

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-07111-OR

August 20, 2013

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

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

MP-001-3

Eberline Services Work Order # 13-07111

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/17/13	KC	Sample Log-In
		8-8-13	JG	Data Compilation
		8-9-13	MLT	First Technical Data Review
		8/9/13	MSK	Second Technical Data Review
		8/13/13	[Signature]	Data Entry/Electronic Deliverable
		8/13/13	[Signature]	Case Narrative
		8/14/13	KB S	Electronic Deliverable Proof
		8/15/13	MSK	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		8/15/13	MSK	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by: [Signature] 8/20/13
 Laboratory Manager Date

Copy No. _____ Radiochemistry Services

US EPA ARCHIVE DOCUMENT

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET



Internal Chain of Custody

Work Order #	13-07111
Lab Deadline	8/6/2013
Analysis	UISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 14, 16 & 18 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 13, 15, 17, & 19 are DISSOLVED</p> <p>MUST USE Fxn 14 as DUP</p>	04	45	V1.1
	05	45	V1.1
	06	40	V1.1
	07	40	V1.1
	08	42	V1.1
	09	42	V1.1
	10	45	V1.1
	11	45	V1.1
	12	38	V1.1
	13	38	V1.1
	14	43	V1.1
	15	43	V1.1
	16	39	V1.1
	17	39	V1.1
	18	39	V1.1
	19	39	V1.1

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/13/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0815 PM	8/13/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0830 PM	8/11/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	DK300	8/11/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	8/11/13 1240
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		



Internal Chain of Custody

Work Order #	13-07111
Lab Deadline	8/6/2013
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	45	V1.1
	05	45	V1.1
	06	40	V1.1
	07	40	V1.1
	08	42	V1.1
	09	42	V1.1
	10	45	V1.1
	11	45	V1.1
	12	38	V1.1
	13	38	V1.1
	14	43	V1.1
	15	43	V1.1
	16	39	V1.1
	17	39	V1.1
	18	39	V1.1
	19	39	V1.1

MUST USE Fxn 14 as DUP

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Wolfe	7/30/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Wolfe	7/30/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	2000 TM	7/30/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0910 TM	8/1/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0910	8/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	8/1/13 1526
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		



Internal Chain of Custody

Work Order # **13-07111**
 Lab Deadline **8/6/2013**
 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> <p>MUST USE Fxn 14 as DUP</p>	04	45	V1.1
	05	45	V1.1
	06	40	V1.1
	07	40	V1.1
	08	42	V1.1
	09	42	V1.1
	10	45	V1.1
	11	45	V1.1
	12	38	V1.1
	13	38	V1.1
	14	43	V1.1
	15	43	V1.1
	16	39	V1.1
	17	39	V1.1
	18	39	V1.1
	19	39	V1.1

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Wolfe	4/24/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Wolfe	4/29/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JA	7/29/13 2025
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JA	7/30/13 1600
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	7/30/13 1602
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	7/31/13 1936
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		



Internal Chain of Custody

Work Order #	13-07111
Lab Deadline	8/6/2013
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> <p>MUST USE Fxn 14 as DUP</p>	04	45	V1.1
	05	45	V1.1
	06	40	V1.1
	07	40	V1.1
	08	42	V1.1
	09	42	V1.1
	10	45	V1.1
	11	45	V1.1
	12	38	V1.1
	13	38	V1.1
	14	43	V1.1
	15	43	V1.1
	16	39	V1.1
	17	39	V1.1
	18	39	V1.1
	19	39	V1.1

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	4/20/11
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	4/29/11
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/29/13 2025
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/30/13 1600
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	7/30/13 1602
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	7/31/13 1736
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 1235
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 0735
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 0735
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 0735
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		



EBERLINE
SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order

13-07111

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	V1.1		
02	BLANK	0		WA	V1.1		
03	DUP	0		WA	V1.1		
04	DUP 03 TOT /	2		WA	V1.1	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	41
			2	<2	<2	4.0000	45
05	DUP 03 DIS /	2		WA	V1.1	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
			2				45
06	S-8 TOT /	2		WA	V1.1	8.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	39
			2	<2	<2	4.0000	40
07	S-8 DIS /	2		WA	V1.1	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
			2				40
08	I-62 TOT /	2		WA	V1.1	8.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	35
			2	<2	<2	4.0000	42
09	I-62 DIS /	2		WA	V1.1	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				35
			2				42
10	D-6 TOT /	2		WA	V1.1	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	41
			2	<2	<2	4.0000	45
11	D-6 DIS /	2		WA	V1.1	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
			2				45
12	S-61 TOT /	2		WA	V1.1	8.00	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	37
			2	<2	<2	4.0000	38
13	S-61 DIS /	2		WA	V1.1	0.00	38
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				37
			2				38
14	I-67 TOT /	3		WA	V1.1	12.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	42
			2	<2	<2	4.0000	43
			3	<2	<2	4.0000	43
15	I-67 DIS /	3		WA	V1.1	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
			2				43
			3				43
16	I-68 TOT /	2		WA	V1.1	8.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	36
			2	<2	<2	4.0000	39
17	I-68 DIS /	2		WA	V1.1	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
			2				39
18	DUP 04 TOT /	2		WA	V1.1	8.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	39
			2	<2	<2	4.0000	35
19	DUP 04 DIS /	2		WA	V1.1	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM

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165 07/17/13

Received by: Kenta Collet

Date: 7/17/13



(Volumes, pH, & CPM)

Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
				1			39
				2			35

165-07/17/13

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Received by: *Kristen Coulston* Date: *7/17/13*

SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-07111

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

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

WERE SAMPLES:

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

WERE CHAIN OF CUSTODY SEALS:

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

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

REMARKS: _____

SIGNATURE: Kristen Coulter DATE: 7/17/13

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**SECTION III
CASE NARRATIVE**



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

EBS-OR-35950

August 20, 2013

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

CASE NARRATIVE
 Work Order # 13-07111-OR

SAMPLE RECEIPT

This work order contains eight water samples received 07/15/2013. 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>
DUP 03 TOT	13-07111-04	S-61 TOT	13-07111-12
DUP 03 DIS	13-07111-05	S-61 DIS	13-07111-13
S-8 TOT	13-07111-06	I-67 TOT	13-07111-14
S-8 DIS	13-07111-07	I-67 DIS	13-07111-15
I-62 TOT	13-07111-08	I-68 TOT	13-07111-16
I-62 DIS	13-07111-09	I-68 DIS	13-07111-17
D-6 TOT	13-07111-10	DUP 04 TOT	13-07111-18
D-6 DIS	13-07111-11	DUP 04 DIS	13-07111-19

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

US EPA ARCHIVE DOCUMENT

ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

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

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly low for sample fraction -05 (Client ID: DUP 03 DIS). Chemical recovery was acceptable for all other samples. The Uranium-234 method blank demonstrated results slightly greater than the detection limit. The Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC THORIUM

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

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

RADIUM-226

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

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

ANALYTICAL RESULTS CONTINUED

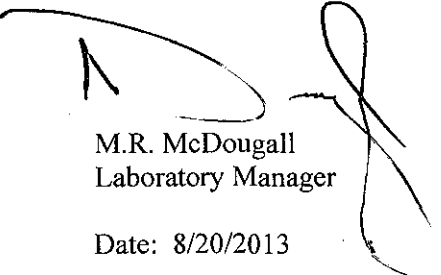
RADIUM-228

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 an acceptable relative percent difference and normalized difference. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 8/20/2013

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

<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>CSU</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
LCS13-07111-01	13-07111-01	07/31/2013 15:15:56	Radium-226	E903.0	10.28	1.33	2.55	0.23		pCi/l
LCS13-07111-01	13-07111-01	08/08/2013 10:12:07	Radium-228	E904.0	8.17	2.18	2.86	2.48		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:17:50	Thorium-228	HASL 300, 4.5.2	4.46	0.69	0.81	0.06		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:17:50	Thorium-230	HASL 300, 4.5.2	4.81	0.73	0.94	0.07		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:17:50	Thorium-232	HASL 300, 4.5.2	4.07	0.65	0.74	0.12		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:16:08	Uranium-234	HASL 300, 4.5.2	6.63	1.11	1.21	0.12		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:16:08	Uranium-235	HASL 300, 4.5.2	1.28	0.38	0.39	0.10		pCi/l
LCS13-07111-01	13-07111-01	08/01/2013 09:16:08	Uranium-238	HASL 300, 4.5.2	7.83	1.27	1.39	0.10		pCi/l
BLANK13-07111-02	13-07111-02	07/31/2013 15:15:57	Radium-226	E903.0	-0.07	0.08	0.08	0.27	U	pCi/l
BLANK13-07111-02	13-07111-02	08/08/2013 07:53:55	Radium-228	E904.0	0.28	0.54	0.54	1.11	U	pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:17:52	Thorium-228	HASL 300, 4.5.2	-0.04	0.05	0.05	0.18	U	pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:17:52	Thorium-230	HASL 300, 4.5.2	0.43	0.22	0.23	0.14		pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:17:52	Thorium-232	HASL 300, 4.5.2	0.01	0.05	0.05	0.13	U	pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:16:09	Uranium-234	HASL 300, 4.5.2	0.39	0.16	0.16	0.07		pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:16:09	Uranium-235	HASL 300, 4.5.2	0.08	0.09	0.09	0.11	U	pCi/l
BLANK13-07111-02	13-07111-02	08/01/2013 09:16:09	Uranium-238	HASL 300, 4.5.2	0.09	0.08	0.08	0.09	J	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	07/31/2013 15:15:58	Radium-226	E903.0	0.46	0.28	0.30	0.25	J	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/08/2013 07:53:55	Radium-228	E904.0	1.22	0.68	0.74	1.32	J	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:17:45	Thorium-228	HASL 300, 4.5.2	0.00	0.03	0.03	0.11	U	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:17:45	Thorium-230	HASL 300, 4.5.2	0.46	0.19	0.19	0.07		pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:17:45	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.06	0.09	U	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:16:36	Uranium-234	HASL 300, 4.5.2	0.84	0.25	0.26	0.09		pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:16:36	Uranium-235	HASL 300, 4.5.2	0.14	0.11	0.11	0.10	J	pCi/l
I-67 TOT_07_12_2013 DUP	13-07111-03	08/01/2013 09:16:36	Uranium-238	HASL 300, 4.5.2	0.54	0.20	0.20	0.10		pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	07/31/2013 15:15:59	Radium-226	E903.0	3.10	0.78	1.02	0.45		pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/08/2013 07:53:55	Radium-228	E904.0	4.43	0.77	1.26	1.21		pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:17:49	Thorium-228	HASL 300, 4.5.2	0.26	0.14	0.14	0.08		pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:17:49	Thorium-230	HASL 300, 4.5.2	0.41	0.18	0.18	0.08		pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:17:49	Thorium-232	HASL 300, 4.5.2	0.00	0.05	0.05	0.10	U	pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:16:37	Uranium-234	HASL 300, 4.5.2	0.19	0.15	0.15	0.13	J	pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:16:37	Uranium-235	HASL 300, 4.5.2	0.13	0.14	0.14	0.14	U	pCi/l
DUP 03 TOT_07_12_2013	13-07111-04	08/01/2013 09:16:37	Uranium-238	HASL 300, 4.5.2	0.13	0.12	0.12	0.13	J	pCi/l



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DUP 03 DIS_07_12_2013	13-07111-05	07/31/2013 15:16:00	Radium-226	E903.0	4.04	0.98	1.30	0.42		pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/08/2013 07:53:56	Radium-228	E904.0	4.29	0.78	1.24	1.25		pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:17:41	Thorium-228	HASL 300, 4.5.2	0.17	0.11	0.11	0.07	J	pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:17:41	Thorium-230	HASL 300, 4.5.2	0.47	0.19	0.20	0.09		pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:17:41	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.07	U	pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:16:38	Uranium-234	HASL 300, 4.5.2	0.73	0.46	0.46	0.30	J	pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:16:38	Uranium-235	HASL 300, 4.5.2	0.16	0.27	0.27	0.47	U	pCi/l
DUP 03 DIS_07_12_2013	13-07111-05	08/01/2013 09:16:38	Uranium-238	HASL 300, 4.5.2	0.19	0.25	0.25	0.38	U	pCi/l
S-8 TOT_07_12_2013	13-07111-06	07/31/2013 15:16:01	Radium-226	E903.0	0.35	0.30	0.31	0.39	J	pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/08/2013 07:53:54	Radium-228	E904.0	0.67	0.64	0.66	1.29	J	pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:17:43	Thorium-228	HASL 300, 4.5.2	-0.02	0.04	0.04	0.11	U	pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:17:43	Thorium-230	HASL 300, 4.5.2	0.40	0.19	0.19	0.11		pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:17:43	Thorium-232	HASL 300, 4.5.2	0.08	0.08	0.08	0.11	U	pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:16:39	Uranium-234	HASL 300, 4.5.2	1.00	0.37	0.37	0.16		pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:16:39	Uranium-235	HASL 300, 4.5.2	0.37	0.24	0.24	0.18	J	pCi/l
S-8 TOT_07_12_2013	13-07111-06	08/01/2013 09:16:39	Uranium-238	HASL 300, 4.5.2	0.72	0.30	0.31	0.15		pCi/l
S-8 DIS_07_12_2013	13-07111-07	07/31/2013 15:16:31	Radium-226	E903.0	0.24	0.19	0.20	0.17	J	pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/08/2013 07:53:55	Radium-228	E904.0	1.03	0.78	0.81	1.55	J	pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 12:17:21	Thorium-228	HASL 300, 4.5.2	0.03	0.07	0.07	0.14	U	pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 12:17:21	Thorium-230	HASL 300, 4.5.2	0.28	0.15	0.15	0.09		pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 12:17:21	Thorium-232	HASL 300, 4.5.2	0.09	0.09	0.09	0.10	U	pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 09:16:40	Uranium-234	HASL 300, 4.5.2	1.14	0.31	0.32	0.11		pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 09:16:40	Uranium-235	HASL 300, 4.5.2	0.20	0.14	0.14	0.11	J	pCi/l
S-8 DIS_07_12_2013	13-07111-07	08/01/2013 09:16:40	Uranium-238	HASL 300, 4.5.2	0.63	0.22	0.22	0.09		pCi/l
I-62 TOT_07_12_2013	13-07111-08	07/31/2013 15:16:33	Radium-226	E903.0	0.66	0.31	0.34	0.16		pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/08/2013 07:53:55	Radium-228	E904.0	1.38	0.71	0.78	1.38	J	pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 12:17:22	Thorium-228	HASL 300, 4.5.2	0.12	0.11	0.11	0.16	J	pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 12:17:22	Thorium-230	HASL 300, 4.5.2	0.40	0.18	0.19	0.13		pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 12:17:22	Thorium-232	HASL 300, 4.5.2	0.12	0.09	0.09	0.08	J	pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 09:16:41	Uranium-234	HASL 300, 4.5.2	0.38	0.18	0.18	0.12		pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 09:16:41	Uranium-235	HASL 300, 4.5.2	0.33	0.18	0.18	0.13		pCi/l
I-62 TOT_07_12_2013	13-07111-08	08/01/2013 09:16:41	Uranium-238	HASL 300, 4.5.2	0.18	0.12	0.12	0.13	J	pCi/l



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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>CSU</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
I-62 DIS_07_12_2013	13-07111-09	07/31/2013 15:16:34	Radium-226	E903.0	0.44	0.25	0.27	0.20	J	pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/08/2013 07:53:56	Radium-228	E904.0	0.70	0.70	0.72	1.42	U	pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 12:17:15	Thorium-228	HASL 300, 4.5.2	0.00	0.06	0.06	0.15	U	pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 12:17:15	Thorium-230	HASL 300, 4.5.2	0.53	0.21	0.22	0.11		pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 12:17:15	Thorium-232	HASL 300, 4.5.2	0.06	0.06	0.07	0.07	U	pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 09:16:42	Uranium-234	HASL 300, 4.5.2	0.58	0.23	0.24	0.12		pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 09:16:42	Uranium-235	HASL 300, 4.5.2	0.16	0.14	0.14	0.16	J	pCi/l
I-62 DIS_07_12_2013	13-07111-09	08/01/2013 09:16:42	Uranium-238	HASL 300, 4.5.2	0.31	0.17	0.17	0.09		pCi/l
D-6 TOT_07_12_2013	13-07111-10	07/31/2013 15:16:35	Radium-226	E903.0	3.10	0.72	0.98	0.20		pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/08/2013 07:55:34	Radium-228	E904.0	3.13	0.88	1.13	1.59		pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 12:17:16	Thorium-228	HASL 300, 4.5.2	0.13	0.09	0.09	0.08	J	pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 12:17:16	Thorium-230	HASL 300, 4.5.2	0.36	0.15	0.15	0.07		pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 12:17:16	Thorium-232	HASL 300, 4.5.2	0.07	0.06	0.06	0.05	J	pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 09:16:43	Uranium-234	HASL 300, 4.5.2	0.37	0.20	0.21	0.18	J	pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 09:16:43	Uranium-235	HASL 300, 4.5.2	0.01	0.09	0.09	0.22	U	pCi/l
D-6 TOT_07_12_2013	13-07111-10	08/01/2013 09:16:43	Uranium-238	HASL 300, 4.5.2	0.05	0.08	0.08	0.14	U	pCi/l
D-6 DIS_07_12_2013	13-07111-11	07/31/2013 15:16:37	Radium-226	E903.0	2.88	0.73	0.95	0.26		pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/08/2013 07:55:36	Radium-228	E904.0	4.07	0.91	1.30	1.57		pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 12:17:17	Thorium-228	HASL 300, 4.5.2	0.17	0.15	0.15	0.16	J	pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 12:17:17	Thorium-230	HASL 300, 4.5.2	0.68	0.33	0.34	0.14		pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 12:17:17	Thorium-232	HASL 300, 4.5.2	0.06	0.09	0.09	0.13	U	pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 09:16:43	Uranium-234	HASL 300, 4.5.2	0.32	0.17	0.17	0.13		pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 09:16:43	Uranium-235	HASL 300, 4.5.2	0.06	0.09	0.09	0.14	U	pCi/l
D-6 DIS_07_12_2013	13-07111-11	08/01/2013 09:16:43	Uranium-238	HASL 300, 4.5.2	0.23	0.15	0.15	0.13	J	pCi/l
S-61 TOT_07_12_2013	13-07111-12	07/31/2013 15:16:39	Radium-226	E903.0	1.29	0.43	0.51	0.20		pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/08/2013 07:55:36	Radium-228	E904.0	1.27	0.64	0.70	1.22	J	pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 12:17:18	Thorium-228	HASL 300, 4.5.2	0.73	0.25	0.26	0.14		pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 12:17:18	Thorium-230	HASL 300, 4.5.2	5.72	1.15	1.35	0.09		pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 12:17:18	Thorium-232	HASL 300, 4.5.2	0.74	0.25	0.25	0.08		pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 09:16:44	Uranium-234	HASL 300, 4.5.2	1.26	0.39	0.40	0.18		pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 09:16:44	Uranium-235	HASL 300, 4.5.2	0.24	0.18	0.18	0.17	J	pCi/l
S-61 TOT_07_12_2013	13-07111-12	08/01/2013 09:16:44	Uranium-238	HASL 300, 4.5.2	0.79	0.30	0.31	0.22		pCi/l



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S-61 DIS_07_12_2013	13-07111-13	07/31/2013 15:16:40	Radium-226	E903.0	0.31	0.21	0.22	0.20	J	pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/08/2013 07:55:36	Radium-228	E904.0	1.53	0.68	0.76	1.28	J	pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 12:17:19	Thorium-228	HASL 300, 4.5.2	0.01	0.11	0.11	0.24	U	pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 12:17:19	Thorium-230	HASL 300, 4.5.2	0.65	0.28	0.29	0.14		pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 12:17:19	Thorium-232	HASL 300, 4.5.2	0.12	0.11	0.12	0.13	J	pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 09:17:16	Uranium-234	HASL 300, 4.5.2	1.12	0.40	0.41	0.13		pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 09:17:16	Uranium-235	HASL 300, 4.5.2	0.22	0.20	0.20	0.22	J	pCi/l
S-61 DIS_07_12_2013	13-07111-13	08/01/2013 09:17:16	Uranium-238	HASL 300, 4.5.2	0.63	0.30	0.30	0.18		pCi/l
I-67 TOT_07_12_2013	13-07111-14	07/31/2013 15:16:42	Radium-226	E903.0	0.49	0.26	0.28	0.22		pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/08/2013 07:55:37	Radium-228	E904.0	1.19	0.63	0.68	1.20	J	pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 12:17:20	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.06	0.13	U	pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 12:17:20	Thorium-230	HASL 300, 4.5.2	0.87	0.38	0.39	0.18		pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 12:17:20	Thorium-232	HASL 300, 4.5.2	0.05	0.08	0.08	0.12	U	pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 09:17:18	Uranium-234	HASL 300, 4.5.2	0.89	0.33	0.33	0.11		pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 09:17:18	Uranium-235	HASL 300, 4.5.2	0.22	0.18	0.18	0.19	J	pCi/l
I-67 TOT_07_12_2013	13-07111-14	08/01/2013 09:17:18	Uranium-238	HASL 300, 4.5.2	0.56	0.25	0.26	0.15		pCi/l
I-67 DIS_07_12_2013	13-07111-15	07/31/2013 15:16:44	Radium-226	E903.0	0.47	0.27	0.28	0.23	J	pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/08/2013 07:55:37	Radium-228	E904.0	1.28	0.60	0.67	1.14	J	pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 12:17:50	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.11	U	pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 12:17:50	Thorium-230	HASL 300, 4.5.2	0.46	0.19	0.20	0.08		pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 12:17:50	Thorium-232	HASL 300, 4.5.2	0.10	0.09	0.09	0.10	J	pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 09:17:10	Uranium-234	HASL 300, 4.5.2	0.67	0.25	0.25	0.11		pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 09:17:10	Uranium-235	HASL 300, 4.5.2	0.28	0.18	0.18	0.15	J	pCi/l
I-67 DIS_07_12_2013	13-07111-15	08/01/2013 09:17:10	Uranium-238	HASL 300, 4.5.2	0.43	0.19	0.20	0.10		pCi/l
I-68 TOT_07_12_2013	13-07111-16	07/31/2013 15:16:47	Radium-226	E903.0	1.40	0.44	0.53	0.19		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/08/2013 07:55:37	Radium-228	E904.0	3.67	0.82	1.17	1.38		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 12:17:52	Thorium-228	HASL 300, 4.5.2	1.27	0.38	0.40	0.08		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 12:17:52	Thorium-230	HASL 300, 4.5.2	1.63	0.45	0.50	0.07		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 12:17:52	Thorium-232	HASL 300, 4.5.2	0.95	0.31	0.32	0.08		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 09:17:12	Uranium-234	HASL 300, 4.5.2	1.54	0.42	0.44	0.11		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 09:17:12	Uranium-235	HASL 300, 4.5.2	0.50	0.25	0.25	0.17		pCi/l
I-68 TOT_07_12_2013	13-07111-16	08/01/2013 09:17:12	Uranium-238	HASL 300, 4.5.2	1.67	0.44	0.46	0.11		pCi/l



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I-68 DIS_07_12_2013	13-07111-17	07/31/2013 15:16:49	Radium-226	E903.0	0.76	0.36	0.40	0.23		pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/08/2013 07:55:38	Radium-228	E904.0	1.65	0.67	0.77	1.25	J	pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 12:17:45	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.05	0.08	U	pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 12:17:45	Thorium-230	HASL 300, 4.5.2	0.23	0.12	0.12	0.07		pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 12:17:45	Thorium-232	HASL 300, 4.5.2	0.06	0.06	0.06	0.08	U	pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 09:17:14	Uranium-234	HASL 300, 4.5.2	0.90	0.28	0.29	0.09		pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 09:17:14	Uranium-235	HASL 300, 4.5.2	0.26	0.16	0.16	0.10		pCi/l
I-68 DIS_07_12_2013	13-07111-17	08/01/2013 09:17:14	Uranium-238	HASL 300, 4.5.2	0.61	0.23	0.23	0.08		pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	07/31/2013 15:16:51	Radium-226	E903.0	0.27	0.21	0.22	0.23	J	pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/08/2013 07:55:43	Radium-228	E904.0	1.85	0.73	0.84	1.36	J	pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 12:17:46	Thorium-228	HASL 300, 4.5.2	0.06	0.07	0.07	0.08	U	pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 12:17:46	Thorium-230	HASL 300, 4.5.2	0.33	0.15	0.16	0.07		pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 12:17:46	Thorium-232	HASL 300, 4.5.2	0.07	0.07	0.07	0.08	U	pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 09:17:20	Uranium-234	HASL 300, 4.5.2	0.38	0.19	0.20	0.11		pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 09:17:20	Uranium-235	HASL 300, 4.5.2	0.10	0.11	0.11	0.15	U	pCi/l
DUP 04 TOT_07_12_2013	13-07111-18	08/01/2013 09:17:20	Uranium-238	HASL 300, 4.5.2	0.20	0.14	0.14	0.11	J	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	07/31/2013 15:16:54	Radium-226	E903.0	0.20	0.19	0.20	0.24	J	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/08/2013 07:55:43	Radium-228	E904.0	1.20	0.67	0.72	1.30	J	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 12:17:48	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.05	0.07	U	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 12:17:48	Thorium-230	HASL 300, 4.5.2	0.29	0.13	0.14	0.06		pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 12:17:48	Thorium-232	HASL 300, 4.5.2	0.10	0.07	0.07	0.05	J	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 09:17:23	Uranium-234	HASL 300, 4.5.2	0.47	0.20	0.20	0.12		pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 09:17:23	Uranium-235	HASL 300, 4.5.2	0.14	0.12	0.12	0.10	J	pCi/l
DUP 04 DIS_07_12_2013	13-07111-19	08/01/2013 09:17:23	Uranium-238	HASL 300, 4.5.2	0.35	0.17	0.17	0.12		pCi/l

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

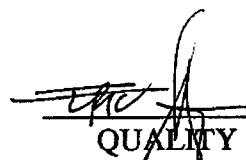
Activity calculations are based upon known specific activity and mass.

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).


ERIC ALLAS
QUALITY CONTROL
29 DECEMBER 1994
Date Signed



ISOTOPE PRODUCTS LABORATORIES
3017 N. SAN FERNANDO BLVD.
BURBANK, CALIFORNIA 91504
818-843-7000 FAX 818-843-6168

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

Chemical Composition of Standard Solution
Uranyl nitrate in dilute HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 1.77955E+04 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: September 6, 2013

Verified & Approved By [Signature]

Date: 9/26/2012 0:00

QC Approval [Signature]

Date: 9/26/12



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 479-50

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

Principal Radionuclide
234, 235, 238 U

Half Life, Years
4.468E+09

Half Life, Days
1.632E+12

Radionuclide of Interest **234, 235, 238 U**
Parent Solution Conc. **1.7796E+04** dpm/ml

Reference Date **1/1/1995 0:00**

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 Volume: **1000.00** ml

Final Activity Concentration: **7.1182E+01** dpm/ml

NOTES:

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

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

Isotopic ratios from manufacturer's data sheet

Expiration Date: **September 6, 2013**

Verified & Approved By 

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

QC Approval 

Date: **9/26/12**

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RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

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

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

Accuracy Method of measurement (see reverse of this certificate)
Random uncertainty is: $\pm 0.7\%$ Systematic uncertainty: $\pm 0.5\%$
Overall uncertainty in the radioactive concentration quoted above: $\pm 1.7\%$
Overall uncertainty is defined on the reverse of this certificate.

Radiometric 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

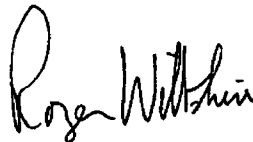
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO₃ solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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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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 # 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 μCi per gram

Ampoule /Solution Gross Weight, Grams
Empty Ampoule Weight, Grams
Solution Net Weight, Grams
Total Activity in Ampoule 0.9760 μCi

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

Dilution Instructions: Dilution Solvent Used 2M HNO₃

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.167E+03 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: December 7, 2013

Verified & Approved By [Signature]

Date: 12/13/2012 0:00

QC Approval [Signature]

Date: 12/13/12

US EPA ARCHIVE DOCUMENT



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

Solution Reference #		MP-009	Date	12/7/2012 0:00
		AEA/Amersham 92/232/67	Solution #	U-10a
Principal Radionuclide	Half Life, Years	Half Life, Days		
²³² U	7.200E+01	2.630E+04		

Radionuclide of Interest	²³² U	Reference Date	3/1/2000 0:00
Parent Solution Conc.	2.167E+03 dpm/ml		

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

Dilution Instructions: Dilution Solvent Used 2M HNO₃


SECONDARY VOLUMETRIC DILUTION

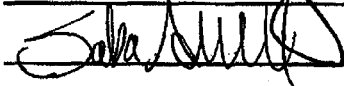
Vol. Parent Solution:	10.0000 ml	Final Activity Concentration:	2.1670E+01 dpm/ml
Total Activity:	2.1670E+04 dpm		
Final Volume:	1000.00 ml		

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: December 7, 2013

Verified & Approved By 

QC Approval 

Date: 12/13/2012 0:00

Date: 12/13/12

US EPA ARCHIVE DOCUMENT

QA/QC REVIEWED

Date 10/14/91 Initials 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.

Radiopurities

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)



ISOTOPE PRODUCTS LABORATORIES
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(818) 843 - 7000

[Signature]
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Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # **MP-009**
IPL 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**
Parent Solution Conc. **2.30E+03** dpm/ml

Reference Date **11/1/1991 0:00**

Chemical Composition of Standard Solution

²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions:

Dilution Solvent Used

0.1N HNO₃

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: **2.2999E+01** dpm/ml

NOTES:

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

Expiration Date: **March 4, 2014**

Recertified By 

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

Verified & Approved By 

Date: **3/21/13**

QC Approval 

Date: **3/21/13**

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Rev.8; 11/01/03

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

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

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

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

Ampoule /Solution Gross	<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(NO₃)₄ in water

c. Carrier content: None added

d. Density: Approx. 1.21 g/ml @ 20°C.

Radioimpurities None detected (other than daughters).

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

Radionuclide Concentration
(Th-232) 0.00779 μ Ci/g.

Method of Calibration
Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

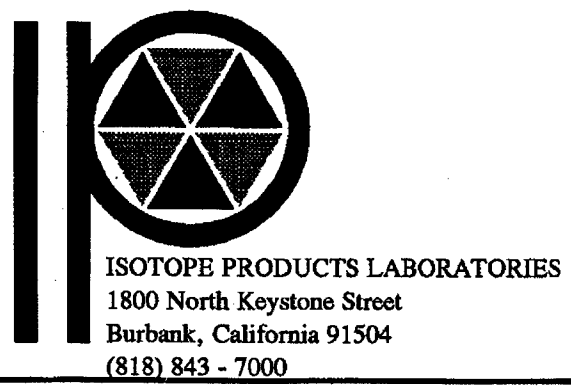
a. Systematic uncertainty in instrument calibration:	$\pm 3.0\%$
b. Random uncertainty in assay:	$\pm 0.0\%$
c. Random uncertainty in weighing(s):	$\pm 2.0\%$
d. Total uncertainty at the 99% confidence level:	$\pm 3.6\%$

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

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

Notes

- 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).



Anna U. Khan

QUALITY CONTROL

Nov. 8, 1993

Date Signed

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QUALITY CONTROL PROGRAM
MP-009

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

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

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

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

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

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

Chemical Composition of Standard Solution
Th(NO₃)₄ in H₂O

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: October 9, 2013

Verified & Approved By [Signature] Date: 10/9/2012 0:00
QC Approval [Signature] Date: 11/12/12

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 STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

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

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

Principal Radionuclide
²²⁸ & ²³² Th

Half Life, Years
1.405E+10

Half Life, Days
5.132E+12

Radionuclide of Interest **²²⁸ & ²³² Th**
Parent Solution Conc. **2.07E+02** dpm/ml

Reference Date **11/1/1993 0:00**

Chemical Composition of Standard Solution

Th(NO₃)₄ in 1% HNO₃

Dilution Instructions:

Dilution Solvent Used

1% Nitric Acid

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: **1.0355E+02** dpm/ml

NOTES:

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

Expiration Date: **October 9, 2013**

Verified & Approved By 

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

QC Approval 

Date: **11/12/12**

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**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010

Fax 661-257-8303

Th-18

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide: Th-229	Customer: EBERLINE SERVICES
Half-life: 7340 ± 160 years	P.O. No.: 00009633
Catalog No.: 7229	Reference Date: 15-Jan-02 12:00 PST
Source No.: 867-54	Contained Radioactivity: 1.013 μCi 37.48 kBq (Th-229 only)

Physical Description:

- | | |
|----------------------|--|
| A. Mass of solution: | 5.0147 g in 5 mL flame-sealed ampoule |
| B. Chemical form: | Th(NO ₃) ₄ in 0.1M HNO ₃ |
| C. Carrier content: | 10μg Th/mL |
| D. Density: | 1.0016 g/mL @ 20°C. |

Radiopurities:

None detected (daughters in equilibrium)

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

Method of Calibration:

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

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

Uncertainty of Measurement:

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

Notes:

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

Am U Khan

Quality Control

9-Jan-02

Date Signed

IPL Ref. No.: 867-54

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street Burbank, California 91504

0039

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 PRIMARY DILUTION RECERTIFICATION MP 009

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

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

Radionuclide ²²⁸Th Reference Date 1/15/2002 0:00
Certified Activity 1.013E+00 μCi
Certified Concentration $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution
²²⁸Th(NO₃)₄ in 0.1M HNO₃

Dilution Instructions: Dilution Solvent Used 0.1 M HNO₃

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.249E+03 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: October 9, 2013

Verified & Approved By
QC Approval

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

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

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

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

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.2490E+04 dpm Final Activity Concentration: 2.2490E+01 dpm/ml
Final Volume: 1000.00 ml

NOTES:

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

Expiration Date: October 9, 2013

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

Date: 11/9/2012 0:00
Date: 11/12/12

US EPA ARCHIVE DOCUMENT



National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

Ba-6
(f 6a)

ORIGINAL

ORIGINAL

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM

QCP-009

Rev.8; 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

SOLUTION REFERENCE # NIST SRM4251C CURRENT DATE 6/16/2013 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 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: June 16, 2014

Verified & Approved By [Signature]

Date: 7/1/13

QC Approval [Signature]

Date: 7/2/13



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 6/18/13
NIST SRM4251C Solution # Ba-6a

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

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

Chemical Composition of Standard Solution

¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used 1M HCl

SECONDARY VOLUMETRIC DILUTION

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

NOTES:

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

Expiration Date: June 18, 2014

Verified & Approved By [Signature]

Date: 7/1/13

QC Approval [Signature]

Date: 7/2/13

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

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

Customer: TMA EBERLINE
P.O.No.: VH1888
Reference Date: February 1 1994 12:00 PST.
Contained Radioactivity: (Ra-226) 1.001 µCi.
Contained Radioactivity: (Ra-226) 37.0 kBq.

Description of Solution

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

Radioimpurities

None detected (other than daughters)

Radioactive Daughters

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

Radionuclide Concentration

(Ra-226) 0.1929 µCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:

- Energy peak(s) integrated under: 186 keV.
- Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



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

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0010 μCi Which Equals 2.222E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.222E+03 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: November 9, 2013

Verified & Approved By 

Date: 11/9/2012

QC Approval 

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	Date	11/9/2012 0:00
IPL-453-26			Solution #	Ra-5b
Principal Radionuclide	Half Life, Years	Half Life, Days		
²²⁶ Radium	1.600E+03	5.844E+05		
Radionuclide of Interest	²²⁶ Radium	Reference Date		
Parent Solution Conc.	2.22E+03 dpm/ml	2/1/1994 0:00		
Chemical Composition of Standard Solution				
²²⁶ Ra(NO ₃) ₂ in 1M HNO ₃				



Dilution Instructions: Dilution Solvent Used 1M 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 
QC Approval 

Date: 11/9/2012 0:00

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



ANALYTICS

RA-11

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

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

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

*99% Confidence Level

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

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

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

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

Q A APPROVED: PCW 11/7/01

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



QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03

Title: Radioactive Reference Standards Solutions & Records

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

SOLUTION REFERENCE # Analytix 62680-416

CURRENT DATE 3/11/2013 0:00

SOLUTION # Ra-11

Principal Radionuclide

Half Life, Years

Half Life, Days

²²⁸Ra

5.750E+00

2.100E+03

Radionuclide ²²⁸Ra

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

²²⁸Ra(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: March 26, 2014

Recertified By

Date: 5/30/13

QC Approval

Date: 5/30/13

US EPA ARCHIVE DOCUMENT

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	UISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	2.39	81.66%	18.21%	100.00%	3.60%	8.12E+00	2.92E-01	6.63E+00	1.21E+00	U-8a	3.52E+01	3.60E+00	5.12E-01
U-238	0.12	98.89%	17.71%	100.00%	3.60%	7.92E+00	2.85E-01	7.83E+00	1.39E+00	U-8a	3.44E+01	3.60E+00	5.12E-01

Matrix Spike

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

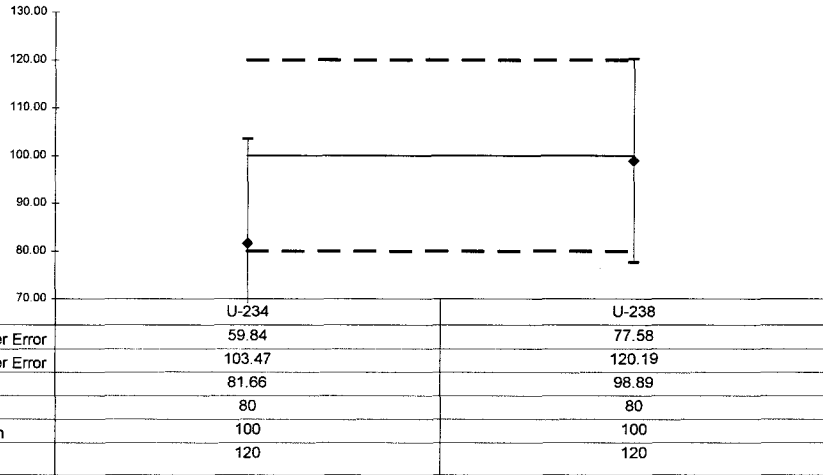
Replicate Sample

QC Summary

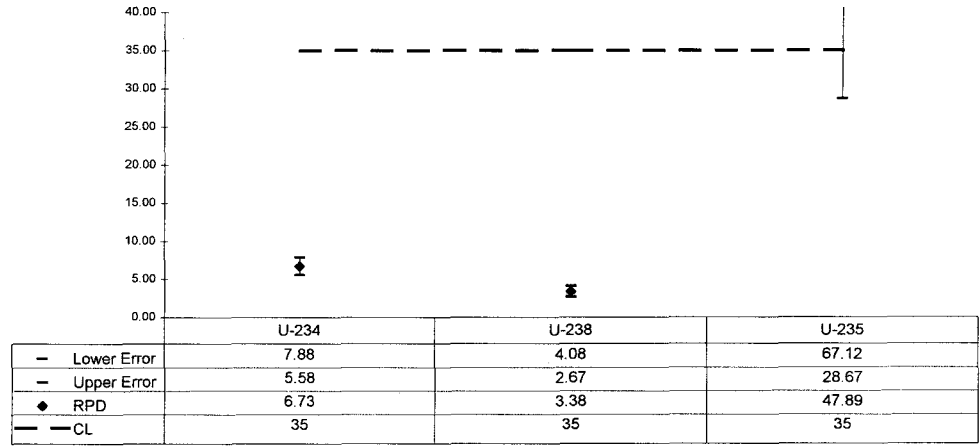
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.27	6.73	8.94E-01	3.31E-01	8.36E-01	2.60E-01	0.82	OK	OK			NA	OK
U-238	0.11	3.38	5.63E-01	2.57E-01	5.44E-01	2.04E-01	0.99	OK	OK			NA	OK
U-235	0.80	47.89	2.22E-01	1.79E-01	1.36E-01	1.08E-01		OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	UUISO	1	pCi	I	Engineering Management Support, Inc.

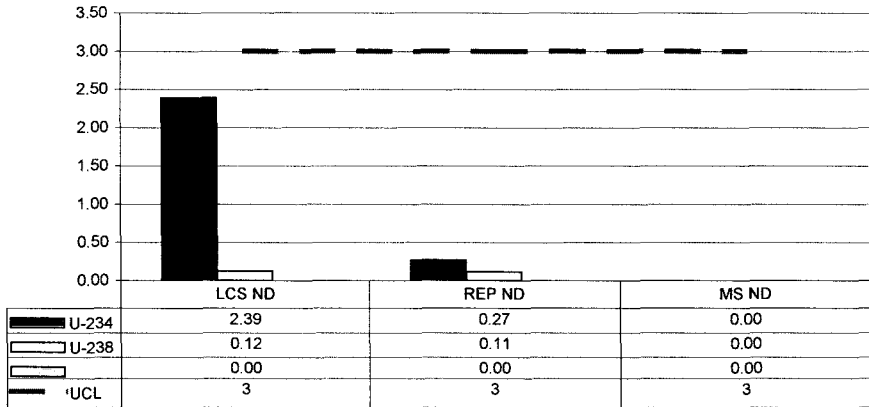
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	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	0.93	91.98%	18.15%	100.00%	3.60%	4.85E+00	1.75E-01	4.46E+00	8.10E-01	Th-8b	1.04E+02	3.60E+00	1.04E-01
TH-230	1.32	88.24%	19.66%	100.00%	2.70%	5.45E+00	1.47E-01	4.81E+00	9.45E-01	Th-1b	2.35E+01	2.70E+00	5.14E-01
TH-232	2.06	83.80%	18.17%	100.00%	3.60%	4.85E+00	1.75E-01	4.07E+00	7.39E-01	Th-8b	1.04E+02	3.60E+00	1.04E-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

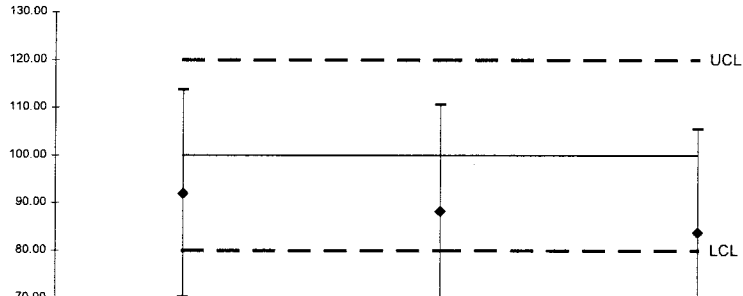
QC Summary

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	0.79	254.93	2.51E-02	6.05E-02	-3.03E-03	3.43E-02	0.92	OK	OK			NA	OK
TH-230	1.80	60.30	8.65E-01	3.90E-01	4.64E-01	1.95E-01	0.88	OK	OK			NA	OK
TH-232	0.14	14.51	5.42E-02	8.38E-02	4.69E-02	6.19E-02	0.84	OK	OK			NA	OK



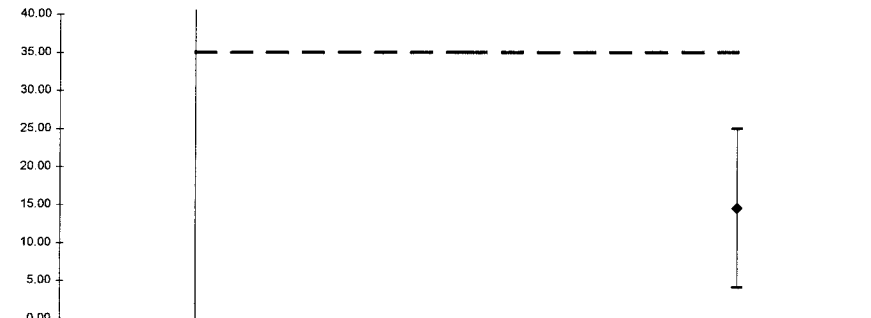
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



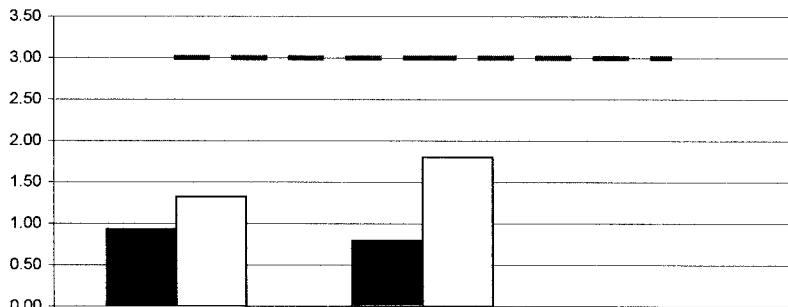
	TH-228	TH-230	TH-232
Lower Error	70.23	65.89	62.03
Upper Error	113.73	110.60	105.56
%R	91.98	88.24	83.80
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	801.99	73.55	24.96
Upper Error	-292.14	47.04	4.06
RPD	254.93	60.30	14.51
CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.93	0.79	0.00
TH-230	1.32	1.80	0.00
UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	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	0.00	100.04%	24.77%	100.00%	4.60%	1.03E+01	4.73E-01	1.03E+01	2.55E+00	Ra-5b	4.41E+01	4.60E+00	5.18E-01

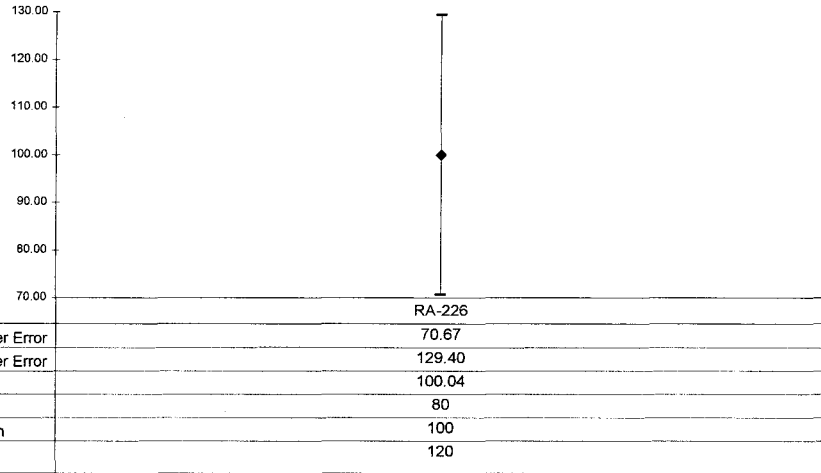
Matrix Spike

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

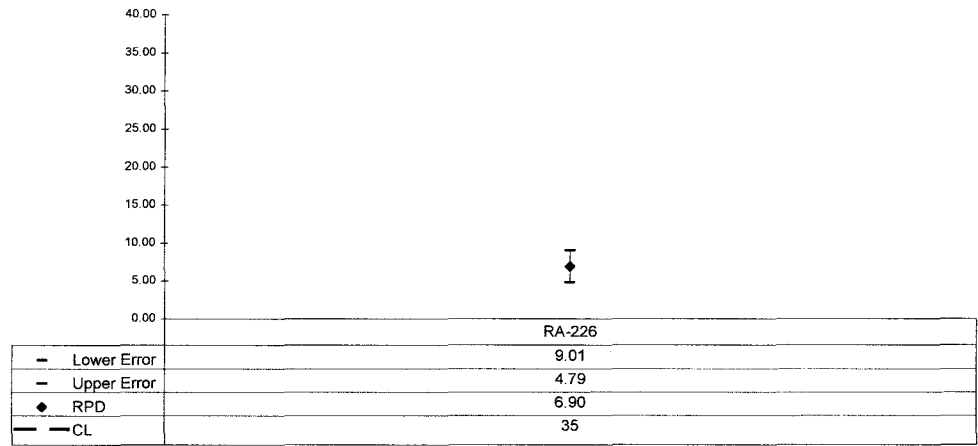
Replicate Sample							QC Summary						
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.16	6.90	4.90E-01	2.81E-01	4.57E-01	2.97E-01	1.00	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	Ra226	1	pCi	I	Engineering Management Support, Inc.

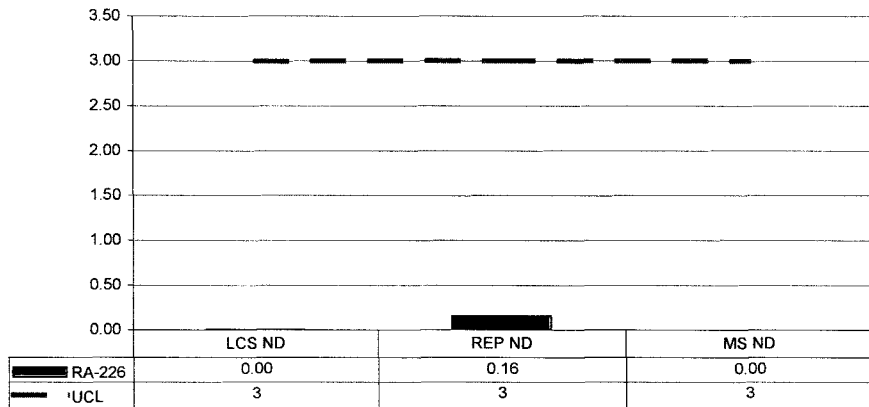
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	Ra228	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.41	93.13%	34.96%	100.00%	5.10%	8.77E+00	4.47E-01	8.17E+00	2.86E+00	Ra-11	3.78E+01	5.10E+00	5.16E-01

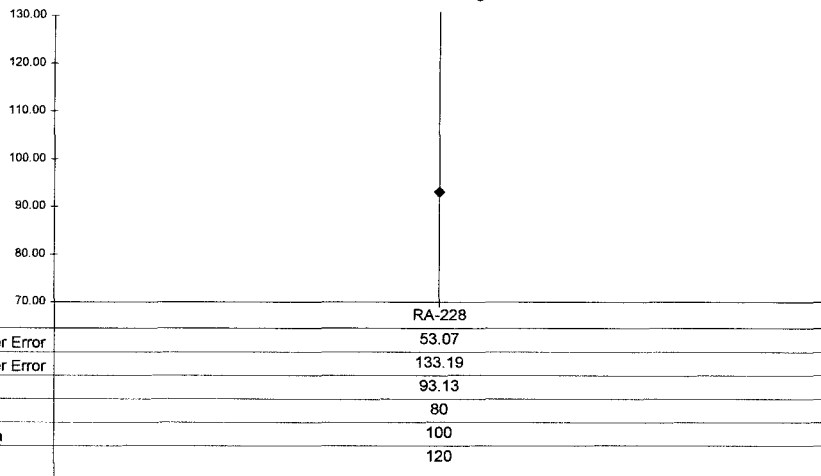
Matrix Spike

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)

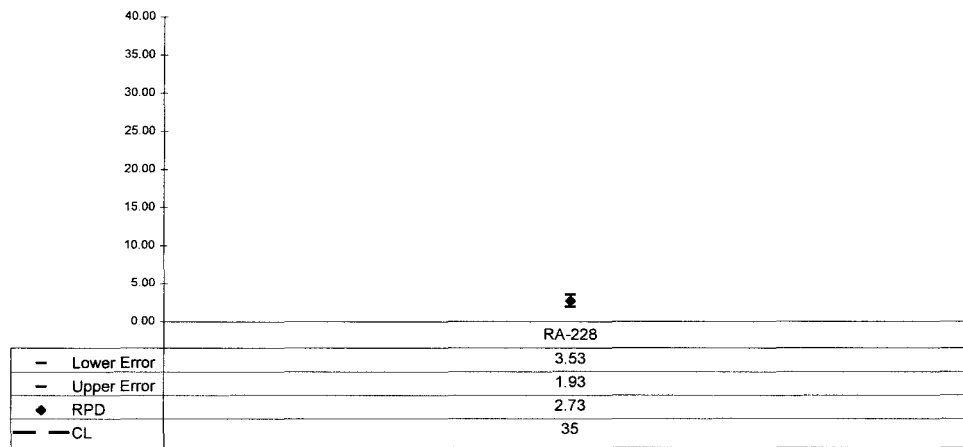
Replicate Sample							QC Summary						
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.06	2.73	1.19E+00	6.81E-01	1.22E+00	7.38E-01	0.93	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07111	Ra228	1	pCi	I	Engineering Management Support, Inc.

