK	
09	TH-228	TRG	FB at PZ-201A-SS DIS	pCi/l	-7.70E-03	5.03E-02	1.27E-01					OK	
10	TH-228	TRG	PZ-201A-SS TOT	pCi/l	4.14E-02	7.74E-02	1.40E-01					OK	
11	TH-228	TRG	PZ-201A-SS DIS	pCi/l	2.88E-02	6.61E-02	1.28E-01					OK	
12	TH-228	TRG	PZ-204A-SS TOT	pCi/l	3.70E-01	1.90E-01	1.66E-01					OK	
13	TH-228	TRG	PZ-204A-SS DIS	pCi/l	1.55E-02	5.81E-02	1.26E-01					OK	
14	TH-228	TRG	PZ-205-AS TOT	pCi/l	3.07E-01	1.51E-01	1.07E-01					OK	
15	TH-228	TRG	PZ-205-AS DIS	pCi/l	-1.80E-02	3.44E-02	1.19E-01					OK	
16	TH-228	TRG	PZ-205-SS TOT	pCi/l	-5.13E-03	4.10E-02	1.11E-01					OK	
17	TH-228	TRG	PZ-205-SS DIS	pCi/l	3.46E-02	5.19E-02	8.41E-02					OK	
18	TH-228	TRG	PZ-206-SS TOT	pCi/l	9.87E-02	7.69E-02	6.03E-02					OK	
19	TH-228	TRG	PZ-206-SS DIS	pCi/l	4.88E-02	5.32E-02	6.37E-02					OK	

2020

Run	1	Analysis Code	THISO	Eberline Services Work Order	13-04104	Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-THISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep 10 Date/Time	Sep 11 Date/Time
01	TH-228	LCS	04/16/13 00:00	1.00E+00	111.68	0.00	0.00			
02	TH-228	MBL	04/16/13 00:00	1.00E+00	122.43	0.00	0.00			
03	TH-228	DUP	04/08/13 11:15	1.00E+00	100.60	0.00	0.00			
04	TH-228	DO	04/08/13 11:15	1.00E+00	111.06	0.00	0.00			
05	TH-228	TRG	04/08/13 11:15	1.00E+00	138.78	0.00	0.00			
06	TH-228	TRG	04/08/13 11:45	1.00E+00	118.78	0.00	0.00			
07	TH-228	TRG	04/08/13 11:45	1.00E+00	90.76	0.00	0.00			
08	TH-228	TRG	04/08/13 12:45	1.00E+00	112.63	0.00	0.00			
09	TH-228	TRG	04/08/13 12:45	1.00E+00	107.25	0.00	0.00			
10	TH-228	TRG	04/08/13 13:22	1.00E+00	103.47	0.00	0.00			
11	TH-228	TRG	04/08/13 13:22	1.00E+00	94.86	0.00	0.00			
12	TH-228	TRG	04/08/13 13:26	1.00E+00	95.20	0.00	0.00			
13	TH-228	TRG	04/08/13 13:26	1.00E+00	97.85	0.00	0.00			
14	TH-228	TRG	04/08/13 13:36	1.00E+00	99.82	0.00	0.00			
15	TH-228	TRG	04/08/13 13:36	1.00E+00	105.10	0.00	0.00			
16	TH-228	TRG	04/08/13 14:50	1.00E+00	103.09	0.00	0.00			
17	TH-228	TRG	04/08/13 14:50	1.00E+00	99.51	0.00	0.00			
18	TH-228	TRG	04/08/13 15:00	1.00E+00	100.96	0.00	0.00			
19	TH-228	TRG	04/08/13 15:00	1.00E+00	111.29	0.00	0.00			

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

0020

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	04/29/13 10:00		A_Spec	Alpha_044	170	3.74 E+02	1.00 E-03	19
02	TH-228	MBL	04/29/13 10:00		A_Spec	Alpha_046	170	1.00 E+00	0.00 E+00	17.9
03	TH-228	DUP	04/29/13 10:00		A_Spec	Alpha_047	170	1.94 E+02	4.00 E-03	18.2
04	TH-228	DO	04/29/13 10:01		A_Spec	Alpha_048	170	2.04 E+02	5.00 E-03	16.8
05	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_003	170.02	4.94 E+00	1.80 E-02	17.5
06	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_004	170.02	2.77 E+00	1.90 E-02	19.4
07	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_010	170.02	-3.08 E+00	2.40 E-02	19.7
08	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_011	170.02	1.96 E+00	1.20 E-02	19.7
09	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_013	170.02	-5.70 E-01	2.10 E-02	18.7
10	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_014	170	2.92 E+00	2.40 E-02	18.5
11	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_018	170	1.79 E+00	1.30 E-02	17.8
12	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_022	170.02	1.99 E+01	1.80 E-02	15.3
13	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_024	170	9.60 E-01	1.20 E-02	17.1
14	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_025	170	1.96 E+01	8.00 E-03	17.4
15	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_027	170	-1.21 E+00	1.30 E-02	17.3
16	TH-228	TRG	04/29/13 12:58		A_Spec	Alpha_029	170	-3.80 E-01	1.40 E-02	19.5
17	TH-228	TRG	04/29/13 12:59		A_Spec	Alpha_033	170	2.32 E+00	4.00 E-03	18.2
18	TH-228	TRG	04/29/13 12:59		A_Spec	Alpha_034	170	6.83 E+00	1.00 E-03	18.6
19	TH-228	TRG	04/29/13 12:59		A_Spec	Alpha_035	170	3.66 E+00	2.00 E-03	18.3

6070

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-THISO-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	TH-230	LCS	LCS	pCi/l	4.85E+00	7.53E-01	5.22E-02	5.42E+00	89.49	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.09E-01	7.70E-02	7.27E-02					OK	OK
03	TH-230	DUP	PZ-103-SS TOT	pCi/l	5.02E+00	9.93E-01	8.17E-02				NA	OK	
04	TH-230	DO	PZ-103-SS TOT	pCi/l	6.03E+00	1.16E+00	8.53E-02					OK	
05	TH-230	TRG	PZ-103-SS DIS	pCi/l	9.46E-02	7.01E-02	7.51E-02					OK	
06	TH-230	TRG	PZ-114-AS TOT	pCi/l	1.28E-01	8.11E-02	6.90E-02					OK	
07	TH-230	TRG	PZ-114-AS DIS	pCi/l	6.90E-02	7.37E-02	1.02E-01					OK	
08	TH-230	TRG	FB at PZ-201A-SS TOT	pCi/l	9.15E-02	6.80E-02	5.71E-02					OK	
09	TH-230	TRG	FB at PZ-201A-SS DIS	pCi/l	4.62E-02	5.30E-02	6.95E-02					OK	
10	TH-230	TRG	PZ-201A-SS TOT	pCi/l	1.02E-01	7.94E-02	7.84E-02					OK	
11	TH-230	TRG	PZ-201A-SS DIS	pCi/l	7.58E-02	7.80E-02	1.04E-01					OK	
12	TH-230	TRG	PZ-204A-SS TOT	pCi/l	3.94E-01	1.87E-01	1.25E-01					OK	
13	TH-230	TRG	PZ-204A-SS DIS	pCi/l	1.06E-01	8.46E-02	7.58E-02					OK	
14	TH-230	TRG	PZ-205-AS TOT	pCi/l	3.57E-01	1.60E-01	8.64E-02					OK	
15	TH-230	TRG	PZ-205-AS DIS	pCi/l	1.02E-01	8.37E-02	9.21E-02					OK	
16	TH-230	TRG	PZ-205-SS TOT	pCi/l	9.46E-02	7.56E-02	7.92E-02					OK	
17	TH-230	TRG	PZ-205-SS DIS	pCi/l	6.32E-02	6.57E-02	8.25E-02					OK	
18	TH-230	TRG	PZ-206-SS TOT	pCi/l	1.32E-01	9.10E-02	7.99E-02					OK	
19	TH-230	TRG	PZ-206-SS DIS	pCi/l	1.00E-01	7.44E-02	6.25E-02					OK	

0120

Run		1	
Analysis Code		THISO	
Eberline Services Work Order		13-04104	
Client		Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-230	LCS	04/16/13 00:00	1.00E+00	111.68	0.00	0.00			
02	TH-230	MBL	04/16/13 00:00	1.00E+00	122.43	0.00	0.00			
03	TH-230	DUP	04/08/13 11:15	1.00E+00	100.60	0.00	0.00			
04	TH-230	DO	04/08/13 11:15	1.00E+00	111.06	0.00	0.00			
05	TH-230	TRG	04/08/13 11:15	1.00E+00	138.78	0.00	0.00			
06	TH-230	TRG	04/08/13 11:45	1.00E+00	118.78	0.00	0.00			
07	TH-230	TRG	04/08/13 11:45	1.00E+00	90.76	0.00	0.00			
08	TH-230	TRG	04/08/13 12:45	1.00E+00	112.63	0.00	0.00			
09	TH-230	TRG	04/08/13 12:45	1.00E+00	107.25	0.00	0.00			
10	TH-230	TRG	04/08/13 13:22	1.00E+00	103.47	0.00	0.00			
11	TH-230	TRG	04/08/13 13:22	1.00E+00	94.86	0.00	0.00			
12	TH-230	TRG	04/08/13 13:26	1.00E+00	95.20	0.00	0.00			
13	TH-230	TRG	04/08/13 13:26	1.00E+00	97.85	0.00	0.00			
14	TH-230	TRG	04/08/13 13:36	1.00E+00	99.82	0.00	0.00			
15	TH-230	TRG	04/08/13 13:36	1.00E+00	105.10	0.00	0.00			
16	TH-230	TRG	04/08/13 14:50	1.00E+00	103.09	0.00	0.00			
17	TH-230	TRG	04/08/13 14:50	1.00E+00	99.51	0.00	0.00			
18	TH-230	TRG	04/08/13 15:00	1.00E+00	100.96	0.00	0.00			
19	TH-230	TRG	04/08/13 15:00	1.00E+00	111.29	0.00	0.00			

Run	1	Analysis Code	THISO	Eberline Services Work Order	13-04104	Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	04/29/13 10:00		A_Spec	Alpha_044	170	3.88 E+02	1.00 E-03	19
02	TH-230	MBL	04/29/13 10:00		A_Spec	Alpha_046	170	9.00 E+00	0.00 E+00	17.9
03	TH-230	DUP	04/29/13 10:00		A_Spec	Alpha_047	170	3.46 E+02	4.00 E-03	18.2
04	TH-230	DO	04/29/13 10:01		A_Spec	Alpha_048	170	4.24 E+02	0.00 E+00	16.8
05	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_003	170.02	8.64 E+00	8.00 E-03	17.5
06	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_004	170.02	1.11 E+01	5.00 E-03	19.4
07	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_010	170.02	4.64 E+00	8.00 E-03	19.7
08	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_011	170.02	7.66 E+00	2.00 E-03	19.7
09	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_013	170.02	3.49 E+00	3.00 E-03	18.7
10	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_014	170	7.32 E+00	4.00 E-03	18.5
11	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_018	170	4.81 E+00	7.00 E-03	17.8
12	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_022	170.02	2.16 E+01	8.00 E-03	15.3
13	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_024	170	6.66 E+00	2.00 E-03	17.1
14	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_025	170	2.33 E+01	4.00 E-03	17.4
15	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_027	170	6.98 E+00	6.00 E-03	17.3
16	TH-230	TRG	04/29/13 12:58		A_Spec	Alpha_029	170	7.15 E+00	5.00 E-03	19.5
17	TH-230	TRG	04/29/13 12:59		A_Spec	Alpha_033	170	4.32 E+00	4.00 E-03	18.2
18	TH-230	TRG	04/29/13 12:59		A_Spec	Alpha_034	170	9.32 E+00	4.00 E-03	18.6
19	TH-230	TRG	04/29/13 12:59		A_Spec	Alpha_035	170	7.66 E+00	2.00 E-03	18.3

Run	1	THISO	13-04104	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-THISO-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	TH-232	LCS	LCS	pCi/l	4.54E+00	7.15E-01	5.21E-02	4.75E+00	95.50	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	2.21E-02	3.39E-02	5.05E-02					OK	OK
03	TH-232	DUP	PZ-103-SS TOT	pCi/l	1.44E+00	3.73E-01	6.03E-02				NA	OK	
04	TH-232	DO	PZ-103-SS TOT	pCi/l	2.47E+00	5.52E-01	8.52E-02					OK	
05	TH-232	TRG	PZ-103-SS DIS	pCi/l	-2.08E-03	2.35E-02	7.20E-02					OK	
06	TH-232	TRG	PZ-114-AS TOT	pCi/l	1.71E-02	3.27E-02	6.03E-02					OK	
07	TH-232	TRG	PZ-114-AS DIS	pCi/l	1.20E-02	4.32E-02	9.78E-02					OK	
08	TH-232	TRG	FB at PZ-201A-SS TOT	pCi/l	5.84E-03	2.44E-02	6.26E-02					OK	
09	TH-232	TRG	FB at PZ-201A-SS DIS	pCi/l	-6.74E-03	2.70E-02	6.94E-02					OK	
10	TH-232	TRG	PZ-201A-SS TOT	pCi/l	1.60E-02	3.99E-02	8.31E-02					OK	
11	TH-232	TRG	PZ-201A-SS DIS	pCi/l	-8.33E-03	3.46E-02	1.12E-01					OK	
12	TH-232	TRG	PZ-204A-SS TOT	pCi/l	1.21E-01	1.05E-01	1.25E-01					OK	
13	TH-232	TRG	PZ-204A-SS DIS	pCi/l	1.55E-02	4.58E-02	9.97E-02					OK	
14	TH-232	TRG	PZ-205-AS TOT	pCi/l	9.67E-02	8.17E-02	8.63E-02					OK	
15	TH-232	TRG	PZ-205-AS DIS	pCi/l	-9.92E-03	3.03E-02	8.23E-02					OK	
16	TH-232	TRG	PZ-205-SS TOT	pCi/l	5.29E-02	5.85E-02	7.92E-02					OK	
17	TH-232	TRG	PZ-205-SS DIS	pCi/l	0.00E+00	4.04E-02	8.75E-02					OK	
18	TH-232	TRG	PZ-206-SS TOT	pCi/l	6.93E-03	2.89E-02	7.42E-02					OK	
19	TH-232	TRG	PZ-206-SS DIS	pCi/l	1.08E-02	2.60E-02	5.44E-02					OK	

0213

Run	1	Analysis Code	THISO	Eberline Services Work Order	13-04104	Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-232	LCS	04/16/13 00:00	1.00E+00	111.68	0.00	0.00			
02	TH-232	MBL	04/16/13 00:00	1.00E+00	122.43	0.00	0.00			
03	TH-232	DUP	04/08/13 11:15	1.00E+00	100.60	0.00	0.00			
04	TH-232	DO	04/08/13 11:15	1.00E+00	111.06	0.00	0.00			
05	TH-232	TRG	04/08/13 11:15	1.00E+00	138.78	0.00	0.00			
06	TH-232	TRG	04/08/13 11:45	1.00E+00	118.78	0.00	0.00			
07	TH-232	TRG	04/08/13 11:45	1.00E+00	90.76	0.00	0.00			
08	TH-232	TRG	04/08/13 12:45	1.00E+00	112.63	0.00	0.00			
09	TH-232	TRG	04/08/13 12:45	1.00E+00	107.25	0.00	0.00			
10	TH-232	TRG	04/08/13 13:22	1.00E+00	103.47	0.00	0.00			
11	TH-232	TRG	04/08/13 13:22	1.00E+00	94.86	0.00	0.00			
12	TH-232	TRG	04/08/13 13:26	1.00E+00	95.20	0.00	0.00			
13	TH-232	TRG	04/08/13 13:26	1.00E+00	97.85	0.00	0.00			
14	TH-232	TRG	04/08/13 13:36	1.00E+00	99.82	0.00	0.00			
15	TH-232	TRG	04/08/13 13:36	1.00E+00	105.10	0.00	0.00			
16	TH-232	TRG	04/08/13 14:50	1.00E+00	103.09	0.00	0.00			
17	TH-232	TRG	04/08/13 14:50	1.00E+00	99.51	0.00	0.00			
18	TH-232	TRG	04/08/13 15:00	1.00E+00	100.96	0.00	0.00			
19	TH-232	TRG	04/08/13 15:00	1.00E+00	111.29	0.00	0.00			

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-04104	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	04/29/13 10:00		A_Spec	Alpha_044	170	3.64 E+02	1.00 E-03	19
02	TH-232	MBL	04/29/13 10:00		A_Spec	Alpha_046	170	1.83 E+00	1.00 E-03	17.9
03	TH-232	DUP	04/29/13 10:00		A_Spec	Alpha_047	170	9.98 E+01	1.00 E-03	18.2
04	TH-232	DO	04/29/13 10:01		A_Spec	Alpha_048	170	1.74 E+02	0.00 E+00	16.8
05	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_003	170.02	-1.90 E-01	7.00 E-03	17.5
06	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_004	170.02	1.49 E+00	3.00 E-03	19.4
07	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_010	170.02	8.10 E-01	7.00 E-03	19.7
08	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_011	170.02	4.90 E-01	3.00 E-03	19.7
09	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_013	170.02	-5.10 E-01	3.00 E-03	18.7
10	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_014	170	1.15 E+00	5.00 E-03	18.5
11	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_018	170	-5.30 E-01	9.00 E-03	17.8
12	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_022	170.02	6.64 E+00	8.00 E-03	15.3
13	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_024	170	9.80 E-01	6.00 E-03	17.1
14	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_025	170	6.32 E+00	4.00 E-03	17.4
15	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_027	170	-6.80 E-01	4.00 E-03	17.3
16	TH-232	TRG	04/29/13 12:58		A_Spec	Alpha_029	170	4.00 E+00	0.00 E+00	19.5
17	TH-232	TRG	04/29/13 12:59		A_Spec	Alpha_033	170	1.00 E+00	0.00 E+00	18.2
18	TH-232	TRG	04/29/13 12:59		A_Spec	Alpha_034	170	4.90 E-01	3.00 E-03	18.6
19	TH-232	TRG	04/29/13 12:59		A_Spec	Alpha_035	170	8.30 E-01	1.00 E-03	18.3

Run	1
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

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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*
0144	LCS	LCS	04/16/13 00:00	1.0000	0.4498	10.1057		0.00		
02	MBL	BLANK	04/16/13 00:00	1.0000	0.2259	5.0753		0.00		
03	DUP	PZ-103-SS TOT	04/08/13 11:15	1.0000	0.2255	5.0663		0.00		
0448	DO	PZ-103-SS TOT	04/08/13 11:15	1.0000	0.2255	5.0663		0.00		
05	TRG	PZ-103-SS DIS	04/08/13 11:15	1.0000	0.2236	5.0236		0.00		
06	TRG	PZ-114-AS TOT	04/08/13 11:45	1.0000	0.2249	5.0528		0.00		
07	TRG	PZ-114-AS DIS	04/08/13 11:45	1.0000	0.2248	5.0506		0.00		
08	TRG	FB at PZ-201A-SS TOT	04/08/13 12:45	1.0000	0.2244	5.0416		0.00		
09	TRG	FB at PZ-201A-SS DIS	04/08/13 12:45	1.0000	0.2253	5.0618		0.00		
10	TRG	PZ-201A-SS TOT	04/08/13 13:22	1.0000	0.2246	5.0461		0.00		
11	TRG	PZ-201A-SS DIS	04/08/13 13:22	1.0000	0.2240	5.0326		0.00		
12	TRG	PZ-204A-SS TOT	04/08/13 13:26	1.0000	0.2247	5.0483		0.00		
13	TRG	PZ-204A-SS DIS	04/08/13 13:26	1.0000	0.2232	5.0146		0.00		
14	TRG	PZ-205-AS TOT	04/08/13 13:36	1.0000	0.2229	5.0079		0.00		
15	TRG	PZ-205-AS DIS	04/08/13 13:36	1.0000	0.2230	5.0101		0.00		
16	TRG	PZ-205-SS TOT	04/08/13 14:50	1.0000	0.2228	5.0056		0.00		
17	TRG	PZ-205-SS DIS	04/08/13 14:50	1.0000	0.2235	5.0214		0.00		
18	TRG	PZ-206-SS TOT	04/08/13 15:00	1.0000	0.2229	5.0079		0.00		
19	TRG	PZ-206-SS DIS	04/08/13 15:00	1.0000	0.2227	5.0034		0.00		

1000

3-14
1254

8-29

33-36
1219

Internal Work Order				Run	Analysis Code				Date		Technician			Technician Initials		Witness Initials				
13-04104				1	ThISO				4/22/2013 14:12		LWALKER			<i>[Signature]</i>						
LCS & Matrix Spikes					LCS		MS		LCSD		MSD		LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate				
Th-228	Th-8b	103.560	4/22/2013	0.100	0.1019				4.75	0.171	0.00	0.000	0.00	0.000	0.00	0.000				
Th-230	Th-1b	23.525	4/22/2013	0.500	0.5112				5.42	0.146	0.00	0.000	0.00	0.000	0.00	0.000				
Th-232	Th-8b	103.560	4/22/2013	0.100	0.1019				4.75	0.171	0.00	0.000	0.00	0.000	0.00	0.000				

Tracers							Balance Printer Tapes																						
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS																	
01	Th-229	Th-18a	22.467	4/22/2013	0.4498	0.2200																							
02	Th-229	Th-18a	22.467	4/22/2013	0.2259	0.2200																							
03	Th-229	Th-18a	22.467	4/22/2013	0.2255	0.2200																							
04	Th-229	Th-18a	22.467	4/22/2013	0.2255	0.2200																							
05	Th-229	Th-18a	22.467	4/22/2013	0.2236	0.2200																							
06	Th-229	Th-18a	22.467	4/22/2013	0.2249	0.2200																							
07	Th-229	Th-18a	22.467	4/22/2013	0.2248	0.2200																							
08	Th-229	Th-18a	22.467	4/22/2013	0.2244	0.2200																							
09	Th-229	Th-18a	22.467	4/22/2013	0.2253	0.2200																							
10	Th-229	Th-18a	22.467	4/22/2013	0.2246	0.2200																							
11	Th-229	Th-18a	22.467	4/22/2013	0.2240	0.2200																							
12	Th-229	Th-18a	22.467	4/22/2013	0.2247	0.2200																							
13	Th-229	Th-18a	22.467	4/22/2013	0.2232	0.2200																							
14	Th-229	Th-18a	22.467	4/22/2013	0.2229	0.2200																							
15	Th-229	Th-18a	22.467	4/22/2013	0.2230	0.2200																							
16	Th-229	Th-18a	22.467	4/22/2013	0.2228	0.2200																							
17	Th-229	Th-18a	22.467	4/22/2013	0.2235	0.2200																							
18	Th-229	Th-18a	22.467	4/22/2013	0.2229	0.2200																							
19	Th-229	Th-18a	22.467	4/22/2013	0.2227	0.2200																							
							0.4498 g										0.5112 g						0.1019 g						
							0.2259 g																						
							-0.2255 g																						
							-0.2255 g																						
							-0.2236 g																						
							-0.2249 g																						
							-0.2248 g																						
							-0.2249 g																						
							-0.2244 g																						
							-0.2244 g																						
							-0.2253 g																						
							-0.2246 g																						
							-0.2240 g																						
							-0.2247 g																						
							-0.2232 g																						
							-0.2229 g																						
							-0.2230 g																						
							-0.2228 g																						
							-0.2235 g																						
							-0.2229 g																						
							-0.2227 g																						

0217

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04104	1	ThISO	liters	5/7/2013	LWALKER

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 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-103-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-103-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-103-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	FB at PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	FB at PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-204A-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-204A-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-205-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-205-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-206-SS TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-206-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician:

J. Walker

Date:

4.22.13

US EPA ARCHIVE DOCUMENT



Apex-Alpha™

105
4/29/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th 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: 4/29/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 10:00:55 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.450 mL
 Effective Efficiency: 0.2124 +/- 0.0129
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Chem. Recovery Factor: 1.1168 +/- 0.0707

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 0.954951 +/- 0.081890
 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	23.83	40.32	0.17	0.00E+000	3.0
TH-228	5.385	373.83	10.14	0.17	0.00E+000	29.9
TH-229 T	4.886	364.83	10.26	0.17	0.00E+000	6.9
TH-230	4.648	387.83	9.96	0.17	0.00E+000	14.4
TH-232	3.971	363.83	10.28	0.17	0.00E+000	23.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

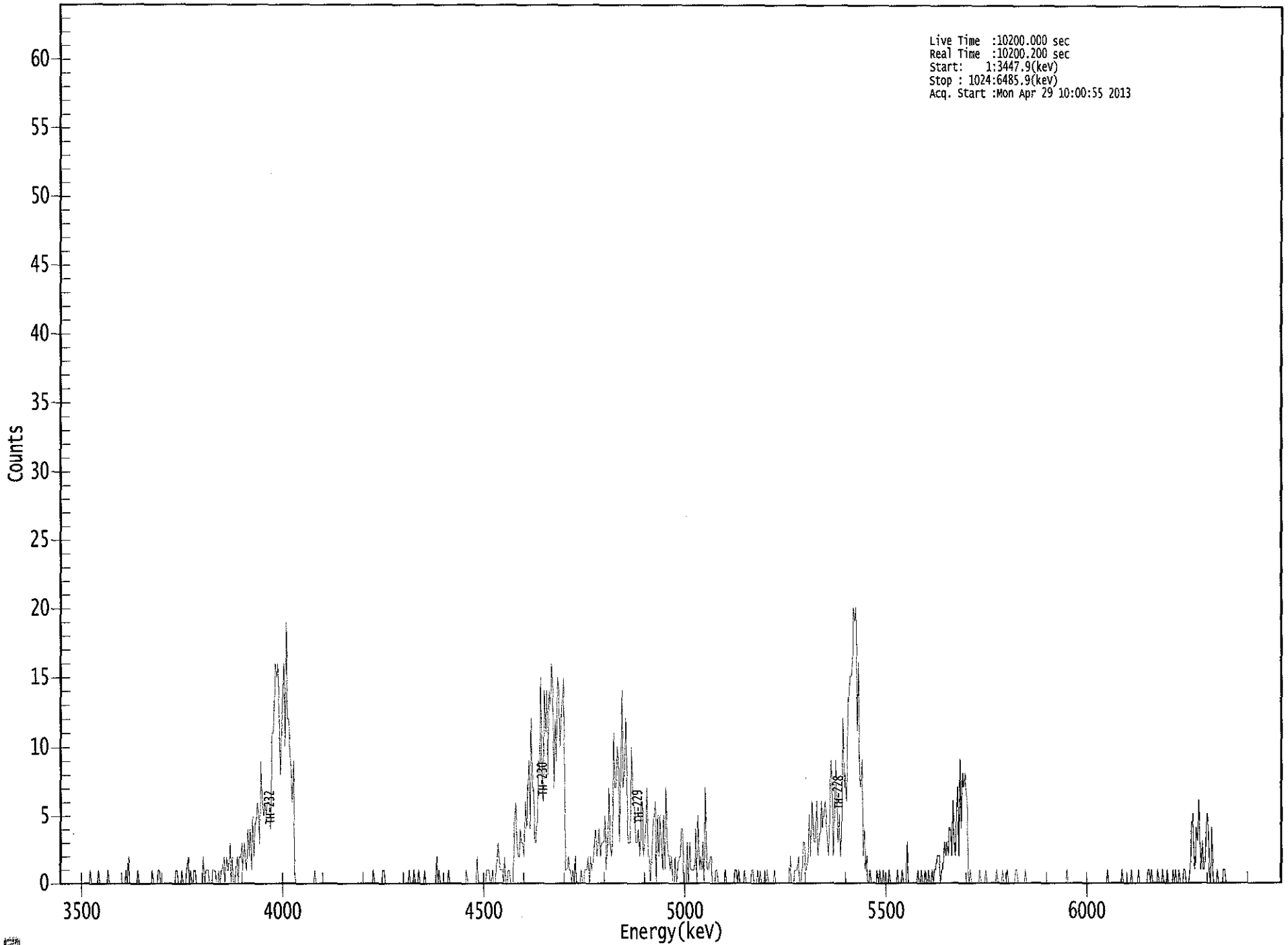
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.941	5850.00*	3.05E-001 +/- 1.28E-001	5.34E-002 +/- 6.37E-003
TH-228	0.999	5400.00*	4.67E+000 +/- 7.31E-001	5.21E-002 +/- 6.21E-003
TH-229	0.999	4872.00*	4.57E+000 +/- 5.46E-001	5.23E-002 +/- 6.24E-003
TH-230	0.997	4672.00*	4.85E+000 +/- 7.53E-001	5.22E-002 +/- 6.22E-003
TH-232	0.997	3997.00*	4.54E+000 +/- 7.15E-001	5.21E-002 +/- 6.21E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

000056621.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3447.9(keV)
Stop : 1024:6485.9(keV)
Acq. Start :Mon Apr 29 10:00:55 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0220

 ***** 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	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	1	0	0	0	0	0	0	0
33:	1	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0	1
57:	0	2	0	0	0	0	0	0	0
65:	0	1	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0	0
81:	0	0	1	1	0	0	0	0	0
89:	0	0	0	0	0	0	0	0	0
97:	0	1	1	0	0	0	0	1	0
105:	0	0	1	2	0	1	0	0	0
113:	1	1	0	0	0	0	0	0	0
121:	2	0	1	1	1	0	0	0	0
129:	1	1	1	0	0	1	0	0	1
137:	1	2	0	2	1	1	3	0	0
145:	2	0	0	1	2	0	2	2	2
153:	3	1	3	2	1	4	2	4	4
161:	1	5	2	4	5	6	5	3	3
169:	9	6	5	6	5	6	6	6	6
177:	4	11	11	13	16	15	16	12	12
185:	8	11	14	16	10	19	12	12	12
193:	10	8	6	9	1	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	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	1	0	0
265:	0	0	0	0	0	0	1	1	1
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	1	0	0	0	0
297:	1	0	0	0	1	0	0	0	0
305:	0	1	0	0	0	0	0	0	0
313:	0	0	0	2	0	1	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	1	0	0	0	0
345:	0	0	0	0	0	2	0	0	0
353:	0	0	0	0	0	1	1	1	1
361:	0	0	1	0	0	1	3	2	2

369: 1 1 1 0 2 0 0 1

Sample Title: 01

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

801: 1 1 0 0 0 0 0 0

Sample Title: 01

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



KS
4/29/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/29/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 10:00:57 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.226 mL
 Effective Efficiency: 0.2191 +/- 0.0174
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 1.2243 +/- 0.0994

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	5.840	7.00	79.20	0.00	0.00E+000	3.0
TH-228	5.297	0.00	1960.0	0.00	0.00E+000	0.0
TH-229 T	4.885	189.00	14.29	0.00	0.00E+000	4.2
TH-230	4.667	9.00	68.87	0.00	0.00E+000	3.7
TH-232	4.010	1.83	152.56	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

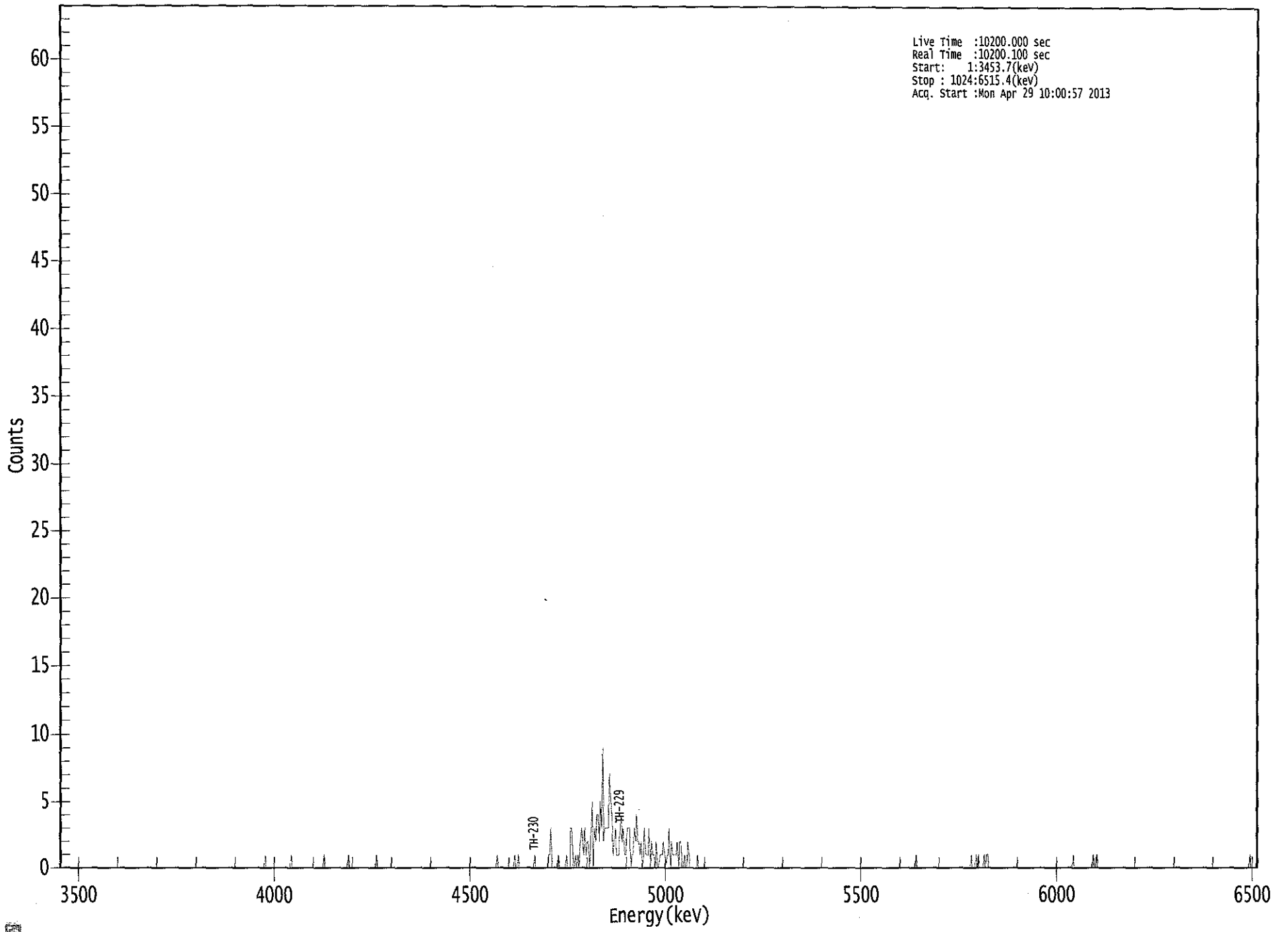
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	8.68E-002 +/- 7.01E-002	7.44E-002 +/- 1.16E-002
TH-228	0.946	5400.00*	0.00E+000 +/- 3.35E-002	7.26E-002 +/- 1.13E-002
TH-229	0.999	4872.00*	2.30E+000 +/- 3.57E-001	7.29E-002 +/- 1.13E-002
TH-230	1.000	4672.00*	1.09E-001 +/- 7.70E-002	7.27E-002 +/- 1.13E-002
TH-232	0.999	3997.00*	2.21E-002 +/- 3.39E-002	5.05E-002 +/- 7.84E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

000056622.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Mon Apr 29 10:00:57 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0225

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

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	1	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	1	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	1	3	0	0	0	0
425:	0	1	0	0	0	0	0	0
433:	1	0	0	0	3	3	0	0
441:	1	0	1	0	2	3	2	1
449:	3	1	2	2	0	2	5	0
457:	3	2	4	4	2	5	3	9
465:	2	3	3	3	3	7	5	4
473:	1	2	3	1	1	1	3	4
481:	2	3	1	1	3	3	3	0
489:	1	1	3	2	4	2	2	1
497:	2	0	1	3	1	1	1	3
505:	0	2	1	1	0	2	0	0
513:	1	1	1	2	1	0	1	1
521:	3	0	2	1	1	1	1	2
529:	0	2	2	0	0	1	0	0
537:	2	1	0	0	0	0	0	0
545:	1	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	1	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	1	0	0	0	1	0
785:	1	0	0	0	0	1	0	1
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	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	1	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	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:	1	0	0	0	0	0	0	0

KBS
4/29/13

Apex-Alpha™

Sample Description: PZ-103-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 10:00:59 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.226 mL
 Effective Efficiency: 0.1833 +/- 0.0157
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 1.0060 +/- 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	5.849	20.32	44.32	0.68	0.00E+000	2.9
TH-228	5.369	194.32	14.09	0.68	0.00E+000	8.0
TH-229 T	4.878	157.83	15.61	0.17	0.00E+000	6.0
TH-230	4.635	346.32	10.54	0.68	0.00E+000	27.5
TH-232	3.961	99.83	19.64	0.17	0.00E+000	4.3

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

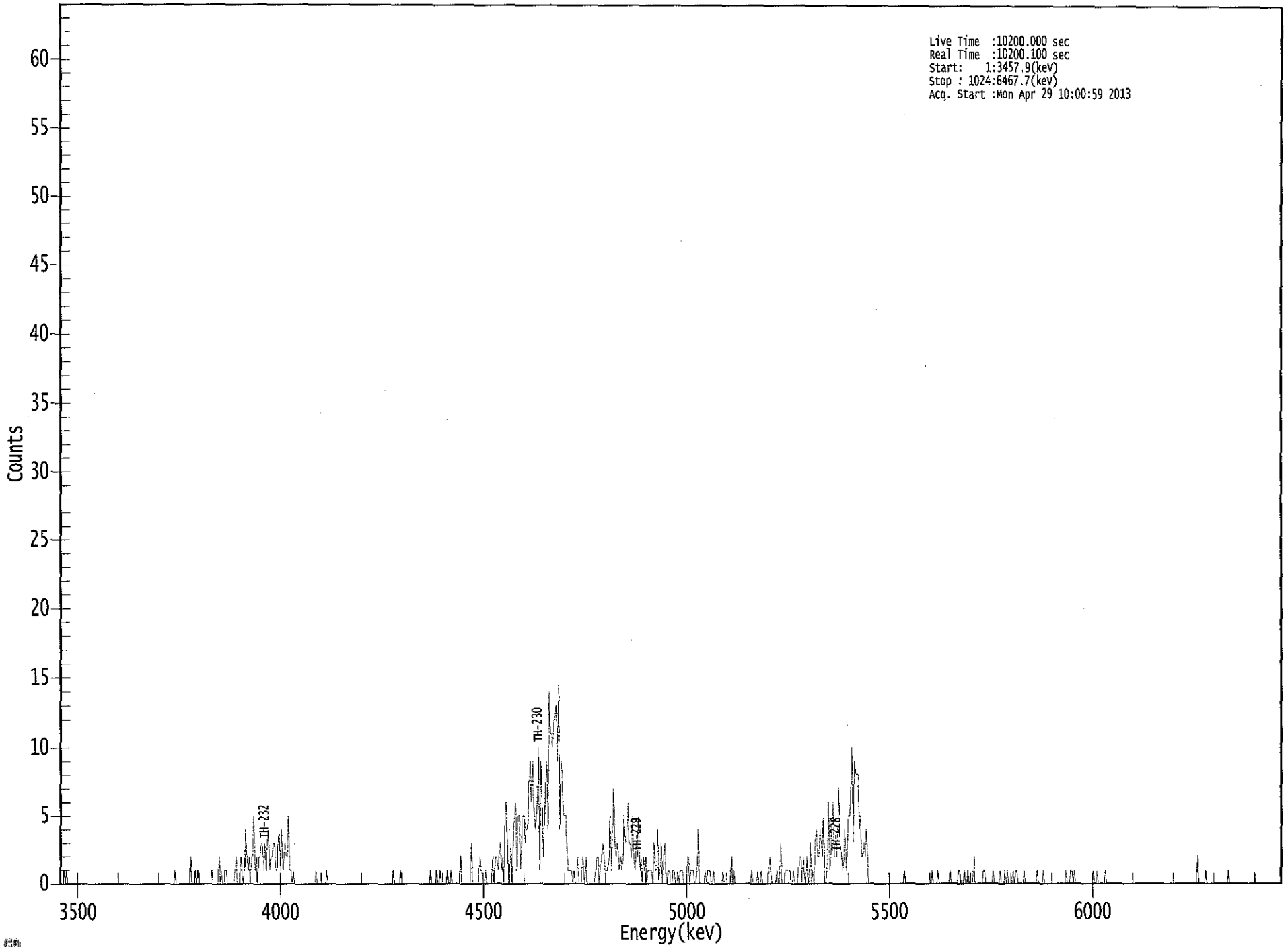
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	3.02E-001 +/- 1.43E-001	8.38E-002 +/- 1.40E-002
TH-228	0.995	5400.00*	2.87E+000 +/- 6.28E-001	8.33E-002 +/- 1.40E-002
TH-229	1.000	4872.00*	2.29E+000 +/- 3.84E-001	6.06E-002 +/- 1.02E-002
TH-230	0.993	4672.00*	5.02E+000 +/- 9.93E-001	8.17E-002 +/- 1.37E-002
TH-232	0.993	3997.00*	1.44E+000 +/- 3.73E-001	6.03E-002 +/- 1.01E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056629.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Mon Apr 29 10:00:59 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0230

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

Sample Title: 03

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 3 1 2 0 5 6 3 0

Sample Title: 03

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

801: 1 1 0 0 0 0 0 1

Sample Title: 03

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

KCS
4/29/13

Apex-Alpha™

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 10:01:01 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.226 mL
 Effective Efficiency: 0.1865 +/- 0.0158
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 1.1106 +/- 0.0963

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	5.854	16.00	50.51	0.00	0.00E+000	3.0
TH-228	5.372	204.15	13.75	0.85	0.00E+000	7.7
TH-229	T 4.874	160.66	15.48	0.34	0.00E+000	10.3
TH-230	4.631	424.00	9.53	0.00	0.00E+000	32.5
TH-232	3.961	174.00	14.90	0.00	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

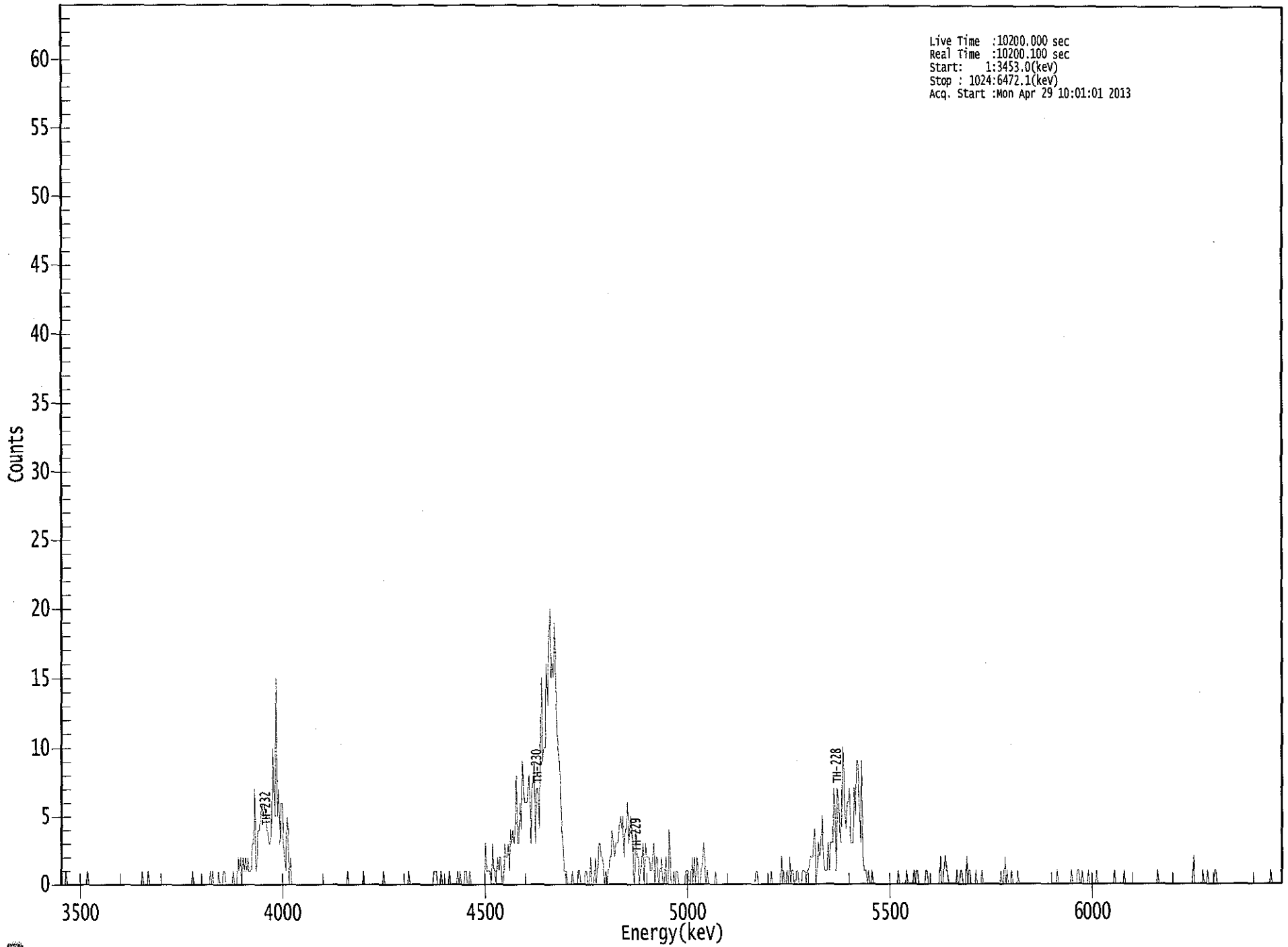
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	2.34E-001 +/- 1.24E-001	8.75E-002 +/- 1.46E-002
TH-228	0.996	5400.00*	2.96E+000 +/- 6.39E-001	8.69E-002 +/- 1.45E-002
TH-229	1.000	4872.00*	2.29E+000 +/- 3.81E-001	6.82E-002 +/- 1.13E-002
TH-230	0.991	4672.00*	6.03E+000 +/- 1.16E+000	8.53E-002 +/- 1.42E-002
TH-232	0.993	3997.00*	2.47E+000 +/- 5.52E-001	8.52E-002 +/- 1.42E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :Mon Apr 29 10:01:01 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	1	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	1	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	1	0	0	0	0
73:	0	1	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	1	0	0
113:	0	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	1	0	1	0
129:	0	0	0	0	1	0	0	0	0
137:	1	1	0	0	0	0	0	0	0
145:	1	0	0	0	2	1	2	0	0
153:	2	1	2	1	2	1	1	1	1
161:	3	3	7	1	2	4	4	5	5
169:	6	5	6	5	4	4	3	3	3
177:	5	10	8	5	15	5	7	3	3
185:	6	6	3	2	1	5	4	0	0
193:	2	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:	1	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	1	0	0	0
257:	0	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	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	1	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:	1	1	1	0	0	0	1	0	0
321:	0	0	0	0	0	1	0	0	0
329:	0	0	0	0	1	0	1	0	0
337:	0	0	1	1	0	0	1	0	0
345:	0	0	0	0	0	0	0	0	0
353:	0	0	0	3	1	1	1	1	1
361:	0	3	1	1	0	2	1	2	2

369: 2 0 0 3 2 2 3 1

Sample Title: 04

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

801: 0 1 0 0 0 0 0 0 0

Sample Title: 04

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	1	0	0	0	0	0	0
841:	0	0	0	0	0	0	1	0	0
849:	0	0	0	1	1	0	0	1	0
857:	0	0	0	0	1	0	0	0	0
865:	0	0	0	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	0	0	0	0
889:	0	0	1	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	1	0	0
921:	0	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0	0
945:	0	0	0	0	2	0	0	0	0
953:	0	0	0	0	1	0	0	0	0
961:	1	0	0	0	0	0	1	1	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	1	0	0	0
1017:	0	0	0	0	0	0	0	0	0

KCS
4/29/13

Apex-Alpha™

Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:06 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.224 mL
 Effective Efficiency: 0.2424 +/- 0.0185
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.3878 +/- 0.1090

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	3.79	130.59	2.21	0.00E+000	3.0
TH-228	5.379	4.94	115.82	3.06	0.00E+000	3.0
TH-229 T	4.886	206.98	13.66	1.02	0.00E+000	16.1
TH-230	4.669	8.64	72.56	1.36	0.00E+000	4.5
TH-232	3.886	-0.19	1130.5	1.19	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

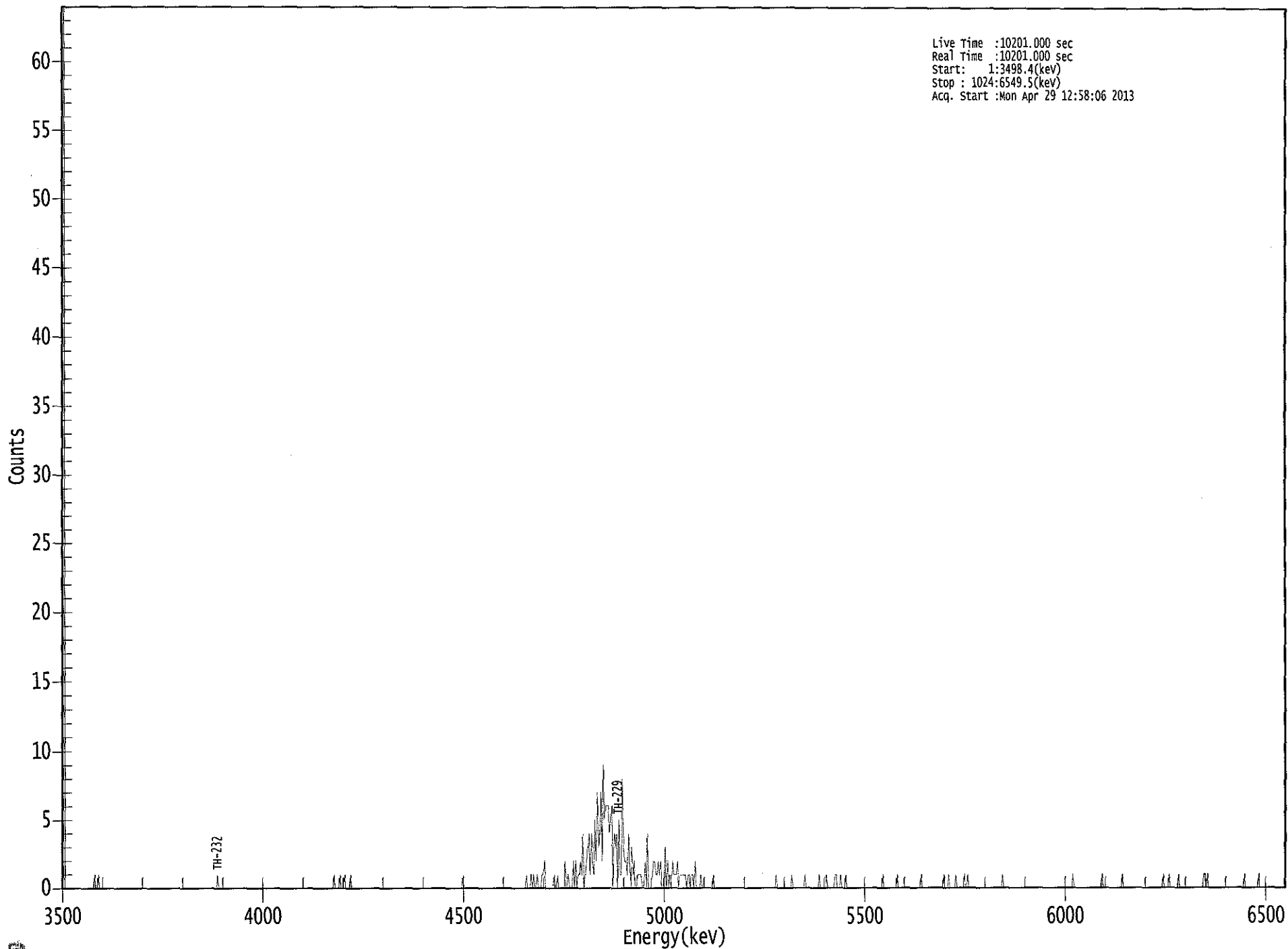
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.987	5850.00*	4.26E-002 +/- 5.60E-002	8.98E-002 +/- 1.34E-002
TH-228	0.998	5400.00*	5.52E-002 +/- 6.44E-002	9.98E-002 +/- 1.49E-002
TH-229	0.999	4872.00*	2.27E+000 +/- 3.40E-001	6.92E-002 +/- 1.03E-002
TH-230	1.000	4672.00*	9.46E-002 +/- 7.01E-002	7.51E-002 +/- 1.12E-002
TH-232	0.938	3997.00*	-2.08E-003 +/- 2.35E-002	7.20E-002 +/- 1.08E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Mon Apr 29 12:58:06 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: 05

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	1	0	0	1
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	1	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	1	0	0	0
233:	1	0	0	0	1	0	0
241:	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	1
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: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	1	0	0	0
393:	1	0	1	0	0	1	0	0
401:	0	1	1	2	0	0	0	0
409:	0	0	0	1	0	0	1	0
417:	0	0	0	0	2	0	0	1
425:	0	0	0	2	0	2	0	1
433:	1	2	1	4	0	1	2	3
441:	4	1	4	2	1	5	2	7
449:	3	4	7	2	9	5	6	6
457:	6	4	5	6	0	4	3	4
465:	0	5	1	1	8	3	2	2
473:	1	4	2	0	3	1	2	0
481:	0	1	1	1	1	0	0	2
489:	0	4	0	0	0	1	2	2
497:	1	1	2	1	2	0	0	1
505:	3	0	2	0	1	0	2	1
513:	1	1	2	0	1	1	1	1
521:	1	1	0	1	1	0	1	1
529:	0	2	0	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	1	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	1	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	0	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	1
641:	0	0	0	0	0	0	1	1
649:	0	0	0	1	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	1	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	1	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	1	0	0
745:	0	0	0	1	0	0	0	0
753:	0	0	1	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	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: 05

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	1	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	1	0	0	0
873:	0	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	1	0	0
889:	0	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0	0
921:	1	0	0	0	0	1	0	0	0
929:	0	0	0	0	0	1	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	1	1	0	1	0	0	0
961:	0	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0	0
985:	0	0	0	0	1	0	0	0	0
993:	0	0	0	0	0	0	0	0	0
1001:	1	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

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4/29/13

Apex-Alpha™

Sample Description: PZ-114-AS TOT
 Spectrum File: \\OR-ALPHA1\Camberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:07 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.225 mL
 Effective Efficiency: 0.2305 +/- 0.0179
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 1.1878 +/- 0.0949

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	5.884	3.62	137.03	2.38	0.00E+000	2.9
TH-228	5.350	2.77	181.10	3.23	0.00E+000	2.9
TH-229 T	4.880	197.98	13.97	1.02	0.00E+000	5.4
TH-230	4.651	11.15	61.26	0.85	0.00E+000	2.9
TH-232	3.957	1.49	190.03	0.51	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

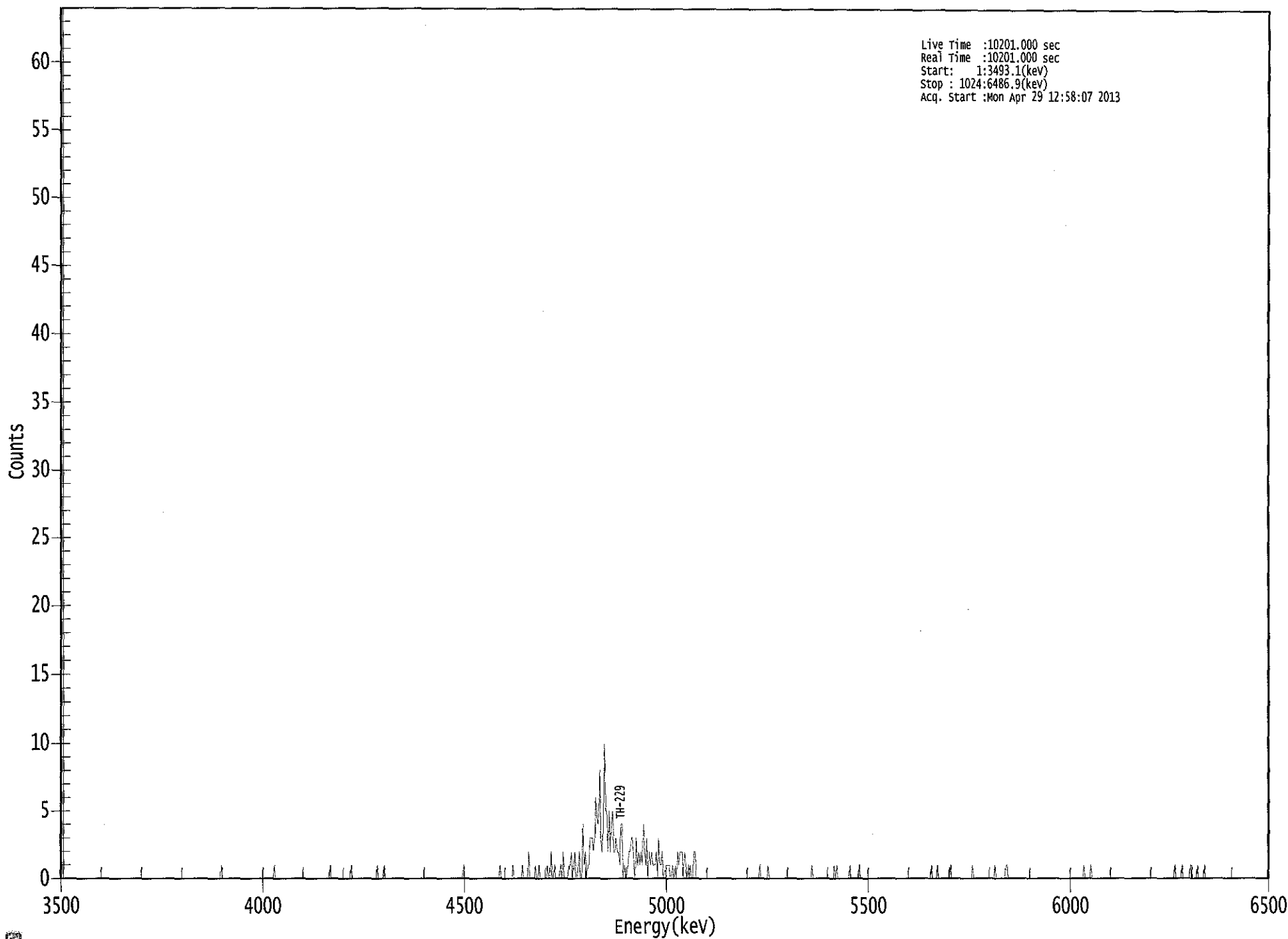
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	4.28E-002 +/- 5.90E-002	9.68E-002 +/- 1.48E-002
TH-228	0.987	5400.00*	3.25E-002 +/- 5.91E-002	1.07E-001 +/- 1.63E-002
TH-229	1.000	4872.00*	2.29E+000 +/- 3.48E-001	7.28E-002 +/- 1.11E-002
TH-230	0.998	4672.00*	1.28E-001 +/- 8.11E-002	6.90E-002 +/- 1.05E-002
TH-232	0.992	3997.00*	1.71E-002 +/- 3.27E-002	6.03E-002 +/- 9.19E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056636.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Mon Apr 29 12:58:07 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: 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:	1	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	1	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	1	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	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 1 0 0 0

Sample Title: 06

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0	0	1
393:	0	0	0	0	2	0	0	0	0
401:	0	0	1	0	0	1	0	0	0
409:	0	0	0	0	1	0	0	0	2
417:	0	0	1	0	0	0	0	0	1
425:	0	2	0	0	0	0	1	1	1
433:	2	0	1	2	0	0	1	1	2
441:	0	0	4	1	2	0	1	1	1
449:	3	3	3	2	3	6	4	4	4
457:	8	3	2	4	10	5	5	2	2
465:	5	2	4	5	2	2	3	2	2
473:	2	1	4	4	0	1	0	0	0
481:	1	2	2	3	3	1	0	0	3
489:	1	2	1	2	1	4	2	1	1
497:	3	0	2	1	2	1	1	1	1
505:	2	0	3	1	1	2	0	0	0
513:	1	1	1	1	0	0	1	0	0
521:	1	0	2	1	2	2	2	0	0
529:	2	1	0	1	0	1	0	0	0
537:	2	2	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0	0
593:	1	0	0	0	0	0	0	0	1
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	1	0	0	0	0
641:	0	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0	1
657:	0	1	0	0	0	0	0	0	0
665:	0	0	0	0	1	0	0	0	0
673:	0	0	0	0	1	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	1	0	0	0	0	1	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	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	0	0	0	0	0	1
793:	0	0	0	0	0	0	0	0	0

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

KCS
4/29/13

Apex-Alpha™

Sample Description: PZ-114-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:02 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.225 mL
 Effective Efficiency: 0.1785 +/- 0.0155
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.9076 +/- 0.0807

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	5.777	2.11	217.70	2.89	0.00E+000	2.9
TH-228	5.270	-3.08	82.81	4.08	0.00E+000	2.9
TH-229 T	4.878	153.30	15.93	1.70	0.00E+000	3.9
TH-230	4.601	4.64	105.45	1.36	0.00E+000	2.9
TH-232	3.912	0.81	359.14	1.19	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

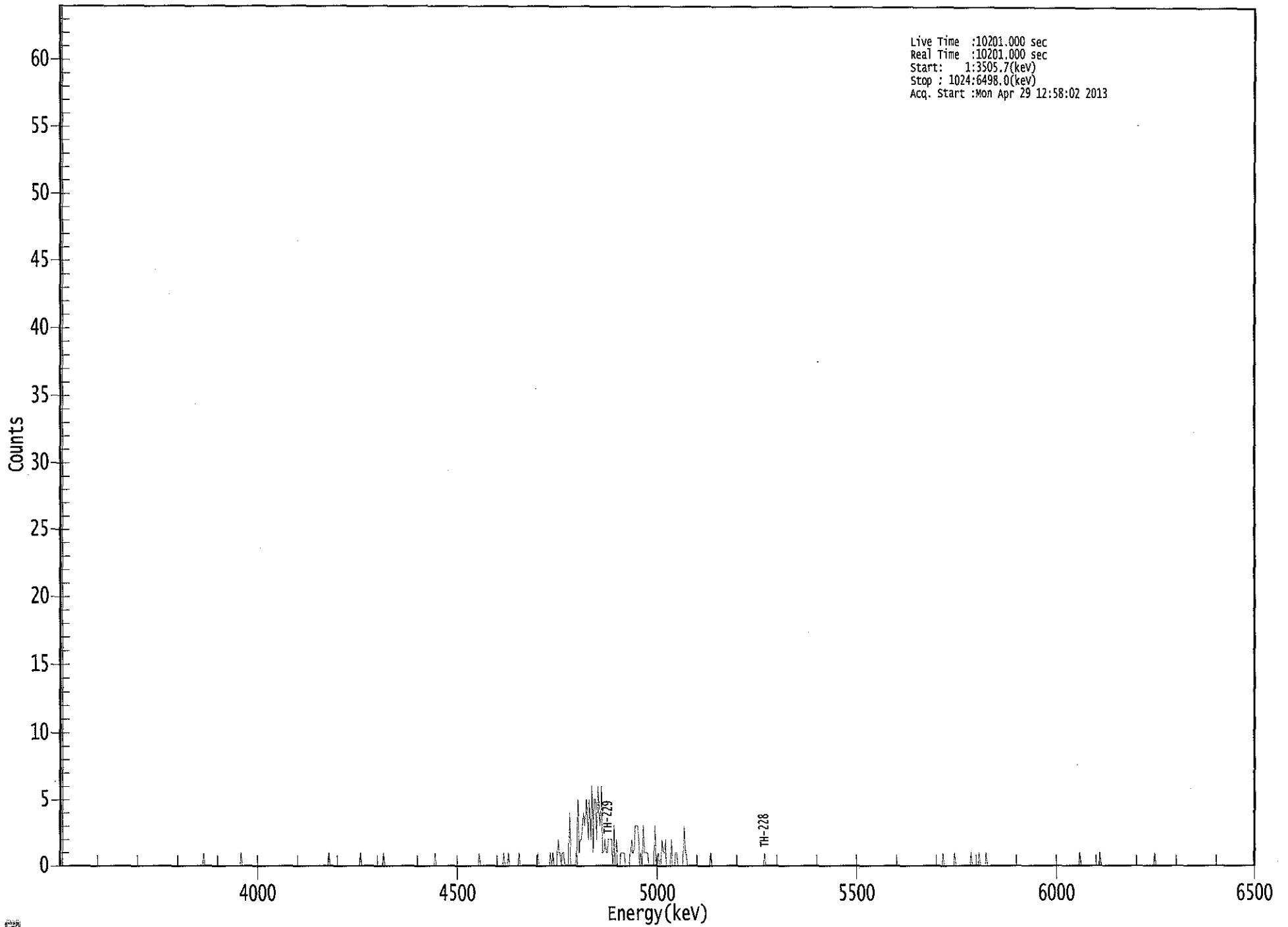
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.972	5850.00*	3.22E-002 +/- 7.02E-002	1.34E-001 +/- 2.28E-002
TH-228	0.915	5400.00*	-4.67E-002 +/- 3.95E-002	1.50E-001 +/- 2.56E-002
TH-229	1.000	4872.00*	2.29E+000 +/- 3.90E-001	1.10E-001 +/- 1.87E-002
TH-230	0.974	4672.00*	6.90E-002 +/- 7.37E-002	1.02E-001 +/- 1.74E-002
TH-232	0.963	3997.00*	1.20E-002 +/- 4.32E-002	9.78E-002 +/- 1.67E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056631.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Mon Apr 29 12:58:02 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0250

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

Sample Title: 07

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

Channel								
809:	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	1	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	1	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	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

100
4/29/13

Apex-Alpha™

Sample Description: FB AT PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:03 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.224 mL
 Effective Efficiency: 0.2222 +/- 0.0176
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Chem. Recovery Factor: 1.1263 +/- 0.0922

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	5.829	6.13	92.22	1.87	0.00E+000	2.7
TH-228	5.379	1.96	208.51	2.04	0.00E+000	2.7
TH-229	T 4.874	190.47	14.27	1.53	0.00E+000	4.0
TH-230	4.596	7.66	72.63	0.34	0.00E+000	2.7
TH-232	4.097	0.49	417.02	0.51	0.00E+000	2.7

T = Tracer Peak used for Effective Efficiency

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

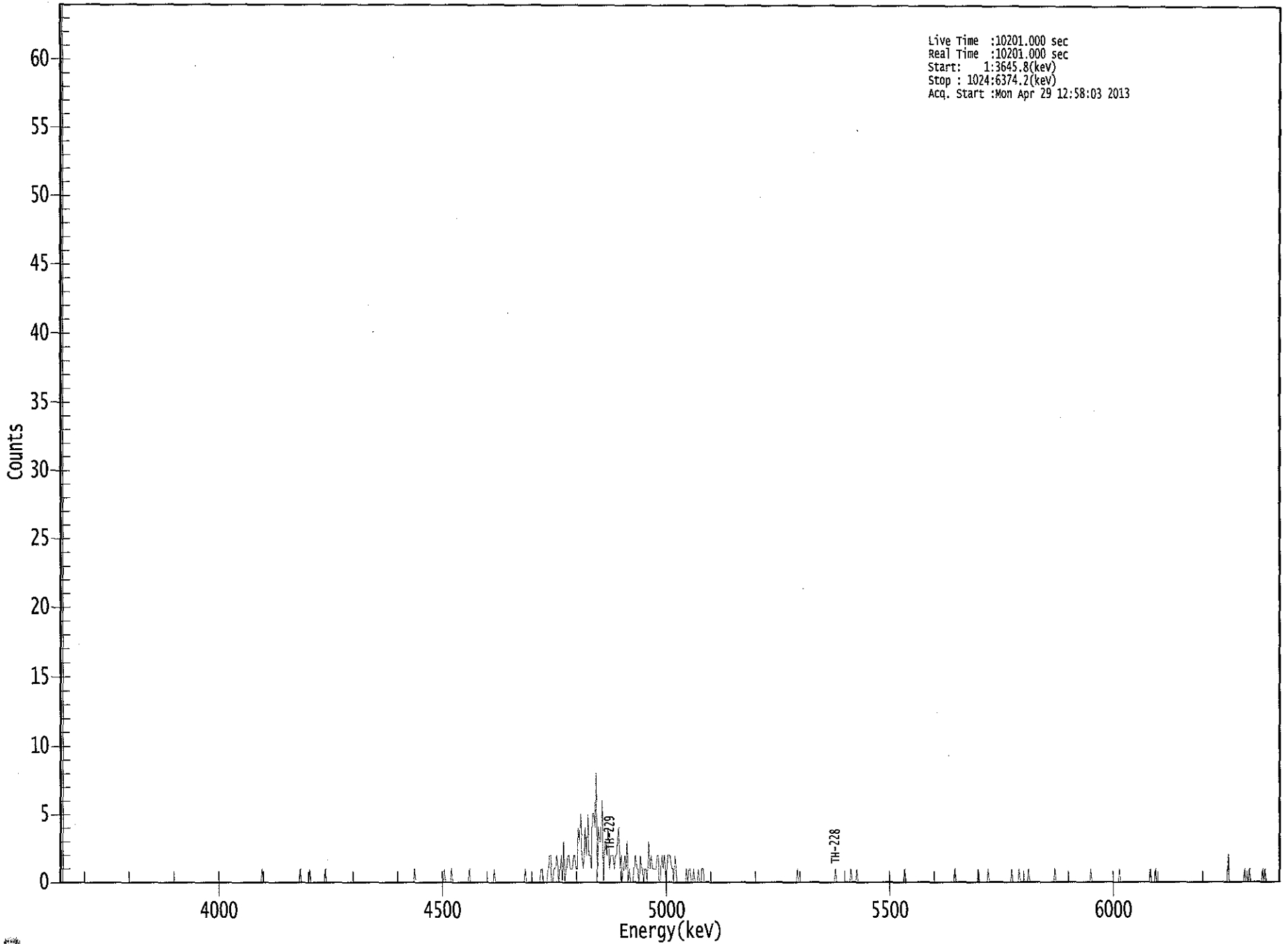
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	7.51E-002 +/- 7.02E-002	9.28E-002 +/- 1.44E-002
TH-228	0.998	5400.00*	2.39E-002 +/- 4.99E-002	9.49E-002 +/- 1.47E-002
TH-229	1.000	4872.00*	2.28E+000 +/- 3.54E-001	8.52E-002 +/- 1.32E-002
TH-230	0.971	4672.00*	9.15E-002 +/- 6.80E-002	5.71E-002 +/- 8.86E-003
TH-232	0.950	3997.00*	5.84E-003 +/- 2.44E-002	6.26E-002 +/- 9.70E-003

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US EPA ARCHIVE DOCUMENT

0000056632.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Mon Apr 29 12:58:03 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0255

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

Sample Title: 08

Elapsed Live time: 10201
Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0
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	1	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	1	0	0	0	0	0
209:	0	1	0	0	0	0	0
217:	0	0	0	0	0	1	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	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	1	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	1	0	0	0	0
329:	1	0	0	0	0	0	0
337:	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0
353:	0	0	0	0	1	0	0
361:	0	0	0	0	1	0	0

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

801: 0 0 0 0 1 0 0 0

Sample Title: 08

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

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4/29/13

Apex-Alpha™

Sample Description: FB AT PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 09
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:04 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.225 mL
 Effective Efficiency: 0.2004 +/- 0.0165
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 1.0725 +/- 0.0905

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.751	1.94	237.41	3.06	0.00E+000	2.8
TH-228	5.312	-0.57	652.66	3.57	0.00E+000	2.8
TH-229 T	4.886	172.49	14.95	0.51	0.00E+000	4.7
TH-230	4.696	3.49	113.53	0.51	0.00E+000	2.8
TH-232	3.949	-0.51	400.59	0.51	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

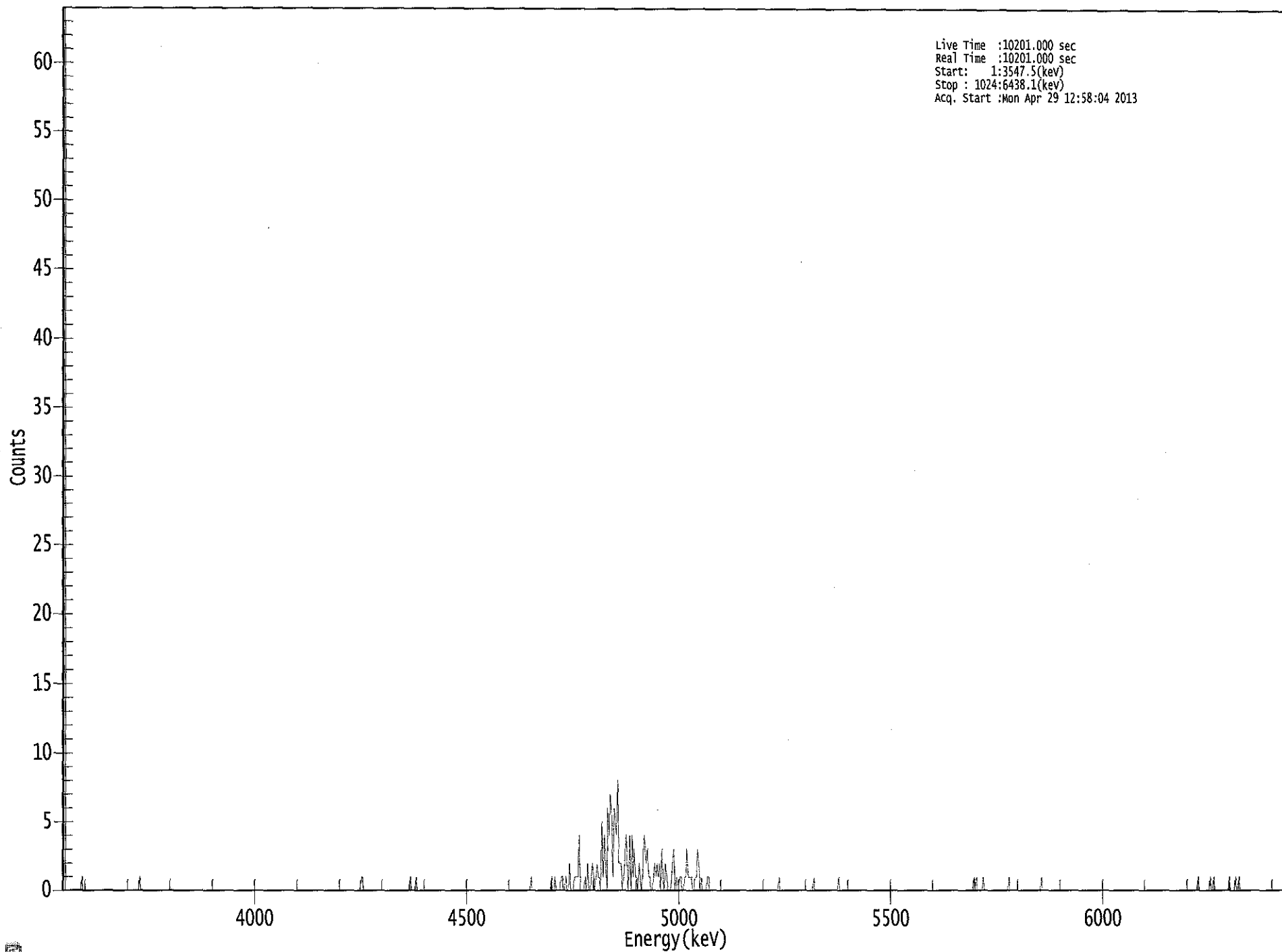
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.951	5850.00*	2.63E-002 +/- 6.27E-002	1.21E-001 +/- 1.96E-002
TH-228	0.960	5400.00*	-7.70E-003 +/- 5.03E-002	1.27E-001 +/- 2.06E-002
TH-229	0.999	4872.00*	2.29E+000 +/- 3.70E-001	6.97E-002 +/- 1.12E-002
TH-230	0.997	4672.00*	4.62E-002 +/- 5.30E-002	6.95E-002 +/- 1.12E-002
TH-232	0.988	3997.00*	-6.74E-003 +/- 2.70E-002	6.94E-002 +/- 1.12E-002

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US EPA ARCHIVE DOCUMENT

0000056633.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3547.5(keV)
Stop : 1024:6438.1(keV)
Acq. Start :Mon Apr 29 12:58:04 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 09

Elapsed Live time: 10201
 Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	1	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	1	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	1	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	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: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	0	1	0	0	0	0
417:	1	1	0	0	1	0	0	2
425:	0	0	0	1	1	1	1	4
433:	0	0	0	0	1	0	2	0
441:	0	1	2	1	0	1	2	1
449:	1	0	5	1	4	2	0	6
457:	4	7	5	1	6	5	4	8
465:	2	2	2	0	1	2	4	2
473:	0	4	0	4	1	3	1	1
481:	0	2	1	0	1	4	3	2
489:	3	1	1	0	0	1	2	1
497:	2	1	2	0	3	1	0	2
505:	1	0	0	0	1	2	3	0
513:	1	0	0	1	1	0	0	1
521:	1	3	1	1	1	1	0	0
529:	1	1	3	2	0	1	0	0
537:	0	0	1	1	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	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	1	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	0	0	0	0
649:	1	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	1	0	1	0	0	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	1	0	0	0	0	0	0
969:	0	0	0	0	0	0	1	0
977:	0	0	0	1	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

KCS
4/29/13



Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 10
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:05 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.225 mL
 Effective Efficiency: 0.1910 +/- 0.0161
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.0347 +/- 0.0894

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	5.796	7.09	94.42	3.91	0.00E+000	2.9
TH-228	5.381	2.92	186.18	4.08	0.00E+000	2.9
TH-229 T	4.885	163.81	15.38	1.19	0.00E+000	11.6
TH-230	4.669	7.32	76.28	0.68	0.00E+000	2.9
TH-232	3.928	1.15	249.59	0.85	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

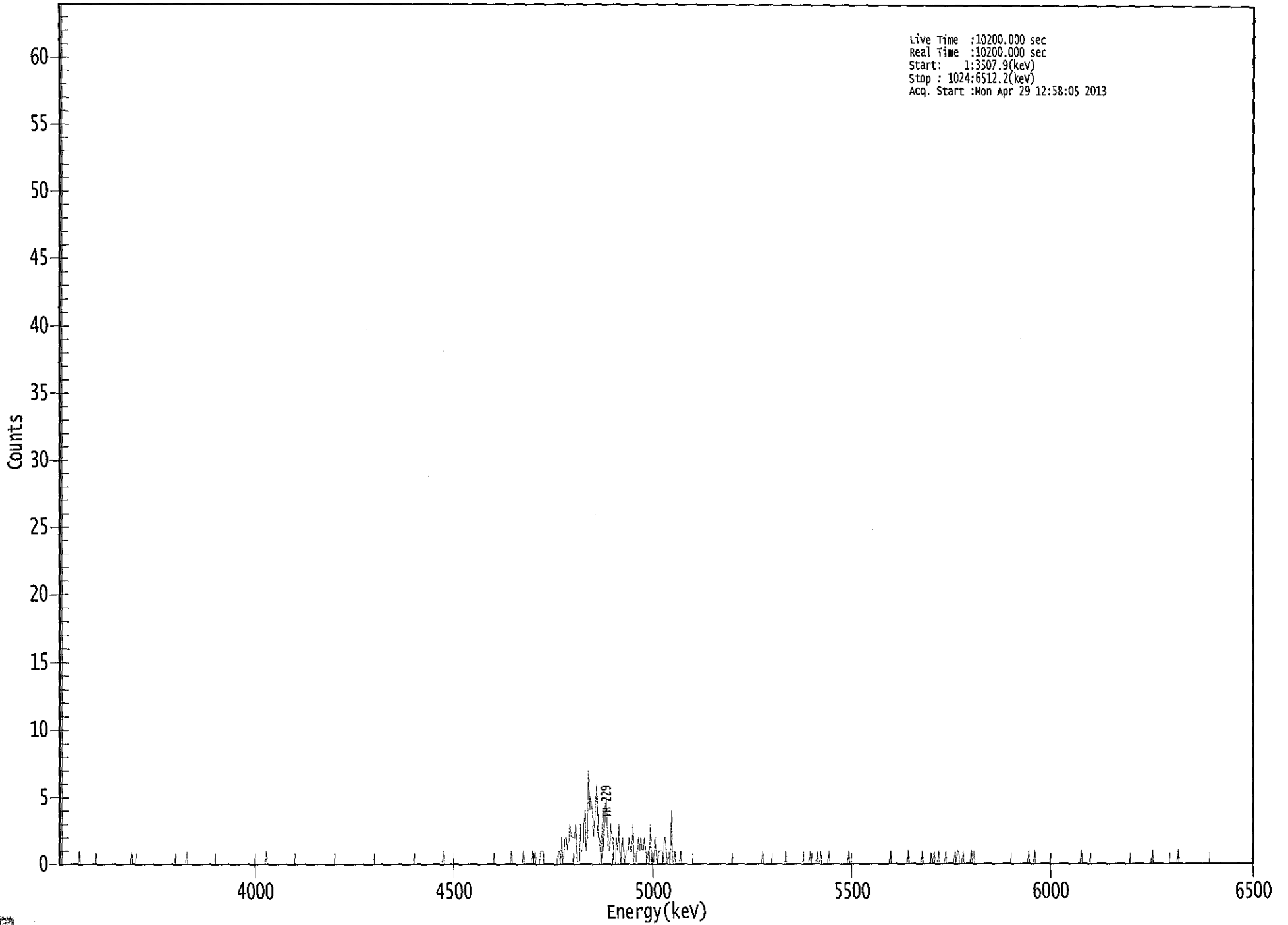
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.985	5850.00*	1.01E-001 +/- 9.69E-002	1.39E-001 +/- 2.30E-002
TH-228	0.998	5400.00*	4.14E-002 +/- 7.74E-002	1.40E-001 +/- 2.32E-002
TH-229	0.999	4872.00*	2.28E+000 +/- 3.78E-001	9.19E-002 +/- 1.52E-002
TH-230	1.000	4672.00*	1.02E-001 +/- 7.94E-002	7.84E-002 +/- 1.30E-002
TH-232	0.975	3997.00*	1.60E-002 +/- 3.99E-002	8.31E-002 +/- 1.37E-002

AG
 4/20/13

US EPA ARCHIVE DOCUMENT

0000056634.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
stop : 1024:6512.2(kev)
Acq. Start :Mon Apr 29 12:58:05 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: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

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	1	0	0
401:	0	0	0	0	0	1	0	1
409:	0	0	0	0	1	1	1	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	1	1	0	2	0
433:	1	2	2	1	2	3	2	2
441:	2	2	3	1	0	0	3	1
449:	1	3	4	1	2	7	4	5
457:	4	2	3	5	6	2	2	1
465:	0	4	1	4	5	3	1	1
473:	3	2	2	0	0	2	1	3
481:	1	0	2	1	0	1	1	1
489:	2	1	1	3	0	0	1	1
497:	2	1	2	1	1	2	1	0
505:	1	0	3	0	1	0	2	1
513:	0	1	1	1	1	0	2	2
521:	0	0	1	0	4	0	0	1
529:	0	0	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	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	1	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	0	1	0	0	0	0
649:	0	1	0	0	1	0	0	0
657:	0	0	0	1	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	1	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	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	1	0	0	0	0
745:	0	0	0	0	0	1	0	0
753:	0	1	0	0	0	0	0	1
761:	0	0	0	0	0	0	0	1
769:	0	1	1	0	0	0	1	0
777:	0	0	0	0	0	1	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: 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	1	0
833:	0	0	0	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	1	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

105
4/29/13



Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 11
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:51 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.224 mL
 Effective Efficiency: 0.1685 +/- 0.0150
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.9486 +/- 0.0864

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.810	-2.06	117.31	3.06	0.00E+000	3.1
TH-228	5.369	1.79	229.05	2.21	0.00E+000	3.1
TH-229 T	4.877	144.15	16.38	0.85	0.00E+000	13.6
TH-230	4.601	4.81	101.48	1.19	0.00E+000	3.1
TH-232	4.027	-0.53	415.13	1.53	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

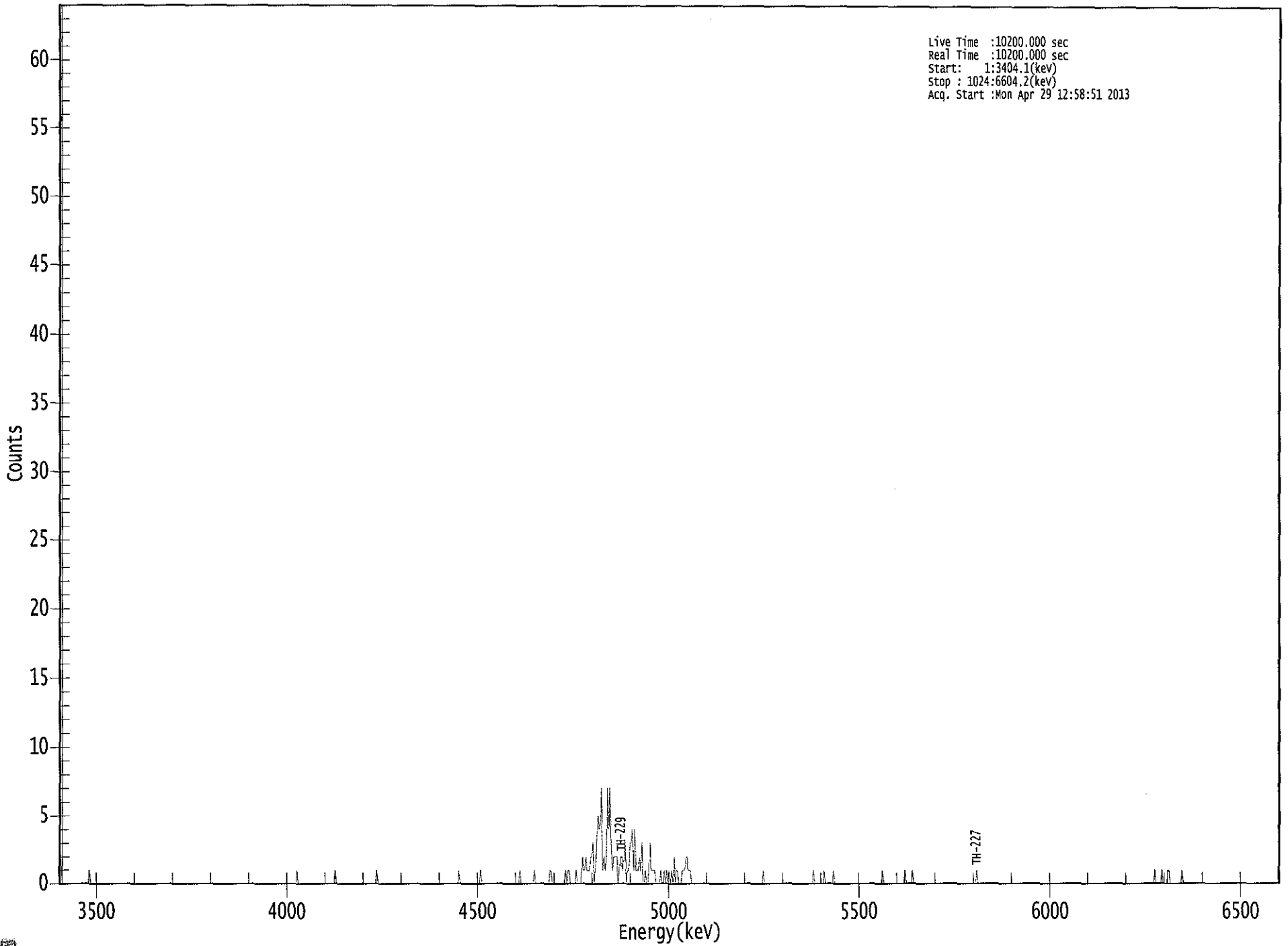
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.992	5850.00*	-3.33E-002 +/- 3.95E-002	1.44E-001 +/- 2.52E-002
TH-228	0.995	5400.00*	2.88E-002 +/- 6.61E-002	1.28E-001 +/- 2.25E-002
TH-229	1.000	4872.00*	2.28E+000 +/- 3.98E-001	9.46E-002 +/- 1.65E-002
TH-230	0.974	4672.00*	7.58E-002 +/- 7.80E-002	1.04E-001 +/- 1.81E-002
TH-232	0.995	3997.00*	-8.33E-003 +/- 3.46E-002	1.12E-001 +/- 1.95E-002

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056637.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Mon Apr 29 12:58:51 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0270

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	1	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	1	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	1	1	0	0	0	0
433:	0	1	0	0	0	0	2	1
441:	1	2	1	1	1	2	2	3
449:	0	1	3	5	4	4	7	1
457:	2	1	2	7	4	7	3	1
465:	2	2	2	2	0	1	2	2
473:	1	2	3	0	1	1	3	3
481:	4	1	4	1	1	1	2	1
489:	3	0	0	1	0	0	1	3
497:	1	1	1	1	0	0	0	0
505:	1	0	0	1	0	1	0	1
513:	0	1	0	2	0	1	1	0
521:	0	0	1	1	1	2	2	1
529:	1	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	1	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	1	0	0	0	0	0	0	0
641:	0	1	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	1	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	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	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: 11

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

105
4/29/13



Sample Description: PZ-204A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 12
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:52 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.225 mL
 Effective Efficiency: 0.1458 +/- 0.0139
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.9520 +/- 0.0926

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.736	2.98	134.37	1.02	0.00E+000	3.1
TH-228	5.331	19.94	47.67	3.06	0.00E+000	3.1
TH-229 T	4.857	125.13	17.67	1.87	0.00E+000	4.5
TH-230	4.652	21.64	43.66	1.36	0.00E+000	3.1
TH-232	3.957	6.64	84.69	1.36	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

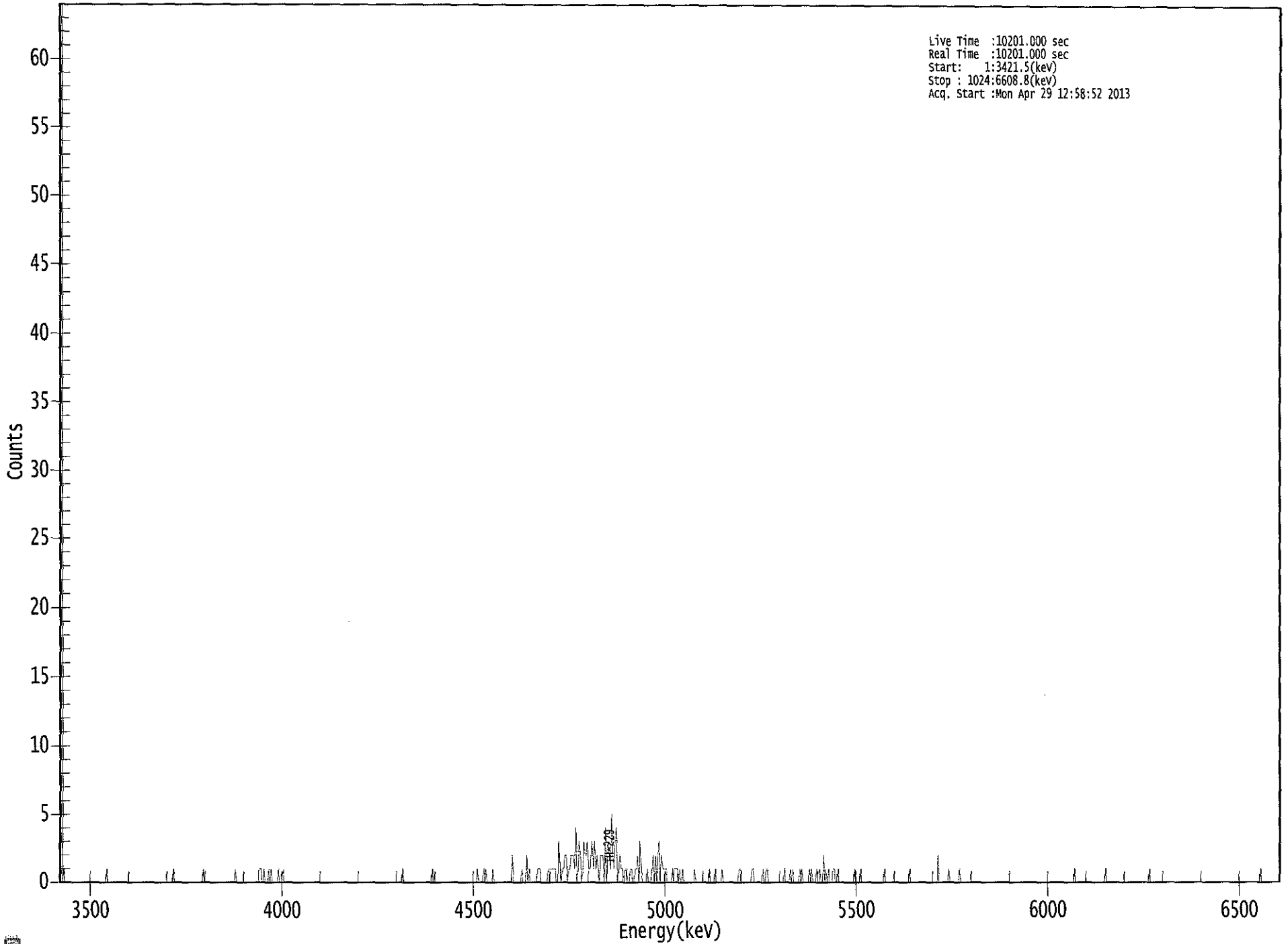
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.934	5850.00*	5.56E-002 +/- 7.55E-002	1.18E-001 +/- 2.20E-002
TH-228	0.975	5400.00*	3.70E-001 +/- 1.90E-001	1.66E-001 +/- 3.10E-002
TH-229	0.999	4872.00*	2.28E+000 +/- 4.27E-001	1.38E-001 +/- 2.58E-002
TH-230	0.998	4672.00*	3.94E-001 +/- 1.87E-001	1.25E-001 +/- 2.33E-002
TH-232	0.992	3997.00*	1.21E-001 +/- 1.05E-001	1.25E-001 +/- 2.33E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056638.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Mon Apr 29 12:58:52 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0275