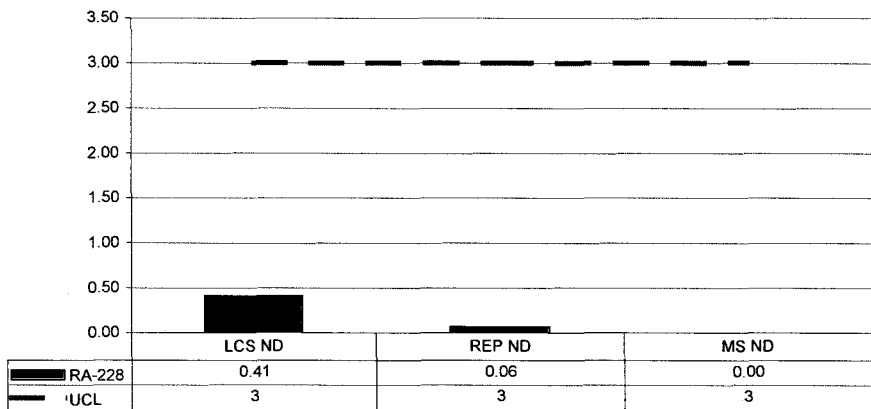
LCS % Recovery



Replicate Sample RPD



Normalized Difference



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	13-07111
		Analysis Code	UISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

J Wolfe
7/29/13


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	13-07111
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:41	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

John Demelas
 7/31/13

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	13-07111
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:41	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.
3	08/01/13 06:14	CHEM	RMARTZ	ADDED 0.1 ML NEODYMIUM CARRIER, 0.3 ML TITANOUS CHLORIDE, & 1 ML HF TO C-TUBES; LET SET SIT IN ICE BATH FOR ONE HOUR. SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.


 8/1/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07111

Analysis Code

Run

UUISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/29/2013
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/31/2013
014204S	HCl - HF	6.5N - 0.04N	JDEMELAS	7/31/2013
014206S	HCl - NH4I	8N - 0.1M	JDEMELAS	7/31/2013
014142D01	Hydrochloric Acid	0.5N	JDEMELAS	7/31/2013
014199S	Hydrochloric Acid	6.5N	JDEMELAS	7/31/2013
014196S	Hydrochloric Acid	8N	JDEMELAS	7/31/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/31/2013
014042S	Carbon substrate	Solution	RMARTZ	8/1/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/1/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	8/1/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/1/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	8/1/2013


US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Location	CTT	Analysis	Fee
7/30/13	SeedA (1-3)	Lab	1109	2hrs	Rate	KB
7/30/13	1307100A(6-14)	Eng Man	1305	2hr	Rate	c
7/30/13	KB 7/30/13			2h		
7/30/13	1307100A(15-19)	Eng. Manag. Sec	1614	2hrs	UM	KB
7/7/13	Dairy Pulse	very	0522	1hr	Rate	
7/13/13	1307110A(1-13)	Eng Man	0915	2hr	Rate	c
7/31/13	1307099A(12-17)	EMS	1215	2hrs	Rate	KB
7/31/13	1307100A(1-7)	EMS	1214	2hrs	Rate	KB
7/31/13	1307111A(7-19)	EMS	1517	2hrs	Rate	KB
7/31/13	1307120A(19-20)	EMS	1830	2hrs	Th	KB
7/31/13	1307143A(1-6)	PCC	1830	2hrs	Th	KB
7/31/13	1307141A(1-5)	Accutest	1831	2hrs	Rate	KB
8/1/13	Dairy Pulse	very	0525	1hr	Rate	
8/1/13	1707129A(1-7)	Miss. Rept	0548	2hr	Rate	c
8/1/13	1707128A(1-4)	Udon	0548	2hr	Rate	c
8/1/13	1707111A(17-19)	Eng Man	0917	2hr	Rate	c
8/1/13	1707111A(1-6)	Eng Man	0917	2hr	Rate	c

Date	Sample #	Client	Location	CT	Time	Manager	Stat
7/28/13	Daily Pulse	WV	0170	1 hr	1 hr		
7/29/13	1307120A(4-7)	ERT	0933	2 hrs	4 hrs		
7/29/13	1307158A(1-4)	ULON	0933	2 hrs	4 hrs		
7/29/13	1307150A(1-2)	ULON	0934	2 hrs	Pulse		
7/29/13	1307100A(13-19)	Eng. Manag. Serv.	1240	2 hrs	Th	KB	
7/29/13	Daily Pulse	WV	0124	1 hr	1 hr		
7/29/13	1307158A(1-4,7)	ULON	0959	2 hrs	Pulse		
7/29/13	1307158A(1-4)	ULON	0959	2 hrs	Pulse		
7/29/13	1307158A(1-4)	ULON	1000	2 hrs	Th		
7/29/13	1307128A(1-4,6)	ULON	1307	2 hrs	NP		
7/29/13	1307100A(1-5)	Eng Man	1301	2 hrs	4 hrs		
7/29/13	Daily Pulse	WV	0122	1 hr	1 hr		
7/29/13	1307128A(4,6)	ULON	0914	2 hrs	Am		
7/29/13	1307167A(1-4)	ULON	0914	2 hrs	4 hrs		
7/29/13	1307168A(1-4)	ULON	0914	2 hrs	4 hrs		
7/31/13	1307099A(2-11)	EMS	1215	2 hrs	5 hrs	Rob	KB
7/31/13	1307100A(16-19)	EMS	1515	2 hrs	5 hrs	Rob	KB
7/31/13	1307111A(1-6)	EMS	1516	2 hrs	5 hrs	Rob	KB
7/31/13	1307110A(9-18)	EMS	1829	2 hrs	5 hrs	Th	KB
8/1/13	Daily Pulse	WV	0125	1 hr	1 hr		
8/1/13	1307111A(3-7)	Eng Man	0916	2 hrs	4 hrs		


ISO TH NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07111
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

J Wolfe
 7/29/13

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	13-07111
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:42	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.

John Demelas
 7/31/13

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07111
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/29/13 08:15	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,10,11,14,15 AND 16 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	07/31/13 16:42	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	08/01/13 06:14	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.

US EPA ARCHIVE DOCUMENT

Handwritten signature
 8/1/13



Reagents Used in an Analysis

Internal Work Order

13-07111

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/29/2013
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/31/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/31/2013
014184S	Nitric Acid	8N	JDEMELAS	7/31/2013
014109P	Nitric Acid	Reagent Grade	JDEMELAS	7/31/2013
014196S	Hydrochloric Acid	8N	JDEMELAS	7/31/2013
014042S	Carbon substrate	Solution	RMARTZ	8/1/2013
014040S	Cerrium Carrier	0.1mg/ml	RMARTZ	8/1/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/1/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/1/2013

US EPA ARCHIVE DOCUMENT

Alpha #3

Sample #	Client	Location	CT/Time	Analysis	Fee
7/30/13	SeedA (1-3)	Lab	1109	2hrs50-	Rate KB
7/30/13	1307100A(1-14)	Eng Man	1305	2hr	Rate
7/30/13	1307100A(15-19)	Eng. Manag. Sec	1614	2hrs50min	Rate
7/30/13	Dairy Paise	very	0522	1hr	Rate
7/31/13	1307110A(1-13)	Eng Man	0915	2hr	Rate
7/31/13	1307099A(12-17)	EMS	1215	2hrs50-	Rate KB
7/31/13	1307100A(1-7)	EMS	1214	2hrs50-	Rate KB
7/31/13	1307111A(7-19)	EMS	1517	2hrs50-	Rate KB
7/31/13	1307120A(19-20)	EMS	1830	2hrs50mins	Th KB
7/31/13	1307143A(1-6)	PCC	1830	2hrs50mins	Th KB
7/31/13	1307141A(1-5)	Accutest	1831	2hrs50mins	Rate KB
8/1/13	Dairy Paise	very	0525	1hr	Rate
8/1/13	1707129A(1-7)	Miss. Rept	0548	2hr	Rate
8/1/13	1707128A(1-4)	Union	0548	2hr	Rate
8/1/13	1707111A(17-19)	Eng Man	0917	2hr	Rate
8/1/13	1707111A(1-6)	Eng Man	0917	2hr	Rate

US EPA ARCHIVE DOCUMENT


Alpha #3

Date	Sample #	Client	Location	CTT	Analysis	Test
7/30/13	SeedA (1-3)	Lab	1109	2hrs 50m	Rate	KB
7/30/13	1307100A(6-14)	Eng Man	1305	2hr	Unit	-
7/30/13	KB 7/30/13			2h		
7/30/13	1307100A(15-19)	Eng. Manag. Sec	1614	2hrs 50min	UM	ICB
7/7/14	Daily Pulse	MS	0522	1hr	---	---
7/31/13	1307110A(1-13)	Eng Man	0915	2hr	Unit	-
7/31/13	1307099A(12-17)	EMS	1215	2hrs 50m	Rate	ICB
7/31/13	1307100A(1-7)	EMS	1214	2hrs 50m	Rate	ICB
7/31/13	1307111A(7-19)	EMS	1517	2hrs 50m	Rate	KB
7/31/13	1307120A(19-20)	EMS	1830	2hrs 50mins	Th	ICB
7/31/13	1307143A(1-6)	PCC	1830	2hrs 50mins	Th	ICB
7/31/13	1307141A(1-5)	Accutest	1831	2hrs 50mins	Rate	ICB
8/1/13	Daily Pulse	MS	0525	1hr	---	---
8/1/13	1707129A(1-7)	Miss. Dept	0548	2hr	Rate	-
8/1/13	1707128A(1-4)	Udon	0548	2hr	Rate	-
8/1/13	1307111A(17-19)	Eng Man	0917	2hr	Unit	-
8/1/13	1707111A(1-6)	Eng Man	0917	2hr	Unit	-
8/1/13	1307111A(15-19)	EMS	1217	2hrs 50m	Th	ICB
8/1/13	1307120A(1-7)	ERA	1218	2hrs 50m	Rate	ICB

Alpha #1


Date	Sample #	Client	Incident #	CTD in	Unexposed Tech	Test
7/3/11	1307110A(1-8)	EMS	1829	2hrs 50mins	TH	ICB
8/1/11	Daily Pulse	W3	0728	1hr	un	—
8/1/11	1707140A(1-4)	W3	0745	2hr	RAB	—
8/1/11	1307098B(1-3)	Eng Man	0915	2hr	W3	—
8/1/11	1307111A(1-2)	Eng Man	0916	2hr	W3	—
8/1/11	1307111A(7-14)	EMS	1217	2hrs 50	TH	ICB

RA-226 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07111
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/26/13 11:36	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
7/26/13

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07111
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/26/13 11:36	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	07/29/13 20:33	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	07/30/13 15:55	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.

J. Walker
 7/30/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07111

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/26/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/26/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/26/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/26/2013
013930D02	Ammonium Sulfate	200 mg/ml	JWOLFE	7/26/2013
014169S	EDTA	0.25M	LWALKER	7/29/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	7/30/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	7/30/2013


US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Good	CT	OT	Manager	Stat
7/28/13	Daily Pulse	Log	0170				
7/29/13	1307120A(4-7)	EMT	0933			Thom	Utzso c
7/29/13	1307118A(1-4)	ULON	0933			Thom	Utzso c
7/29/13	1307150A(1-2)	ULON	0934			Thom	Puzso c
7/29/13	1307100A(13-19)	Eng. Manay Sew.	1240			Thom	Utzso c
7/29/13	Daily Pulse	Log	0124				
7/29/13	1307158A(1-4,7)	ULON	0959			Thom	Puzso c
7/29/13	1307118A(1-4)	ULON	0959			Thom	Puzso c
7/29/13	1307158A(1-4)	ULON	1000			Thom	Thom c
7/29/13	1307128A(1-4,6)	ULON	1307			Thom	MPZSO c
7/29/13	1307100A(1-5)	Eng Man	1301			Thom	Utzso c
7/29/13	Daily Pulse	Log	0122				
7/29/13	1307128A(1-4,6)	ULON	0914			Thom	MPZSO c
7/29/13	1307118A(1-4)	ULON	0914			Thom	Utzso c
7/29/13	1307118A(1-4)	ULON	0914			Thom	Utzso c
7/31/13	1307099A(2-11)	EMS	1215			Thom	Rak UCB
7/31/13	1307100A(11-19)	EMS	1515			Thom	Rak UCB
7/31/13	1307111A(1-6)	EMS	1514			Thom	Rak UCB

Alpha #3

Date	Sample #	Client	Location	CTTi	Analysis	Test
7/30/13	SeedA (1-3)	Lab	1104	2hrs50-	Rate	KB
7/30/13	1307100A(6-14)	Engman	1307	2hr	Rate	c
7/30/13	1307100A(15-19)	Engman	1307	2hr	Rate	KB
7/30/13	1307100A(15-19)	Eng. Murray-Seen	1614	2hrs00m	Rate	1CB
7/7/13	Daily Price	1077	0772	1hr	Rate	c
7/31/13	1307110A(1-13)	Engman	0115	2hr	Rate	c
7/31/13	1307099A(12-7)	EMS	1215	2hrs00-	Rate	1CB
7/31/13	1307100A(1-7)	EMS	1214	2hrs00-	Rate	1CB
7/31/13	1307111A(7-19)	EMS	1517	2hrs00-	Rate	KB


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	13-07111
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/26/13 11:36	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
 7/26/13


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	13-07111
			Analysis Code	Ra228
			Run Number	1

#	Date	Dept	User	Notes
1	07/26/13 11:36	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/01/13 12:52	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/06/13 15:30	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

L Walker
 8/6/13

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	13-07111
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/26/13 11:36	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/01/13 12:52	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/06/13 15:30	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/08/13 06:20	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)

8-8-13
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US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Fuel Tin	C/T Tin	Analysis	Fuel
8/7/13	1307172CL(1-3,5)	UCOR	1518	30mins	CL36	KB
8/7/13	1307184CL(1-3,5)	UCOR	1519	30mins	CL36	KB
8/7/13	1308004CL(1-3,6)	UCOR	1555	30mins	CL36	KB
8/7/13	1308005CL(1-3,5)	UCOR	1556	30mins	CL36	KB
8/8/13	BIGDOG	URS	0117	6m	113	C
8/8/13	GF702	URS	0616	7m	113	C
8/8/13	1707111(A10-19)	Engwa	0786	2L	113	C

Date	Sample #	Client	Facilities	C/T	Analysis	Fee
8/7/13	1307172CL(1-3,5)	UCOR	1518	30mins	CL36	KB
8/7/13	1307186CL(1-3,5)	UCOR	1519	30mins	CL36	KB
8/7/13	1308004CL(1-3,6)	UCOR	1555	30mins	CL36	KB
8/7/13	1308005CL(1-3,5)	UCOR	1556	30mins	CL36	KB
8/8/13	BILGADOL	URS	0717	hr	113	C
8/8/13	GF702	URS	0616	7-	113	C
8/8/13	1707111RA(10-19)	EngMan	0786	2L	RA	C
8/8/13	1707111RA(1)	EngMan	1013	30min	RA	C
8/8/13	17071254(1-7,8-13)	TestAm.	1017	2L	S/Soly	C

Date	Sample #	Client	Location	CT Time	Analysis	Fee
8/11/13	1707079SN(1-4)	Unitech	1050	2h	SN707	C
8/11/13	1707082SN(1-4)	Unitech	1050	2h	SN707	C
8/11/13	1707106SN(1-4)	Unitech	1050	2h	SN707	C
8/21/13	ETFOE	LAB	0507	70m	LAB	C
8/21/13	BLLADOC	LAB	0540	6m	LAB	C
8/21/13	1707110RA(2-2)	Engman	0759	2h	RA8	C
8/21/13	170709254(2-4.8)	Ulon	1012	2h	SN904	C
8/21/13	170710754(1-5.8.9)	TestAm	1012	2h	SN904	C
8/21/13	1307077ABC(1-6)	Accutest	1219	2hrs	2B	KB
8/21/13	1307128CL(1-3,5,7)	Ulor	1504	30mins	CL36	KB
8/21/13	1307172CL(1-3,5)	Ulor	1505	30mins	CL36	KB
8/3/13	Weekly BKsgl	Lab	0948	12 hrs	2B	KB
8/15/13	ETFOE	LAB	0518	70m	LAB	C
8/15/13	BLLADOC	LAB	0544	6m	LAB	C
8/15/13	1307099RA(1-1)	Engman	0802	2h	RA8	C
8/15/13	170709454(1-6.7)	TestAm	1014	2h	SN904	C
8/16/13	ETFOE	LAB	0541	30m	LAB	C
8/16/13	BLLADOC	LAB	0546	6m	LAB	C
8/16/13	1707100RA(2-3)	Engman	0808	2h	RA8	C
8/16/13	1307171PB(2-4,6)	Ulon	1013	2h	PB200	C
8/16/13	1707171NPA(4,6)	Ulon	1015	10min	NP272	C
8/17/13	ETFOE	LAB	0520	70m	LAB	C
8/17/13	BLLADOC	LAB	0547	6m	LAB	C
8/17/13	1707140RA(1-4)	Ulon	0818	2h	RA8	C
8/17/13	1707171RA(1-3)	Ulon	0818	2h	RA8	C
8/17/13	1707108RA(2-8)	Accutest	1858	2h	RA8	C
8/17/13	1708006NPL(1-4)	Ulon	1071	10m	NP272	C
8/17/13	1707172NPA(4)	Ulon	1044	10m	NP272	C
8/17/13	1708071AN(2-5)	Ulon	1707	2h	LAB	C
8/17/13	170802SAN(2-4)	Ulon	1707	2h	LAB	C
8/17/13	1307120RA(1-7)	ERA	1511	2hrs	Raw	KB
8/18/13	ETFOE	LAB	0517	70m	LAB	C
8/18/13	BLLADOC	LAB	0544	6m	LAB	C
8/18/13	1707111RA(2-8)	Engman	0754	2h	RA8	C

US EPA ARCHIVE DOCUMENT

SECTION VIII
ANALYTICAL DATA (ISOTOPIC URANIUM)

Work Order	13-07111	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	UUISO	01	LCS	LCS		07/17/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/17/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 03 TOT	45	07/11/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 03 DIS	45	07/11/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	S-8 TOT	40	07/12/13 09:23	1.0000E+00
Report Level	4	07	TRG	S-8 DIS	40	07/12/13 09:23	1.0000E+00
Activity Units	pCi	08	TRG	I-62 TOT	42	07/12/13 09:56	1.0000E+00
Aliquot Units	I	09	TRG	I-62 DIS	42	07/12/13 09:56	1.0000E+00
Matrix	WA	10	TRG	D-6 TOT	45	07/12/13 11:35	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	D-6 DIS	45	07/12/13 11:35	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	S-61 TOT	38	07/12/13 12:02	1.0000E+00
Radiometric Tracer	U-232	13	TRG	S-61 DIS	38	07/12/13 12:02	1.0000E+00
Radiometric Sol#	U-10a	14	DO	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Tracer Act (dpm/g)	19.045	15	TRG	I-67 DIS	43	07/12/13 13:33	1.0000E+00
Carrier		16	TRG	I-68 TOT	39	07/12/13 14:35	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	I-68 DIS	39	07/12/13 14:35	1.0000E+00
		18	TRG	DUP 04 TOT	39	07/12/13 00:00	1.0000E+00
		19	TRG	DUP 04 DIS	39	07/12/13 00:00	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.

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	0.6120	11.7		0.00								
02	MBL	0.6085	11.6		0.00								
03	DUP	0.6072	11.6		0.00								
04	TRG	0.6032	11.5		0.00								
05	TRG	0.6056	11.5		0.00								
06	TRG	0.6046	11.5		0.00								
07	TRG	0.6050	11.5		0.00								
08	TRG	0.6064	11.5		0.00								
09	TRG	0.6061	11.5		0.00								
10	TRG	0.6073	11.6		0.00								
11	TRG	0.5962	11.4		0.00								
12	TRG	0.6041	11.5		0.00								
13	TRG	0.6059	11.5		0.00								
14	DO	0.6070	11.6		0.00								
15	TRG	0.6062	11.5		0.00								
16	TRG	0.6046	11.5		0.00								
17	TRG	0.6054	11.5		0.00								
18	TRG	0.6061	11.5		0.00								
19	TRG	0.6064	11.5		0.00								

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

0001

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Rough Prep Date</i>	<i>Rough Prep By</i>	<i>Prep Date</i>	<i>Prep By</i>	<i>Sep t0 Date/Time</i>	<i>Sep t0 By</i>	<i>Sep t1 Date/Time</i>	<i>Sep t1 By</i>
01	LCS			07/29/13 08:10	JWOLFE				
02	MBL			07/29/13 08:10	JWOLFE				
03	DUP			07/29/13 08:10	JWOLFE				
04	TRG			07/29/13 08:10	JWOLFE				
05	TRG			07/29/13 08:10	JWOLFE				
06	TRG			07/29/13 08:10	JWOLFE				
07	TRG			07/29/13 08:10	JWOLFE				
08	TRG			07/29/13 08:10	JWOLFE				
09	TRG			07/29/13 08:10	JWOLFE				
10	TRG			07/29/13 08:10	JWOLFE				
11	TRG			07/29/13 08:10	JWOLFE				
12	TRG			07/29/13 08:10	JWOLFE				
13	TRG			07/29/13 08:10	JWOLFE				
14	DO			07/29/13 08:10	JWOLFE				
15	TRG			07/29/13 08:10	JWOLFE				
16	TRG			07/29/13 08:10	JWOLFE				
17	TRG			07/29/13 08:10	JWOLFE				
18	TRG			07/29/13 08:10	JWOLFE				
19	TRG			07/29/13 08:10	JWOLFE				

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

5092

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UISO-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	6.63E+00	1.11E+00	1.24E-01	8.12E+00	81.66	OK		OK	
02	U-234	MBL	BLANK	pCi/l	3.93E-01	1.62E-01	6.60E-02					OK	OK
03	U-234	DUP	I-67 TOT	pCi/l	8.36E-01	2.53E-01	8.69E-02				NA	OK	
04	U-234	TRG	DUP 03 TOT	pCi/l	1.87E-01	1.49E-01	1.34E-01					OK	
05	U-234	TRG	DUP 03 DIS	pCi/l	7.33E-01	4.58E-01	3.01E-01					OK	
06	U-234	TRG	S-8 TOT	pCi/l	1.00E+00	3.68E-01	1.60E-01					OK	
07	U-234	TRG	S-8 DIS	pCi/l	1.14E+00	3.11E-01	1.09E-01					OK	
08	U-234	TRG	I-62 TOT	pCi/l	3.84E-01	1.77E-01	1.21E-01					OK	
09	U-234	TRG	I-62 DIS	pCi/l	5.77E-01	2.33E-01	1.19E-01					OK	
10	U-234	TRG	D-6 TOT	pCi/l	3.71E-01	2.04E-01	1.78E-01					OK	
11	U-234	TRG	D-6 DIS	pCi/l	3.19E-01	1.71E-01	1.26E-01					OK	
12	U-234	TRG	S-61 TOT	pCi/l	1.26E+00	3.88E-01	1.80E-01					OK	
13	U-234	TRG	S-61 DIS	pCi/l	1.12E+00	4.02E-01	1.27E-01					OK	
14	U-234	DO	I-67 TOT	pCi/l	8.94E-01	3.25E-01	1.07E-01					OK	
15	U-234	TRG	I-67 DIS	pCi/l	6.72E-01	2.50E-01	1.09E-01					OK	
16	U-234	TRG	I-68 TOT	pCi/l	1.54E+00	4.23E-01	1.07E-01					OK	
17	U-234	TRG	I-68 DIS	pCi/l	9.03E-01	2.85E-01	9.25E-02					OK	
18	U-234	TRG	DUP 04 TOT	pCi/l	3.84E-01	1.94E-01	1.10E-01					OK	
19	U-234	TRG	DUP 04 DIS	pCi/l	4.66E-01	2.00E-01	1.16E-01					OK	



Run
1
Analysis Code
UISO

Eberline Services Work Order
13-07111

Client
Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	07/17/13 00:00	1.00E+00	73.09	0.00	0.00			
02	U-234	MBL	07/17/13 00:00	1.00E+00	113.63	0.00	0.00			
03	U-234	DUP	07/12/13 13:33	1.00E+00	90.23	0.00	0.00			
04	U-234	TRG	07/11/13 00:00	1.00E+00	57.11	0.00	0.00			
05	U-234	TRG	07/11/13 00:00	1.00E+00	26.20	0.00	0.00			
06	U-234	TRG	07/12/13 09:23	1.00E+00	61.11	0.00	0.00			
07	U-234	TRG	07/12/13 09:23	1.00E+00	89.67	0.00	0.00			
08	U-234	TRG	07/12/13 09:56	1.00E+00	84.20	0.00	0.00			
09	U-234	TRG	07/12/13 09:56	1.00E+00	72.39	0.00	0.00			
10	U-234	TRG	07/12/13 11:35	1.00E+00	63.41	0.00	0.00			
11	U-234	TRG	07/12/13 11:35	1.00E+00	64.90	0.00	0.00			
12	U-234	TRG	07/12/13 12:02	1.00E+00	78.92	0.00	0.00			
13	U-234	TRG	07/12/13 12:02	1.00E+00	47.34	0.00	0.00			
14	U-234	DO	07/12/13 13:33	1.00E+00	55.71	0.00	0.00			
15	U-234	TRG	07/12/13 13:33	1.00E+00	70.26	0.00	0.00			
16	U-234	TRG	07/12/13 14:35	1.00E+00	61.84	0.00	0.00			
17	U-234	TRG	07/12/13 14:35	1.00E+00	79.73	0.00	0.00			
18	U-234	TRG	07/12/13 00:00	1.00E+00	58.56	0.00	0.00			
19	U-234	TRG	07/12/13 00:00	1.00E+00	71.94	0.00	0.00			

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

7600

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UIISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	08/01/13 09:16		A_Spec	Alpha_014	170.02	3.37 E+02	6.00 E-03	18.5
02	U-234	MBL	08/01/13 09:16		A_Spec	Alpha_015	170.02	2.48 E+01	1.00 E-03	14.8
03	U-234	DUP	08/01/13 09:16		A_Spec	Alpha_018	170.02	5.05 E+01	3.00 E-03	17.8
04	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_019	170.02	6.66 E+00	2.00 E-03	16.6
05	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_020	170	1.17 E+01	2.00 E-03	16.1
06	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_022	170	3.53 E+01	4.00 E-03	15.3
07	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_023	170.02	6.60 E+01	6.00 E-03	17.1
08	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_024	170.02	2.08 E+01	7.00 E-03	17.1
09	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_025	170.02	2.73 E+01	4.00 E-03	17.4
10	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_027	170	1.53 E+01	1.00 E-02	17.3
11	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_029	170	1.51 E+01	5.00 E-03	19.5
12	U-234	TRG	08/01/13 09:16		A_Spec	Alpha_031	170	5.31 E+01	1.10 E-02	14.2
13	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_033	170	3.68 E+01	1.00 E-03	18.5
14	U-234	DO	08/01/13 09:17		A_Spec	Alpha_034	170	3.48 E+01	1.00 E-03	18.6
15	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_035	170	3.25 E+01	3.00 E-03	18.3
16	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_036	170	6.87 E+01	2.00 E-03	19.1
17	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_038	170	4.67 E+01	2.00 E-03	17.2
18	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_039	170	1.67 E+01	2.00 E-03	19.7
19	U-234	TRG	08/01/13 09:17		A_Spec	Alpha_040	170	2.40 E+01	0.00 E+00	19

	
Run	1
Analysis Code	UIISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

5500

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UJISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/l	7.83E+00	1.27E+00	1.03E-01	7.92E+00	98.89	OK		OK	
02	U-238	MBL	BLANK	pCi/l	9.45E-02	8.24E-02	9.44E-02					OK	OK
03	U-238	DUP	I-67 TOT	pCi/l	5.44E-01	2.00E-01	1.04E-01				NA	OK	
04	U-238	TRG	DUP 03 TOT	pCi/l	1.30E-01	1.25E-01	1.33E-01					OK	
05	U-238	TRG	DUP 03 DIS	pCi/l	1.88E-01	2.49E-01	3.75E-01					OK	
06	U-238	TRG	S-8 TOT	pCi/l	7.20E-01	3.03E-01	1.48E-01					OK	
07	U-238	TRG	S-8 DIS	pCi/l	6.29E-01	2.20E-01	9.05E-02					OK	
08	U-238	TRG	I-62 TOT	pCi/l	1.77E-01	1.23E-01	1.26E-01					OK	
09	U-238	TRG	I-62 DIS	pCi/l	3.12E-01	1.65E-01	8.78E-02					OK	
10	U-238	TRG	D-6 TOT	pCi/l	5.19E-02	8.42E-02	1.44E-01					OK	
11	U-238	TRG	D-6 DIS	pCi/l	2.30E-01	1.45E-01	1.26E-01					OK	
12	U-238	TRG	S-61 TOT	pCi/l	7.94E-01	3.05E-01	2.19E-01					OK	
13	U-238	TRG	S-61 DIS	pCi/l	6.34E-01	2.95E-01	1.81E-01					OK	
14	U-238	DO	I-67 TOT	pCi/l	5.63E-01	2.54E-01	1.53E-01					OK	
15	U-238	TRG	I-67 DIS	pCi/l	4.26E-01	1.94E-01	9.85E-02					OK	
16	U-238	TRG	I-68 TOT	pCi/l	1.67E+00	4.44E-01	1.07E-01					OK	
17	U-238	TRG	I-68 DIS	pCi/l	6.13E-01	2.28E-01	8.04E-02					OK	
18	U-238	TRG	DUP 04 TOT	pCi/l	1.99E-01	1.38E-01	1.10E-01					OK	
19	U-238	TRG	DUP 04 DIS	pCi/l	3.48E-01	1.71E-01	1.16E-01					OK	

	
Run	1
Analysis Code	UJISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

9500

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UIISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	07/17/13 00:00	1.00E+00	73.09	0.00	0.00			
02	U-238	MBL	07/17/13 00:00	1.00E+00	113.63	0.00	0.00			
03	U-238	DUP	07/12/13 13:33	1.00E+00	90.23	0.00	0.00			
04	U-238	TRG	07/11/13 00:00	1.00E+00	57.11	0.00	0.00			
05	U-238	TRG	07/11/13 00:00	1.00E+00	26.20	0.00	0.00			
06	U-238	TRG	07/12/13 09:23	1.00E+00	61.11	0.00	0.00			
07	U-238	TRG	07/12/13 09:23	1.00E+00	89.67	0.00	0.00			
08	U-238	TRG	07/12/13 09:56	1.00E+00	84.20	0.00	0.00			
09	U-238	TRG	07/12/13 09:56	1.00E+00	72.39	0.00	0.00			
10	U-238	TRG	07/12/13 11:35	1.00E+00	63.41	0.00	0.00			
11	U-238	TRG	07/12/13 11:35	1.00E+00	64.90	0.00	0.00			
12	U-238	TRG	07/12/13 12:02	1.00E+00	78.92	0.00	0.00			
13	U-238	TRG	07/12/13 12:02	1.00E+00	47.34	0.00	0.00			
14	U-238	DO	07/12/13 13:33	1.00E+00	55.71	0.00	0.00			
15	U-238	TRG	07/12/13 13:33	1.00E+00	70.26	0.00	0.00			
16	U-238	TRG	07/12/13 14:35	1.00E+00	61.84	0.00	0.00			
17	U-238	TRG	07/12/13 14:35	1.00E+00	79.73	0.00	0.00			
18	U-238	TRG	07/12/13 00:00	1.00E+00	58.56	0.00	0.00			
19	U-238	TRG	07/12/13 00:00	1.00E+00	71.94	0.00	0.00			



Run 1

Analysis Code UIISO

Eberline Services Work Order 13-07111

Client Engineering Management Support, Inc.

4600

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UIISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	08/01/13 09:16		A_Spec	Alpha_014	170.02	3.99 E+02	3.00 E-03	18.5
02	U-238	MBL	08/01/13 09:16		A_Spec	Alpha_015	170.02	6.00 E+00	0.00 E+00	14.8
03	U-238	DUP	08/01/13 09:16		A_Spec	Alpha_018	170.02	3.30 E+01	6.00 E-03	17.8
04	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_019	170.02	4.66 E+00	2.00 E-03	16.6
05	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_020	170	3.00 E+00	0.00 E+00	16.1
06	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_022	170	2.55 E+01	3.00 E-03	15.3
07	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_023	170.02	3.65 E+01	3.00 E-03	17.1
08	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_024	170.02	9.64 E+00	8.00 E-03	17.1
09	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_025	170.02	1.48 E+01	1.00 E-03	17.4
10	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_027	170	2.15 E+00	5.00 E-03	17.3
11	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_029	170	1.10 E+01	0.00 E+00	19.5
12	U-238	TRG	08/01/13 09:16		A_Spec	Alpha_031	170	3.36 E+01	2.00 E-02	14.2
13	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_033	170	2.10 E+01	0.00 E+00	18.5
14	U-238	DO	08/01/13 09:17		A_Spec	Alpha_034	170	2.20 E+01	0.00 E+00	18.6
15	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_035	170	2.07 E+01	2.00 E-03	18.3
16	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_036	170	7.47 E+01	2.00 E-03	19.1
17	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_038	170	3.18 E+01	1.00 E-03	17.2
18	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_039	170	8.66 E+00	2.00 E-03	19.7
19	U-238	TRG	08/01/13 09:17		A_Spec	Alpha_040	170	1.80 E+01	0.00 E+00	19



Run 1

Analysis Code
UIISO

Eberline Services Work Order
13-07111

Client
Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UISO-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-235	LCS	LCS	pCi/l	1.28E+00	3.84E-01	1.01E-01					OK	
02	U-235	MBL	BLANK	pCi/l	8.43E-02	8.71E-02	1.10E-01					OK	OK
03	U-235	DUP	I-67 TOT	pCi/l	1.36E-01	1.08E-01	9.77E-02				NA	OK	
04	U-235	TRG	DUP 03 TOT	pCi/l	1.32E-01	1.37E-01	1.44E-01					OK	
05	U-235	TRG	DUP 03 DIS	pCi/l	1.55E-01	2.66E-01	4.65E-01					OK	
06	U-235	TRG	S-8 TOT	pCi/l	3.67E-01	2.35E-01	1.84E-01					OK	
07	U-235	TRG	S-8 DIS	pCi/l	2.03E-01	1.35E-01	1.12E-01					OK	
08	U-235	TRG	I-62 TOT	pCi/l	3.26E-01	1.78E-01	1.28E-01					OK	
09	U-235	TRG	I-62 DIS	pCi/l	1.56E-01	1.37E-01	1.56E-01					OK	
10	U-235	TRG	D-6 TOT	pCi/l	8.97E-03	8.87E-02	2.20E-01					OK	
11	U-235	TRG	D-6 DIS	pCi/l	6.46E-02	8.98E-02	1.36E-01					OK	
12	U-235	TRG	S-61 TOT	pCi/l	2.43E-01	1.77E-01	1.65E-01					OK	
13	U-235	TRG	S-61 DIS	pCi/l	2.25E-01	1.97E-01	2.24E-01					OK	
14	U-235	DO	I-67 TOT	pCi/l	2.22E-01	1.79E-01	1.90E-01					OK	
15	U-235	TRG	I-67 DIS	pCi/l	2.81E-01	1.77E-01	1.53E-01					OK	
16	U-235	TRG	I-68 TOT	pCi/l	4.99E-01	2.47E-01	1.66E-01					OK	
17	U-235	TRG	I-68 DIS	pCi/l	2.58E-01	1.59E-01	9.96E-02					OK	
18	U-235	TRG	DUP 04 TOT	pCi/l	9.93E-02	1.14E-01	1.49E-01					OK	
19	U-235	TRG	DUP 04 DIS	pCi/l	1.40E-01	1.17E-01	1.00E-01					OK	

	
Run	1
Analysis Code	UISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

6600

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	07/17/13 00:00	1.00E+00	73.09	0.00	0.00			
02	U-235	MBL	07/17/13 00:00	1.00E+00	113.63	0.00	0.00			
03	U-235	DUP	07/12/13 13:33	1.00E+00	90.23	0.00	0.00			
04	U-235	TRG	07/11/13 00:00	1.00E+00	57.11	0.00	0.00			
05	U-235	TRG	07/11/13 00:00	1.00E+00	26.20	0.00	0.00			
06	U-235	TRG	07/12/13 09:23	1.00E+00	61.11	0.00	0.00			
07	U-235	TRG	07/12/13 09:23	1.00E+00	89.67	0.00	0.00			
08	U-235	TRG	07/12/13 09:56	1.00E+00	84.20	0.00	0.00			
09	U-235	TRG	07/12/13 09:56	1.00E+00	72.39	0.00	0.00			
10	U-235	TRG	07/12/13 11:35	1.00E+00	63.41	0.00	0.00			
11	U-235	TRG	07/12/13 11:35	1.00E+00	64.90	0.00	0.00			
12	U-235	TRG	07/12/13 12:02	1.00E+00	78.92	0.00	0.00			
13	U-235	TRG	07/12/13 12:02	1.00E+00	47.34	0.00	0.00			
14	U-235	DO	07/12/13 13:33	1.00E+00	55.71	0.00	0.00			
15	U-235	TRG	07/12/13 13:33	1.00E+00	70.26	0.00	0.00			
16	U-235	TRG	07/12/13 14:35	1.00E+00	61.84	0.00	0.00			
17	U-235	TRG	07/12/13 14:35	1.00E+00	79.73	0.00	0.00			
18	U-235	TRG	07/12/13 00:00	1.00E+00	58.56	0.00	0.00			
19	U-235	TRG	07/12/13 00:00	1.00E+00	71.94	0.00	0.00			

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

0010

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-UISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	08/01/13 09:16		A_Spec	Alpha_014	170.02	5.28 E+01	1.00 E-03	18.5
02	U-235	MBL	08/01/13 09:16		A_Spec	Alpha_015	170.02	4.32 E+00	4.00 E-03	14.8
03	U-235	DUP	08/01/13 09:16		A_Spec	Alpha_018	170.02	6.66 E+00	2.00 E-03	17.8
04	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_019	170.02	3.83 E+00	1.00 E-03	16.6
05	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_020	170	2.00 E+00	0.00 E+00	16.1
06	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_022	170	1.05 E+01	3.00 E-03	15.3
07	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_023	170.02	9.49 E+00	3.00 E-03	17.1
08	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_024	170.02	1.43 E+01	4.00 E-03	17.1
09	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_025	170.02	6.00 E+00	0.00 E+00	17.4
10	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_027	170	3.00 E-01	1.00 E-02	17.3
11	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_029	170	2.49 E+00	3.00 E-03	19.5
12	U-235	TRG	08/01/13 09:16		A_Spec	Alpha_031	170	8.32 E+00	4.00 E-03	14.2
13	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_033	170	6.00 E+00	0.00 E+00	18.5
14	U-235	DO	08/01/13 09:17		A_Spec	Alpha_034	170	7.00 E+00	0.00 E+00	18.6
15	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_035	170	1.10 E+01	0.00 E+00	18.3
16	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_036	170	1.80 E+01	0.00 E+00	19.1
17	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_038	170	1.08 E+01	1.00 E-03	17.2
18	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_039	170	3.49 E+00	3.00 E-03	19.7
19	U-235	TRG	08/01/13 09:17		A_Spec	Alpha_040	170	5.83 E+00	1.00 E-03	19

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07111	Analysis Code	UISO	Run	1

Handwritten scribble

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*
0914	01 14	LCS	LCS	07/17/13 00:00	1.0000	0.6120	11.6555	0.00		
	02 15	MBL	BLANK	07/17/13 00:00	1.0000	0.6085	11.5889	0.00		
	03 18	DUP	I-67 TOT	07/12/13 13:33	1.0000	0.6072	11.5641	0.00		
	04	TRG	DUP 03 TOT	07/11/13 00:00	1.0000	0.6032	11.4879	0.00		
	05	TRG	DUP 03 DIS	07/11/13 00:00	1.0000	0.6056	11.5337	0.00		
0916	06	TRG	S-8 TOT	07/12/13 09:23	1.0000	0.6046	11.5146	0.00		
	07	TRG	S-8 DIS	07/12/13 09:23	1.0000	0.6050	11.5222	0.00		
	08	TRG	I-62 TOT	07/12/13 09:56	1.0000	0.6064	11.5489	0.00		
	09	TRG	I-62 DIS	07/12/13 09:56	1.0000	0.6061	11.5432	0.00		
	10	TRG	D-6 TOT	07/12/13 11:35	1.0000	0.6073	11.5660	0.00		
	11	TRG	D-6 DIS	07/12/13 11:35	1.0000	0.5962	11.3546	0.00		
	12 31	TRG	S-61 TOT	07/12/13 12:02	1.0000	0.6041	11.5051	0.00		
	13 33	TRG	S-61 DIS	07/12/13 12:02	1.0000	0.6059	11.5394	0.00		
0917	14	DO	I-67 TOT	07/12/13 13:33	1.0000	0.6070	11.5603	0.00		
	15	TRG	I-67 DIS	07/12/13 13:33	1.0000	0.6062	11.5451	0.00		
	16	TRG	I-68 TOT	07/12/13 14:35	1.0000	0.6046	11.5146	0.00		
	17	TRG	I-68 DIS	07/12/13 14:35	1.0000	0.6054	11.5298	0.00		
	18	TRG	DUP 04 TOT	07/12/13 00:00	1.0000	0.6061	11.5432	0.00		
	19 40	TRG	DUP 04 DIS	07/12/13 00:00	1.0000	0.6064	11.5489	0.00		

Spike and Tracer Worksheet

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07111		1	UUISO		7/29/2013 8:08	JWOLFE		JW			

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
U-234	U-8a	35.240	7/29/2013	0.500	0.5116				8.12	0.292	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	7/29/2013	0.500	0.5116				7.92	0.285	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										
01	U-232	U-10a	19.045	7/29/2013	0.6120	0.6300	0.6120 g									
02	U-232	U-10a	19.045	7/29/2013	0.6085	0.6300	0.6085 g									
03	U-232	U-10a	19.045	7/29/2013	0.6072	0.6300	-0.6072 g									
04	U-232	U-10a	19.045	7/29/2013	0.6032	0.6300	-0.6032 g									
05	U-232	U-10a	19.045	7/29/2013	0.6056	0.6300	-0.6056 g									
06	U-232	U-10a	19.045	7/29/2013	0.6046	0.6300	-0.6046 g									
07	U-232	U-10a	19.045	7/29/2013	0.6050	0.6300	-0.6050 g									
08	U-232	U-10a	19.045	7/29/2013	0.6064	0.6300	-0.6064 g									
09	U-232	U-10a	19.045	7/29/2013	0.6061	0.6300	-0.6061 g									
10	U-232	U-10a	19.045	7/29/2013	0.6073	0.6300	-0.6073 g									
11	U-232	U-10a	19.045	7/29/2013	0.5962	0.6300	-0.5962 g									
12	U-232	U-10a	19.045	7/29/2013	0.6041	0.6300	-0.6041 g									
13	U-232	U-10a	19.045	7/29/2013	0.6059	0.6300	-0.6059 g									
14	U-232	U-10a	19.045	7/29/2013	0.6070	0.6300	-0.6070 g									
15	U-232	U-10a	19.045	7/29/2013	0.6062	0.6300	-0.6062 g									
16	U-232	U-10a	19.045	7/29/2013	0.6046	0.6300	-0.6046 g									
17	U-232	U-10a	19.045	7/29/2013	0.6054	0.6300	-0.6054 g									
18	U-232	U-10a	19.045	7/29/2013	0.6061	0.6300	-0.6061 g									
19	U-232	U-10a	19.045	7/29/2013	0.6064	0.6300	-0.6064 g									

LCS

0.5116 g

Matrix Spike

0103

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07111	1	UIISO	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-67 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 03 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 03 DIS	TRG					1.0000E+00	1.0000E+00				
06	S-8 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-8 DIS	TRG					1.0000E+00	1.0000E+00				
08	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-62 DIS	TRG					1.0000E+00	1.0000E+00				
10	D-6 TOT	TRG					1.0000E+00	1.0000E+00				
11	D-6 DIS	TRG					1.0000E+00	1.0000E+00				
12	S-61 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-61 DIS	TRG					1.0000E+00	1.0000E+00				
14	I-67 TOT	DO					1.0000E+00	1.0000E+00				
15	I-67 DIS	TRG					1.0000E+00	1.0000E+00				
16	I-68 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-68 DIS	TRG					1.0000E+00	1.0000E+00				
18	DUP 04 TOT	TRG					1.0000E+00	1.0000E+00				
19	DUP 04 DIS	TRG					1.0000E+00	1.0000E+00				

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

Technician: _____

J Wolfe

Date: _____

7, 29, 13

0010

108
8/1/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
 Batch Identification: 1307111A-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_014
 Chamber Serial Number:
 Detector Serial Number: 14
 Env. Background: System Bkgd 63310
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/1/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:08 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.612 mL
 Effective Efficiency: 0.1349 +/- 0.0089
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 0.7309 +/- 0.0500

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.963933 +/- 0.084780
 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 5.257	265.79	12.08	2.21	0.00E+000	10.4
U-234	4.713	336.98	10.70	1.02	0.00E+000	11.4
U-235	4.406	52.83	27.02	0.17	0.00E+000	5.4
U-238	4.132	399.49	9.81	0.51	0.00E+000	17.8

T = Tracer Peak used for Effective Efficiency

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

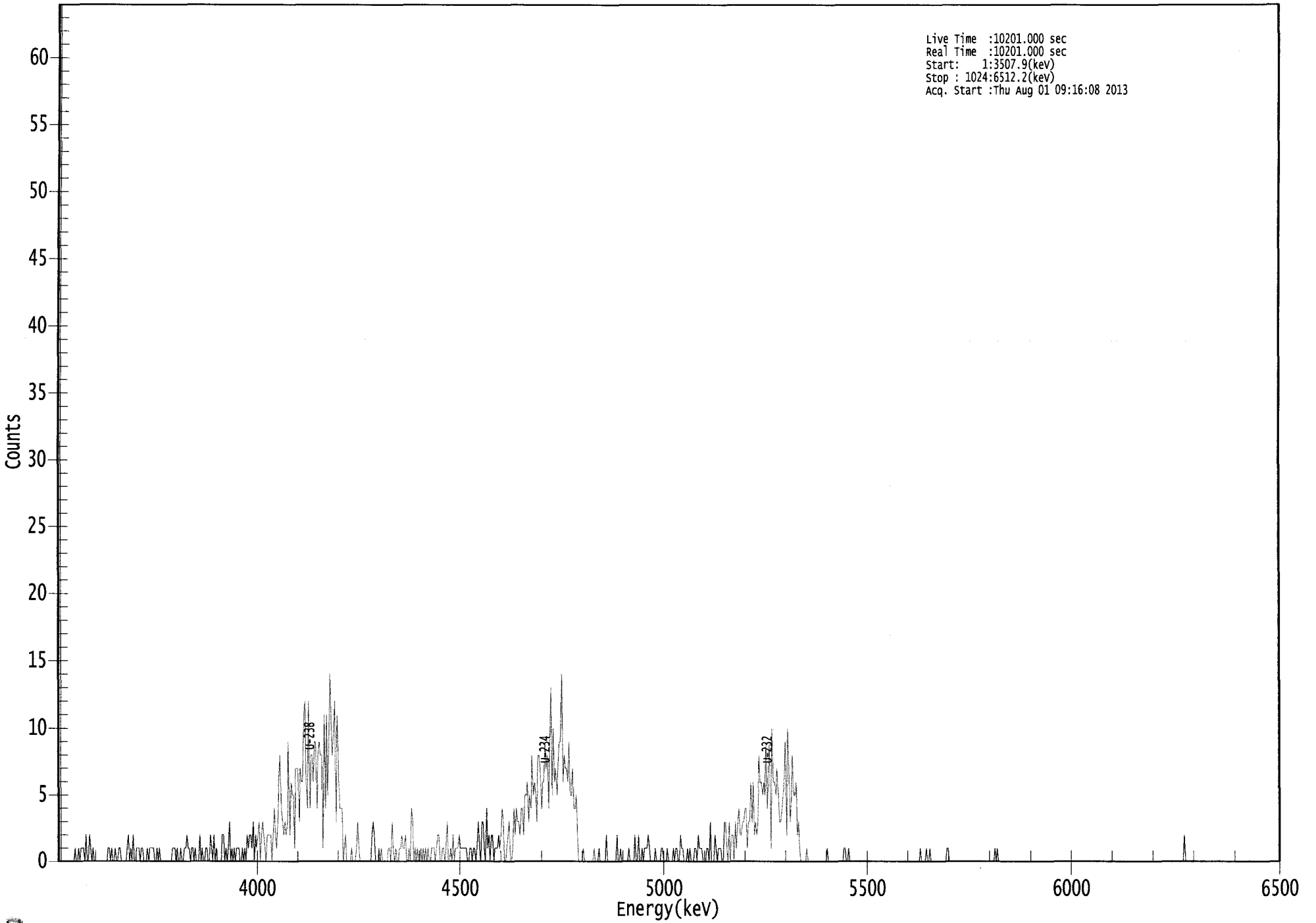
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.986	5302.50*	5.23E+000 +/- 6.74E-001	1.57E-001 +/- 2.03E-002
U-234	0.984	4761.50*	6.63E+000 +/- 1.11E+000	1.24E-001 +/- 1.60E-002
U-235	0.997	4385.50*	1.28E+000 +/- 3.84E-001	1.01E-001 +/- 1.31E-002
U-238	0.981	4184.40*	7.83E+000 +/- 1.27E+000	1.03E-001 +/- 1.33E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064793.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Thu Aug 01 09:16:08 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 01

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	1	0
17:	0	1	0	1	1	1	0	2
25:	0	0	2	1	0	1	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	1	1	0	1	0	0
49:	1	0	0	1	1	0	0	0
57:	0	0	1	2	0	1	0	2
65:	0	0	1	1	1	0	1	1
73:	0	0	0	1	0	1	1	1
81:	1	0	0	1	0	1	0	0
89:	0	0	0	0	0	0	0	0
97:	1	1	1	0	1	0	0	1
105:	0	0	1	1	2	1	1	0
113:	1	1	0	1	0	0	0	2
121:	0	1	0	0	1	1	0	0
129:	2	1	0	2	0	1	0	0
137:	0	0	2	2	0	1	0	1
145:	3	0	1	0	1	0	1	1
153:	1	0	0	1	0	1	0	2
161:	1	2	2	1	3	0	2	1
169:	2	3	0	2	3	2	1	0
177:	2	2	2	2	0	2	4	2
185:	1	3	6	8	4	3	2	3
193:	2	3	9	2	6	5	5	1
201:	7	7	7	3	7	6	6	11
209:	12	6	4	12	4	8	8	6
217:	9	9	4	8	9	8	8	1
225:	11	4	11	5	9	14	10	8
233:	10	12	3	11	8	4	4	4
241:	0	1	2	0	0	0	0	1
249:	0	0	0	1	3	1	0	0
257:	0	0	0	0	0	0	0	0
265:	2	3	2	0	0	0	1	0
273:	1	0	0	0	0	0	1	1
281:	0	3	1	0	1	0	0	1
289:	1	2	1	1	2	0	0	1
297:	0	4	3	0	1	0	1	0
305:	0	1	0	1	0	1	0	1
313:	0	0	1	1	1	0	1	2
321:	2	0	0	1	1	0	1	3
329:	0	0	1	0	2	0	1	1
337:	1	2	1	1	1	1	1	1
345:	0	0	1	1	0	1	1	0
353:	1	3	1	0	3	3	1	0
361:	4	1	2	0	2	2	0	1