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

Sample Title: 12

Elapsed Live time: 10201
 Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	1	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	1
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	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	1
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	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	1	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	1
169:	1	0	0	1	0	0	0	1
177:	0	1	0	0	0	0	0	1
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	1
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	1	0	1	0	0
361:	0	0	0	1	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	2	0	0	0	0
385:	0	0	0	1	0	0	0	2
393:	0	1	0	0	0	0	0	0
401:	1	1	1	0	0	0	0	0
409:	0	1	1	1	1	1	1	1
417:	0	0	3	1	0	1	1	2
425:	2	0	1	1	2	2	2	1
433:	4	0	1	3	2	0	1	3
441:	2	2	3	1	1	2	3	1
449:	3	1	2	1	0	2	2	2
457:	0	4	0	3	2	1	5	2
465:	1	3	4	0	1	2	1	1
473:	0	0	1	1	0	0	1	1
481:	0	0	1	1	2	0	3	1
489:	0	0	0	0	1	0	0	0
497:	1	2	0	2	0	2	3	0
505:	2	1	1	1	1	0	0	0
513:	0	1	0	1	1	1	0	1
521:	0	0	1	0	0	0	0	0
529:	0	0	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	1	0	0	0	0	1	0	0
553:	0	0	0	1	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	1	1	0	0	0	0	0
577:	0	0	0	0	1	1	0	0
585:	0	0	0	0	0	1	0	0
593:	1	1	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	1
609:	0	0	0	0	1	0	1	0
617:	0	0	0	0	1	0	1	0
625:	0	0	0	0	1	0	1	0
633:	0	0	1	0	0	1	0	0
641:	2	0	1	0	1	0	0	0
649:	1	1	0	0	1	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	1	0	0	0	0	1
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	1	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	2	0	0	0	0	0	0	0
745:	0	1	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: 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	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	1	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	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	1	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

ICS
4/29/13

Apex-Alpha™

Sample Description: PZ-204A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 13
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:53 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.1674 +/- 0.0150
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.9785 +/- 0.0894

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	5.777	-0.89	347.60	2.89	0.00E+000	6.2
TH-228	5.341	0.96	373.51	2.04	0.00E+000	3.1
TH-229 T	4.865	142.66	16.43	0.34	0.00E+000	5.2
TH-230	4.665	6.66	78.18	0.34	0.00E+000	4.7
TH-232	3.907	0.98	294.85	1.02	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

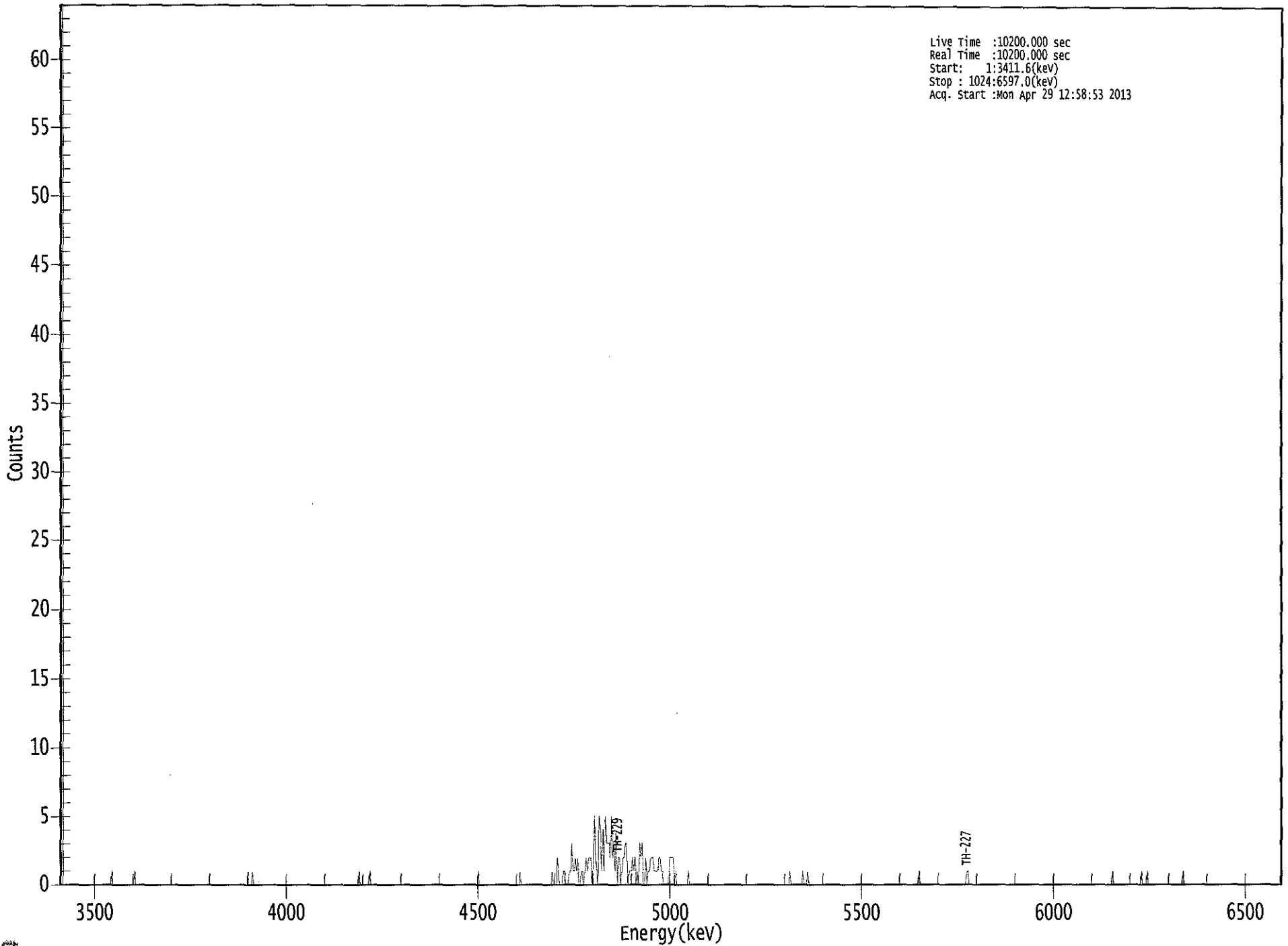
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.972	5850.00*	-1.45E-002 +/- 5.04E-002	1.42E-001 +/- 2.50E-002
TH-228	0.982	5400.00*	1.55E-002 +/- 5.81E-002	1.26E-001 +/- 2.21E-002
TH-229	1.000	4872.00*	2.27E+000 +/- 3.98E-001	7.61E-002 +/- 1.33E-002
TH-230	1.000	4672.00*	1.06E-001 +/- 8.46E-002	7.58E-002 +/- 1.33E-002
TH-232	0.958	3997.00*	1.55E-002 +/- 4.58E-002	9.97E-002 +/- 1.75E-002

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056639.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Mon Apr 29 12:58:53 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: 13

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	1	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	1	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	1	0
161:	0	1	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	1	0	0	0	0
257:	0	0	0	1	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	1	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: 13

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	1	0	0	0
417:	2	1	0	0	0	1	1	0
425:	0	0	1	1	3	1	1	2
433:	1	2	0	0	1	1	0	1
441:	2	1	2	2	2	0	2	5
449:	2	1	0	5	4	1	4	1
457:	5	3	3	3	2	5	2	3
465:	1	4	0	2	2	0	1	2
473:	2	3	3	0	1	1	1	2
481:	1	2	0	1	0	3	2	3
489:	0	0	2	0	1	1	2	2
497:	2	1	1	1	1	2	2	1
505:	1	0	0	0	0	0	2	2
513:	2	2	0	1	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	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	0
617:	0	0	0	0	0	0	1	0
625:	0	0	1	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	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	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	1
761:	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: 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	1	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	1	0	0	0	0	1	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	1	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KS
4/29/13

Apex-Alpha™

Sample Description: PZ-205-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 14
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:54 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.1733 +/- 0.0153
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 0.9982 +/- 0.0899

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	5.824	5.98	87.78	1.02	0.00E+000	6.3
TH-228	5.366	19.64	45.98	1.36	0.00E+000	3.1
TH-229 T	4.868	147.49	16.17	0.51	0.00E+000	13.7
TH-230	4.598	23.32	41.27	0.68	0.00E+000	4.7
TH-232	3.994	6.32	82.73	0.68	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

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

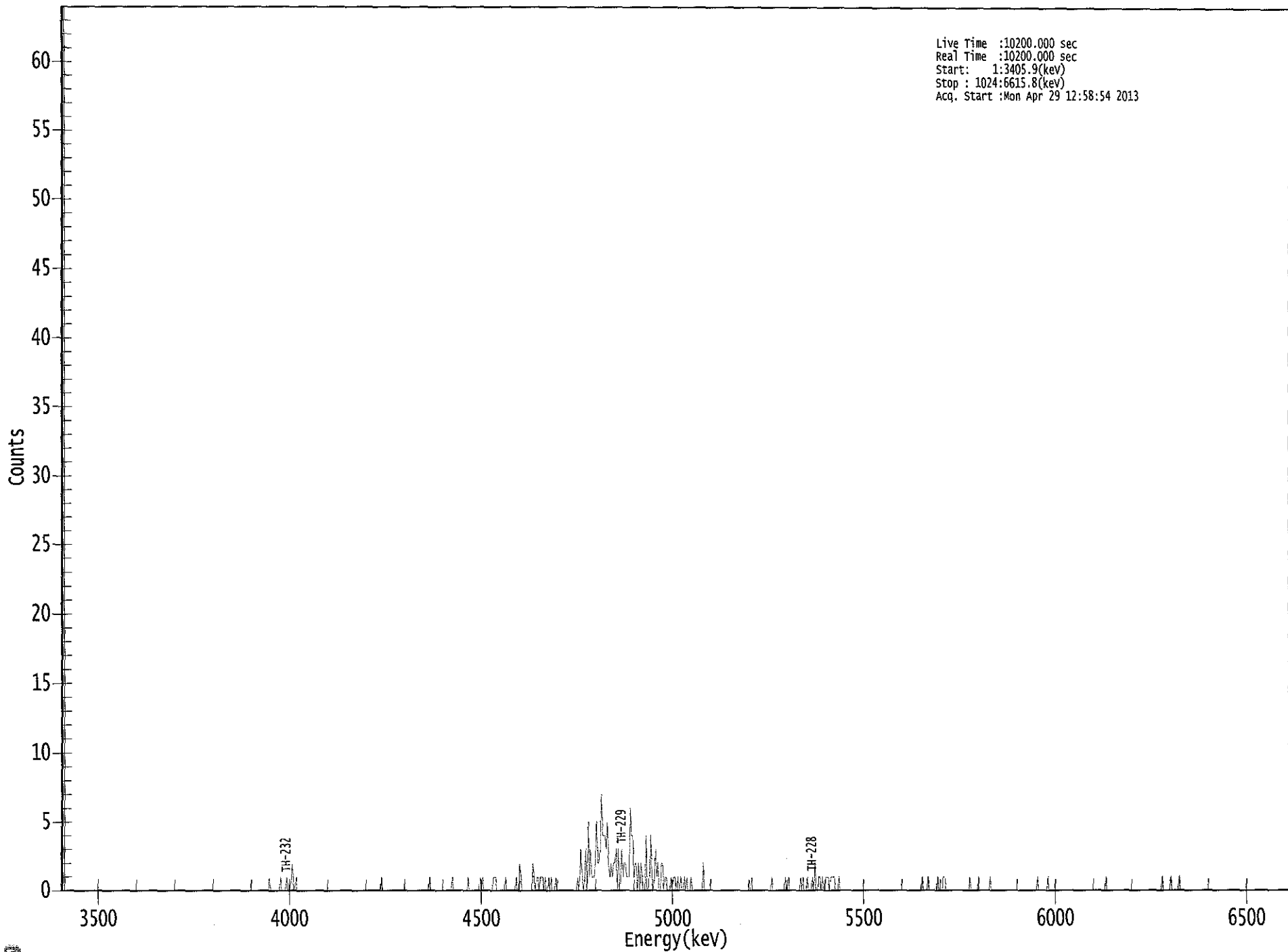
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	9.40E-002 +/- 8.41E-002	9.90E-002 +/- 1.71E-002
TH-228	0.994	5400.00*	3.07E-001 +/- 1.51E-001	1.07E-001 +/- 1.85E-002
TH-229	1.000	4872.00*	2.27E+000 +/- 3.92E-001	8.06E-002 +/- 1.39E-002
TH-230	0.972	4672.00*	3.57E-001 +/- 1.60E-001	8.64E-002 +/- 1.49E-002
TH-232	1.000	3997.00*	9.67E-002 +/- 8.17E-002	8.63E-002 +/- 1.49E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056640.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Mon Apr 29 12:58:54 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: 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	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	1	0	0
177:	0	0	0	0	0	0	1	0
185:	0	0	0	1	0	0	0	1
193:	2	0	0	1	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	1	0	0	0	0	0
345:	0	0	0	0	1	0	1	0
353:	0	0	0	0	0	0	0	1
361:	1	1	0	0	0	0	0	0

369: 0 1 0 0 0 0 0 0

Sample Title: 14

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	1	0	0	2	1	0	
385:	0	0	0	0	0	0	0	0	
393:	2	1	0	1	1	0	1	1	
401:	1	0	1	0	0	1	0	1	
409:	0	0	0	1	0	0	0	0	
417:	0	0	0	0	0	0	0	0	
425:	0	0	0	0	0	1	0	1	
433:	3	1	0	1	3	0	5	1	
441:	3	1	1	1	2	5	2	2	
449:	3	7	4	4	4	3	5	2	
457:	1	2	1	2	2	3	0	3	
465:	0	1	3	1	2	2	1	1	
473:	1	6	4	4	1	2	2	0	
481:	2	0	2	1	0	0	4	0	
489:	0	1	4	1	0	1	3	1	
497:	2	0	0	2	2	0	1	1	
505:	0	0	0	1	0	1	1	0	
513:	0	1	0	1	0	0	1	0	
521:	1	0	0	0	1	0	0	0	
529:	0	0	0	0	0	0	2	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	1	0	
577:	0	0	0	0	0	0	0	0	
585:	0	0	0	0	0	0	0	1	
593:	0	0	0	0	0	0	0	0	
601:	0	0	1	0	0	1	0	0	
609:	0	0	0	0	0	0	0	1	
617:	0	1	0	0	0	1	0	0	
625:	0	1	0	2	0	0	1	1	
633:	0	1	0	0	1	1	1	0	
641:	1	1	1	1	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	1	0	0	0	
721:	0	1	0	0	0	0	0	0	
729:	0	1	0	0	0	0	1	1	
737:	0	0	0	0	0	0	0	0	
745:	0	0	0	0	0	0	0	0	
753:	0	0	0	0	1	0	0	0	
761:	0	0	0	1	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: 14

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



Apex-Alpha™

103
4/29/13

Sample Description: PZ-205-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 15
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:55 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.1816 +/- 0.0157
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 1.0510 +/- 0.0931

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	5.789	2.15	161.66	0.85	0.00E+000	3.2
TH-228	5.417	-1.21	189.99	2.21	0.00E+000	3.2
TH-229 T	4.861	154.64	15.84	1.36	0.00E+000	4.2
TH-230	4.653	6.98	80.28	1.02	0.00E+000	4.8
TH-232	3.947	-0.68	304.44	0.68	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

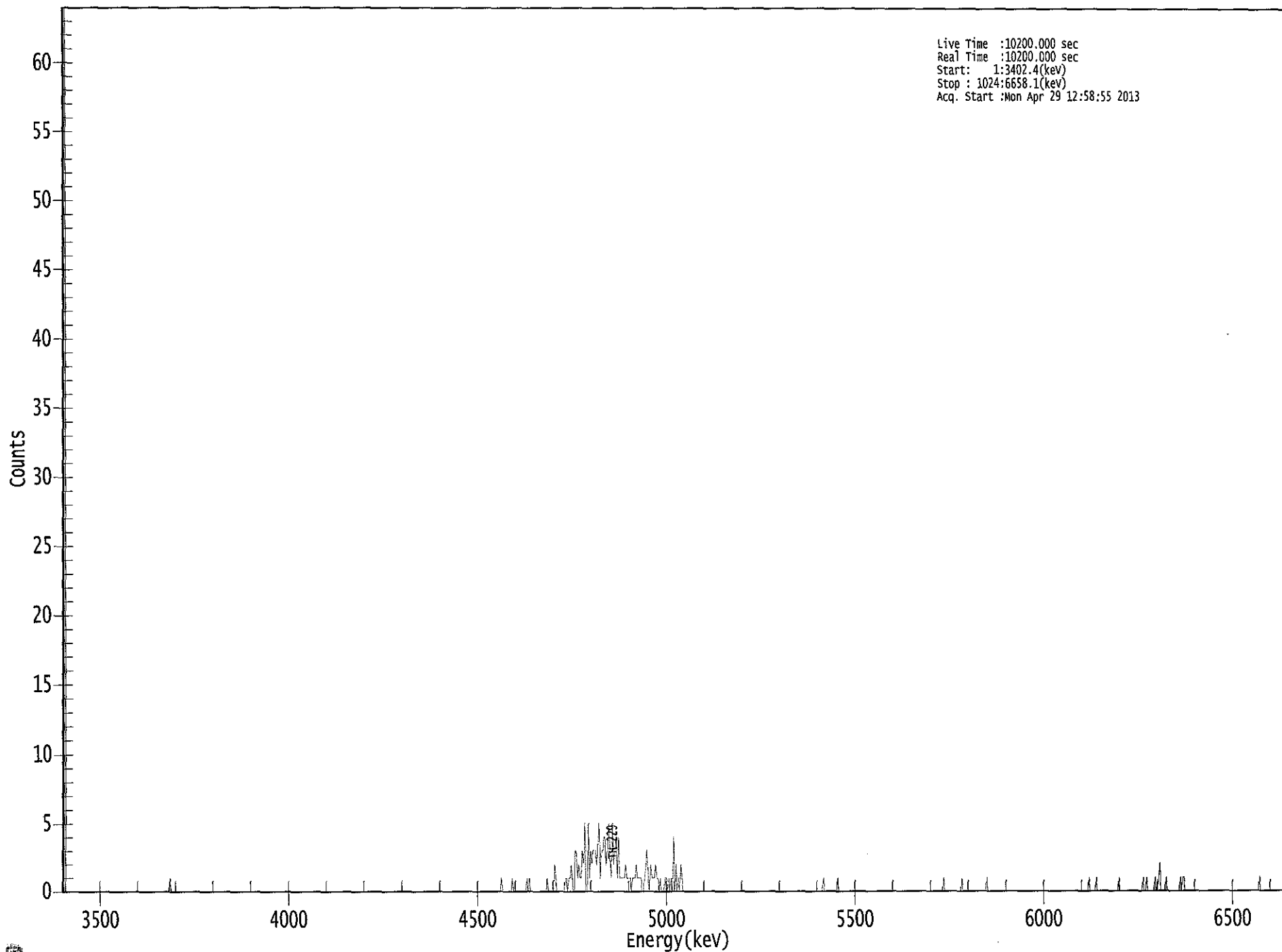
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.981	5850.00*	3.22E-002 +/- 5.24E-002	8.98E-002 +/- 1.52E-002
TH-228	0.999	5400.00*	-1.80E-002 +/- 3.44E-002	1.19E-001 +/- 2.02E-002
TH-229	0.999	4872.00*	2.27E+000 +/- 3.85E-001	1.01E-001 +/- 1.71E-002
TH-230	0.998	4672.00*	1.02E-001 +/- 8.37E-002	9.21E-002 +/- 1.56E-002
TH-232	0.987	3997.00*	-9.92E-003 +/- 3.03E-002	8.23E-002 +/- 1.40E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056641.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Mon Apr 29 12:58:55 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: 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	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369: 0 0 0 0 0 0 0 1 0

Sample Title: 15

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	0
401:	0	0	0	1	0	0	0	0
409:	0	2	1	0	0	0	0	0
417:	0	0	1	1	0	1	1	2
425:	0	0	3	3	1	2	1	1
433:	3	2	5	0	0	5	1	3
441:	2	3	3	3	2	3	5	1
449:	3	3	4	4	2	3	5	3
457:	1	5	2	3	4	1	4	1
465:	1	1	1	1	2	1	1	1
473:	1	0	1	1	1	2	1	1
481:	1	1	0	0	1	2	3	1
489:	0	2	1	1	1	2	1	1
497:	0	1	0	0	0	1	1	0
505:	1	0	1	0	4	0	2	0
513:	1	0	2	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	0	0	0	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	1	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	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: 15

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

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4/29/13

Apex-Alpha™

Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 16
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:58:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.2005 +/- 0.0166
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 1.0309 +/- 0.0876

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	5.816	4.64	105.44	1.36	0.00E+000	3.1
TH-228	5.279	-0.38	799.82	2.38	0.00E+000	3.1
TH-229 T	4.875	170.64	15.07	1.36	0.00E+000	4.9
TH-230	4.674	7.15	78.23	0.85	0.00E+000	3.1
TH-232	3.957	4.00	109.57	0.00	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

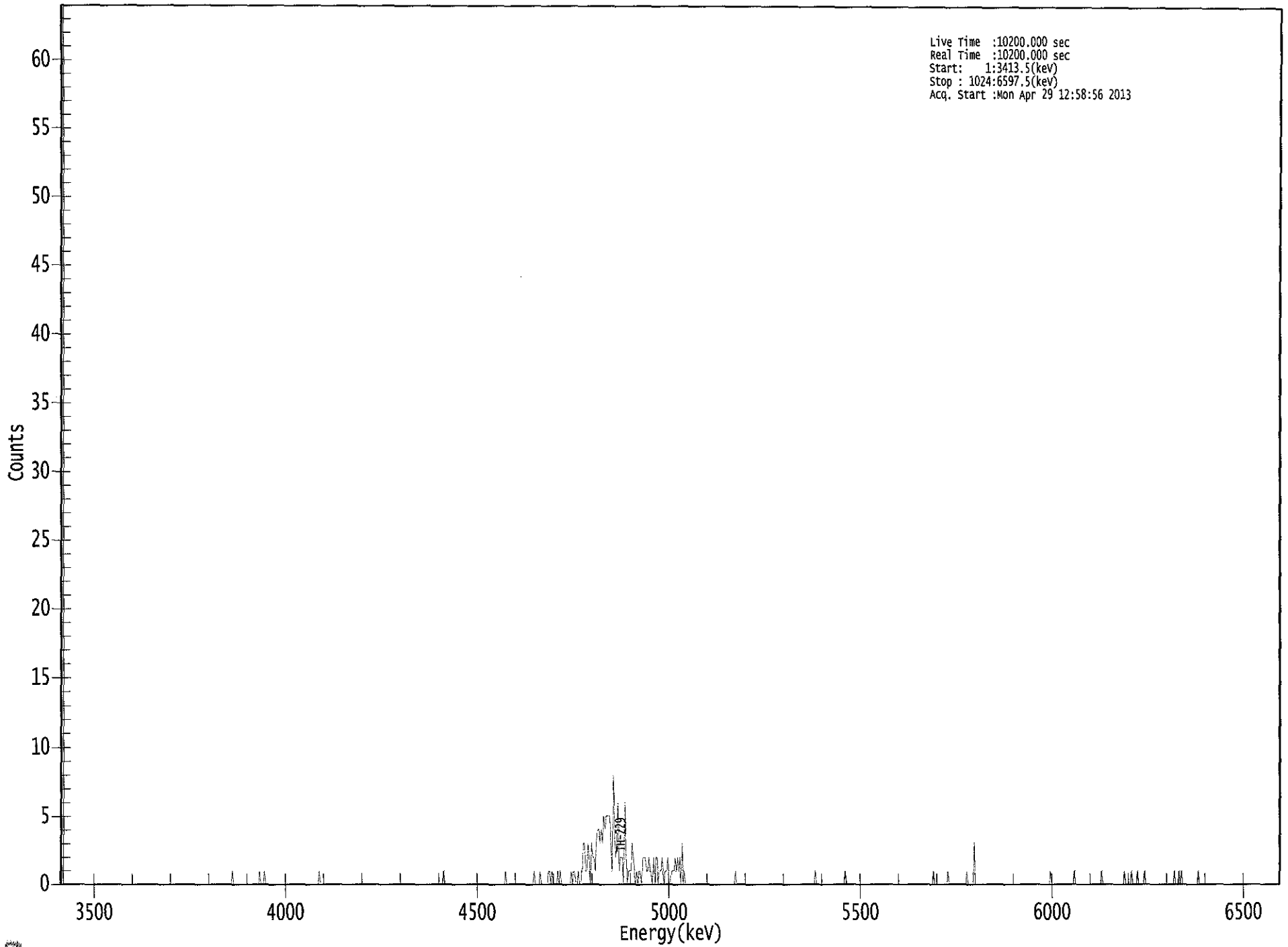
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	6.30E-002 +/- 6.72E-002	9.31E-002 +/- 1.51E-002
TH-228	0.927	5400.00*	-5.13E-003 +/- 4.10E-002	1.11E-001 +/- 1.80E-002
TH-229	1.000	4872.00*	2.27E+000 +/- 3.68E-001	9.10E-002 +/- 1.48E-002
TH-230	1.000	4672.00*	9.46E-002 +/- 7.56E-002	7.92E-002 +/- 1.29E-002
TH-232	0.992	3997.00*	5.29E-002 +/- 5.85E-002	7.92E-002 +/- 1.29E-002

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056642.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(keV)
Stop : 1024:6597.5(keV)
Acq. Start :Mon Apr 29 12:58:56 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0295

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

Sample Title: 16

Elapsed Live time: 10200
Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----
1:	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:	1	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	1
169:	0	0	0	1	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	1	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	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	1	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 1 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	1	0	0	0	0	0
409:	0	1	1	0	1	0	0	0
417:	0	1	0	1	0	0	0	0
425:	0	0	0	0	1	0	1	1
433:	0	0	1	0	0	1	3	3
441:	1	1	3	2	0	3	2	2
449:	1	3	4	4	3	4	3	5
457:	4	5	5	5	5	3	1	8
465:	4	2	3	6	1	2	2	2
473:	0	6	2	0	1	1	1	3
481:	2	1	0	1	0	1	1	0
489:	2	2	2	1	1	2	1	1
497:	0	2	0	2	2	0	1	1
505:	2	1	0	1	1	2	0	0
513:	1	1	1	2	1	2	1	2
521:	0	3	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	1	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	1	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	0	0	0	0	3	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: 16

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

103
4/29/13

Apex-Alpha™

Sample Description: PZ-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 17
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:59:21 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.1816 +/- 0.0157
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Chem. Recovery Factor: 0.9951 +/- 0.0877

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	5.787	3.66	107.87	0.34	0.00E+000	3.0
TH-228	5.408	2.32	149.12	0.68	0.00E+000	3.0
TH-229 T	4.881	155.00	15.79	0.00	0.00E+000	7.1
TH-230	4.601	4.32	102.62	0.68	0.00E+000	3.0
TH-232	3.947	0.00	1960.0	0.00	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

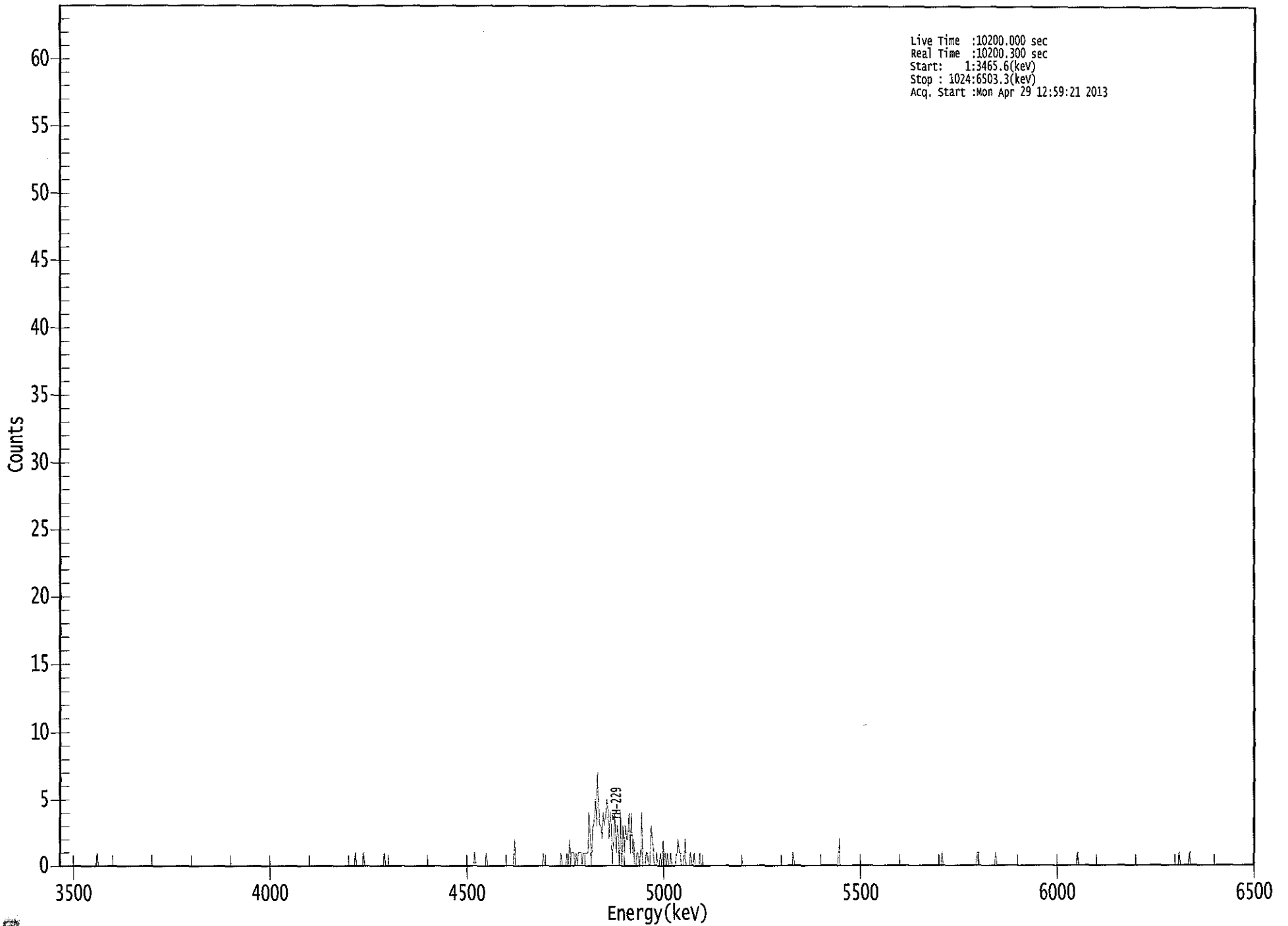
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.979	5850.00*	5.49E-002 +/- 5.99E-002	7.17E-002 +/- 1.21E-002
TH-228	1.000	5400.00*	3.46E-002 +/- 5.19E-002	8.41E-002 +/- 1.42E-002
TH-229	1.000	4872.00*	2.27E+000 +/- 3.85E-001	8.79E-002 +/- 1.49E-002
TH-230	0.974	4672.00*	6.32E-002 +/- 6.57E-002	8.25E-002 +/- 1.40E-002
TH-232	0.987	3997.00*	0.00E+000 +/- 4.04E-002	8.75E-002 +/- 1.48E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056643.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3465.6(kev)
Stop : 1024:6503.3(kev)
Acq. Start :Mon Apr 29 12:59:21 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0000

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

Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0	0
33:	1	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	1	0	0	0
257:	0	0	0	0	1	0	0	0	0
265:	0	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	1	0	0
281:	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	1	0	0	0	0	0
361:	0	0	0	0	0	1	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	2	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	1	0	0
433:	0	0	1	0	2	0	1	1
441:	1	0	1	0	1	1	1	0
449:	1	1	1	1	1	4	2	0
457:	3	3	5	3	7	4	3	3
465:	2	4	3	4	5	4	2	4
473:	3	0	2	4	1	3	2	0
481:	4	0	3	1	3	2	2	4
489:	1	4	1	2	0	0	1	1
497:	0	1	4	0	0	0	1	1
505:	0	0	3	2	1	0	0	1
513:	0	0	1	0	2	0	1	0
521:	1	0	0	1	0	0	0	0
529:	1	2	1	1	0	0	0	2
537:	0	0	0	0	1	0	0	1
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	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	1	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	2	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	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	1	1	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 1 0 0 0 0 0 0 0

Sample Title: 17

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	1
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	0
921:	0	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	1	0	0
961:	0	0	0	0	0	0	0	1	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

KCB
4/29/13

Apex-Alpha™

Sample Description: PZ-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 18
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:59:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.1874 +/- 0.0160
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 1.0096 +/- 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	5.911	3.66	107.87	0.34	0.00E+000	3.0
TH-228	5.313	6.83	76.08	0.17	0.00E+000	3.0
TH-229 T	4.872	159.49	15.55	0.51	0.00E+000	9.2
TH-230	4.644	9.32	66.89	0.68	0.00E+000	3.0
TH-232	3.930	0.49	416.98	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

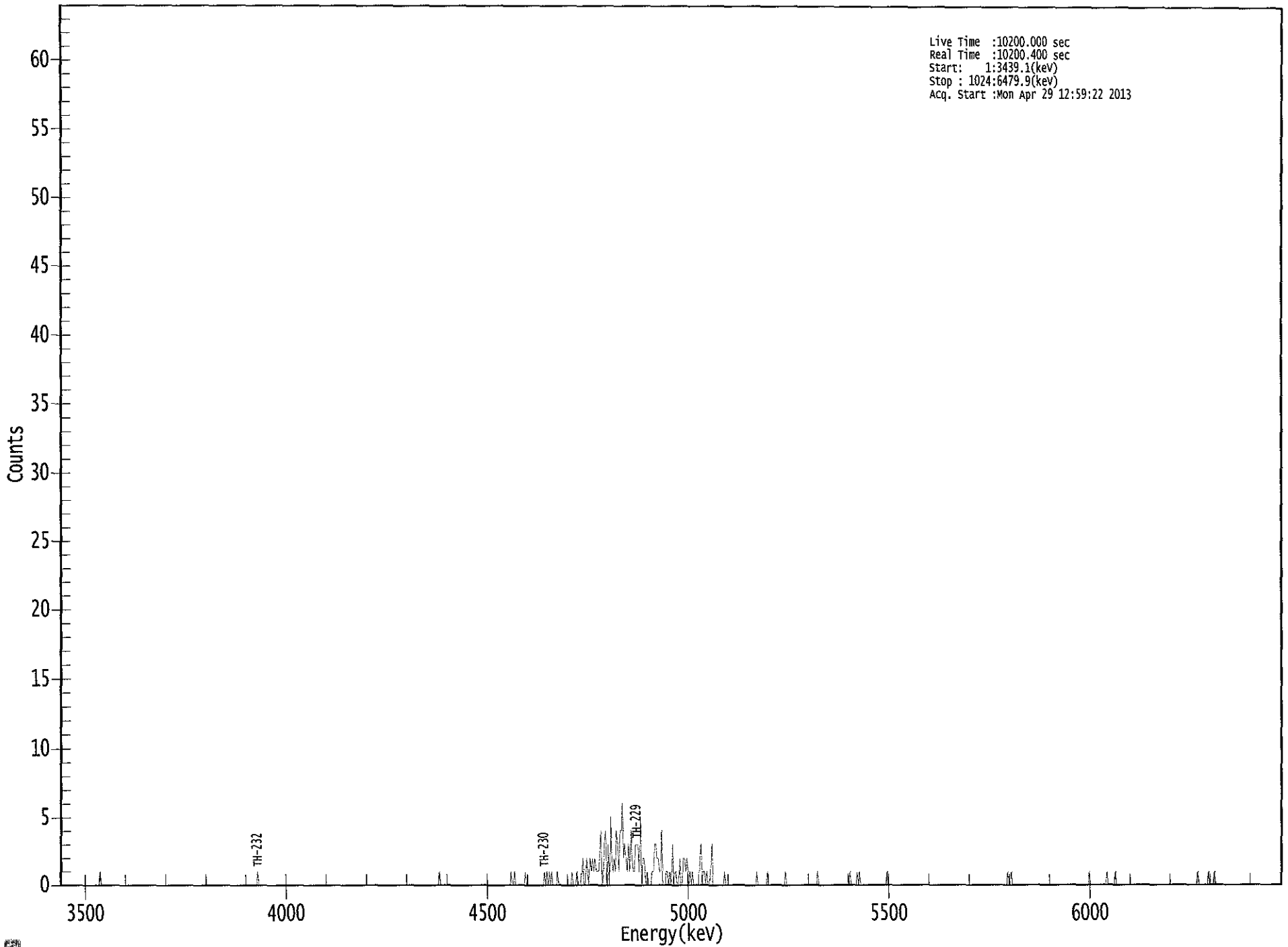
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.981	5850.00*	5.32E-002 +/- 5.81E-002	6.95E-002 +/- 1.16E-002
TH-228	0.961	5400.00*	9.87E-002 +/- 7.69E-002	6.03E-002 +/- 1.01E-002
TH-229	1.000	4872.00*	2.27E+000 +/- 3.78E-001	7.46E-002 +/- 1.24E-002
TH-230	0.996	4672.00*	1.32E-001 +/- 9.10E-002	7.99E-002 +/- 1.33E-002
TH-232	0.977	3997.00*	6.93E-003 +/- 2.89E-002	7.42E-002 +/- 1.24E-002

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056644.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Mon Apr 29 12:59:22 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

5050

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

Sample Title: 18

Elapsed Live time: 10200
 Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	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	1	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	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	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	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	1	2	3	4	5	6	7	8
377:	0	1	0	0	1	0	0	0
385:	0	0	0	0	0	1	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	1	0	1
409:	0	1	0	1	0	0	0	0
417:	1	0	0	0	0	0	0	0
425:	0	0	0	0	1	0	0	0
433:	1	0	0	0	1	2	0	0
441:	2	1	0	2	1	2	1	2
449:	1	1	1	2	4	0	1	3
457:	4	0	3	0	5	2	1	2
465:	1	4	3	1	4	4	6	2
473:	3	2	1	3	1	4	2	1
481:	1	3	3	3	1	5	0	2
489:	2	1	0	1	0	0	0	1
497:	1	3	3	2	2	1	1	4
505:	0	0	0	1	1	0	1	0
513:	3	0	1	1	0	0	2	0
521:	0	2	2	1	2	1	0	1
529:	0	1	0	0	0	0	0	2
537:	3	0	1	1	0	1	0	0
545:	1	3	0	0	0	0	0	0
553:	0	0	0	0	1	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	1
585:	0	0	0	0	0	0	0	0
593:	1	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	1
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	1	0	0
665:	0	0	0	1	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	1	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	1	0	0	1	0	0	0

801: 0 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	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
961:	0	1	0	0	0	0	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



143
4/29/13

Sample Description: PZ-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-TH
 Sample Identification: 19
 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: 4/8/2013 8:03:25 AM
 Acquisition Date/Time: 4/29/2013 12:59:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.223 mL
 Effective Efficiency: 0.2032 +/- 0.0167
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.1129 +/- 0.0935

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	5.723	0.32	646.93	0.68	0.00E+000	2.9
TH-228	5.391	3.66	107.87	0.34	0.00E+000	2.9
TH-229 T	4.889	172.83	14.92	0.17	0.00E+000	5.3
TH-230	4.668	7.66	72.63	0.34	0.00E+000	2.9
TH-232	3.852	0.83	239.53	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

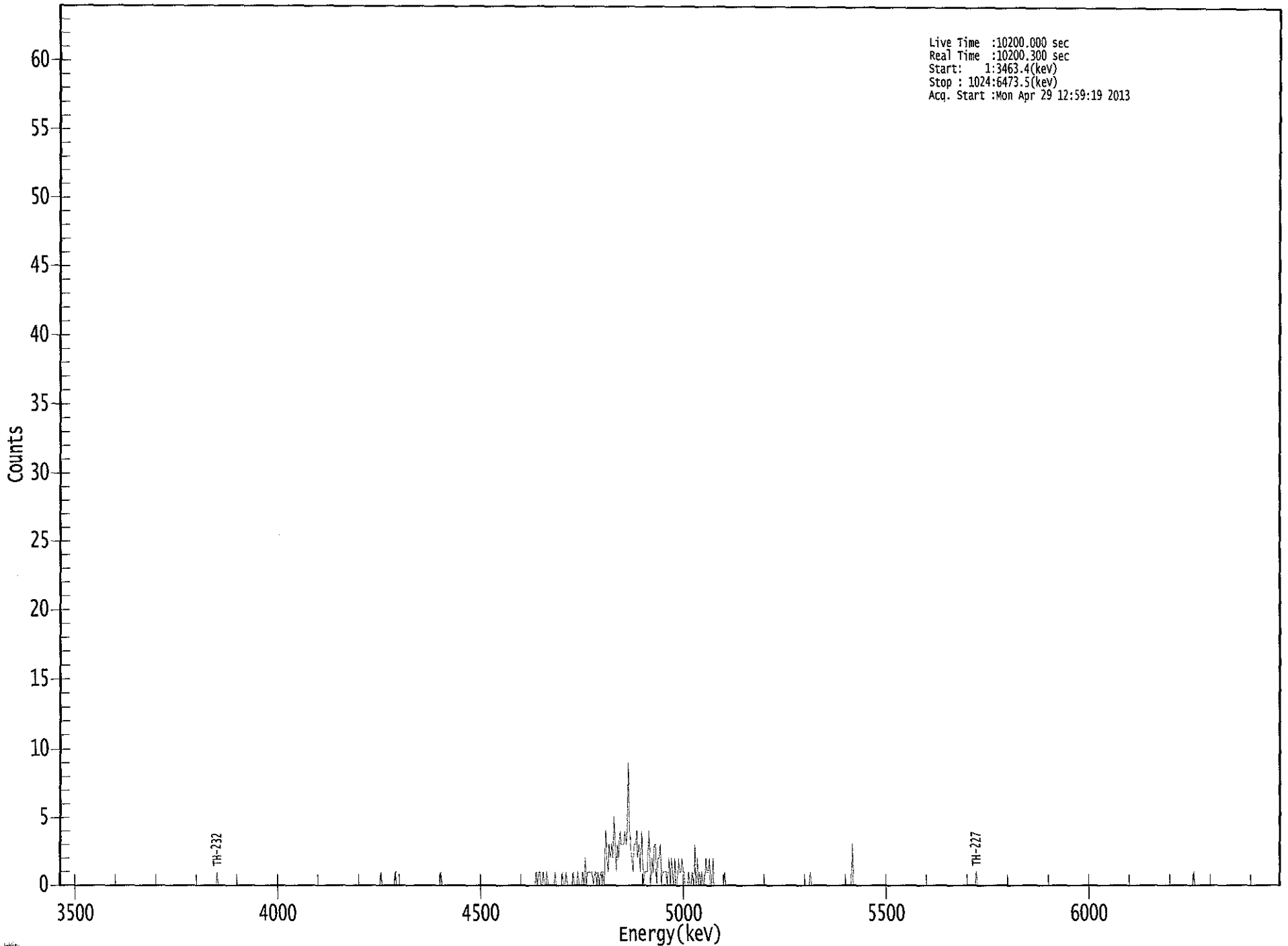
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.919	5850.00*	4.29E-003 +/- 2.77E-002	7.56E-002 +/- 1.22E-002
TH-228	1.000	5400.00*	4.88E-002 +/- 5.32E-002	6.37E-002 +/- 1.03E-002
TH-229	0.998	4872.00*	2.26E+000 +/- 3.65E-001	5.47E-002 +/- 8.81E-003
TH-230	1.000	4672.00*	1.00E-001 +/- 7.44E-002	6.25E-002 +/- 1.01E-002
TH-232	0.896	3997.00*	1.08E-002 +/- 2.60E-002	5.44E-002 +/- 8.77E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056645.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Mon Apr 29 12:59:19 2013



ROI Type: 1

ROI Type: 3

US EPA ARCHIVE DOCUMENT

0120

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

Sample Title: 19

Elapsed Live time: 10200
 Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	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	1	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	1	0	0	0
273:	0	0	0	0	0	0	0	0	0
281:	0	1	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	1
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: 19

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	1
401:	0	1	1	0	0	1	0	0
409:	1	0	0	0	0	0	0	1
417:	0	0	0	0	0	1	0	0
425:	1	0	0	0	0	0	1	0
433:	0	0	1	0	0	0	1	0
441:	2	0	1	1	1	1	1	0
449:	1	1	0	1	0	1	1	1
457:	0	4	2	1	3	2	3	2
465:	5	3	1	3	2	4	3	3
473:	3	4	3	4	9	4	3	2
481:	1	3	3	4	2	3	1	4
489:	2	0	1	1	1	4	2	0
497:	2	1	3	3	0	2	2	3
505:	0	1	1	1	1	0	2	0
513:	2	1	0	2	0	0	2	1
521:	1	2	1	1	0	0	0	1
529:	0	0	1	0	3	0	2	0
537:	1	0	1	0	0	2	1	1
545:	2	0	0	2	0	0	0	0
553:	0	0	0	0	0	1	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	3	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:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 4/29/2013
Time : 5:51:06 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/29/2013 5:29:44 AM
Alpha 004	21f	ALL	Passed	4/29/2013 5:29:45 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	4/29/2013 5:29:45 AM
Alpha 011	21f	ALL	Passed	4/29/2013 5:29:46 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/29/2013 5:29:47 AM
Alpha 014	21f	ALL	Passed	4/29/2013 5:29:48 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/29/2013 5:29:49 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/29/2013 5:29:50 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/29/2013 5:29:51 AM
Alpha 025	AIM730	ALL	Passed	4/29/2013 5:29:52 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/29/2013 5:29:53 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/29/2013 5:29:53 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	4/29/2013 5:29:55 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:56 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:58 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:59 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:01 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	4/29/2013 5:30:04 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:06 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:07 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	4/29/2013 5:30:11 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:13 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:15 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:17 AM

APPROVED BY: _____

APPROVAL DATE: _____ 4/29/13

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

Nuclide Library Title: Thorium

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

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

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X
ANALYTICAL DATA (RADIUM-226)

US EPA ARCHIVE DOCUMENT

Work Order	13-04104
Analysis Code	Ra226
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 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1009.412
Carrier	
Carrier Conc (mg/ml)	

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	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.5000E+00
04	TRG	PZ-103-SS TOT	36	04/08/13 11:15	1.5000E+00
05	TRG	PZ-103-SS DIS	36	04/08/13 11:15	1.5000E+00
06	TRG	PZ-114-AS TOT	39	04/08/13 11:45	1.5000E+00
07	TRG	PZ-114-AS DIS	39	04/08/13 11:45	1.5000E+00
08	DO	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.5000E+00
09	TRG	FB at PZ-201A-SS DIS	40	04/08/13 12:45	1.5000E+00
10	TRG	PZ-201A-SS TOT	38	04/08/13 13:22	1.5000E+00
11	TRG	PZ-201A-SS DIS	38	04/08/13 13:22	1.5000E+00
12	TRG	PZ-204A-SS TOT	45	04/08/13 13:26	1.5000E+00
13	TRG	PZ-204A-SS DIS	45	04/08/13 13:26	1.5000E+00
14	TRG	PZ-205-AS TOT	43	04/08/13 13:36	1.5000E+00
15	TRG	PZ-205-AS DIS	43	04/08/13 13:36	1.5000E+00
16	TRG	PZ-205-SS TOT	40	04/08/13 14:50	1.5000E+00
17	TRG	PZ-205-SS DIS	40	04/08/13 14:50	1.5000E+00
18	TRG	PZ-206-SS TOT	42	04/08/13 15:00	1.5000E+00
19	TRG	PZ-206-SS DIS	42	04/08/13 15:00	1.5000E+00

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

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	0.9141	922.7	383.9	92.37		0.0225	0.0281	0.0056		92.37	2.00	1.00
02	MBL	0.9085	917.1	383.6	92.86		0.0227	0.0280	0.0053		92.86	1.86	1.00
03	DUP	0.9058	914.3	340.5	82.67		0.0228	0.0280	0.0052		82.67	1.81	1.00
04	TRG	0.9029	911.4	287.0	69.91		0.0228	0.0314	0.0086		69.91	2.91	1.00
05	TRG	0.9035	912.0	371.8	90.50		0.0224	0.0313	0.0089		90.50	2.99	1.00
06	TRG	0.9049	913.4	277.2	67.37		0.0233	0.0281	0.0048		67.37	1.61	1.00
07	TRG	0.9037	912.2	340.8	82.94		0.0224	0.0282	0.0058		82.94	2.08	1.00
08	DO	0.9025	911.0	349.2	85.10		0.0225	0.0282	0.0057		85.10	2.04	1.00
09	TRG	0.8660	874.2	344.7	87.54		0.0225	0.0278	0.0053		87.54	1.86	1.00
10	TRG	0.8983	906.8	332.9	81.50		0.0224	0.0281	0.0057		81.50	2.04	1.00
11	TRG	0.8924	900.8	346.8	85.47		0.0225	0.0279	0.0054		85.47	1.91	1.00
12	TRG	0.9028	911.3	330.3	80.46		0.0224	0.0286	0.0062		80.46	2.23	1.00
13	TRG	0.9014	909.9	371.5	90.64		0.0225	0.0291	0.0066		90.64	2.37	1.00
14	TRG	0.8741	882.3	326.4	82.12		0.0227	0.0316	0.0089		82.12	2.99	1.00
15	TRG	0.9025	911.0	372.7	90.82		0.0223	0.0302	0.0079		90.82	2.74	1.00
16	TRG	0.8446	852.5	285.0	74.21		0.0224	0.0278	0.0054		74.21	1.91	1.00
17	TRG	0.7700	777.2	296.5	84.69		0.0227	0.0283	0.0056		84.69	2.00	1.00
18	TRG	0.9112	919.8	332.1	80.16		0.0225	0.0274	0.0049		80.16	1.66	1.00
19	TRG	0.9108	919.4	355.9	85.94		0.0224	0.0284	0.0060		85.94	2.16	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.

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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			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
02	MBL			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
03	DUP			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
04	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
05	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
06	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
07	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
08	DO			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
09	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
10	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
11	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
12	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
13	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
14	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
15	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
16	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
17	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
18	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		
19	TRG			04/23/13 06:15	JBARNARD	04/26/13 14:23	LWALKER		

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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: 13-04104-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	9.72E+00	1.09E+00	1.74E-01	1.02E+01	94.82	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	3.79E-02	6.69E-02	1.21E-01					OK	OK
03	RA-226	DUP	FB at PZ-201A-SS TOT	pCi/l	3.38E-02	5.72E-02	9.72E-02				OK	OK	
04	RA-226	TRG	PZ-103-SS TOT	pCi/l	1.67E+01	1.72E+00	2.46E-01					OK	
05	RA-226	TRG	PZ-103-SS DIS	pCi/l	3.89E+00	7.07E-01	1.81E-01					OK	
06	RA-226	TRG	PZ-114-AS TOT	pCi/l	4.27E-01	2.10E-01	1.51E-01					OK	
07	RA-226	TRG	PZ-114-AS DIS	pCi/l	1.81E-01	1.52E-01	1.92E-01					OK	
08	RA-226	DO	FB at PZ-201A-SS TOT	pCi/l	3.21E-02	7.72E-02	1.55E-01					OK	
09	RA-226	TRG	FB at PZ-201A-SS DIS	pCi/l	-4.87E-02	4.48E-02	1.60E-01					OK	
10	RA-226	TRG	PZ-201A-SS TOT	pCi/l	3.25E-01	1.71E-01	1.18E-01					OK	
11	RA-226	TRG	PZ-201A-SS DIS	pCi/l	3.20E-01	1.67E-01	1.26E-01					OK	
12	RA-226	TRG	PZ-204A-SS TOT	pCi/l	1.46E+00	3.93E-01	1.67E-01					OK	
13	RA-226	TRG	PZ-204A-SS DIS	pCi/l	6.66E-01	2.59E-01	1.43E-01					OK	
14	RA-226	TRG	PZ-205-AS TOT	pCi/l	1.15E+00	3.99E-01	2.08E-01					OK	
15	RA-226	TRG	PZ-205-AS DIS	pCi/l	5.69E-01	2.57E-01	1.53E-01					OK	
16	RA-226	TRG	PZ-205-SS TOT	pCi/l	1.39E+00	3.74E-01	1.22E-01					OK	
17	RA-226	TRG	PZ-205-SS DIS	pCi/l	1.33E+00	3.39E-01	1.15E-01					OK	
18	RA-226	TRG	PZ-206-SS TOT	pCi/l	1.12E+00	2.88E-01	1.22E-01					OK	
19	RA-226	TRG	PZ-206-SS DIS	pCi/l	1.13E+00	3.29E-01	1.52E-01					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-04104	Analysis Code	Ra226	Run	1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Allquot	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	92.37	0.00	92.37		4/26/2013 14:23	
02	RA-226	MBL	04/16/13 00:00	1.50E+00	92.86	0.00	92.86		4/26/2013 14:23	
03	RA-226	DUP	04/08/13 12:45	1.50E+00	82.67	0.00	82.67		4/26/2013 14:23	
04	RA-226	TRG	04/08/13 11:15	1.50E+00	69.91	0.00	69.91		4/26/2013 14:23	
05	RA-226	TRG	04/08/13 11:15	1.50E+00	90.50	0.00	90.50		4/26/2013 14:23	
06	RA-226	TRG	04/08/13 11:45	1.50E+00	67.37	0.00	67.37		4/26/2013 14:23	
07	RA-226	TRG	04/08/13 11:45	1.50E+00	82.94	0.00	82.94		4/26/2013 14:23	
08	RA-226	DO	04/08/13 12:45	1.50E+00	85.10	0.00	85.10		4/26/2013 14:23	
09	RA-226	TRG	04/08/13 12:45	1.50E+00	87.54	0.00	87.54		4/26/2013 14:23	
10	RA-226	TRG	04/08/13 13:22	1.50E+00	81.50	0.00	81.50		4/26/2013 14:23	
11	RA-226	TRG	04/08/13 13:22	1.50E+00	85.47	0.00	85.47		4/26/2013 14:23	
12	RA-226	TRG	04/08/13 13:26	1.50E+00	80.46	0.00	80.46		4/26/2013 14:23	
13	RA-226	TRG	04/08/13 13:26	1.50E+00	90.64	0.00	90.64		4/26/2013 14:23	
14	RA-226	TRG	04/08/13 13:36	1.50E+00	82.12	0.00	82.12		4/26/2013 14:23	
15	RA-226	TRG	04/08/13 13:36	1.50E+00	90.82	0.00	90.82		4/26/2013 14:23	
16	RA-226	TRG	04/08/13 14:50	1.50E+00	74.21	0.00	74.21		4/26/2013 14:23	
17	RA-226	TRG	04/08/13 14:50	1.50E+00	84.69	0.00	84.69		4/26/2013 14:23	
18	RA-226	TRG	04/08/13 15:00	1.50E+00	80.16	0.00	80.16		4/26/2013 14:23	
19	RA-226	TRG	04/08/13 15:00	1.50E+00	85.94	0.00	85.94		4/26/2013 14:23	

	Run	1
	Analysis Code	Ra226
Eberline Services Work Order	13-04104	
Client	Engineering Management Support, Inc.	

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	04/29/13 13:02		A_Spec	Alpha_041	170	3.35 E+02	5.00 E-03	19.8
02	RA-226	MBL	04/29/13 13:02		A_Spec	Alpha_042	170	1.98 E+00	6.00 E-03	18.5
03	RA-226	DUP	04/29/13 13:02		A_Spec	Alpha_044	170	1.66 E+00	2.00 E-03	19
04	RA-226	TRG	04/29/13 13:02		A_Spec	Alpha_046	170	4.06 E+02	0.00 E+00	17.9
05	RA-226	TRG	04/29/13 13:02		A_Spec	Alpha_047	170	1.21 E+02	4.00 E-03	18.2
06	RA-226	TRG	04/29/13 13:02		A_Spec	Alpha_048	170	1.70 E+01	0.00 E+00	16.8
07	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_003	170	7.13 E+00	1.10 E-02	17.5
08	RA-226	DO	04/29/13 16:20		A_Spec	Alpha_004	170	1.47 E+00	9.00 E-03	19.4
09	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_010	170	-2.55 E+00	1.50 E-02	19.7
10	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_011	170.02	1.45 E+01	3.00 E-03	19.7
11	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_013	170.02	1.51 E+01	5.00 E-03	18.7
12	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_014	170	5.50 E+01	6.00 E-03	18.5
13	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_033	170	2.63 E+01	4.00 E-03	18.2
14	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_034	170	3.32 E+01	5.00 E-03	18.6
15	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_035	170	1.95 E+01	3.00 E-03	18.3
16	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_037	170	5.47 E+01	2.00 E-03	17.8
17	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_040	170	6.05 E+01	3.00 E-03	19
18	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_041	170	6.08 E+01	7.00 E-03	19.8
19	RA-226	TRG	04/29/13 16:20		A_Spec	Alpha_042	170	4.70 E+01	6.00 E-03	18.5

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

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 100
 3-14
 33-42

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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	0.9141	922.7035	383.9000	92.37	2.00	1.00
02	MBL	BLANK	04/16/13 00:00	1.5000	0.9085	917.0508	383.6000	92.86	1.86	1.00
03	DUP	FB at PZ-201A-SS TOT	04/08/13 12:45	1.5000	0.9058	914.3254	340.5000	82.67	1.81	1.00
04	TRG	PZ-103-SS TOT	04/08/13 11:15	1.5000	0.9029	911.3981	287.0000	69.91	2.91	1.00
05	TRG	PZ-103-SS DIS	04/08/13 11:15	1.5000	0.9035	912.0037	371.8000	90.50	2.99	1.00
06	TRG	PZ-114-AS TOT	04/08/13 11:45	1.5000	0.9049	913.4169	277.2000	67.37	1.61	1.00
07	TRG	PZ-114-AS DIS	04/08/13 11:45	1.5000	0.9037	912.2056	340.8000	82.94	2.08	1.00
08	DO	FB at PZ-201A-SS TOT	04/08/13 12:45	1.5000	0.9025	910.9943	349.2000	85.10	2.04	1.00
09	TRG	FB at PZ-201A-SS DIS	04/08/13 12:45	1.5000	0.8660	874.1508	344.7000	87.54	1.86	1.00
10	TRG	PZ-201A-SS TOT	04/08/13 13:22	1.5000	0.8983	906.7548	332.9000	81.50	2.04	1.00
11	TRG	PZ-201A-SS DIS	04/08/13 13:22	1.5000	0.8924	900.7993	346.8000	85.47	1.91	1.00
12	TRG	PZ-204A-SS TOT	04/08/13 13:26	1.5000	0.9028	911.2972	330.3000	80.46	2.23	1.00
13	TRG	PZ-204A-SS DIS	04/08/13 13:26	1.5000	0.9014	909.8840	371.5000	90.64	2.37	1.00
14	TRG	PZ-205-AS TOT	04/08/13 13:36	1.5000	0.8741	882.3270	326.4000	82.12	2.99	1.00
15	TRG	PZ-205-AS DIS	04/08/13 13:36	1.5000	0.9025	910.9943	372.7000	90.82	2.74	1.00
16	TRG	PZ-205-SS TOT	04/08/13 14:50	1.5000	0.8446	852.5494	285.0000	74.21	1.91	1.00
17	TRG	PZ-205-SS DIS	04/08/13 14:50	1.5000	0.7700	777.2472	296.5000	84.69	2.00	1.00
18	TRG	PZ-206-SS TOT	04/08/13 15:00	1.5000	0.9112	919.7762	332.1000	80.16	1.66	1.00
19	TRG	PZ-206-SS DIS	04/08/13 15:00	1.5000	0.9108	919.3724	355.9000	85.94	2.16	1.00

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Internal Work Order					Run	Analysis Code			Date	Technician			Technician Initials		Witness Initials	
13-04104					1	Ra226			4/23/2013 6:14	JBARNARD			B			
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	4/23/2013	0.500	0.5163				10.25	0.471	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	1009.412	4/23/2013	0.9141	1.0000										
02	Ba-133	Ba-6a	1009.412	4/23/2013	0.9085	1.0000	0.9141 g					0.5163 g				
03	Ba-133	Ba-6a	1009.412	4/23/2013	0.9058	1.0000	0.9085 g					0.5110 g				
04	Ba-133	Ba-6a	1009.412	4/23/2013	0.9029	1.0000	-0.9058 g									
05	Ba-133	Ba-6a	1009.412	4/23/2013	0.9035	1.0000	-0.9029 g									
06	Ba-133	Ba-6a	1009.412	4/23/2013	0.9049	1.0000	-0.9035 g									
07	Ba-133	Ba-6a	1009.412	4/23/2013	0.9037	1.0000	-0.9049 g									
08	Ba-133	Ba-6a	1009.412	4/23/2013	0.9025	1.0000	-0.9037 g									
09	Ba-133	Ba-6a	1009.412	4/23/2013	0.8660	1.0000	-0.9025 g									
10	Ba-133	Ba-6a	1009.412	4/23/2013	0.8983	1.0000	-0.8660 g									
11	Ba-133	Ba-6a	1009.412	4/23/2013	0.8924	1.0000	-0.8983 g									
12	Ba-133	Ba-6a	1009.412	4/23/2013	0.9028	1.0000	-0.8924 g									
13	Ba-133	Ba-6a	1009.412	4/23/2013	0.9014	1.0000	-0.9028 g									
14	Ba-133	Ba-6a	1009.412	4/23/2013	0.8741	1.0000	-0.9014 g									
15	Ba-133	Ba-6a	1009.412	4/23/2013	0.9025	1.0000	-0.8741 g									
16	Ba-133	Ba-6a	1009.412	4/23/2013	0.8446	1.0000	-0.9025 g									
17	Ba-133	Ba-6a	1009.412	4/23/2013	0.7700	1.0000	-0.8446 g									
18	Ba-133	Ba-6a	1009.412	4/23/2013	0.9112	1.0000	-0.7700 g									
19	Ba-133	Ba-6a	1009.412	4/23/2013	0.9108	1.0000	-0.9112 g									
							-0.9108 g									
							Matrix Spike									

US EPA ARCHIVE DOCUMENT

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Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04104	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	FB at PZ-201A-SS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-103-SS TOT	TRG					1.5000E+00	1.5000E+00				
05	PZ-103-SS DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-114-AS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-114-AS DIS	TRG					1.5000E+00	1.5000E+00				
08	FB at PZ-201A-SS TOT	DO					1.5000E+00	1.5000E+00				
09	FB at PZ-201A-SS DIS	TRG					1.5000E+00	1.5000E+00				
10	PZ-201A-SS TOT	TRG					1.5000E+00	1.5000E+00				
11	PZ-201A-SS DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-204A-SS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-204A-SS DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-205-AS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-205-AS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-205-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-205-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-206-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-206-SS DIS	TRG					1.5000E+00	1.5000E+00				

Comments

Technician: Date: 4/23/13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04104	1	Ra226			LWALKER

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0225	0.0281	0.0056	
02	BLANK	MBL		0.0227	0.0280	0.0053	
03	DUP	DUP		0.0228	0.0280	0.0052	
04	PZ-103-SS TOT	TRG		0.0228	0.0314	0.0086	
05	PZ-103-SS DIS	TRG		0.0224	0.0313	0.0089	
06	PZ-114-AS TOT	TRG		0.0233	0.0281	0.0048	
07	PZ-114-AS DIS	TRG		0.0224	0.0282	0.0058	
08	FB at PZ-201A-SS TOT	DO		0.0225	0.0282	0.0057	
09	FB at PZ-201A-SS DIS	TRG		0.0225	0.0278	0.0053	
10	PZ-201A-SS TOT	TRG		0.0224	0.0281	0.0057	
11	PZ-201A-SS DIS	TRG		0.0225	0.0279	0.0054	
12	PZ-204A-SS TOT	TRG		0.0224	0.0286	0.0062	
13	PZ-204A-SS DIS	TRG		0.0225	0.0291	0.0066	
14	PZ-205-AS TOT	TRG		0.0227	0.0316	0.0089	
15	PZ-205-AS DIS	TRG		0.0223	0.0302	0.0079	
16	PZ-205-SS TOT	TRG		0.0224	0.0278	0.0054	
17	PZ-205-SS DIS	TRG		0.0227	0.0283	0.0056	
18	PZ-206-SS TOT	TRG		0.0225	0.0274	0.0049	
19	PZ-206-SS DIS	TRG		0.0224	0.0284	0.0060	

US EPA ARCHIVE DOCUMENT

0327

Technician: J. Walker

Date: 4/26/13



Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 01
 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: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/29/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:06 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9237 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1828 +/- 0.0032

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.474086 +/- 0.030691
 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	474.66	9.00	0.34	0.00E+000	7.0
RA-226	4.696	335.15	10.72	0.85	0.00E+000	6.7

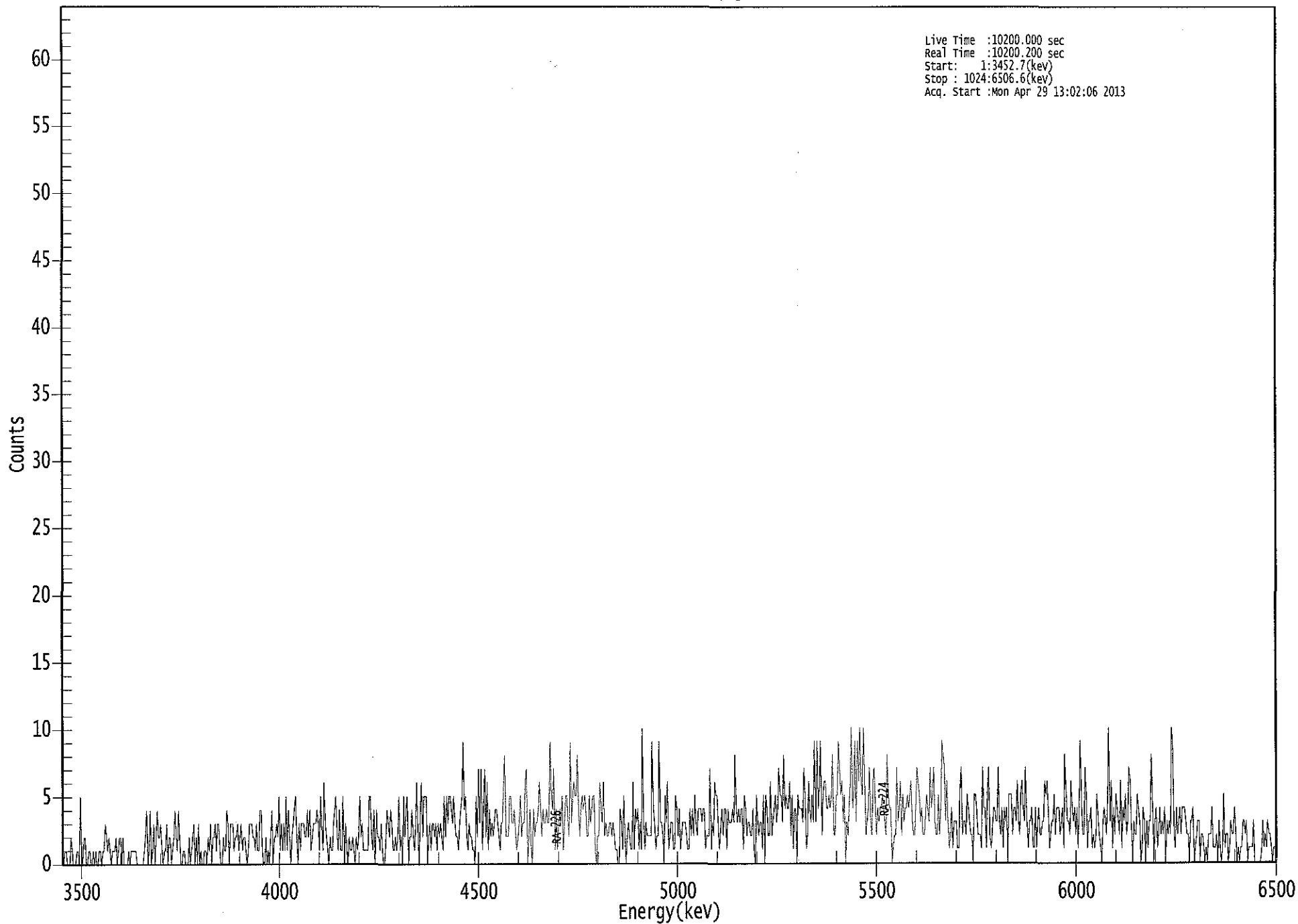
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	1.43E+001 +/- 2.09E+002	1.44E-001 +/- 2.11E+000
RA-226	0.990	4785.00*	9.72E+000 +/- 1.09E+000	1.74E-001 +/- 5.88E-003

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 4/30/13

US EPA ARCHIVE DOCUMENT

0000056693.CNF



0329

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

369: 2 1 3 3 6 8 2 2

Sample Title: 01

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

801: 2 4 4 3 6 3 2 5

Sample Title: 01

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



47011

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 02
 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: 1.860E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/29/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:08 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9286 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.1714 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.529	-0.85	246.69	0.85	0.00E+000	0.0
RA-226	4.439	1.98	176.34	1.02	0.00E+000	3.0

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

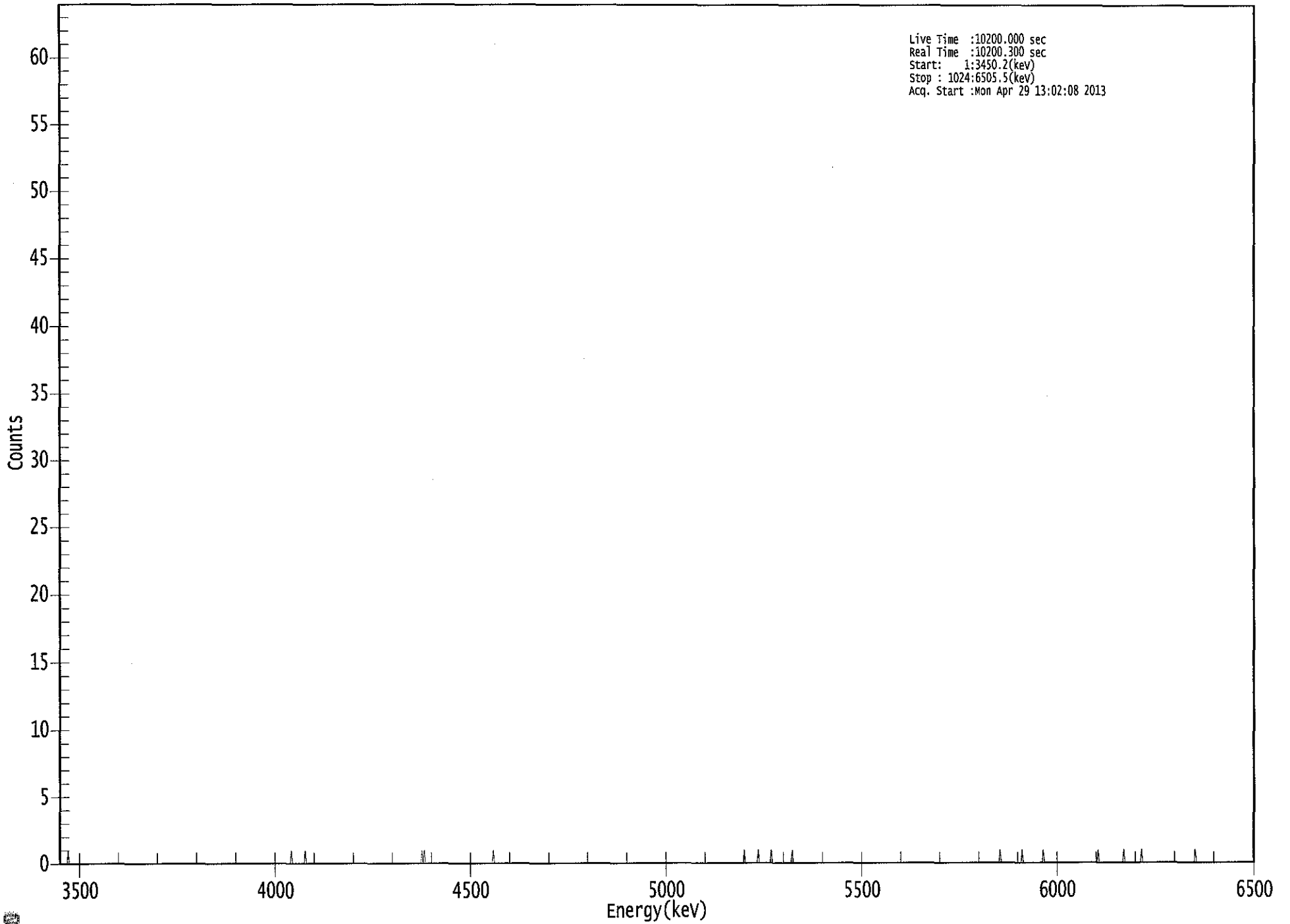
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	-1.69E-002 +/- 2.51E-001	1.19E-001 +/- 1.74E+000
RA-226	0.855	4785.00*	3.79E-002 +/- 6.69E-002	1.21E-001 +/- 4.12E-003

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 4/30/13

US EPA ARCHIVE DOCUMENT

0000056650.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3450.2(keV)
Stop : 1024:6505.5(keV)
Acq. Start :Mon Apr 29 13:02:08 2013



US EPA ARCHIVE DOCUMENT

0334

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	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	1
9:	0	0	0	0	0	0	0	0	0
17:	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	1	0
201:	0	0	0	0	0	0	0	0	0
209:	0	0	1	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	1	0
313:	1	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 1 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0
585:	0	0	1	0	0	0	0
593:	0	0	0	0	0	1	0
601:	0	0	0	0	0	0	0
609:	0	1	0	0	0	0	0
617:	0	0	0	0	0	0	0
625:	0	0	0	1	0	0	0
633:	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0
777:	0	0	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 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:	1	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	1	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	1
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	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	1	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
4/70K

Sample Description: FB AT PZ-201A-SS TOT DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 1.810E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:03 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8267 +/- 0.0000
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM
 Effective Efficiency: 0.1572 +/- 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	5.530	-0.17	1169.4	0.17	0.00E+000	0.0
RA-226	4.608	1.66	169.38	0.34	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

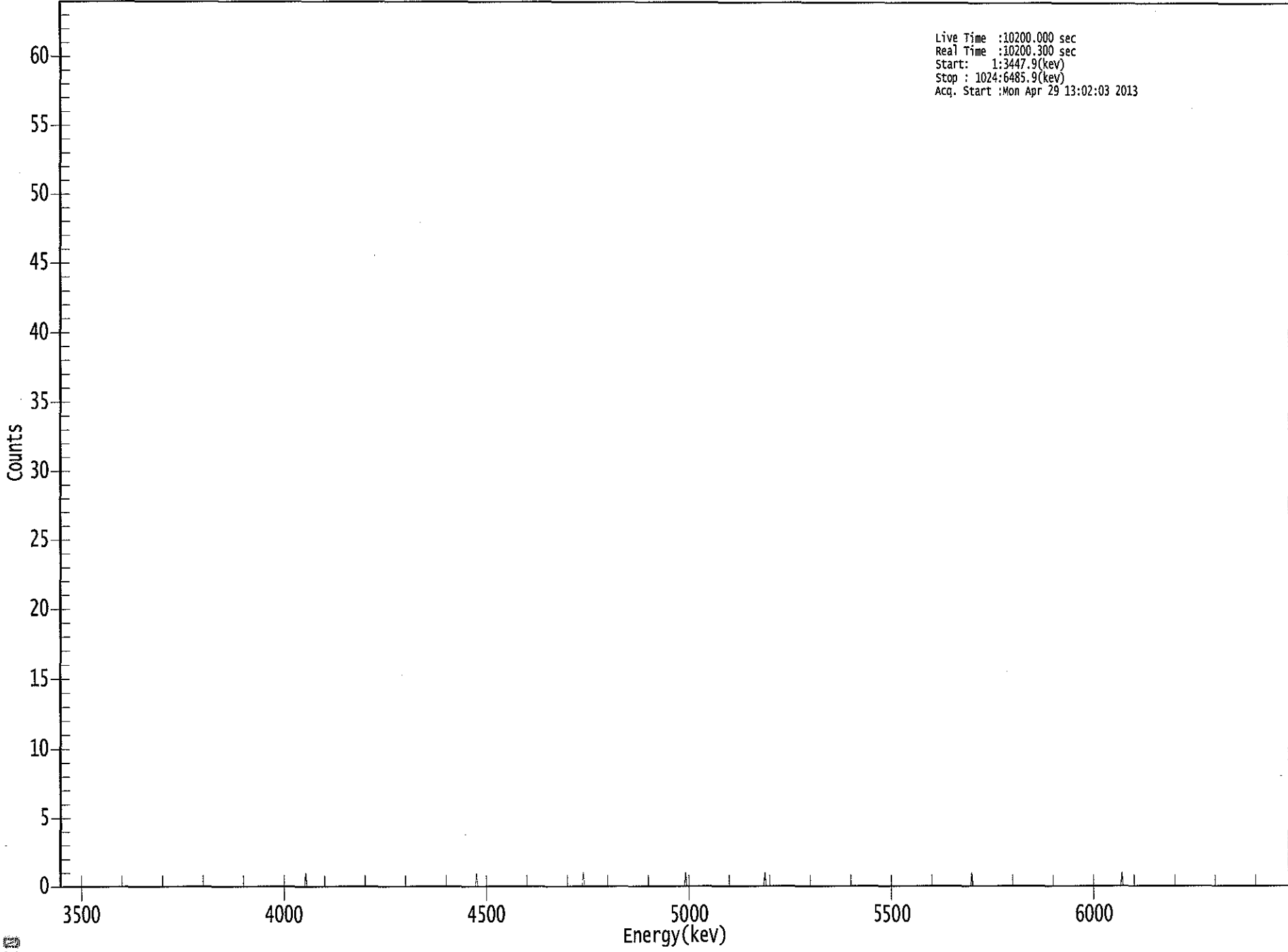
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	-6.35E-003 +/- 4.85E+000	1.56E-001 +/- 1.19E+002
RA-226	0.960	4785.00*	3.38E-002 +/- 5.72E-002	9.72E-002 +/- 3.32E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056651.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3447.9(kev)
Stop : 1024:6485.9(kev)
Acq. Start :Mon Apr 29 13:02:03 2013



US EPA ARCHIVE DOCUMENT

0329
6520

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: 10200

Elapsed Real Time: 10200

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

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

Channel	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	1	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	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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4/7/13

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.910E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:04 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.6991 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Effective Efficiency: 0.1251 +/- 0.0022

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.518	162.00	15.45	0.00	0.00E+000	4.5
RA-226	4.590	406.00	9.74	0.00	0.00E+000	4.2

 NUCLIDE ANALYSIS RESULTS

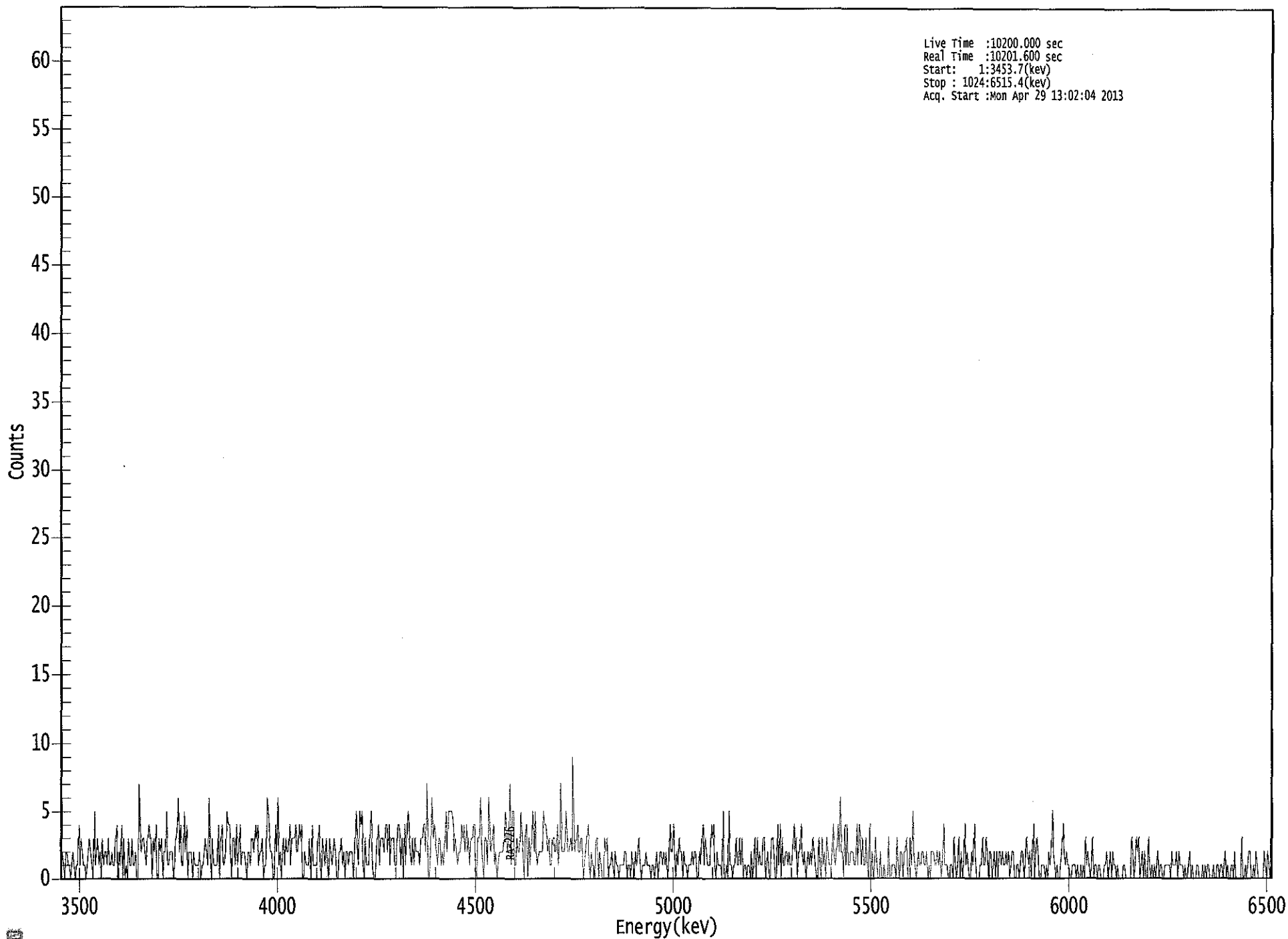
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.961	5685.50*	1.22E+001 +/- 9.33E+003	4.52E-001 +/- 3.45E+002
RA-226	0.952	4785.00*	1.67E+001 +/- 1.72E+000	2.46E-001 +/- 8.48E-003

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056648.CNF

Live Time :10200.000 sec
Real Time :10201.600 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Mon Apr 29 13:02:04 2013



US EPA ARCHIVE DOCUMENT

0314
7750

ROI Type: 1

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10202

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

369: 0 1 2 2 2 2 3 5

Sample Title: 04

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

801: 2 0 1 2 2 0 0 1

Sample Title: 04

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



4/30

Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.990E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:00 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9050 +/- 0.0000
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Effective Efficiency: 0.1649 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.501	35.83	32.83	0.17	0.00E+000	2.9
RA-226	4.603	121.32	17.85	0.68	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

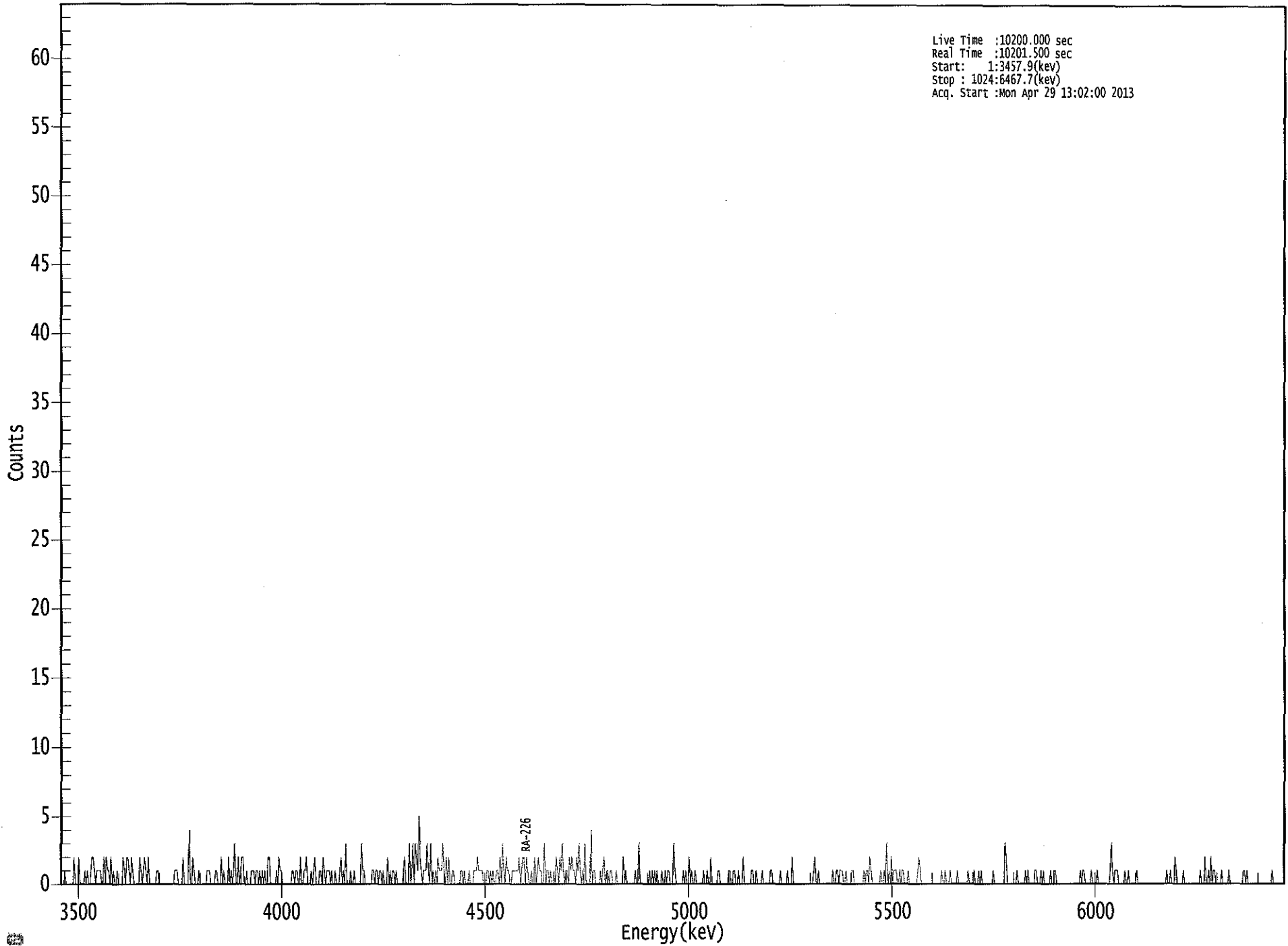
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	2.11E+000 +/- 1.61E+003	2.46E-001 +/- 1.87E+002
RA-226	0.958	4785.00*	3.89E+000 +/- 7.07E-001	1.81E-001 +/- 6.20E-003

*AG
4/30/13*

US EPA ARCHIVE DOCUMENT

0000056652.CNF

Live Time :10200.000 sec
Real Time :10201.500 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Mon Apr 29 13:02:00 2013



US EPA ARCHIVE DOCUMENT

0349

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: 10202

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

369: 0 3 1 0 2 1 1 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 1 0

Sample Title: 05

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

4.