369: 1 1 2 1 2 4 3 0

Sample Title: 01

Channel	1	2	3	4	5	6	7	8
377:	0	1	2	3	0	0	1	4
385:	2	4	3	3	2	4	4	2
393:	5	5	6	3	5	4	8	5
401:	6	5	3	8	8	7	4	6
409:	6	9	7	8	4	9	13	5
417:	10	6	7	5	7	9	9	14
425:	6	8	7	7	6	9	5	5
433:	7	4	4	5	2	0	0	0
441:	0	1	0	0	0	0	0	0
449:	0	0	1	0	0	0	1	0
457:	0	0	0	0	2	0	0	0
465:	0	0	0	0	0	2	0	0
473:	1	0	0	0	0	0	0	1
481:	0	0	0	0	2	0	0	2
489:	0	0	1	0	1	1	1	2
497:	1	0	0	0	0	1	0	0
505:	0	0	1	1	0	0	0	1
513:	0	0	0	0	1	0	1	1
521:	0	0	2	1	1	0	0	0
529:	1	0	1	0	0	0	1	1
537:	0	2	1	1	1	0	0	0
545:	1	1	0	3	0	0	0	2
553:	1	0	1	1	1	0	0	3
561:	3	1	0	3	0	2	2	0
569:	3	1	3	4	2	2	3	3
577:	4	4	1	3	3	6	3	6
585:	2	3	2	3	8	6	6	5
593:	6	5	9	4	7	9	1	10
601:	6	6	5	7	5	3	3	4
609:	5	6	9	2	10	7	3	5
617:	8	5	5	6	2	3	1	0
625:	0	0	0	0	1	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	1	1	0	0	1
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	0	0	0	0
729:	1	0	0	1	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	1	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	1	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: 01

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

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Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
 Batch Identification: 1307111A-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_015
 Chamber Serial Number:
 Detector Serial Number: 15
 Env. Background: System Bkgd 63311
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/1/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:09 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.609 mL
 Effective Efficiency: 0.1679 +/- 0.0100
 Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
 Chem. Recovery Factor: 1.1363 +/- 0.0709

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.266	328.83	10.81	0.17	0.00E+000	5.1
U-234	4.741	24.83	39.49	0.17	0.00E+000	4.5
U-235	4.460	4.32	102.62	0.68	0.00E+000	3.0
U-238	4.107	6.00	86.43	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

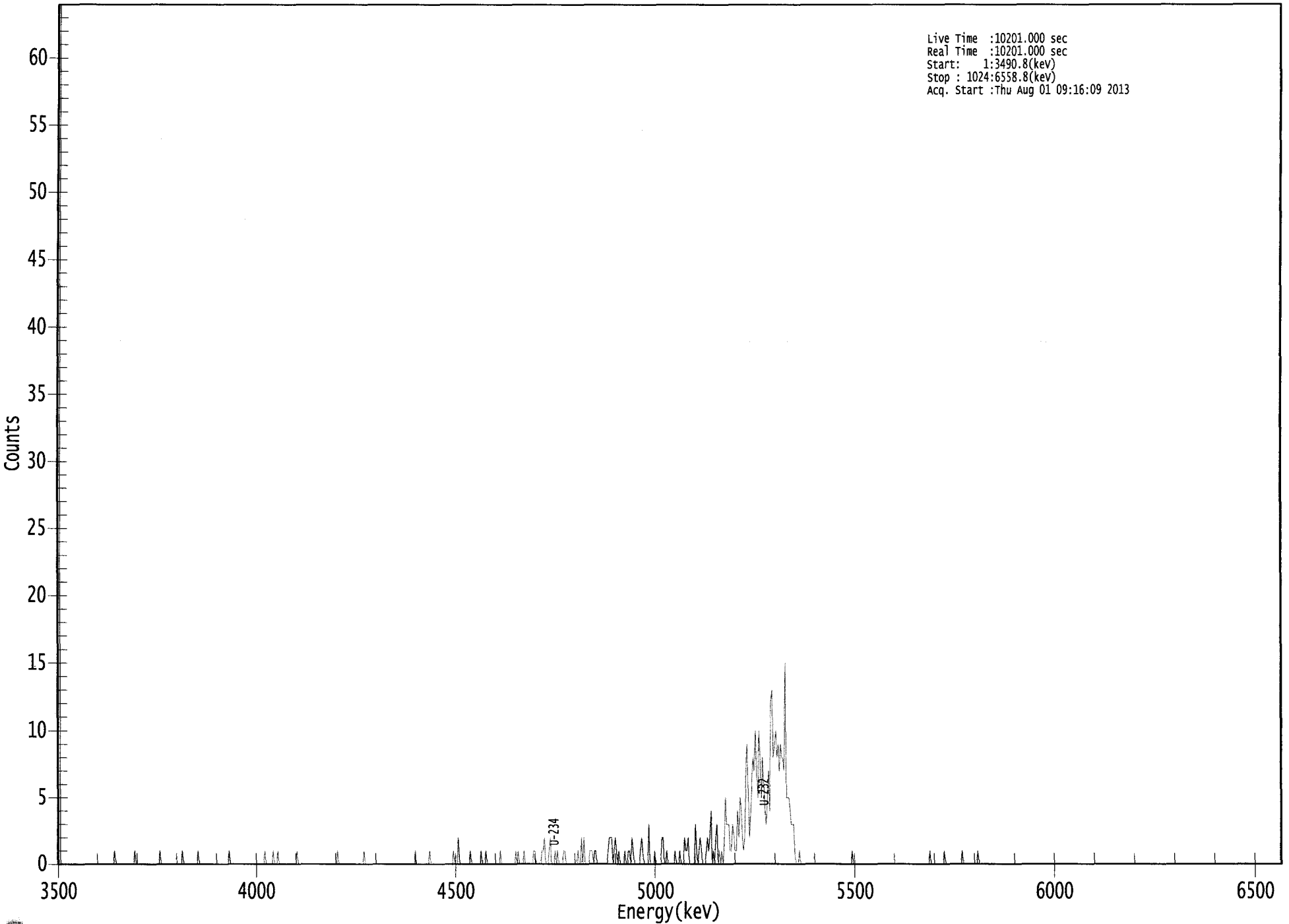
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.20E+000 +/- 6.09E-001	6.60E-002 +/- 7.73E-003
U-234	0.997	4761.50*	3.93E-001 +/- 1.62E-001	6.60E-002 +/- 7.73E-003
U-235	0.961	4385.50*	8.43E-002 +/- 8.71E-002	1.10E-001 +/- 1.29E-002
U-238	0.958	4184.40*	9.45E-002 +/- 8.24E-002	9.44E-002 +/- 1.11E-002

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US EPA ARCHIVE DOCUMENT

000064794.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :Thu Aug 01 09:16:09 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:	0	0	0	0	0	0	0	0
49:	1	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	1	0	0	0	0	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	0	0	0
105:	0	1	0	0	0	0	0	0
113:	0	0	0	0	0	0	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	1	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	0	0	1	0	0
185:	0	1	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	1	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	1	0	0	0
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	0	0	0
337:	2	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	1	0	0	0	1
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:	1	0	1	0	0	0	0	1
393:	0	0	0	0	0	0	0	1
401:	1	0	0	0	0	0	1	1
409:	2	0	0	0	1	2	0	0
417:	0	1	0	1	0	0	0	0
425:	1	1	0	0	0	0	0	0
433:	0	0	0	0	1	0	0	2
441:	0	2	0	0	0	0	1	1
449:	1	0	1	1	0	0	0	0
457:	0	0	0	0	0	1	2	2
465:	2	0	1	2	1	0	1	0
473:	0	0	0	1	0	0	1	1
481:	0	2	1	0	0	0	0	0
489:	1	2	1	0	0	0	0	3
497:	0	0	0	0	1	0	0	0
505:	0	0	2	2	0	0	1	0
513:	0	0	0	0	0	1	0	0
521:	0	1	0	0	0	2	1	1
529:	2	0	0	0	0	0	3	1
537:	0	1	2	1	0	0	0	1
545:	2	1	2	4	0	1	0	2
553:	3	0	1	0	1	0	1	5
561:	3	3	3	1	1	3	2	1
569:	1	4	2	5	4	2	1	2
577:	7	9	5	2	4	6	8	7
585:	10	7	5	10	8	5	8	6
593:	4	3	5	7	4	12	13	8
601:	9	10	8	9	7	9	8	8
609:	7	15	5	5	5	4	3	3
617:	3	1	0	0	0	1	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	1	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	1	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

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Apex-Alpha™

Sample Description: I-67 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
 Batch Identification: 1307111A-UU
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_018
 Chamber Serial Number:
 Detector Serial Number: 18
 Env. Background: System Bkgd 63312
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:36 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.607 mL
 Effective Efficiency: 0.1603 +/- 0.0098
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.9023 +/- 0.0576

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.273	313.32	11.09	0.68	0.00E+000	12.3
U-234	4.718	50.49	27.75	0.51	0.00E+000	3.6
U-235	4.374	6.66	78.18	0.34	0.00E+000	3.1
U-238	4.157	32.98	34.74	1.02	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

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

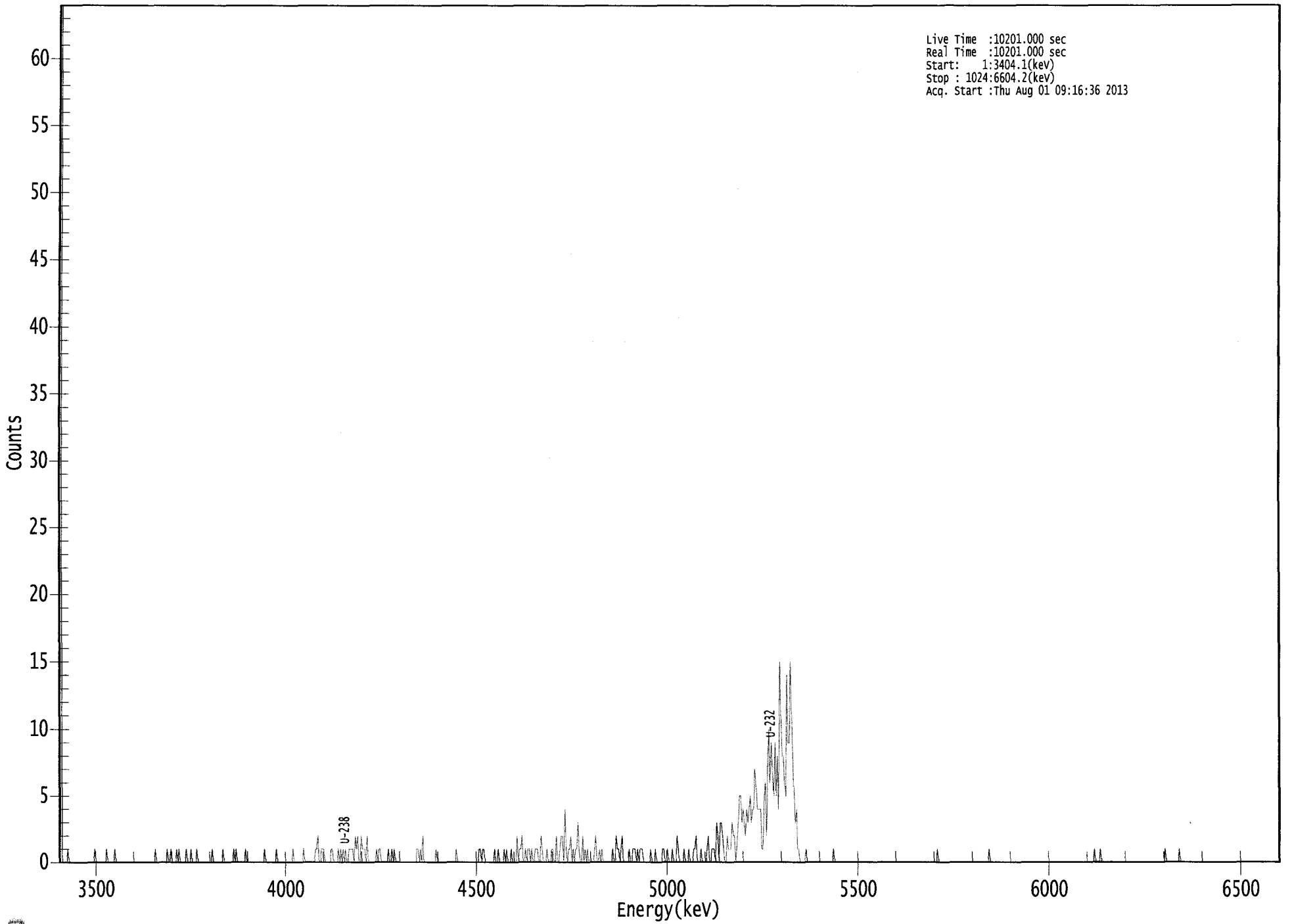
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.19E+000 +/- 6.21E-001	9.35E-002 +/- 1.12E-002
U-234	0.987	4761.50*	8.36E-001 +/- 2.53E-001	8.69E-002 +/- 1.04E-002
U-235	0.999	4385.50*	1.36E-001 +/- 1.08E-001	9.77E-002 +/- 1.17E-002
U-238	0.995	4184.40*	5.44E-001 +/- 2.00E-001	1.04E-001 +/- 1.24E-002

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US EPA ARCHIVE DOCUMENT

000064795.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Thu Aug 01 09:16:36 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: 10201

Elapsed Real Time: 10201

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

369: 0 1 0 0 0 0 1 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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



Apex-Alpha™

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Sample Description: DUP 03 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_019
 Chamber Serial Number:
 Detector Serial Number: 19
 Env. Background: System Bkgd 63313
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:37 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.0948 +/- 0.0073
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
 Chem. Recovery Factor: 0.5711 +/- 0.0454

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.261	184.00	14.49	0.00	0.00E+000	8.0
U-234	4.720	6.66	78.18	0.34	0.00E+000	3.3
U-235	4.405	3.83	102.72	0.17	0.00E+000	3.3
U-238	4.102	4.66	94.59	0.34	0.00E+000	3.3

T = Tracer Peak used for Effective Efficiency

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

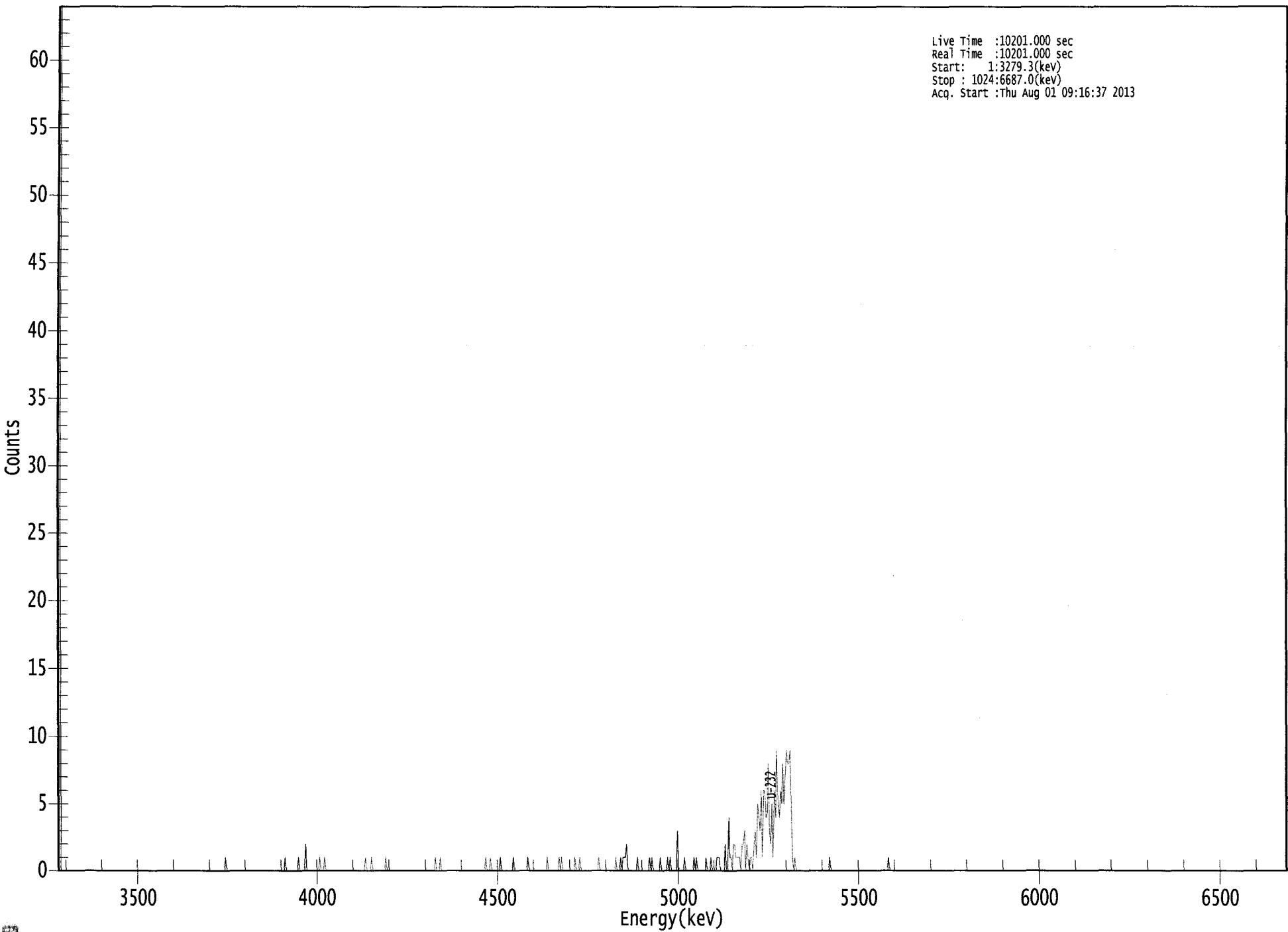
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.988	5302.50*	5.16E+000 +/- 7.83E-001	1.68E-001 +/- 2.55E-002
U-234	0.988	4761.50*	1.87E-001 +/- 1.49E-001	1.34E-001 +/- 2.03E-002
U-235	0.997	4385.50*	1.32E-001 +/- 1.37E-001	1.44E-001 +/- 2.19E-002
U-238	0.953	4184.40*	1.30E-001 +/- 1.25E-001	1.33E-001 +/- 2.02E-002

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US EPA ARCHIVE DOCUMENT

0000064823.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3279.3(keV)
Stop : 1024:6687.0(keV)
Acq. Start :Thu Aug 01 09:16:37 2013



ROI Type: 1

ROI Type: 3

0121

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

Sample Title: 04

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 1 0 0 0 0 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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

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Apex-Alpha™

Sample Description: DUP 03 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_020
 Chamber Serial Number:
 Detector Serial Number: 20
 Env. Background: System Bkgd 63314
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:38 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: 0.0422 +/- 0.0048
 Counting Efficiency: 0.1612 +/- 0.0029 on 7/20/2013 6:29:23 PM
 Chem. Recovery Factor: 0.2620 +/- 0.0302

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	82.30	21.86	1.70	0.00E+000	4.8
U-234	4.727	11.66	58.37	0.34	0.00E+000	3.3
U-235	4.404	2.00	169.74	0.00	0.00E+000	3.3
U-238	4.157	3.00	130.67	0.00	0.00E+000	3.3

T = Tracer Peak used for Effective Efficiency

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

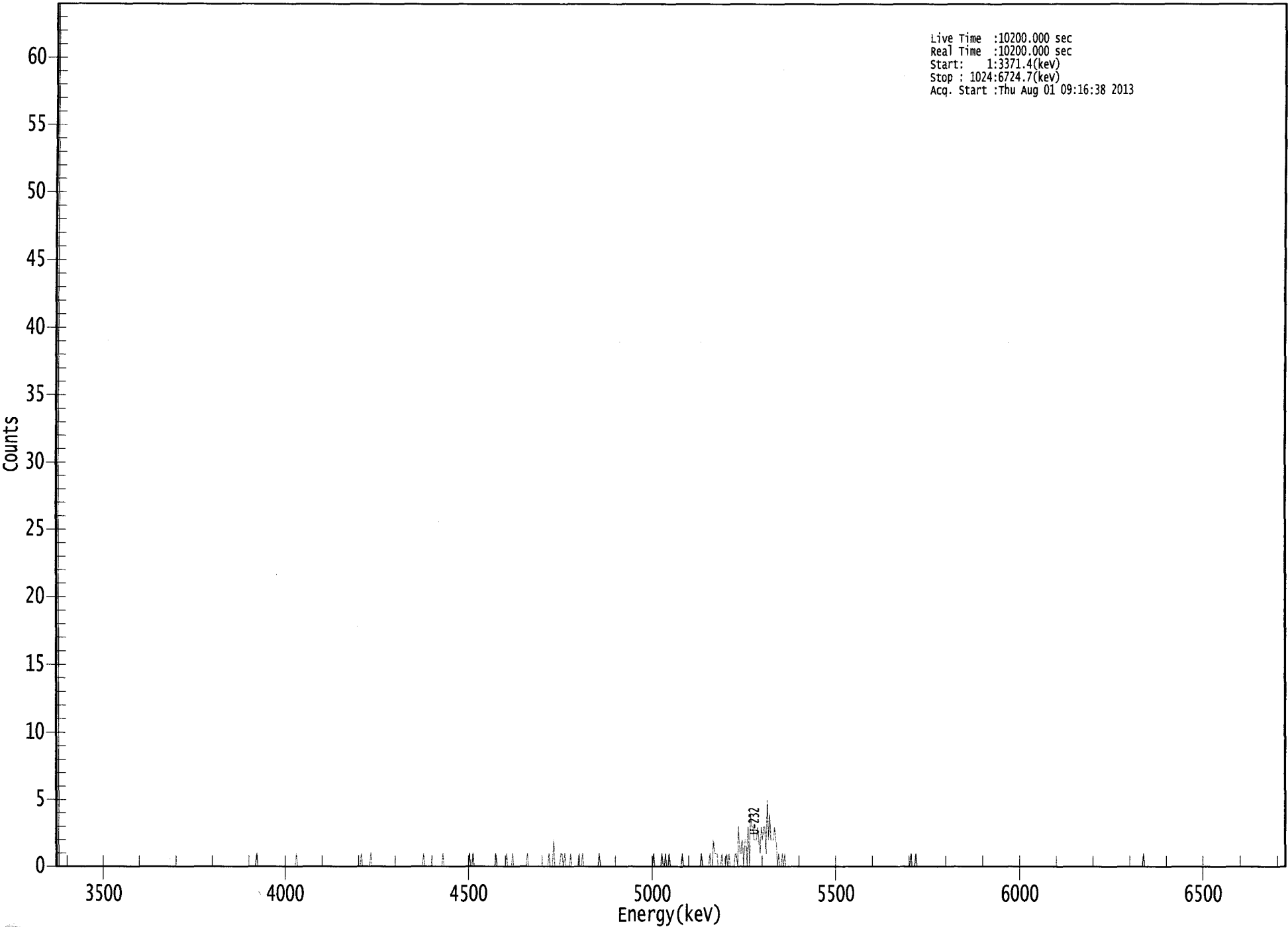
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.18E+000 +/- 1.16E+000	4.62E-001 +/- 1.03E-001
U-234	0.991	4761.50*	7.33E-001 +/- 4.58E-001	3.01E-001 +/- 6.71E-002
U-235	0.998	4385.50*	1.55E-001 +/- 2.66E-001	4.65E-001 +/- 1.04E-001
U-238	0.995	4184.40*	1.88E-001 +/- 2.49E-001	3.75E-001 +/- 8.38E-002

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US EPA ARCHIVE DOCUMENT

0000064824.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3371.4(kev)
Stop : 1024:6724.7(kev)
Acq. Start :Thu Aug 01 09:16:38 2013



ROI Type: 1

ROI Type: 3

0125

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

Sample Title: 05

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

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	1	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	0	0	0
977:	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0



Apex-Alpha™

K13
8/1/13

Sample Description: S-8 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_022
 Chamber Serial Number:
 Detector Serial Number: 22
 Env. Background: System Bkgd 63315
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:39 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: 0.0936 +/- 0.0073
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.6111 +/- 0.0491

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 5.232	182.13	14.61	1.87	0.00E+000	7.4
U-234	4.677	35.32	33.35	0.68	0.00E+000	3.1
U-235	4.418	10.49	62.21	0.51	0.00E+000	6.2
U-238	4.112	25.49	39.27	0.51	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

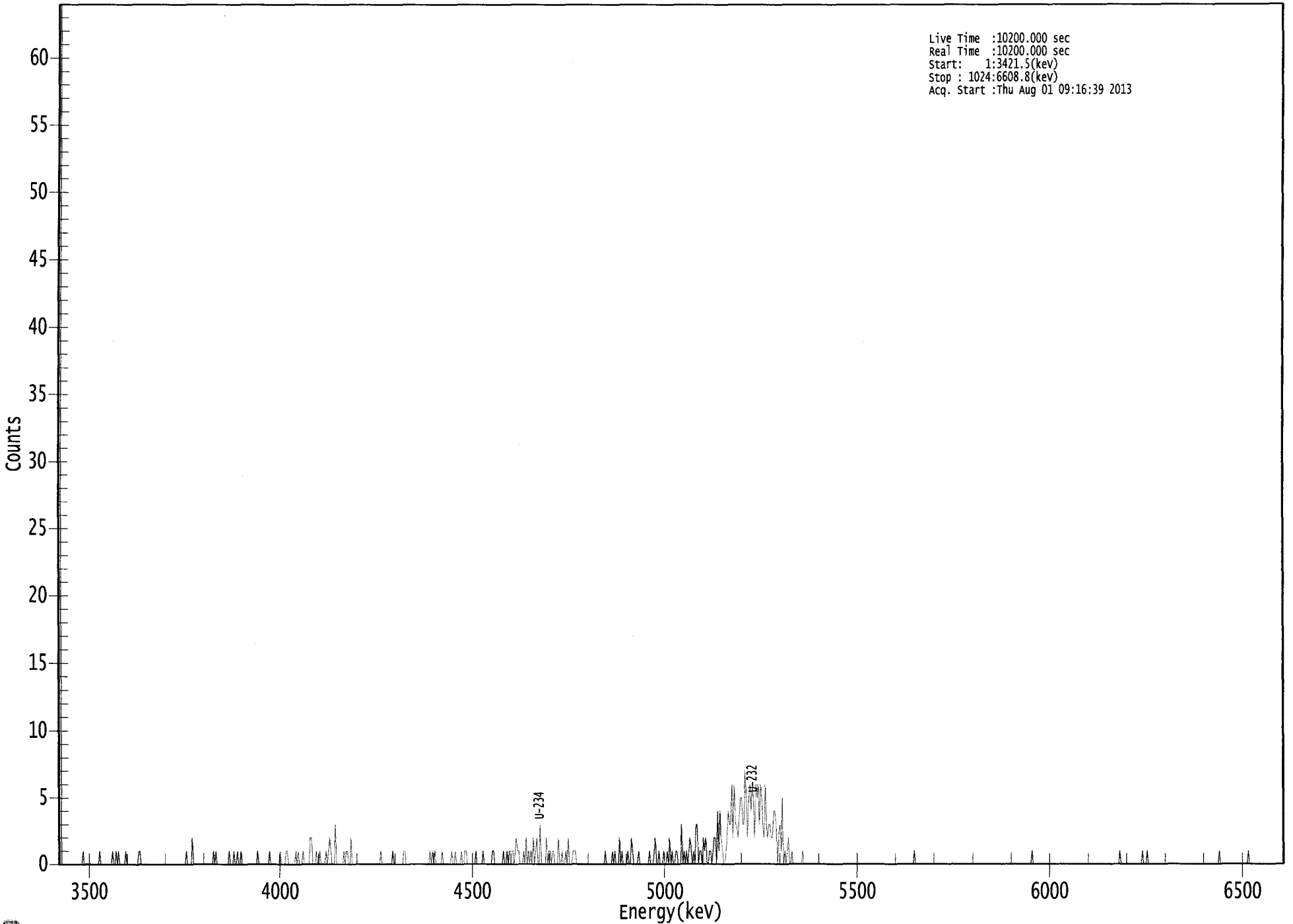
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.966	5302.50*	5.17E+000 +/- 7.91E-001	2.15E-001 +/- 3.29E-002
U-234	0.950	4761.50*	1.00E+000 +/- 3.68E-001	1.60E-001 +/- 2.45E-002
U-235	0.993	4385.50*	3.67E-001 +/- 2.35E-001	1.84E-001 +/- 2.81E-002
U-238	0.964	4184.40*	7.20E-001 +/- 3.03E-001	1.48E-001 +/- 2.27E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064825.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Thu Aug 01 09:16:39 2013



ROI Type: 1

ROI Type: 3

0121

 ***** 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	1	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	1	0	0
49:	1	0	1	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	1	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	1	0	0	0	0
113:	2	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	1	0	1	0	0	0
137:	0	0	0	0	0	0	0	1
145:	0	0	0	1	0	0	1	0
153:	0	1	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	1	0	0	0	0	0	0
185:	0	0	1	0	0	0	0	1
193:	1	0	0	0	0	0	0	1
201:	0	1	0	0	0	1	0	0
209:	0	0	0	2	2	0	0	0
217:	1	0	0	1	0	0	0	0
225:	1	0	1	2	1	0	0	0
233:	3	0	0	0	0	0	0	1
241:	0	1	1	0	0	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	0	0	1	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	0	0	0	0
289:	0	1	1	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	1	0	1	0	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	1	0	0	1	0	0	0
337:	0	1	0	0	1	1	0	0
345:	0	0	0	0	0	1	0	0
353:	0	0	0	1	0	0	0	0
361:	0	0	0	1	1	0	0	0

369: 0 0 0 0 1 0 0 1

Sample Title: 06

Channel	1	2	3	4	5	6	7	8
377:	0	1	1	1	1	0	1	2
385:	1	1	0	0	0	1	0	2
393:	0	1	0	1	0	2	0	1
401:	2	0	0	3	0	0	0	0
409:	2	0	1	1	0	1	1	0
417:	0	0	2	0	0	1	0	0
425:	1	0	2	0	0	0	1	1
433:	1	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	1	0	0	0	0	0	1
465:	0	1	0	0	0	2	0	1
473:	0	0	0	0	1	0	0	2
481:	1	0	0	0	0	1	0	0
489:	0	0	0	0	0	0	1	0
497:	0	0	1	2	0	0	1	0
505:	0	0	1	0	0	1	0	2
513:	0	1	0	0	1	1	0	0
521:	0	3	0	1	0	1	0	1
529:	2	1	0	1	0	3	3	0
537:	1	1	0	2	1	2	0	0
545:	1	1	0	1	2	2	0	4
553:	1	4	2	1	0	0	1	2
561:	4	3	3	6	2	6	3	3
569:	2	3	5	5	3	3	7	5
577:	2	5	6	4	6	5	2	6
585:	5	6	3	6	5	3	2	6
593:	3	2	3	3	2	2	4	4
601:	3	0	2	3	1	5	0	1
609:	0	1	2	0	0	1	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	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	1	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	1	0	0	0	1	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	1	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	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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Sample Description: S-8 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_023
 Chamber Serial Number:
 Detector Serial Number: 23
 Env. Background: System Bkgd 63316
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:40 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: 0.1533 +/- 0.0096
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
 Chem. Recovery Factor: 0.8967 +/- 0.0581

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.285	298.66	11.35	0.34	0.00E+000	31.1
U-234	4.730	65.98	24.35	1.02	0.00E+000	3.7
U-235	4.370	9.49	65.59	0.51	0.00E+000	6.2
U-238	4.146	36.49	32.71	0.51	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

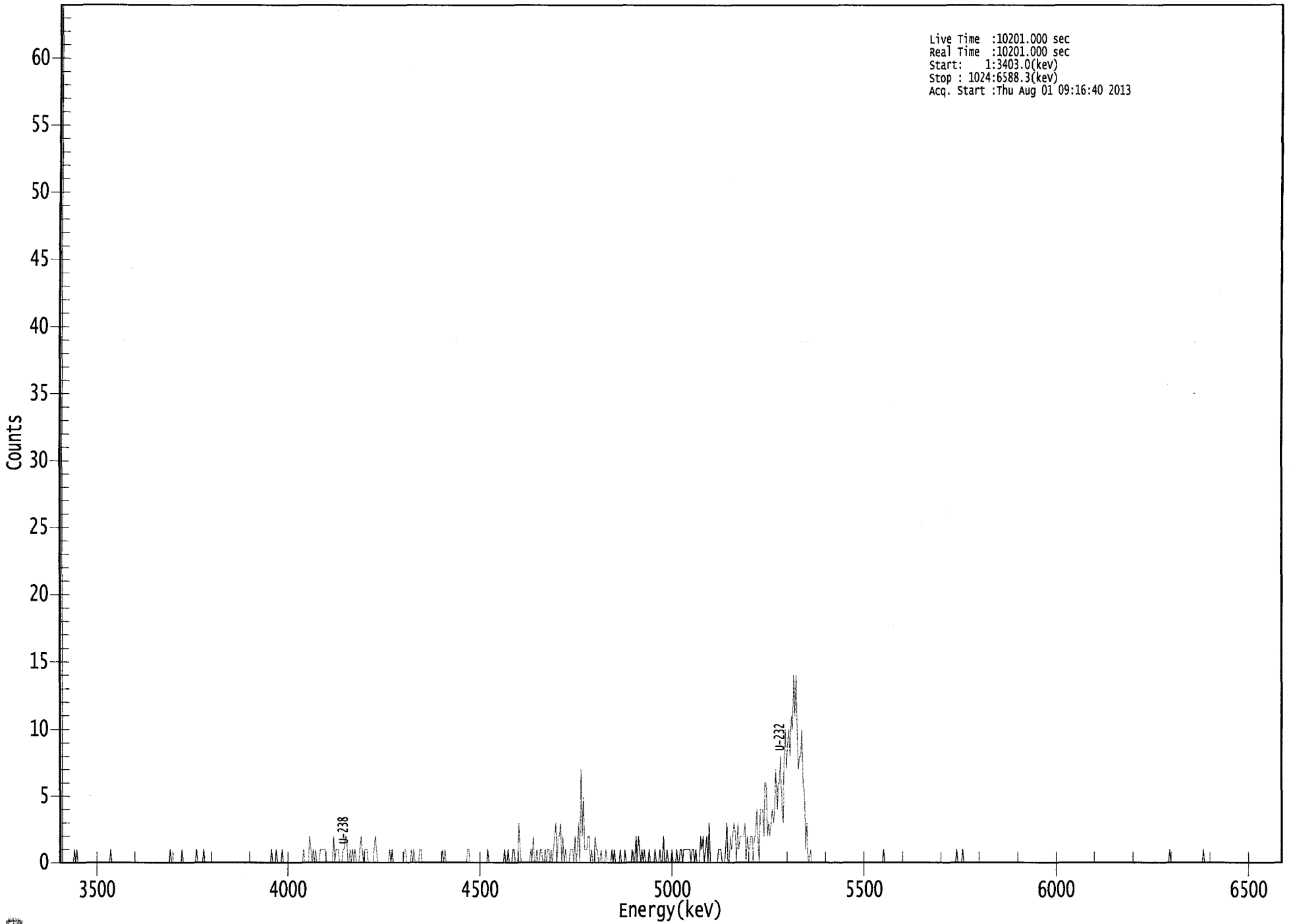
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.17E+000 +/- 6.32E-001	8.28E-002 +/- 1.01E-002
U-234	0.993	4761.50*	1.14E+000 +/- 3.11E-001	1.09E-001 +/- 1.33E-002
U-235	0.998	4385.50*	2.03E-001 +/- 1.35E-001	1.12E-001 +/- 1.37E-002
U-238	0.989	4184.40*	6.29E-001 +/- 2.20E-001	9.05E-002 +/- 1.10E-002

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US EPA ARCHIVE DOCUMENT

0000064826.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3403.0(kev)
Stop : 1024:6588.3(kev)
Acq. Start :Thu Aug 01 09:16:40 2013



ROI Type: 1

ROI Type: 3

0110

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

369: 0 0 0 0 0 1 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

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



Apex-Alpha™

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Sample Description: I-62 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_024
 Chamber Serial Number:
 Detector Serial Number: 24
 Env. Background: System Bkgd 63317
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:41 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: 0.1440 +/- 0.0092
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.8420 +/- 0.0563

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.258	281.13	11.74	1.87	0.00E+000	6.7
U-234	4.725	20.81	44.38	1.19	0.00E+000	3.1
U-235	4.419	14.32	53.21	0.68	0.00E+000	3.1
U-238	4.125	9.64	68.14	1.36	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

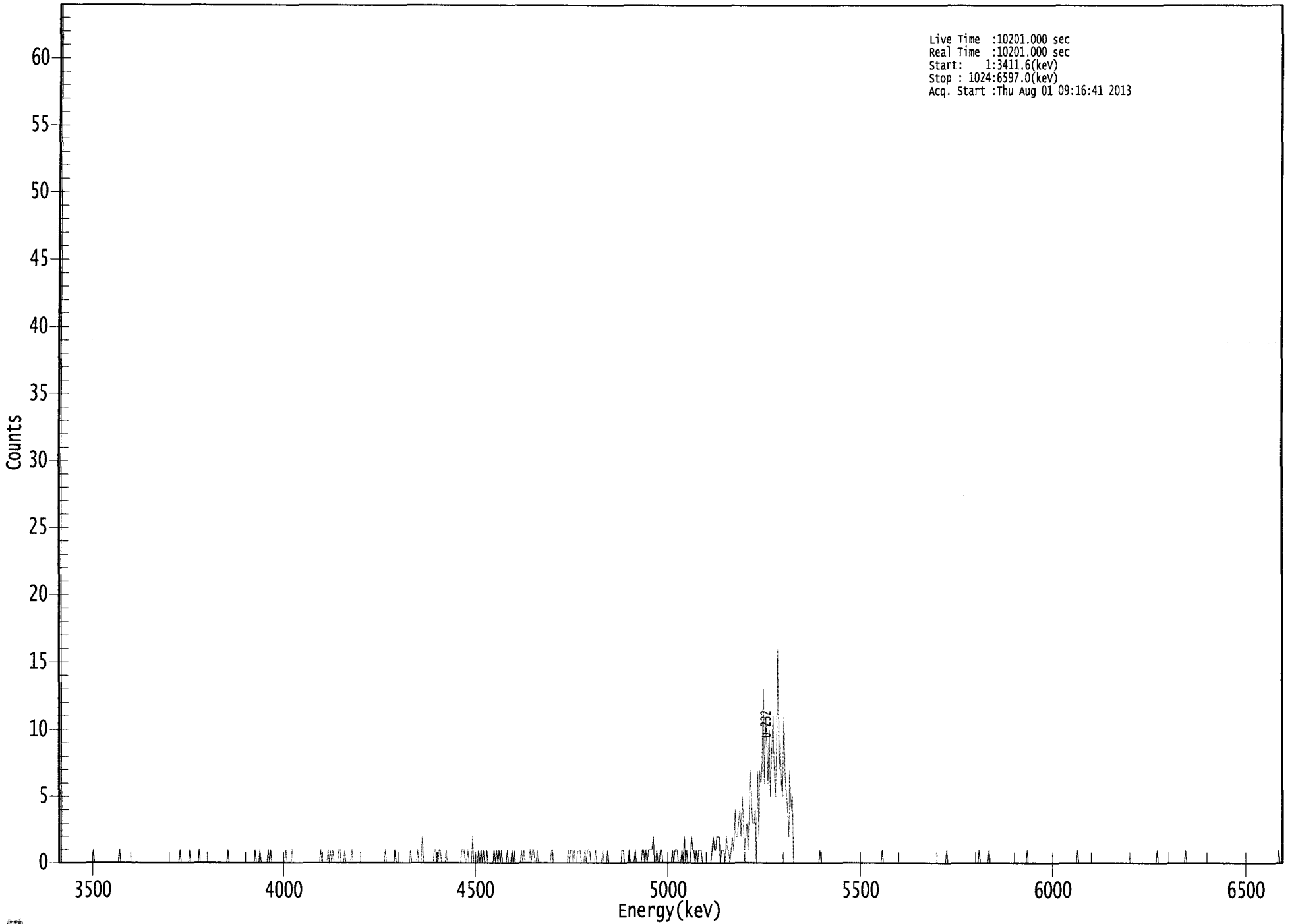
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.986	5302.50*	5.19E+000 +/- 6.52E-001	1.40E-001 +/- 1.76E-002
U-234	0.991	4761.50*	3.84E-001 +/- 1.77E-001	1.21E-001 +/- 1.53E-002
U-235	0.992	4385.50*	3.26E-001 +/- 1.78E-001	1.28E-001 +/- 1.61E-002
U-238	0.976	4184.40*	1.77E-001 +/- 1.23E-001	1.26E-001 +/- 1.58E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064827.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Thu Aug 01 09:16:41 2013



ROI Type: 1

ROI Type: 3

0171

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

369: 0 1 0 1 0 0 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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



Apex-Alpha™

KB
8/1/13

Sample Description: I-62 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_025
 Chamber Serial Number:
 Detector Serial Number: 25
 Env. Background: System Bkgd 63318
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:42 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: 0.1256 +/- 0.0085
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 0.7239 +/- 0.0510

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.270	245.15	12.54	0.85	0.00E+000	13.9
U-234	4.726	27.32	38.04	0.68	0.00E+000	4.7
U-235	4.384	6.00	86.43	0.00	0.00E+000	3.1
U-238	4.159	14.83	51.24	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

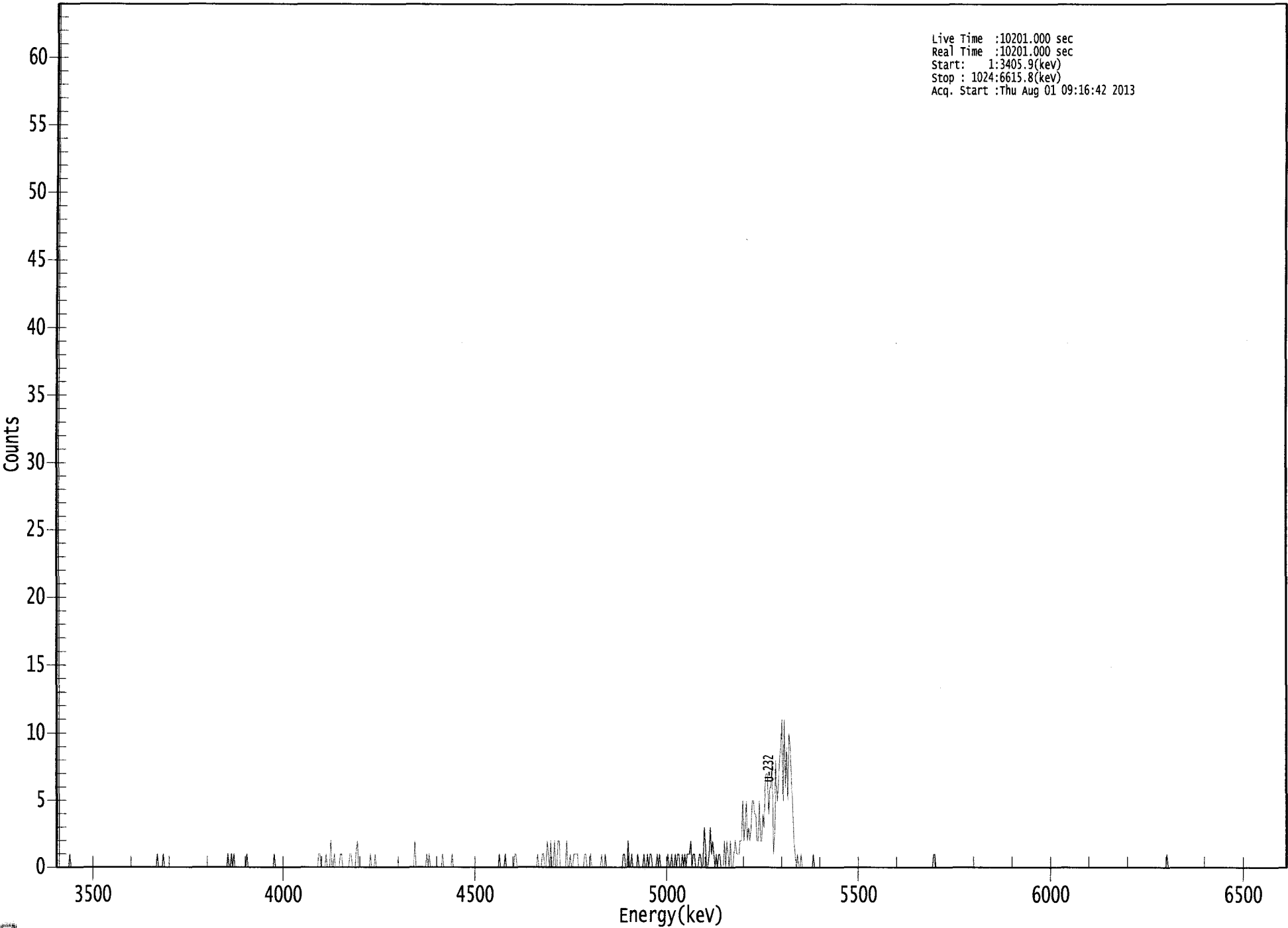
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.18E+000 +/- 6.91E-001	1.27E-001 +/- 1.69E-002
U-234	0.991	4761.50*	5.77E-001 +/- 2.33E-001	1.19E-001 +/- 1.59E-002
U-235	1.000	4385.50*	1.56E-001 +/- 1.37E-001	1.56E-001 +/- 2.08E-002
U-238	0.995	4184.40*	3.12E-001 +/- 1.65E-001	8.78E-002 +/- 1.17E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064828.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Thu Aug 01 09:16:42 2013



ROI Type: 1

ROI Type: 3

0146

 ***** 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	1	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	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	1	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	1
145:	0	0	1	0	1	0	0	0
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	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	1	1	0	0	0
225:	0	1	0	0	0	2	0	0
233:	1	0	0	0	0	1	1	0
241:	0	0	0	0	0	1	1	0
249:	0	0	1	2	0	0	0	0
257:	0	0	0	0	0	0	1	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	2	0	0	0	0
305:	0	0	0	0	0	1	0	1
313:	0	0	0	0	0	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 1 0 0 0 0 1 0

Sample Title: 09

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	1	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	1	1	0
409:	0	2	1	0	2	0	0	2
417:	0	0	2	2	0	0	0	0
425:	0	2	0	0	1	0	0	1
433:	1	1	1	0	0	0	0	0
441:	1	1	0	0	0	1	0	0
449:	0	0	0	0	0	0	1	0
457:	0	1	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	1	0	0	2	0	0	1
481:	0	0	0	0	1	0	0	0
489:	0	1	0	0	1	0	1	1
497:	0	0	0	0	1	0	1	0
505:	0	0	0	0	0	1	0	0
513:	1	0	0	1	0	1	1	0
521:	0	1	0	1	0	1	1	1
529:	2	0	1	1	0	0	0	1
537:	1	0	0	3	2	0	0	1
545:	3	1	2	1	0	1	0	1
553:	1	0	0	0	2	0	2	1
561:	0	2	0	0	1	2	1	1
569:	1	2	2	5	2	3	5	2
577:	3	2	3	5	5	4	4	2
585:	2	5	2	2	4	3	6	7
593:	7	4	6	6	8	1	3	8
601:	5	6	8	9	11	5	11	6
609:	9	5	10	9	7	4	2	1
617:	0	1	0	0	1	0	0	0
625:	0	0	0	0	0	0	1	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	1	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	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: 09

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

KS
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Apex-Alpha™

Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_027
 Chamber Serial Number:
 Detector Serial Number: 27
 Env. Background: System Bkgd 63319
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:43 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.607 mL
 Effective Efficiency: 0.1095 +/- 0.0079
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 0.6341 +/- 0.0474

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 5.291	214.13	13.46	1.87	0.00E+000	5.1
U-234	4.726	15.30	53.27	1.70	0.00E+000	3.2
U-235	4.383	0.30	988.46	1.70	0.00E+000	3.2
U-238	4.076	2.15	161.66	0.85	0.00E+000	3.2

T = Tracer Peak used for Effective Efficiency

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

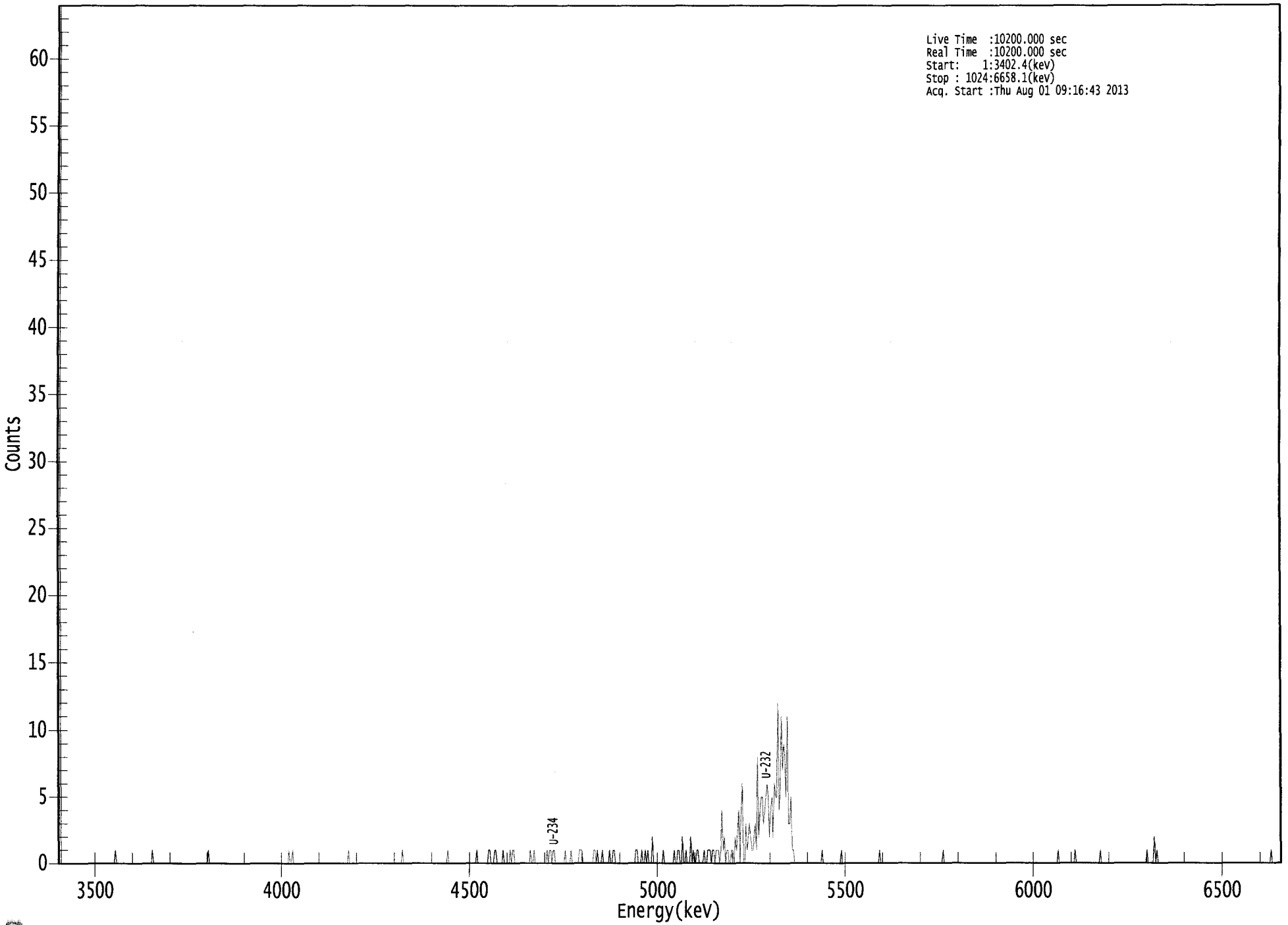
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.19E+000 +/- 7.37E-001	1.84E-001 +/- 2.61E-002
U-234	0.991	4761.50*	3.71E-001 +/- 2.04E-001	1.78E-001 +/- 2.53E-002
U-235	1.000	4385.50*	8.97E-003 +/- 8.87E-002	2.20E-001 +/- 3.12E-002
U-238	0.920	4184.40*	5.19E-002 +/- 8.42E-002	1.44E-001 +/- 2.05E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064829.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Thu Aug 01 09:16:43 2013



ROI Type: 1

ROI Type: 3

0000064829.CNF

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 10

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

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Apex-Alpha™

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 63320
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:43 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.596 mL
 Effective Efficiency: 0.1263 +/- 0.0086
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 0.6490 +/- 0.0460

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	242.30	12.64	1.70	0.00E+000	10.8
U-234	4.717	15.15	51.98	0.85	0.00E+000	3.1
U-235	4.357	2.49	138.29	0.51	0.00E+000	3.1
U-238	4.155	11.00	61.72	0.00	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