4/17/13

Sample Description: PZ-114-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 1.610E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 1:02:01 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.6737 +/- 0.0000
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Effective Efficiency: 0.1132 +/- 0.0020

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

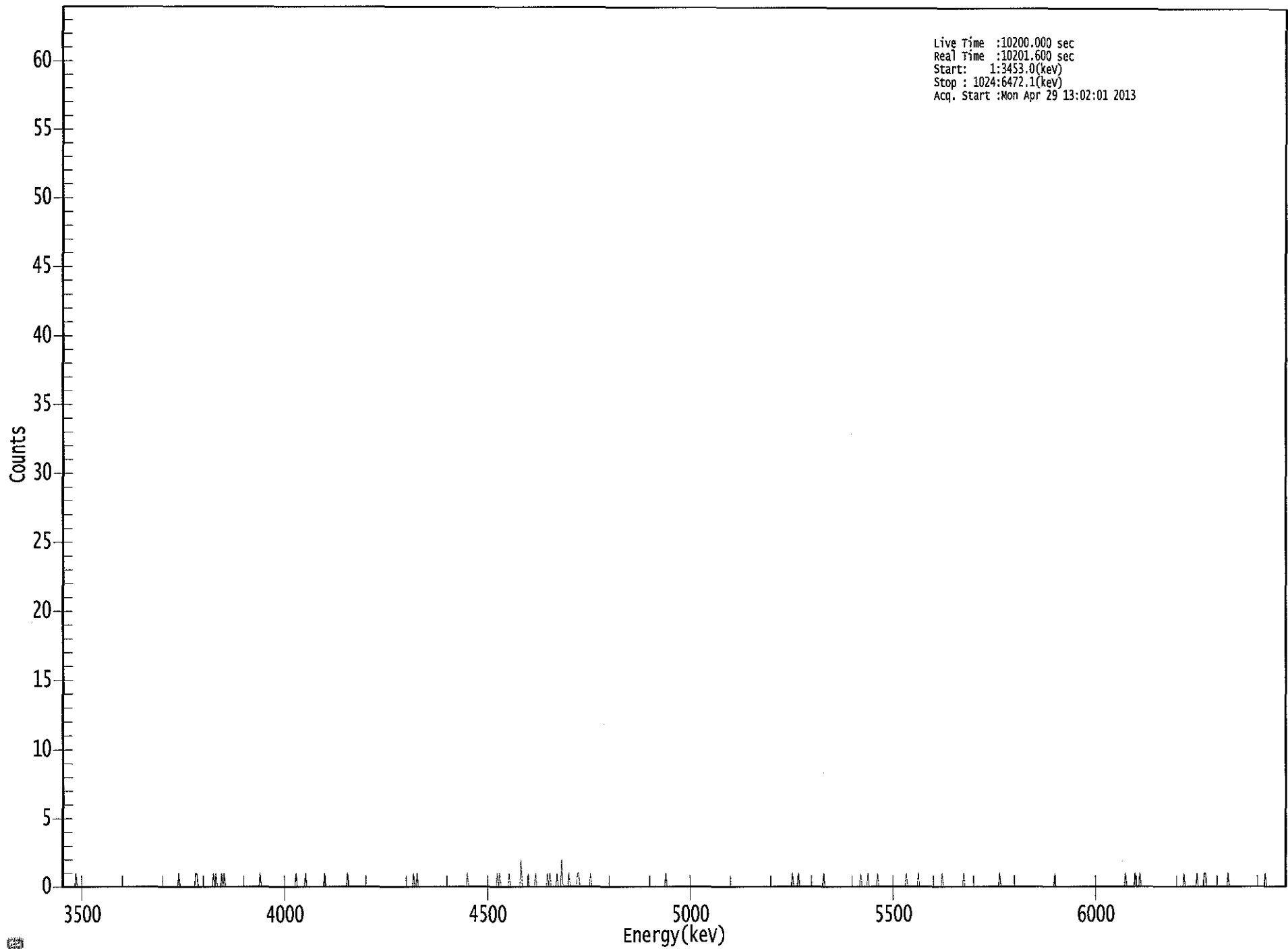
Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.531	6.66	78.18	0.34	0.00E+000	3.0
RA-226	4.629	17.00	48.92	0.00	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	3.07E-001 +/- 2.35E+002	2.21E-001 +/- 1.68E+002
RA-226	0.969	4785.00*	4.27E-001 +/- 2.10E-001	1.51E-001 +/- 5.22E-003

AG
4/30/13

0000056653.CNF



0351

ROI Type: 1

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 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	1	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	1	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0	1
113:	1	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	1	0	0
129:	1	0	0	0	0	1	0	0	1
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	1	0	0	0
169:	0	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0	0
193:	0	0	0	1	0	0	0	0	0
201:	0	0	0	1	0	0	0	0	0
209:	0	0	0	0	0	0	0	0	0
217:	0	0	0	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	1	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	1	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	0	0	0
329:	0	0	0	0	0	0	0	0	0
337:	0	0	1	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0	0
361:	0	0	0	1	0	1	0	0	0

369: 0 0 0 0 0 1 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	2
385:	0	0	0	0	0	1	0	0
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	0	1	0	1
409:	0	0	0	0	0	1	0	0
417:	0	2	0	0	0	0	0	1
425:	0	0	0	0	0	0	1	1
433:	0	0	0	0	0	0	0	0
441:	0	1	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	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	1	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	0	0	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	1	0	0	0	0
673:	0	1	0	0	0	0	0	0
681:	0	1	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	1	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	1
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	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	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	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:	1	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	1	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	1	1	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	1	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
4/7/02

Sample Description: PZ-114-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 07
 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: 1.500E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.080E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:18 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8294 +/- 0.0000
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Effective Efficiency: 0.1448 +/- 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	5.585	3.62	137.02	2.38	0.00E+000	3.0
RA-226	4.658	7.13	83.91	1.87	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

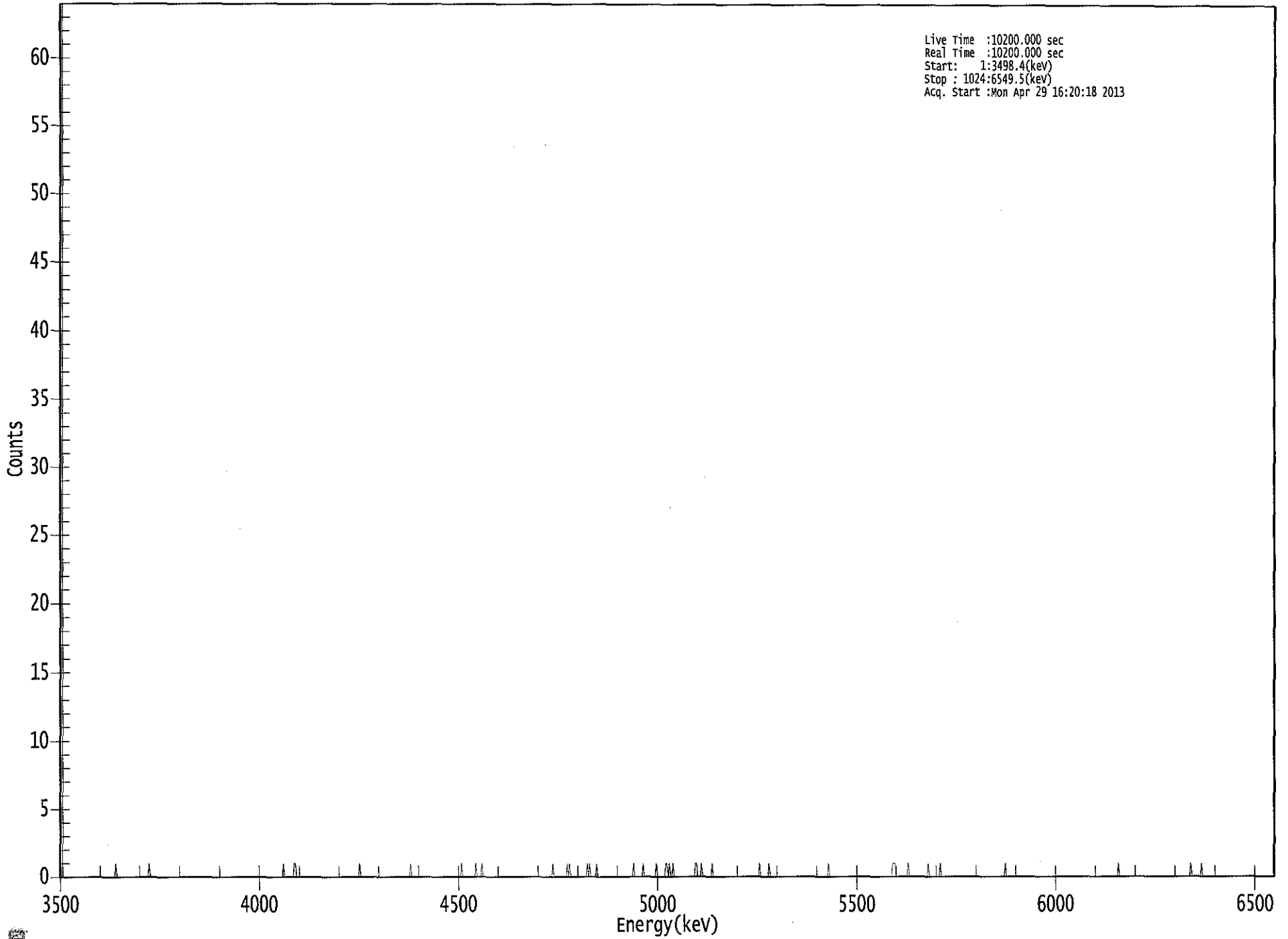
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.983	5685.50*	1.73E-001 +/- 1.38E+002	3.92E-001 +/- 3.13E+002
RA-226	0.979	4785.00*	1.81E-001 +/- 1.52E-001	1.92E-001 +/- 7.04E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

000056657.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Mon Apr 29 16:20:18 2013



US EPA ARCHIVE DOCUMENT

6559

ROI Type: 1

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	10200	10200	0	0	0	0	0	0
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	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	1	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	1	0	0	0
193:	0	0	0	0	0	1	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:	0	0	0	0	0	0	0	0
249:	0	0	0	0	1	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	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	0	0	0	0	0	0
337:	0	0	1	0	0	0	0	0
345:	0	0	0	0	0	0	1	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: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

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



C
4/17/13

Sample Description: FB AT PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 08
 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: 2.040E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8510 +/- 0.0000
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Effective Efficiency: 0.1651 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.525	4.11	130.52	2.89	0.00E+000	2.9
RA-226	4.639	1.47	240.74	1.53	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

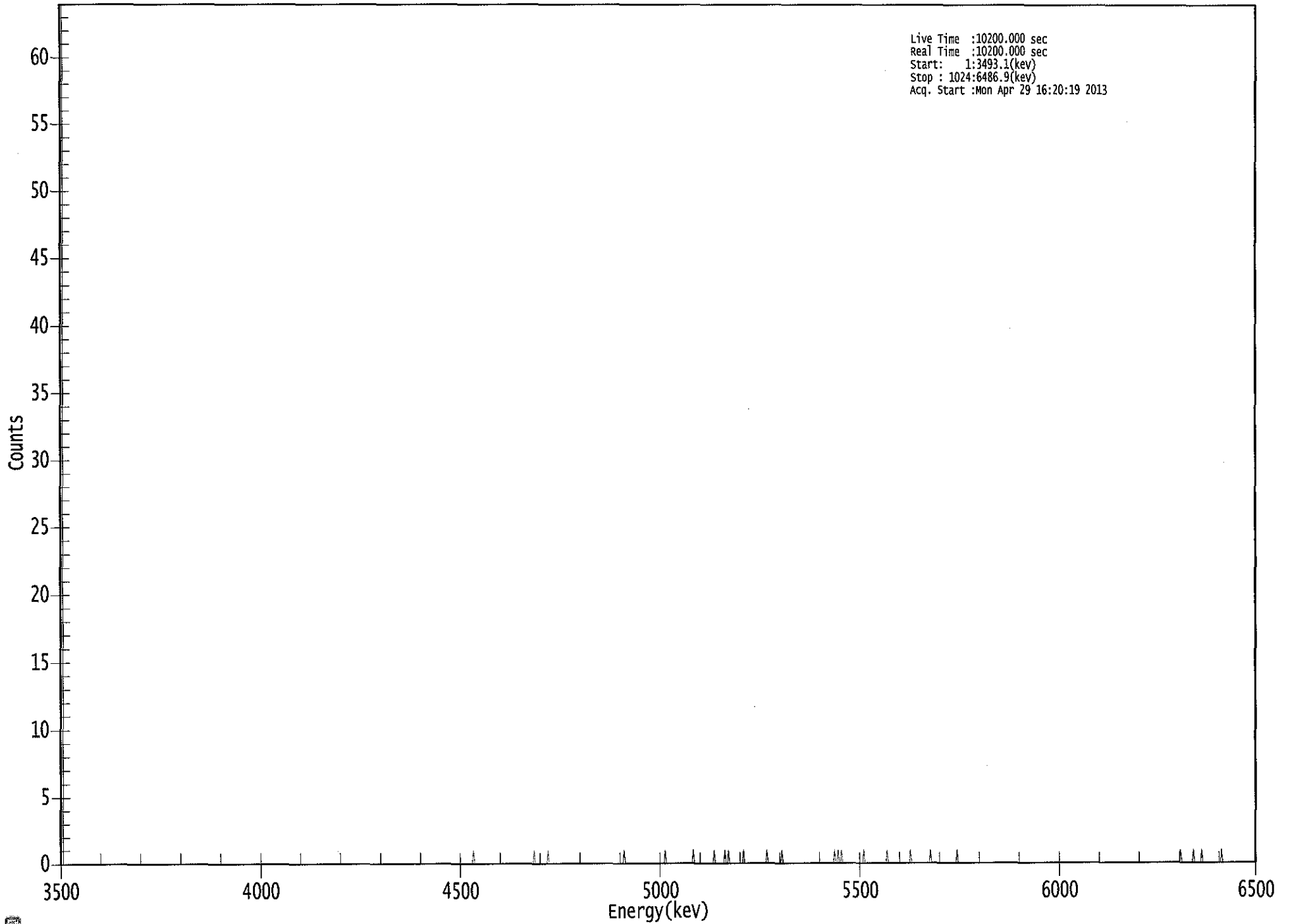
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.963	5685.50*	1.69E-001 +/- 1.35E+002	3.60E-001 +/- 2.88E+002
RA-226	0.973	4785.00*	3.21E-002 +/- 7.72E-002	1.55E-001 +/- 5.58E-003

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4/30/13

US EPA ARCHIVE DOCUMENT

0000056658.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Mon Apr 29 16:20:19 2013



US EPA ARCHIVE DOCUMENT

0364

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	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	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 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	1	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	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	0	0	0	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	1
561:	0	0	0	0	0	0	0	0
569:	1	0	0	1	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	1	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	1	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	1	0	0	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	1
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	1	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	1
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	1
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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



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4/20/13

Sample Description: FB AT PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 09
 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: 1.860E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:14 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8754 +/- 0.0000
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Effective Efficiency: 0.1722 +/- 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	5.513	0.26	1622.7	3.74	0.00E+000	2.9
RA-226	4.603	-2.55	92.03	2.55	0.00E+000	0.0

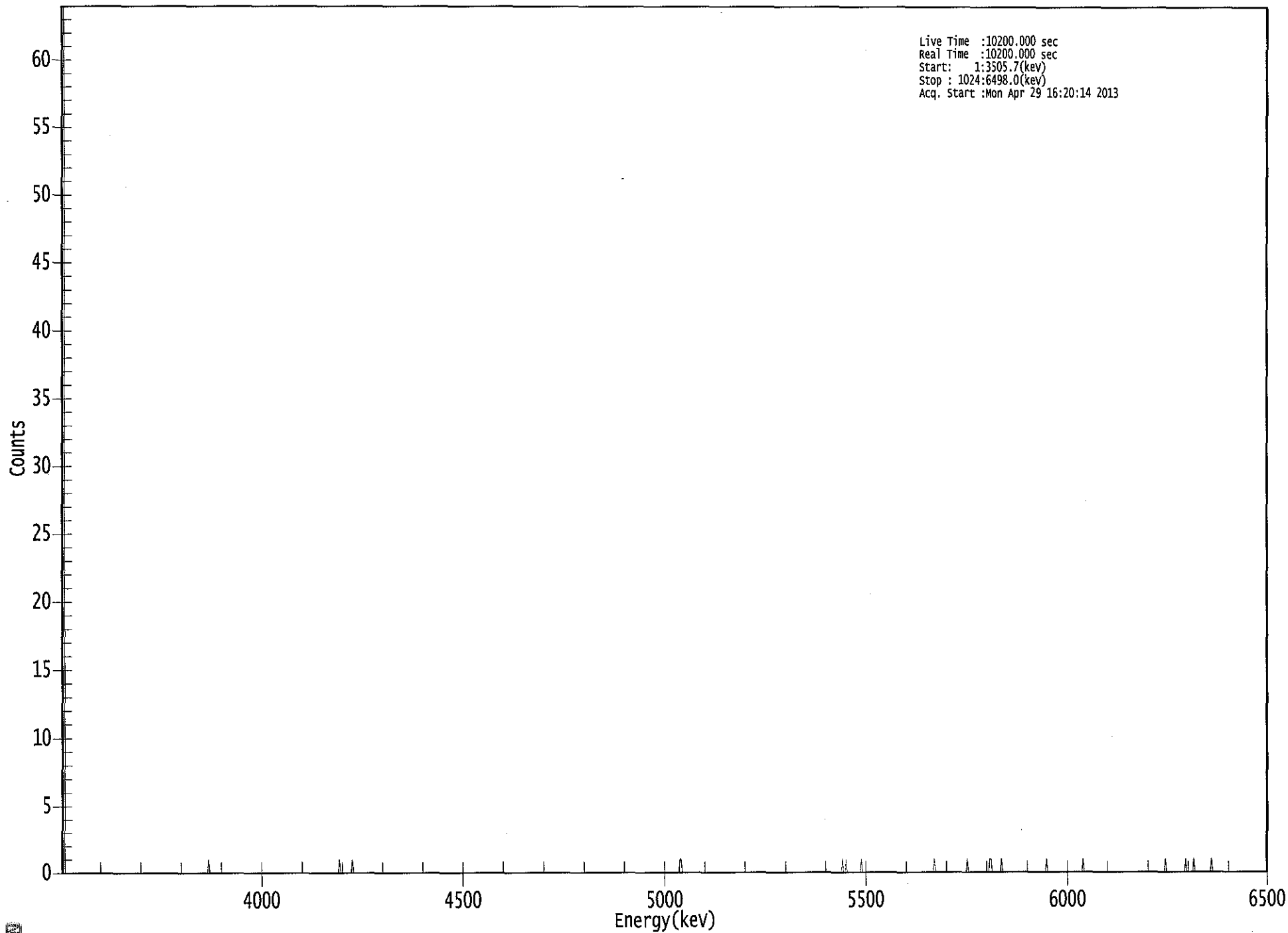
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	9.35E-003 +/- 7.47E+000	3.45E-001 +/- 2.75E+002
RA-226	0.957	4785.00*	-4.87E-002 +/- 4.48E-002	1.60E-001 +/- 5.72E-003

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4/30/13

US EPA ARCHIVE DOCUMENT

0000056656.CNF



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	2	3	4	5	6	7	8	9
1:	10200	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	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	1	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	1	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 0 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	1	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	1	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	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	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	1	1	0	0	0
793:	0	0	0	0	0	1	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	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	1	0	0	0	0	0	0
961:	1	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



C4704

Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 10
 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: 2.040E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:15 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8150 +/- 0.0000
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM
 Effective Efficiency: 0.1608 +/- 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	5.467	-0.40	926.24	3.40	0.00E+000	2.7
RA-226	4.589	14.49	52.54	0.51	0.00E+000	2.7

 NUCLIDE ANALYSIS RESULTS

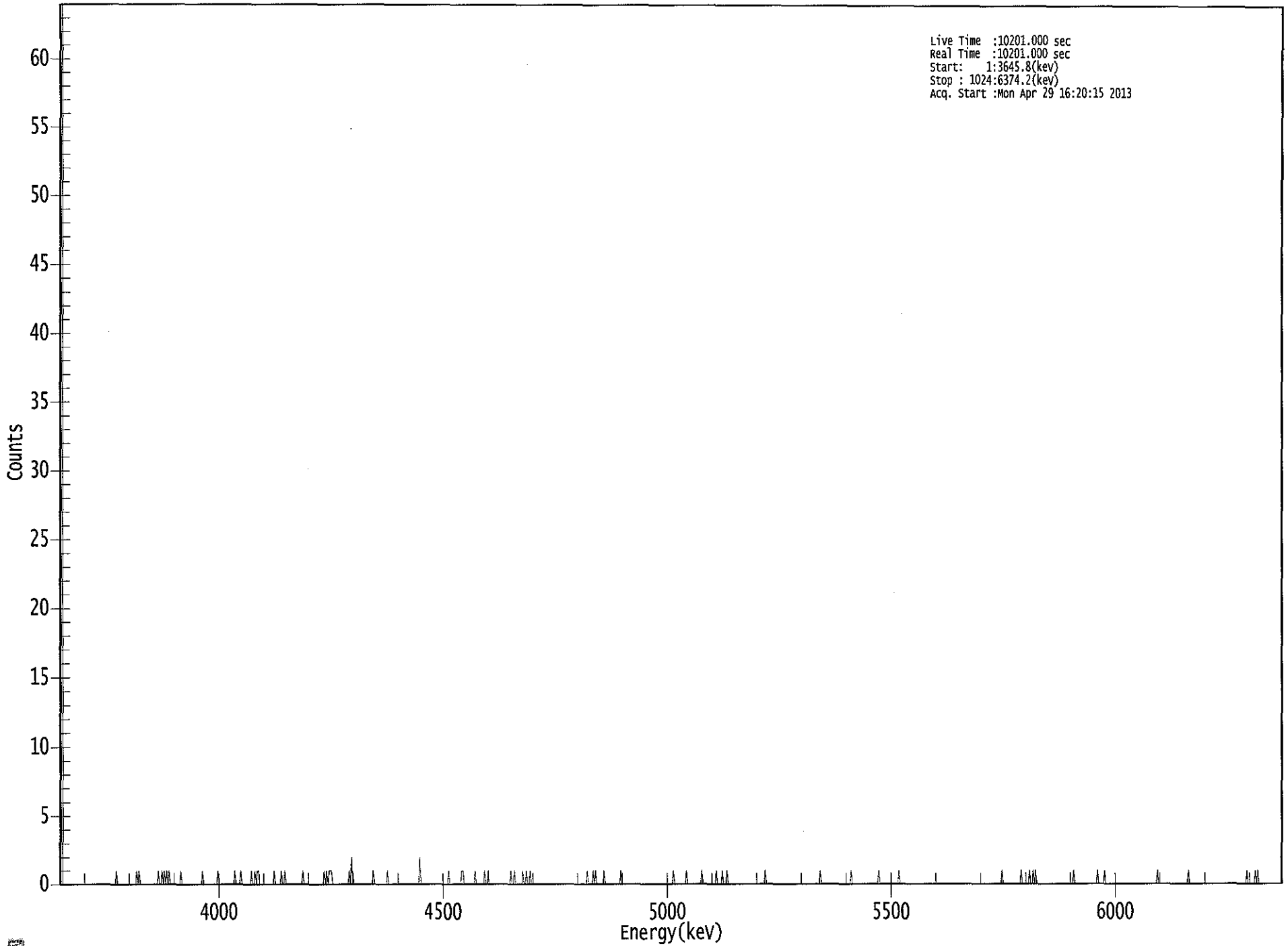
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.936	5685.50*	-1.69E-002 +/- 1.35E+001	3.91E-001 +/- 3.13E+002
RA-226	0.951	4785.00*	3.25E-001 +/- 1.71E-001	1.18E-001 +/- 4.85E-003

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056659.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3645.8(kev)
Stop : 1024:6374.2(kev)
Acq. Start :Mon Apr 29 16:20:15 2013



US EPA ARCHIVE DOCUMENT

7280

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: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 10

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	1	0	0	1	0	0	0
385:	0	0	0	1	0	0	1	0
393:	0	1	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	1	0	0	0	0	1	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	1	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	1	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	1	0	0	0	0	0	0
545:	0	0	0	0	0	1	0	0
553:	0	0	1	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	1	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	1	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	1	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	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	1	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 1 0 0 0

Sample Title: 10

Channel								
809:	0	0	0	1	0	0	1	0
817:	1	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	1	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	1	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	1	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	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	1	0	0	0	0	0	0
1001:	1	0	1	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C 4/7/13

Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 11
 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: 1.910E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:16 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8547 +/- 0.0000
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Effective Efficiency: 0.1597 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.459	9.43	76.67	3.57	0.00E+000	4.2
RA-226	4.597	15.15	51.98	0.85	0.00E+000	2.8

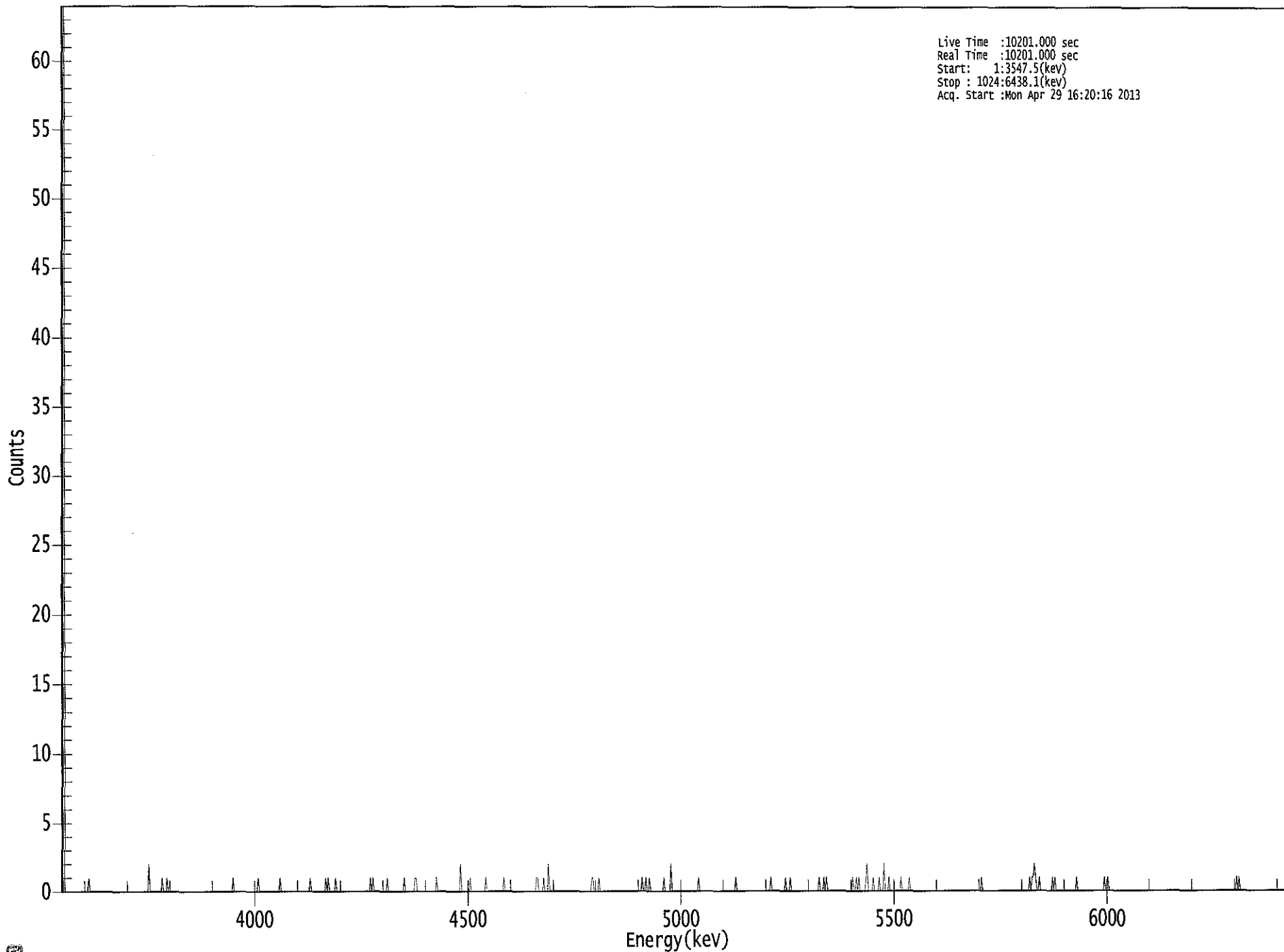
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.932	5685.50*	3.75E-001 +/- 3.00E+002	3.75E-001 +/- 3.00E+002
RA-226	0.955	4785.00*	3.20E-001 +/- 1.67E-001	1.26E-001 +/- 4.58E-003

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4/30/13*

US EPA ARCHIVE DOCUMENT

0000056660.CNF



0379

ROI Type: 1

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

Sample Title: 11

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	10201	10201	0	0	0	0	0	0
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	1	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	2	0	0	0	0	0	0	0
81:	0	0	0	1	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	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	1	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	1	0	1	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	1	0	1	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	1	0	0	0
289:	0	0	0	0	0	1	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	1
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	2	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	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	0	0	0	0	0
393:	0	0	1	1	0	0	0	0
401:	1	0	0	0	2	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:	1	1	0	0	0	0	1	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	0	1	0	0
489:	1	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0
505:	0	0	2	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	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:	1	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	1	0	0
593:	0	0	0	0	0	0	0	0
601:	0	1	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	1	0	0
633:	0	1	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	1	0	1	0
665:	0	0	0	0	1	2	0	0
673:	0	0	1	0	0	0	0	1
681:	0	0	0	2	0	0	0	1
689:	0	0	0	0	0	0	0	0
697:	0	1	0	0	0	0	0	0
705:	1	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	1	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 1 0 1 1

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	2	1	0	0	1	0	0	0
817:	0	0	0	0	0	0	0	1
825:	0	1	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	1	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	1	0	0	1	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:	1	0	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
4/20

Sample Description: PZ-204A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-RA
 Sample Identification: 12
 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: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:17 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8046 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Effective Efficiency: 0.1485 +/- 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	5.536	28.43	39.37	3.57	0.00E+000	2.9
RA-226	4.597	54.98	26.72	1.02	0.00E+000	3.7

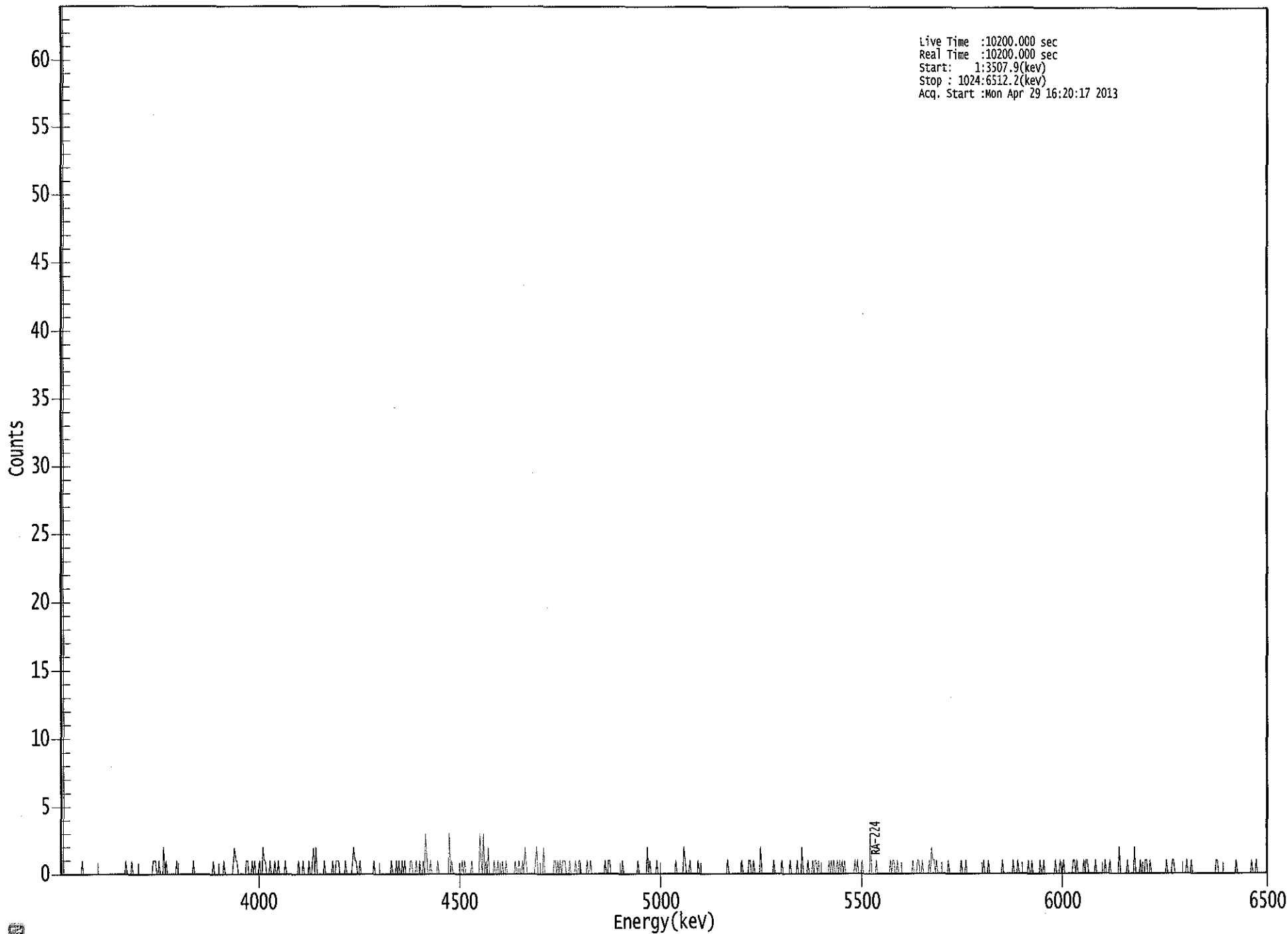
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	1.42E+000 +/- 1.14E+003	4.71E-001 +/- 3.77E+002
RA-226	0.955	4785.00*	1.46E+000 +/- 3.93E-001	1.67E-001 +/- 6.07E-003

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 4/30/13

US EPA ARCHIVE DOCUMENT

0000056661.CNF



0304
7080

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

369: 0 0 1 0 0 0 1 0

Sample Title: 12

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

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



C470

Sample Description: PZ-204A SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 2.370E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:49 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9064 +/- 0.0000
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM
 Effective Efficiency: 0.1654 +/- 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	5.521	24.66	39.79	0.34	0.00E+000	3.0
RA-226	4.611	26.32	38.78	0.68	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

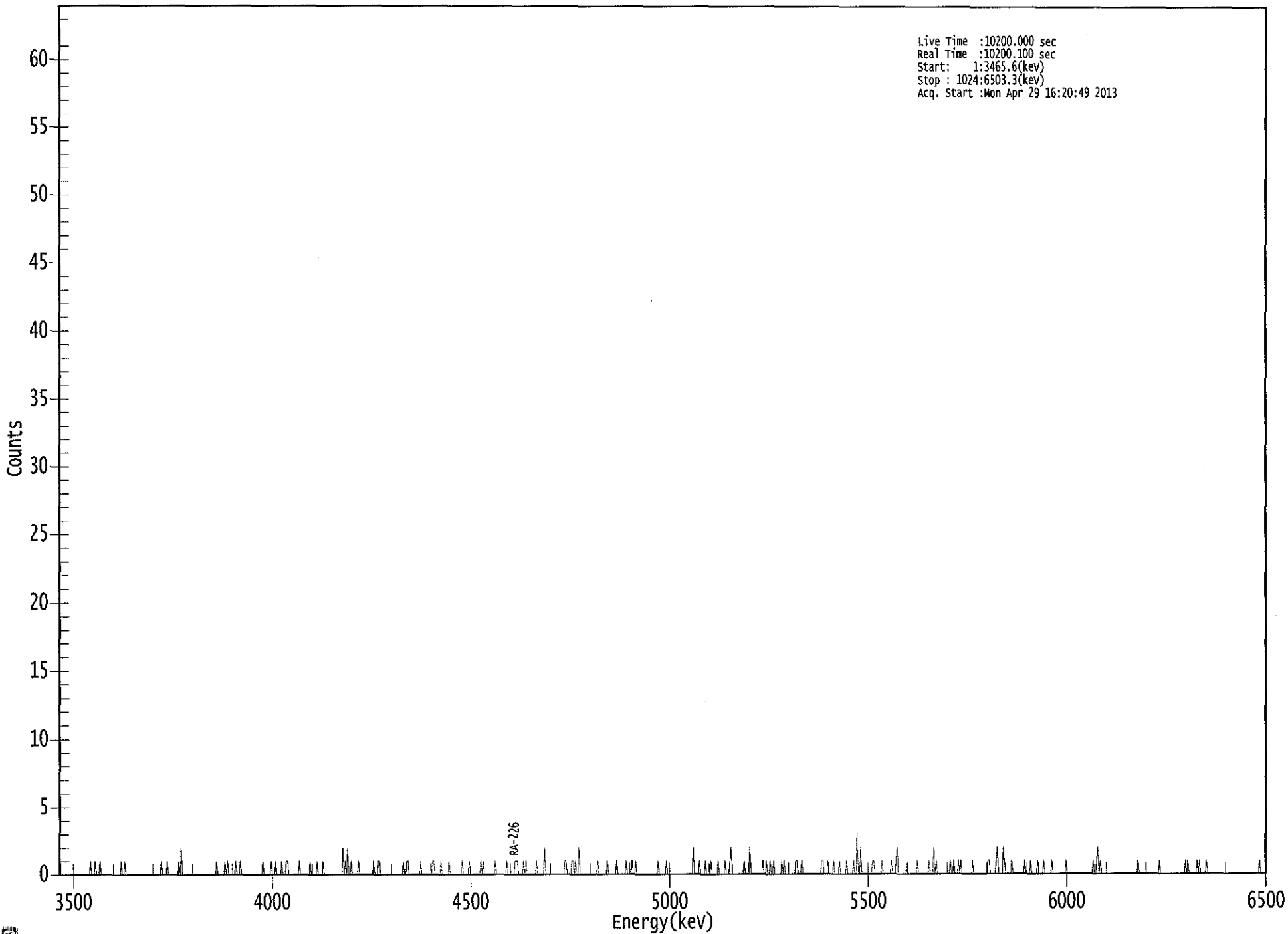
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	1.18E+000 +/- 9.40E+002	2.28E-001 +/- 1.82E+002
RA-226	0.961	4785.00*	6.66E-001 +/- 2.59E-001	1.43E-001 +/- 4.92E-003

AG
 4/30/13

US EPA ARCHIVE DOCUMENT

0000056663.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3465.6(kev)
Stop : 1024:6503.3(kev)
Acq. Start :Mon Apr 29 16:20:49 2013



US EPA ARCHIVE DOCUMENT

0389

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: 10200

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

369: 0 1 0 0 0 0 0 0

Sample Title: 13

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

801: 2 1 0 0 0 0 0 1

Sample Title: 13

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



CU206

Sample Description: PZ-205-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 2.990E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8212 +/- 0.0000
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Effective Efficiency: 0.1524 +/- 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	5.453	15.83	49.57	0.17	0.00E+000	5.9
RA-226	4.598	33.15	34.55	0.85	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

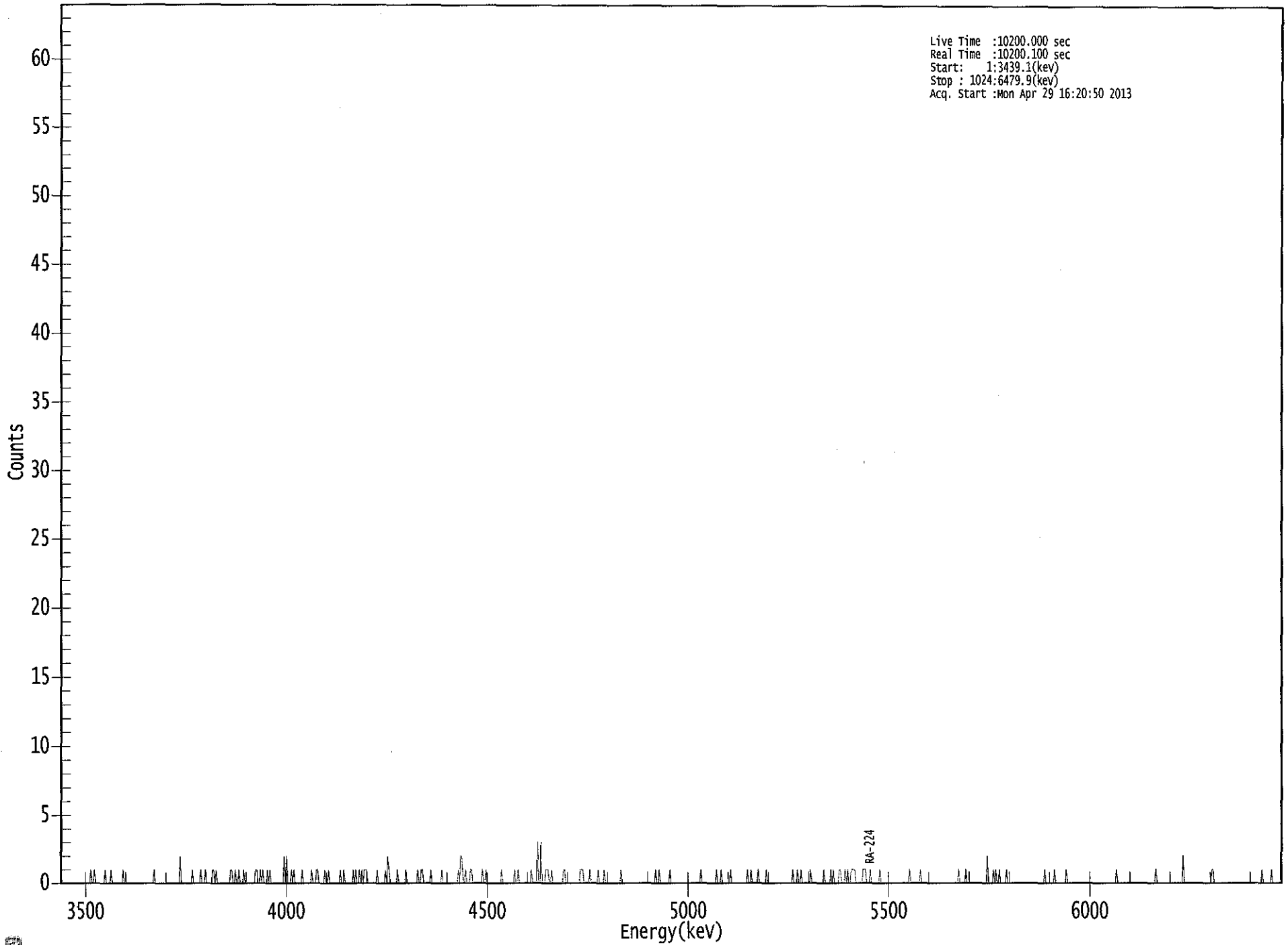
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.929	5685.50*	1.03E+000 +/- 8.26E+002	2.73E-001 +/- 2.18E+002
RA-226	0.955	4785.00*	1.15E+000 +/- 3.99E-001	2.08E-001 +/- 7.08E-003

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 4/30/13

US EPA ARCHIVE DOCUMENT

0000056664.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Mon Apr 29 16:20:50 2013



US EPA ARCHIVE DOCUMENT

0394

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: 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	1	0	0	1	0	0	0	0
33:	0	0	0	0	0	1	0	0	0
41:	0	0	1	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:	0	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0	0
81:	0	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0	0
97:	0	0	0	0	2	0	0	0	0
105:	0	0	0	0	0	0	1	0	0
113:	0	0	0	0	0	1	0	0	0
121:	0	1	0	0	0	0	0	1	0
129:	1	0	1	0	0	0	0	0	0
137:	0	0	0	0	0	0	1	1	0
145:	0	0	1	0	0	1	0	0	0
153:	0	1	0	0	0	0	0	0	0
161:	0	0	0	1	1	0	0	1	0
169:	0	1	0	0	0	1	0	1	0
177:	0	0	0	0	0	0	0	0	0
185:	0	0	0	2	0	2	0	0	0
193:	0	1	0	1	0	0	0	0	0
201:	0	0	1	0	0	0	0	0	0
209:	0	0	1	0	0	0	1	1	0
217:	0	0	0	0	0	1	0	0	0
225:	1	0	0	0	0	0	0	0	0
233:	0	0	1	0	0	1	0	0	0
241:	0	0	0	0	0	1	0	1	0
249:	0	0	1	0	1	0	1	1	0
257:	1	0	0	0	0	0	0	0	0
265:	0	1	0	0	0	0	0	0	0
273:	1	0	2	1	0	0	0	0	0
281:	0	0	1	0	0	0	0	0	0
289:	0	1	0	0	0	0	0	0	0
297:	0	0	0	1	0	0	1	1	0
305:	0	0	0	0	0	0	1	0	0
313:	0	0	0	0	0	0	0	1	0
321:	0	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	2	0
337:	2	0	0	1	0	0	0	1	0
345:	1	0	0	0	0	0	0	0	0
353:	0	1	0	0	1	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: 14

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	1	0	1
385:	0	0	0	0	0	0	0
393:	0	0	1	0	0	0	3
401:	0	0	3	0	0	0	1
409:	1	0	0	1	0	0	0
417:	0	0	0	0	0	1	0
425:	0	0	0	0	0	0	0
433:	0	0	0	1	1	1	0
441:	0	0	0	1	0	0	0
449:	0	0	1	0	0	0	1
457:	0	0	0	0	0	0	0
465:	0	0	0	0	0	1	0
473:	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0
497:	0	0	1	0	0	1	0
505:	0	0	0	0	0	0	1
513:	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0
537:	1	0	0	0	0	0	0
545:	0	0	0	0	0	1	0
553:	0	1	0	0	0	0	0
561:	0	1	0	0	0	0	0
569:	0	0	0	0	0	0	1
577:	0	0	1	0	0	0	0
585:	1	0	0	0	0	0	1
593:	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0
609:	0	0	0	0	0	1	0
617:	0	1	0	0	1	0	0
625:	0	0	0	0	1	0	0
633:	0	0	0	0	0	0	1
641:	0	0	0	0	0	1	1
649:	0	0	0	0	1	1	0
657:	0	1	0	1	0	0	1
665:	1	1	0	0	0	0	0
673:	1	1	1	0	0	0	1
681:	0	0	0	0	0	0	1
689:	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0
721:	1	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0
753:	1	0	0	0	0	0	1
761:	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0
777:	2	0	0	0	0	1	1
785:	0	0	1	0	0	0	0
793:	1	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:	1	0	0	0	0	0	0	0
833:	1	0	0	0	0	0	0	0
841:	0	0	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	1	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	1	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	2	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	1	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	1	0
1009:	0	0	0	0	0	0	1	0
1017:	0	0	0	0	0	0	0	0



Cyran

Sample Description: PZ-205-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 2.740E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9082 +/- 0.0000
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Effective Efficiency: 0.1658 +/- 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	5.514	8.66	68.12	0.34	0.00E+000	2.9
RA-226	4.589	19.49	45.07	0.51	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

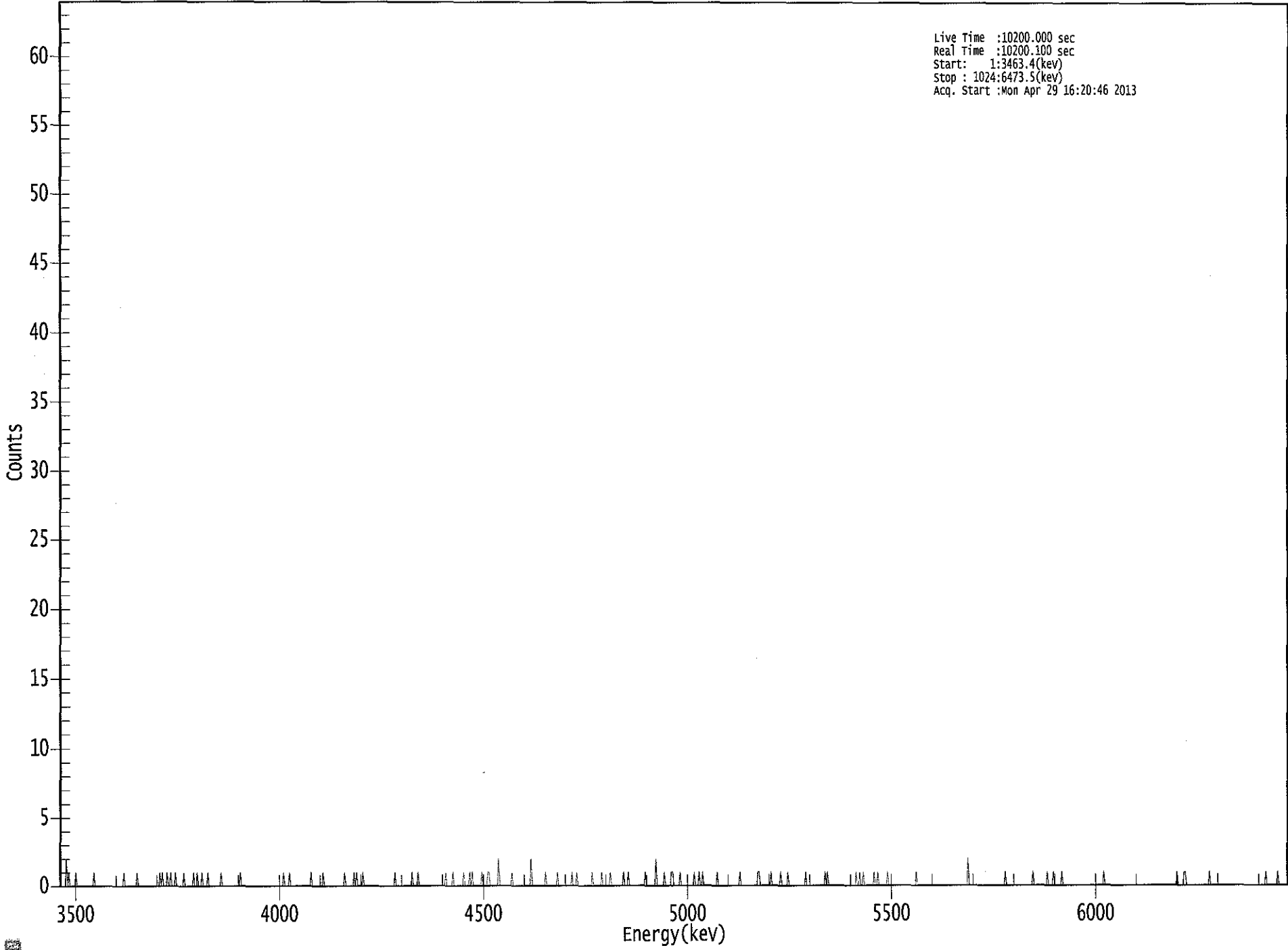
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.959	5685.50*	4.76E-001 +/- 3.81E+002	2.63E-001 +/- 2.10E+002
RA-226	0.951	4785.00*	5.69E-001 +/- 2.57E-001	1.53E-001 +/- 5.25E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056665.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Mon Apr 29 16:20:46 2013



US EPA ARCHIVE DOCUMENT

0399

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: 10200

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	1	0	0	0	0	0	0	0
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	2	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	1	0
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	0	1	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	0	1	0	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	1	0	0
473:	0	1	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:	2	0	0	0	0	0	0	1
505:	0	0	0	0	0	1	1	0
513:	0	0	0	0	1	0	0	0
521:	0	0	0	0	0	0	0	0
529:	1	0	0	0	1	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	1	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	1	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	1	1	0
585:	0	0	0	0	0	0	0	0
593:	1	0	0	0	0	0	0	0
601:	1	0	0	0	0	0	1	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	0	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	1
665:	0	0	1	0	0	1	0	0
673:	0	0	0	0	0	0	1	0
681:	0	1	0	0	0	0	0	0
689:	0	1	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	1	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	2	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	1	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 15

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



Cypro

Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 1.910E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:47 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7421 +/- 0.0000
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Effective Efficiency: 0.1323 +/- 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	5.509	12.83	55.14	0.17	0.00E+000	2.9
RA-226	4.616	54.66	26.61	0.34	0.00E+000	4.4

 NUCLIDE ANALYSIS RESULTS

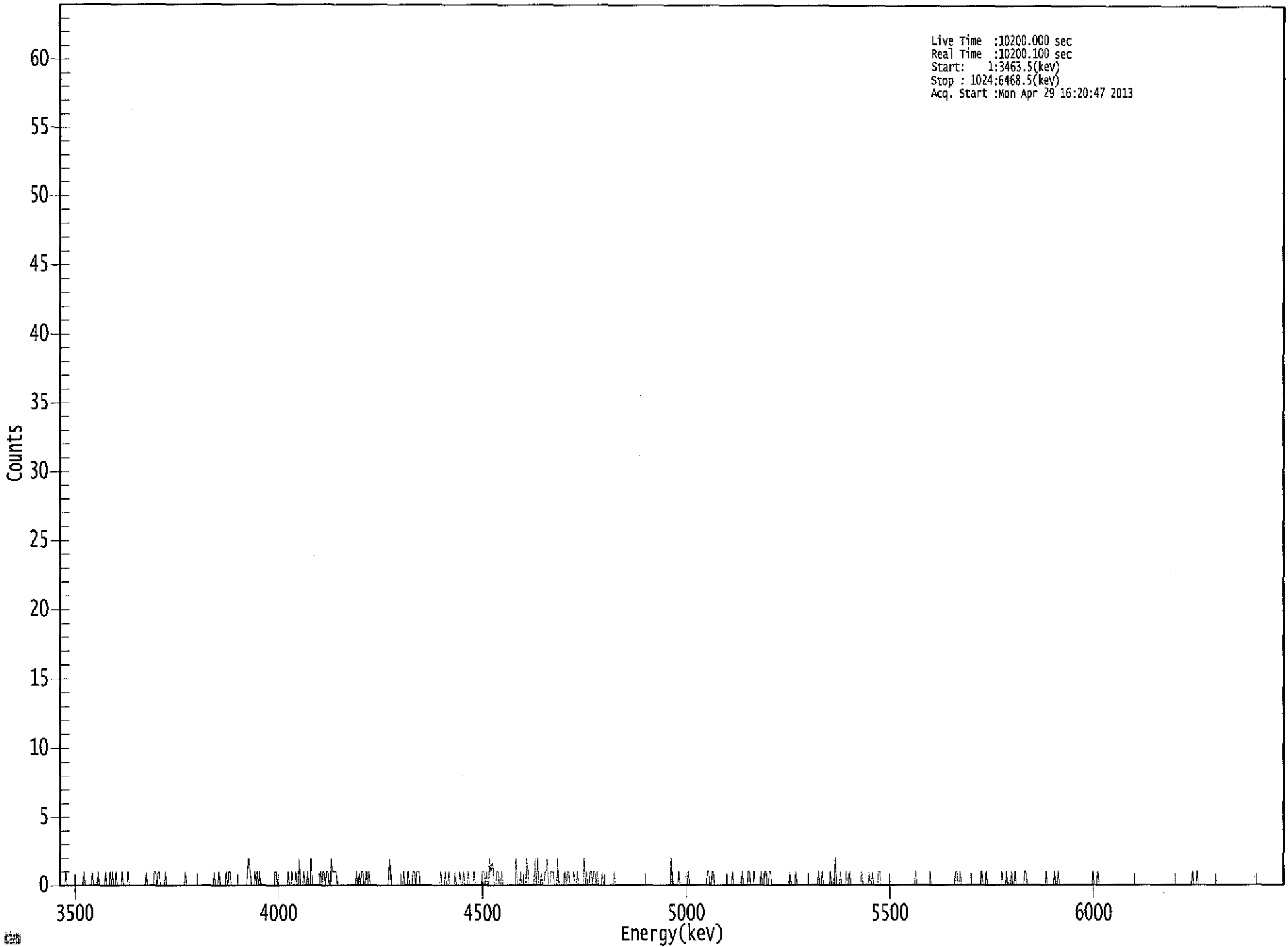
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.957	5685.50*	6.17E-001 +/- 4.93E+002	2.01E-001 +/- 1.60E+002
RA-226	0.963	4785.00*	1.39E+000 +/- 3.74E-001	1.22E-001 +/- 4.44E-003

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4/30/13

US EPA ARCHIVE DOCUMENT

0000056662.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :Mon Apr 29 16:20:47 2013



US EPA ARCHIVE DOCUMENT

0404

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: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	1	0	0	0	0
33:	1	0	0	0	0	0	1	0
41:	0	0	1	0	1	0	0	1
49:	0	0	0	0	1	0	0	0
57:	0	1	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	1	0	0	0	0	0	0	1
81:	1	0	1	1	0	0	0	0
89:	1	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	1	0	0	0	1	0	0
137:	0	0	0	1	0	1	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	2	1
161:	0	0	0	1	0	1	0	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	1	1	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	1	0	0	1	0	0
201:	2	0	0	0	1	0	0	1
209:	0	0	2	0	0	0	0	0
217:	0	0	1	0	1	1	0	1
225:	1	0	0	2	1	1	1	1
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	1	0	1	1	0	0
257:	1	0	1	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	1	2	0	0	0
281:	0	0	0	0	0	0	0	1
289:	0	0	0	1	0	0	0	1
297:	1	0	1	1	1	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:	0	1	0	0	0	1	0	0
345:	0	0	1	0	0	0	0	0
353:	0	1	1	0	1	0	0	2
361:	1	2	1	0	0	1	1	0

369: 0 1 0 0 0 0 0 0 0

Sample Title: 16

Channel	1	2	3	4	5	6	7	8	9
377:	0	0	0	0	0	2	0	0	
385:	0	1	0	0	0	0	2	1	
393:	0	0	0	0	0	2	0	2	
401:	0	0	1	0	0	1	1	2	
409:	0	0	1	1	1	0	0	0	
417:	2	0	0	0	0	0	1	0	
425:	1	1	0	0	0	1	0	0	
433:	1	0	0	0	0	0	2	0	
441:	1	0	0	1	1	0	1	1	
449:	0	1	0	0	0	1	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	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	2	
513:	0	0	0	0	0	1	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	1	1	0	
545:	0	1	1	0	0	0	0	0	
553:	0	0	0	0	0	0	0	0	
561:	0	0	1	0	0	0	0	0	
569:	0	0	1	0	0	0	0	1	
577:	1	0	0	0	1	0	0	0	
585:	0	0	1	0	0	1	1	0	
593:	0	1	1	0	0	0	0	0	
601:	0	0	0	0	0	0	0	0	
609:	0	0	1	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	1	0	0	
641:	0	0	0	0	1	0	0	0	
649:	2	0	0	0	1	0	0	0	
657:	0	1	0	0	1	0	0	0	
665:	0	0	0	0	0	0	1	0	
673:	0	0	0	0	1	0	0	1	
681:	0	0	0	0	1	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	0	0	0	
713:	0	0	0	1	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	1	1	0	0	
753:	1	0	0	0	0	0	0	0	
761:	0	0	0	0	0	0	0	0	
769:	0	0	1	0	0	0	1	0	
777:	0	0	0	0	0	0	0	0	
785:	0	0	0	1	0	0	0	1	
793:	0	0	0	1	0	0	1	0	

801: 0 0 0 0 0 0 0 1 1

Sample Title: 16

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

Apex-Alpha™

Cytron

Sample Description: PZ-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 2.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8469 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1609 +/- 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	5.484	22.32	42.22	0.68	0.00E+000	3.7
RA-226	4.611	60.49	25.32	0.51	0.00E+000	3.0

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

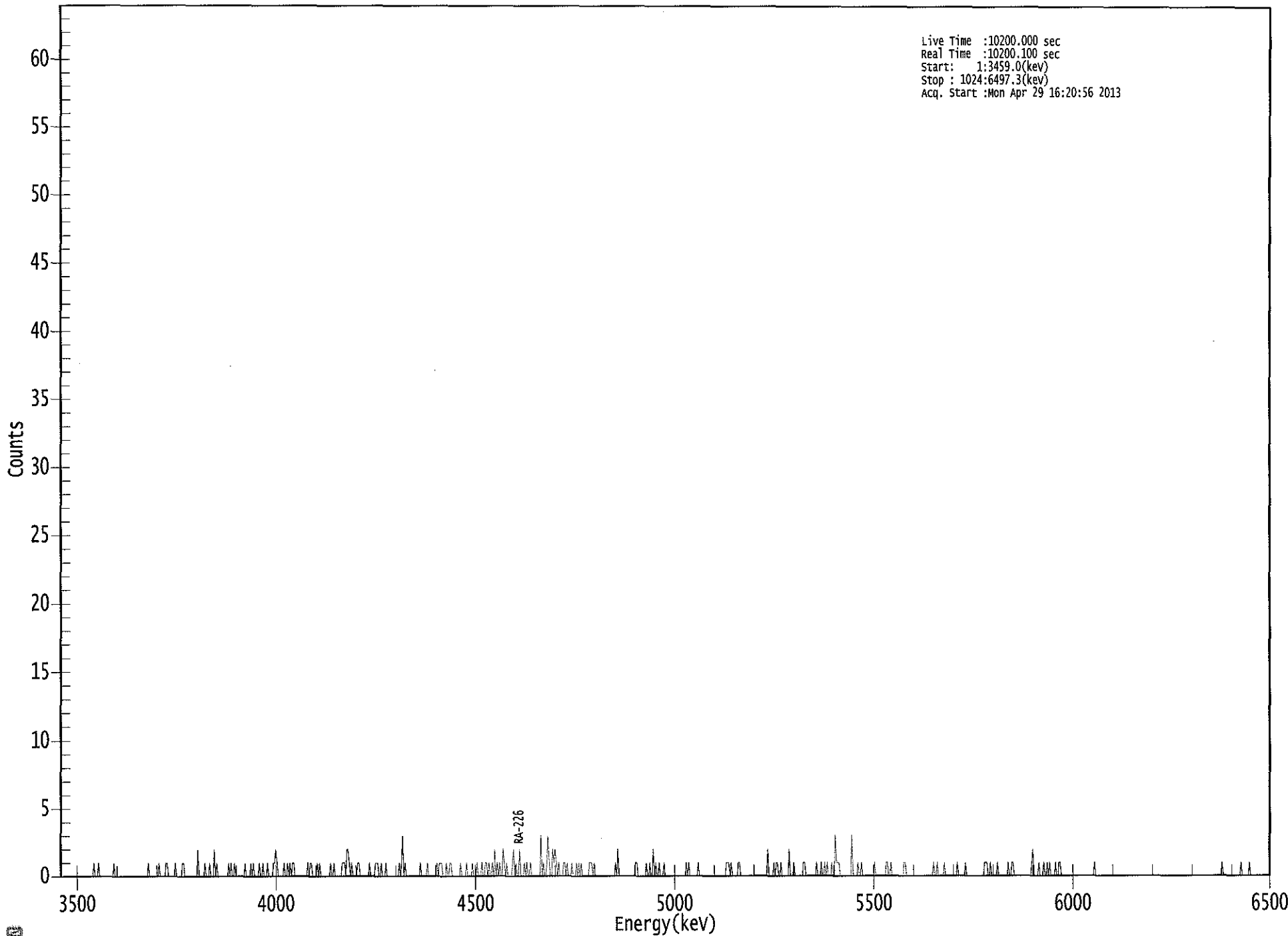
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.945	5685.50*	9.24E-001 +/- 7.38E+002	2.33E-001 +/- 1.87E+002
RA-226	0.961	4785.00*	1.33E+000 +/- 3.39E-001	1.15E-001 +/- 3.92E-003

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4/30/13

US EPA ARCHIVE DOCUMENT

0000056666.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Mon Apr 29 16:20:56 2013



6070

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

369: 0 1 0 1 0 0 2 1

Sample Title: 17

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

801: 0 1 0 0 1 1 0 0

Sample Title: 17

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	1	2	0
825:	0	0	0	1	0	0	0	1
833:	0	0	1	0	1	0	0	0
841:	0	1	0	0	1	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	1	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	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	1	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	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Apex-Alpha™

C 4/27

Sample Description: PZ-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 1.660E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:52 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8016 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1586 +/- 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	5.494	16.66	48.59	0.34	0.00E+000	4.5
RA-226	4.596	60.81	25.42	1.19	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

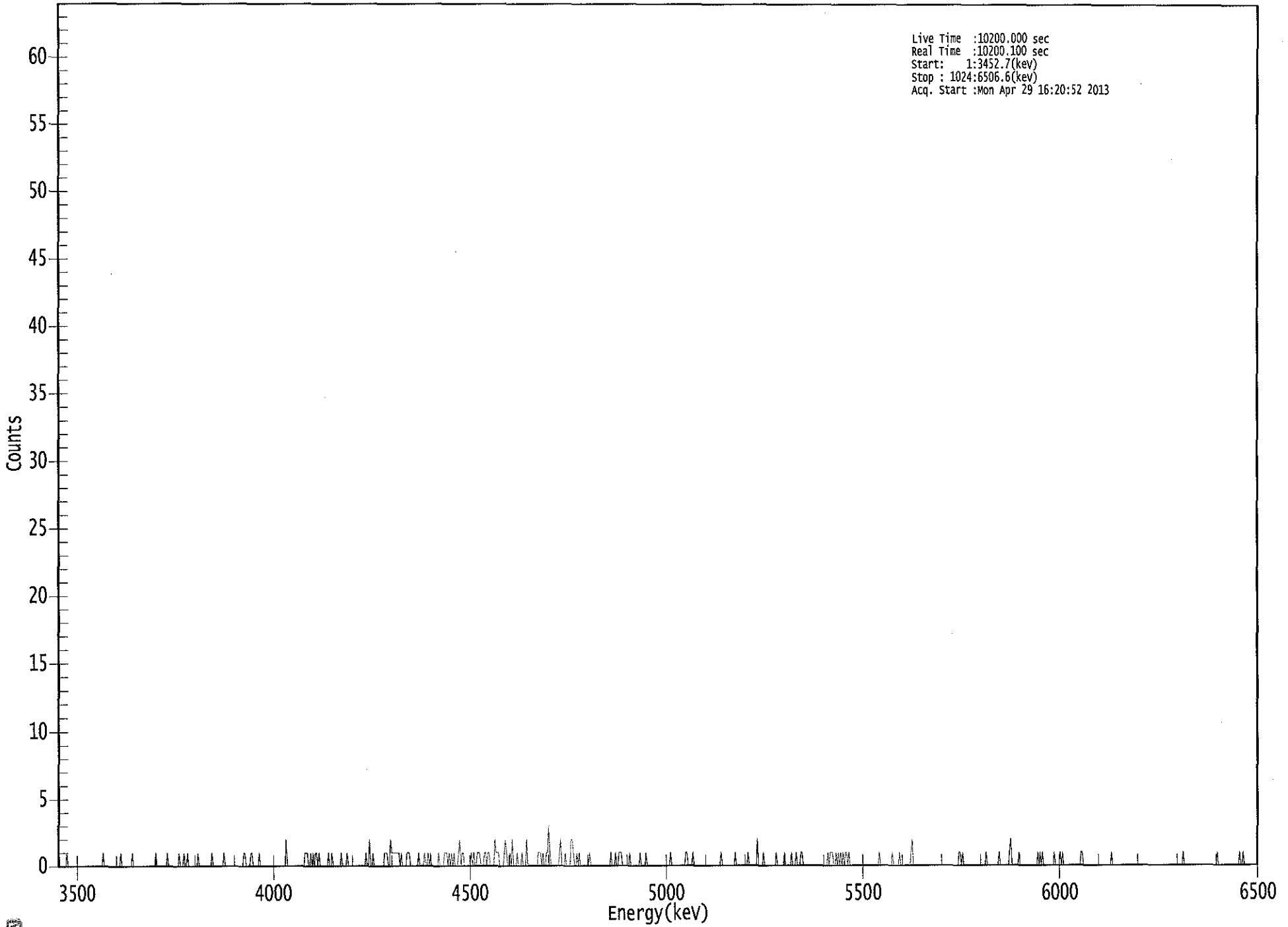
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.950	5685.50*	5.81E-001 +/- 4.64E+002	1.67E-001 +/- 1.33E+002
RA-226	0.954	4785.00*	1.12E+000 +/- 2.88E-001	1.22E-001 +/- 4.12E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056667.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Mon Apr 29 16:20:52 2013



US EPA ARCHIVE DOCUMENT

1170

ROI Type: 1

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 2 1 1 1

Sample Title: 18

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

Sample Title: 18

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	1	2	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	1	0	1	0	1
841:	0	0	0	0	0	0	0	0
849:	0	1	0	0	0	0	1	0
857:	1	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	1	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	1	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	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	1	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	1
1009:	0	0	1	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C. J. Jones

Sample Description: PZ-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000566
 Batch Identification: 1304104A-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: 2.160E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 4/26/2013 2:23:16 PM
 Acquisition Date/Time: 4/29/2013 4:20:54 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8594 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.1587 +/- 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	5.546	14.15	53.90	0.85	0.00E+000	3.0
RA-226	4.595	46.98	28.96	1.02	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

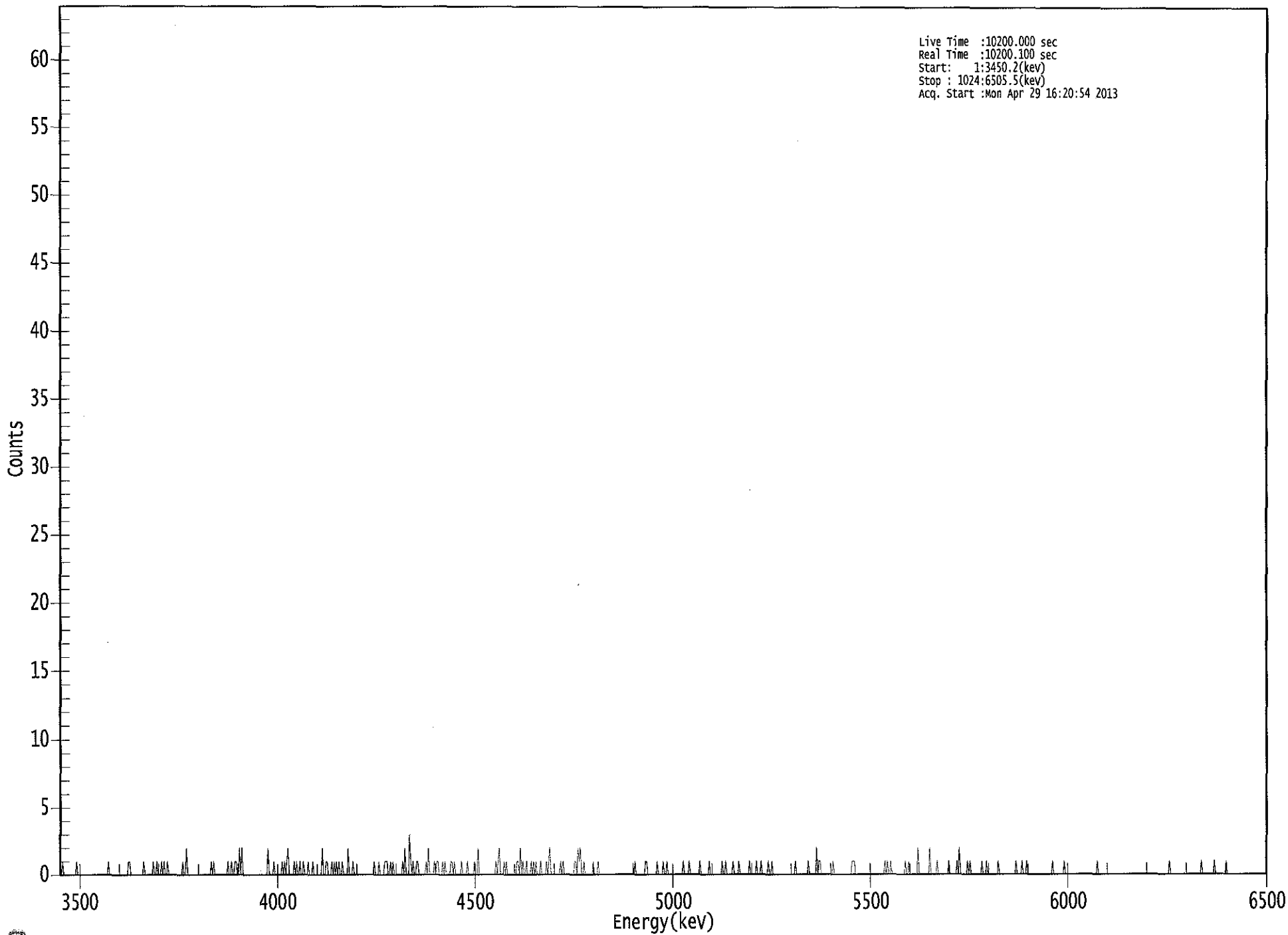
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	6.41E-001 +/- 5.13E+002	2.71E-001 +/- 2.17E+002
RA-226	0.954	4785.00*	1.13E+000 +/- 3.29E-001	1.52E-001 +/- 5.16E-003

AG
4/30/13

US EPA ARCHIVE DOCUMENT

0000056668.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start : 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Mon Apr 29 16:20:54 2013



US EPA ARCHIVE DOCUMENT

6170

ROI Type: 1

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 0 1 2 0 0 0

Sample Title: 19

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

801: 0 0 0 0 0 0 0 0

Sample Title: 19

Channel	-----	-----	-----	-----	-----	-----	-----
809:	0	0	1	0	0	0	1
817:	0	0	0	1	0	0	0
825:	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0
841:	0	1	0	0	0	0	0
849:	0	0	0	1	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	1
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	1	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	1
969:	0	0	0	0	0	0	0
977:	0	0	1	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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 4/29/2013

Time : 5:51:06 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/29/2013 5:29:44 AM
Alpha 004	21f	ALL	Passed	4/29/2013 5:29:45 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	4/29/2013 5:29:45 AM
Alpha 011	21f	ALL	Passed	4/29/2013 5:29:46 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/29/2013 5:29:47 AM
Alpha 014	21f	ALL	Passed	4/29/2013 5:29:48 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/29/2013 5:29:49 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/29/2013 5:29:50 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/29/2013 5:29:51 AM
Alpha 025	AIM730	ALL	Passed	4/29/2013 5:29:52 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/29/2013 5:29:53 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/29/2013 5:29:53 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	4/29/2013 5:29:55 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:56 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:58 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:29:59 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:01 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	4/29/2013 5:30:04 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:06 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:07 AM

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CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:09 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:11 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:13 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:15 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/29/2013 5:30:17 AM

APPROVED BY: _____ *C*APPROVAL DATE: _____ *4/29/13*

***** 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	13-04104
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	1
Matrix	WA
Method	EPA 904.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1009.412
Carrier	Yttrium
Carrier Conc (mg/ml)	34

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	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.5000E+00
04	TRG	PZ-103-SS TOT	36	04/08/13 11:15	1.5000E+00
05	TRG	PZ-103-SS DIS	36	04/08/13 11:15	1.5000E+00
06	TRG	PZ-114-AS TOT	39	04/08/13 11:45	1.5000E+00
07	TRG	PZ-114-AS DIS	39	04/08/13 11:45	1.5000E+00
08	DO	FB at PZ-201A-SS TOT	40	04/08/13 12:45	1.5000E+00
09	TRG	FB at PZ-201A-SS DIS	40	04/08/13 12:45	1.5000E+00
10	TRG	PZ-201A-SS TOT	38	04/08/13 13:22	1.5000E+00
11	TRG	PZ-201A-SS DIS	38	04/08/13 13:22	1.5000E+00
12	TRG	PZ-204A-SS TOT	45	04/08/13 13:26	1.5000E+00
13	TRG	PZ-204A-SS DIS	45	04/08/13 13:26	1.5000E+00
14	TRG	PZ-205-AS TOT	43	04/08/13 13:36	1.5000E+00
15	TRG	PZ-205-AS DIS	43	04/08/13 13:36	1.5000E+00
16	TRG	PZ-205-SS TOT	40	04/08/13 14:50	1.5000E+00
17	TRG	PZ-205-SS DIS	40	04/08/13 14:50	1.5000E+00
18	TRG	PZ-206-SS TOT	42	04/08/13 15:00	1.5000E+00
19	TRG	PZ-206-SS DIS	42	04/08/13 15:00	1.5000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9141	922.7	383.9	92.37	2.000	0.0948	0.1448	0.0500	73.53	67.92	1.00	1.00
02	MBL	0.9085	917.1	383.6	92.86	2.000	0.0955	0.1484	0.0529	77.79	72.24	1.00	1.00
03	DUP	0.9058	914.3	340.5	82.67	2.000	0.0950	0.1473	0.0523	76.91	63.59	1.00	1.00
04	TRG	0.9029	911.4	287.0	69.91	2.000	0.0948	0.1464	0.0516	75.88	53.05	1.00	1.00
05	TRG	0.9035	912.0	371.8	90.50	2.000	0.0953	0.1451	0.0498	73.24	66.28	1.00	1.00
06	TRG	0.9049	913.4	277.2	67.37	2.000	0.0949	0.1472	0.0523	76.91	51.82	1.00	1.00
07	TRG	0.9037	912.2	340.8	82.94	2.000	0.0948	0.1467	0.0519	76.32	63.30	1.00	1.00
08	DO	0.9025	911.0	349.2	85.10	2.000	0.0949	0.1446	0.0497	73.09	62.20	1.00	1.00
09	TRG	0.8660	874.2	344.7	87.54	2.000	0.0945	0.1463	0.0518	76.18	66.69	1.00	1.00
10	TRG	0.8983	906.8	332.9	81.50	2.000	0.0944	0.1454	0.0510	75.00	61.13	1.00	1.00
11	TRG	0.8924	900.8	346.8	85.47	2.000	0.0953	0.1467	0.0514	75.59	64.60	1.00	1.00
12	TRG	0.9028	911.3	330.3	80.46	2.000	0.0926	0.1477	0.0551	81.03	65.20	1.00	1.00
13	TRG	0.9014	909.9	371.5	90.64	2.000	0.0928	0.1463	0.0535	78.68	71.31	1.00	1.00
14	TRG	0.8741	882.3	326.4	82.12	2.000	0.0921	0.1468	0.0547	80.44	66.06	1.00	1.00
15	TRG	0.9025	911.0	372.7	90.82	2.000	0.0923	0.1452	0.0529	77.79	70.66	1.00	1.00
16	TRG	0.8446	852.5	285.0	74.21	2.000	0.0925	0.1423	0.0498	73.24	54.35	1.00	1.00
17	TRG	0.7700	777.2	296.5	84.69	2.000	0.0918	0.1465	0.0547	80.44	68.12	1.00	1.00
18	TRG	0.9112	919.8	332.1	80.16	2.000	0.0922	0.1469	0.0547	80.44	64.48	1.00	1.00
19	TRG	0.9108	919.4	355.9	85.94	2.000	0.0920	0.1464	0.0544	80.00	68.75	1.00	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.

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			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
02	MBL			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
03	DUP			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
04	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
05	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
06	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
07	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
08	DO			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
09	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
10	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
11	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
12	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
13	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
14	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
15	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
16	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
17	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
18	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH
19	TRG			04/23/13 06:17	JBARNARD	04/26/13 14:23	LWALKER	05/07/13 09:12	TSMITH

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: 13-04104-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	8.38E+00	1.00E+00	1.34E+00	8.97E+00	93.45	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	6.34E-01	3.94E-01	7.65E-01					OK	OK
03	RA-228	DUP	FB at PZ-201A-SS TOT	pCi/l	1.76E-01	4.51E-01	9.47E-01				NA	OK	
04	RA-228	TRG	PZ-103-SS TOT	pCi/l	5.28E+00	7.43E-01	1.01E+00					OK	
05	RA-228	TRG	PZ-103-SS DIS	pCi/l	1.53E+00	5.23E-01	9.52E-01					OK	
06	RA-228	TRG	PZ-114-AS TOT	pCi/l	8.59E-01	6.44E-01	1.28E+00					OK	
07	RA-228	TRG	PZ-114-AS DIS	pCi/l	1.67E-01	4.84E-01	1.02E+00					OK	
08	RA-228	DO	FB at PZ-201A-SS TOT	pCi/l	3.21E-01	4.86E-01	1.00E+00					OK	
09	RA-228	TRG	FB at PZ-201A-SS DIS	pCi/l	4.48E-01	4.37E-01	8.83E-01					OK	
10	RA-228	TRG	PZ-201A-SS TOT	pCi/l	1.11E+00	5.99E-01	1.16E+00					OK	
11	RA-228	TRG	PZ-201A-SS DIS	pCi/l	9.30E-01	4.98E-01	9.57E-01					OK	
12	RA-228	TRG	PZ-204A-SS TOT	pCi/l	1.30E+00	5.46E-01	1.03E+00					OK	
13	RA-228	TRG	PZ-204A-SS DIS	pCi/l	4.59E-01	4.63E-01	9.40E-01					OK	
14	RA-228	TRG	PZ-205-AS TOT	pCi/l	1.81E+00	5.43E-01	9.63E-01					OK	
15	RA-228	TRG	PZ-205-AS DIS	pCi/l	1.04E+00	4.92E-01	9.37E-01					OK	
16	RA-228	TRG	PZ-205-SS TOT	pCi/l	1.31E+00	6.08E-01	1.15E+00					OK	
17	RA-228	TRG	PZ-205-SS DIS	pCi/l	1.13E+00	4.98E-01	9.38E-01					OK	
18	RA-228	TRG	PZ-206-SS TOT	pCi/l	1.10E+00	6.74E-01	1.31E+00					OK	
19	RA-228	TRG	PZ-206-SS DIS	pCi/l	7.21E-01	7.31E-01	1.48E+00					OK	

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	04/16/13 00:00	1.00E+00	92.37	73.53	67.92	1.00	4/26/2013 14:23	5/7/2013 9:12
02	RA-228	MBL	04/16/13 00:00	1.50E+00	92.86	77.79	72.24	1.00	4/26/2013 14:23	5/7/2013 9:12
03	RA-228	DUP	04/08/13 12:45	1.50E+00	82.67	76.91	63.59	1.00	4/26/2013 14:23	5/7/2013 9:12
04	RA-228	TRG	04/08/13 11:15	1.50E+00	69.91	75.88	53.05	1.00	4/26/2013 14:23	5/7/2013 9:12
05	RA-228	TRG	04/08/13 11:15	1.50E+00	90.50	73.24	66.28	1.00	4/26/2013 14:23	5/7/2013 9:12
06	RA-228	TRG	04/08/13 11:45	1.50E+00	67.37	76.91	51.82	1.00	4/26/2013 14:23	5/7/2013 9:12
07	RA-228	TRG	04/08/13 11:45	1.50E+00	82.94	76.32	63.30	1.00	4/26/2013 14:23	5/7/2013 9:12
08	RA-228	DO	04/08/13 12:45	1.50E+00	85.10	73.09	62.20	1.00	4/26/2013 14:23	5/7/2013 9:12
09	RA-228	TRG	04/08/13 12:45	1.50E+00	87.54	76.18	66.69	1.00	4/26/2013 14:23	5/7/2013 9:12
10	RA-228	TRG	04/08/13 13:22	1.50E+00	81.50	75.00	61.13	1.00	4/26/2013 14:23	5/7/2013 9:12
11	RA-228	TRG	04/08/13 13:22	1.50E+00	85.47	75.59	64.60	1.00	4/26/2013 14:23	5/7/2013 9:12
12	RA-228	TRG	04/08/13 13:26	1.50E+00	80.46	81.03	65.20	1.00	4/26/2013 14:23	5/7/2013 9:12
13	RA-228	TRG	04/08/13 13:26	1.50E+00	90.64	78.68	71.31	1.00	4/26/2013 14:23	5/7/2013 9:12
14	RA-228	TRG	04/08/13 13:36	1.50E+00	82.12	80.44	66.06	1.00	4/26/2013 14:23	5/7/2013 9:12
15	RA-228	TRG	04/08/13 13:36	1.50E+00	90.82	77.79	70.66	1.00	4/26/2013 14:23	5/7/2013 9:12
16	RA-228	TRG	04/08/13 14:50	1.50E+00	74.21	73.24	54.35	1.00	4/26/2013 14:23	5/7/2013 9:12
17	RA-228	TRG	04/08/13 14:50	1.50E+00	84.69	80.44	68.12	1.00	4/26/2013 14:23	5/7/2013 9:12
18	RA-228	TRG	04/08/13 15:00	1.50E+00	80.16	80.44	64.48	1.00	4/26/2013 14:23	5/7/2013 9:12
19	RA-228	TRG	04/08/13 15:00	1.50E+00	85.94	80.00	68.75	1.00	4/26/2013 14:23	5/7/2013 9:12

Run	1	Analysis Code	Ra228	Eberline Services Work Order	13-04104	Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-04104-Ra228-1

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04104
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	05/07/13 12:37		LB4110R	A1	120	576	1.15	0.4776
02	RA-228	MBL	05/07/13 12:37		LB4110R	A2	120	162	0.916666667	0.4699
03	RA-228	DUP	05/07/13 12:37		LB4110R	A3	120	151	1.15	0.4809
04	RA-228	TRG	05/07/13 12:37		LB4110R	A4	120	424	0.866666667	0.4732
05	RA-228	TRG	05/07/13 12:38		LB4110R	B1	120	264	1.233333333	0.4754
06	RA-228	TRG	05/07/13 12:38		LB4110R	B2	120	208	1.316666667	0.4658
07	RA-228	TRG	05/07/13 12:38		LB4110R	B3	120	164	1.266666667	0.4713
08	RA-228	DO	05/07/13 12:38		LB4110R	B4	120	169	1.216666667	0.4773
09	RA-228	TRG	05/07/13 12:37		LB4110R	C1	120	160	1.05	0.4705
10	RA-228	TRG	05/07/13 12:37		LB4110R	C2	120	261	1.533333333	0.4676
11	RA-228	TRG	05/07/13 12:37		LB4110R	C3	120	201	1.116666667	0.4614
12	RA-228	TRG	05/07/13 12:40		LB4110A	C1	120	255	1.333333333	0.4667
13	RA-228	TRG	05/07/13 12:40		LB4110A	C2	120	190	1.283333333	0.4578
14	RA-228	TRG	05/07/13 12:40		LB4110A	C3	120	281	1.216666667	0.4699
15	RA-228	TRG	05/07/13 12:40		LB4110A	C4	120	241	1.316666667	0.4692
16	RA-228	TRG	05/07/13 12:40		LB4110A	D2	120	220	1.166666667	0.4682
17	RA-228	TRG	05/07/13 12:40		LB4110A	D4	120	238	1.25	0.4741
18	RA-228	TRG	05/07/13 15:49		LB4110R	C1	120	182	1.05	0.4705
19	RA-228	TRG	05/07/13 15:49		LB4110R	C2	120	223	1.533333333	0.4676

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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	0.9141	922.7035	383.9000	92.37	1.00	1.00
02	MBL	BLANK	04/16/13 00:00	1.5000	0.9085	917.0508	383.6000	92.86	1.00	1.00
03	DUP	FB at PZ-201A-SS TOT	04/08/13 12:45	1.5000	0.9058	914.3254	340.5000	82.67	1.00	1.00
04	TRG	PZ-103-SS TOT	04/08/13 11:15	1.5000	0.9029	911.3981	287.0000	69.91	1.00	1.00
05	TRG	PZ-103-SS DIS	04/08/13 11:15	1.5000	0.9035	912.0037	371.8000	90.50	1.00	1.00
06	TRG	PZ-114-AS TOT	04/08/13 11:45	1.5000	0.9049	913.4169	277.2000	67.37	1.00	1.00
07	TRG	PZ-114-AS DIS	04/08/13 11:45	1.5000	0.9037	912.2056	340.8000	82.94	1.00	1.00
08	DO	FB at PZ-201A-SS TOT	04/08/13 12:45	1.5000	0.9025	910.9943	349.2000	85.10	1.00	1.00
09	TRG	FB at PZ-201A-SS DIS	04/08/13 12:45	1.5000	0.8660	874.1508	344.7000	87.54	1.00	1.00
10	TRG	PZ-201A-SS TOT	04/08/13 13:22	1.5000	0.8983	906.7548	332.9000	81.50	1.00	1.00
11	TRG	PZ-201A-SS DIS	04/08/13 13:22	1.5000	0.8924	900.7993	346.8000	85.47	1.00	1.00
12	TRG	PZ-204A-SS TOT	04/08/13 13:26	1.5000	0.9028	911.2972	330.3000	80.46	1.00	1.00
13	TRG	PZ-204A-SS DIS	04/08/13 13:26	1.5000	0.9014	909.8840	371.5000	90.64	1.00	1.00
14	TRG	PZ-205-AS TOT	04/08/13 13:36	1.5000	0.8741	882.3270	326.4000	82.12	1.00	1.00
15	TRG	PZ-205-AS DIS	04/08/13 13:36	1.5000	0.9025	910.9943	372.7000	90.82	1.00	1.00
16	TRG	PZ-205-SS TOT	04/08/13 14:50	1.5000	0.8446	852.5494	285.0000	74.21	1.00	1.00
17	TRG	PZ-205-SS DIS	04/08/13 14:50	1.5000	0.7700	777.2472	296.5000	84.69	1.00	1.00
18	TRG	PZ-206-SS TOT	04/08/13 15:00	1.5000	0.9112	919.7762	332.1000	80.16	1.00	1.00
19	TRG	PZ-206-SS DIS	04/08/13 15:00	1.5000	0.9108	919.3724	355.9000	85.94	1.00	1.00

Aliquot Worksheet

US EPA ARCHIVE DOCUMENT

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-04104	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 Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.5000E+00	1.5000E+00				
03	FB at PZ-201A-SS TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-103-SS TOT	TRG					1.5000E+00	1.5000E+00				
05	PZ-103-SS DIS	TRG					1.5000E+00	1.5000E+00				
06	PZ-114-AS TOT	TRG					1.5000E+00	1.5000E+00				
07	PZ-114-AS DIS	TRG					1.5000E+00	1.5000E+00				
08	FB at PZ-201A-SS TOT	DO					1.5000E+00	1.5000E+00				
09	FB at PZ-201A-SS DIS	TRG					1.5000E+00	1.5000E+00				
10	PZ-201A-SS TOT	TRG					1.5000E+00	1.5000E+00				
11	PZ-201A-SS DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-204A-SS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-204A-SS DIS	TRG					1.5000E+00	1.5000E+00				
14	PZ-205-AS TOT	TRG					1.5000E+00	1.5000E+00				
15	PZ-205-AS DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-205-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-205-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	PZ-206-SS TOT	TRG					1.5000E+00	1.5000E+00				
19	PZ-206-SS DIS	TRG					1.5000E+00	1.5000E+00				

Comments

Technician: _____

JB

Date: _____

4/23/12

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-04104	1	Ra228	Yttrium	34.0000	TSMITH

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	
01	LCS	LCS	2.0000	0.0948	0.1448	0.0500	73.53
02	BLANK	MBL	2.0000	0.0955	0.1484	0.0529	77.79
03	DUP	DUP	2.0000	0.0950	0.1473	0.0523	76.91
04	PZ-103-SS TOT	TRG	2.0000	0.0948	0.1464	0.0516	75.88
05	PZ-103-SS DIS	TRG	2.0000	0.0953	0.1451	0.0498	73.24
06	PZ-114-AS TOT	TRG	2.0000	0.0949	0.1472	0.0523	76.91
07	PZ-114-AS DIS	TRG	2.0000	0.0948	0.1467	0.0519	76.32
08	FB at PZ-201A-SS TOT	DO	2.0000	0.0949	0.1446	0.0497	73.09
09	FB at PZ-201A-SS DIS	TRG	2.0000	0.0945	0.1463	0.0518	76.18
10	PZ-201A-SS TOT	TRG	2.0000	0.0944	0.1454	0.0510	75.00
11	PZ-201A-SS DIS	TRG	2.0000	0.0953	0.1467	0.0514	75.59
12	PZ-204A-SS TOT	TRG	2.0000	0.0926	0.1477	0.0551	81.03
13	PZ-204A-SS DIS	TRG	2.0000	0.0928	0.1463	0.0535	78.68
14	PZ-205-AS TOT	TRG	2.0000	0.0921	0.1468	0.0547	80.44
15	PZ-205-AS DIS	TRG	2.0000	0.0923	0.1452	0.0529	77.79
16	PZ-205-SS TOT	TRG	2.0000	0.0925	0.1423	0.0498	73.24
17	PZ-205-SS DIS	TRG	2.0000	0.0918	0.1465	0.0547	80.44
18	PZ-206-SS TOT	TRG	2.0000	0.0922	0.1469	0.0547	80.44
19	PZ-206-SS DIS	TRG	2.0000	0.0920	0.1464	0.0544	80.00

US EPA ARCHIVE DOCUMENT

0435

Technician: _____

T Smith

Date: _____

5/7/13

②
5/7/13
KCB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304104-09	10	160	120	1400	5/7/13 14:37
C2	1304104-10	15	261	120	1400	5/7/13 14:37
C3	1304104-11	11	201	120	1400	5/7/13 14:37
A1	1304104-01	27	576	120	1400	5/7/13 14:37
A2	1304104-02	7	162	120	1400	5/7/13 14:37
A3	1304104-03	13	151	120	1400	5/7/13 14:37
A4	1304104-04	14	424	120	1400	5/7/13 14:37
B1	1304104-05	13	264	120	1400	5/7/13 14:38
B2	1304104-06	12	208	120	1400	5/7/13 14:38
B3	1304104-07	11	164	120	1400	5/7/13 14:38
B4	1304104-08	4	169	120	1400	5/7/13 14:38

①
5/7/13
KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304104-12	15	255	120	1400	5/7/13 14:40
C2	1304104-13	19	190	120	1400	5/7/13 14:40
C3	1304104-14	24	281	120	1400	5/7/13 14:40
C4	1304104-15	12	241	120	1400	5/7/13 14:40
D2	1304104-16	10	220	120	1400	5/7/13 14:40
D4	1304104-17	15	238	120	1400	5/7/13 14:40

②
SF13
145

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304104-18	14	182	120	1400	5/7/13 17:49
C2	1304104-19	18	223	120	1400	5/7/13 17:49

GPC Detector Report
(ALL Backgrounds)

CFR117

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/7/2013	6.67E-02	P	-2.18E+01	2.94E-01	2.24E+01
LB4110A - A2	Alpha	11/18/2007	5/7/2013	6.67E-02	P	-1.85E+01	2.62E-01	1.90E+01
LB4110A - A3	Alpha	11/18/2007	5/7/2013	3.33E-02	P	-1.80E+01	2.24E-01	1.85E+01
LB4110A - A4	Alpha	11/18/2007	5/7/2013	6.67E-02	P	-1.91E+01	2.45E-01	1.96E+01
LB4110A - B1	Alpha	11/18/2007	5/7/2013	1.33E-01	P	-9.89E-02	7.51E-02	2.49E-01
LB4110A - B2	Alpha	11/18/2007	5/7/2013	1.00E-01	P	-7.95E-02	7.27E-02	2.25E-01
LB4110A - B3	Alpha	11/18/2007	5/7/2013	0.00E+00	P	-6.40E-02	5.32E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	5/7/2013	1.67E-02	P	-1.44E-01	7.91E-02	3.02E-01
LB4110A - C1	Alpha	11/18/2007	5/7/2013	5.00E-02	P	-1.53E-01	8.92E-02	3.31E-01
LB4110A - C2	Alpha	11/18/2007	5/7/2013	5.00E-02	P	-1.80E-01	8.83E-02	3.57E-01
LB4110A - C3	Alpha	11/18/2007	5/7/2013	5.00E-02	P	-1.76E-01	1.01E-01	3.79E-01
LB4110A - C4	Alpha	11/18/2007	5/7/2013	6.67E-02	P	-6.28E-02	6.88E-02	2.00E-01
LB4110A - D1	Alpha	11/18/2007	5/7/2013	1.67E-02	P	-5.35E-02	8.42E-02	2.22E-01
LB4110A - D2	Alpha	11/18/2007	5/7/2013	8.33E-02	P	-7.03E-02	6.04E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	5/7/2013	5.00E-02	P	-4.75E-02	7.20E-02	1.91E-01
LB4110A - D4	Alpha	11/18/2007	5/7/2013	1.67E-02	P	-5.75E-02	7.08E-02	1.99E-01
LB4110R - A1	Alpha	11/24/2006	5/7/2013	8.33E-02	P	-1.01E-01	1.01E-01	3.03E-01
LB4110R - A2	Alpha	11/24/2006	5/7/2013	8.33E-02	P	-9.02E-02	7.74E-02	2.45E-01
LB4110R - A3	Alpha	11/24/2006	5/7/2013	6.67E-02	P	-7.36E-02	7.68E-02	2.27E-01
LB4110R - A4	Alpha	11/24/2006	5/7/2013	1.67E-02	P	-5.30E-02	7.17E-02	1.96E-01
LB4110R - B1	Alpha	11/24/2006	5/7/2013	1.67E-02	P	-9.59E-02	6.20E-02	2.20E-01
LB4110R - B2	Alpha	11/24/2006	5/7/2013	8.33E-02	P	-6.93E-02	6.44E-02	1.98E-01
LB4110R - B3	Alpha	11/24/2006	5/7/2013	8.33E-02	P	-6.53E-02	7.01E-02	2.06E-01
LB4110R - B4	Alpha	11/24/2006	5/7/2013	5.00E-02	P	-6.47E-02	7.08E-02	2.06E-01
LB4110R - C1	Alpha	11/24/2006	5/7/2013	1.67E-02	P	-7.80E-02	7.43E-02	2.27E-01
LB4110R - C2	Alpha	11/24/2006	5/7/2013	6.67E-02	P	-7.53E-02	7.23E-02	2.20E-01
LB4110R - C3	Alpha	11/24/2006	5/7/2013	3.33E-02	P	-8.91E-02	8.48E-02	2.59E-01
LB4110R - C4	Alpha	11/24/2006	5/7/2013	1.50E-01	P	-6.22E-02	8.21E-02	2.26E-01
LB4110R - D1	Alpha	11/24/2006	5/7/2013	0.00E+00	P	-9.92E-02	7.31E-02	2.45E-01
LB4110R - D2	Alpha	11/24/2006	5/7/2013	0.00E+00	P	-7.33E-02	7.25E-02	2.18E-01
LB4110R - D3	Alpha	11/24/2006	5/7/2013	0.00E+00	P	-7.86E-02	7.23E-02	2.23E-01
LB4110R - D4	Alpha	11/24/2006	5/7/2013	0.00E+00	P	-7.00E-02	7.72E-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