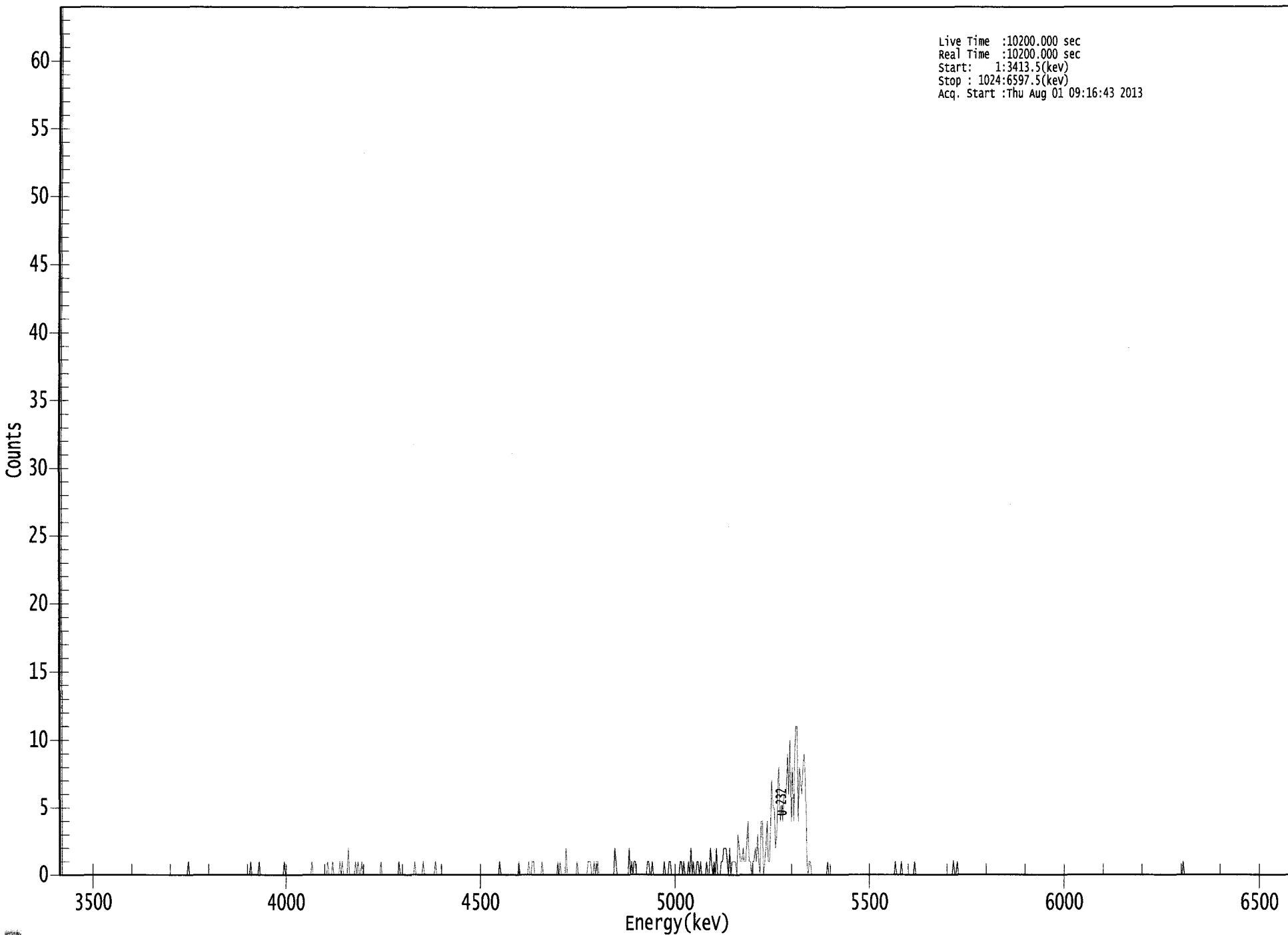
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.10E+000 +/- 6.84E-001	1.55E-001 +/- 2.07E-002
U-234	0.986	4761.50*	3.19E-001 +/- 1.71E-001	1.26E-001 +/- 1.69E-002
U-235	0.994	4385.50*	6.46E-002 +/- 8.98E-002	1.36E-001 +/- 1.83E-002
U-238	0.994	4184.40*	2.30E-001 +/- 1.45E-001	1.26E-001 +/- 1.69E-002

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US EPA ARCHIVE DOCUMENT

0000064830.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start :Thu Aug 01 09:16:43 2013



ROI Type: 1

ROI Type: 3

2155

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	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	1	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	1
161:	0	0	0	0	0	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	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	1	0	0	0	0	0
217:	0	0	0	0	0	0	0	1
225:	0	0	0	1	0	0	0	0
233:	0	1	0	1	0	0	0	0
241:	2	0	0	0	0	0	1	0
249:	1	0	0	1	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	1	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	1	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	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	1	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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

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Apex-Alpha™

Sample Description: S-61 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_031
 Chamber Serial Number:
 Detector Serial Number: 31
 Env. Background: System Bkgd 63321
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:16:44 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: 0.1119 +/- 0.0080
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM
 Chem. Recovery Factor: 0.7892 +/- 0.0597

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.266	217.66	13.30	0.34	0.00E+000	4.6
U-234	4.729	53.13	27.44	1.87	0.00E+000	4.7
U-235	4.377	8.32	71.13	0.68	0.00E+000	3.1
U-238	4.139	33.60	35.76	3.40	0.00E+000	3.9

T = Tracer Peak used for Effective Efficiency

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

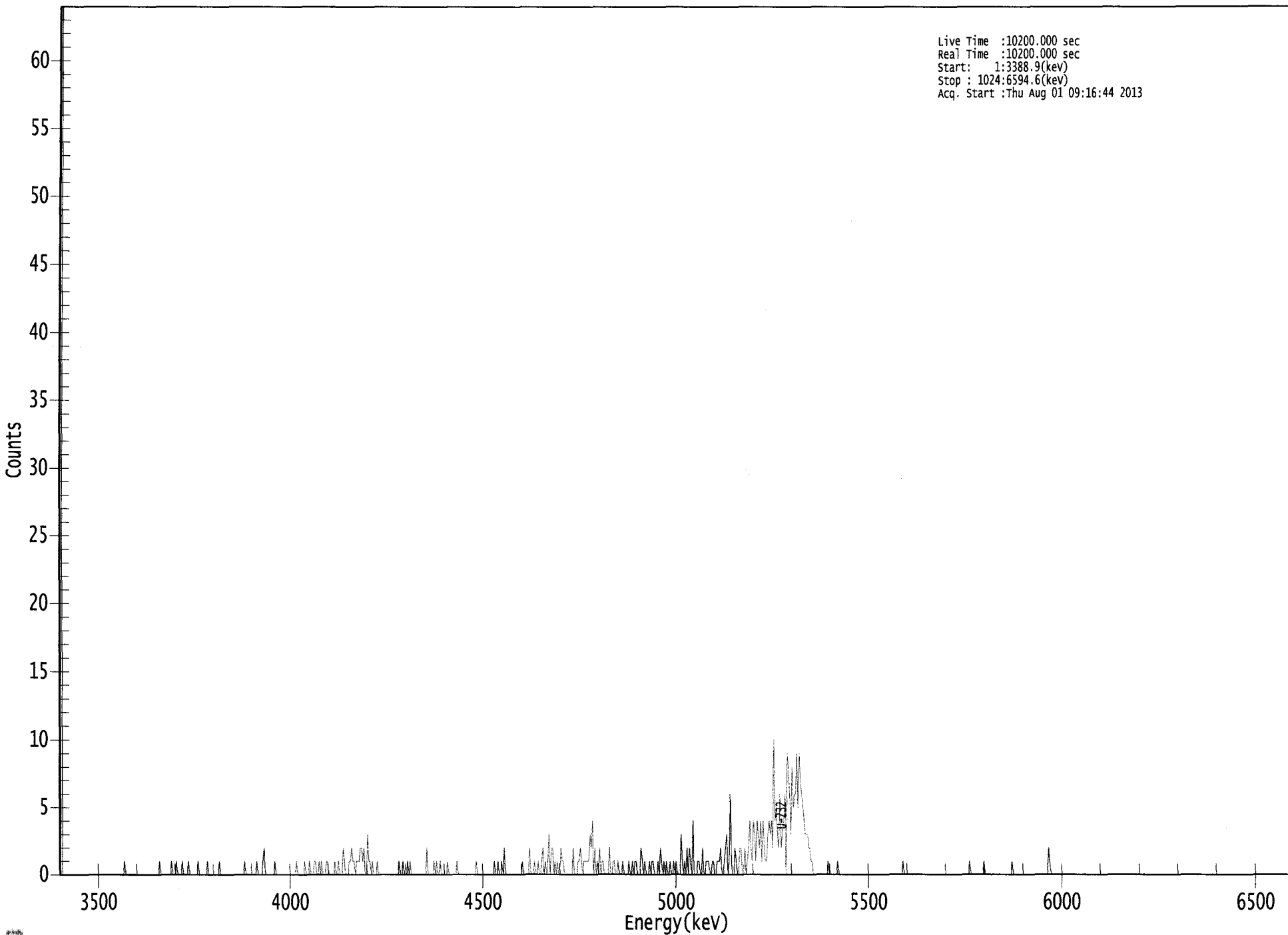
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.991	5302.50*	5.17E+000 +/- 7.25E-001	1.13E-001 +/- 1.59E-002
U-234	0.992	4761.50*	1.26E+000 +/- 3.88E-001	1.80E-001 +/- 2.52E-002
U-235	1.000	4385.50*	2.43E-001 +/- 1.77E-001	1.65E-001 +/- 2.32E-002
U-238	0.985	4184.40*	7.94E-001 +/- 3.05E-001	2.19E-001 +/- 3.07E-002

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US EPA ARCHIVE DOCUMENT

0000064831.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3388.9(kev)
Stop : 1024:6594.6(kev)
Acq. Start :Thu Aug 01 09:16:44 2013



ROI Type: 1

ROI Type: 3

0000064831.CNF

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 2 0 0 0 0 0 0 0

Sample Title: 12

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

KB
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Apex-Alpha™

Sample Description: S-61 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-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 63322
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:16 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: 0.0875 +/- 0.0070
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Chem. Recovery Factor: 0.4734 +/- 0.0388

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 5.251	170.66	15.02	0.34	0.00E+000	4.2
U-234	4.721	36.83	32.38	0.17	0.00E+000	3.7
U-235	4.446	6.00	86.43	0.00	0.00E+000	3.0
U-238	4.117	21.00	43.78	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

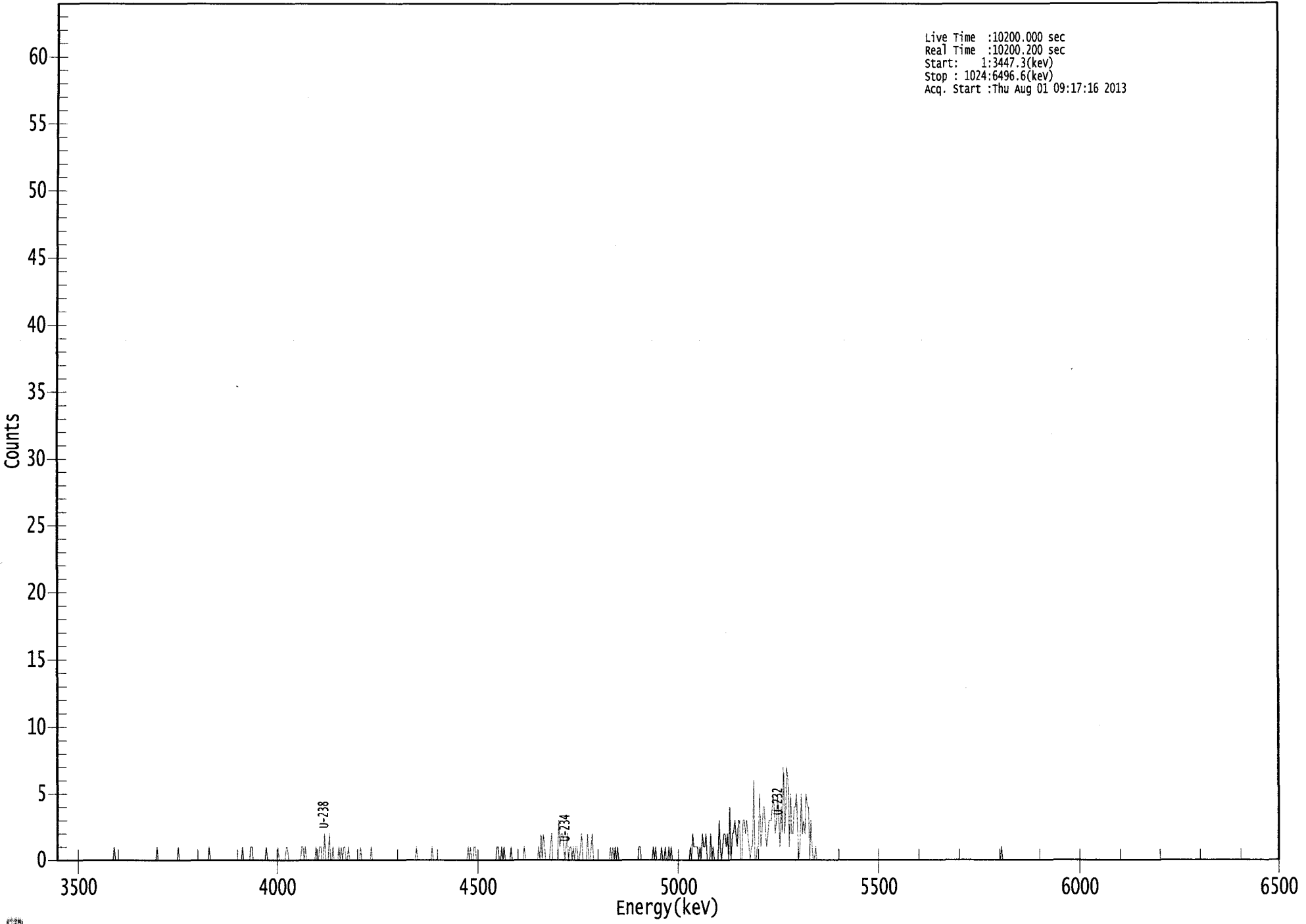
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.981	5302.50*	5.18E+000 +/- 8.13E-001	1.45E-001 +/- 2.28E-002
U-234	0.989	4761.50*	1.12E+000 +/- 4.02E-001	1.27E-001 +/- 1.99E-002
U-235	0.974	4385.50*	2.25E-001 +/- 1.97E-001	2.24E-001 +/- 3.52E-002
U-238	0.968	4184.40*	6.34E-001 +/- 2.95E-001	1.81E-001 +/- 2.84E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064832.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :Thu Aug 01 09:17:16 2013



ROI Type: 1

ROI Type: 3

9910

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

Sample Title: 13

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 1 1 0 0 1 0 1

Sample Title: 13

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	2	0
409:	2	1	0	0	0	0	1	2
417:	0	0	0	0	0	3	1	2
425:	2	1	0	1	2	0	1	1
433:	0	1	0	1	1	0	0	1
441:	2	0	0	0	0	2	0	0
449:	1	2	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	1	0	1	0	1	0	1	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	1	1	0	0	0	0	0	0
497:	0	0	0	0	1	0	1	0
505:	0	0	0	1	0	0	1	0
513:	0	1	0	1	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	1	0	2	1	1
537:	1	1	0	1	0	2	1	1
545:	2	0	0	0	2	0	1	0
553:	0	0	0	3	1	0	1	2
561:	2	1	2	0	4	0	2	2
569:	3	2	1	3	3	0	0	3
577:	3	2	3	2	1	0	1	1
585:	6	0	0	1	1	5	1	2
593:	4	4	2	1	2	3	3	3
601:	5	4	2	3	5	3	1	4
609:	2	7	2	4	7	6	1	5
617:	2	2	4	4	5	2	0	1
625:	5	2	3	2	5	4	4	0
633:	3	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	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: 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

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Apex-Alpha™

Sample Description: I-67 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-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 63323
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:18 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.607 mL
 Effective Efficiency: 0.1034 +/- 0.0077
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.5571 +/- 0.0425

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 5.264	202.00	13.82	0.00	0.00E+000	13.9
U-234	4.726	34.83	33.31	0.17	0.00E+000	5.9
U-235	4.389	7.00	79.20	0.00	0.00E+000	3.0
U-238	4.160	22.00	42.73	0.00	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

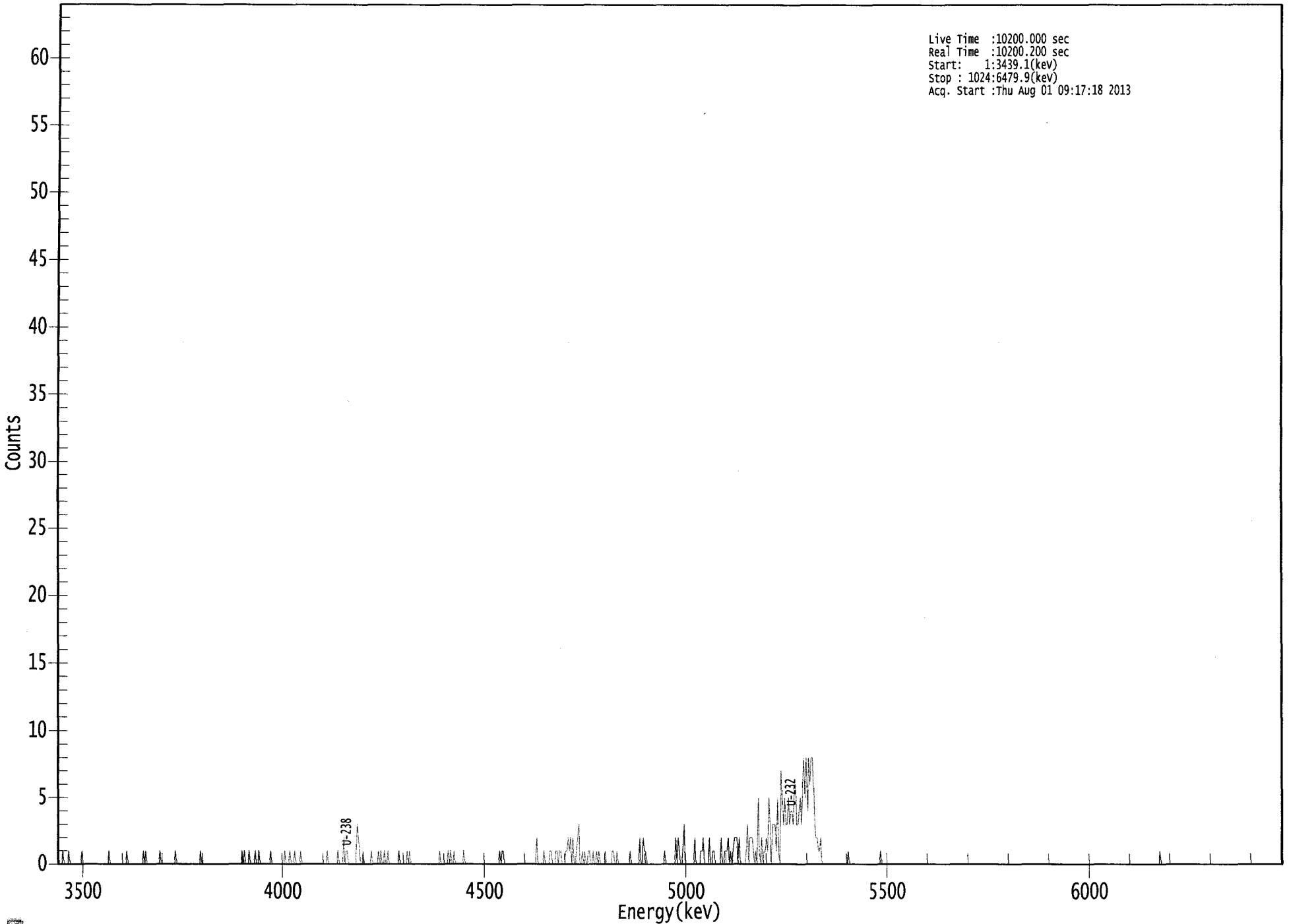
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.989	5302.50*	5.19E+000 +/- 7.55E-001	1.54E-001 +/- 2.24E-002
U-234	0.991	4761.50*	8.94E-001 +/- 3.25E-001	1.07E-001 +/- 1.56E-002
U-235	1.000	4385.50*	2.22E-001 +/- 1.79E-001	1.90E-001 +/- 2.76E-002
U-238	0.996	4184.40*	5.63E-001 +/- 2.54E-001	1.53E-001 +/- 2.23E-002

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US EPA ARCHIVE DOCUMENT

0000064833.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Thu Aug 01 09:17:18 2013



ROI Type: 1

ROI Type: 3

0171

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

Sample Title: 14

Elapsed Live time: 10200
 Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	1	0	0	0
9:	0	1	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	1	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	1	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	1	0	1	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	1	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	1	0	1	0	0
161:	0	1	0	0	0	0	1	0
169:	0	1	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	0	1	0	0	0	1
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	1	0	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	2	0	1	1	0	0	0	0
249:	0	0	0	3	2	1	0	0
257:	1	0	0	0	0	0	0	1
265:	0	0	0	0	0	1	0	1
273:	0	0	1	0	0	1	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	1
329:	0	1	0	0	1	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 1 0 1 1 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0

Sample Title: 14

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

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8/11/13

Apex-Alpha™

Sample Description: I-67 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-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 63324
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:10 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: 0.1283 +/- 0.0086
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.7026 +/- 0.0489

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 5.287	250.32	12.41	0.68	0.00E+000	9.1
U-234	4.726	32.49	34.70	0.51	0.00E+000	4.4
U-235	4.411	11.00	61.72	0.00	0.00E+000	4.4
U-238	4.161	20.66	43.53	0.34	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

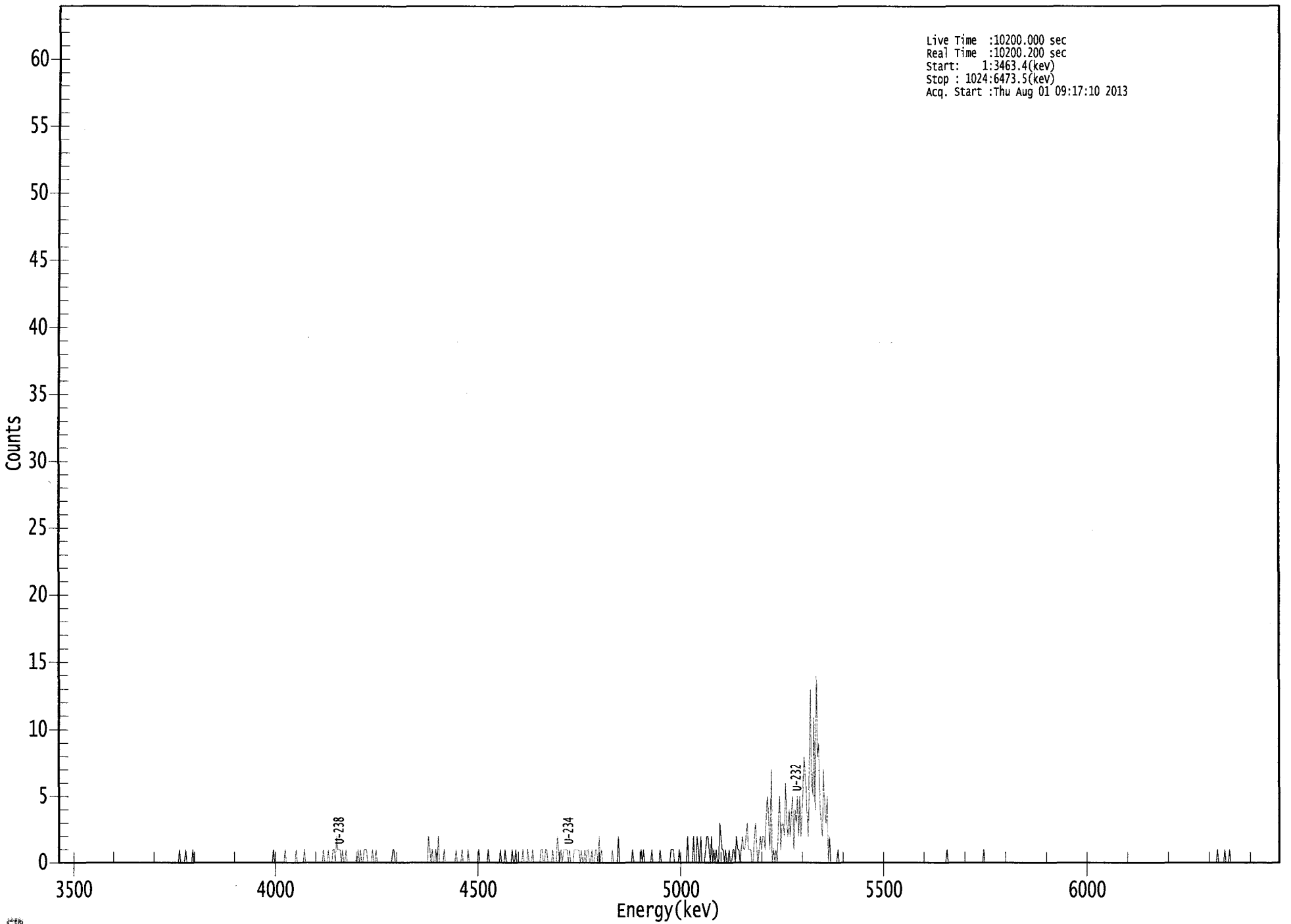
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.18E+000 +/- 6.84E-001	1.17E-001 +/- 1.54E-002
U-234	0.991	4761.50*	6.72E-001 +/- 2.50E-001	1.09E-001 +/- 1.43E-002
U-235	0.995	4385.50*	2.81E-001 +/- 1.77E-001	1.53E-001 +/- 2.02E-002
U-238	0.996	4184.40*	4.26E-001 +/- 1.94E-001	9.85E-002 +/- 1.30E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064834.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Thu Aug 01 09:17:10 2013



ROI Type: 1

ROI Type: 3

0119

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

Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 0 0 0 1

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	1	0	0	0	0	0	1	0
393:	0	0	1	0	0	0	1	0
401:	0	0	0	0	0	1	1	0
409:	0	1	1	0	0	0	0	1
417:	0	0	0	2	1	0	1	0
425:	1	1	1	1	0	1	0	0
433:	0	1	1	1	1	1	0	1
441:	0	0	1	0	1	1	0	0
449:	1	0	0	1	1	0	2	0
457:	1	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	2	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	0	0	0	0
489:	0	1	0	1	0	0	0	0
497:	0	0	1	0	0	0	0	0
505:	0	1	0	0	0	0	0	0
513:	0	0	1	1	1	0	0	0
521:	0	1	0	0	0	0	0	0
529:	2	0	0	0	0	2	0	0
537:	2	1	0	2	0	0	0	1
545:	2	2	1	0	2	0	1	0
553:	1	0	0	3	2	1	1	0
561:	1	0	0	1	0	0	1	1
569:	0	2	1	1	0	1	2	1
577:	1	2	3	1	1	1	0	0
585:	2	3	1	0	1	2	1	2
593:	2	1	4	5	3	1	7	0
601:	1	0	1	0	3	5	1	3
609:	3	2	6	3	2	4	2	4
617:	5	1	4	3	5	2	5	2
625:	4	6	8	6	4	2	6	13
633:	6	5	11	4	14	8	9	4
641:	3	2	7	4	3	5	0	2
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	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	1	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:	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: 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	1	0	0	0	0
977:	0	1	0	0	0	1	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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Apex-Alpha™

Sample Description: I-68 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_036
 Chamber Serial Number: 04026477B
 Detector Serial Number: 84167
 Env. Background: System Bkgd 63325
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:12 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: 0.1181 +/- 0.0083
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.6184 +/- 0.0445

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.263	229.83	12.93	0.17	0.00E+000	4.6
U-234	4.728	68.66	23.72	0.34	0.00E+000	3.4
U-235	4.419	18.00	47.46	0.00	0.00E+000	3.0
U-238	4.127	74.66	22.74	0.34	0.00E+000	4.9

T = Tracer Peak used for Effective Efficiency

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

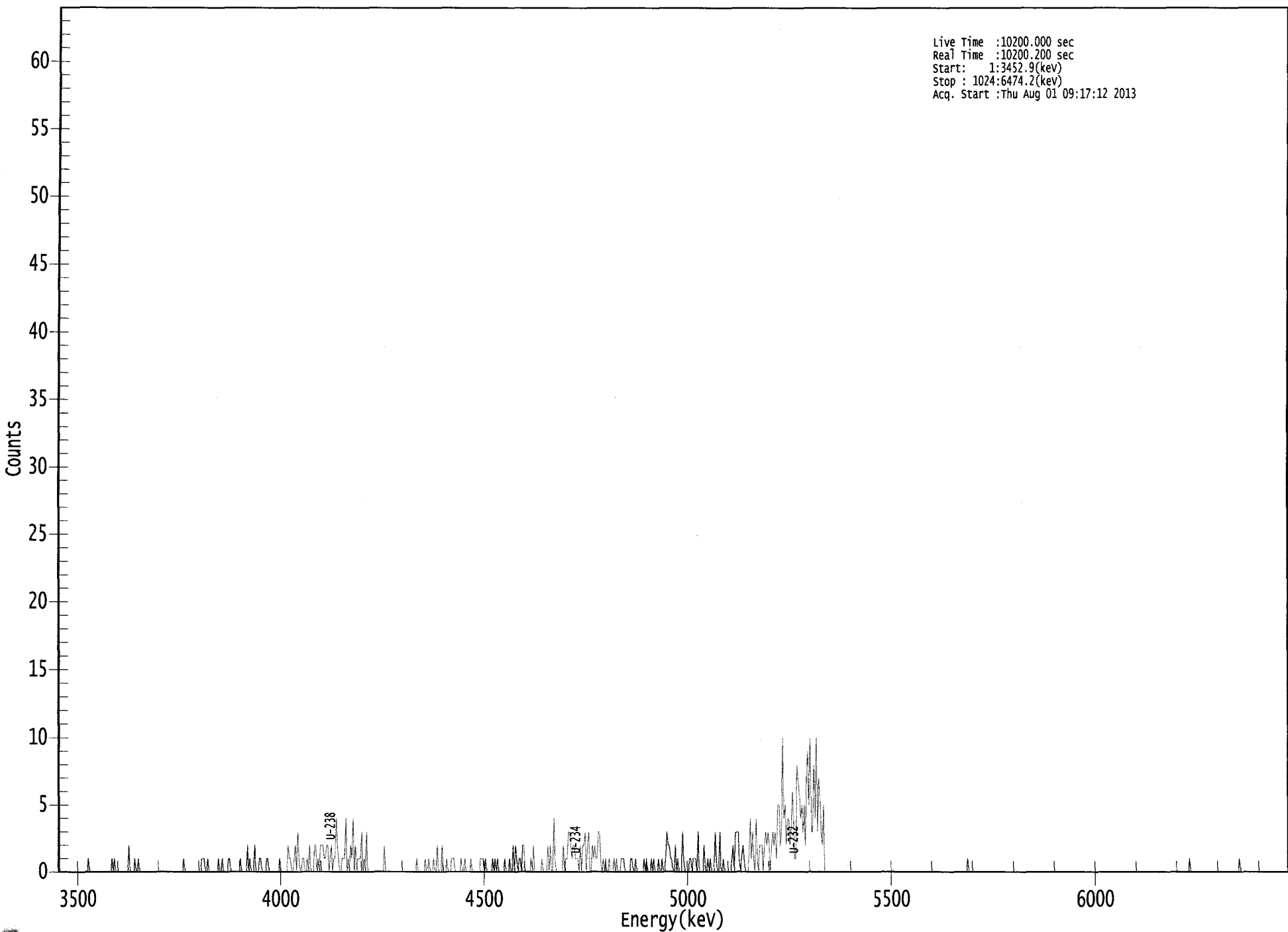
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.989	5302.50*	5.17E+000 +/- 7.08E-001	9.39E-002 +/- 1.29E-002
U-234	0.992	4761.50*	1.54E+000 +/- 4.23E-001	1.07E-001 +/- 1.47E-002
U-235	0.992	4385.50*	4.99E-001 +/- 2.47E-001	1.66E-001 +/- 2.28E-002
U-238	0.977	4184.40*	1.67E+000 +/- 4.44E-001	1.07E-001 +/- 1.47E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064835.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Thu Aug 01 09:17:12 2013



ROI Type: 1

ROI Type: 3

0101

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 1 0 0 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

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

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Apex-Alpha™

Sample Description: I-68 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_038
 Chamber Serial Number: 04026478B
 Detector Serial Number: 91134
 Env. Background: System Bkgd 63326
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:14 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: 0.1373 +/- 0.0090
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 0.7973 +/- 0.0540

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 5.264	267.49	12.00	0.51	0.00E+000	4.4
U-234	4.726	46.66	28.82	0.34	0.00E+000	3.9
U-235	4.415	10.83	60.10	0.17	0.00E+000	3.0
U-238	4.157	31.83	34.85	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

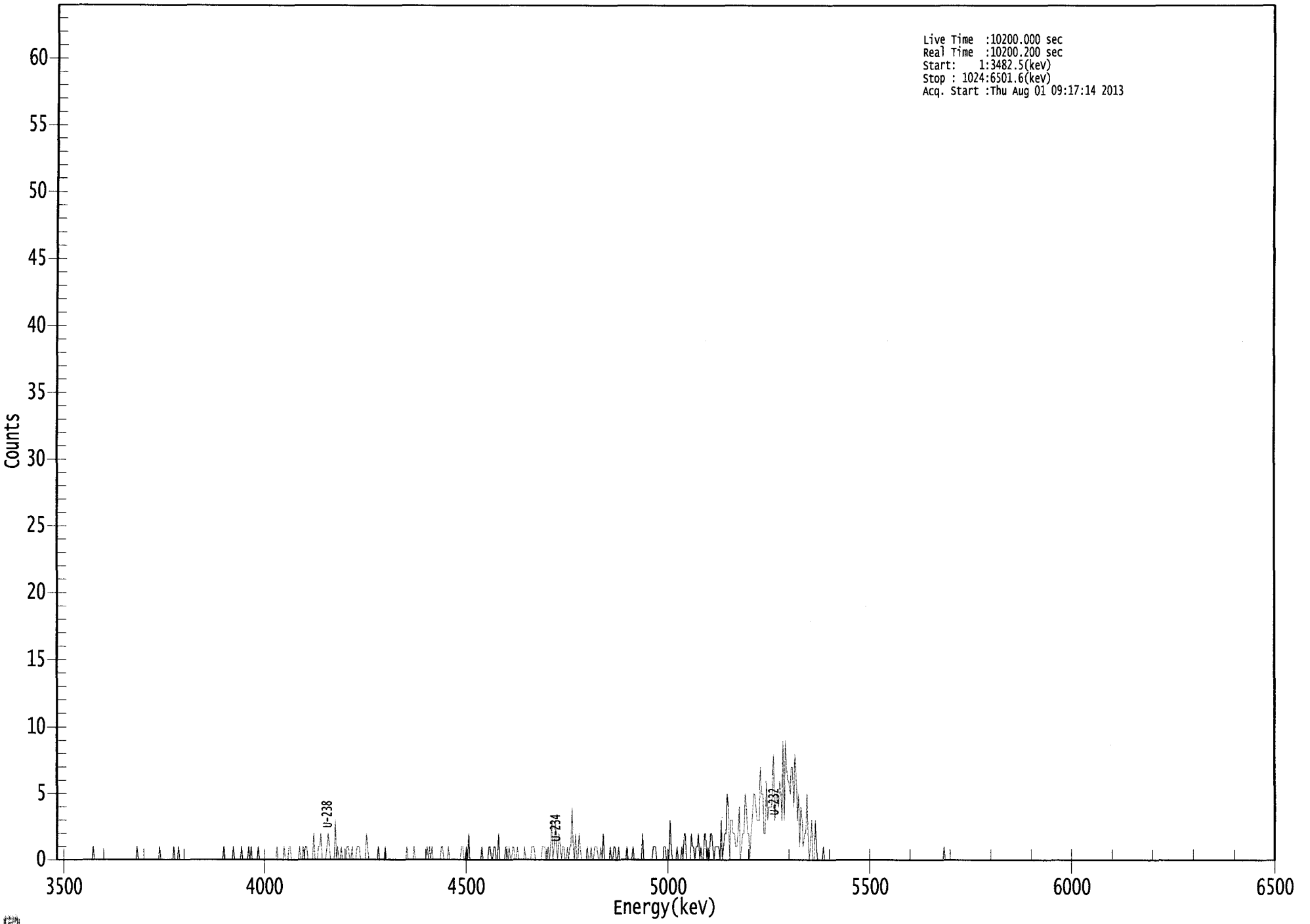
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.18E+000 +/- 6.64E-001	1.02E-001 +/- 1.30E-002
U-234	0.991	4761.50*	9.03E-001 +/- 2.85E-001	9.25E-002 +/- 1.19E-002
U-235	0.994	4385.50*	2.58E-001 +/- 1.59E-001	9.96E-002 +/- 1.28E-002
U-238	0.995	4184.40*	6.13E-001 +/- 2.28E-001	8.04E-002 +/- 1.03E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064836.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Thu Aug 01 09:17:14 2013



ROI Type: 1

ROI Type: 3

2185

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

Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 1 0 0 2 0 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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

KCS
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Apex-Alpha™

Sample Description: DUP 04 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 63327
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:20 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: 0.1151 +/- 0.0081
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.5856 +/- 0.0426

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	224.49	13.10	0.51	0.00E+000	4.6
U-234	4.704	16.66	48.59	0.34	0.00E+000	4.5
U-235	4.392	3.49	113.53	0.51	0.00E+000	3.0
U-238	4.092	8.66	68.12	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

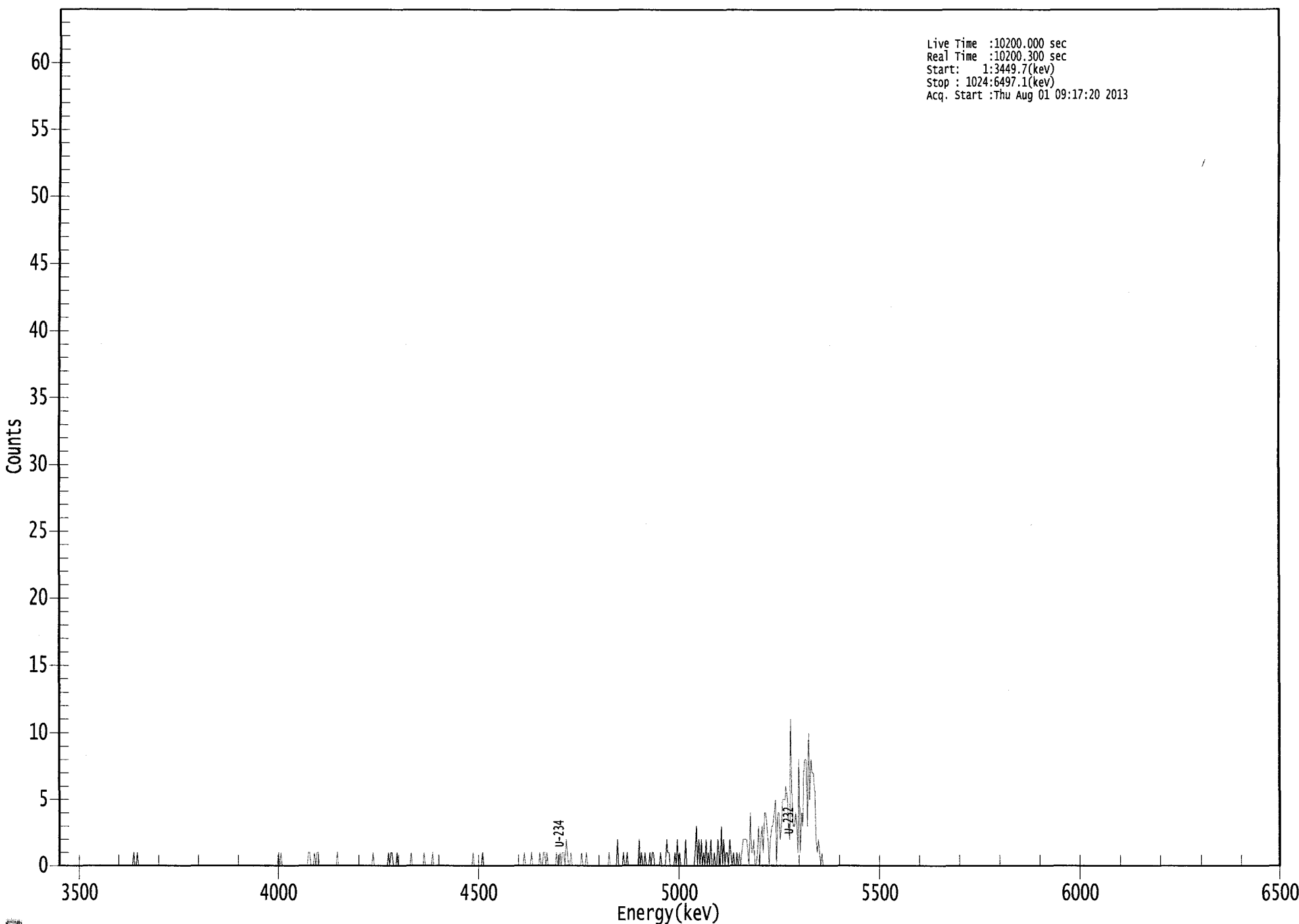
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.18E+000 +/- 7.18E-001	1.21E-001 +/- 1.68E-002
U-234	0.976	4761.50*	3.84E-001 +/- 1.94E-001	1.10E-001 +/- 1.53E-002
U-235	1.000	4385.50*	9.93E-002 +/- 1.14E-001	1.49E-001 +/- 2.07E-002
U-238	0.941	4184.40*	1.99E-001 +/- 1.38E-001	1.10E-001 +/- 1.52E-002

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US EPA ARCHIVE DOCUMENT

0000064837.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Thu Aug 01 09:17:20 2013



ROI Type: 1

ROI Type: 3

1610

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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	1	0	0
401:	0	0	0	0	1	0	0	1
409:	1	0	1	0	0	0	0	0
417:	0	0	1	0	0	1	0	1
425:	1	0	2	1	0	0	1	0
433:	0	0	0	0	0	0	0	1
441:	0	0	0	1	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	1	0
465:	0	0	0	0	0	2	0	0
473:	0	0	1	0	0	1	0	0
481:	0	0	0	0	0	0	0	2
489:	0	1	0	0	1	0	0	0
497:	1	0	1	1	0	0	0	0
505:	0	1	0	0	0	0	2	1
513:	1	0	0	0	0	1	0	2
521:	0	1	0	0	0	0	2	0
529:	0	0	0	0	0	0	1	3
537:	0	2	0	2	0	1	0	2
545:	0	1	0	2	0	0	1	0
553:	0	2	1	0	3	0	2	0
561:	1	1	0	2	1	0	1	0
569:	0	1	0	1	0	1	2	2
577:	2	2	1	0	4	1	1	2
585:	0	0	1	3	0	2	3	1
593:	4	4	3	2	0	2	3	3
601:	4	5	0	4	4	2	3	5
609:	5	5	6	5	3	2	11	5
617:	3	3	4	3	1	8	1	4
625:	3	7	8	8	3	10	5	8
633:	7	7	6	2	1	2	1	0
641:	1	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	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: 18

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

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Apex-Alpha™

Sample Description: DUP 04 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-UU
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 63328
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:21:27 AM
 Acquisition Date/Time: 8/1/2013 9:17:23 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: 0.1367 +/- 0.0089
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 0.7194 +/- 0.0487

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	266.83	12.00	0.17	0.00E+000	46.8
U-234	4.716	24.00	40.83	0.00	0.00E+000	3.0
U-235	4.429	5.83	82.55	0.17	0.00E+000	3.0
U-238	4.141	18.00	47.46	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

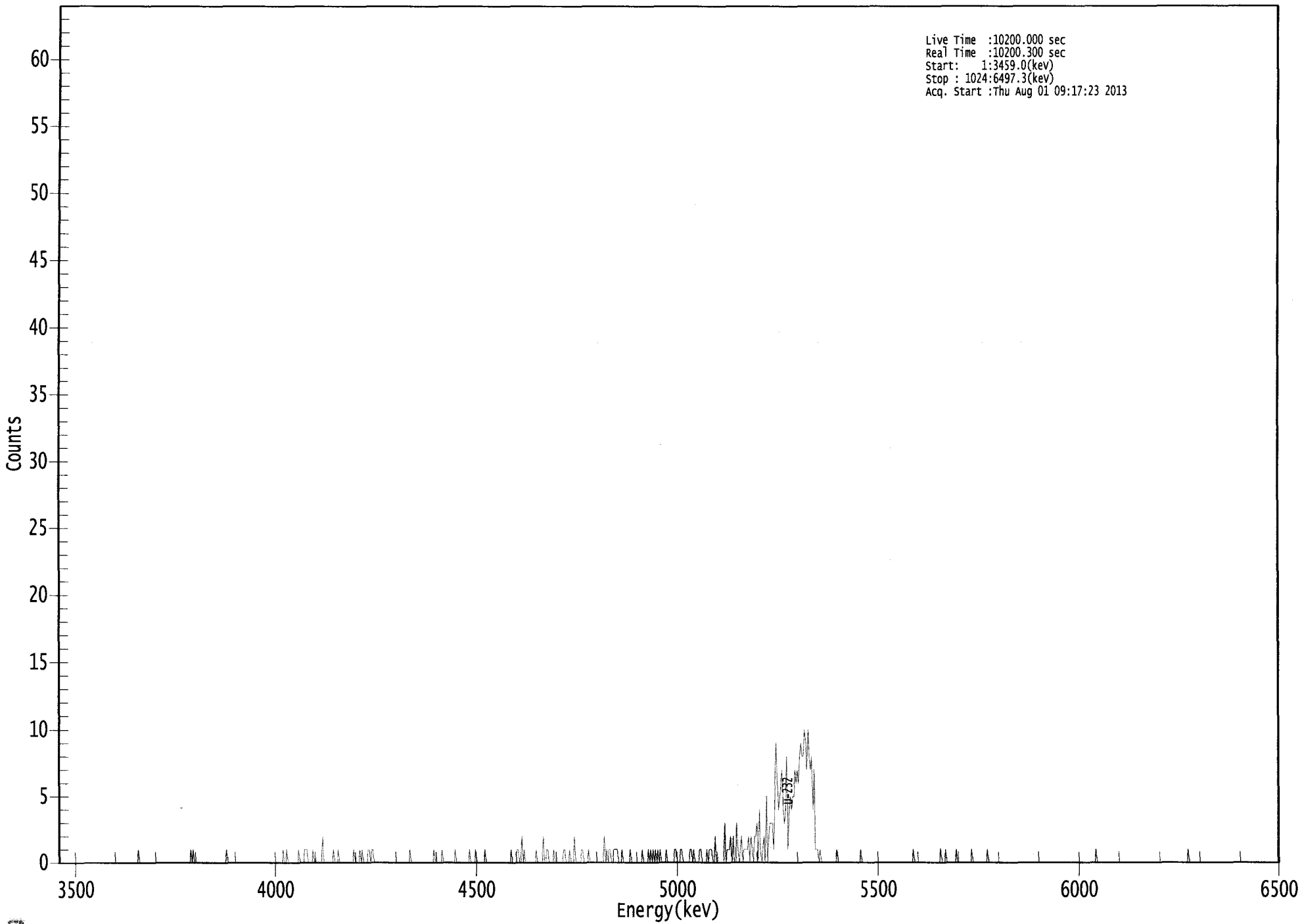
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.19E+000 +/- 6.65E-001	8.11E-002 +/- 1.04E-002
U-234	0.986	4761.50*	4.66E-001 +/- 2.00E-001	1.16E-001 +/- 1.49E-002
U-235	0.987	4385.50*	1.40E-001 +/- 1.17E-001	1.00E-001 +/- 1.28E-002
U-238	0.987	4184.40*	3.48E-001 +/- 1.71E-001	1.16E-001 +/- 1.49E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064838.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Thu Aug 01 09:17:23 2013



ROI Type: 1

ROI Type: 3

0196

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	1	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	1
113:	0	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	1	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	1	0	0	0	0	0	0	0
201:	0	0	1	0	0	0	0	1
209:	1	1	0	0	0	0	1	0
217:	0	0	0	0	0	0	2	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	1	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	1	0	1
257:	0	0	0	0	1	1	0	1
265:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	1	0
353:	0	0	0	0	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: 19

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

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/1/2013

Time : 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 004	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/1/2013 5:25:36 AM
Alpha 011	21f	ALL	Passed	8/1/2013 5:25:37 AM
Alpha 012	21f	ALL	Passed	8/1/2013 5:25:38 AM
Alpha 013	21f	ALL	Passed	8/1/2013 5:25:39 AM
Alpha 014	21f	ALL	Passed	8/1/2013 5:25:40 AM
Alpha 015	21f	Peak Energy	Action	8/1/2013 5:25:41 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/1/2013 5:25:41 AM
Alpha 019	AIM730	ALL	Passed	8/1/2013 5:25:42 AM
Alpha 020	AIM730	ALL	Passed	8/1/2013 5:25:43 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/1/2013 5:25:44 AM
Alpha 023	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 024	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 025	AIM730	ALL	Passed	8/1/2013 5:25:46 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/1/2013 5:25:47 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/1/2013 5:25:48 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/1/2013 5:25:49 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:53 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:55 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/1/2013 5:25:57 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:59 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:01 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:02 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:07 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:12 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:14 AM

APPROVED BY: _____ C

APPROVAL DATE: _____ 8/1/13

***** 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	13-07111	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	ThISO	01	LCS	LCS		07/17/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/17/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 03 TOT	45	07/11/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 03 DIS	45	07/11/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	S-8 TOT	40	07/12/13 09:23	1.0000E+00
Report Level	4	07	TRG	S-8 DIS	40	07/12/13 09:23	1.0000E+00
Activity Units	pCi	08	TRG	I-62 TOT	42	07/12/13 09:56	1.0000E+00
Aliquot Units	I	09	TRG	I-62 DIS	42	07/12/13 09:56	1.0000E+00
Matrix	WA	10	TRG	D-6 TOT	45	07/12/13 11:35	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	D-6 DIS	45	07/12/13 11:35	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	S-61 TOT	38	07/12/13 12:02	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	S-61 DIS	38	07/12/13 12:02	1.0000E+00
Radiometric Sol#	Th-18a	14	DO	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Tracer Act (dpm/g)	22.466	15	TRG	I-67 DIS	43	07/12/13 13:33	1.0000E+00
Carrier		16	TRG	I-68 TOT	39	07/12/13 14:35	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	I-68 DIS	39	07/12/13 14:35	1.0000E+00
		18	TRG	DUP 04 TOT	39	07/12/13 00:00	1.0000E+00
		19	TRG	DUP 04 DIS	39	07/12/13 00:00	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.