GPC Detector Report
(ALL Backgrounds)

C
517112

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/7/2013	7.22E+00	P	-2.96E+02	7.63E+00	3.11E+02
LB4110A - A2	Beta	11/18/2007	5/7/2013	3.20E+00	P	-3.11E+01	2.55E+00	3.62E+01
LB4110A - A3	Beta	11/18/2007	5/7/2013	1.33E+00	P	-5.13E+01	2.67E+00	5.67E+01
LB4110A - A4	Beta	11/18/2007	5/7/2013	7.98E+00	P	-3.34E+01	3.02E+00	3.94E+01
LB4110A - B1	Beta	11/18/2007	5/7/2013	2.43E+00	P	-1.05E+01	3.26E+00	1.70E+01
LB4110A - B2	Beta	11/18/2007	5/7/2013	2.57E+00	P	-7.56E+00	1.99E+00	1.15E+01
LB4110A - B3	Beta	11/18/2007	5/7/2013	1.22E+00	P	1.06E-01	1.36E+00	2.62E+00
LB4110A - B4	Beta	11/18/2007	5/7/2013	9.67E-01	P	-7.61E+00	1.97E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	5/7/2013	1.33E+00	P	-5.51E+00	2.16E+00	9.82E+00
LB4110A - C2	Beta	11/18/2007	5/7/2013	1.28E+00	P	3.80E-01	1.27E+00	2.16E+00
LB4110A - C3	Beta	11/18/2007	5/7/2013	1.22E+00	P	4.69E-01	1.47E+00	2.47E+00
LB4110A - C4	Beta	11/18/2007	5/7/2013	1.32E+00	P	-1.77E+00	2.14E+00	6.05E+00
LB4110A - D1	Beta	11/18/2007	5/7/2013	1.87E+00	P	-2.39E+00	2.59E+00	7.56E+00
LB4110A - D2	Beta	11/18/2007	5/7/2013	1.17E+00	P	-6.81E-01	1.57E+00	3.81E+00
LB4110A - D3	Beta	11/18/2007	5/7/2013	4.17E+00	P	1.22E+00	4.47E+00	7.73E+00
LB4110A - D4	Beta	11/18/2007	5/7/2013	1.25E+00	P	-4.52E-01	1.37E+00	3.20E+00
LB4110R - A1	Beta	11/24/2006	5/7/2013	1.15E+00	P	-6.20E+01	3.78E+00	6.96E+01
LB4110R - A2	Beta	11/24/2006	5/7/2013	9.17E-01	P	-4.93E+01	2.06E+00	5.34E+01
LB4110R - A3	Beta	11/24/2006	5/7/2013	1.15E+00	P	-4.56E+01	2.80E+00	5.12E+01
LB4110R - A4	Beta	11/24/2006	5/7/2013	8.67E-01	P	-4.55E+01	2.02E+00	4.96E+01
LB4110R - B1	Beta	11/24/2006	5/7/2013	1.23E+00	P	-4.79E+01	2.05E+00	5.20E+01
LB4110R - B2	Beta	11/24/2006	5/7/2013	1.32E+00	P	-4.79E+01	2.08E+00	5.20E+01
LB4110R - B3	Beta	11/24/2006	5/7/2013	1.27E+00	P	-4.76E+01	2.71E+00	5.31E+01
LB4110R - B4	Beta	11/24/2006	5/7/2013	1.22E+00	P	-4.80E+01	1.95E+00	5.19E+01
LB4110R - C1	Beta	11/24/2006	5/7/2013	1.05E+00	P	-4.78E+01	3.04E+00	5.38E+01
LB4110R - C2	Beta	11/24/2006	5/7/2013	1.53E+00	P	-4.78E+01	2.75E+00	5.33E+01
LB4110R - C3	Beta	11/24/2006	5/7/2013	1.12E+00	P	-4.82E+01	2.56E+00	5.34E+01
LB4110R - C4	Beta	11/24/2006	5/7/2013	2.48E+00	P	-5.44E+01	2.99E+00	6.04E+01
LB4110R - D1	Beta	11/24/2006	5/7/2013	0.00E+00	P	-4.52E+01	5.78E+00	5.67E+01
LB4110R - D2	Beta	11/24/2006	5/7/2013	0.00E+00	P	-4.87E+01	1.95E+00	5.26E+01
LB4110R - D3	Beta	11/24/2006	5/7/2013	0.00E+00	P	-5.20E+01	5.76E+00	6.35E+01
LB4110R - D4	Beta	11/24/2006	5/7/2013	0.00E+00	P	-4.84E+01	2.32E+00	5.30E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

US EPA ARCHIVE DOCUMENT

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	5/7/2013	0.2470	P	-0.0190	0.2146	0.4483
LB4110A - A2	Alpha	11/18/2007	5/7/2013	0.2064	P	-0.0564	0.1725	0.4014
LB4110A - A3	Alpha	11/18/2007	5/7/2013	0.2120	P	-0.0801	0.1613	0.4027
LB4110A - A4	Alpha	11/18/2007	5/7/2013	0.2204	P	-0.0585	0.1803	0.4191
LB4110A - B1	Alpha	11/18/2007	5/7/2013	0.2216	P	0.1943	0.2247	0.2550
LB4110A - B2	Alpha	11/18/2007	5/7/2013	0.2131	P	0.1929	0.2218	0.2507
LB4110A - B3	Alpha	11/18/2007	5/7/2013	0.2446	P	0.1292	0.2326	0.3360
LB4110A - B4	Alpha	11/18/2007	5/7/2013	0.2341	P	0.2090	0.2367	0.2644
LB4110A - C1	Alpha	11/18/2007	5/7/2013	0.2091	P	0.1973	0.2208	0.2444
LB4110A - C2	Alpha	11/18/2007	5/7/2013	0.2154	P	0.1966	0.2252	0.2538
LB4110A - C3	Alpha	11/18/2007	5/7/2013	0.2423	P	0.2228	0.2494	0.2759
LB4110A - C4	Alpha	11/18/2007	5/7/2013	0.2095	P	0.1965	0.2258	0.2550
LB4110A - D1	Alpha	11/18/2007	5/7/2013	0.2251	P	0.2036	0.2334	0.2632
LB4110A - D2	Alpha	11/18/2007	5/7/2013	0.2497	P	0.2278	0.2584	0.2891
LB4110A - D3	Alpha	11/18/2007	5/7/2013	0.2575	P	0.2315	0.2639	0.2963
LB4110A - D4	Alpha	11/18/2007	5/7/2013	0.1854	P	0.1651	0.1999	0.2347
LB4110R - A1	Alpha	11/24/2006	5/7/2013	0.2389	P	0.2031	0.2389	0.2747
LB4110R - A2	Alpha	11/24/2006	5/7/2013	0.2121	P	0.1899	0.2207	0.2514
LB4110R - A3	Alpha	11/24/2006	5/7/2013	0.2261	P	0.1963	0.2249	0.2534
LB4110R - A4	Alpha	11/24/2006	5/7/2013	0.2482	P	0.2159	0.2457	0.2755
LB4110R - B1	Alpha	11/24/2006	5/7/2013	0.2172	P	0.1877	0.2261	0.2645
LB4110R - B2	Alpha	11/24/2006	5/7/2013	0.2098	P	0.1801	0.2176	0.2550
LB4110R - B3	Alpha	11/24/2006	5/7/2013	0.2438	P	0.2067	0.2440	0.2813
LB4110R - B4	Alpha	11/24/2006	5/7/2013	0.2160	P	0.1938	0.2320	0.2702
LB4110R - C1	Alpha	11/24/2006	5/7/2013	0.2118	P	0.1861	0.2153	0.2445
LB4110R - C2	Alpha	11/24/2006	5/7/2013	0.2219	P	0.1963	0.2248	0.2534
LB4110R - C3	Alpha	11/24/2006	5/7/2013	0.2320	P	0.2064	0.2398	0.2732
LB4110R - C4	Alpha	11/24/2006	5/7/2013	0.2069	P	0.1859	0.2230	0.2600
LB4110R - D1	Alpha	11/24/2006	5/7/2013	0.0000	F	0.0395	0.2076	0.3757
LB4110R - D2	Alpha	11/24/2006	5/7/2013	0.0000	F	0.0456	0.2361	0.4265
LB4110R - D3	Alpha	11/24/2006	5/7/2013	0.0000	F	0.0449	0.2319	0.4189
LB4110R - D4	Alpha	11/24/2006	5/7/2013	0.0000	F	0.0345	0.1869	0.3394
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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US EPA ARCHIVE DOCUMENT

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	5/7/2013	0.5551	P	0.2032	0.5628	0.9224
LB4110A - A2	Beta	11/18/2007	5/7/2013	0.4901	P	0.1539	0.4633	0.7726
LB4110A - A3	Beta	11/18/2007	5/7/2013	0.4725	P	0.0812	0.4570	0.8328
LB4110A - A4	Beta	11/18/2007	5/7/2013	0.5235	P	0.1336	0.4877	0.8418
LB4110A - B1	Beta	11/18/2007	5/7/2013	0.5162	P	0.4637	0.5306	0.5975
LB4110A - B2	Beta	11/18/2007	5/7/2013	0.5228	P	0.4639	0.5277	0.5915
LB4110A - B3	Beta	11/18/2007	5/7/2013	0.5444	P	0.3189	0.5321	0.7453
LB4110A - B4	Beta	11/18/2007	5/7/2013	0.5433	P	0.4922	0.5546	0.6171
LB4110A - C1	Beta	11/18/2007	5/7/2013	0.4817	P	0.4501	0.5027	0.5553
LB4110A - C2	Beta	11/18/2007	5/7/2013	0.4723	P	0.4279	0.5011	0.5744
LB4110A - C3	Beta	11/18/2007	5/7/2013	0.5857	P	0.5276	0.5901	0.6526
LB4110A - C4	Beta	11/18/2007	5/7/2013	0.4946	P	0.4567	0.5251	0.5934
LB4110A - D1	Beta	11/18/2007	5/7/2013	0.5323	P	0.4798	0.5543	0.6288
LB4110A - D2	Beta	11/18/2007	5/7/2013	0.5483	P	0.4905	0.5889	0.6872
LB4110A - D3	Beta	11/18/2007	5/7/2013	0.6121	P	0.5368	0.6156	0.6944
LB4110A - D4	Beta	11/18/2007	5/7/2013	0.4369	P	0.3865	0.4735	0.5606
LB4110R - A1	Beta	11/24/2006	5/7/2013	0.5659	P	0.4813	0.5680	0.6546
LB4110R - A2	Beta	11/24/2006	5/7/2013	0.5165	P	0.4208	0.5089	0.5970
LB4110R - A3	Beta	11/24/2006	5/7/2013	0.5287	P	0.4580	0.5398	0.6216
LB4110R - A4	Beta	11/24/2006	5/7/2013	0.5989	P	0.5099	0.5917	0.6735
LB4110R - B1	Beta	11/24/2006	5/7/2013	0.5272	P	0.4534	0.5428	0.6322
LB4110R - B2	Beta	11/24/2006	5/7/2013	0.5114	P	0.4312	0.5203	0.6094
LB4110R - B3	Beta	11/24/2006	5/7/2013	0.5990	P	0.5015	0.5913	0.6811
LB4110R - B4	Beta	11/24/2006	5/7/2013	0.5259	P	0.4624	0.5501	0.6378
LB4110R - C1	Beta	11/24/2006	5/7/2013	0.4654	P	0.4243	0.5034	0.5825
LB4110R - C2	Beta	11/24/2006	5/7/2013	0.5150	P	0.4503	0.5293	0.6083
LB4110R - C3	Beta	11/24/2006	5/7/2013	0.5585	P	0.4813	0.5713	0.6614
LB4110R - C4	Beta	11/24/2006	5/7/2013	0.4857	P	0.4325	0.5266	0.6207
LB4110R - D1	Beta	11/24/2006	5/7/2013	0.0000	F	0.0934	0.4964	0.8995
LB4110R - D2	Beta	11/24/2006	5/7/2013	0.0000	F	0.1057	0.5578	1.0100
LB4110R - D3	Beta	11/24/2006	5/7/2013	0.0000	F	0.1026	0.5418	0.9810
LB4110R - D4	Beta	11/24/2006	5/7/2013	0.0000	F	0.0809	0.4460	0.8110
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

CY#117

US EPA ARCHIVE DOCUMENT

SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

C
4/25/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410401_GE1_BAFIL_191027.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : SPIKE
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 07:15:44
 Sample ID : 1304104-01 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	2	30.91	2087	77	1.44	31.14	27	13	2.32E+00	2.2	2.46E+01
2	2	34.97	512	64	1.68	35.20	27	13	5.69E-01	5.3	
3	0	53.36	61	113	3.36	53.59	49	9	6.76E-02	34.2	
4	2	61.84	262	66	1.73	62.07	58	13	2.92E-01	7.8	2.96E+00
5	2	65.83	108	84	1.74	66.06	58	13	1.20E-01	17.3	
6	10	81.28	828	71	1.66	81.51	78	10	9.20E-01	3.7	4.16E+01
7	10	84.66	17	76	2.54	84.89	78	10	1.92E-02	141.5	
8	0	92.72	40	114	1.71	92.95	89	8	4.47E-02	48.6	
9	5	112.03	233	42	1.82	112.26	106	18	2.59E-01	7.7	1.53E+00
10	5	116.37	63	53	2.42	116.60	106	18	6.99E-02	28.2	
11	0	161.78	40	77	2.73	162.00	158	8	4.40E-02	42.0	
12	0	186.70	22	77	1.11	186.93	184	7	2.39E-02	71.0	
13	0	224.61	24	50	1.45	224.83	221	9	2.61E-02	57.8	
14	0	240.44	25	46	1.87	240.66	236	8	2.80E-02	51.9	
15	0	276.71	66	34	1.44	276.92	272	8	7.30E-02	19.7	
16	0	303.07	143	32	1.76	303.28	298	9	1.59E-01	11.2	
17	0	307.74	23	24	1.34	307.96	307	5	2.60E-02	38.5	
18	1	333.93	83	9	1.84	334.14	330	14	9.27E-02	12.4	2.29E+00
19	1	338.62	34	9	1.84	338.83	330	14	3.81E-02	22.9	
20	3	351.79	12	2	1.69	352.00	351	11	1.29E-02	6.1	2.26E+00
21	3	356.32	521	7	1.50	356.53	351	11	5.78E-01	4.4	
22	1	383.78	112	22	1.87	383.99	381	15	1.24E-01	11.7	2.40E+01
23	1	386.96	215	16	1.88	387.17	381	15	2.39E-01	8.8	
24	1	390.96	42	10	1.88	391.17	381	15	4.65E-02	31.2	
25	3	414.92	42	9	2.29	415.13	411	19	4.66E-02	22.0	1.62E+00
26	3	418.36	25	8	2.30	418.57	411	19	2.81E-02	38.2	
27	3	423.09	11	7	2.30	423.29	411	19	1.17E-02	65.1	
28	0	437.48	114	14	1.94	437.68	432	11	1.27E-01	11.3	
29	0	446.73	15	7	2.16	446.93	443	8	1.63E-02	42.0	
30	0	468.74	39	14	1.91	468.94	464	11	4.30E-02	24.6	
31	0	496.47	6	8	2.75	496.67	493	8	6.67E-03	91.3	
32	0	511.92	17	7	2.92	512.12	508	7	1.89E-02	35.4	
33	0	799.49	6	0	1.00	799.67	797	6	6.67E-03	40.8	

Summary of Nuclide Activity

Sample ID : 1304104-01

Acquisition date : 29-APR-2013 07:15:44

Total number of lines in spectrum 33
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 5 15.15%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.839E+02	3.839E+02	0.708E+02		18.44	
NP-237	2.14E+06Y	1.00	2.692E+01	2.692E+01	7.629E+01		283.37	
Total Activity :			4.108E+02	4.108E+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	3.536E+02	3.536E+02	0.582E+02		16.47	
Total Activity :			3.536E+02	3.536E+02				

Grand Total Activity : 7.644E+02 7.644E+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	3.839E+02	3.839E+02	18.44	OK
	302.84	17.80	4.915E+00	4.900E+02	4.901E+02	36.84	OK
	356.01	60.00	6.963E+00	3.742E+02	3.742E+02	17.52	OK

Final Mean for 3 Valid Peaks = 3.839E+02 +/- 7.081E+01 (18.44%)

NP-237	86.50	12.60*	1.532E+01	2.692E+01	2.692E+01	283.37	OK
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Final Mean for 1 Valid Peaks = 2.692E+01 +/- 7.629E+01 (283.37%)

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	3.536E+02	3.536E+02	16.47	OK

Final Mean for 1 Valid Peaks = 3.536E+02 +/- 5.823E+01 (16.47%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.839E+02	7.081E+01	2.225E+01	3.653E+00	17.254
TH-234	3.536E+02	5.823E+01	5.828E+01	1.867E+00	6.067
NP-237	2.692E+01	7.629E+01	7.031E+01	8.560E+00	0.383

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.370E+00		1.279E+01	2.014E+01	6.289E+00	-0.068
CD-109	-1.462E+02		1.756E+02	2.132E+02	2.758E+01	-0.686
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.905E+00		1.834E+00	3.799E+00	7.138E-02	2.608
AM-241	9.044E+00		3.461E+00	6.469E+00	1.518E-01	1.398

412917

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410402_GE1_BAFIL_191028.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : BLANK
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 07:32:17
 Sample ID : 1304104-02 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 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	2	28.05	44	55	1.66	28.29	27	14	4.89E-02	26.7	5.24E+01
2	2	30.89	1979	61	1.35	31.12	27	14	2.20E+00	2.3	
3	2	34.96	497	55	1.68	35.19	27	14	5.52E-01	5.1	
4	2	38.77	19	40	1.39	39.00	27	14	2.13E-02	57.3	
5	0	53.24	44	102	2.66	53.47	50	8	4.94E-02	41.8	
6	1	61.91	253	80	1.58	62.14	57	13	2.82E-01	8.5	7.80E+00
7	1	65.63	114	71	1.58	65.86	57	13	1.27E-01	16.6	
8	0	81.30	827	112	1.92	81.53	76	11	9.19E-01	4.3	
9	0	93.12	68	65	1.38	93.35	90	7	7.51E-02	23.5	
10	3	111.96	243	51	1.66	112.19	106	20	2.70E-01	7.8	7.94E-01
11	3	116.28	40	62	2.00	116.51	106	20	4.42E-02	35.9	
12	0	161.89	19	72	1.58	162.12	158	7	2.10E-02	77.9	
13	0	179.54	38	54	4.91	179.76	176	8	4.25E-02	37.0	
14	0	185.53	30	74	1.71	185.75	184	7	3.34E-02	50.0	
15	0	276.84	47	32	1.23	277.05	274	7	5.19E-02	24.8	
16	3	303.21	166	13	1.68	303.42	300	19	1.85E-01	8.3	2.09E+00
17	3	307.40	30	18	2.21	307.62	300	19	3.31E-02	42.0	
18	0	324.15	8	18	2.77	324.37	319	8	9.10E-03	96.1	
19	0	334.30	69	26	1.46	334.51	331	6	7.72E-02	16.6	
20	0	338.91	23	21	1.29	339.12	338	5	2.56E-02	38.7	
21	0	356.25	547	15	1.94	356.46	351	10	6.08E-01	4.5	
22	0	366.00	11	24	1.92	366.21	362	7	1.27E-02	75.8	
23	3	383.97	171	22	2.24	384.18	381	17	1.90E-01	10.6	1.54E+01
24	3	387.18	230	16	1.83	387.38	381	17	2.55E-01	7.6	
25	3	391.60	40	21	1.87	391.81	381	17	4.42E-02	26.6	
26	1	414.97	35	16	1.89	415.17	411	14	3.88E-02	25.0	6.67E+00
27	1	417.62	14	14	1.90	417.83	411	14	1.54E-02	68.4	
28	1	421.62	16	13	1.90	421.83	411	14	1.79E-02	47.4	
29	0	437.25	117	9	1.94	437.46	431	11	1.30E-01	10.4	
30	0	468.67	32	4	3.13	468.87	462	16	3.51E-02	22.9	
31	0	485.81	3	11	1.07	486.01	482	8	3.85E-03	168.3	
32	0	511.23	18	8	2.97	511.43	508	9	2.03E-02	35.1	
33	0	710.72	7	2	3.12	710.91	708	6	8.21E-03	45.4	

Total number of lines in spectrum 33
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 5 15.15%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.835E+02	3.836E+02	0.726E+02	18.93		
Total Activity :			3.835E+02	3.836E+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	3.415E+02	3.415E+02	0.608E+02	17.81		
Total Activity :			3.415E+02	3.415E+02				

Grand Total Activity : 7.250E+02 7.251E+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	3.835E+02	3.836E+02	18.93	OK
	302.84	17.80	4.915E+00	5.711E+02	5.711E+02	33.58	OK
	356.01	60.00	6.963E+00	3.932E+02	3.932E+02	17.60	OK

Final Mean for 3 Valid Peaks = 3.836E+02+/- 7.262E+01 (18.93%)

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	3.415E+02	3.415E+02	17.81	OK

Final Mean for 1 Valid Peaks = 3.415E+02+/- 6.084E+01 (17.81%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.836E+02	7.262E+01	1.843E+01	3.025E+00	20.811
TH-234	3.415E+02	6.084E+01	5.980E+01	1.916E+00	5.711

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.678E+00	1.255E+01	2.209E+01	6.897E+00	0.121
CD-109	3.247E+01	1.424E+02	2.073E+02	2.682E+01	0.157
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.789E+00	1.798E+00	3.744E+00	7.035E-02	2.615
NP-237	2.430E+01	3.813E+01	5.899E+01	7.182E+00	0.412
AM-241	9.567E+00	3.560E+00	6.644E+00	1.559E-01	1.440

4/29/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410403_GE1_BAFIL_191030.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : FB AT PZ-201A-SS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 07:49:36
 Sample ID : 1304104-03 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	30.77	1869	53	1.52	31.00	27	13	2.08E+00	2.4	4.88E+01
2	1	34.91	391	42	1.53	35.14	27	13	4.34E-01	5.9	
3	0	51.59	48	69	3.83	51.82	49	7	5.28E-02	32.4	
4	2	61.93	211	81	1.73	62.16	57	14	2.34E-01	9.4	2.03E+00
5	2	65.81	86	83	1.74	66.05	57	14	9.55E-02	21.2	
6	0	81.30	734	115	1.91	81.53	76	11	8.16E-01	4.7	
7	0	92.75	62	82	1.38	92.98	90	7	6.83E-02	27.6	
8	3	112.12	179	57	1.90	112.35	108	16	1.99E-01	9.8	2.03E+00
9	3	116.28	51	41	2.00	116.50	108	16	5.69E-02	27.0	
10	3	120.27	19	36	2.00	120.50	108	16	2.11E-02	68.4	
11	0	135.33	25	83	2.54	135.56	131	11	2.74E-02	74.2	
12	0	185.63	29	65	1.37	185.86	183	7	3.22E-02	49.7	
13	0	276.81	53	14	1.47	277.03	273	8	5.93E-02	18.3	
14	0	302.75	105	64	1.61	302.97	300	8	1.17E-01	16.2	
15	4	333.95	46	20	1.86	334.16	330	12	5.08E-02	21.2	2.31E+00
16	4	338.17	33	9	2.46	338.38	330	12	3.71E-02	28.1	
17	0	356.32	525	15	1.96	356.53	351	10	5.83E-01	4.6	
18	0	365.03	14	14	1.16	365.24	362	6	1.59E-02	48.4	
19	3	383.77	82	12	1.82	383.97	381	17	9.14E-02	13.4	1.08E+01
20	3	386.98	240	12	1.95	387.18	381	17	2.67E-01	7.7	
21	3	391.36	44	10	2.07	391.57	381	17	4.94E-02	27.4	
22	3	415.05	45	11	2.29	415.26	411	15	4.99E-02	22.4	4.51E+00
23	3	418.31	29	14	1.99	418.52	411	15	3.27E-02	30.0	
24	3	422.37	11	20	2.30	422.57	411	15	1.22E-02	72.7	
25	7	432.07	8	2	3.38	432.27	431	14	9.44E-03	35.8	3.69E+00
26	7	437.55	67	6	1.66	437.75	431	14	7.46E-02	14.8	
27	0	447.28	11	2	4.68	447.48	444	7	1.26E-02	35.2	
28	4	468.28	29	2	2.57	468.48	464	15	3.17E-02	21.6	7.81E-01
29	4	473.59	11	1	2.57	473.79	464	15	1.23E-02	44.1	
30	0	511.86	26	2	2.07	512.06	507	10	2.84E-02	22.9	

Summary of Nuclide Activity

Sample ID : 1304104-03

Acquisition date : 29-APR-2013 07:49:36

Total number of lines in spectrum 30
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 6 20.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
CO-57	270.90D	1.00	1.173E+01	1.174E+01		1.649E+01	140.40	
BA-133	10.50Y	1.00	3.405E+02	3.405E+02		0.657E+02	19.29	
Total Activity :			3.522E+02	3.523E+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	2.842E+02	2.842E+02		0.556E+02	19.57	
Total Activity :			2.842E+02	2.842E+02				

Grand Total Activity : 6.364E+02 6.365E+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
CO-57	122.06	85.51*	5.696E+00	1.173E+01	1.174E+01	140.40	OK
	136.48	10.60	4.614E+00	1.513E+02	1.515E+02	153.27	OK

Final Mean for 2 Valid Peaks = 1.174E+01 +/- 1.649E+01 (140.40%)

BA-133	81.00	33.00*	1.963E+01	3.405E+02	3.405E+02	19.29	OK
	302.84	17.80	4.915E+00	3.611E+02	3.611E+02	43.58	OK
	356.01	60.00	6.963E+00	3.774E+02	3.774E+02	17.70	OK

Final Mean for 3 Valid Peaks = 3.405E+02 +/- 6.568E+01 (19.29%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.842E+02	2.842E+02	19.57	OK

Final Mean for 1 Valid Peaks = 2.842E+02 +/- 5.561E+01 (19.57%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.174E+01	1.649E+01	2.063E+01	6.442E+00	0.569
BA-133	3.405E+02	6.568E+01	1.638E+01	2.689E+00	20.785
TH-234	2.842E+02	5.561E+01	5.617E+01	1.800E+00	5.059

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	6.510E+01	1.290E+02	1.979E+02	2.560E+01	0.329
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.556E+00	1.763E+00	3.685E+00	6.925E-02	2.593
NP-237	1.960E+01	3.859E+01	5.860E+01	7.134E+00	0.334
AM-241	9.055E+00	3.373E+00	6.362E+00	1.492E-01	1.423

Handwritten: 7/29/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410404_GE1_BAFIL_191033.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-103-SS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 08:11:39
 Sample ID : 1304104-04 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.23 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.86	1445	67	1.46	31.09	27	13	1.61E+00	2.7	1.77E+01
2	2	35.04	364	52	1.68	35.27	27	13	4.04E-01	6.4	
3	0	52.49	76	72	2.29	52.72	49	7	8.46E-02	21.7	
4	1	61.91	195	52	1.58	62.14	58	15	2.16E-01	9.2	7.29E+00
5	1	65.63	90	42	1.58	65.86	58	15	9.95E-02	18.4	
6	1	69.63	17	35	1.59	69.86	58	15	1.89E-02	72.7	
7	0	81.35	619	119	1.91	81.58	76	12	6.88E-01	5.4	
8	1	89.92	16	29	1.62	90.15	89	8	1.78E-02	46.3	1.30E+01
9	1	92.92	48	49	1.62	93.15	89	8	5.35E-02	25.1	
10	2	112.07	146	28	1.81	112.29	107	14	1.63E-01	10.1	2.45E+00
11	2	116.09	43	26	1.81	116.31	107	14	4.82E-02	25.6	
12	1	183.93	15	38	1.72	184.16	180	20	1.67E-02	70.8	2.09E+00
13	1	191.93	17	33	1.73	192.16	180	20	1.90E-02	56.3	
14	0	238.82	28	44	2.67	239.04	235	9	3.06E-02	47.0	
15	0	276.64	49	26	2.04	276.86	272	9	5.45E-02	23.8	
16	1	302.95	112	20	1.61	303.17	298	17	1.24E-01	11.1	1.39E+00
17	1	307.80	25	18	1.82	308.01	298	17	2.78E-02	33.0	
18	0	325.25	12	23	2.78	325.46	320	11	1.33E-02	81.3	
19	3	333.86	63	12	1.86	334.08	330	16	6.97E-02	16.0	1.32E+00
20	3	338.34	18	18	2.23	338.55	330	16	1.99E-02	52.9	
21	0	356.40	398	50	1.92	356.61	352	11	4.42E-01	6.1	
22	0	377.79	8	14	2.56	378.00	373	7	8.89E-03	85.2	
23	3	384.25	97	14	2.27	384.46	381	17	1.08E-01	14.8	1.56E+01
24	3	387.33	160	10	2.27	387.54	381	17	1.78E-01	10.3	
25	3	391.71	47	4	1.86	391.92	381	17	5.23E-02	18.2	
26	2	414.81	33	9	2.08	415.02	411	11	3.68E-02	22.7	2.49E+00
27	2	418.16	21	9	2.09	418.36	411	11	2.34E-02	39.9	
28	0	437.57	89	8	2.02	437.78	434	9	9.87E-02	12.2	
29	1	467.70	24	6	1.93	467.90	465	10	2.70E-02	26.3	5.49E+00
30	1	470.62	13	2	1.93	470.82	465	10	1.40E-02	53.0	
31	0	511.11	25	11	4.03	511.31	506	11	2.74E-02	33.0	
32	0	558.84	7	1	2.81	559.04	557	5	7.85E-03	43.8	
33	0	597.22	8	5	0.85	597.41	593	7	8.50E-03	61.5	
34	0	610.54	6	7	1.33	610.73	607	7	6.45E-03	91.6	

Summary of Nuclide Activity

Sample ID : 1304104-04

Acquisition date : 29-APR-2013 08:11:39

Total number of lines in spectrum 34
 Number of unidentified lines 29
 Number of lines tentatively identified by NID 5 14.71%

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				
CD-109	464.00D	1.00	8.982E+01	8.986E+01	8.407E+01	93.55		
BA-133	10.50Y	1.00	2.870E+02	2.870E+02	0.574E+02	20.00		
Total Activity :			3.768E+02	3.769E+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	2.625E+02	2.625E+02	0.501E+02	19.10		
Total Activity :			2.625E+02	2.625E+02				

Grand Total Activity : 6.394E+02 6.394E+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
CD-109	88.03	3.72*	1.439E+01	8.982E+01	8.986E+01	93.55	OK

Final Mean for 1 Valid Peaks = 8.986E+01 +/- 8.407E+01 (93.55%)

BA-133	81.00	33.00*	1.963E+01	2.870E+02	2.870E+02	20.00	OK
	302.84	17.80	4.915E+00	3.830E+02	3.830E+02	36.65	OK
	356.01	60.00	6.963E+00	2.862E+02	2.862E+02	19.47	OK

Final Mean for 3 Valid Peaks = 2.870E+02 +/- 5.742E+01 (20.00%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.625E+02	2.625E+02	19.10	OK

Final Mean for 1 Valid Peaks = 2.625E+02 +/- 5.015E+01 (19.10%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	8.986E+01	8.407E+01	1.968E+02	2.545E+01	0.457
BA-133	2.870E+02	5.742E+01	1.666E+01	2.735E+00	17.228
TH-234	2.625E+02	5.015E+01	4.576E+01	1.466E+00	5.737

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.327E+00	1.166E+01	1.948E+01	6.082E+00	0.171
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.222E+00	1.683E+00	3.499E+00	6.576E-02	2.350
NP-237	6.750E+00	3.924E+01	5.671E+01	6.904E+00	0.119
AM-241	8.138E+00	2.759E+00	5.667E+00	1.329E-01	1.436

Urgent

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410405_GE1_BAFIL_191034.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-103-SS DIS
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 08:27:09
 Sample ID : 1304104-05 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 00:15:00.28 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.84	2014	62	1.39	31.08	27	12	2.24E+00	2.3	1.79E+01
2	2	35.05	519	52	1.54	35.28	27	12	5.77E-01	4.9	
3	0	53.07	78	117	2.03	53.30	49	9	8.63E-02	27.6	
4	1	61.77	238	81	1.58	62.00	58	11	2.64E-01	9.0	5.44E+00
5	1	65.66	108	95	1.58	65.89	58	11	1.20E-01	16.8	
6	0	81.26	802	126	1.93	81.49	76	11	8.91E-01	4.5	
7	0	93.18	46	104	1.21	93.40	89	8	5.10E-02	41.5	
8	1	111.92	218	54	1.64	112.15	108	13	2.43E-01	8.6	3.11E+00
9	1	115.92	33	60	1.65	116.15	108	13	3.67E-02	40.1	
10	0	186.62	10	71	1.93	186.84	184	6	1.07E-02	142.3	
11	0	276.69	58	31	1.53	276.90	274	8	6.50E-02	20.9	
12	3	303.04	169	12	1.72	303.25	299	16	1.88E-01	8.2	1.29E+00
13	3	307.55	29	20	2.21	307.76	299	16	3.18E-02	42.5	
14	1	330.96	11	4	1.84	331.17	330	19	1.18E-02	30.6	4.43E+00
15	1	333.96	124	10	1.84	334.17	330	19	1.38E-01	9.6	
16	0	356.31	568	28	1.91	356.52	352	10	6.31E-01	4.6	
17	2	384.00	138	8	2.06	384.21	381	14	1.53E-01	9.5	1.13E+01
18	2	387.13	238	11	1.76	387.34	381	14	2.64E-01	7.2	
19	2	391.15	34	17	1.88	391.36	381	14	3.76E-02	25.9	
20	0	416.02	86	19	4.70	416.22	411	10	9.56E-02	14.5	
21	0	437.47	127	8	1.84	437.67	432	11	1.41E-01	9.9	
22	0	468.31	32	11	1.87	468.51	465	8	3.55E-02	24.8	
23	0	500.84	6	4	2.01	501.04	497	6	6.17E-03	73.7	
24	0	511.63	18	6	3.47	511.83	508	8	2.03E-02	32.8	
25	0	599.52	13	2	1.05	599.71	595	10	1.43E-02	35.8	
26	0	1037.00	6	0	2.74	1037.17	1034	6	6.67E-03	40.8	

Total number of lines in spectrum 26
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 4 15.38%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.718E+02	3.718E+02	0.710E+02	19.10	
Total Activity :			3.718E+02	3.718E+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	3.207E+02	3.207E+02	0.601E+02	18.75	
Total Activity :			3.207E+02	3.207E+02			

Grand Total Activity : 6.925E+02 6.925E+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	3.718E+02	3.718E+02	19.10	OK
	302.84	17.80	4.915E+00	5.818E+02	5.819E+02	33.55	OK
	356.01	60.00	6.963E+00	4.084E+02	4.085E+02	17.69	OK

Final Mean for 3 Valid Peaks = 3.718E+02+/- 7.102E+01 (19.10%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.207E+02	3.207E+02	18.75	OK

Final Mean for 1 Valid Peaks = 3.207E+02+/- 6.013E+01 (18.75%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.718E+02	7.102E+01	1.901E+01	3.121E+00	19.557
TH-234	3.207E+02	6.013E+01	6.177E+01	1.979E+00	5.191

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	7.346E+00	1.293E+01	2.187E+01	6.828E+00	0.336
CD-109	-2.406E+01	1.560E+02	2.128E+02	2.753E+01	-0.113
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.604E+00	1.721E+00	3.632E+00	6.825E-02	2.645
NP-237	4.517E+00	4.398E+01	6.227E+01	7.581E+00	0.073
AM-241	9.638E+00	3.648E+00	6.761E+00	1.586E-01	1.425

Handwritten: 4/29/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410406_GE1_BAFIL_191035.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-114-AS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 08:42:56
 Sample ID : 1304104-06 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 00:15:00.23 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	28.22	66	38	1.83	28.45	27	13	7.30E-02	17.1	2.05E+01
2	3	30.90	1433	51	1.40	31.14	27	13	1.59E+00	2.7	
3	3	35.15	365	78	1.85	35.38	27	13	4.06E-01	6.5	
4	0	52.75	81	79	2.27	52.98	49	9	8.95E-02	22.8	
5	1	61.74	170	65	1.58	61.97	58	13	1.89E-01	10.7	4.11E+00
6	1	65.63	52	80	1.58	65.86	58	13	5.78E-02	31.1	
7	0	81.16	598	97	1.98	81.39	77	10	6.64E-01	5.1	
8	0	92.98	43	66	1.30	93.21	90	7	4.80E-02	34.5	
9	0	111.67	122	135	1.81	111.90	108	8	1.36E-01	18.7	
10	0	162.28	28	57	1.04	162.50	160	7	3.13E-02	48.1	
11	0	276.70	51	28	1.36	276.92	273	8	5.69E-02	23.0	
12	0	295.24	17	42	7.19	295.46	287	13	1.85E-02	84.2	
13	2	302.93	89	22	1.66	303.15	300	11	9.91E-02	13.4	4.04E+00
14	2	307.71	22	29	2.01	307.92	300	11	2.50E-02	41.4	
15	2	333.91	75	13	2.03	334.13	331	15	8.35E-02	13.4	2.05E+00
16	2	338.14	26	6	2.03	338.35	331	15	2.92E-02	32.3	
17	0	356.31	416	31	1.91	356.52	351	12	4.62E-01	5.6	
18	6	383.79	62	9	1.92	384.00	380	21	6.91E-02	18.1	8.46E+00
19	6	387.13	178	10	1.93	387.34	380	21	1.97E-01	9.3	
20	6	391.35	43	14	2.29	391.56	380	21	4.82E-02	27.7	
21	2	415.16	20	17	2.08	415.36	412	14	2.21E-02	40.7	2.41E+00
22	2	418.43	22	16	2.09	418.64	412	14	2.46E-02	38.7	
23	0	437.40	93	4	1.86	437.61	434	8	1.03E-01	11.0	
24	0	468.22	23	6	1.83	468.42	464	7	2.59E-02	26.5	
25	0	539.99	12	4	5.51	540.19	535	10	1.30E-02	45.7	

Summary of Nuclide Activity

Sample ID : 1304104-06

Acquisition date : 29-APR-2013 08:42:56

Total number of lines in spectrum 25
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 4 16.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr	2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	2.772E+02	2.772E+02	0.547E+02	19.74		
Total Activity :			2.772E+02	2.772E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	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	2.292E+02	2.292E+02	0.507E+02	22.10		
Total Activity :			2.292E+02	2.292E+02				

Grand Total Activity : 5.065E+02 5.065E+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	2.772E+02	2.772E+02	19.74	OK
	302.84	17.80	4.915E+00	3.062E+02	3.062E+02	39.68	OK
	356.01	60.00	6.963E+00	2.990E+02	2.991E+02	18.81	OK

Final Mean for 3 Valid Peaks = 2.772E+02 +/- 5.474E+01 (19.74%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.292E+02	2.292E+02	22.10	OK

Final Mean for 1 Valid Peaks = 2.292E+02 +/- 5.067E+01 (22.10%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.772E+02	5.474E+01	1.828E+01	3.001E+00	15.165
TH-234	2.292E+02	5.067E+01	5.724E+01	1.834E+00	4.005

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.454E+00	1.134E+01	1.705E+01	5.324E+00	-0.554
CD-109	-3.602E+01	1.433E+02	1.930E+02	2.496E+01	-0.187
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.158E+00	1.679E+00	3.490E+00	6.558E-02	2.338
NP-237	1.666E+01	4.091E+01	6.082E+01	7.404E+00	0.274
AM-241	5.327E+00	3.164E+00	5.687E+00	1.334E-01	0.937

4/29/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410407_GE1_BAFIL_191037.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-114-AS DIS
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 09:01:14
 Sample ID : 1304104-07 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	1942	59	1.51	31.02	27	13	2.16E+00	2.3	3.87E+01
2	3	35.10	495	42	1.68	35.34	27	13	5.50E-01	5.0	
3	0	53.07	58	115	2.19	53.30	49	9	6.42E-02	36.0	
4	1	61.80	184	68	1.53	62.03	58	15	2.05E-01	9.9	1.74E+00
5	1	65.91	89	68	1.58	66.14	58	15	9.93E-02	17.3	
6	0	81.32	735	152	1.89	81.55	77	10	8.17E-01	4.9	
7	0	92.35	37	95	1.05	92.58	89	8	4.10E-02	48.5	
8	2	111.99	201	37	1.81	112.22	107	16	2.23E-01	8.8	2.37E+00
9	2	116.09	59	34	1.81	116.31	107	16	6.55E-02	21.1	
10	0	161.64	17	71	1.22	161.86	158	7	1.84E-02	88.4	
11	3	251.13	13	6	2.15	251.35	249	15	1.41E-02	36.1	3.78E+00
12	3	254.32	23	7	2.16	254.54	249	15	2.51E-02	33.1	
13	3	257.19	16	5	2.16	257.41	249	15	1.73E-02	50.1	
14	0	277.04	52	30	1.34	277.26	274	7	5.78E-02	22.3	
15	0	303.16	126	50	1.46	303.37	299	8	1.40E-01	13.2	
16	0	334.21	65	23	1.82	334.43	330	7	7.28E-02	17.3	
17	0	338.21	29	12	1.78	338.42	337	5	3.21E-02	26.4	
18	0	356.34	480	26	1.88	356.55	352	11	5.34E-01	5.0	
19	0	366.71	26	13	1.53	366.92	362	10	2.87E-02	33.9	
20	0	376.15	30	9	5.11	376.36	372	9	3.32E-02	25.8	
21	4	383.94	92	8	2.04	384.14	381	17	1.02E-01	12.7	9.32E+00
22	4	387.12	229	4	1.94	387.33	381	17	2.55E-01	7.7	
23	4	391.56	46	1	2.09	391.77	381	17	5.07E-02	17.1	
24	5	414.85	40	11	2.77	415.05	409	20	4.40E-02	23.7	1.51E+00
25	5	417.71	24	6	2.78	417.91	409	20	2.68E-02	40.4	
26	5	421.85	12	2	2.78	422.05	409	20	1.36E-02	62.8	
27	0	437.46	82	19	1.93	437.67	432	12	9.16E-02	15.1	
28	3	464.26	6	4	2.33	464.46	462	12	6.44E-03	60.1	2.21E+00
29	3	468.38	21	3	2.18	468.58	462	12	2.34E-02	28.2	
30	0	511.78	46	0	3.04	511.98	509	10	5.11E-02	14.7	
31	0	1460.70	6	0	2.74	1460.83	1457	7	6.67E-03	40.8	

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 %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.408E+02	3.408E+02	0.665E+02	19.50		
Total Activity :			3.408E+02	3.408E+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	2.482E+02	2.482E+02	0.507E+02	20.42		
Total Activity :			2.482E+02	2.482E+02				

Grand Total Activity : 5.891E+02 5.891E+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	3.408E+02	3.408E+02	19.50	OK
	302.84	17.80	4.915E+00	4.326E+02	4.326E+02	39.37	OK
	356.01	60.00	6.963E+00	3.454E+02	3.454E+02	18.18	OK

Final Mean for 3 Valid Peaks = 3.408E+02+/- 6.647E+01 (19.50%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.482E+02	2.482E+02	20.42	OK

Final Mean for 1 Valid Peaks = 2.482E+02+/- 5.068E+01 (20.42%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.408E+02	6.647E+01	1.944E+01	3.191E+00	17.535
TH-234	2.482E+02	5.068E+01	5.111E+01	1.638E+00	4.857

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.939E+00	1.213E+01	1.847E+01	5.767E+00	-0.213
CD-109	-8.785E+00	1.358E+02	1.896E+02	2.452E+01	-0.046
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.036E+00	1.673E+00	3.536E+00	6.645E-02	2.556
NP-237	6.941E+00	3.838E+01	5.567E+01	6.777E+00	0.125
AM-241	7.944E+00	3.084E+00	5.887E+00	1.381E-01	1.349

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	3.492E+02	3.492E+02	0.664E+02	19.01		
Total Activity :			3.492E+02	3.492E+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	2.854E+02	2.854E+02	0.526E+02	18.43		
Total Activity :			2.854E+02	2.854E+02				

Grand Total Activity : 6.346E+02 6.346E+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	3.492E+02	3.492E+02	19.01	OK
	302.84	17.80	4.915E+00	4.884E+02	4.885E+02	34.58	OK
	356.01	60.00	6.963E+00	3.524E+02	3.524E+02	18.34	OK

Final Mean for 3 Valid Peaks = 3.492E+02+/- 6.639E+01 (19.01%)

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	2.854E+02	2.854E+02	18.43	OK

Final Mean for 1 Valid Peaks = 2.854E+02+/- 5.260E+01 (18.43%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.492E+02	6.639E+01	1.720E+01	2.824E+00	20.300
TH-234	2.854E+02	5.260E+01	5.398E+01	1.730E+00	5.287

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.025E+00	1.378E+01	2.260E+01	7.057E+00	0.178
CD-109	4.494E+01	1.403E+02	2.074E+02	2.682E+01	0.217
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.086E+01	1.956E+00	4.012E+00	7.539E-02	2.706
NP-237	9.339E+00	4.114E+01	5.965E+01	7.262E+00	0.157
AM-241	9.539E+00	3.316E+00	6.340E+00	1.487E-01	1.504