0204

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	0.4721	10.6		0.00								
02	MBL	0.2384	5.4		0.00								
03	DUP	0.2340	5.3		0.00								
04	TRG	0.2331	5.2		0.00								
05	TRG	0.2322	5.2		0.00								
06	TRG	0.2310	5.2		0.00								
07	TRG	0.2319	5.2		0.00								
08	TRG	0.2351	5.3		0.00								
09	TRG	0.2341	5.3		0.00								
10	TRG	0.2285	5.1		0.00								
11	TRG	0.2071	4.7		0.00								
12	TRG	0.2280	5.1		0.00								
13	TRG	0.2318	5.2		0.00								
14	DO	0.2362	5.3		0.00								
15	TRG	0.2334	5.2		0.00								
16	TRG	0.2039	4.6		0.00								
17	TRG	0.2021	4.5		0.00								
18	TRG	0.2356	5.3		0.00								
19	TRG	0.2381	5.3		0.00								

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

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Rough Prep Date</i>	<i>Rough Prep By</i>	<i>Prep Date</i>	<i>Prep By</i>	<i>Sep t0 Date/Time</i>	<i>Sep t0 By</i>	<i>Sep t1 Date/Time</i>	<i>Sep t1 By</i>
01	LCS			07/29/13 08:07	JWOLFE				
02	MBL			07/29/13 08:07	JWOLFE				
03	DUP			07/29/13 08:07	JWOLFE				
04	TRG			07/29/13 08:07	JWOLFE				
05	TRG			07/29/13 08:07	JWOLFE				
06	TRG			07/29/13 08:07	JWOLFE				
07	TRG			07/29/13 08:07	JWOLFE				
08	TRG			07/29/13 08:07	JWOLFE				
09	TRG			07/29/13 08:07	JWOLFE				
10	TRG			07/29/13 08:07	JWOLFE				
11	TRG			07/29/13 08:07	JWOLFE				
12	TRG			07/29/13 08:07	JWOLFE				
13	TRG			07/29/13 08:07	JWOLFE				
14	DO			07/29/13 08:07	JWOLFE				
15	TRG			07/29/13 08:07	JWOLFE				
16	TRG			07/29/13 08:07	JWOLFE				
17	TRG			07/29/13 08:07	JWOLFE				
18	TRG			07/29/13 08:07	JWOLFE				
19	TRG			07/29/13 08:07	JWOLFE				

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-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-228	LCS	LCS	pCi/l	4.46E+00	6.92E-01	5.85E-02	4.85E+00	91.98	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	-4.44E-02	5.42E-02	1.80E-01					OK	OK
03	TH-228	DUP	I-67 TOT	pCi/l	-3.03E-03	3.43E-02	1.05E-01				NA	OK	
04	TH-228	TRG	DUP 03 TOT	pCi/l	2.63E-01	1.40E-01	8.02E-02					OK	
05	TH-228	TRG	DUP 03 DIS	pCi/l	1.66E-01	1.05E-01	7.44E-02					OK	
06	TH-228	TRG	S-8 TOT	pCi/l	-1.63E-02	4.04E-02	1.15E-01					OK	
07	TH-228	TRG	S-8 DIS	pCi/l	3.14E-02	7.22E-02	1.40E-01					OK	
08	TH-228	TRG	I-62 TOT	pCi/l	1.17E-01	1.13E-01	1.61E-01					OK	
09	TH-228	TRG	I-62 DIS	pCi/l	-3.82E-03	6.13E-02	1.51E-01					OK	
10	TH-228	TRG	D-6 TOT	pCi/l	1.30E-01	8.80E-02	8.22E-02					OK	
11	TH-228	TRG	D-6 DIS	pCi/l	1.69E-01	1.54E-01	1.61E-01					OK	
12	TH-228	TRG	S-61 TOT	pCi/l	7.28E-01	2.52E-01	1.42E-01					OK	
13	TH-228	TRG	S-61 DIS	pCi/l	9.68E-03	1.11E-01	2.44E-01					OK	
14	TH-228	DO	I-67 TOT	pCi/l	2.51E-02	6.04E-02	1.26E-01					OK	
15	TH-228	TRG	I-67 DIS	pCi/l	5.06E-02	6.86E-02	1.07E-01					OK	
16	TH-228	TRG	I-68 TOT	pCi/l	1.27E+00	3.81E-01	8.48E-02					OK	
17	TH-228	TRG	I-68 DIS	pCi/l	3.32E-02	4.99E-02	8.08E-02					OK	
18	TH-228	TRG	DUP 04 TOT	pCi/l	5.95E-02	6.50E-02	7.78E-02					OK	
19	TH-228	TRG	DUP 04 DIS	pCi/l	3.29E-02	4.57E-02	6.93E-02					OK	

Run	1	Analysis Code	ThISO	Eberline Services Work Order	13-07111	Client	Engineering Management Support, Inc.

2020

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-ThISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-228	LCS	07/17/13 00:00	1.00E+00	109.52	0.00	0.00			
02	TH-228	MBL	07/17/13 00:00	1.00E+00	60.48	0.00	0.00			
03	TH-228	DUP	07/12/13 13:33	1.00E+00	88.78	0.00	0.00			
04	TH-228	TRG	07/11/13 00:00	1.00E+00	90.19	0.00	0.00			
05	TH-228	TRG	07/11/13 00:00	1.00E+00	95.53	0.00	0.00			
06	TH-228	TRG	07/12/13 09:23	1.00E+00	83.89	0.00	0.00			
07	TH-228	TRG	07/12/13 09:23	1.00E+00	88.24	0.00	0.00			
08	TH-228	TRG	07/12/13 09:56	1.00E+00	84.25	0.00	0.00			
09	TH-228	TRG	07/12/13 09:56	1.00E+00	82.89	0.00	0.00			
10	TH-228	TRG	07/12/13 11:35	1.00E+00	101.03	0.00	0.00			
11	TH-228	TRG	07/12/13 11:35	1.00E+00	44.27	0.00	0.00			
12	TH-228	TRG	07/12/13 12:02	1.00E+00	91.34	0.00	0.00			
13	TH-228	TRG	07/12/13 12:02	1.00E+00	62.10	0.00	0.00			
14	TH-228	DO	07/12/13 13:33	1.00E+00	60.53	0.00	0.00			
15	TH-228	TRG	07/12/13 13:33	1.00E+00	86.19	0.00	0.00			
16	TH-228	TRG	07/12/13 14:35	1.00E+00	82.23	0.00	0.00			
17	TH-228	TRG	07/12/13 14:35	1.00E+00	103.48	0.00	0.00			
18	TH-228	TRG	07/12/13 00:00	1.00E+00	87.09	0.00	0.00			
19	TH-228	TRG	07/12/13 00:00	1.00E+00	119.02	0.00	0.00			

Run	1
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

8920

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	08/01/13 09:17		A_Spec	Alpha_041	170	3.65 E+02	2.00 E-03	19.8
02	TH-228	MBL	08/01/13 09:17		A_Spec	Alpha_042	170	-1.87 E+00	1.10 E-02	18.5
03	TH-228	DUP	08/01/13 09:17		A_Spec	Alpha_045	170	-1.90 E-01	7.00 E-03	19.1
04	TH-228	TRG	08/01/13 09:17		A_Spec	Alpha_046	170	1.57 E+01	2.00 E-03	17.9
05	TH-228	TRG	08/01/13 09:17		A_Spec	Alpha_047	170	1.07 E+01	2.00 E-03	18.2
06	TH-228	TRG	08/01/13 09:17		A_Spec	Alpha_048	170	-8.50 E-01	5.00 E-03	16.8
07	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_003	170.02	1.79 E+00	1.30 E-02	17.5
08	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_004	170.02	7.09 E+00	2.30 E-02	19.4
09	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_010	170	-2.30 E-01	1.90 E-02	19.7
10	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_011	170	9.98 E+00	6.00 E-03	20.5
11	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_012	170.02	5.49 E+00	3.00 E-03	19.9
12	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_013	170.02	4.59 E+01	1.80 E-02	18.7
13	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_014	170	4.10 E-01	2.70 E-02	18.5
14	TH-228	DO	08/01/13 12:17		A_Spec	Alpha_015	170	8.30 E-01	1.00 E-03	14.8
15	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_033	170	2.98 E+00	6.00 E-03	18.5
16	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_034	170	7.17 E+01	2.00 E-03	18.6
17	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_035	170	2.32 E+00	4.00 E-03	18.3
18	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_036	170	3.66 E+00	2.00 E-03	19.1
19	TH-228	TRG	08/01/13 12:17		A_Spec	Alpha_038	170	2.49 E+00	3.00 E-03	17.2

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

6020

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-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	4.81E+00	7.34E-01	6.91E-02	5.45E+00	88.24	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	4.31E-01	2.22E-01	1.42E-01					OK	OK
03	TH-230	DUP	I-67 TOT	pCi/l	4.64E-01	1.86E-01	7.49E-02				NA	OK	
04	TH-230	TRG	DUP 03 TOT	pCi/l	4.06E-01	1.76E-01	7.86E-02					OK	
05	TH-230	TRG	DUP 03 DIS	pCi/l	4.73E-01	1.87E-01	9.15E-02					OK	
06	TH-230	TRG	S-8 TOT	pCi/l	3.96E-01	1.88E-01	1.13E-01					OK	
07	TH-230	TRG	S-8 DIS	pCi/l	2.84E-01	1.48E-01	9.04E-02					OK	
08	TH-230	TRG	I-62 TOT	pCi/l	4.03E-01	1.81E-01	1.30E-01					OK	
09	TH-230	TRG	I-62 DIS	pCi/l	5.34E-01	2.09E-01	1.07E-01					OK	
10	TH-230	TRG	D-6 TOT	pCi/l	3.65E-01	1.47E-01	6.72E-02					OK	
11	TH-230	TRG	D-6 DIS	pCi/l	6.83E-01	3.29E-01	1.44E-01					OK	
12	TH-230	TRG	S-61 TOT	pCi/l	5.72E+00	1.15E+00	9.31E-02					OK	
13	TH-230	TRG	S-61 DIS	pCi/l	6.52E-01	2.79E-01	1.39E-01					OK	
14	TH-230	DO	I-67 TOT	pCi/l	8.65E-01	3.75E-01	1.78E-01					OK	
15	TH-230	TRG	I-67 DIS	pCi/l	4.61E-01	1.91E-01	7.97E-02					OK	
16	TH-230	TRG	I-68 TOT	pCi/l	1.63E+00	4.53E-01	7.26E-02					OK	
17	TH-230	TRG	I-68 DIS	pCi/l	2.32E-01	1.21E-01	7.37E-02					OK	
18	TH-230	TRG	DUP 04 TOT	pCi/l	3.32E-01	1.54E-01	6.66E-02					OK	
19	TH-230	TRG	DUP 04 DIS	pCi/l	2.94E-01	1.30E-01	6.19E-02					OK	



Run 1

Analysis Code THISO

Eberline Services Work Order 13-07111

Client Engineering Management Support, Inc.

0120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-THISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-230	LCS	07/17/13 00:00	1.00E+00	109.52	0.00	0.00			
02	TH-230	MBL	07/17/13 00:00	1.00E+00	60.48	0.00	0.00			
03	TH-230	DUP	07/12/13 13:33	1.00E+00	88.78	0.00	0.00			
04	TH-230	TRG	07/11/13 00:00	1.00E+00	90.19	0.00	0.00			
05	TH-230	TRG	07/11/13 00:00	1.00E+00	95.53	0.00	0.00			
06	TH-230	TRG	07/12/13 09:23	1.00E+00	83.89	0.00	0.00			
07	TH-230	TRG	07/12/13 09:23	1.00E+00	88.24	0.00	0.00			
08	TH-230	TRG	07/12/13 09:56	1.00E+00	84.25	0.00	0.00			
09	TH-230	TRG	07/12/13 09:56	1.00E+00	82.89	0.00	0.00			
10	TH-230	TRG	07/12/13 11:35	1.00E+00	101.03	0.00	0.00			
11	TH-230	TRG	07/12/13 11:35	1.00E+00	44.27	0.00	0.00			
12	TH-230	TRG	07/12/13 12:02	1.00E+00	91.34	0.00	0.00			
13	TH-230	TRG	07/12/13 12:02	1.00E+00	62.10	0.00	0.00			
14	TH-230	DO	07/12/13 13:33	1.00E+00	60.53	0.00	0.00			
15	TH-230	TRG	07/12/13 13:33	1.00E+00	86.19	0.00	0.00			
16	TH-230	TRG	07/12/13 14:35	1.00E+00	82.23	0.00	0.00			
17	TH-230	TRG	07/12/13 14:35	1.00E+00	103.48	0.00	0.00			
18	TH-230	TRG	07/12/13 00:00	1.00E+00	87.09	0.00	0.00			
19	TH-230	TRG	07/12/13 00:00	1.00E+00	119.02	0.00	0.00			

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-ThISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	08/01/13 09:17		A_Spec	Alpha_041	170	3.92 E+02	4.00 E-03	19.8
02	TH-230	MBL	08/01/13 09:17		A_Spec	Alpha_042	170	1.81 E+01	5.00 E-03	18.5
03	TH-230	DUP	08/01/13 09:17		A_Spec	Alpha_045	170	2.97 E+01	2.00 E-03	19.1
04	TH-230	TRG	08/01/13 09:17		A_Spec	Alpha_046	170	2.47 E+01	2.00 E-03	17.9
05	TH-230	TRG	08/01/13 09:17		A_Spec	Alpha_047	170	3.10 E+01	0.00 E+00	18.2
06	TH-230	TRG	08/01/13 09:17		A_Spec	Alpha_048	170	2.10 E+01	0.00 E+00	16.8
07	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_003	170.02	1.65 E+01	3.00 E-03	17.5
08	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_004	170.02	2.48 E+01	1.30 E-02	19.4
09	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_010	170	3.28 E+01	7.00 E-03	19.7
10	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_011	170	2.85 E+01	3.00 E-03	20.5
11	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_012	170.02	2.27 E+01	2.00 E-03	19.9
12	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_013	170.02	3.68 E+02	5.00 E-03	18.7
13	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_014	170	2.82 E+01	5.00 E-03	18.5
14	TH-230	DO	08/01/13 12:17		A_Spec	Alpha_015	170	2.91 E+01	5.00 E-03	14.8
15	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_033	170	2.77 E+01	2.00 E-03	18.5
16	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_034	170	9.38 E+01	1.00 E-03	18.6
17	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_035	170	1.65 E+01	3.00 E-03	18.3
18	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_036	170	2.08 E+01	1.00 E-03	19.1
19	TH-230	TRG	08/01/13 12:17		A_Spec	Alpha_038	170	2.27 E+01	2.00 E-03	17.2

Run	1
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

2120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-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	4.07E+00	6.46E-01	1.15E-01	4.85E+00	83.80	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	7.59E-03	4.92E-02	1.34E-01					OK	OK
03	TH-232	DUP	I-67 TOT	pCi/l	4.69E-02	6.18E-02	9.37E-02				NA	OK	
04	TH-232	TRG	DUP 03 TOT	pCi/l	0.00E+00	4.55E-02	9.85E-02					OK	
05	TH-232	TRG	DUP 03 DIS	pCi/l	4.05E-02	5.26E-02	7.28E-02					OK	
06	TH-232	TRG	S-8 TOT	pCi/l	7.52E-02	8.36E-02	1.13E-01					OK	
07	TH-232	TRG	S-8 DIS	pCi/l	8.85E-02	8.50E-02	1.03E-01					OK	
08	TH-232	TRG	I-62 TOT	pCi/l	1.24E-01	9.27E-02	7.75E-02					OK	
09	TH-232	TRG	I-62 DIS	pCi/l	6.22E-02	6.48E-02	6.78E-02					OK	
10	TH-232	TRG	D-6 TOT	pCi/l	7.45E-02	6.27E-02	5.34E-02					OK	
11	TH-232	TRG	D-6 DIS	pCi/l	5.51E-02	8.51E-02	1.26E-01					OK	
12	TH-232	TRG	S-61 TOT	pCi/l	7.37E-01	2.46E-01	8.14E-02					OK	
13	TH-232	TRG	S-61 DIS	pCi/l	1.23E-01	1.15E-01	1.30E-01					OK	
14	TH-232	DO	I-67 TOT	pCi/l	5.42E-02	8.36E-02	1.24E-01					OK	
15	TH-232	TRG	I-67 DIS	pCi/l	9.98E-02	8.80E-02	9.97E-02					OK	
16	TH-232	TRG	I-68 TOT	pCi/l	9.49E-01	3.10E-01	8.30E-02					OK	
17	TH-232	TRG	I-68 DIS	pCi/l	5.61E-02	6.22E-02	8.41E-02					OK	
18	TH-232	TRG	DUP 04 TOT	pCi/l	7.42E-02	7.14E-02	7.62E-02					OK	
19	TH-232	TRG	DUP 04 DIS	pCi/l	1.01E-01	7.35E-02	5.40E-02					OK	



Run 1

Analysis Code THISO

Eberline Services Work Order 13-07111

Client Engineering Management Support, Inc.

0120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-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-232	LCS	07/17/13 00:00	1.00E+00	109.52	0.00	0.00			
02	TH-232	MBL	07/17/13 00:00	1.00E+00	60.48	0.00	0.00			
03	TH-232	DUP	07/12/13 13:33	1.00E+00	88.78	0.00	0.00			
04	TH-232	TRG	07/11/13 00:00	1.00E+00	90.19	0.00	0.00			
05	TH-232	TRG	07/11/13 00:00	1.00E+00	95.53	0.00	0.00			
06	TH-232	TRG	07/12/13 09:23	1.00E+00	83.89	0.00	0.00			
07	TH-232	TRG	07/12/13 09:23	1.00E+00	88.24	0.00	0.00			
08	TH-232	TRG	07/12/13 09:56	1.00E+00	84.25	0.00	0.00			
09	TH-232	TRG	07/12/13 09:56	1.00E+00	82.89	0.00	0.00			
10	TH-232	TRG	07/12/13 11:35	1.00E+00	101.03	0.00	0.00			
11	TH-232	TRG	07/12/13 11:35	1.00E+00	44.27	0.00	0.00			
12	TH-232	TRG	07/12/13 12:02	1.00E+00	91.34	0.00	0.00			
13	TH-232	TRG	07/12/13 12:02	1.00E+00	62.10	0.00	0.00			
14	TH-232	DO	07/12/13 13:33	1.00E+00	60.53	0.00	0.00			
15	TH-232	TRG	07/12/13 13:33	1.00E+00	86.19	0.00	0.00			
16	TH-232	TRG	07/12/13 14:35	1.00E+00	82.23	0.00	0.00			
17	TH-232	TRG	07/12/13 14:35	1.00E+00	103.48	0.00	0.00			
18	TH-232	TRG	07/12/13 00:00	1.00E+00	87.09	0.00	0.00			
19	TH-232	TRG	07/12/13 00:00	1.00E+00	119.02	0.00	0.00			

Run	1	Analysis Code	ThISO	Eberline Services Work Order	13-07111	Client	Engineering Management Support, Inc.

7120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	08/01/13 09:17		A_Spec	Alpha_041	170	3.32 E+02	2.10 E-02	19.8
02	TH-232	MBL	08/01/13 09:17		A_Spec	Alpha_042	170	3.20 E-01	4.00 E-03	18.5
03	TH-232	DUP	08/01/13 09:17		A_Spec	Alpha_045	170	3.00 E+00	0.00 E+00	19.1
04	TH-232	TRG	08/01/13 09:17		A_Spec	Alpha_046	170	1.00 E+00	0.00 E+00	17.9
05	TH-232	TRG	08/01/13 09:17		A_Spec	Alpha_047	170	2.66 E+00	2.00 E-03	18.2
06	TH-232	TRG	08/01/13 09:17		A_Spec	Alpha_048	170	4.00 E+00	0.00 E+00	16.8
07	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_003	170.02	5.15 E+00	5.00 E-03	17.5
08	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_004	170.02	7.66 E+00	2.00 E-03	19.4
09	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_010	170	3.83 E+00	1.00 E-03	19.7
10	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_011	170	5.83 E+00	1.00 E-03	20.5
11	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_012	170.02	1.83 E+00	1.00 E-03	19.9
12	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_013	170.02	4.75 E+01	3.00 E-03	18.7
13	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_014	170	5.32 E+00	4.00 E-03	18.5
14	TH-232	DO	08/01/13 12:17		A_Spec	Alpha_015	170	1.83 E+00	1.00 E-03	14.8
15	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_033	170	6.00 E+00	0.00 E+00	18.5
16	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_034	170	5.47 E+01	2.00 E-03	18.6
17	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_035	170	4.00 E+00	0.00 E+00	18.3
18	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_036	170	4.66 E+00	2.00 E-03	19.1
19	TH-232	TRG	08/01/13 12:17		A_Spec	Alpha_038	170	7.83 E+00	1.00 E-03	17.2

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

5129

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	LC (LCS)	LCS	07/17/13 00:00	1.0000	0.4721	10.6062		0.00		
02	MBL	BLANK	07/17/13 00:00	1.0000	0.2384	5.3559		0.00		
03	DUP	I-67 TOT	07/12/13 13:33	1.0000	0.2340	5.2570		0.00		
04	TRG	DUP 03 TOT	07/11/13 00:00	1.0000	0.2331	5.2368		0.00		
05	TRG	DUP 03 DIS	07/11/13 00:00	1.0000	0.2322	5.2166		0.00		
06	TRG	S-8 TOT	07/12/13 09:23	1.0000	0.2310	5.1896		0.00		
07	TRG	S-8 DIS	07/12/13 09:23	1.0000	0.2319	5.2099		0.00		
08	TRG	I-62 TOT	07/12/13 09:56	1.0000	0.2351	5.2818		0.00		
09	TRG	I-62 DIS	07/12/13 09:56	1.0000	0.2341	5.2593		0.00		
10	TRG	D-6 TOT	07/12/13 11:35	1.0000	0.2285	5.1335		0.00		
11	TRG	D-6 DIS	07/12/13 11:35	1.0000	0.2071	4.6527		0.00		
12	TRG	S-61 TOT	07/12/13 12:02	1.0000	0.2280	5.1222		0.00		
13	TRG	S-61 DIS	07/12/13 12:02	1.0000	0.2318	5.2076		0.00		
14	DO	I-67 TOT	07/12/13 13:33	1.0000	0.2362	5.3065		0.00		
15	TRG	I-67 DIS	07/12/13 13:33	1.0000	0.2334	5.2436		0.00		
16	TRG	I-68 TOT	07/12/13 14:35	1.0000	0.2039	4.5808		0.00		
17	TRG	I-68 DIS	07/12/13 14:35	1.0000	0.2021	4.5404		0.00		
18	TRG	DUP 04 TOT	07/12/13 00:00	1.0000	0.2356	5.2930		0.00		
19	TRG	DUP 04 DIS	07/12/13 00:00	1.0000	0.2381	5.3492		0.00		

0117

5-15

02-15

0218

Spike and Tracer Worksheet

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07111	1	THISO	7/29/2013 8:05	JWOLFE	<i>J Wolfe</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	7/29/2013	0.100	0.1040				4.85	0.175	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	7/29/2013	0.500	0.5140				5.45	0.147	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	7/29/2013	0.100	0.1040				4.85	0.175	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	22.466	7/29/2013	0.4721	0.2200		
02	Th-229	Th-18a	22.466	7/29/2013	0.2384	0.2200		
03	Th-229	Th-18a	22.466	7/29/2013	0.2340	0.2200		
04	Th-229	Th-18a	22.466	7/29/2013	0.2331	0.2200		
05	Th-229	Th-18a	22.466	7/29/2013	0.2322	0.2200		
06	Th-229	Th-18a	22.466	7/29/2013	0.2310	0.2200		
07	Th-229	Th-18a	22.466	7/29/2013	0.2319	0.2200		
08	Th-229	Th-18a	22.466	7/29/2013	0.2351	0.2200		
09	Th-229	Th-18a	22.466	7/29/2013	0.2341	0.2200		
10	Th-229	Th-18a	22.466	7/29/2013	0.2285	0.2200		
11	Th-229	Th-18a	22.466	7/29/2013	0.2071	0.2200		
12	Th-229	Th-18a	22.466	7/29/2013	0.2280	0.2200		
13	Th-229	Th-18a	22.466	7/29/2013	0.2318	0.2200		
14	Th-229	Th-18a	22.466	7/29/2013	0.2362	0.2200		
15	Th-229	Th-18a	22.466	7/29/2013	0.2334	0.2200		
16	Th-229	Th-18a	22.466	7/29/2013	0.2039	0.2200		
17	Th-229	Th-18a	22.466	7/29/2013	0.2021	0.2200		
18	Th-229	Th-18a	22.466	7/29/2013	0.2356	0.2200		
19	Th-229	Th-18a	22.466	7/29/2013	0.2381	0.2200		

0.4721 g
0.2384 g
-0.2340 g
-0.2331 g
-0.2322 g
-0.2310 g
-0.2319 g
-0.2351 g
-0.2341 g
-0.2285 g
-0.2071 g
-0.2280 g
-0.2318 g
-0.2362 g
-0.2334 g
-0.2039 g
-0.2021 g
-0.2356 g
-0.2381 g

0.5140 g
0.1040 g

Matrix Spike

0217

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07111	1	ThISO	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-67 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 03 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 03 DIS	TRG					1.0000E+00	1.0000E+00				
06	S-8 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-8 DIS	TRG					1.0000E+00	1.0000E+00				
08	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-62 DIS	TRG					1.0000E+00	1.0000E+00				
10	D-6 TOT	TRG					1.0000E+00	1.0000E+00				
11	D-6 DIS	TRG					1.0000E+00	1.0000E+00				
12	S-61 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-61 DIS	TRG					1.0000E+00	1.0000E+00				
14	I-67 TOT	DO					1.0000E+00	1.0000E+00				
15	I-67 DIS	TRG					1.0000E+00	1.0000E+00				
16	I-68 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-68 DIS	TRG					1.0000E+00	1.0000E+00				
18	DUP 04 TOT	TRG					1.0000E+00	1.0000E+00				
19	DUP 04 DIS	TRG					1.0000E+00	1.0000E+00				

Comments

Technician: _____

J Wolfe

Date: _____

7, 29, 13

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Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 63329
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/1/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:50 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.472 mL
 Effective Efficiency: 0.2167 +/- 0.0129
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.0952 +/- 0.0677

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 0.837953 +/- 0.072420
 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	19.32	45.50	0.68	0.00E+000	6.3
TH-228	5.359	364.66	10.27	0.34	0.00E+000	40.2
TH-229	T 4.877	390.66	9.92	0.34	0.00E+000	20.9
TH-230	4.618	392.32	9.91	0.68	0.00E+000	25.1
TH-232	3.956	332.43	10.82	3.57	0.00E+000	29.0

T = Tracer Peak used for Effective Efficiency

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

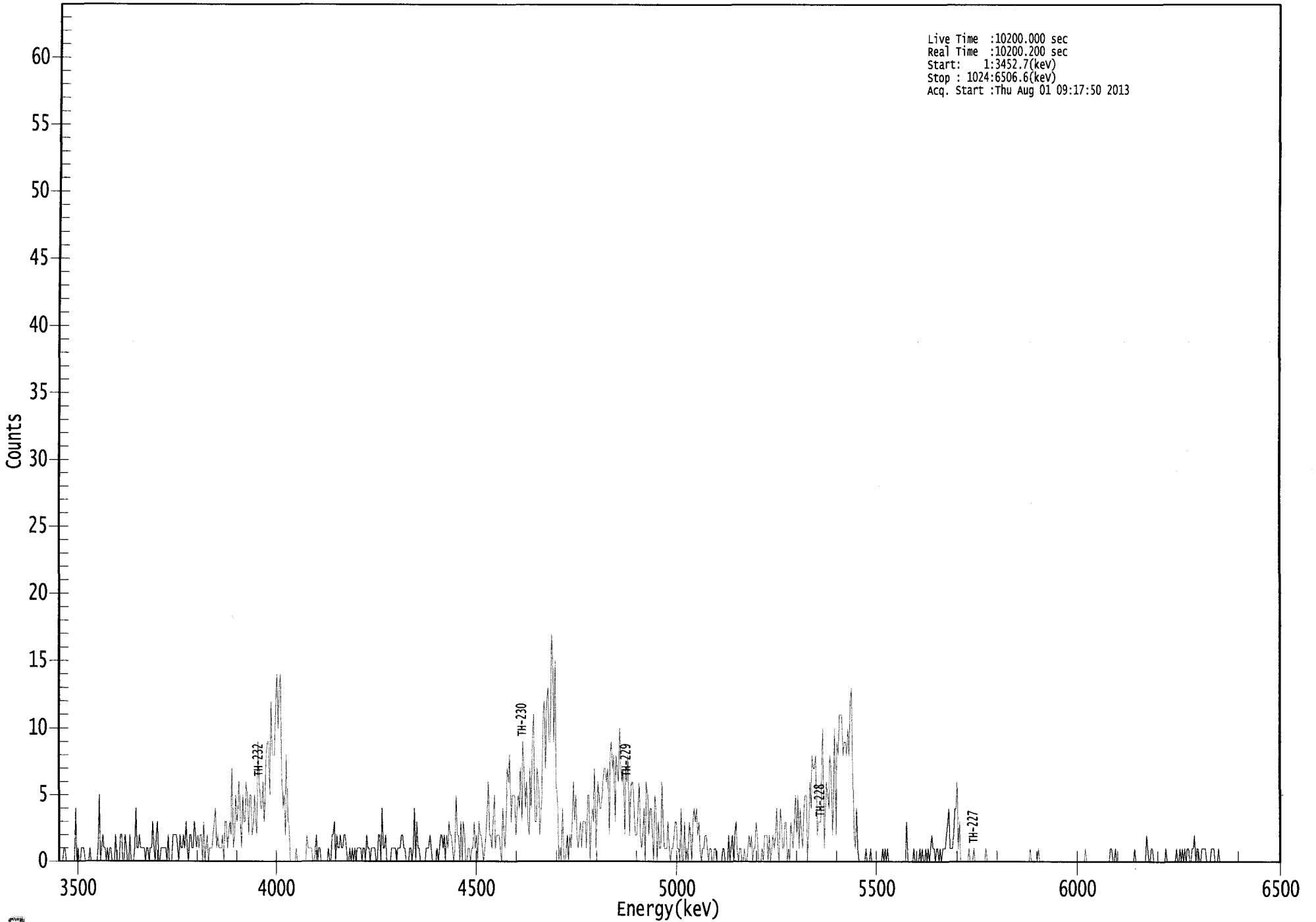
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.942	5850.00*	2.42E-001 +/- 1.14E-001	7.07E-002 +/- 8.23E-003
TH-228	0.991	5400.00*	4.46E+000 +/- 6.92E-001	5.85E-002 +/- 6.81E-003
TH-229	1.000	4872.00*	4.80E+000 +/- 5.58E-001	5.87E-002 +/- 6.84E-003
TH-230	0.985	4672.00*	4.81E+000 +/- 7.34E-001	6.91E-002 +/- 8.04E-003
TH-232	0.991	3997.00*	4.07E+000 +/- 6.46E-001	1.15E-001 +/- 1.34E-002

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US EPA ARCHIVE DOCUMENT

0000064810.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Thu Aug 01 09:17:50 2013



ROI Type: 1

ROI Type: 3

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

369: 2 2 2 1 0 4 2 1

Sample Title: 01

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 01

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



Apex-Alpha™

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Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 63330
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/1/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:52 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.238 mL
 Effective Efficiency: 0.1117 +/- 0.0116
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.6048 +/- 0.0638

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	5.965	0.49	416.98	0.51	0.00E+000	3.0
TH-228	5.299	-1.87	120.32	1.87	0.00E+000	0.0
TH-229	T 4.867	101.66	19.48	0.34	0.00E+000	4.0
TH-230	4.621	18.15	47.25	0.85	0.00E+000	3.0
TH-232	4.015	0.32	646.93	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

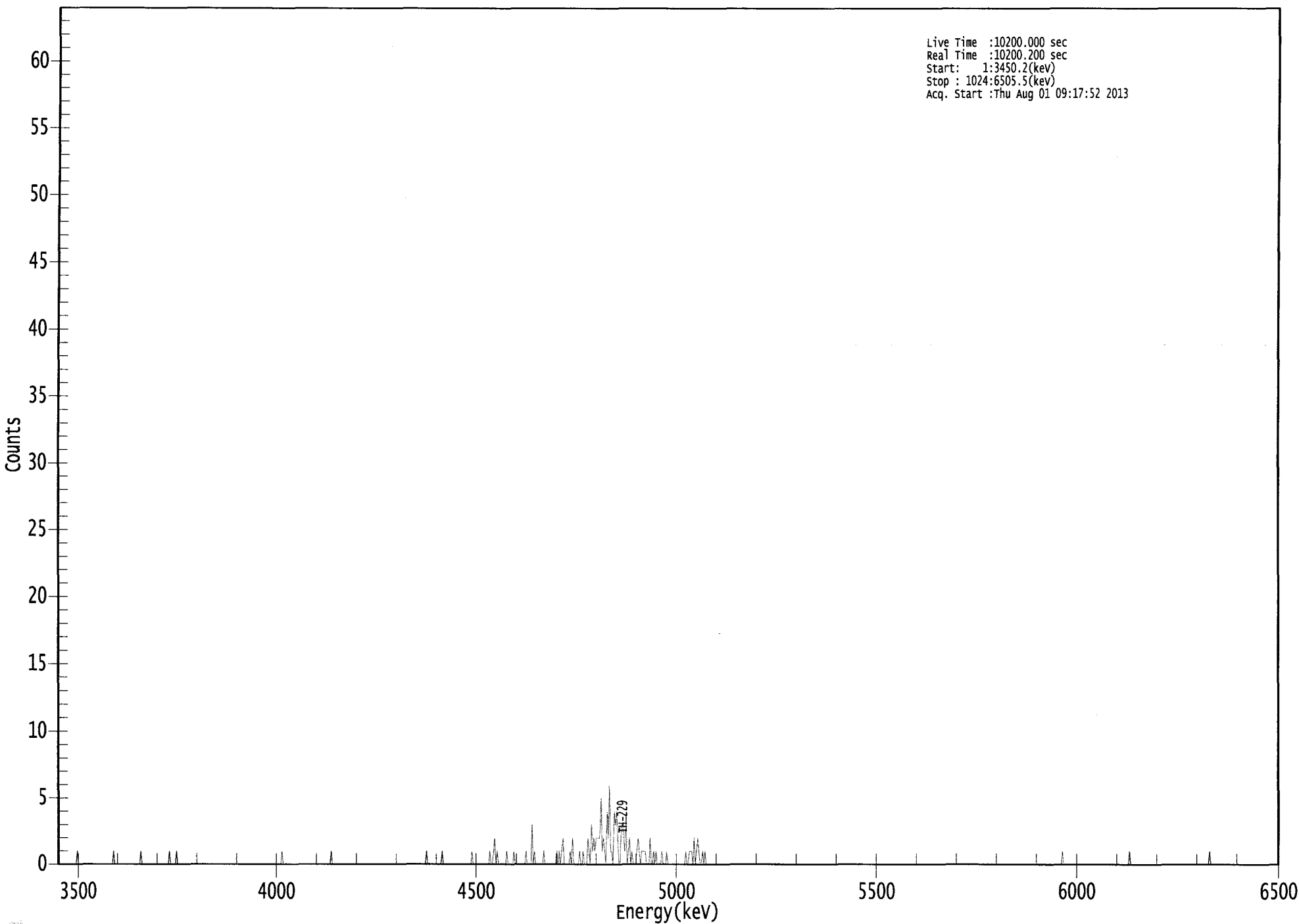
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.933	5850.00*	1.19E-002 +/- 4.98E-002	1.28E-001 +/- 2.61E-002
TH-228	0.948	5400.00*	-4.44E-002 +/- 5.42E-002	1.80E-001 +/- 3.67E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 4.95E-001	1.14E-001 +/- 2.33E-002
TH-230	0.986	4672.00*	4.31E-001 +/- 2.22E-001	1.42E-001 +/- 2.90E-002
TH-232	0.998	3997.00*	7.59E-003 +/- 4.92E-002	1.34E-001 +/- 2.73E-002

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US EPA ARCHIVE DOCUMENT

0000064811.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Thu Aug 01 09:17:52 2013



ROI Type: 1

ROI Type: 3

5228

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 0 0 0 0 0 0

Sample Title: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

KBS
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Apex-Alpha™

Sample Description: I-67 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 63331
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:45 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1695 +/- 0.0148
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Chem. Recovery Factor: 0.8878 +/- 0.0789

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	5.702	1.15	249.59	0.85	0.00E+000	3.0
TH-228	5.359	-0.19	1131.1	1.19	0.00E+000	3.0
TH-229 T	4.850	151.49	15.96	0.51	0.00E+000	7.3
TH-230	4.620	29.66	36.23	0.34	0.00E+000	3.7
TH-232	3.959	3.00	130.67	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

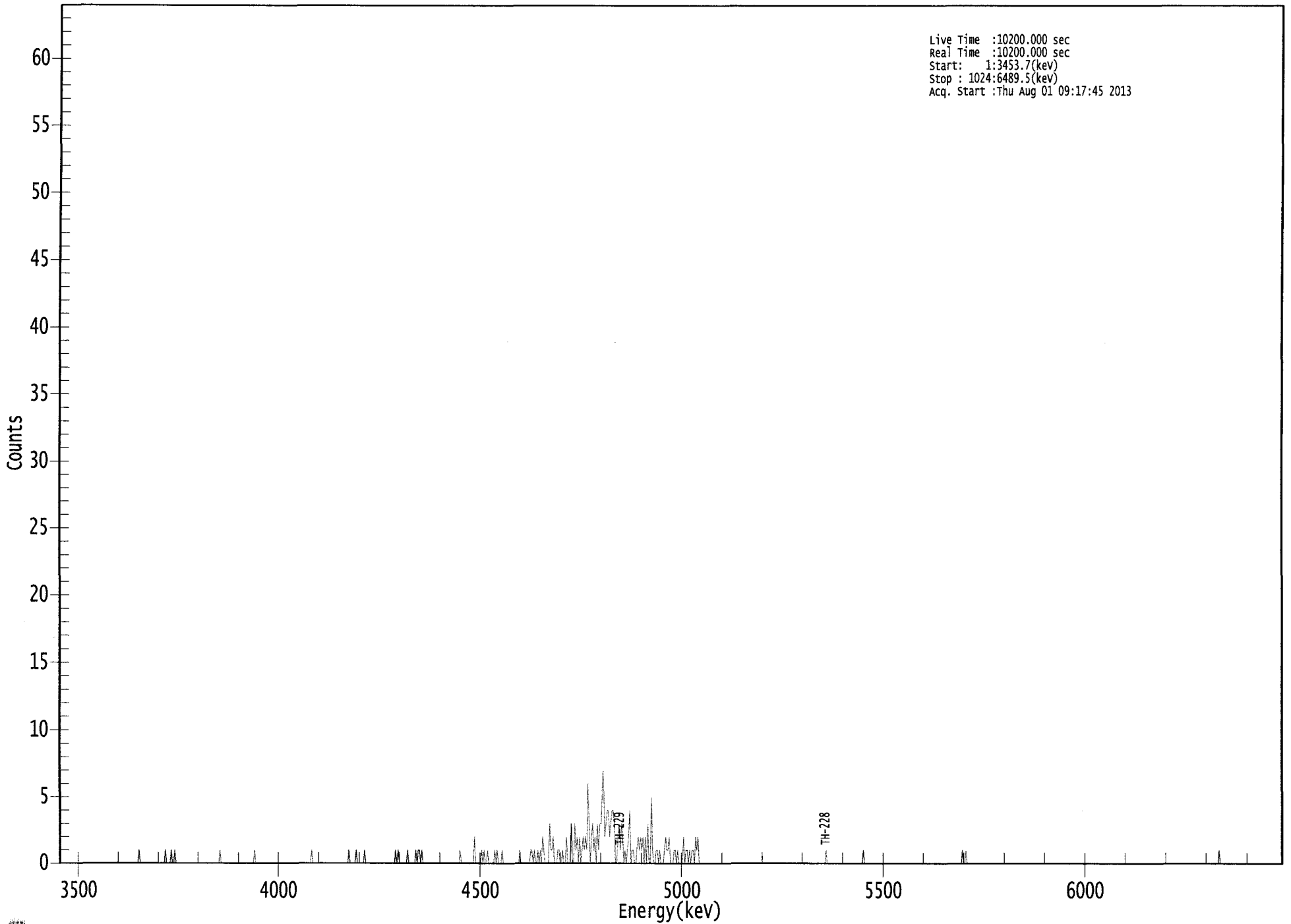
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.891	5850.00*	1.85E-002 +/- 4.62E-002	9.62E-002 +/- 1.64E-002
TH-228	0.991	5400.00*	-3.03E-003 +/- 3.43E-002	1.05E-001 +/- 1.79E-002
TH-229	0.997	4872.00*	2.38E+000 +/- 4.06E-001	8.24E-002 +/- 1.41E-002
TH-230	0.986	4672.00*	4.64E-001 +/- 1.86E-001	7.49E-002 +/- 1.28E-002
TH-232	0.993	3997.00*	4.69E-002 +/- 6.18E-002	9.37E-002 +/- 1.60E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064806.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :Thu Aug 01 09:17:45 2013



ROI Type: 1

ROI Type: 3

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	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	1	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	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	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	1	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	0	0	0
249:	0	1	0	0	0	0	0	0
257:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	0	1	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	1	0	1	1	0
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	0	0	0	0	0
345:	0	0	0	0	2	0	0	0
353:	0	0	1	0	1	0	0	1
361:	0	0	0	0	0	1	0	1

369: 0 0 0 1 0 0 0 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	1	1	0	1	0
401:	0	1	0	1	0	2	1	0
409:	0	0	0	3	1	1	2	0
417:	0	0	1	1	0	0	1	0
425:	0	2	0	0	0	3	0	0
433:	3	1	2	0	2	0	1	2
441:	1	2	1	6	3	0	2	3
449:	1	2	0	3	1	3	3	5
457:	7	2	3	4	4	2	3	4
465:	4	3	0	0	2	3	1	3
473:	2	0	1	0	1	2	4	0
481:	1	1	0	0	1	2	1	2
489:	1	2	0	2	0	3	0	0
497:	5	1	0	0	1	1	0	1
505:	0	0	0	1	2	1	1	2
513:	0	0	0	1	1	0	1	0
521:	0	0	0	2	0	1	1	0
529:	1	0	1	1	0	2	1	2
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	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	1	0	0	0	0	0	0
681:	0	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	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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

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Apex-Alpha™

Sample Description: DUP 03 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 63332
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:49 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1614 +/- 0.0144
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.9019 +/- 0.0819

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	5.864	2.00	169.74	0.00	0.00E+000	3.0
TH-228	5.363	15.66	50.15	0.34	0.00E+000	4.5
TH-229 T	4.867	143.66	16.38	0.34	0.00E+000	11.2
TH-230	4.599	24.66	39.79	0.34	0.00E+000	4.5
TH-232	3.948	0.00	1960.0	0.00	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

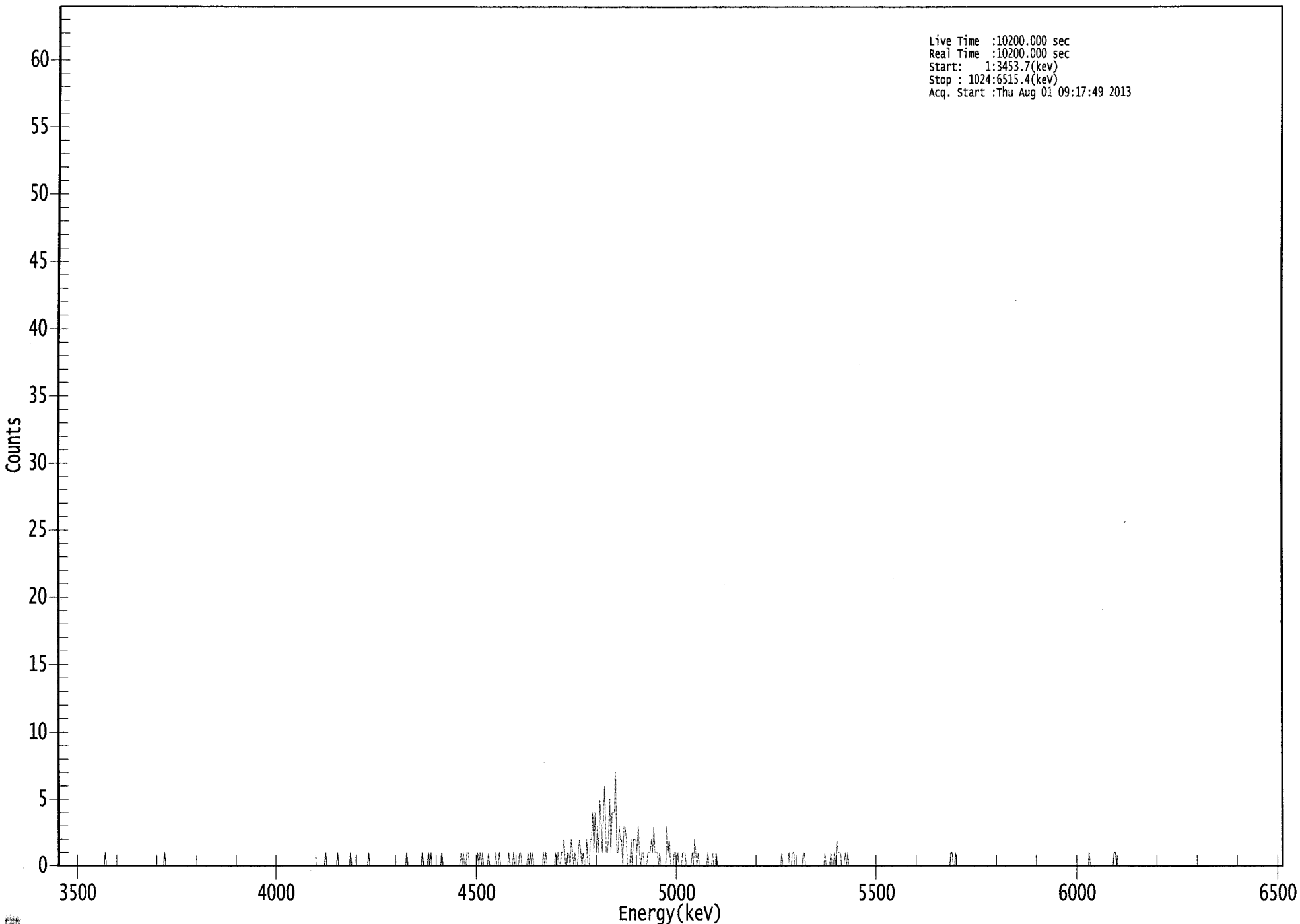
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	3.37E-002 +/- 5.76E-002	1.01E-001 +/- 1.77E-002
TH-228	0.993	5400.00*	2.63E-001 +/- 1.40E-001	8.02E-002 +/- 1.40E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.14E-001	7.89E-002 +/- 1.38E-002
TH-230	0.973	4672.00*	4.06E-001 +/- 1.76E-001	7.86E-002 +/- 1.37E-002
TH-232	0.987	3997.00*	0.00E+000 +/- 4.55E-002	9.85E-002 +/- 1.72E-002

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US EPA ARCHIVE DOCUMENT

0000064805.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Thu Aug 01 09:17:49 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:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	1
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	1	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	0	0	1	0
313:	1	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	1	0	1	0	0	1	1
345:	0	0	0	0	0	0	0	1
353:	0	1	0	1	0	0	0	0
361:	1	0	0	0	0	0	1	0

369: 0 1 0 0 0 0 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

Sample Title: 04

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	1	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



Apex-Alpha™

KCS
8/1/13

Sample Description: DUP 03 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 63333
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:41 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1740 +/- 0.0150
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.9553 +/- 0.0843

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	5.891	0.32	646.93	0.68	0.00E+000	2.9
TH-228	5.350	10.66	61.14	0.34	0.00E+000	2.9
TH-229 T	4.865	154.32	15.82	0.68	0.00E+000	6.4
TH-230	4.640	31.00	35.77	0.00	0.00E+000	6.6
TH-232	3.942	2.66	128.85	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

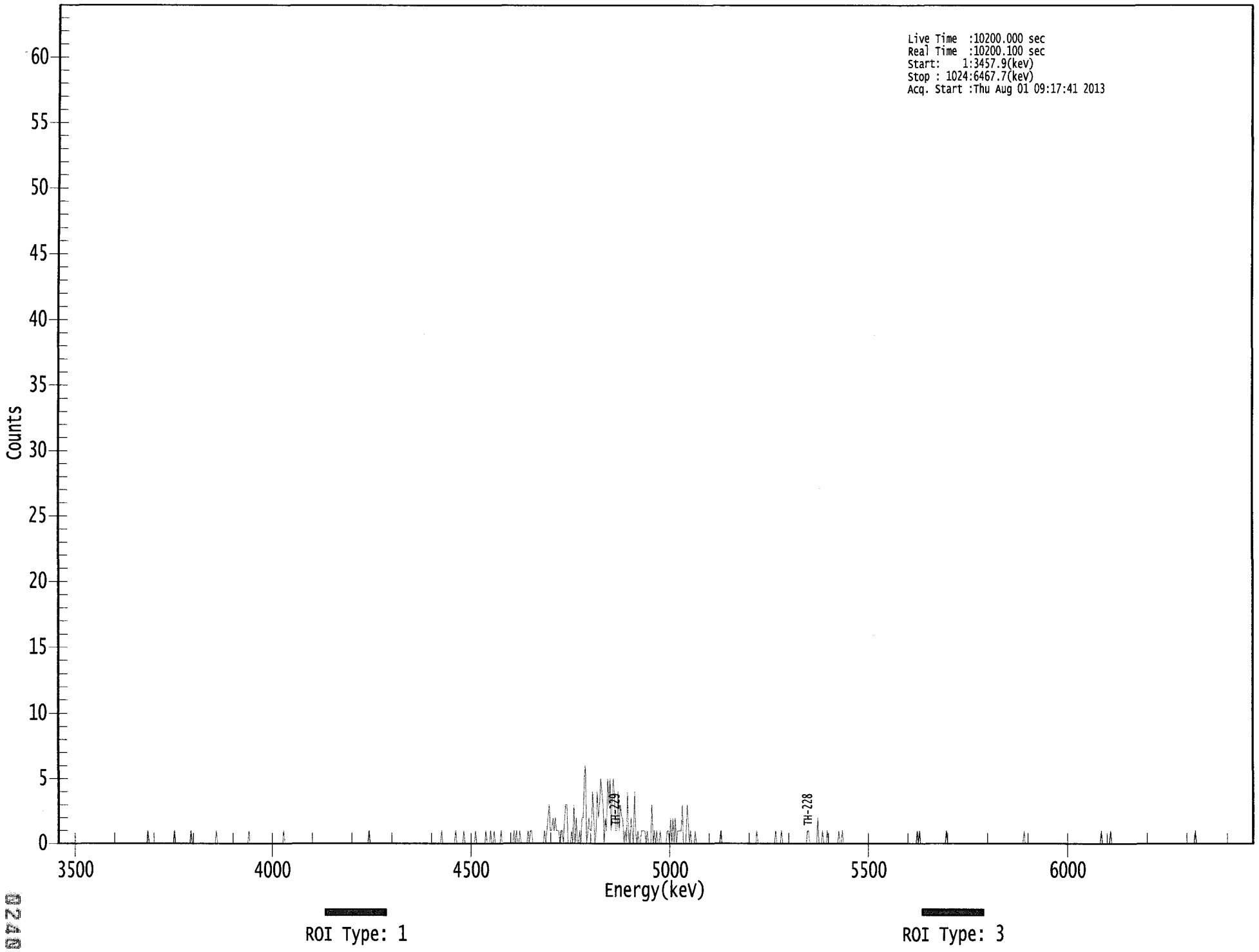
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.991	5850.00*	5.01E-003 +/- 3.24E-002	8.82E-002 +/- 1.50E-002
TH-228	0.987	5400.00*	1.66E-001 +/- 1.05E-001	7.44E-002 +/- 1.26E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.00E-001	8.63E-002 +/- 1.46E-002
TH-230	0.995	4672.00*	4.73E-001 +/- 1.87E-001	9.15E-002 +/- 1.55E-002
TH-232	0.985	3997.00*	4.05E-002 +/- 5.26E-002	7.28E-002 +/- 1.23E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064817.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Thu Aug 01 09:17:41 2013



0240

ROI Type: 1

ROI Type: 3

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	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	1	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	1	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	1	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	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	1	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	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	1	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	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	1	0	0
345:	0	0	0	0	1	0	0	0
353:	0	0	0	0	0	0	1	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 1 0 0 1 0

Sample Title: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	1	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	1	0	0	1	0	0	0
401:	0	0	0	1	0	1	1	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	1	2	3	1	1
425:	2	1	2	1	1	1	0	1
433:	1	0	2	3	3	0	0	0
441:	1	0	3	0	2	0	0	1
449:	0	2	2	5	6	0	1	2
457:	1	1	4	2	0	1	4	2
465:	3	5	4	3	0	2	1	5
473:	3	5	1	4	5	3	1	1
481:	4	1	3	2	2	0	1	0
489:	4	0	0	2	1	0	4	1
497:	0	1	0	0	1	1	1	1
505:	0	1	0	0	0	3	0	1
513:	0	1	0	0	1	0	0	0
521:	0	0	1	1	0	2	0	2
529:	0	2	0	1	1	1	1	3
537:	0	0	0	3	2	0	1	0
545:	0	0	1	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	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	1
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	1
617:	0	0	0	0	1	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	1	1	0	0	0	0
649:	0	0	0	2	0	0	0	1
657:	0	0	0	1	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	1	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	1	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	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: 05

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



Sample Description: S-8 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307111A-TH
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 63334
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 9:17:43 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.231 mL
 Effective Efficiency: 0.1409 +/- 0.0134
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 0.8389 +/- 0.0812

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	5.873	0.00	1960.0	0.00	0.00E+000	0.0
TH-228	5.309	-0.85	246.69	0.85	0.00E+000	0.0
TH-229 T	4.844	124.32	17.63	0.68	0.00E+000	3.7
TH-230	4.577	21.00	43.78	0.00	0.00E+000	3.0
TH-232	3.955	4.00	109.57	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

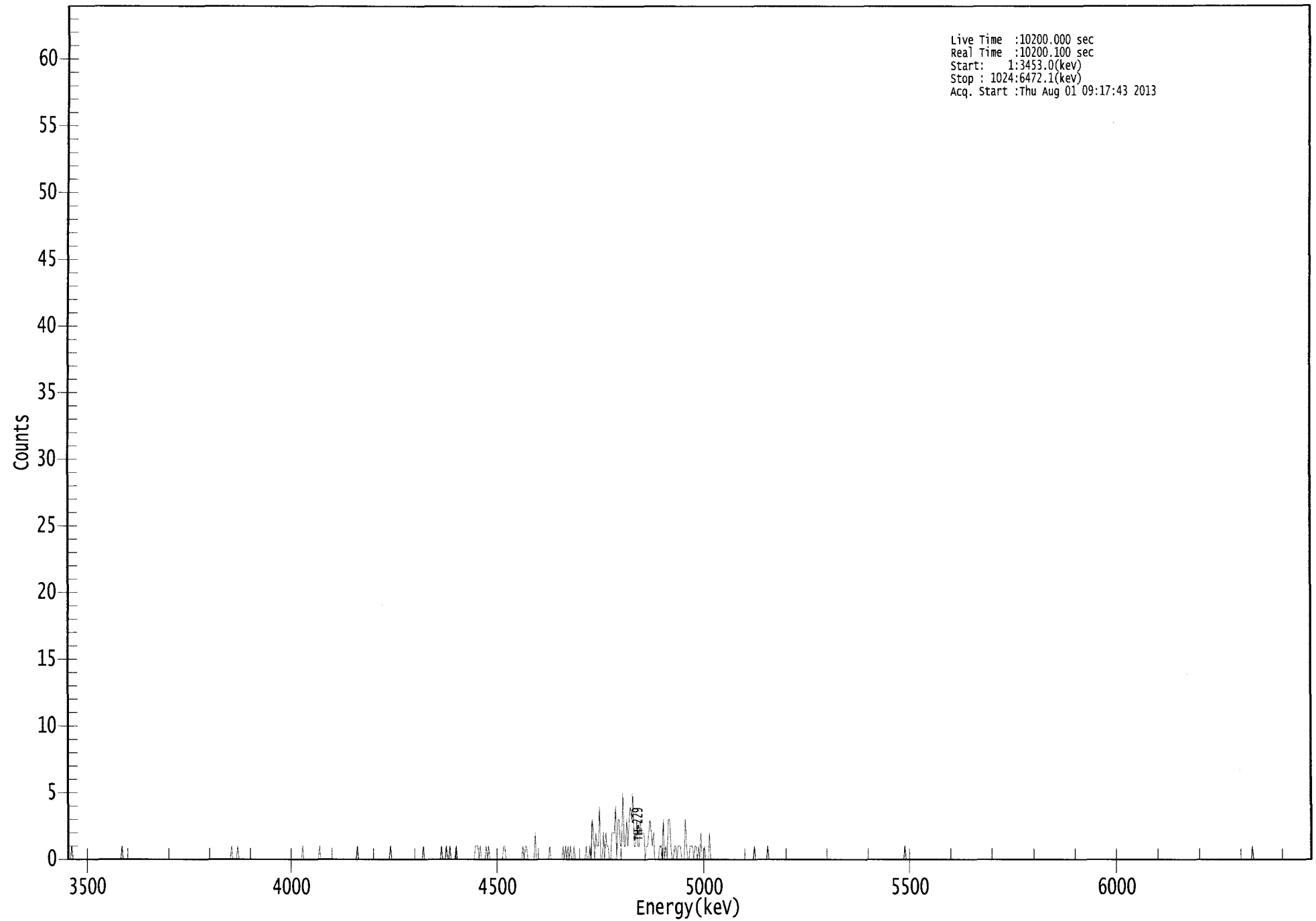
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	0.00E+000 +/- 5.35E-002	1.16E-001 +/- 2.16E-002
TH-228	0.958	5400.00*	-1.63E-002 +/- 4.04E-002	1.15E-001 +/- 2.14E-002
TH-229	0.996	4872.00*	2.35E+000 +/- 4.38E-001	1.07E-001 +/- 1.99E-002
TH-230	0.954	4672.00*	3.96E-001 +/- 1.88E-001	1.13E-001 +/- 2.11E-002
TH-232	0.991	3997.00*	7.52E-002 +/- 8.36E-002	1.13E-001 +/- 2.10E-002

AG
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US EPA ARCHIVE DOCUMENT

000064903.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start : 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :Thu Aug 01 09:17:43 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:	0	0	0	1	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	1	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	1	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	1	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	1	0	0
313:	0	1	0	0	1	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	1	1	1	0	1	0	0
345:	0	0	1	0	1	0	0	0
353:	0	0	0	0	0	0	0	0
361:	1	1	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	1	0	1	1	0	0	0	0
385:	0	0	2	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	1	0	1	0	1	0	1
417:	0	0	1	0	0	0	0	0
425:	0	0	0	0	1	0	0	1
433:	0	3	2	0	2	1	1	4
441:	0	0	2	0	2	1	1	0
449:	0	2	2	2	4	0	3	3
457:	1	1	5	1	1	3	1	3
465:	4	3	5	1	1	3	1	1
473:	3	2	2	2	0	1	1	2
481:	3	2	1	2	0	0	0	0
489:	1	1	0	3	0	1	0	3
497:	3	1	0	0	1	1	0	1
505:	1	1	0	0	0	3	1	0
513:	0	1	1	1	0	1	1	0
521:	1	0	2	0	0	1	0	0
529:	0	2	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	1	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	1	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	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	1	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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Sample Description: S-8 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:21 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1541 +/- 0.0141
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 0.8824 +/- 0.0822

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.833	4.28	125.11	2.72	0.00E+000	3.0
TH-228	5.432	1.79	229.08	2.21	0.00E+000	3.0
TH-229 T	4.869	136.49	16.81	0.51	0.00E+000	4.7
TH-230	4.605	16.49	49.13	0.51	0.00E+000	4.5
TH-232	3.951	5.15	94.34	0.85	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

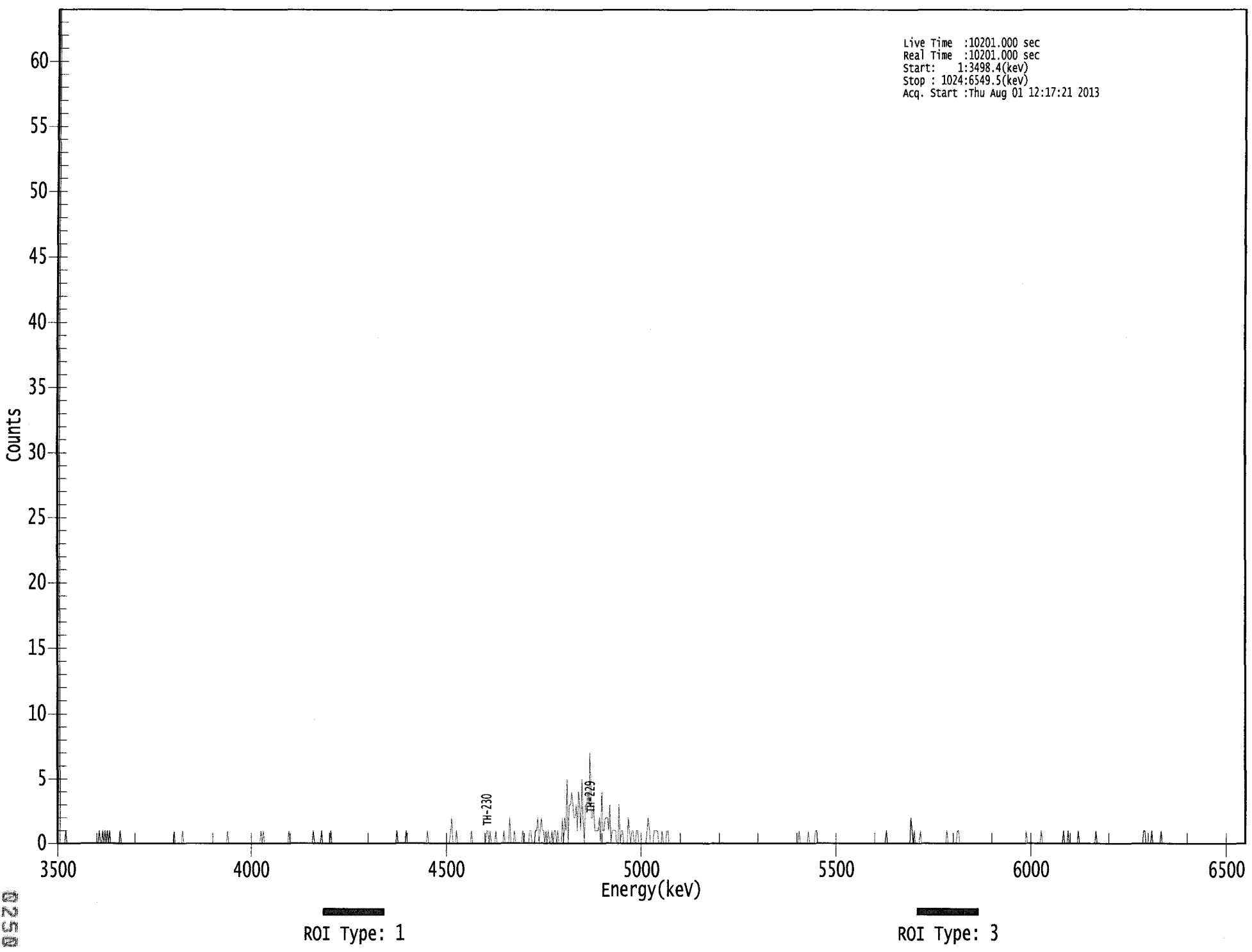
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	7.56E-002 +/- 9.55E-002	1.51E-001 +/- 2.71E-002
TH-228	0.995	5400.00*	3.14E-002 +/- 7.22E-002	1.40E-001 +/- 2.51E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.22E-001	9.07E-002 +/- 1.62E-002
TH-230	0.977	4672.00*	2.84E-001 +/- 1.48E-001	9.04E-002 +/- 1.62E-002
TH-232	0.989	3997.00*	8.85E-002 +/- 8.50E-002	1.03E-001 +/- 1.84E-002

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US EPA ARCHIVE DOCUMENT

0000064844.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Thu Aug 01 12:17:21 2013



ROI Type: 1

ROI Type: 3

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

369: 0 0 1 1 0 1 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	0	0
385:	0	1	0	0	0	0	2	0
393:	0	0	1	0	0	0	0	0
401:	0	1	0	0	0	0	0	1
409:	1	0	0	0	1	1	2	0
417:	1	2	1	1	0	1	0	1
425:	0	0	1	0	1	1	0	1
433:	0	0	0	2	0	2	1	5
441:	0	3	3	4	3	2	2	3
449:	1	4	3	1	5	2	0	3
457:	3	4	3	7	2	2	3	1
465:	1	1	1	2	0	4	1	1
473:	2	2	2	1	3	0	1	1
481:	1	1	0	0	3	0	1	1
489:	0	0	0	0	2	1	0	1
497:	1	0	0	1	1	0	0	0
505:	0	0	0	0	1	2	1	0
513:	0	0	1	1	1	1	0	0
521:	0	1	0	0	0	1	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	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	1
641:	0	0	0	0	0	0	0	1
649:	0	0	0	0	0	1	1	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	1	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	2
737:	1	0	1	0	0	0	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	1	0
769:	0	0	0	0	0	0	0	1
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: 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	1	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	1	0	0	0	1	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	1	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	1
937:	1	0	0	0	0	0	1	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

LCB
8/1/13

Apex-Alpha™

Sample Description: I-62 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.1635 +/- 0.0145
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.8425 +/- 0.0764

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	5.758	-0.53	415.04	1.53	0.00E+000	2.9
TH-228	5.375	7.09	94.42	3.91	0.00E+000	2.9
TH-229 T	4.867	146.79	16.32	2.21	0.00E+000	3.8
TH-230	4.606	24.79	41.37	2.21	0.00E+000	2.9
TH-232	3.953	7.66	72.63	0.34	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

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

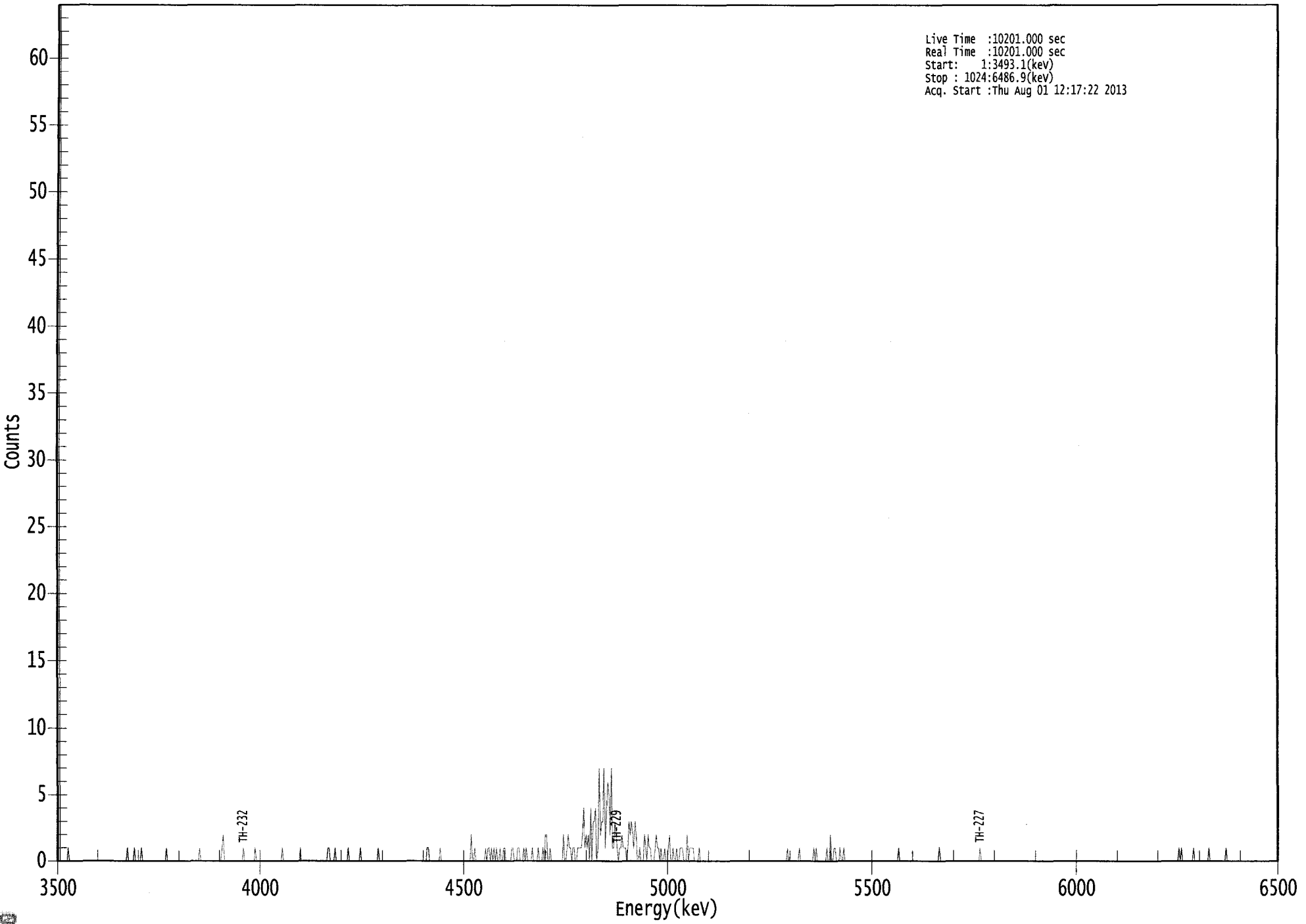
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.957	5850.00*	-8.83E-003 +/- 3.67E-002	1.18E-001 +/- 2.06E-002
TH-228	0.997	5400.00*	1.17E-001 +/- 1.13E-001	1.61E-001 +/- 2.81E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.16E-001	1.30E-001 +/- 2.27E-002
TH-230	0.978	4672.00*	4.03E-001 +/- 1.81E-001	1.30E-001 +/- 2.26E-002
TH-232	0.990	3997.00*	1.24E-001 +/- 9.27E-002	7.75E-002 +/- 1.35E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064845.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Thu Aug 01 12:17:22 2013



ROI Type: 1

ROI Type: 3

0000

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

369: 0 1 0 0 1 0 0 1

Sample Title: 08

Channel	1	2	3	4	5	6	7	8
377:	1	0	0	0	0	0	1	1
385:	0	0	0	1	1	0	0	0
393:	1	0	1	0	0	0	0	1
401:	0	0	0	0	1	0	0	0
409:	1	0	2	2	0	0	1	0
417:	0	0	0	0	0	0	0	0
425:	0	2	0	0	1	2	1	1
433:	0	1	1	0	0	1	1	1
441:	1	2	4	1	2	1	2	0
449:	4	0	3	3	4	0	1	7
457:	2	3	3	7	1	4	6	5
465:	2	7	1	1	3	2	1	0
473:	1	1	2	1	1	1	0	1
481:	3	2	3	2	1	3	2	0
489:	0	1	0	0	0	2	1	0
497:	2	1	1	0	0	0	1	2
505:	1	1	0	1	0	0	1	0
513:	0	1	2	0	0	1	0	0
521:	1	0	0	1	1	1	0	0
529:	0	2	0	1	1	1	1	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	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	1	0	0
617:	0	0	0	0	0	0	0	1
625:	0	0	0	0	0	0	0	0
633:	0	0	0	1	0	1	0	0
641:	0	0	0	0	0	0	1	0
649:	0	2	0	0	1	1	0	0
657:	0	1	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	1	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:	0	0	0	0	0	0	1	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 08

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

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8/1/13

Apex-Alpha™

Sample Description: I-62 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:15 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1631 +/- 0.0145
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.8289 +/- 0.0754

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.786	3.45	144.10	2.55	0.00E+000	0.0
TH-228	5.334	-0.23	1605.4	3.23	0.00E+000	2.9
TH-229 T	4.886	145.79	16.38	2.21	0.00E+000	5.9
TH-230	4.605	32.81	34.94	1.19	0.00E+000	2.9
TH-232	3.987	3.83	102.72	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

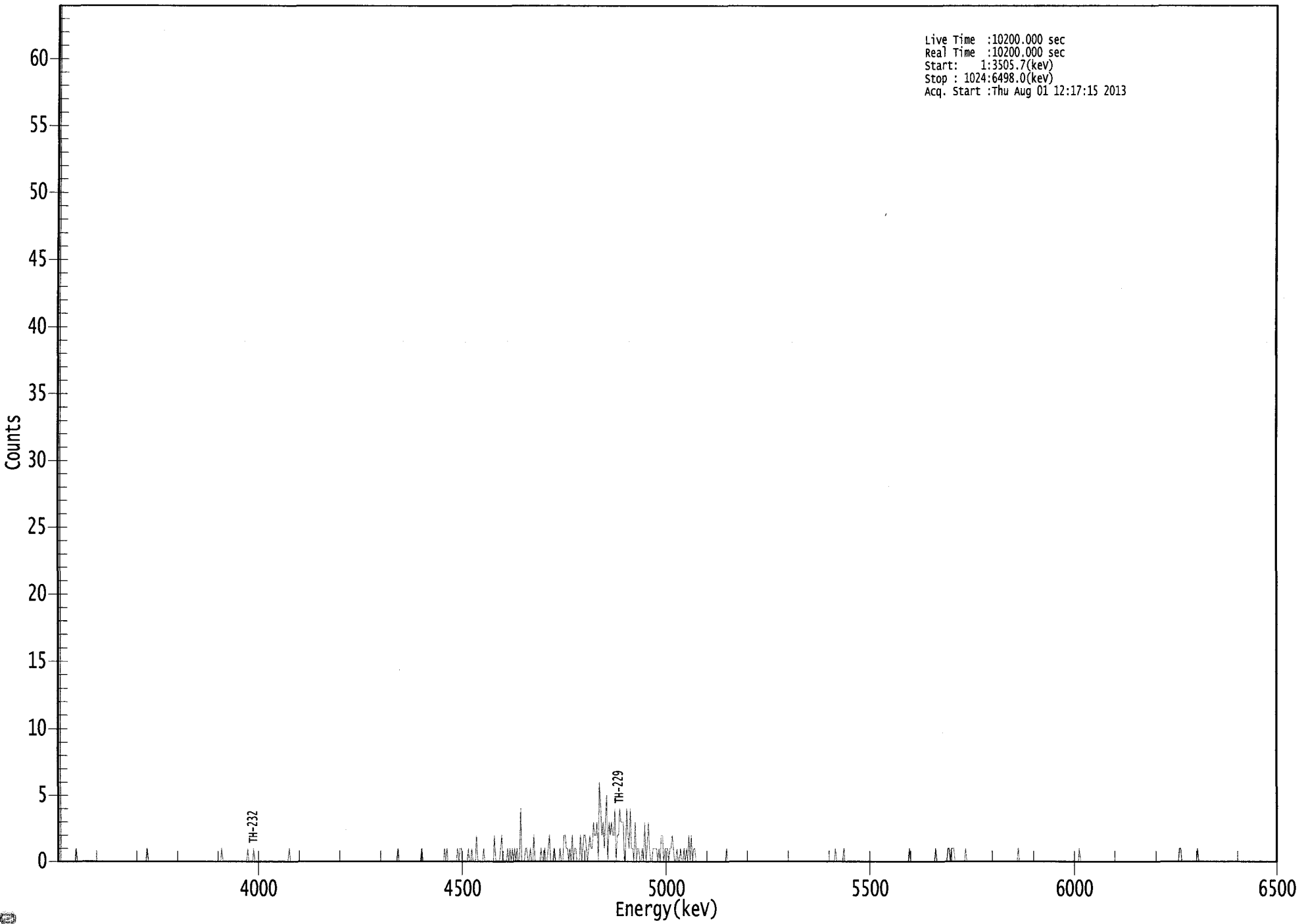
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.979	5850.00*	5.76E-002 +/- 8.36E-002	1.40E-001 +/- 2.45E-002
TH-228	0.977	5400.00*	-3.82E-003 +/- 6.13E-002	1.51E-001 +/- 2.64E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 4.16E-001	1.31E-001 +/- 2.28E-002
TH-230	0.977	4672.00*	5.34E-001 +/- 2.09E-001	1.07E-001 +/- 1.87E-002
TH-232	0.999	3997.00*	6.22E-002 +/- 6.48E-002	6.78E-002 +/- 1.18E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064840.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Thu Aug 01 12:17:15 2013



ROI Type: 1

ROI Type: 3

0260

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	1
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	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	1	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	1	0	0	0	0	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	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	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	1
329:	0	0	0	0	0	0	0	0
337:	1	0	1	1	0	0	0	0
345:	0	1	0	0	1	0	0	0
353:	2	0	0	0	0	0	1	0
361:	0	0	0	0	0	0	0	2

369: 0 0 0 0 1 2 0 0

Sample Title: 09

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

801: 0 0 0 0 0 0 1 0

Sample Title: 09

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

KB
8/2/13

Apex-Alpha™

Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:16 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.2072 +/- 0.0167
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
 Chem. Recovery Factor: 1.0103 +/- 0.0833

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	5.991	0.49	416.97	0.51	0.00E+000	2.6
TH-228	5.362	9.98	65.65	1.02	0.00E+000	3.9
TH-229 T	4.864	180.83	14.58	0.17	0.00E+000	10.5
TH-230	4.638	28.49	37.10	0.51	0.00E+000	2.6
TH-232	3.934	5.83	82.55	0.17	0.00E+000	2.6

T = Tracer Peak used for Effective Efficiency

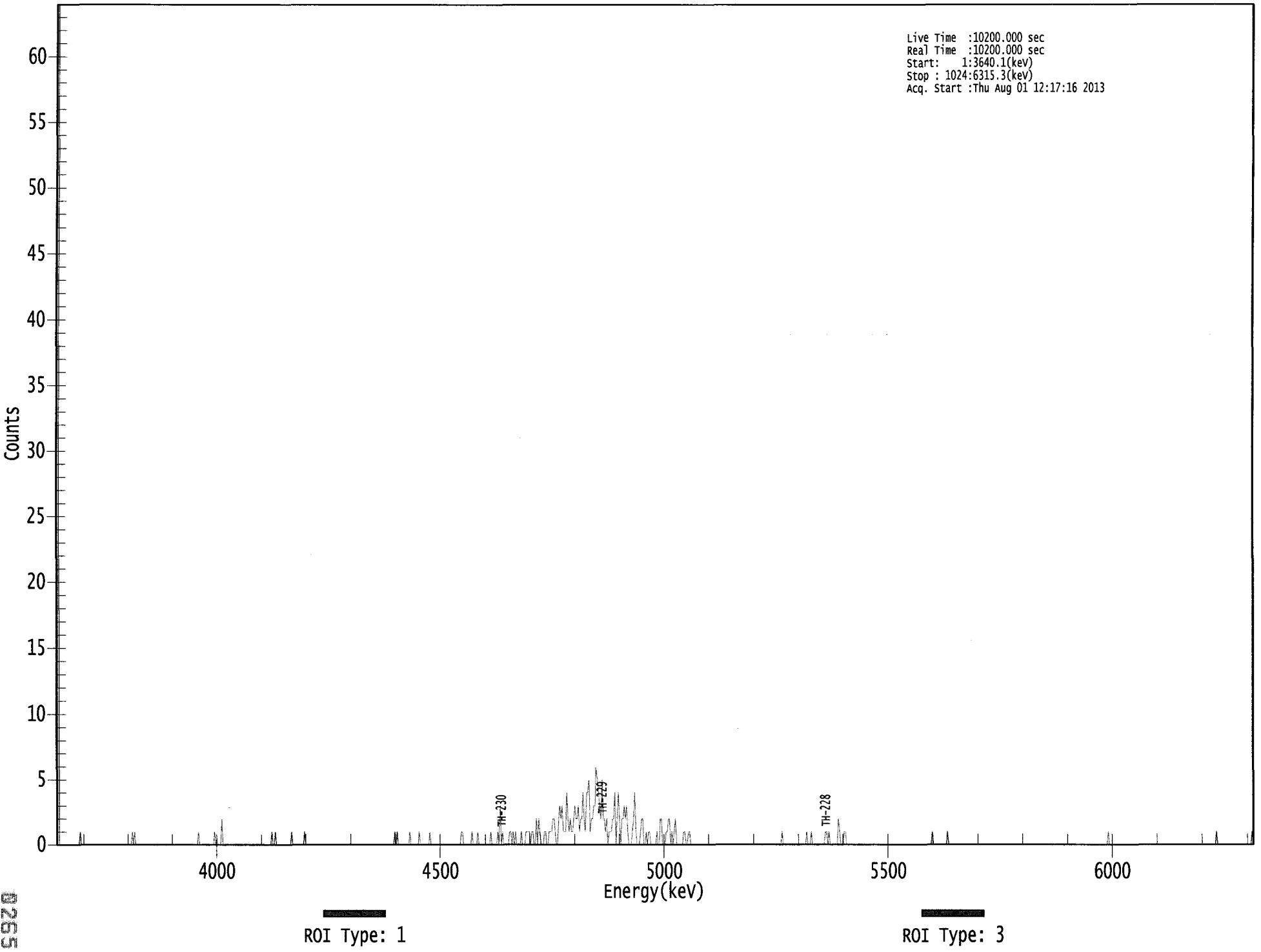
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.901	5850.00*	6.44E-003 +/- 2.69E-002	6.89E-002 +/- 1.09E-002
TH-228	0.993	5400.00*	1.30E-001 +/- 8.80E-002	8.22E-002 +/- 1.30E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 3.67E-001	5.36E-002 +/- 8.47E-003
TH-230	0.994	4672.00*	3.65E-001 +/- 1.47E-001	6.72E-002 +/- 1.06E-002
TH-232	0.979	3997.00*	7.45E-002 +/- 6.27E-002	5.34E-002 +/- 8.43E-003

AG
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0000064839.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3640.1(kev)
Stop : 1024:6315.3(kev)
Acq. Start :Thu Aug 01 12:17:16 2013



0265

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 1 0 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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

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Apex-Alpha™

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:17 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.207 mL
 Effective Efficiency: 0.0881 +/- 0.0109
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Chem. Recovery Factor: 0.4427 +/- 0.0555

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.874	-0.68	304.41	0.68	0.00E+000	0.0
TH-228	5.310	5.49	88.08	0.51	0.00E+000	3.0
TH-229 T	4.861	69.66	23.55	0.34	0.00E+000	3.0
TH-230	4.648	22.66	41.53	0.34	0.00E+000	3.0
TH-232	3.943	1.83	152.56	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

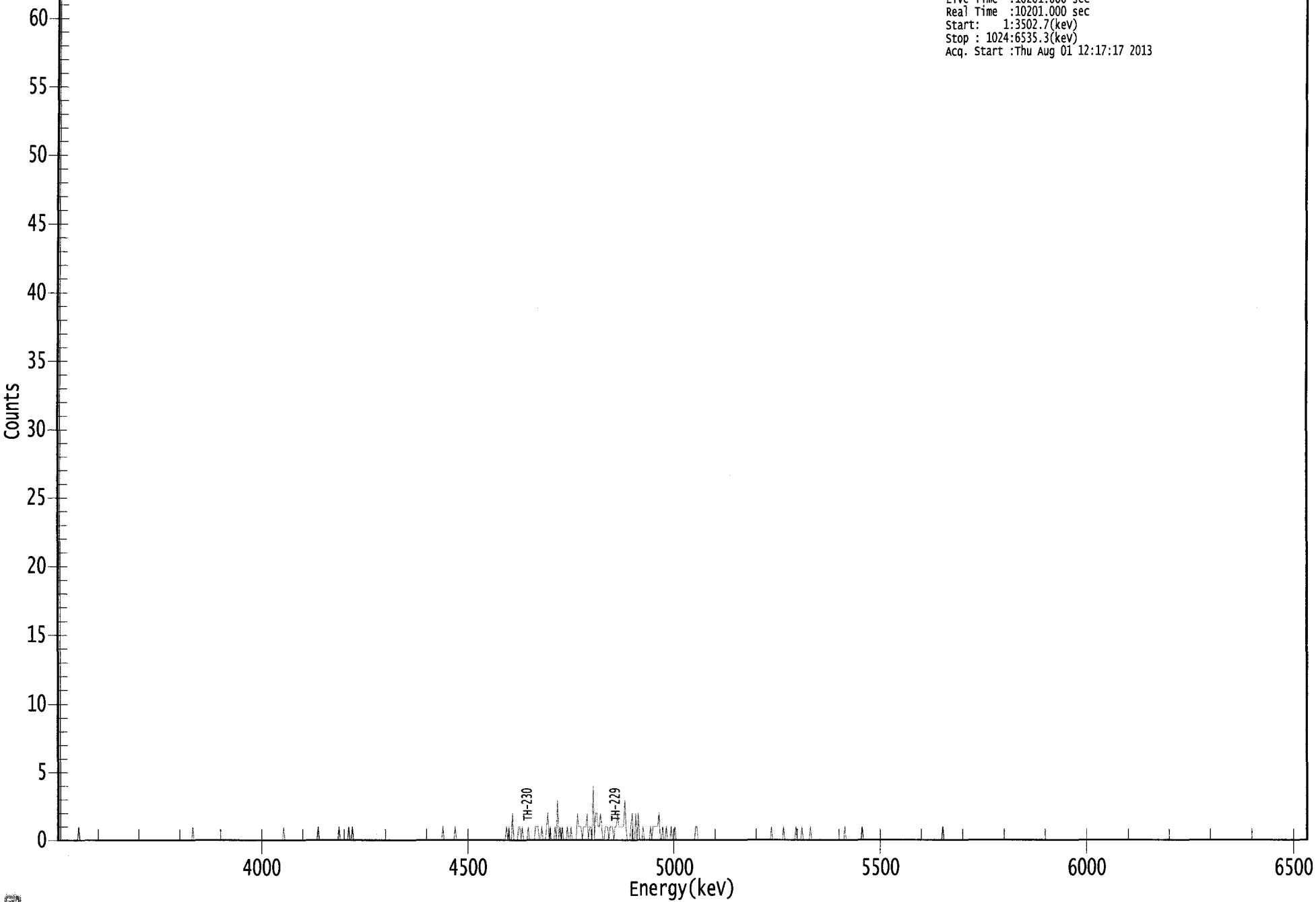
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-2.10E-002 +/- 6.42E-002	1.74E-001 +/- 4.24E-002
TH-228	0.958	5400.00*	1.69E-001 +/- 1.54E-001	1.61E-001 +/- 3.92E-002
TH-229	0.999	4872.00*	2.11E+000 +/- 5.12E-001	1.45E-001 +/- 3.52E-002
TH-230	0.997	4672.00*	6.83E-001 +/- 3.29E-001	1.44E-001 +/- 3.50E-002
TH-232	0.985	3997.00*	5.51E-002 +/- 8.51E-002	1.26E-001 +/- 3.05E-002

AC
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US EPA ARCHIVE DOCUMENT

0000064843.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3502.7(kev)
Stop : 1024:6535.3(kev)
Acq. Start :Thu Aug 01 12:17:17 2013



ROI Type: 1

ROI Type: 3

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: 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	1	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	1
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	1	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	1	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	1
241:	0	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	0
321:	0	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 1 0 1 0 0 2 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	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: S-61 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:18 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1707 +/- 0.0150
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.9134 +/- 0.0819

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.838	0.62	583.50	2.38	0.00E+000	2.8
TH-228	5.371	45.94	30.02	3.06	0.00E+000	5.7
TH-229 T	4.869	148.66	16.10	0.34	0.00E+000	4.7
TH-230	4.620	368.15	10.23	0.85	0.00E+000	27.5
TH-232	3.956	47.49	28.62	0.51	0.00E+000	3.8

T = Tracer Peak used for Effective Efficiency

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

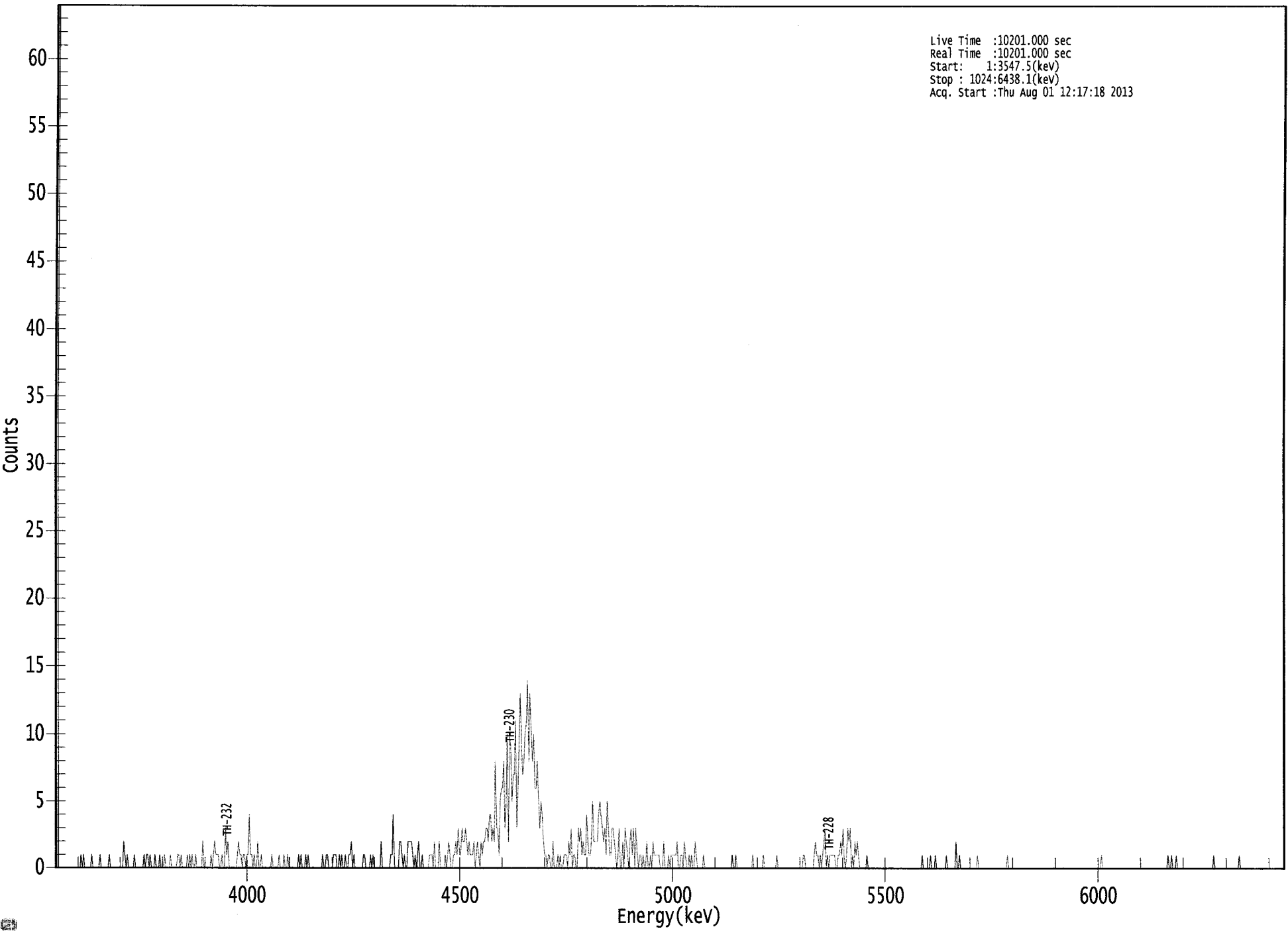
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	9.88E-003 +/- 5.77E-002	1.31E-001 +/- 2.25E-002
TH-228	0.996	5400.00*	7.28E-001 +/- 2.52E-001	1.42E-001 +/- 2.43E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 3.99E-001	7.46E-002 +/- 1.28E-002
TH-230	0.986	4672.00*	5.72E+000 +/- 1.15E+000	9.31E-002 +/- 1.60E-002
TH-232	0.991	3997.00*	7.37E-001 +/- 2.46E-001	8.14E-002 +/- 1.40E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064846.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Thu Aug 01 12:17:18 2013



ROI Type: 1

ROI Type: 3

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

369: 3 3 1 5 6 6 8 3

Sample Title: 12

Channel	1	2	3	4	5	6	7	8
377:	5	10	2	10	9	5	7	7
385:	11	3	6	9	13	9	7	8
393:	10	11	14	8	13	10	8	10
401:	6	6	8	5	3	5	4	2
409:	1	1	0	1	1	0	0	2
417:	0	0	0	1	0	1	0	0
425:	1	1	1	0	2	1	3	0
433:	1	1	0	0	3	2	3	1
441:	2	1	1	4	2	1	1	2
449:	5	2	2	2	2	4	5	4
457:	3	2	3	1	5	3	1	1
465:	3	3	2	1	0	1	3	0
473:	0	2	0	3	2	1	0	2
481:	3	1	3	0	3	1	0	1
489:	1	0	1	0	0	2	0	0
497:	1	0	2	1	1	1	1	1
505:	0	0	0	2	0	0	0	1
513:	0	1	1	1	1	1	2	0
521:	0	1	1	0	2	1	0	0
529:	1	0	1	0	0	2	1	0
537:	0	0	0	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	1	0	0	1
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	1	0	0
585:	0	0	0	0	0	0	1	0
593:	0	0	0	0	0	0	0	0
601:	0	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	1
625:	1	0	0	0	0	0	0	0
633:	1	2	1	1	0	1	0	1
641:	2	3	0	1	0	1	1	1
649:	1	1	0	0	1	1	2	1
657:	3	1	0	1	3	2	3	0
665:	1	0	2	1	2	1	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	1	0	0	0	0	0
729:	0	1	0	0	0	1	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	2	0
753:	0	1	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	1	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	1
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	1	0
929:	0	1	0	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	1	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



105
8/2/13

Sample Description: S-61 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_014
 Chamber Serial Number:
 Detector Serial Number: 14
 Env. Background: System Bkgd 63310
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1146 +/- 0.0120
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 0.6210 +/- 0.0661

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	5.837	-1.21	190.00	2.21	0.00E+000	2.9
TH-228	5.380	0.41	1149.1	4.59	0.00E+000	2.9
TH-229 T	4.874	101.47	19.63	1.53	0.00E+000	6.2
TH-230	4.630	28.15	37.59	0.85	0.00E+000	2.9
TH-232	3.964	5.32	91.11	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

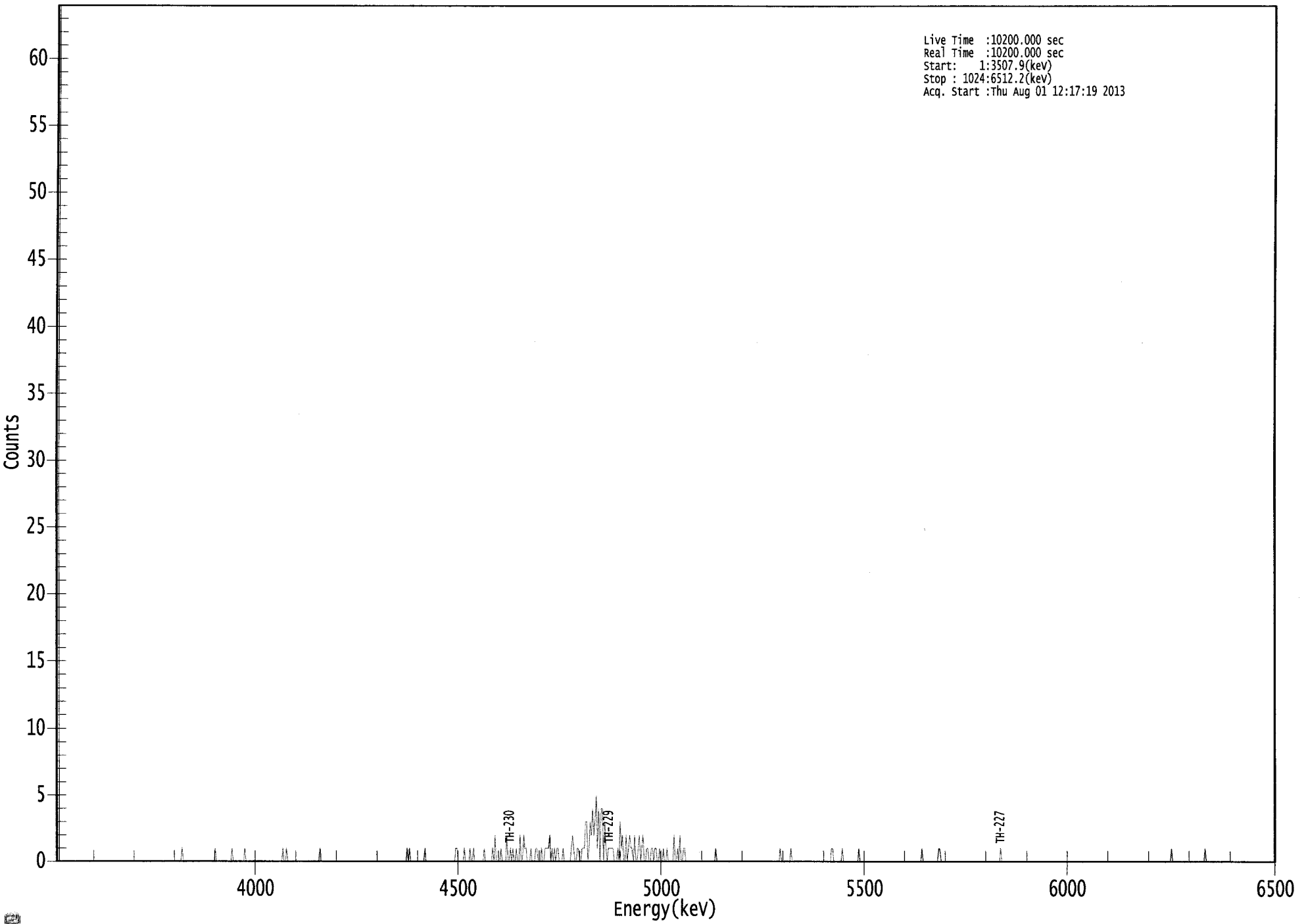
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	-2.87E-002 +/- 5.49E-002	1.90E-001 +/- 3.90E-002
TH-228	0.998	5400.00*	9.68E-003 +/- 1.11E-001	2.44E-001 +/- 5.01E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 4.84E-001	1.65E-001 +/- 3.39E-002
TH-230	0.991	4672.00*	6.52E-001 +/- 2.79E-001	1.39E-001 +/- 2.85E-002
TH-232	0.994	3997.00*	1.23E-001 +/- 1.15E-001	1.30E-001 +/- 2.68E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064842.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Thu Aug 01 12:17:19 2013



0280

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

369: 0 2 0 0 0 0 1 0

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	2	0	0	1	0
385:	1	0	0	1	0	0	2	0
393:	0	2	1	1	0	0	0	1
401:	0	0	0	1	1	0	0	0
409:	1	0	0	1	1	1	1	2
417:	0	1	0	1	0	1	1	0
425:	0	0	1	0	0	0	0	0
433:	0	1	2	1	0	0	1	1
441:	0	0	1	1	1	3	3	0
449:	1	3	2	4	2	3	5	1
457:	4	0	4	4	0	3	1	0
465:	1	1	1	1	1	0	0	0
473:	1	0	3	1	2	0	0	2
481:	0	1	2	1	1	0	2	0
489:	0	1	2	0	1	2	0	0
497:	1	1	0	0	1	1	0	1
505:	1	0	0	1	0	0	1	0
513:	0	1	0	0	0	0	0	2
521:	0	0	1	0	2	0	0	1
529:	1	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	1	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:	1	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	1	1	0	0	0
657:	0	0	0	0	1	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	1	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	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	1	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	1	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:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	1	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	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
911113

Apex-Alpha™

Sample Description: I-67 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_015
 Chamber Serial Number:
 Detector Serial Number: 15
 Env. Background: System Bkgd 63311
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:20 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.236 mL
 Effective Efficiency: 0.0894 +/- 0.0104
 Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
 Chem. Recovery Factor: 0.6053 +/- 0.0710

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.912	3.83	102.72	0.17	0.00E+000	3.0
TH-228	5.377	0.83	239.53	0.17	0.00E+000	3.0
TH-229 T	4.870	80.66	21.88	0.34	0.00E+000	5.5
TH-230	4.627	29.15	36.92	0.85	0.00E+000	4.5
TH-232	3.936	1.83	152.56	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

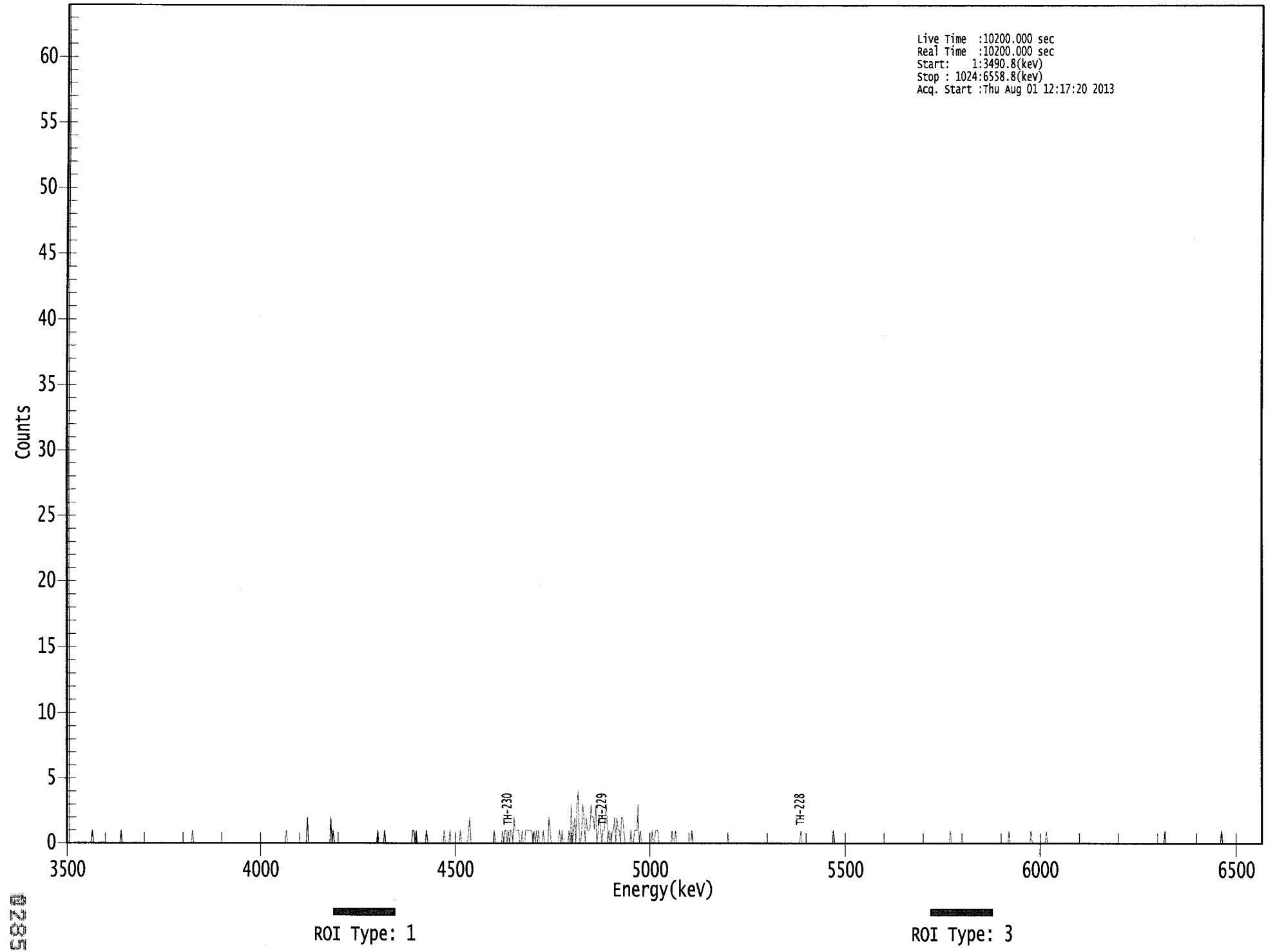
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.980	5850.00*	1.17E-001 +/- 1.23E-001	1.27E-001 +/- 2.89E-002
TH-228	0.997	5400.00*	2.51E-002 +/- 6.04E-002	1.26E-001 +/- 2.87E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 5.45E-001	1.42E-001 +/- 3.23E-002
TH-230	0.989	4672.00*	8.65E-001 +/- 3.75E-001	1.78E-001 +/- 4.04E-002
TH-232	0.981	3997.00*	5.42E-002 +/- 8.36E-002	1.24E-001 +/- 2.81E-002

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US EPA ARCHIVE DOCUMENT

0000064841.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :Thu Aug 01 12:17:20 2013



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

Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 1 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0 1

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	1	0	0	0	0	0
833:	0	0	0	0	0	0	0	1
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	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	1	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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8/2/13

Sample Description: I-67 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_033
 Chamber Serial Number: 04026479A
 Detector Serial Number: 91132
 Env. Background: System Bkgd 63322
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1593 +/- 0.0143
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Chem. Recovery Factor: 0.8619 +/- 0.0788