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4/29/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410409_GE1_BAFIL_191041.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : FB AT PZ-201A-SS DIS
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 09:33:37
 Sample ID : 1304104-09 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	2	30.87	1807	60	1.35	31.11	27	13	2.01E+00	2.4	6.33E+00
2	2	35.05	493	44	1.68	35.29	27	13	5.48E-01	5.1	
3	5	52.38	46	48	2.28	52.62	50	20	5.16E-02	27.4	2.68E+00
4	5	56.64	19	68	2.29	56.87	50	20	2.11E-02	84.0	
5	5	61.84	284	61	1.96	62.07	50	20	3.16E-01	7.4	
6	5	65.81	129	76	2.32	66.04	50	20	1.44E-01	15.5	
7	0	81.31	743	125	1.92	81.54	77	11	8.26E-01	4.7	
8	0	93.49	64	94	2.10	93.72	90	9	7.06E-02	30.1	
9	2	111.93	232	42	1.81	112.16	107	20	2.58E-01	7.8	2.01E+00
10	2	116.46	32	34	1.82	116.68	107	20	3.61E-02	36.1	
11	0	185.73	15	73	1.63	185.95	183	7	1.66E-02	98.1	
12	0	276.83	66	34	1.41	277.05	273	8	7.32E-02	19.7	
13	3	303.02	167	22	1.60	303.23	299	12	1.86E-01	8.4	1.23E+01
14	3	307.35	30	26	2.21	307.57	299	12	3.31E-02	41.9	
15	0	334.32	61	50	1.48	334.54	330	8	6.80E-02	23.7	
16	4	352.35	15	0	2.24	352.56	351	12	1.67E-02	27.3	2.65E+00
17	4	356.30	554	6	1.56	356.51	351	12	6.16E-01	4.3	
18	0	366.60	29	20	2.76	366.81	362	11	3.25E-02	35.8	
19	3	383.98	110	27	1.66	384.19	382	9	1.22E-01	12.7	1.32E+01
20	3	387.16	194	50	1.81	387.37	382	9	2.16E-01	9.2	
21	0	391.66	34	20	2.54	391.87	391	5	3.76E-02	29.7	
22	3	414.96	30	8	2.29	415.16	410	16	3.31E-02	28.9	2.59E+00
23	3	418.97	31	5	1.90	419.17	410	16	3.47E-02	26.4	
24	0	437.34	107	9	1.90	437.54	434	8	1.19E-01	10.9	
25	0	468.47	25	13	1.91	468.67	465	10	2.77E-02	33.4	
26	0	510.99	20	2	2.09	511.19	506	9	2.23E-02	26.0	
27	0	569.96	13	0	2.07	570.15	567	8	1.44E-02	27.7	

Summary of Nuclide Activity

Sample ID : 1304104-09

Acquisition date : 29-APR-2013 09:33:37

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	3.447E+02	3.447E+02	0.666E+02	19.33	
Total Activity :			3.447E+02	3.447E+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	3.832E+02	3.832E+02	0.602E+02	15.70	
Total Activity :			3.832E+02	3.832E+02			

Grand Total Activity : 7.278E+02 7.279E+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	3.447E+02	3.447E+02	19.33	OK
	302.84	17.80	4.915E+00	5.742E+02	5.743E+02	33.74	OK
	356.01	60.00	6.963E+00	3.984E+02	3.985E+02	17.41	OK

Final Mean for 3 Valid Peaks = 3.447E+02 +/- 6.662E+01 (19.33%)

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	3.832E+02	3.832E+02	15.70	OK

Final Mean for 1 Valid Peaks = 3.832E+02 +/- 6.016E+01 (15.70%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.447E+02	6.662E+01	1.872E+01	3.074E+00	18.409
TH-234	3.832E+02	6.016E+01	5.051E+01	1.618E+00	7.586

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.309E+00	1.248E+01	2.256E+01	7.044E+00	0.368
CD-109	-3.472E+01	1.434E+02	1.934E+02	2.502E+01	-0.180
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.448E+00	1.771E+00	3.690E+00	6.934E-02	2.561
NP-237	1.918E+01	4.028E+01	6.055E+01	7.372E+00	0.317
AM-241	1.219E+01	3.232E+00	6.659E+00	1.562E-01	1.831

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Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410410_GE1_BAFIL_191043.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-201A-SS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 09:52:00
 Sample ID : 1304104-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.77	1910	67	1.57	31.01	27	13	2.12E+00	2.3	3.50E+01
2	4	35.10	435	47	1.54	35.33	27	13	4.84E-01	5.5	
3	0	52.48	65	70	2.98	52.71	50	6	7.17E-02	23.9	
4	2	61.93	197	68	1.73	62.17	58	18	2.19E-01	9.6	4.04E+00
5	2	66.47	106	65	1.74	66.70	58	18	1.18E-01	15.6	
6	0	81.22	718	129	1.93	81.45	76	11	7.98E-01	4.8	
7	0	93.65	38	69	1.00	93.88	92	6	4.22E-02	38.2	
8	0	111.80	131	149	1.58	112.03	108	8	1.46E-01	18.3	
9	0	160.83	25	71	1.06	161.05	158	7	2.73E-02	60.7	
10	0	262.44	10	24	1.70	262.66	261	7	1.16E-02	89.0	
11	0	276.43	67	22	1.46	276.65	272	10	7.41E-02	18.1	
12	2	303.10	144	12	1.67	303.32	297	18	1.60E-01	9.0	1.12E+00
13	2	307.59	32	11	2.01	307.80	297	18	3.56E-02	26.2	
14	2	311.79	11	9	2.01	312.00	297	18	1.24E-02	62.2	
15	1	333.77	61	21	1.84	333.99	329	18	6.73E-02	17.4	2.16E+00
16	1	337.96	20	21	1.84	338.17	329	18	2.25E-02	45.2	
17	0	356.29	519	17	1.95	356.50	351	11	5.77E-01	4.6	
18	3	380.79	9	2	1.70	381.00	380	16	1.00E-02	13.0	1.50E+01
19	3	384.35	129	12	2.27	384.56	380	16	1.43E-01	12.3	
20	3	387.12	190	7	1.80	387.33	380	16	2.12E-01	8.3	
21	3	391.36	53	8	2.27	391.57	380	16	5.84E-02	24.7	
22	2	414.84	45	17	2.08	415.04	411	12	4.98E-02	20.1	2.73E+00
23	2	418.16	17	19	2.09	418.36	411	12	1.93E-02	56.8	
24	0	437.37	111	6	1.92	437.57	433	8	1.23E-01	10.3	
25	0	468.63	18	11	1.53	468.83	465	7	1.94E-02	38.9	
26	0	510.84	32	7	2.76	511.04	506	13	3.52E-02	24.5	
27	0	1765.55	6	0	1.47	1765.67	1762	6	6.67E-03	40.8	

Summary of Nuclide Activity

Sample ID : 1304104-10

Acquisition date : 29-APR-2013 09:52:00

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	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.329E+02	3.329E+02	0.648E+02	19.46	
Total Activity :			3.329E+02	3.329E+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	2.650E+02	2.650E+02	0.529E+02	19.96	
Total Activity :			2.650E+02	2.650E+02			

Grand Total Activity : 5.979E+02 5.980E+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	3.329E+02	3.329E+02	19.46	OK
	302.84	17.80	4.915E+00	4.938E+02	4.938E+02	34.29	OK
	356.01	60.00	6.963E+00	3.734E+02	3.734E+02	17.77	OK

Final Mean for 3 Valid Peaks = 3.329E+02+/- 6.480E+01 (19.46%)

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	2.650E+02	2.650E+02	19.96	OK

Final Mean for 1 Valid Peaks = 2.650E+02+/- 5.289E+01 (19.96%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.329E+02	6.480E+01	1.752E+01	2.876E+00	19.005
TH-234	2.650E+02	5.289E+01	5.509E+01	1.765E+00	4.811

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.943E+00	1.270E+01	2.279E+01	7.117E+00	0.305
CD-109	-4.691E-01	1.429E+02	2.007E+02	2.596E+01	-0.002
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.502E+00	1.715E+00	3.497E+00	6.572E-02	2.145
NP-237	1.207E+01	3.408E+01	5.695E+01	6.934E+00	0.212
AM-241	8.680E+00	3.302E+00	6.235E+00	1.463E-01	1.392

41-28117

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410411_GE1_BAFIL_191046.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-201A-SS DIS
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 10:09:29
 Sample ID : 1304104-11 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.22	62	53	1.83	28.45	27	13	6.92E-02	19.3	3.18E+01
2	3	30.92	1863	60	1.34	31.15	27	13	2.07E+00	2.4	
3	3	34.95	504	68	1.85	35.18	27	13	5.60E-01	6.4	
4	0	53.44	52	104	1.95	53.67	50	8	5.78E-02	36.7	
5	1	61.90	231	70	1.58	62.13	58	13	2.57E-01	8.6	7.70E+00
6	1	65.64	90	74	1.58	65.87	58	13	1.00E-01	19.4	
7	0	81.19	748	100	1.95	81.42	77	9	8.31E-01	4.4	
8	0	92.41	42	54	1.28	92.64	90	6	4.61E-02	31.8	
9	0	111.51	194	105	1.51	111.74	109	7	2.15E-01	11.2	
10	0	162.21	52	112	2.93	162.44	157	12	5.81E-02	42.6	
11	0	255.49	19	37	2.46	255.70	249	10	2.12E-02	65.5	
12	0	277.28	49	45	1.40	277.50	274	8	5.44E-02	27.9	
13	0	303.33	136	38	1.70	303.54	299	8	1.51E-01	11.7	
14	0	307.85	17	30	1.03	308.06	307	5	1.89E-02	54.1	
15	1	333.88	105	19	1.84	334.09	330	14	1.17E-01	11.7	3.11E+00
16	1	337.83	22	20	1.84	338.05	330	14	2.46E-02	45.0	
17	0	356.34	472	22	1.94	356.55	352	9	5.24E-01	4.9	
18	0	367.42	39	23	6.79	367.63	362	13	4.33E-02	29.9	
19	5	384.12	135	44	2.50	384.33	381	10	1.50E-01	13.7	3.23E+01
20	5	387.04	182	45	1.83	387.25	381	10	2.02E-01	9.3	
21	3	414.95	50	14	2.29	415.15	411	20	5.52E-02	19.0	2.94E+00
22	3	418.36	18	11	2.30	418.57	411	20	2.05E-02	53.6	
23	3	422.19	8	9	2.30	422.39	411	20	9.26E-03	86.9	
24	3	426.37	9	8	2.30	426.57	411	20	9.81E-03	75.5	
25	0	437.28	116	12	1.83	437.49	432	10	1.29E-01	10.9	
26	0	468.30	20	7	1.86	468.50	465	6	2.18E-02	31.5	
27	0	511.18	20	14	1.49	511.38	507	9	2.27E-02	39.3	
28	0	608.35	8	2	3.13	608.55	604	8	8.94E-03	46.5	
29	0	767.28	7	2	1.37	767.46	764	6	7.22E-03	49.3	

Summary of Nuclide Activity

Sample ID : 1304104-11

Acquisition date : 29-APR-2013 10:09:29

Total number of lines in spectrum 29
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 4 13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.468E+02	3.468E+02	0.660E+02		19.04	
Total Activity :			3.468E+02	3.468E+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	3.111E+02	3.111E+02	0.559E+02		17.97	
Total Activity :			3.111E+02	3.111E+02				

Grand Total Activity : 6.578E+02 6.579E+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	3.468E+02	3.468E+02	19.04	OK
	302.84	17.80	4.915E+00	4.661E+02	4.661E+02	37.50	OK
	356.01	60.00	6.963E+00	3.390E+02	3.390E+02	18.10	OK

Final Mean for 3 Valid Peaks = 3.468E+02+/- 6.602E+01 (19.04%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.111E+02	3.111E+02	17.97	OK

Final Mean for 1 Valid Peaks = 3.111E+02+/- 5.589E+01 (17.97%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.468E+02	6.602E+01	1.752E+01	2.876E+00	19.796
TH-234	3.111E+02	5.589E+01	5.398E+01	1.730E+00	5.762

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.030E+00	1.267E+01	2.146E+01	6.700E+00	-0.095
CD-109	7.748E+01	1.195E+02	1.895E+02	2.451E+01	0.409
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.758E+00	1.653E+00	3.430E+00	6.445E-02	2.262
NP-237	8.928E+00	3.580E+01	5.289E+01	6.439E+00	0.169
AM-241	8.685E+00	3.256E+00	6.179E+00	1.450E-01	1.406

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE]BKG_130410412_GE1_BAFIL_191047.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-204A-SS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 10:24:58
 Sample ID : 1304104-12 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 00:15:00.25 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	30.81	1715	50	1.50	31.05	27	13	1.91E+00	2.4	1.50E+01
2	3	35.10	452	36	1.69	35.33	27	13	5.03E-01	5.3	
3	0	53.06	68	87	2.66	53.29	50	8	7.58E-02	26.5	
4	2	61.93	235	61	1.73	62.16	58	13	2.61E-01	8.2	2.82E+00
5	2	65.83	95	65	1.74	66.06	58	13	1.06E-01	18.2	
6	3	81.29	712	54	1.69	81.52	77	11	7.91E-01	4.0	2.05E+01
7	3	84.63	16	55	1.95	84.86	77	11	1.83E-02	134.1	
8	0	92.14	73	68	1.33	92.37	88	8	8.13E-02	22.7	
9	0	111.76	142	173	1.61	111.98	107	10	1.58E-01	19.2	
10	0	186.45	18	59	1.21	186.67	183	6	2.04E-02	70.0	
11	0	226.07	13	74	3.33	226.29	220	12	1.42E-02	138.4	
12	0	276.18	53	20	1.58	276.40	272	8	5.90E-02	20.0	
13	3	302.97	117	17	1.58	303.18	298	16	1.30E-01	10.4	2.34E+00
14	3	307.24	30	20	2.21	307.45	298	16	3.29E-02	37.3	
15	4	334.00	69	17	1.95	334.21	329	17	7.65E-02	15.7	2.89E+00
16	4	338.33	19	11	2.45	338.54	329	17	2.08E-02	47.6	
17	0	356.33	482	16	1.94	356.54	351	11	5.35E-01	4.8	
18	3	384.03	96	17	2.27	384.24	381	15	1.06E-01	16.1	5.16E+00
19	3	387.24	190	8	1.75	387.45	381	15	2.11E-01	8.2	
20	3	391.44	66	5	2.12	391.65	381	15	7.39E-02	20.2	
21	1	414.97	38	7	1.89	415.17	410	20	4.23E-02	18.9	2.43E+00
22	1	418.83	21	3	1.90	419.04	410	20	2.33E-02	34.0	
23	0	436.95	99	5	1.83	437.16	431	11	1.10E-01	11.0	
24	0	467.71	34	10	2.44	467.91	462	10	3.75E-02	24.6	
25	0	512.88	20	18	3.04	513.08	506	12	2.22E-02	48.0	
26	0	543.09	4	5	1.17	543.29	540	6	4.44E-03	99.2	

Summary of Nuclide Activity

Sample ID : 1304104-12

Acquisition date : 29-APR-2013 10:24:58

Total number of lines in spectrum 26
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 5 19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.303E+02	3.303E+02	0.617E+02	18.67	
NP-237	2.14E+06Y	1.00	2.562E+01	2.562E+01	6.877E+01	268.49	
Total Activity :			3.559E+02	3.559E+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	3.164E+02	3.164E+02	0.545E+02	17.23	
Total Activity :			3.164E+02	3.164E+02			

Grand Total Activity : 6.723E+02 6.723E+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	3.303E+02	3.303E+02	18.67	OK
	302.84	17.80	4.915E+00	4.016E+02	4.016E+02	35.93	OK
	356.01	60.00	6.963E+00	3.461E+02	3.462E+02	17.98	OK

Final Mean for 3 Valid Peaks = 3.303E+02 +/- 6.165E+01 (18.67%)

NP-237	86.50	12.60*	1.532E+01	2.562E+01	2.562E+01	268.49	OK
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Final Mean for 1 Valid Peaks = 2.562E+01 +/- 6.877E+01 (268.49%)

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	3.164E+02	3.164E+02	17.23	OK

Final Mean for 1 Valid Peaks = 3.164E+02 +/- 5.452E+01 (17.23%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.303E+02	6.165E+01	1.773E+01	2.910E+00	18.635
TH-234	3.164E+02	5.452E+01	5.509E+01	1.765E+00	5.743
NP-237	2.562E+01	6.877E+01	4.970E+01	6.051E+00	0.515

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.465E-01	1.140E+01	1.966E+01	6.139E+00	-0.043
CD-109	3.570E+01	1.297E+02	1.921E+02	2.486E+01	0.186
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.043E+01	1.828E+00	3.819E+00	7.176E-02	2.732
AM-241	7.402E+00	3.214E+00	5.988E+00	1.405E-01	1.236

KB
4/29/13

VAX/VMS Peak Search Report Generated 29-APR-2013 10:55:46.72

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410413_GE1_BAFIL_191048.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-204A-SS DIS
Deposition Date :
Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 10:40:28
Sample ID : 1304104-13 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	2085	59	1.46	31.02	27	12	2.32E+00	2.2	4.00E+01
2	3	35.10	515	50	1.55	35.33	27	12	5.72E-01	4.9	
3	0	53.14	110	92	2.05	53.37	49	9	1.22E-01	18.4	
4	4	61.83	283	65	2.05	62.06	58	16	3.14E-01	7.5	2.21E+00
5	4	66.12	122	70	2.11	66.35	58	16	1.35E-01	15.8	
6	4	70.52	19	74	2.12	70.75	58	16	2.06E-02	78.0	
7	0	81.21	801	118	1.89	81.44	76	11	8.90E-01	4.4	
8	0	92.89	32	74	1.38	93.12	90	6	3.50E-02	47.1	
9	5	108.11	18	43	2.40	108.33	106	15	2.00E-02	62.8	1.69E+00
10	5	112.05	226	57	1.84	112.28	106	15	2.51E-01	8.5	
11	5	116.46	52	71	2.20	116.69	106	15	5.78E-02	34.6	
12	0	276.89	76	18	1.20	277.11	274	7	8.45E-02	14.7	
13	0	303.31	121	45	1.48	303.52	300	7	1.35E-01	12.8	
14	0	334.03	70	37	1.41	334.24	331	7	7.79E-02	18.5	
15	0	356.41	536	38	1.93	356.62	352	10	5.96E-01	4.8	
16	0	365.29	23	15	2.70	365.49	362	7	2.56E-02	34.3	
17	0	377.42	10	16	2.60	377.63	374	7	1.08E-02	75.2	
18	2	383.97	118	17	2.06	384.17	381	15	1.31E-01	11.1	6.90E+00
19	2	387.12	233	10	1.81	387.33	381	15	2.59E-01	7.4	
20	2	391.43	35	9	2.07	391.64	381	15	3.88E-02	25.2	
21	1	414.97	39	4	1.89	415.17	410	16	4.29E-02	18.4	1.53E+00
22	1	418.75	38	2	1.90	418.96	410	16	4.23E-02	20.4	
23	1	421.97	11	1	1.90	422.17	410	16	1.20E-02	61.2	
24	0	437.43	116	13	1.87	437.63	434	8	1.29E-01	10.8	
25	0	467.98	29	6	1.94	468.18	462	9	3.20E-02	24.6	
26	0	511.76	23	9	1.98	511.96	508	9	2.56E-02	31.4	
27	0	539.79	5	6	2.46	539.99	534	8	5.66E-03	94.2	

Summary of Nuclide Activity

Sample ID : 1304104-13

Acquisition date : 29-APR-2013 10:40:28

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	3.715E+02	3.715E+02	0.708E+02	19.05	
Total Activity :			3.715E+02	3.715E+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	3.810E+02	3.810E+02	0.604E+02	15.84	
Total Activity :			3.810E+02	3.810E+02			

Grand Total Activity : 7.525E+02 7.525E+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	3.715E+02	3.715E+02	19.05	OK
	302.84	17.80	4.915E+00	4.168E+02	4.169E+02	38.90	OK
	356.01	60.00	6.963E+00	3.855E+02	3.856E+02	17.93	OK

Final Mean for 3 Valid Peaks = 3.715E+02+/- 7.078E+01 (19.05%)

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	3.810E+02	3.810E+02	15.84	OK

Final Mean for 1 Valid Peaks = 3.810E+02+/- 6.037E+01 (15.84%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.715E+02	7.078E+01	1.720E+01	2.824E+00	21.596
TH-234	3.810E+02	6.037E+01	4.990E+01	1.599E+00	7.635

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.735E+00	1.384E+01	2.249E+01	7.022E+00	0.122
CD-109	5.140E+01	1.471E+02	2.170E+02	2.807E+01	0.237
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.758E+00	1.810E+00	3.759E+00	7.064E-02	2.596
NP-237	1.446E+01	4.236E+01	6.218E+01	7.570E+00	0.233
AM-241	1.155E+01	3.296E+00	6.518E+00	1.529E-01	1.772

KB
4/29/13

VAX/VMS Peak Search Report Generated 29-APR-2013 11:11:45.06

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410414_GE1_BAFIL_191050.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-205-AS TOT
Deposition Date :
Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 10:56:28
Sample ID : 1304104-14 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	30.82	1794	78	1.34	31.06	27	12	1.99E+00	2.4	1.28E+01
2	3	35.07	442	60	1.63	35.31	27	12	4.91E-01	5.6	
3	0	52.60	44	88	1.99	52.84	48	8	4.89E-02	39.9	
4	5	61.97	244	85	2.17	62.20	57	13	2.71E-01	8.8	4.94E+00
5	5	66.06	124	56	2.01	66.29	57	13	1.38E-01	15.1	
6	0	81.19	704	118	1.90	81.42	76	11	7.82E-01	4.8	
7	0	93.41	70	95	1.45	93.64	89	10	7.78E-02	28.7	
8	0	111.49	134	141	1.31	111.72	108	7	1.49E-01	15.4	
9	0	186.29	35	68	1.50	186.52	183	8	3.87E-02	44.8	
10	1	273.73	10	2	1.80	273.95	273	8	1.10E-02	16.8	3.18E+01
11	1	276.90	76	15	1.80	277.11	273	8	8.45E-02	12.9	
12	0	303.13	127	31	1.35	303.34	300	6	1.41E-01	11.3	
13	2	334.04	72	13	1.94	334.26	330	15	7.99E-02	14.3	3.04E+00
14	2	338.45	23	6	2.03	338.67	330	15	2.55E-02	32.2	
15	0	356.35	493	34	1.93	356.56	352	9	5.48E-01	5.0	
16	2	383.68	101	15	1.86	383.89	381	10	1.12E-01	13.2	1.60E+01
17	2	387.15	187	27	1.73	387.36	381	10	2.08E-01	8.8	
18	0	391.94	26	14	1.41	392.14	391	6	2.93E-02	33.1	
19	1	414.73	33	16	1.89	414.94	412	10	3.68E-02	25.6	1.25E+01
20	1	417.97	16	17	1.90	418.17	412	10	1.83E-02	59.0	
21	0	437.40	89	8	1.57	437.61	433	10	9.92E-02	12.1	
22	0	468.10	31	5	1.86	468.31	464	9	3.48E-02	21.7	
23	0	511.57	19	14	1.88	511.77	507	8	2.12E-02	40.9	
24	0	583.56	7	1	1.26	583.75	580	6	7.50E-03	47.4	

Summary of Nuclide Activity

Sample ID : 1304104-14

Acquisition date : 29-APR-2013 10:56:28

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	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.264E+02	3.264E+02	0.635E+02	19.44		
Total Activity :			3.264E+02	3.264E+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	3.291E+02	3.291E+02	0.601E+02	18.27		
Total Activity :			3.291E+02	3.291E+02				

Grand Total Activity : 6.555E+02 6.555E+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	3.264E+02	3.264E+02	19.44	OK
	302.84	17.80	4.915E+00	4.345E+02	4.345E+02	36.98	OK
	356.01	60.00	6.963E+00	3.545E+02	3.546E+02	18.13	OK

Final Mean for 3 Valid Peaks = 3.264E+02+/- 6.346E+01 (19.44%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.291E+02	3.291E+02	18.27	OK

Final Mean for 1 Valid Peaks = 3.291E+02+/- 6.014E+01 (18.27%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.264E+02	6.346E+01	1.655E+01	2.717E+00	19.719
TH-234	3.291E+02	6.014E+01	5.285E+01	1.694E+00	6.227

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.458E+00	1.182E+01	2.020E+01	6.308E+00	-0.072
CD-109	4.388E+01	1.198E+02	1.820E+02	2.354E+01	0.241
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.984E+00	1.694E+00	3.499E+00	6.575E-02	2.282
NP-237	2.824E+01	3.478E+01	5.592E+01	6.808E+00	0.505
AM-241	8.309E+00	3.183E+00	6.049E+00	1.419E-01	1.374

KB
4/29/13

VAX/VMS Peak Search Report Generated 29-APR-2013 11:27:46.96

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410415_GE1_BAFIL_191054.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-205-AS DIS
Deposition Date :
Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 11:12:29
Sample ID : 1304104-15 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.83	1998	66	1.44	31.06	27	12	2.22E+00	2.3	1.76E+01
2	4	35.15	450	80	1.55	35.39	27	12	5.00E-01	5.6	
3	0	52.79	85	84	2.47	53.02	49	8	9.42E-02	21.6	
4	1	61.91	240	71	1.58	62.14	58	11	2.67E-01	8.5	6.33E+00
5	1	65.68	114	68	1.58	65.91	58	11	1.27E-01	15.4	
6	0	81.16	804	117	1.95	81.39	77	10	8.93E-01	4.3	
7	0	92.41	27	81	1.33	92.64	89	7	3.02E-02	58.0	
8	0	111.53	158	123	1.41	111.75	108	8	1.75E-01	14.5	
9	0	222.65	18	42	2.81	222.87	219	6	1.99E-02	63.7	
10	0	276.78	37	44	1.30	277.00	273	7	4.15E-02	33.6	
11	2	303.01	152	17	1.81	303.22	297	18	1.69E-01	8.5	8.97E+00
12	2	307.78	52	13	1.96	307.99	297	18	5.81E-02	17.9	
13	2	311.74	18	10	2.01	311.95	297	18	1.97E-02	43.7	
14	0	333.91	88	29	1.75	334.12	330	7	9.75E-02	14.8	
15	0	338.40	28	30	1.41	338.61	337	6	3.11E-02	36.2	
16	3	356.37	550	14	1.52	356.58	351	23	6.11E-01	4.3	3.31E+00
17	3	364.47	9	27	2.25	364.68	351	23	9.88E-03	92.6	
18	2	383.93	131	14	2.06	384.13	379	16	1.46E-01	10.0	7.84E+00
19	2	387.14	239	9	1.79	387.34	379	16	2.66E-01	7.2	
20	2	391.51	40	9	2.00	391.72	379	16	4.48E-02	22.0	
21	2	414.43	27	11	2.08	414.64	409	17	2.97E-02	29.0	1.48E+00
22	2	418.16	23	14	2.09	418.36	409	17	2.51E-02	39.6	
23	2	422.16	13	17	2.09	422.36	409	17	1.42E-02	61.7	
24	2	433.97	8	3	1.91	434.17	431	12	9.17E-03	54.5	1.00E+01
25	2	437.43	101	2	2.10	437.64	431	12	1.12E-01	11.1	
26	2	468.43	21	5	2.12	468.63	464	14	2.32E-02	28.2	5.49E-01
27	2	472.70	8	3	2.12	472.91	464	14	9.04E-03	53.2	
28	0	481.32	8	9	3.02	481.52	477	11	9.18E-03	76.2	
29	0	511.34	22	7	2.53	511.54	508	9	2.43E-02	30.4	
30	0	840.86	5	2	2.52	841.04	838	6	6.03E-03	56.0	

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	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.727E+02	3.727E+02	0.708E+02	18.99	
Total Activity :			3.727E+02	3.727E+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	3.236E+02	3.236E+02	0.573E+02	17.71	
Total Activity :			3.236E+02	3.236E+02			

Grand Total Activity : 6.964E+02 6.964E+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	3.727E+02	3.727E+02	18.99	OK
	302.84	17.80	4.915E+00	5.232E+02	5.232E+02	33.84	OK
	356.01	60.00	6.963E+00	3.955E+02	3.956E+02	17.47	OK

Final Mean for 3 Valid Peaks = 3.727E+02 +/- 7.079E+01 (18.99%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.236E+02	3.236E+02	17.71	OK

Final Mean for 1 Valid Peaks = 3.236E+02 +/- 5.732E+01 (17.71%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.727E+02	7.079E+01	1.843E+01	3.026E+00	20.224
TH-234	3.236E+02	5.732E+01	5.671E+01	1.817E+00	5.707

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.884E+00	1.244E+01	2.194E+01	6.849E+00	0.131
CD-109	-3.757E+01	1.551E+02	2.086E+02	2.699E+01	-0.180
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.621E+00	1.850E+00	3.805E+00	7.150E-02	2.529
NP-237	2.351E+00	4.382E+01	6.164E+01	7.505E+00	0.038
AM-241	8.664E+00	3.369E+00	6.316E+00	1.482E-01	1.372

C
4125112

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410416_GE1_BAFIL_191055.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-205-SS TOT
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 11:28:15
 Sample ID : 1304104-16 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 00:15:00.24 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	27.90	26	51	1.51	28.14	27	13	2.85E-02	41.1	2.77E+01
2	2	30.88	1661	56	1.37	31.11	27	13	1.85E+00	2.5	
3	2	34.93	361	51	1.68	35.17	27	13	4.01E-01	6.3	
4	0	53.06	71	80	1.58	53.29	50	8	7.93E-02	24.5	
5	5	61.89	240	70	2.16	62.12	58	12	2.66E-01	8.4	5.12E+00
6	5	65.93	100	71	2.10	66.16	58	12	1.11E-01	18.2	
7	3	81.18	615	48	1.45	81.41	76	13	6.83E-01	4.3	4.04E+00
8	3	84.75	18	50	1.95	84.98	76	13	1.96E-02	117.3	
9	0	93.08	36	48	1.24	93.31	91	5	4.00E-02	32.4	
10	0	111.85	192	125	1.79	112.07	107	11	2.13E-01	13.3	
11	0	135.09	20	49	1.29	135.32	132	7	2.27E-02	60.8	
12	0	142.23	28	54	2.63	142.45	139	8	3.08E-02	49.7	
13	0	276.65	54	28	1.40	276.87	272	8	5.99E-02	21.8	
14	3	303.11	141	10	1.69	303.32	299	19	1.57E-01	8.9	2.44E+00
15	3	307.24	39	9	2.21	307.45	299	19	4.32E-02	28.6	
16	0	334.56	61	38	1.45	334.77	331	9	6.80E-02	21.9	
17	0	356.35	467	22	1.93	356.56	352	10	5.19E-01	5.0	
18	0	377.12	14	18	2.78	377.33	374	7	1.50E-02	58.1	
19	4	384.09	126	16	2.33	384.30	381	19	1.40E-01	12.3	5.78E+00
20	4	387.28	180	10	1.69	387.48	381	19	2.00E-01	8.6	
21	4	391.33	41	11	2.25	391.54	381	19	4.56E-02	30.8	
22	3	415.20	43	12	2.29	415.41	410	16	4.79E-02	21.7	1.27E+00
23	3	418.37	24	13	2.30	418.58	410	16	2.68E-02	41.6	
24	3	422.79	8	10	2.30	423.00	410	16	8.64E-03	68.0	
25	0	437.34	96	10	1.99	437.54	434	9	1.07E-01	11.7	
26	0	468.29	18	10	2.14	468.49	464	8	1.99E-02	38.6	
27	0	483.57	7	3	1.82	483.77	480	7	7.78E-03	57.4	
28	0	512.23	16	10	1.44	512.43	508	7	1.78E-02	41.5	
29	0	803.32	8	0	1.33	803.50	800	7	8.89E-03	35.4	

Total number of lines in spectrum 29
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 6 20.69%

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	2.850E+02	2.850E+02	0.540E+02	18.94	
NP-237	2.14E+06Y	1.00	2.748E+01	2.748E+01	6.456E+01	234.89	
Total Activity :			3.125E+02	3.125E+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	3.230E+02	3.230E+02	0.565E+02	17.49	
Total Activity :			3.230E+02	3.230E+02			

Grand Total Activity : 6.355E+02 6.356E+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	2.850E+02	2.850E+02	18.94	OK
	302.84	17.80	4.915E+00	4.851E+02	4.851E+02	34.28	OK
	356.01	60.00	6.963E+00	3.355E+02	3.355E+02	18.16	OK

Final Mean for 3 Valid Peaks = 2.850E+02 +/- 5.400E+01 (18.94%)

NP-237	86.50	12.60*	1.532E+01	2.748E+01	2.748E+01	234.89	OK
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Final Mean for 1 Valid Peaks = 2.748E+01 +/- 6.456E+01 (234.89%)

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	3.230E+02	3.230E+02	17.49	OK

Final Mean for 1 Valid Peaks = 3.230E+02 +/- 5.650E+01 (17.49%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.850E+02	5.400E+01	1.604E+01	2.634E+00	17.767
TH-234	3.230E+02	5.650E+01	5.285E+01	1.694E+00	6.112
NP-237	2.748E+01	6.456E+01	4.710E+01	5.734E+00	0.584

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.784E+00	1.106E+01	1.866E+01	5.825E+00	-0.149
CD-109	2.811E+01	1.182E+02	1.761E+02	2.278E+01	0.160
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.927E+00	1.769E+00	3.656E+00	6.871E-02	2.442
AM-241	7.381E+00	3.116E+00	5.864E+00	1.376E-01	1.259

C 4/25/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130410417_GE1_BAFIL_191056.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-205-SS DIS
 Deposition Date :
 Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 11:43:42
 Sample ID : 1304104-17 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 00:15:00.24 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	30.87	1636	58	1.32	31.10	27	13	1.82E+00	2.5	1.33E+01
2	1	34.91	317	43	1.53	35.14	27	13	3.52E-01	6.9	
3	0	52.68	31	54	3.33	52.91	50	6	3.49E-02	40.7	
4	2	61.94	197	68	1.73	62.17	57	14	2.19E-01	9.4	3.54E+00
5	2	65.73	81	68	1.74	65.96	57	14	9.02E-02	20.7	
6	0	81.21	639	132	1.87	81.44	77	10	7.10E-01	5.2	
7	0	93.47	54	64	1.58	93.69	90	8	6.00E-02	29.3	
8	1	111.88	149	48	1.64	112.11	107	14	1.66E-01	11.0	1.99E+00
9	1	116.62	28	46	1.65	116.85	107	14	3.14E-02	43.6	
10	0	143.28	32	45	3.59	143.50	140	8	3.59E-02	39.8	
11	0	184.70	30	69	1.15	184.92	181	8	3.37E-02	50.9	
12	0	193.49	44	50	4.00	193.71	190	9	4.86E-02	33.6	
13	0	276.80	37	21	1.28	277.01	276	5	4.10E-02	26.1	
14	0	303.12	119	33	1.64	303.33	300	7	1.32E-01	12.1	
15	0	307.68	26	17	1.14	307.89	307	4	2.87E-02	31.0	
16	5	334.01	57	15	2.01	334.22	329	18	6.28E-02	17.4	1.99E+00
17	5	338.48	24	15	2.70	338.69	329	18	2.70E-02	41.6	
18	3	356.25	472	18	1.55	356.46	353	16	5.24E-01	4.7	4.59E+00
19	3	364.28	15	11	2.25	364.49	353	16	1.64E-02	56.7	
20	4	383.94	94	4	2.11	384.15	381	15	1.04E-01	11.8	2.06E+01
21	4	387.15	188	8	1.99	387.36	381	15	2.08E-01	8.8	
22	4	391.40	28	13	2.27	391.61	381	15	3.13E-02	39.7	
23	1	417.79	23	7	1.72	418.00	410	20	2.56E-02	36.2	3.87E+00
24	1	421.79	11	6	1.73	422.00	410	20	1.19E-02	56.5	
25	0	437.23	93	5	1.96	437.44	432	10	1.03E-01	11.3	
26	0	467.06	18	6	1.37	467.27	463	8	2.01E-02	33.1	
27	0	511.56	31	8	2.28	511.76	506	10	3.49E-02	24.2	
28	0	604.84	10	3	2.65	605.03	601	7	1.07E-02	45.5	

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	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	2.965E+02	2.965E+02	0.588E+02	19.83	
Total Activity :			2.965E+02	2.965E+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	2.661E+02	2.661E+02	0.520E+02	19.53	
Total Activity :			2.661E+02	2.661E+02			

Grand Total Activity : 5.625E+02 5.626E+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	2.965E+02	2.965E+02	19.83	OK
	302.84	17.80	4.915E+00	4.089E+02	4.089E+02	37.93	OK
	356.01	60.00	6.963E+00	3.392E+02	3.393E+02	17.83	OK

Final Mean for 3 Valid Peaks = 2.965E+02+/- 5.880E+01 (19.83%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.661E+02	2.661E+02	19.53	OK

Final Mean for 1 Valid Peaks = 2.661E+02+/- 5.198E+01 (19.53%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	2.965E+02	5.880E+01	1.872E+01	3.074E+00	15.834
TH-234	2.661E+02	5.198E+01	4.990E+01	1.599E+00	5.332

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.485E+00		1.285E+01	2.084E+01	6.505E+00	0.071
CD-109	-5.848E+01		1.537E+02	2.020E+02	2.613E+01	-0.290
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.585E+00		1.747E+00	3.607E+00	6.779E-02	2.380
NP-237	4.982E+00		4.163E+01	5.936E+01	7.227E+00	0.084
AM-241	7.496E+00		3.001E+00	5.735E+00	1.345E-01	1.307

KAS
4/29/13

VAX/VMS Peak Search Report Generated 29-APR-2013 12:14:47.76

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410418_GE1_BAFIL_191057.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-206-SS TOT
Deposition Date :
Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 11:59:10
Sample ID : 1304104-18 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE1 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.25 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	30.81	1691	57	1.51	31.04	27	13	1.88E+00	2.5	2.42E+01
2	3	35.14	410	49	1.56	35.37	27	13	4.55E-01	5.6	
3	0	53.05	50	73	2.99	53.29	50	8	5.55E-02	32.9	
4	3	61.91	218	47	1.91	62.14	58	15	2.42E-01	8.6	2.08E+00
5	3	66.03	131	40	1.91	66.26	58	15	1.46E-01	13.7	
6	0	81.13	716	102	1.92	81.35	76	11	7.96E-01	4.6	
7	0	92.68	48	75	1.36	92.91	90	7	5.30E-02	33.3	
8	0	111.70	142	106	1.98	111.93	108	8	1.57E-01	15.1	
9	0	116.89	46	41	2.58	117.12	116	5	5.16E-02	26.9	
10	0	149.32	22	72	4.69	149.55	145	8	2.44E-02	70.1	
11	0	175.42	21	59	1.58	175.65	173	8	2.38E-02	64.7	
12	0	240.57	22	24	2.72	240.79	237	7	2.39E-02	44.4	
13	0	248.01	14	24	2.51	248.23	245	6	1.53E-02	62.6	
14	0	255.40	11	29	3.00	255.62	251	7	1.18E-02	90.0	
15	0	276.89	70	27	1.40	277.11	274	8	7.76E-02	17.5	
16	3	303.12	140	18	1.76	303.34	299	18	1.56E-01	9.3	1.75E+00
17	3	307.77	24	17	2.21	307.98	299	18	2.72E-02	39.6	
18	4	333.89	63	24	1.90	334.10	329	14	7.05E-02	18.3	4.46E+00
19	4	338.25	14	28	2.45	338.46	329	14	1.52E-02	77.8	
20	8	356.35	521	10	1.54	356.56	354	18	5.79E-01	4.4	6.43E+00
21	8	365.13	20	32	3.63	365.34	354	18	2.22E-02	50.9	
22	2	383.67	82	27	2.06	383.88	381	10	9.07E-02	16.1	3.43E+01
23	2	387.10	179	38	1.82	387.31	381	10	1.99E-01	9.0	
24	0	391.65	34	14	1.31	391.86	391	5	3.74E-02	27.0	
25	0	407.48	11	2	1.24	407.69	404	7	1.26E-02	35.4	
26	0	415.12	57	21	1.45	415.33	412	8	6.31E-02	19.1	
27	0	437.22	94	6	1.89	437.43	433	8	1.05E-01	11.2	
28	3	511.39	17	6	2.36	511.59	507	12	1.86E-02	36.5	1.03E+00
29	3	514.62	7	1	1.95	514.82	507	12	8.10E-03	69.6	
30	0	603.32	6	2	2.90	603.52	600	7	6.87E-03	53.8	

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	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.321E+02	3.321E+02	0.640E+02	19.26	
Total Activity :			3.321E+02	3.321E+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	2.941E+02	2.941E+02	0.528E+02	17.95	
Total Activity :			2.941E+02	2.941E+02			

Grand Total Activity : 6.261E+02 6.262E+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	3.321E+02	3.321E+02	19.26	OK
	302.84	17.80	4.915E+00	4.819E+02	4.819E+02	34.62	OK
	356.01	60.00	6.963E+00	3.743E+02	3.744E+02	17.55	OK

Final Mean for 3 Valid Peaks = 3.321E+02+/- 6.397E+01 (19.26%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.941E+02	2.941E+02	17.95	OK

Final Mean for 1 Valid Peaks = 2.941E+02+/- 5.278E+01 (17.95%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.321E+02	6.397E+01	1.655E+01	2.717E+00	20.065
TH-234	2.941E+02	5.278E+01	4.041E+01	1.295E+00	7.278

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.831E+00		1.086E+01	1.864E+01	5.819E+00	0.259
CD-109	3.794E+01		1.264E+02	1.887E+02	2.441E+01	0.201
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.863E+00		1.745E+00	3.620E+00	6.803E-02	2.448
NP-237	5.044E+00		3.732E+01	5.390E+01	6.562E+00	0.094
AM-241	1.066E+01		2.887E+00	5.953E+00	1.397E-01	1.791

MS
4/29/13

VAX/VMS Peak Search Report Generated 29-APR-2013 12:29:54.86

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130410419_GE1_BAFIL_191060.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-206-SS DIS
Deposition Date :
Sample Date : 29-APR-2013 00:00:00 Acquisition date : 29-APR-2013 12:14:39
Sample ID : 1304104-19 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	27.90	38	69	1.51	28.14	27	13	4.26E-02	31.6	1.95E+01
2	3	30.88	2040	67	1.37	31.11	27	13	2.27E+00	2.3	
3	3	35.03	497	51	1.85	35.27	27	13	5.52E-01	6.6	
4	0	52.71	45	82	1.89	52.94	50	6	5.02E-02	34.9	
5	6	61.97	309	78	1.86	62.20	58	16	3.44E-01	7.1	3.93E+00
6	6	66.27	126	72	2.55	66.50	58	16	1.40E-01	17.4	
7	4	81.19	768	51	1.54	81.42	77	12	8.53E-01	3.8	5.29E+00
8	4	85.09	26	52	2.14	85.32	77	12	2.83E-02	87.9	
9	1	92.62	42	44	1.62	92.85	89	16	4.66E-02	28.8	1.80E+00
10	1	101.62	21	47	1.63	101.85	89	16	2.35E-02	52.3	
11	4	109.77	24	39	1.49	110.00	106	14	2.71E-02	43.0	2.20E+01
12	4	116.01	73	55	2.20	116.23	106	14	8.08E-02	24.4	
13	0	162.04	32	78	2.03	162.26	157	9	3.51E-02	54.2	
14	0	186.32	27	50	2.22	186.54	183	7	3.03E-02	46.7	
15	0	276.85	58	39	1.83	277.07	273	10	6.43E-02	24.3	
16	3	303.10	180	16	1.62	303.32	299	19	2.00E-01	8.0	2.44E+00
17	3	307.60	36	14	2.21	307.82	299	19	4.00E-02	26.3	
18	1	333.67	78	22	1.84	333.88	330	20	8.68E-02	14.7	1.67E+00
19	1	337.96	31	20	1.84	338.17	330	20	3.47E-02	31.9	
20	0	356.37	504	35	1.92	356.58	352	10	5.61E-01	5.0	
21	1	383.67	152	12	1.88	383.88	380	17	1.69E-01	9.1	1.66E+01
22	1	386.96	218	17	1.84	387.17	380	17	2.42E-01	8.7	
23	1	391.65	54	19	1.81	391.86	380	17	5.99E-02	18.2	
24	1	414.66	46	11	1.89	414.87	411	16	5.06E-02	19.7	4.68E+00
25	1	417.62	19	10	1.90	417.83	411	16	2.08E-02	52.6	
26	1	421.62	12	9	1.90	421.83	411	16	1.30E-02	60.9	
27	0	437.27	123	5	1.83	437.47	432	10	1.37E-01	9.6	
28	0	457.02	11	4	2.89	457.23	453	7	1.27E-02	40.1	
29	0	468.73	16	6	1.15	468.93	466	5	1.75E-02	34.7	
30	0	512.22	24	16	2.51	512.41	507	9	2.70E-02	35.7	

Total number of lines in spectrum 30
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 5 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
			pCi/filter	pCi/filter			%Error	
BA-133	10.50Y	1.00	3.559E+02	3.559E+02		0.660E+02	18.55	
NP-237	2.14E+06Y	1.00	3.968E+01	3.968E+01		6.996E+01	176.34	
Total Activity :			3.956E+02	3.956E+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	4.169E+02	4.169E+02		0.628E+02	15.05	
Total Activity :			4.169E+02	4.169E+02				

Grand Total Activity : 8.124E+02 8.125E+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	3.559E+02	3.559E+02	18.55	OK
	302.84	17.80	4.915E+00	6.178E+02	6.179E+02	33.32	OK
	356.01	60.00	6.963E+00	3.626E+02	3.626E+02	18.11	OK

Final Mean for 3 Valid Peaks = 3.559E+02 +/- 6.604E+01 (18.55%)

NP-237	86.50	12.60*	1.532E+01	3.968E+01	3.968E+01	176.34	OK
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Final Mean for 1 Valid Peaks = 3.968E+01 +/- 6.996E+01 (176.34%)

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	4.169E+02	4.169E+02	15.05	OK

Final Mean for 1 Valid Peaks = 4.169E+02 +/- 6.276E+01 (15.05%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.559E+02	6.604E+01	1.872E+01	3.074E+00	19.007
TH-234	4.169E+02	6.276E+01	5.604E+01	1.796E+00	7.439
NP-237	3.968E+01	6.996E+01	4.842E+01	5.895E+00	0.819

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.772E+00		1.461E+01	2.185E+01	6.821E+00	-0.264
CD-109	1.184E+01		1.240E+02	1.793E+02	2.319E+01	0.066
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.685E+00		1.811E+00	3.755E+00	7.057E-02	2.579
AM-241	1.088E+01		3.331E+00	6.685E+00	1.568E-01	1.628