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.805	0.15	1397.8	0.85	0.00E+000	3.0
TH-228	5.280	2.98	134.36	1.02	0.00E+000	3.0
TH-229 T	4.846	142.00	16.51	0.00	0.00E+000	4.7
TH-230	4.618	27.66	37.53	0.34	0.00E+000	3.0
TH-232	3.995	6.00	86.43	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

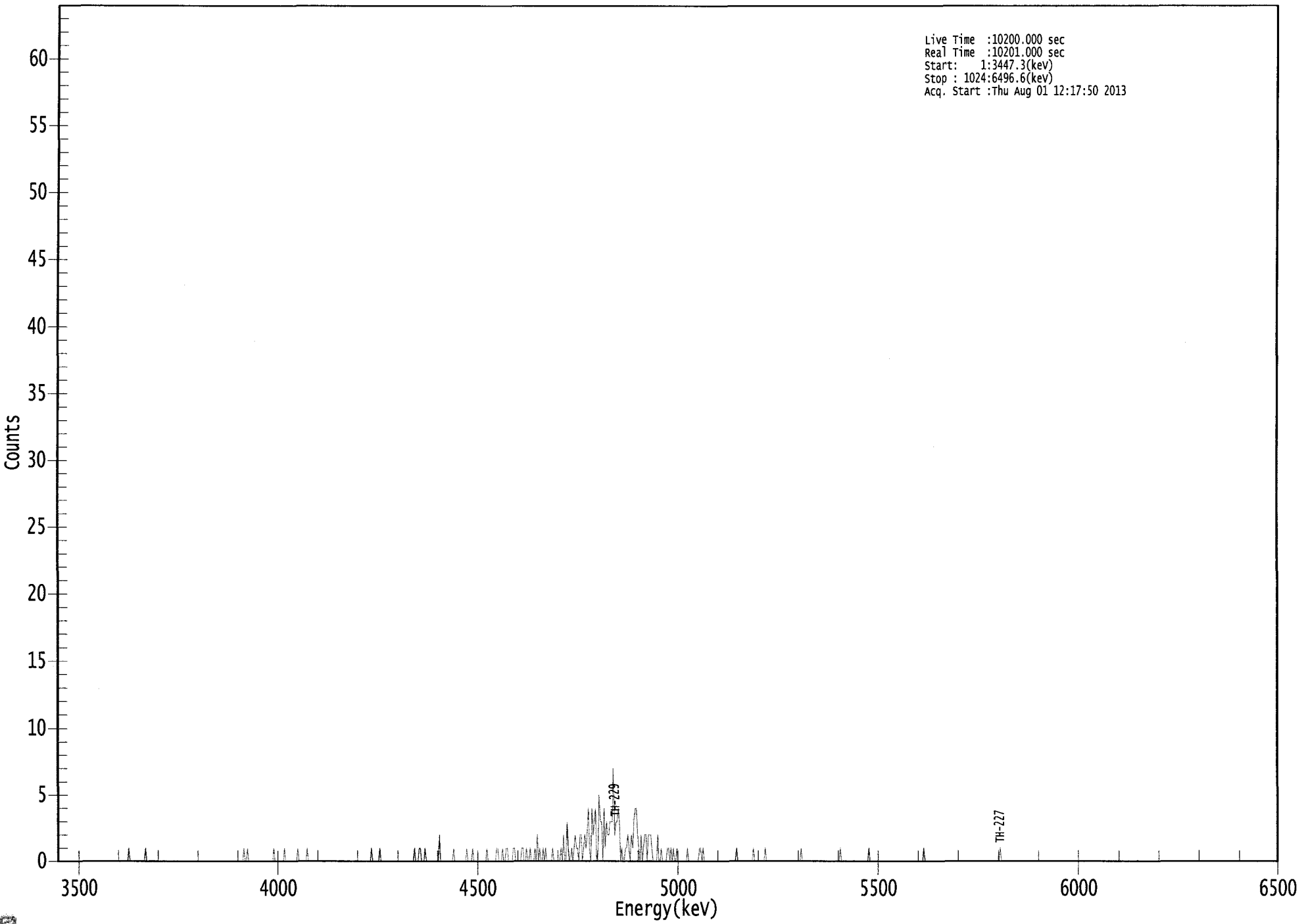
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.990	5850.00*	2.56E-003 +/- 3.58E-002	1.02E-001 +/- 1.80E-002
TH-228	0.927	5400.00*	5.06E-002 +/- 6.86E-002	1.07E-001 +/- 1.88E-002
TH-229	0.996	4872.00*	2.37E+000 +/- 4.17E-001	1.00E-001 +/- 1.76E-002
TH-230	0.985	4672.00*	4.61E-001 +/- 1.91E-001	7.97E-002 +/- 1.40E-002
TH-232	1.000	3997.00*	9.98E-002 +/- 8.80E-002	9.97E-002 +/- 1.75E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064850.CNF

Live Time :10200.000 sec
Real Time :10201.000 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :Thu Aug 01 12:17:50 2013



ROI Type: 1

ROI Type: 3

0020

 ***** 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: 10201

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

369: 0 1 1 0 0 0 1 0

Sample Title: 15

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

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Apex-Alpha™

Sample Description: I-68 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 63323
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:52 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.204 mL
 Effective Efficiency: 0.1526 +/- 0.0148
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.8223 +/- 0.0810

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.830	2.15	161.66	0.85	0.00E+000	3.0
TH-228	5.360	71.66	23.22	0.34	0.00E+000	7.9
TH-229 T	4.890	118.83	18.00	0.17	0.00E+000	4.3
TH-230	4.610	93.83	20.26	0.17	0.00E+000	7.9
TH-232	3.961	54.66	26.61	0.34	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

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

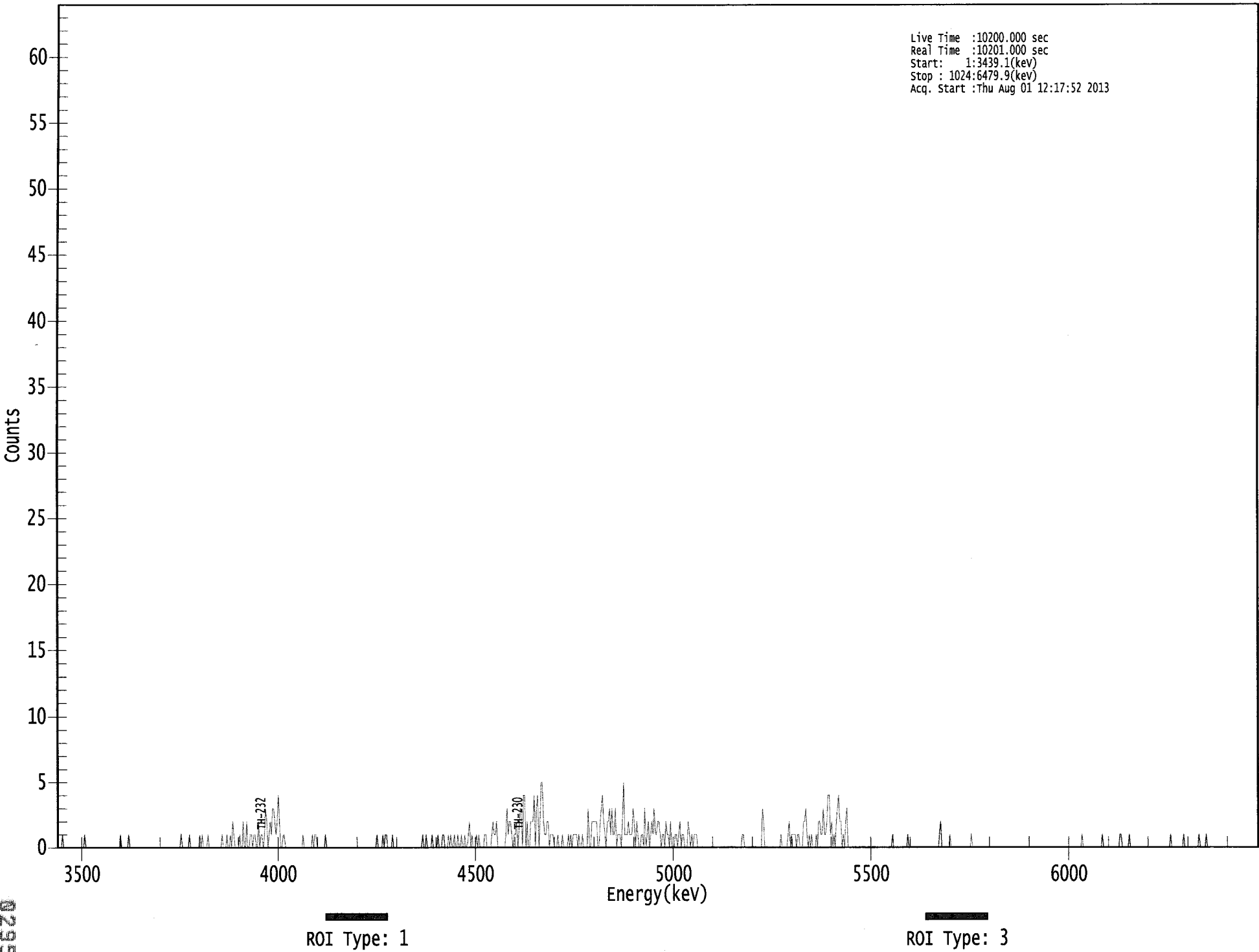
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	3.84E-002 +/- 6.24E-002	1.07E-001 +/- 2.03E-002
TH-228	0.992	5400.00*	1.27E+000 +/- 3.81E-001	8.48E-002 +/- 1.61E-002
TH-229	0.998	4872.00*	2.07E+000 +/- 3.94E-001	7.28E-002 +/- 1.38E-002
TH-230	0.980	4672.00*	1.63E+000 +/- 4.53E-001	7.26E-002 +/- 1.38E-002
TH-232	0.993	3997.00*	9.49E-001 +/- 3.10E-001	8.30E-002 +/- 1.58E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064851.CNF

Live Time :10200.000 sec
Real Time :10201.000 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Thu Aug 01 12:17:52 2013



0295

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: 10201

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

369: 0 0 0 1 2 1 1 2

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	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	1	1	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	1	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	1	0	0	0
977:	0	0	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KCB
8/2/13

Apex-Alpha™

Sample Description: I-68 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 63324
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:45 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.202 mL
 Effective Efficiency: 0.1889 +/- 0.0167
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.0348 +/- 0.0933

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	5.797	0.47	626.93	1.53	0.00E+000	2.9
TH-228	5.366	2.32	149.12	0.68	0.00E+000	2.9
TH-229 T	4.886	145.83	16.24	0.17	0.00E+000	4.9
TH-230	4.625	16.49	49.13	0.51	0.00E+000	2.9
TH-232	3.958	4.00	109.57	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

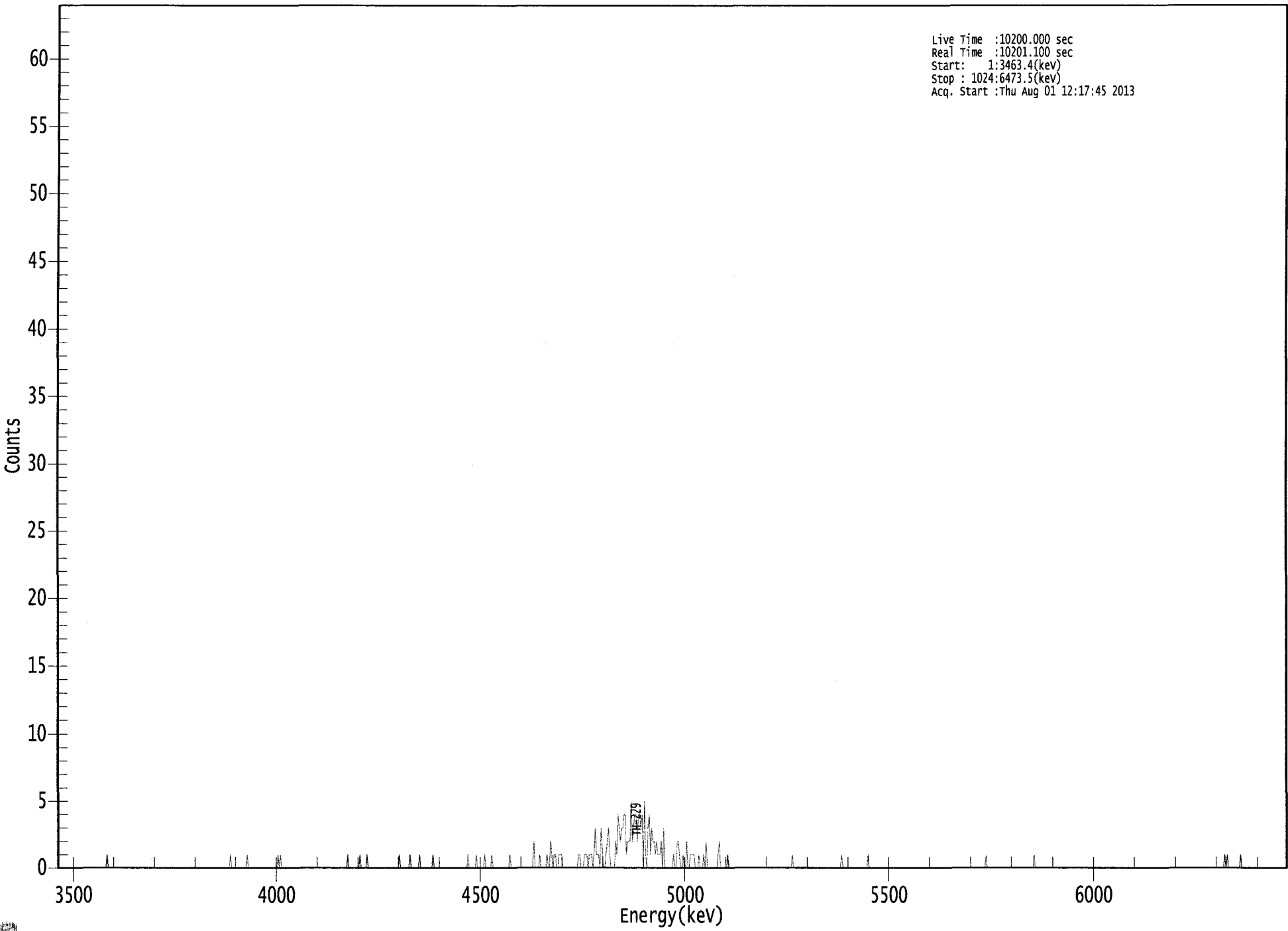
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.985	5850.00*	6.77E-003 +/- 4.25E-002	1.02E-001 +/- 1.78E-002
TH-228	0.994	5400.00*	3.32E-002 +/- 4.99E-002	8.08E-002 +/- 1.40E-002
TH-229	0.999	4872.00*	2.06E+000 +/- 3.56E-001	5.88E-002 +/- 1.02E-002
TH-230	0.988	4672.00*	2.32E-001 +/- 1.21E-001	7.37E-002 +/- 1.28E-002
TH-232	0.992	3997.00*	5.61E-002 +/- 6.22E-002	8.41E-002 +/- 1.46E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064852.CNF

Live Time :10200.000 sec
Real Time :10201.100 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Thu Aug 01 12:17:45 2013



ROI Type: 1

ROI Type: 3

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: 10201

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 17

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

KCS
5/11/13

Apex-Alpha™

Sample Description: DUP 04 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_036
 Chamber Serial Number: 04026477B
 Detector Serial Number: 84167
 Env. Background: System Bkgd 63325
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.236 mL
 Effective Efficiency: 0.1663 +/- 0.0146
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.8709 +/- 0.0777

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.783	2.83	120.53	0.17	0.00E+000	3.0
TH-228	5.296	3.66	107.87	0.34	0.00E+000	3.0
TH-229 T	4.869	149.66	16.04	0.34	0.00E+000	4.4
TH-230	4.634	20.83	43.15	0.17	0.00E+000	3.0
TH-232	3.936	4.66	94.59	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

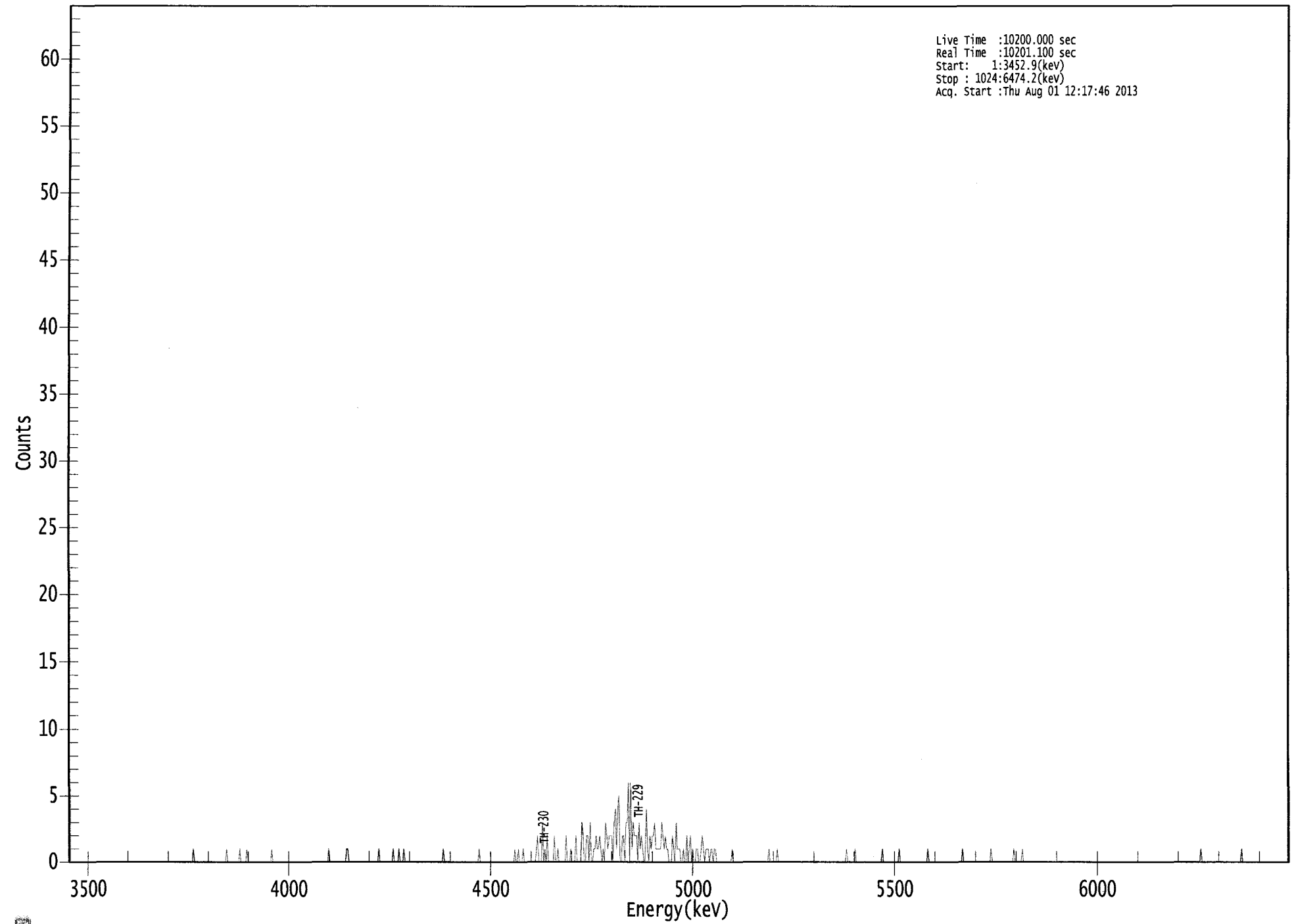
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.977	5850.00*	4.63E-002 +/- 5.64E-002	6.83E-002 +/- 1.17E-002
TH-228	0.945	5400.00*	5.95E-002 +/- 6.50E-002	7.78E-002 +/- 1.33E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 4.11E-001	7.65E-002 +/- 1.31E-002
TH-230	0.992	4672.00*	3.32E-001 +/- 1.54E-001	6.66E-002 +/- 1.14E-002
TH-232	0.980	3997.00*	7.42E-002 +/- 7.14E-002	7.62E-002 +/- 1.31E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064853.CNF

Live Time :10200.000 sec
Real Time :10201.100 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Thu Aug 01 12:17:46 2013



ROI Type: 1

ROI Type: 3

0305

 ***** 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: 10201

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

369: 0 0 0 0 0 0 0 1

Sample Title: 18

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

801: 1 0 0 0 0 0 0 0

Sample Title: 18

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

103
8/1/13

Apex-Alpha™

Sample Description: DUP 04 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307111A-TH
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_038
 Chamber Serial Number: 04026478B
 Detector Serial Number: 91134
 Env. Background: System Bkgd 63326
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/12/2013 7:29:03 AM
 Acquisition Date/Time: 8/1/2013 12:17:48 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.238 mL
 Effective Efficiency: 0.2049 +/- 0.0163
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 1.1902 +/- 0.0971

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.783	1.49	190.02	0.51	0.00E+000	3.0
TH-228	5.282	2.49	138.29	0.51	0.00E+000	3.0
TH-229 T	4.877	186.32	14.39	0.68	0.00E+000	3.2
TH-230	4.610	22.66	41.53	0.34	0.00E+000	3.0
TH-232	3.971	7.83	70.93	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

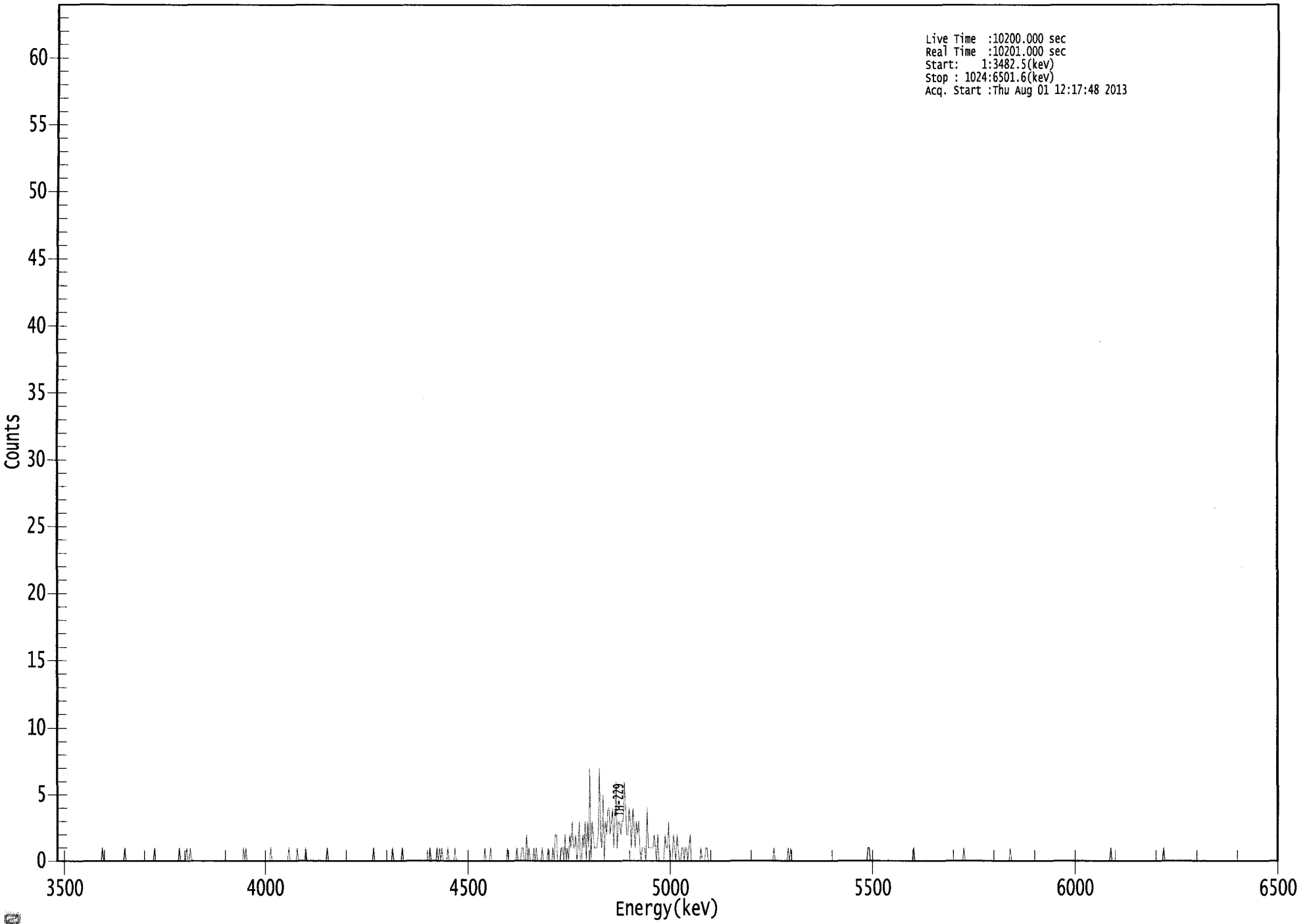
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.977	5850.00*	1.98E-002 +/- 3.77E-002	6.97E-002 +/- 1.09E-002
TH-228	0.930	5400.00*	3.29E-002 +/- 4.57E-002	6.93E-002 +/- 1.08E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 3.78E-001	7.33E-002 +/- 1.14E-002
TH-230	0.980	4672.00*	2.94E-001 +/- 1.30E-001	6.19E-002 +/- 9.67E-003
TH-232	0.996	3997.00*	1.01E-001 +/- 7.35E-002	5.40E-002 +/- 8.43E-003

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064849.CNF

Live Time :10200.000 sec
Real Time :10201.000 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Thu Aug 01 12:17:48 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: 19

Elapsed Live time: 10200

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0

Sample Title: 19

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

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/1/2013

Time : 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 004	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/1/2013 5:25:36 AM
Alpha 011	21f	ALL	Passed	8/1/2013 5:25:37 AM
Alpha 012	21f	ALL	Passed	8/1/2013 5:25:38 AM
Alpha 013	21f	ALL	Passed	8/1/2013 5:25:39 AM
Alpha 014	21f	ALL	Passed	8/1/2013 5:25:40 AM
Alpha 015	21f	Peak Energy	Action	8/1/2013 5:25:41 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/1/2013 5:25:41 AM
Alpha 019	AIM730	ALL	Passed	8/1/2013 5:25:42 AM
Alpha 020	AIM730	ALL	Passed	8/1/2013 5:25:43 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/1/2013 5:25:44 AM
Alpha 023	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 024	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 025	AIM730	ALL	Passed	8/1/2013 5:25:46 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/1/2013 5:25:47 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/1/2013 5:25:48 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/1/2013 5:25:49 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:53 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:55 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/1/2013 5:25:57 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:59 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:01 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:02 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:07 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:12 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:14 AM

APPROVED BY: _____ C

APPROVAL DATE: _____ 8/1/13

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

Nuclide Library Title: Thorium

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

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

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X
ANALYTICAL DATA (RADIUM-226)

Work Order	13-07111	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		07/17/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/17/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 03 TOT	45	07/11/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 03 DIS	45	07/11/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	S-8 TOT	40	07/12/13 09:23	1.0000E+00
Report Level	4	07	TRG	S-8 DIS	40	07/12/13 09:23	1.0000E+00
Activity Units	pCi	08	TRG	I-62 TOT	42	07/12/13 09:56	1.0000E+00
Aliquot Units	I	09	TRG	I-62 DIS	42	07/12/13 09:56	1.0000E+00
Matrix	WA	10	TRG	D-6 TOT	45	07/12/13 11:35	1.0000E+00
Method	E903.0	11	TRG	D-6 DIS	45	07/12/13 11:35	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	S-61 TOT	38	07/12/13 12:02	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	S-61 DIS	38	07/12/13 12:02	1.0000E+00
Radiometric Sol#	Ba-6a	14	DO	I-67 TOT	43	07/12/13 13:33	1.0000E+00
Tracer Act (dpm/g)	992.377	15	TRG	I-67 DIS	43	07/12/13 13:33	1.0000E+00
Carrier		16	TRG	I-68 TOT	39	07/12/13 14:35	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	I-68 DIS	39	07/12/13 14:35	1.0000E+00
		18	TRG	DUP 04 TOT	39	07/12/13 00:00	1.0000E+00
		19	TRG	DUP 04 DIS	39	07/12/13 00:00	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.

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	0.9198	912.8	417.6	101.56		0.0225	0.0301	0.0076		101.56	2.66	1.00
02	MBL	0.9051	898.2	440.4	108.85		0.0228	0.0291	0.0063		108.85	2.27	1.00
03	DUP	0.9081	901.2	362.7	89.35		0.0227	0.0294	0.0067		89.35	2.40	1.00
04	TRG	0.9006	893.7	394.1	97.89		0.0227	0.0316	0.0089		97.89	2.99	1.00
05	TRG	0.9016	894.7	372.1	92.33		0.0223	0.0353	0.0130		92.33	4.65	1.00
06	TRG	0.9050	898.1	373.6	92.35		0.0226	0.0290	0.0064		92.35	2.31	1.00
07	TRG	0.9016	894.7	383.2	95.08		0.0228	0.0295	0.0067		95.08	2.40	1.00
08	TRG	0.9021	895.2	377.9	93.71		0.0226	0.0294	0.0068		93.71	2.44	1.00
09	TRG	0.9039	897.0	396.3	98.08		0.0220	0.0287	0.0067		98.08	2.40	1.00
10	TRG	0.9029	896.0	366.2	90.73		0.0223	0.0304	0.0081		90.73	2.79	1.00
11	TRG	0.9028	895.9	380.0	94.16		0.0225	0.0309	0.0084		94.16	2.87	1.00
12	TRG	0.9043	897.4	383.6	94.89		0.0226	0.0296	0.0070		94.89	2.50	1.00
13	TRG	0.9007	893.8	394.3	97.93		0.0222	0.0289	0.0067		97.93	2.40	1.00
14	DO	0.9034	896.5	406.6	100.68		0.0221	0.0290	0.0069		100.68	2.47	1.00
15	TRG	0.9030	896.1	387.0	95.87		0.0225	0.0292	0.0067		95.87	2.40	1.00
16	TRG	0.9032	896.3	358.5	88.79		0.0226	0.0289	0.0063		88.79	2.27	1.00
17	TRG	0.9057	898.8	359.6	88.82		0.0230	0.0304	0.0074		88.82	2.61	1.00
18	TRG	0.9027	895.8	345.2	85.55		0.0229	0.0292	0.0063		85.55	2.27	1.00
19	TRG	0.9014	894.5	329.6	81.80		0.0228	0.0286	0.0058		81.80	2.08	1.00

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

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
02	MBL			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
03	DUP			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
04	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
05	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
06	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
07	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
08	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
09	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
10	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
11	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
12	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
13	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
14	DO			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
15	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
16	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
17	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
18	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		
19	TRG			07/26/13 11:23	JWOLFE	07/30/13 11:55	LWALKER		

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

0320

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-Ra226-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	1.03E+01	1.33E+00	2.32E-01	1.03E+01	100.04	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-6.58E-02	7.92E-02	2.66E-01					OK	OK
03	RA-226	DUP	I-67 TOT	pCi/l	4.57E-01	2.81E-01	2.46E-01				NA	OK	
04	RA-226	TRG	DUP 03 TOT	pCi/l	3.10E+00	7.80E-01	4.49E-01					OK	
05	RA-226	TRG	DUP 03 DIS	pCi/l	4.04E+00	9.80E-01	4.19E-01					OK	
06	RA-226	TRG	S-8 TOT	pCi/l	3.48E-01	2.96E-01	3.92E-01					OK	
07	RA-226	TRG	S-8 DIS	pCi/l	2.41E-01	1.89E-01	1.73E-01					OK	
08	RA-226	TRG	I-62 TOT	pCi/l	6.63E-01	3.10E-01	1.55E-01					OK	
09	RA-226	TRG	I-62 DIS	pCi/l	4.38E-01	2.53E-01	2.00E-01					OK	
10	RA-226	TRG	D-6 TOT	pCi/l	3.10E+00	7.23E-01	2.04E-01					OK	
11	RA-226	TRG	D-6 DIS	pCi/l	2.88E+00	7.31E-01	2.65E-01					OK	
12	RA-226	TRG	S-61 TOT	pCi/l	1.29E+00	4.26E-01	2.00E-01					OK	
13	RA-226	TRG	S-61 DIS	pCi/l	3.08E-01	2.12E-01	2.05E-01					OK	
14	RA-226	DO	I-67 TOT	pCi/l	4.90E-01	2.62E-01	2.18E-01					OK	
15	RA-226	TRG	I-67 DIS	pCi/l	4.66E-01	2.66E-01	2.26E-01					OK	
16	RA-226	TRG	I-68 TOT	pCi/l	1.40E+00	4.43E-01	1.86E-01					OK	
17	RA-226	TRG	I-68 DIS	pCi/l	7.61E-01	3.64E-01	2.28E-01					OK	
18	RA-226	TRG	DUP 04 TOT	pCi/l	2.70E-01	2.14E-01	2.31E-01					OK	
19	RA-226	TRG	DUP 04 DIS	pCi/l	2.01E-01	1.93E-01	2.41E-01					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07111	Analysis Code	Ra226	Run	1

1329

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-Ra226-1

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	07/17/13 00:00	1.00E+00	100.00	0.00	101.56		7/30/2013 11:55	
02	RA-226	MBL	07/17/13 00:00	1.00E+00	100.00	0.00	108.85		7/30/2013 11:55	
03	RA-226	DUP	07/12/13 13:33	1.00E+00	89.35	0.00	89.35		7/30/2013 11:55	
04	RA-226	TRG	07/11/13 00:00	1.00E+00	97.89	0.00	97.89		7/30/2013 11:55	
05	RA-226	TRG	07/11/13 00:00	1.00E+00	92.33	0.00	92.33		7/30/2013 11:55	
06	RA-226	TRG	07/12/13 09:23	1.00E+00	92.35	0.00	92.35		7/30/2013 11:55	
07	RA-226	TRG	07/12/13 09:23	1.00E+00	95.08	0.00	95.08		7/30/2013 11:55	
08	RA-226	TRG	07/12/13 09:56	1.00E+00	93.71	0.00	93.71		7/30/2013 11:55	
09	RA-226	TRG	07/12/13 09:56	1.00E+00	98.08	0.00	98.08		7/30/2013 11:55	
10	RA-226	TRG	07/12/13 11:35	1.00E+00	90.73	0.00	90.73		7/30/2013 11:55	
11	RA-226	TRG	07/12/13 11:35	1.00E+00	94.16	0.00	94.16		7/30/2013 11:55	
12	RA-226	TRG	07/12/13 12:02	1.00E+00	94.89	0.00	94.89		7/30/2013 11:55	
13	RA-226	TRG	07/12/13 12:02	1.00E+00	97.93	0.00	97.93		7/30/2013 11:55	
14	RA-226	DO	07/12/13 13:33	1.00E+00	100.00	0.00	100.68		7/30/2013 11:55	
15	RA-226	TRG	07/12/13 13:33	1.00E+00	95.87	0.00	95.87		7/30/2013 11:55	
16	RA-226	TRG	07/12/13 14:35	1.00E+00	88.79	0.00	88.79		7/30/2013 11:55	
17	RA-226	TRG	07/12/13 14:35	1.00E+00	88.82	0.00	88.82		7/30/2013 11:55	
18	RA-226	TRG	07/12/13 00:00	1.00E+00	85.55	0.00	85.55		7/30/2013 11:55	
19	RA-226	TRG	07/12/13 00:00	1.00E+00	81.80	0.00	81.80		7/30/2013 11:55	

2250

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-Ra226-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	07/31/13 15:15		A_Spec	Alpha_023	170	2.49 E+02	4.00 E-03	17.1
02	RA-226	MBL	07/31/13 15:15		A_Spec	Alpha_024	170	-1.87 E+00	1.10 E-02	17.1
03	RA-226	DUP	07/31/13 15:15		A_Spec	Alpha_025	170	1.11 E+01	5.00 E-03	17.4
04	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_027	170.02	6.63 E+01	2.20 E-02	17.3
05	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_029	170	6.85 E+01	9.00 E-03	19.5
06	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_031	170.02	7.45 E+00	1.50 E-02	14.2
07	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_033	170	6.66 E+00	2.00 E-03	18.5
08	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_034	170	1.78 E+01	1.00 E-03	18.6
09	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_035	170	1.23 E+01	4.00 E-03	18.3
10	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_036	170	7.27 E+01	2.00 E-03	19.1
11	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_038	170	6.13 E+01	4.00 E-03	17.2
12	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_039	170	3.63 E+01	4.00 E-03	19.7
13	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_040	170	9.00 E+00	0.00 E+00	19
14	RA-226	DO	07/31/13 15:16		A_Spec	Alpha_041	170	1.48 E+01	7.00 E-03	19.8
15	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_042	170	1.30 E+01	6.00 E-03	18.5
16	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_045	170	3.95 E+01	3.00 E-03	19.1
17	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_046	170	1.75 E+01	3.00 E-03	17.9
18	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_047	170	7.00 E+00	0.00 E+00	18.2
19	RA-226	TRG	07/31/13 15:16		A_Spec	Alpha_048	170	5.00 E+00	0.00 E+00	16.8

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

0220

2333
 53-29

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Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/17/13 00:00	1.0000	0.9198	912.7884	417.6000	101.56	2.66	1.00
02	MBL	BLANK	07/17/13 00:00	1.0000	0.9051	898.2004	440.4000	108.85	2.27	1.00
03	DUP	I-67 TOT	07/12/13 13:33	1.0000	0.9081	901.1776	362.7000	89.35	2.40	1.00
04	TRG	DUP 03 TOT	07/11/13 00:00	1.0000	0.9006	893.7347	394.1000	97.89	2.99	1.00
05	TRG	DUP 03 DIS	07/11/13 00:00	1.0000	0.9016	894.7271	372.1000	92.33	4.65	1.00
06	TRG	S-8 TOT	07/12/13 09:23	1.0000	0.9050	898.1012	373.6000	92.35	2.31	1.00
07	TRG	S-8 DIS	07/12/13 09:23	1.0000	0.9016	894.7271	383.2000	95.08	2.40	1.00
08	TRG	I-62 TOT	07/12/13 09:56	1.0000	0.9021	895.2233	377.9000	93.71	2.44	1.00
09	TRG	I-62 DIS	07/12/13 09:56	1.0000	0.9039	897.0096	396.3000	98.08	2.40	1.00
10	TRG	D-6 TOT	07/12/13 11:35	1.0000	0.9029	896.0172	366.2000	90.73	2.79	1.00
11	TRG	D-6 DIS	07/12/13 11:35	1.0000	0.9028	895.9180	380.0000	94.16	2.87	1.00
12	TRG	S-61 TOT	07/12/13 12:02	1.0000	0.9043	897.4065	383.6000	94.89	2.50	1.00
13	TRG	S-61 DIS	07/12/13 12:02	1.0000	0.9007	893.8340	394.3000	97.93	2.40	1.00
14	DO	I-67 TOT	07/12/13 13:33	1.0000	0.9034	896.5134	406.6000	100.68	2.47	1.00
15	TRG	I-67 DIS	07/12/13 13:33	1.0000	0.9030	896.1164	387.0000	95.87	2.40	1.00
16	TRG	I-68 TOT	07/12/13 14:35	1.0000	0.9032	896.3149	358.5000	88.79	2.27	1.00
17	TRG	I-68 DIS	07/12/13 14:35	1.0000	0.9057	898.7958	359.6000	88.82	2.61	1.00
18	TRG	DUP 04 TOT	07/12/13 00:00	1.0000	0.9027	895.8187	345.2000	85.55	2.27	1.00
19	TRG	DUP 04 DIS	07/12/13 00:00	1.0000	0.9014	894.5286	329.6000	81.80	2.08	1.00

0324

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07111		1	Ra226		7/26/2013 11:22	JWOLFE		JD			

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Ra-226	Ra-5b	44.067	7/26/2013	0.500	0.5175				10.27	0.473	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes	
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer	
01	Ba-133	Ba-6a	992.377	7/26/2013	0.9198	1.0200		
02	Ba-133	Ba-6a	992.377	7/26/2013	0.9051	1.0200	0.9198 g	
03	Ba-133	Ba-6a	992.377	7/26/2013	0.9081	1.0200	0.9051 g	
04	Ba-133	Ba-6a	992.377	7/26/2013	0.9006	1.0200	0.9081 g	
05	Ba-133	Ba-6a	992.377	7/26/2013	0.9016	1.0200	-0.9306 g	
06	Ba-133	Ba-6a	992.377	7/26/2013	0.9050	1.0200	-0.9016 g	
07	Ba-133	Ba-6a	992.377	7/26/2013	0.9016	1.0200	-0.9050 g	
08	Ba-133	Ba-6a	992.377	7/26/2013	0.9021	1.0200	-0.9016 g	
09	Ba-133	Ba-6a	992.377	7/26/2013	0.9039	1.0200	-0.9021 g	
10	Ba-133	Ba-6a	992.377	7/26/2013	0.9029	1.0200	-0.9039 g	
11	Ba-133	Ba-6a	992.377	7/26/2013	0.9028	1.0200	-0.9029 g	
12	Ba-133	Ba-6a	992.377	7/26/2013	0.9043	1.0200	-0.9028 g	
13	Ba-133	Ba-6a	992.377	7/26/2013	0.9007	1.0200	-0.9043 g	
14	Ba-133	Ba-6a	992.377	7/26/2013	0.9034	1.0200	-0.9007 g	
15	Ba-133	Ba-6a	992.377	7/26/2013	0.9030	1.0200	-0.9034 g	
16	Ba-133	Ba-6a	992.377	7/26/2013	0.9032	1.0200	-0.9030 g	
17	Ba-133	Ba-6a	992.377	7/26/2013	0.9057	1.0200	-0.9032 g	
18	Ba-133	Ba-6a	992.377	7/26/2013	0.9027	1.0200	-0.9057 g	
19	Ba-133	Ba-6a	992.377	7/26/2013	0.9014	1.0200	-0.9027 g	

LCS	
0.5175 g	
0.5175 g	

Matrix Spike	

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07111	1	Ra226	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-67 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 03 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 03 DIS	TRG					1.0000E+00	1.0000E+00				
06	S-8 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-8 DIS	TRG					1.0000E+00	1.0000E+00				
08	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-62 DIS	TRG					1.0000E+00	1.0000E+00				
10	D-6 TOT	TRG					1.0000E+00	1.0000E+00				
11	D-6 DIS	TRG					1.0000E+00	1.0000E+00				
12	S-61 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-61 DIS	TRG					1.0000E+00	1.0000E+00				
14	I-67 TOT	DO					1.0000E+00	1.0000E+00				
15	I-67 DIS	TRG					1.0000E+00	1.0000E+00				
16	I-68 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-68 DIS	TRG					1.0000E+00	1.0000E+00				
18	DUP 04 TOT	TRG					1.0000E+00	1.0000E+00				
19	DUP 04 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7/26/13

0325

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07111	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	0.0301	0.0076	
02	BLANK	MBL		0.0228	0.0291	0.0063	
03	DUP	DUP		0.0227	0.0294	0.0067	
04	DUP 03 TOT	TRG		0.0227	0.0316	0.0089	
05	DUP 03 DIS	TRG		0.0223	0.0353	0.0130	
06	S-8 TOT	TRG		0.0226	0.0290	0.0064	
07	S-8 DIS	TRG		0.0228	0.0295	0.0067	
08	I-62 TOT	TRG		0.0226	0.0294	0.0068	
09	I-62 DIS	TRG		0.0220	0.0287	0.0067	
10	D-6 TOT	TRG		0.0223	0.0304	0.0081	
11	D-6 DIS	TRG		0.0225	0.0309	0.0084	
12	S-61 TOT	TRG		0.0226	0.0296	0.0070	
13	S-61 DIS	TRG		0.0222	0.0289	0.0067	
14	I-67 TOT	DO		0.0221	0.0290	0.0069	
15	I-67 DIS	TRG		0.0225	0.0292	0.0067	
16	I-68 TOT	TRG		0.0226	0.0289	0.0063	
17	I-68 DIS	TRG		0.0230	0.0304	0.0074	
18	DUP 04 TOT	TRG		0.0229	0.0292	0.0063	
19	DUP 04 DIS	TRG		0.0228	0.0286	0.0058	

Technician: J. Walker

Date: 7, 30, 13

0327



100
7/31/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_023
 Chamber Serial Number:
 Detector Serial Number: 23
 Env. Background: System Bkgd 63316
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.660E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:15:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
 Effective Efficiency: 0.1710 +/- 0.0030

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.376074 +/- 0.027209
 Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.534	526.64	8.55	1.36	0.00E+000	11.4
RA-226	4.634	249.32	12.43	0.68	0.00E+000	28.0

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

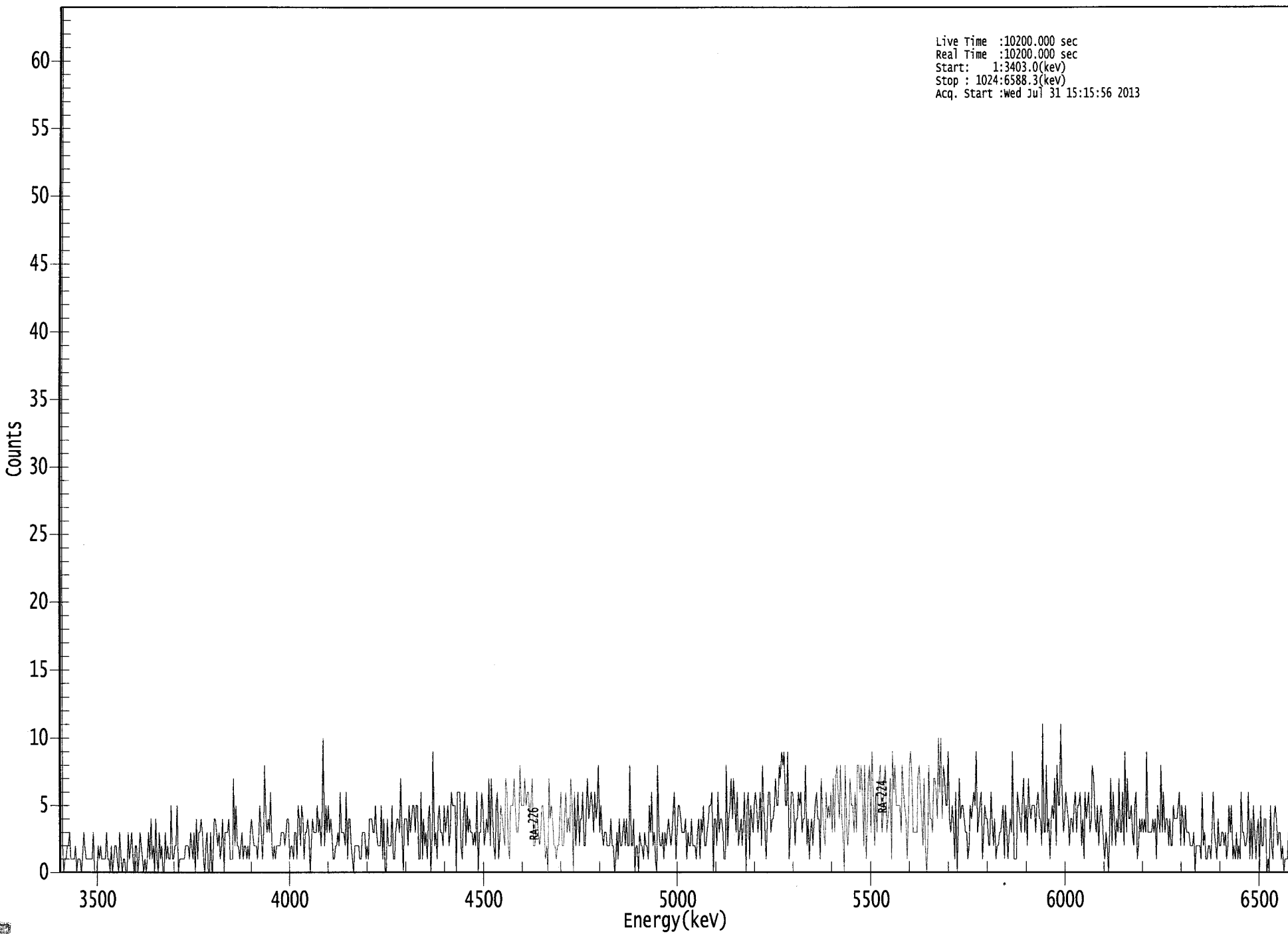
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	2.28E+001 +/- 2.11E+000	2.97E-001 +/- 1.03E-002
RA-226	0.971	4785.00*	1.03E+001 +/- 1.33E+000	2.32E-001 +/- 8.03E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064693.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3403.0(keV)
Stop : 1024:6588.3(keV)
Acq. Start :wed Jul 31 15:15:56 2013



ROI Type: 1

0329

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

369: 4 3 2 7 6 2 1 5

Sample Title: 01

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

801: 7 3 5 2 7 5 4 5

Sample Title: 01

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



Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000647
 Batch Identification: 1307111A-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_024
 Chamber Serial Number:
 Detector Serial Number: 24
 Env. Background: System Bkgd 63317
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:15:57 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Effective Efficiency: 0.1710 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.436	-2.57	96.68	3.57	0.00E+000	3.1
RA-226	4.642	-1.87	120.32	1.87	0.00E+000	0.0

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

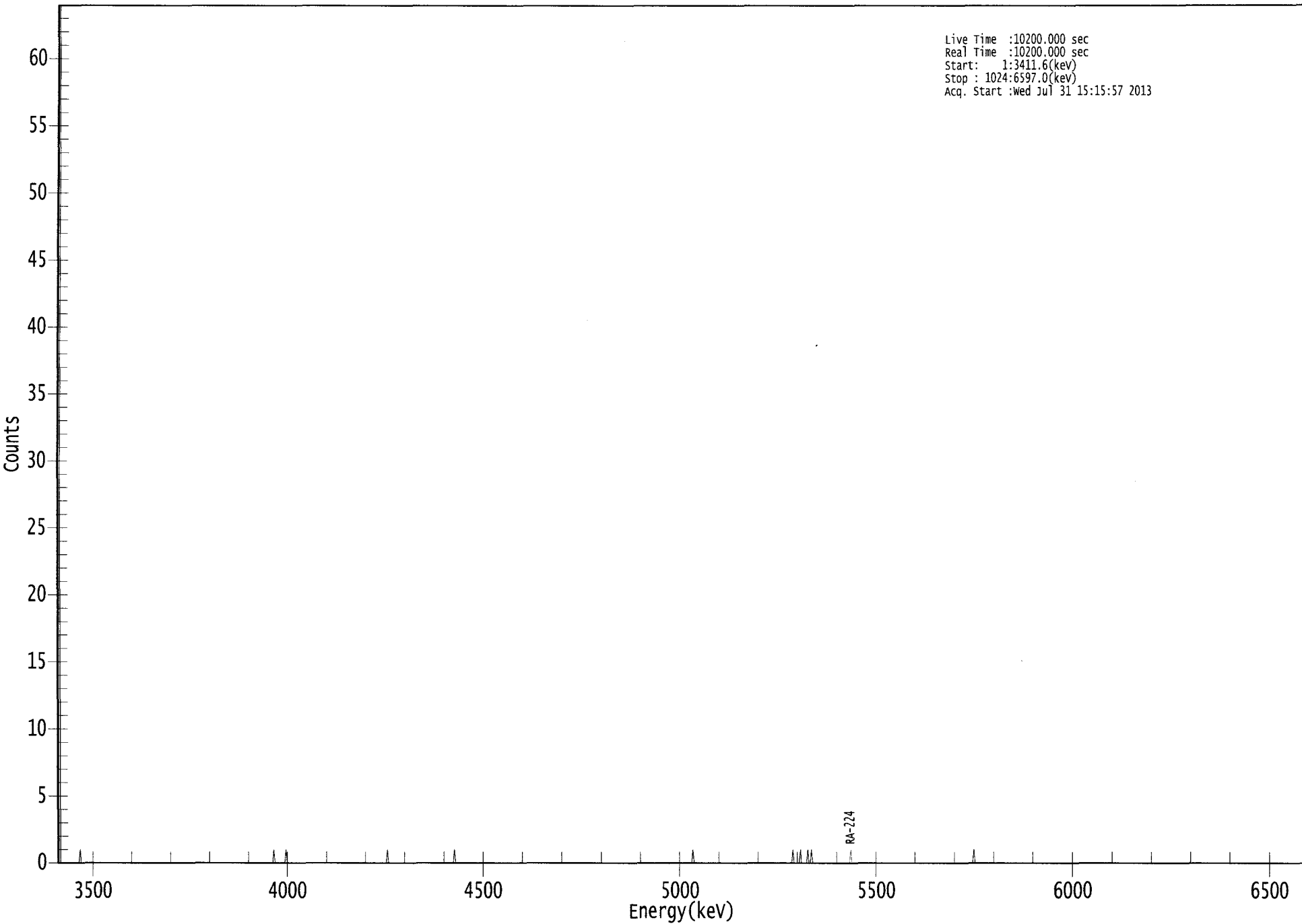
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.922	5685.50*	-9.50E-002 +/- 9.20E-002	3.49E-001 +/- 1.28E-002
RA-226	0.973	4785.00*	-6.58E-002 +/- 7.92E-002	2.66E-001 +/- 9.75E-003

AG
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US EPA ARCHIVE DOCUMENT

000064756.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :wed Jul 31 15:15:57 2013



ROI Type: 1

0334

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	1	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	1	0	0	0	0	0
185:	0	0	0	0	1	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	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: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

Sample Description: I-67 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_025
 Chamber Serial Number:
 Detector Serial Number: 25
 Env. Background: System Bkgd 63318
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:15:58 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8935 +/- 0.0000
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Effective Efficiency: 0.1551 +/- 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	5.455	5.66	85.23	0.34	0.00E+000	3.1
RA-226	4.606	11.15	61.26	0.85	0.00E+000	3.1

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

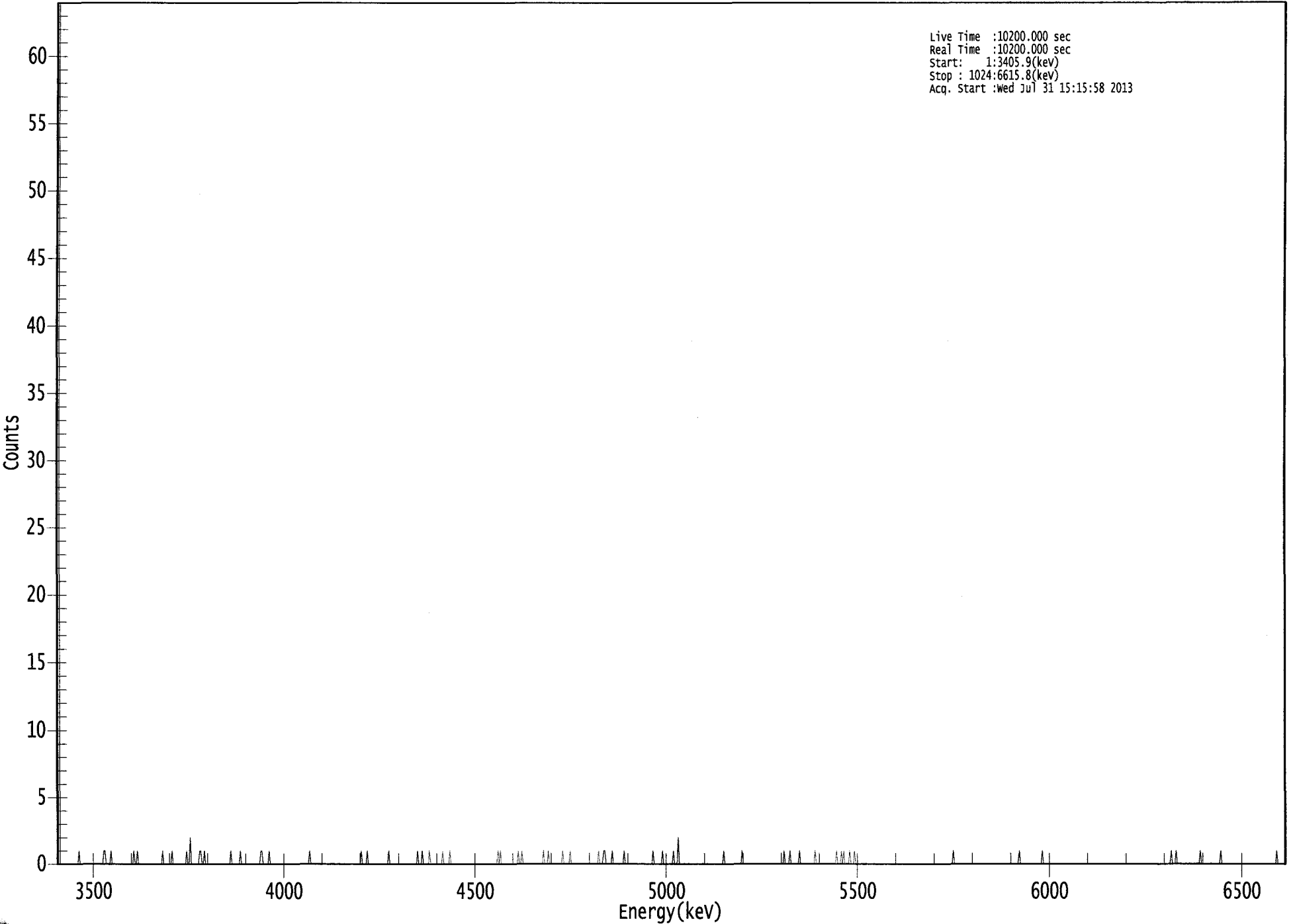
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.933	5685.50*	2.46E-001 +/- 2.10E-001	2.07E-001 +/- 7.59E-003
RA-226	0.959	4785.00*	4.57E-001 +/- 2.81E-001	2.46E-001 +/- 8.97E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064672.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Wed Jul 31 15:15:58 2013



ROI Type: 1

6339

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

369: 1 0 1 0 0 0 0 0

Sample Title: 03

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

801: 0 0 1 0 0 0 0 0

Sample Title: 03

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

108
7/31/13

Apex-Alpha™

Sample Description: DUP 03 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_027
 Chamber Serial Number:
 Detector Serial Number: 27
 Env. Background: System Bkgd 63319
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.990E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:15:59 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9789 +/- 0.0000
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Effective Efficiency: 0.1691 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.563	20.96	45.18	2.04	0.00E+000	6.4
RA-226	4.584	66.26	24.86	3.74	0.00E+000	3.2

 NUCLIDE ANALYSIS RESULTS

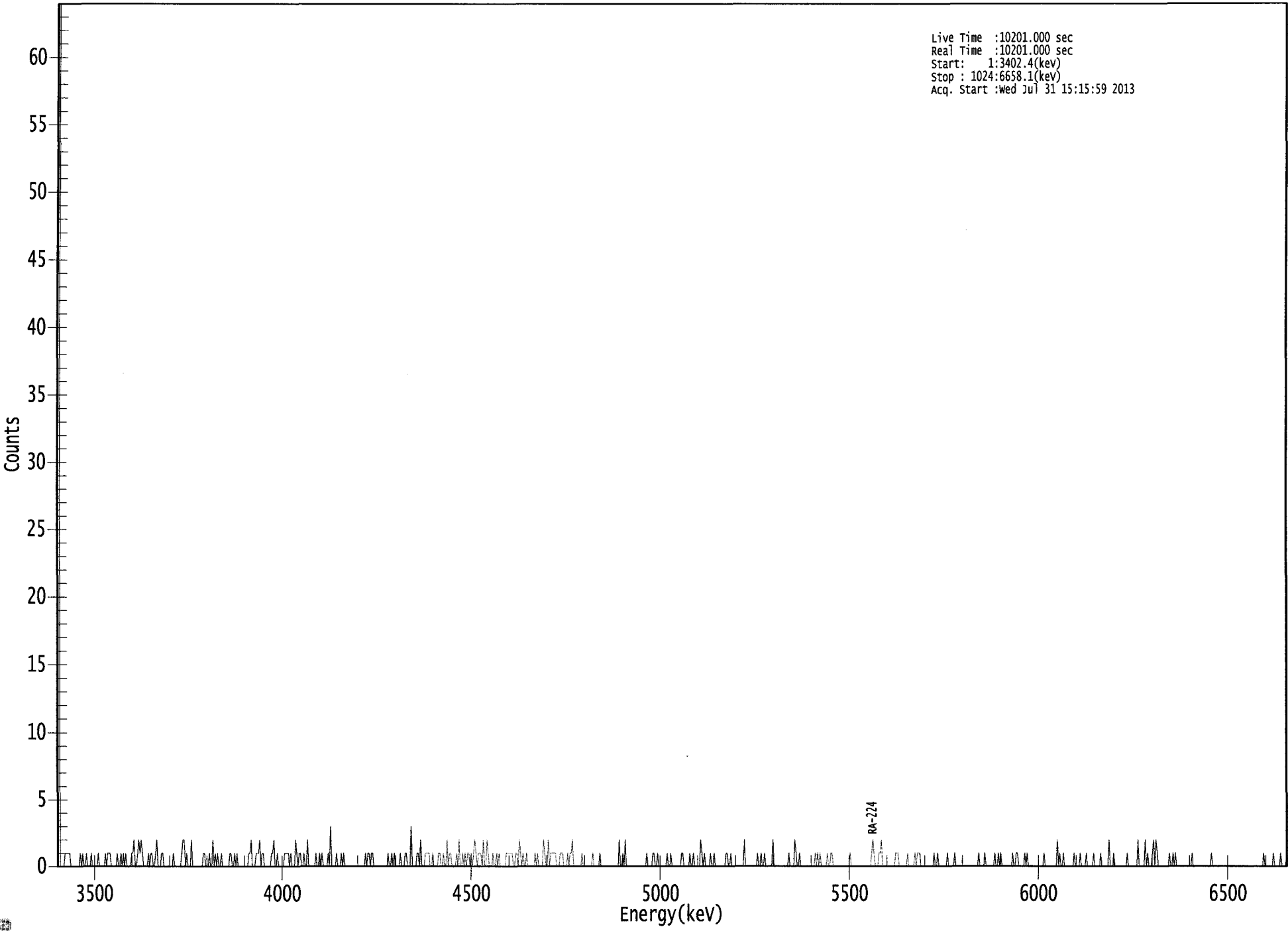
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.981	5685.50*	1.04E+000 +/- 4.71E-001	3.86E-001 +/- 1.42E-002
RA-226	0.949	4785.00*	3.10E+000 +/- 7.80E-001	4.49E-001 +/- 1.65E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

000064675.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :wed Jul 31 15:15:59 2013



054

ROI Type: 1

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

Sample Title: 04

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 1 0 0 0 0 0 1 1

Sample Title: 04

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

801: 0 0 0 0 0 1 0 1

Sample Title: 04

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

KB
8/13/13

Apex-Alpha™

Sample Description: DUP 03 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 63320
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:00 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9233 +/- 0.0000
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Effective Efficiency: 0.1796 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.481	9.26	78.16	3.74	0.00E+000	4.7
RA-226	4.613	68.47	23.99	1.53	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

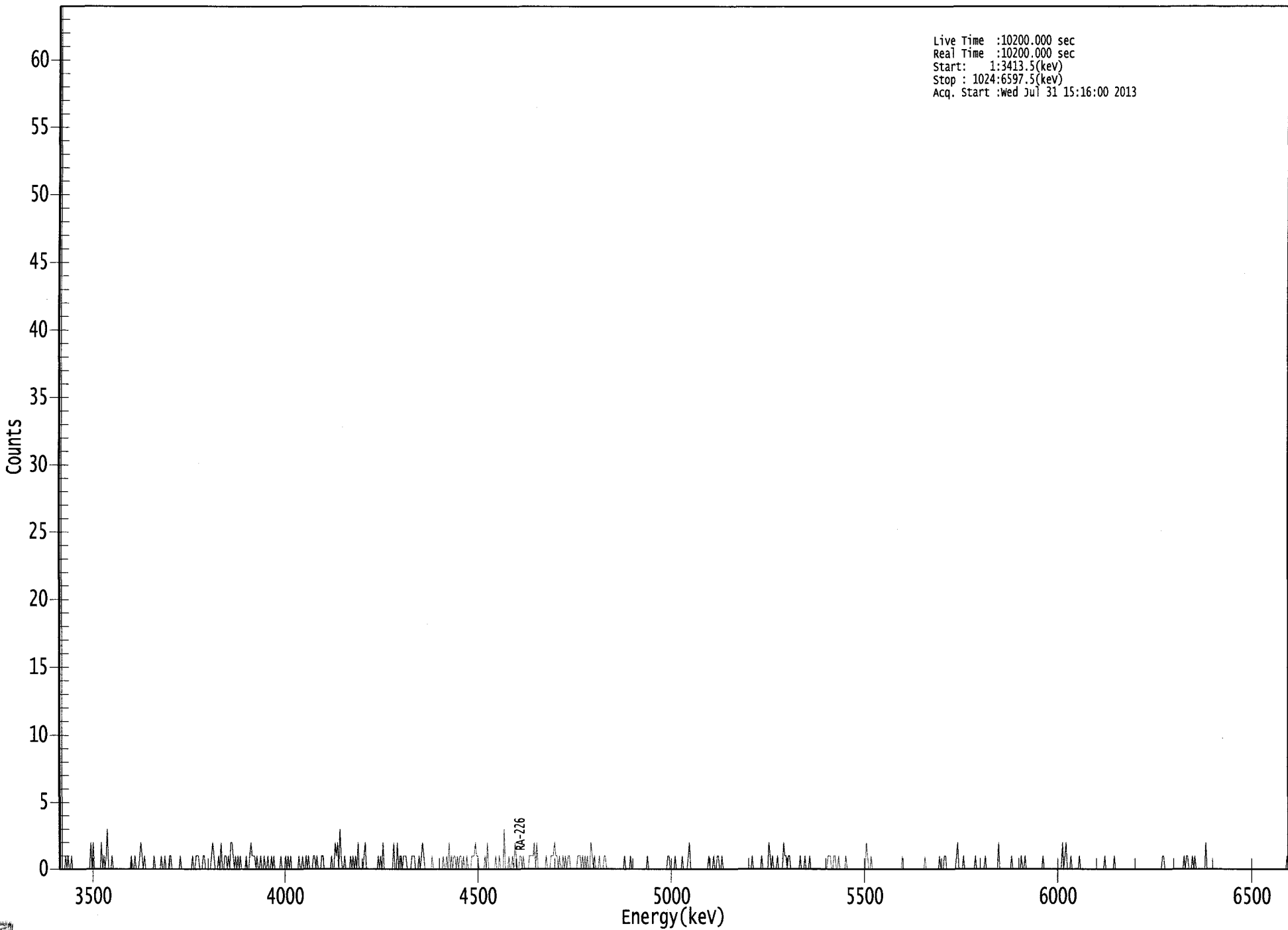
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.947	5685.50*	5.78E-001 +/- 4.53E-001	5.99E-001 +/- 2.16E-002
RA-226	0.962	4785.00*	4.04E+000 +/- 9.80E-001	4.19E-001 +/- 1.51E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064674.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start :wed Jul 31 15:16:00 2013



ROI Type: 1

0349
6739

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

369: 0 0 0 3 0 0 0 1

Sample Title: 05

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

801: 0 1 0 0 1 0 0 0

Sample Title: 05

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

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7/31/13

Apex-Alpha™

Sample Description: S-8 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_031
 Chamber Serial Number:
 Detector Serial Number: 31
 Env. Background: System Bkgd 63321
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.310E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:01 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9235 +/- 0.0000
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM
 Effective Efficiency: 0.1310 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.454	2.32	149.13	0.68	0.00E+000	3.1
RA-226	4.624	7.45	84.98	2.55	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

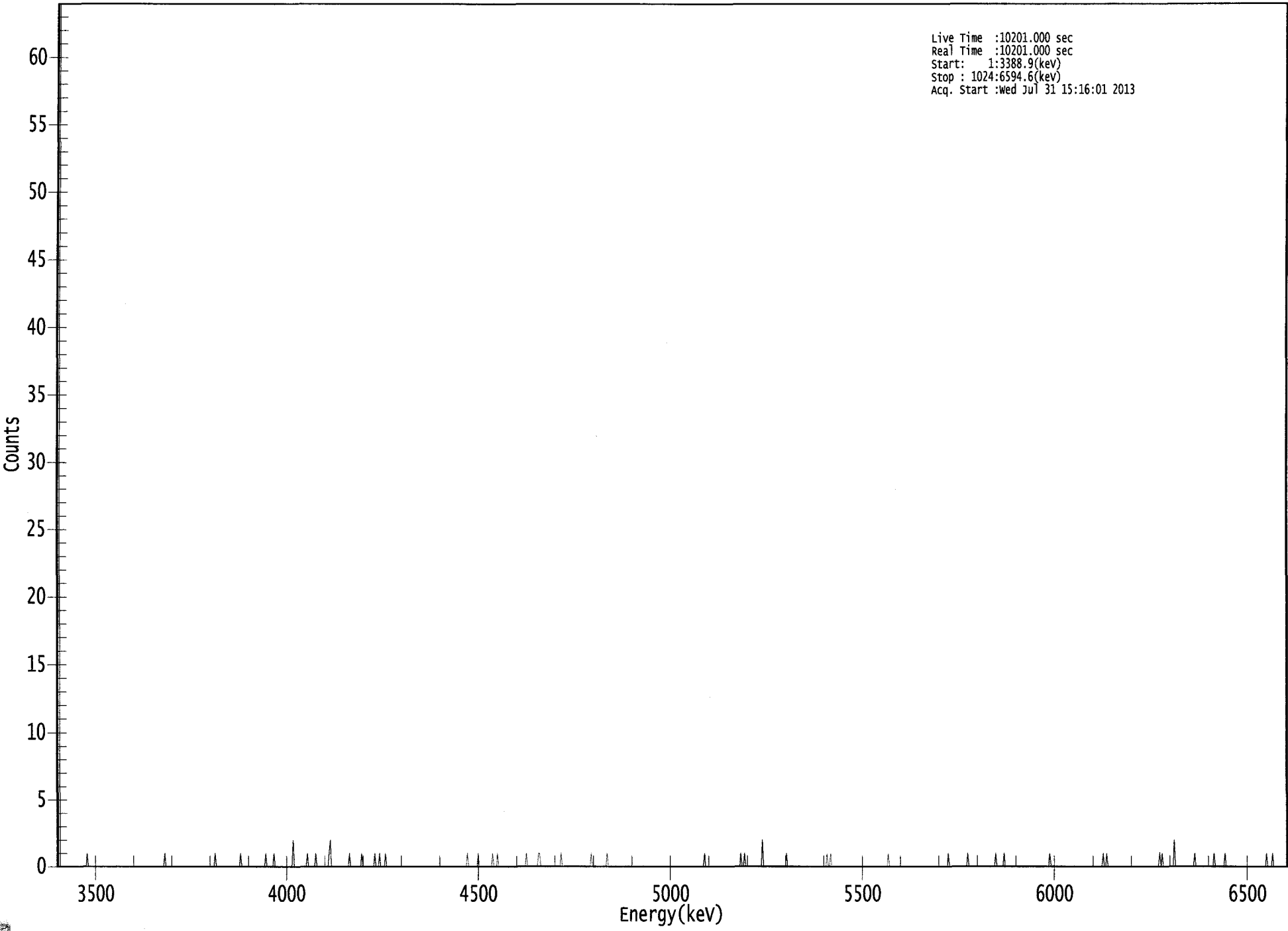
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.932	5685.50*	1.15E-001 +/- 1.71E-001	2.79E-001 +/- 1.33E-002
RA-226	0.967	4785.00*	3.48E-001 +/- 2.96E-001	3.92E-001 +/- 1.86E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064673.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3388.9(kev)
Stop : 1024:6594.6(kev)
Acq. Start :Wed Jul 31 15:16:01 2013



ROI Type: 1

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

Sample Title: 06

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	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	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	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	1	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	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	2	0	0
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	1	2	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	1	0
257:	0	0	0	0	0	0	0	0
265:	0	1	0	0	0	1	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	0	1	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	1	0	0	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 06

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

801: 0 0 0 0 0 0 0 0

Sample Title: 06

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



KCS
7/21/13

Sample Description: S-8 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_033
 Chamber Serial Number: 04026479A
 Detector Serial Number: 91132
 Env. Background: System Bkgd 63322
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9508 +/- 0.0000
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Effective Efficiency: 0.1757 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.545	3.64	123.16	1.36	0.00E+000	3.0
RA-226	4.650	6.66	78.18	0.34	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

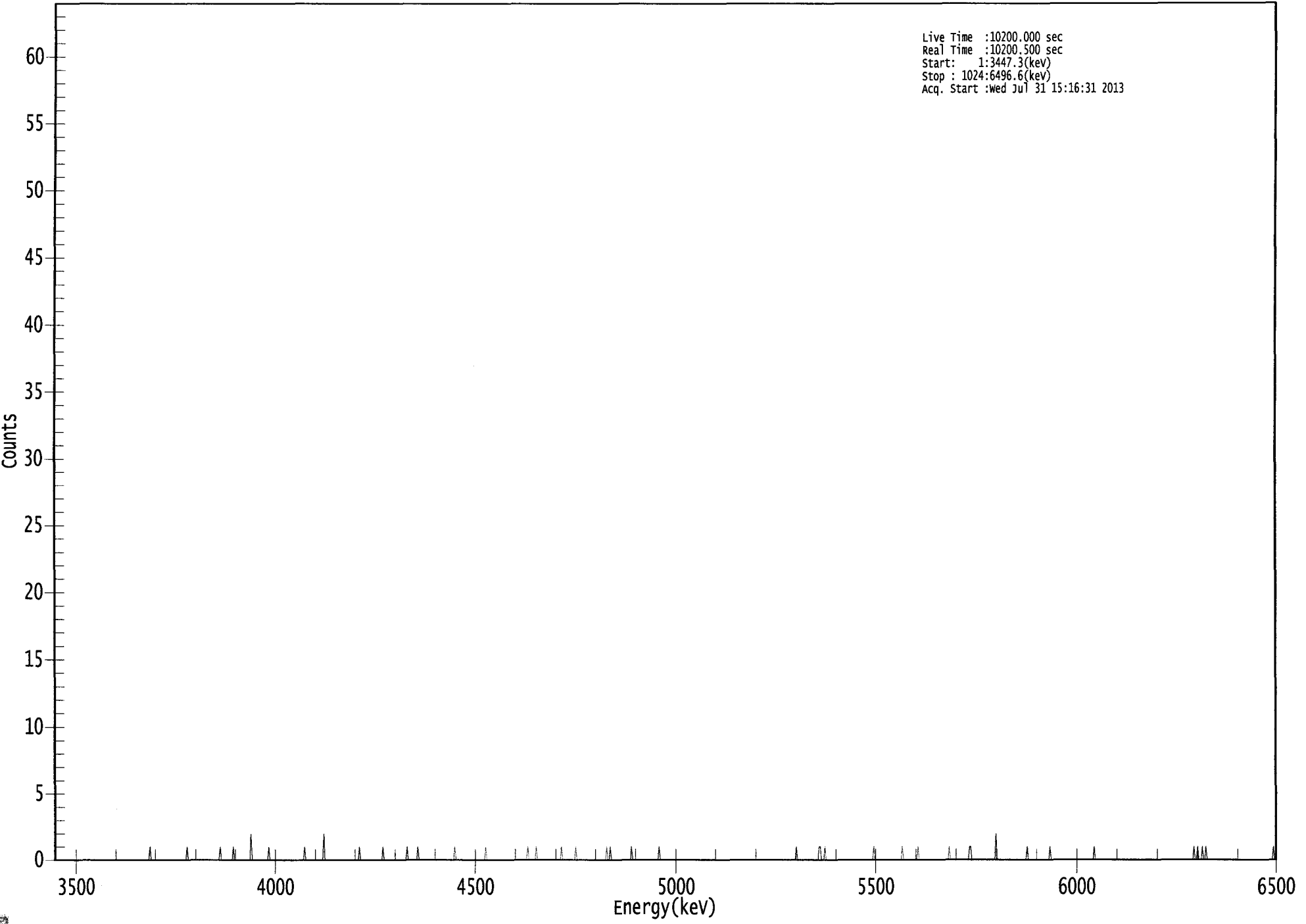
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	1.39E-001 +/- 1.72E-001	2.63E-001 +/- 9.04E-003
RA-226	0.976	4785.00*	2.41E-001 +/- 1.89E-001	1.73E-001 +/- 5.95E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064686.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :wed Jul 31 15:16:31 2013



ROI Type: 1

0359
6559

 ***** 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: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	1	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	1
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	1	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	2	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	1	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	1	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	2	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:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	1	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	1	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	1	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	1	0	0	0	0	0	0
433:	0	0	0	0	0	1	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	1	0	0	0	0	0
473:	0	0	0	0	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	0	0	0	0	0	0
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	1	1	0	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	1
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	1	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	1
769:	1	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	2	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 07

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

KB
7/31/13

Apex-Alpha™

Sample Description: I-62 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 63323
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:33 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9371 +/- 0.0000
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Effective Efficiency: 0.1739 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.512	7.15	78.23	0.85	0.00E+000	3.0
RA-226	4.605	17.83	46.68	0.17	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

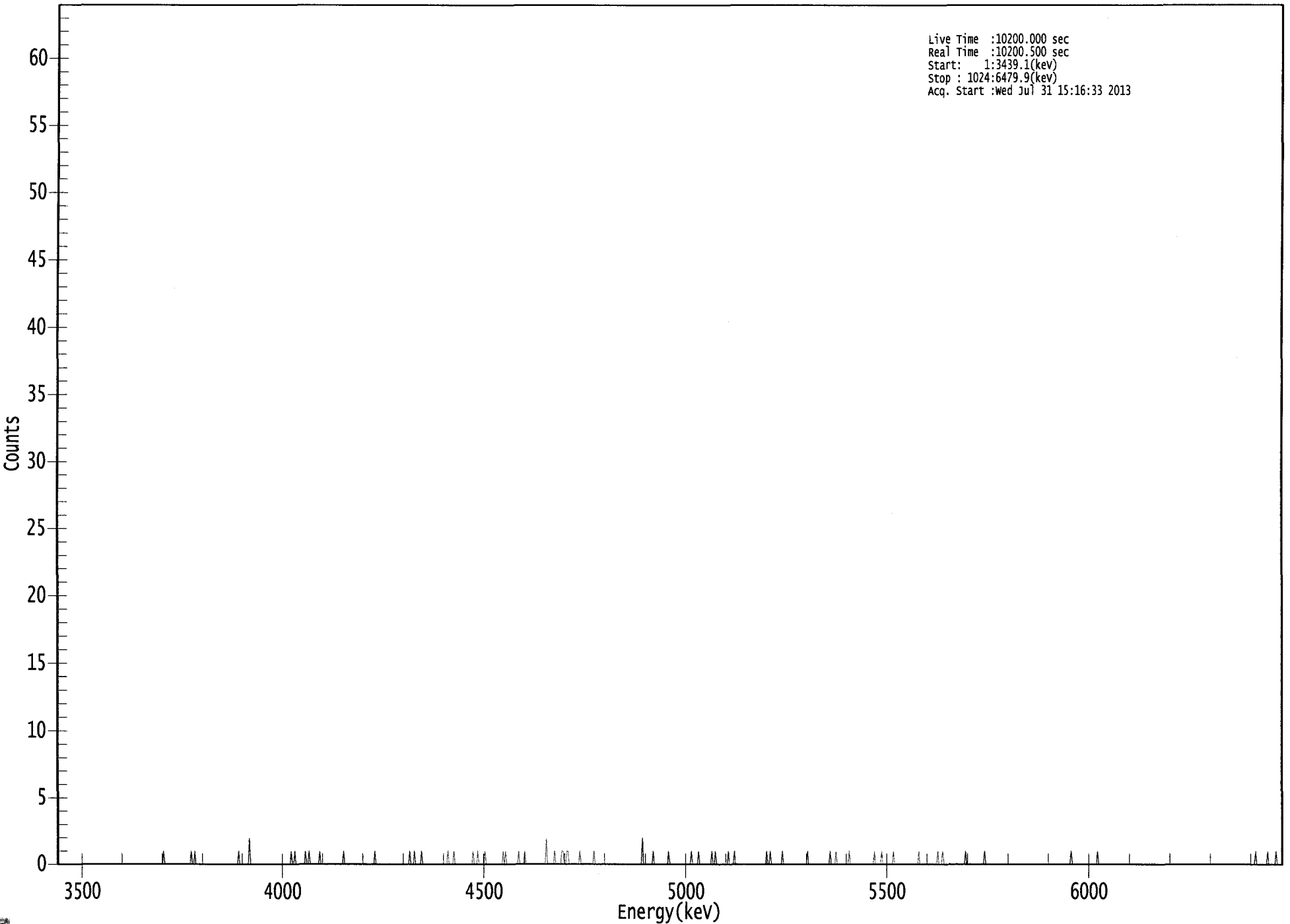
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	2.81E-001 +/- 2.20E-001	2.36E-001 +/- 8.06E-003
RA-226	0.959	4785.00*	6.63E-001 +/- 3.10E-001	1.55E-001 +/- 5.30E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064685.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Wed Jul 31 15:16:33 2013



ROI Type: 1

0354

 ***** 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: 10201

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

369: 0 0 0 0 0 1 0 1

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0 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	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	1	0	0
873:	0	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:	1	0	0	0	0	0	0	0
1009:	0	0	1	0	0	0	0	0
1017:	0	1	0	0	0	0	0	0

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Apex-Alpha™

Sample Description: I-62 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 63324
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:34 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9808 +/- 0.0000
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Effective Efficiency: 0.1791 +/- 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	5.532	3.81	117.34	1.19	0.00E+000	2.9
RA-226	4.611	12.32	57.62	0.68	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

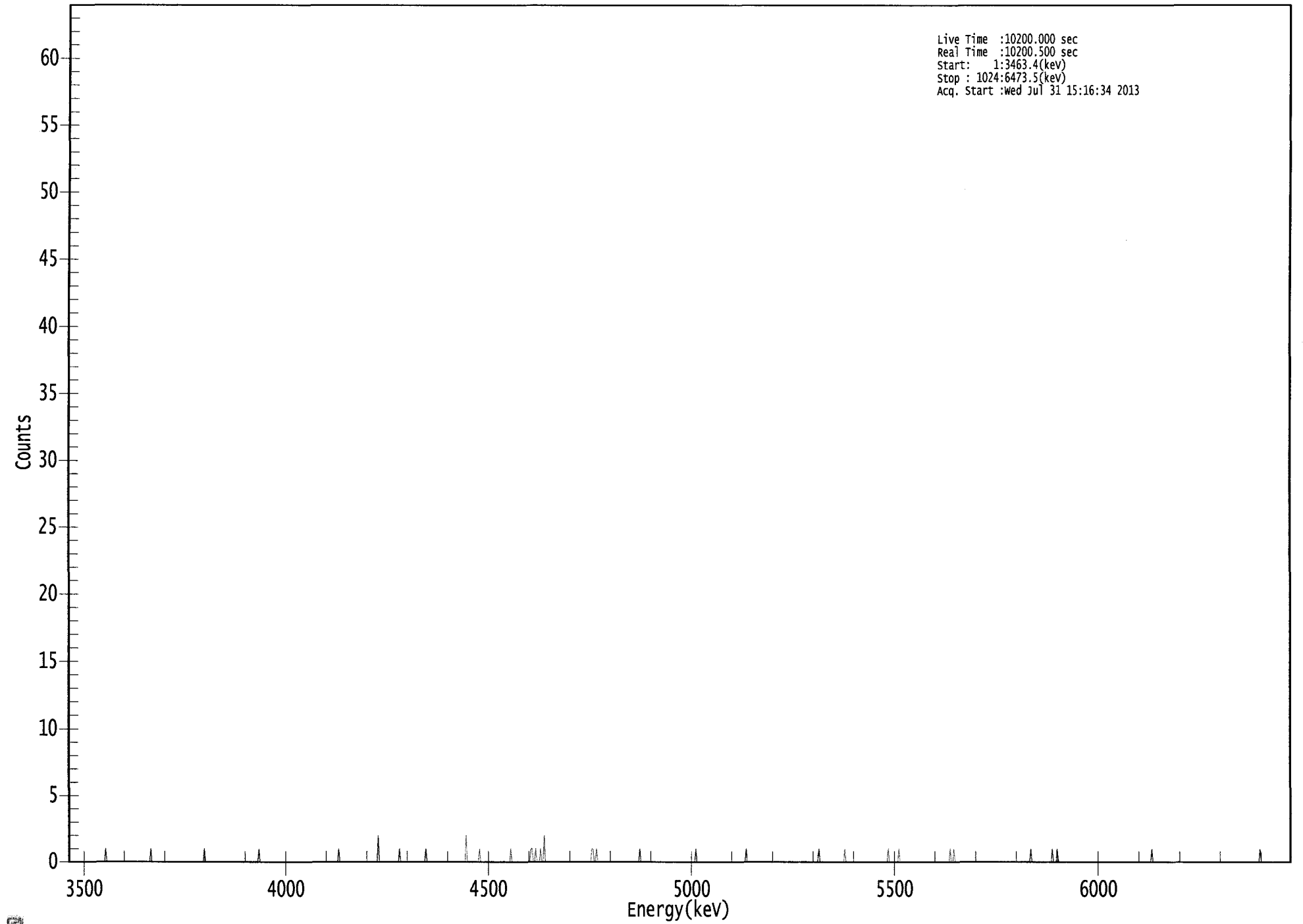
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.970	5685.50*	1.43E-001 +/- 1.68E-001	2.48E-001 +/- 8.49E-003
RA-226	0.961	4785.00*	4.38E-001 +/- 2.53E-001	2.00E-001 +/- 6.86E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064679.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :wed Jul 31 15:16:34 2013



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: 10201

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

369: 0 0 0 1 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	1	1	0	0
393:	1	0	0	0	1	0	0	2
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	1
441:	1	0	0	1	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	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	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:	1	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	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	1
689:	0	0	0	0	0	0	0	0
697:	1	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	1	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 1 0

Sample Title: 09

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

KD
7/31/13

Apex-Alpha™

Sample Description: D-6 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_036
 Chamber Serial Number: 04026477B
 Detector Serial Number: 84167
 Env. Background: System Bkgd 63325
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.790E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:35 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9073 +/- 0.0000
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Effective Efficiency: 0.1733 +/- 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	5.528	17.15	48.68	0.85	0.00E+000	3.0
RA-226	4.580	72.66	23.06	0.34	0.00E+000	3.7

 NUCLIDE ANALYSIS RESULTS

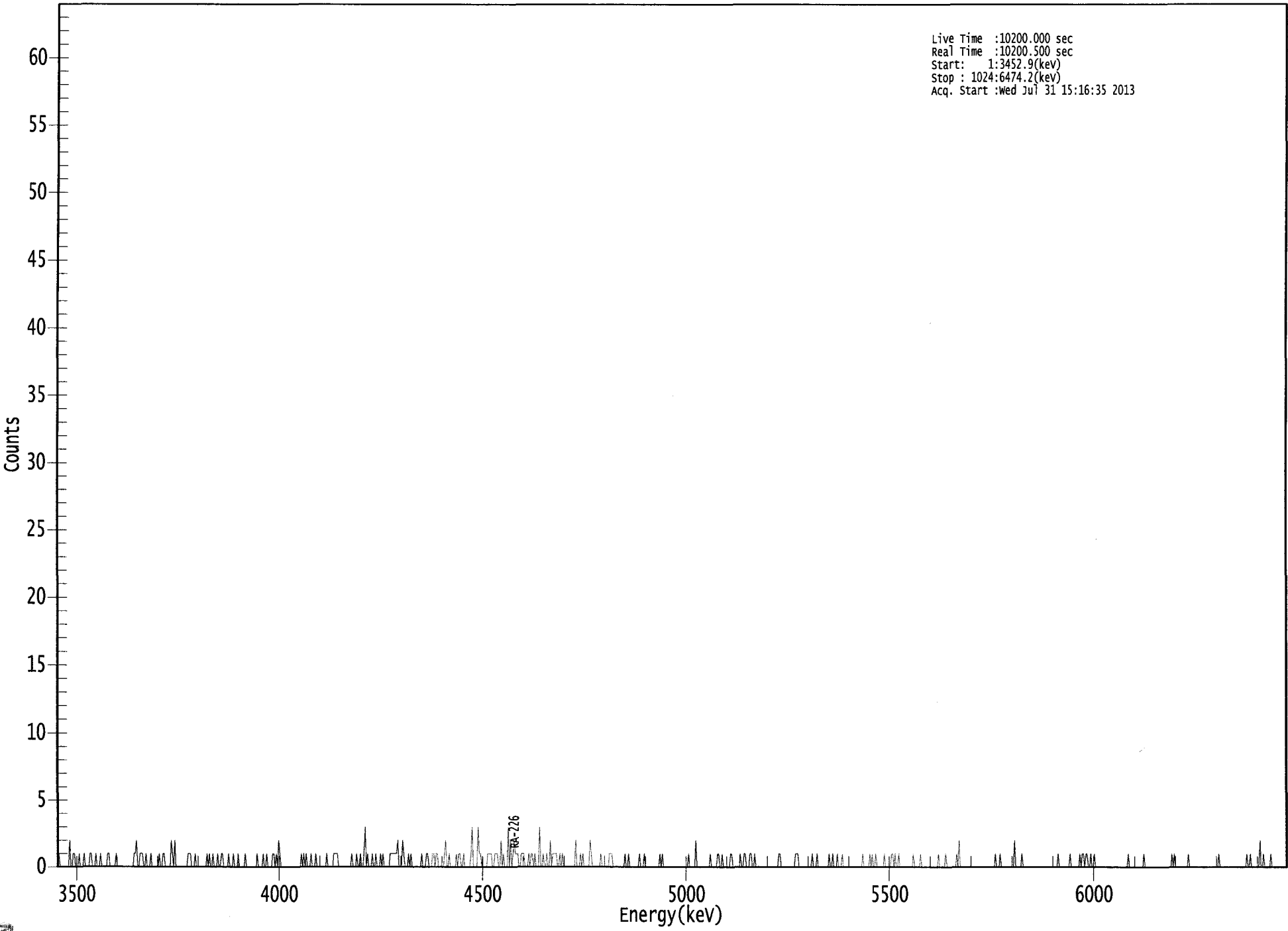
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	7.74E-001 +/- 3.78E-001	2.70E-001 +/- 9.23E-003
RA-226	0.947	4785.00*	3.10E+000 +/- 7.23E-001	2.04E-001 +/- 6.95E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064680.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Wed Jul 31 15:16:35 2013



0374

ROI Type: 1

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

Sample Title: 10

Elapsed Live time: 10200
 Elapsed Real Time: 10201

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

369: 0 0 2 0 1 0 0 0

Sample Title: 10

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

801: 0 0 0 1 0 0 0 0

Sample Title: 10

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

103
7/31/13

Apex-Alpha™

Sample Description: D-6 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_038
 Chamber Serial Number: 04026478B
 Detector Serial Number: 91134
 Env. Background: System Bkgd 63326
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.870E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:37 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9416 +/- 0.0000
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Effective Efficiency: 0.1621 +/- 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	15.49	50.75	0.51	0.00E+000	3.0
RA-226	4.587	61.32	25.19	0.68	0.00E+000	3.7

 NUCLIDE ANALYSIS RESULTS

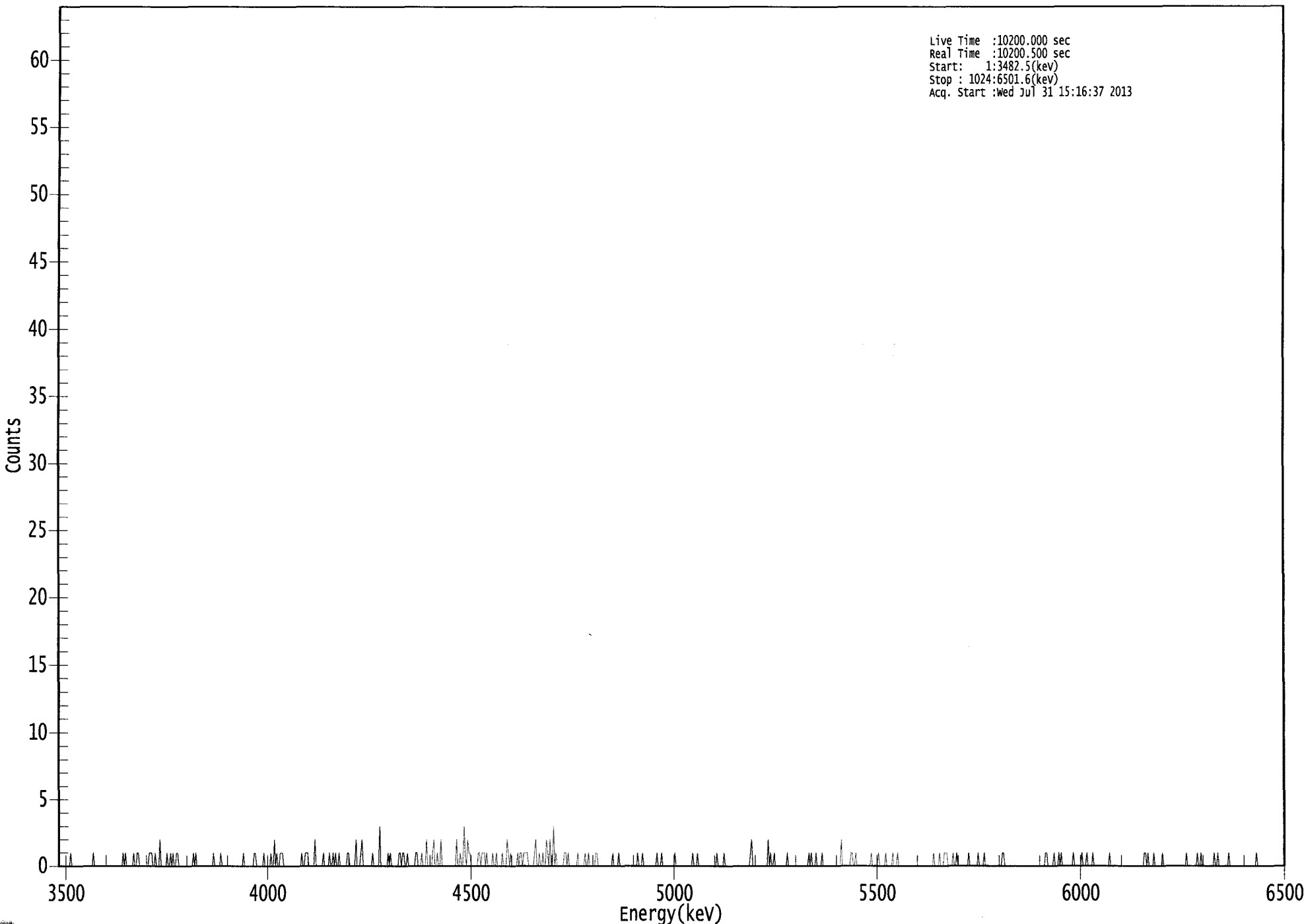
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.975	5685.50*	7.69E-001 +/- 3.91E-001	2.60E-001 +/- 8.98E-003
RA-226	0.950	4785.00*	2.88E+000 +/- 7.31E-001	2.65E-001 +/- 9.11E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064678.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Wed Jul 31 15:16:37 2013



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: 10200

Elapsed Real Time: 10201

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

369: 0 0 0 1 0 0 0 2

Sample Title: 11

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



RS
7/31/13

Sample Description: S-61 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 63327
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.500E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:39 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9489 +/- 0.0000
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Effective Efficiency: 0.1865 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.495	22.98	41.93	1.02	0.00E+000	4.5
RA-226	4.609	36.32	32.88	0.68	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

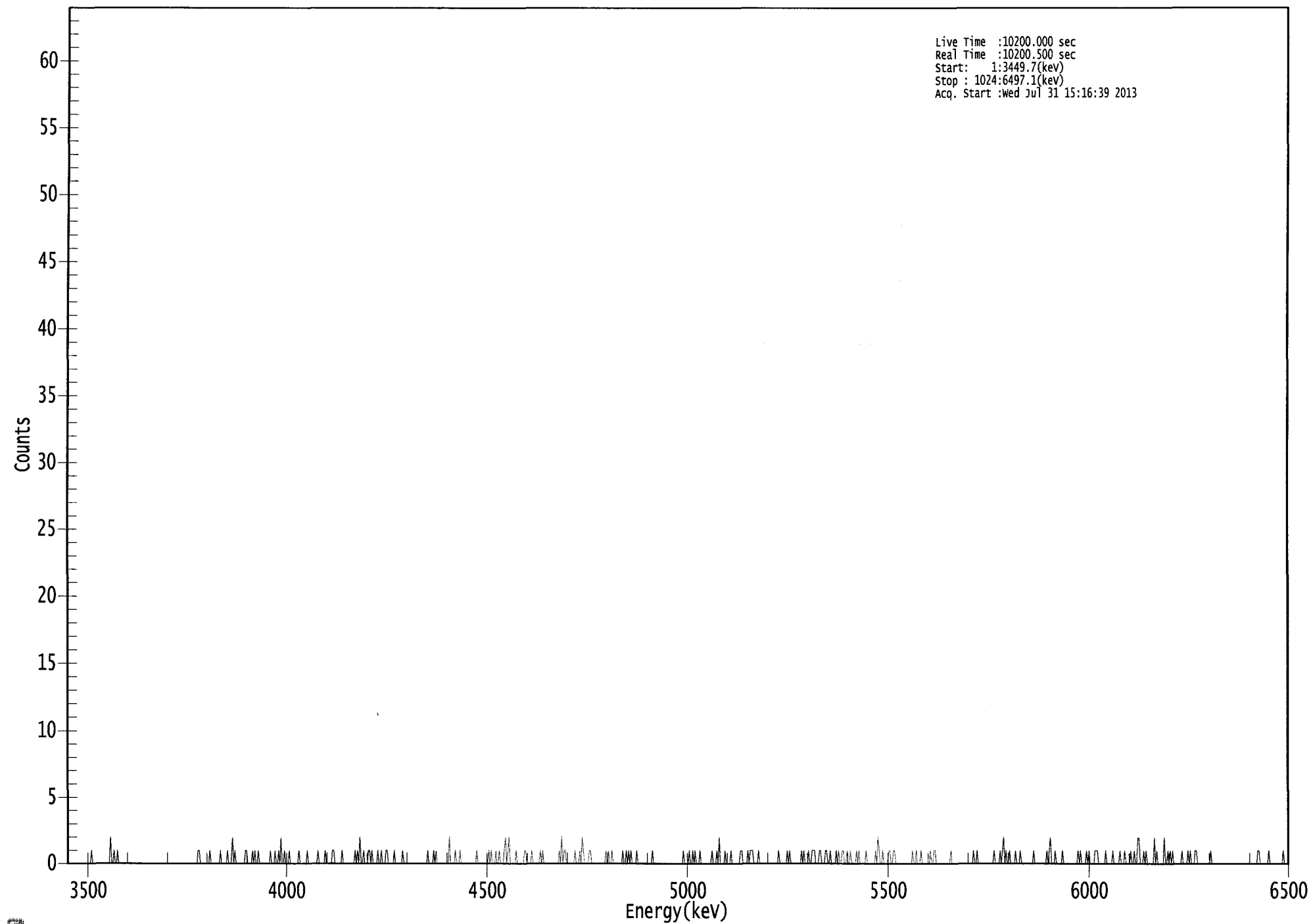
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	8.64E-001 +/- 3.63E-001	2.37E-001 +/- 8.06E-003
RA-226	0.960	4785.00*	1.29E+000 +/- 4.26E-001	2.00E-001 +/- 6.80E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064681.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :wed Jul 31 15:16:39 2013



ROI Type: 1

0304

 ***** 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: 10201

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

369: 2 0 1 2 0 0 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

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

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7/31/13



Sample Description: S-61 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 63328
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:40 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9793 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1861 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.387	1.00	277.19	0.00	0.00E+000	3.0
RA-226	4.568	9.00	68.87	0.00	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

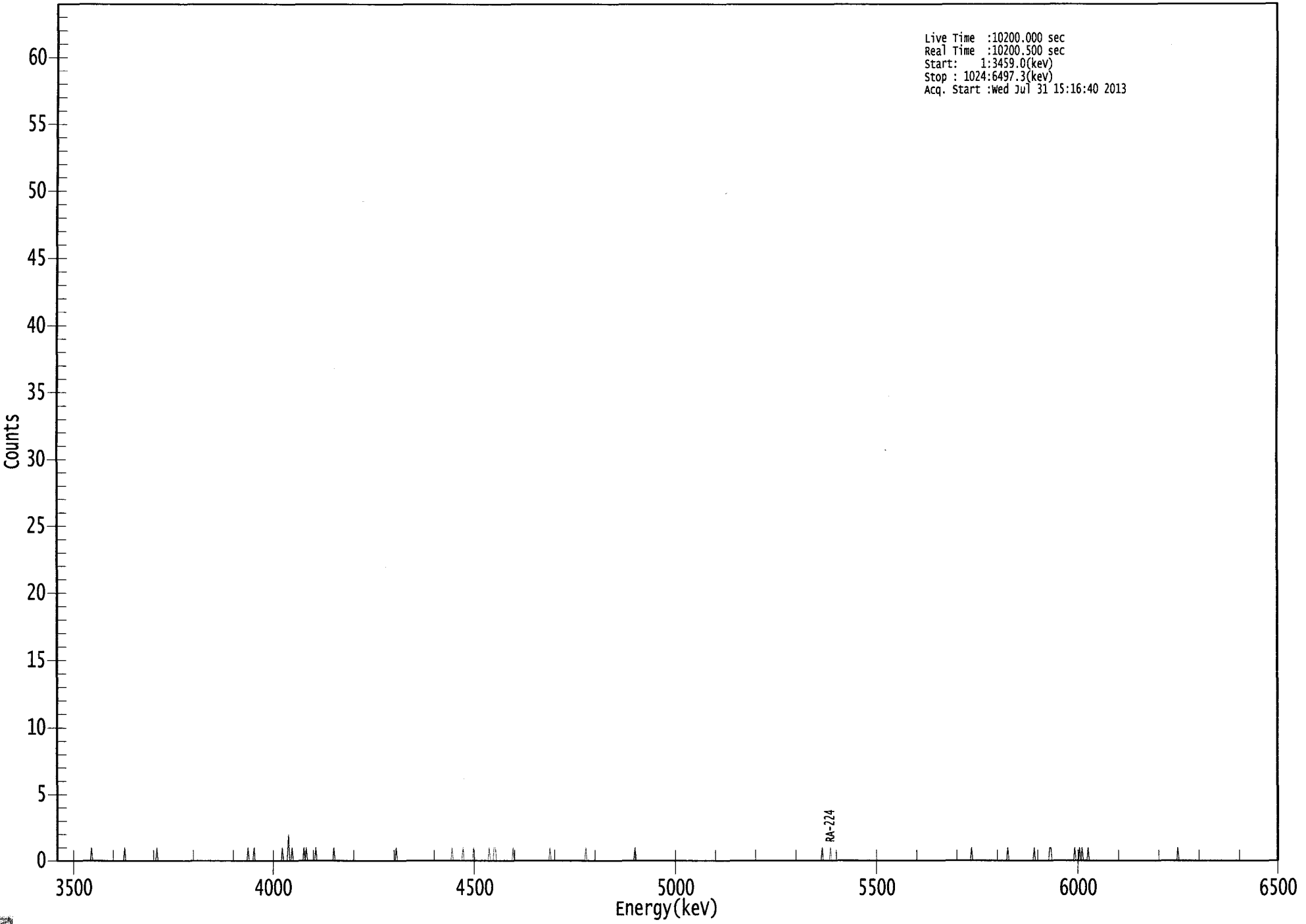
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.890	5685.50*	3.62E-002 +/- 1.00E-001	2.17E-001 +/- 7.39E-003
RA-226	0.941	4785.00*	3.08E-001 +/- 2.12E-001	2.05E-001 +/- 6.97E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064682.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Wed Jul 31 15:16:40 2013



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: 10201

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

369: 1 0 0 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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

KD
7/31/13

Apex-Alpha™

Sample Description: I-67 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 63329
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.470E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:42 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1978 +/- 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	5.547	11.32	60.27	0.68	0.00E+000	3.0
RA-226	4.570	14.81	53.27	1.19	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

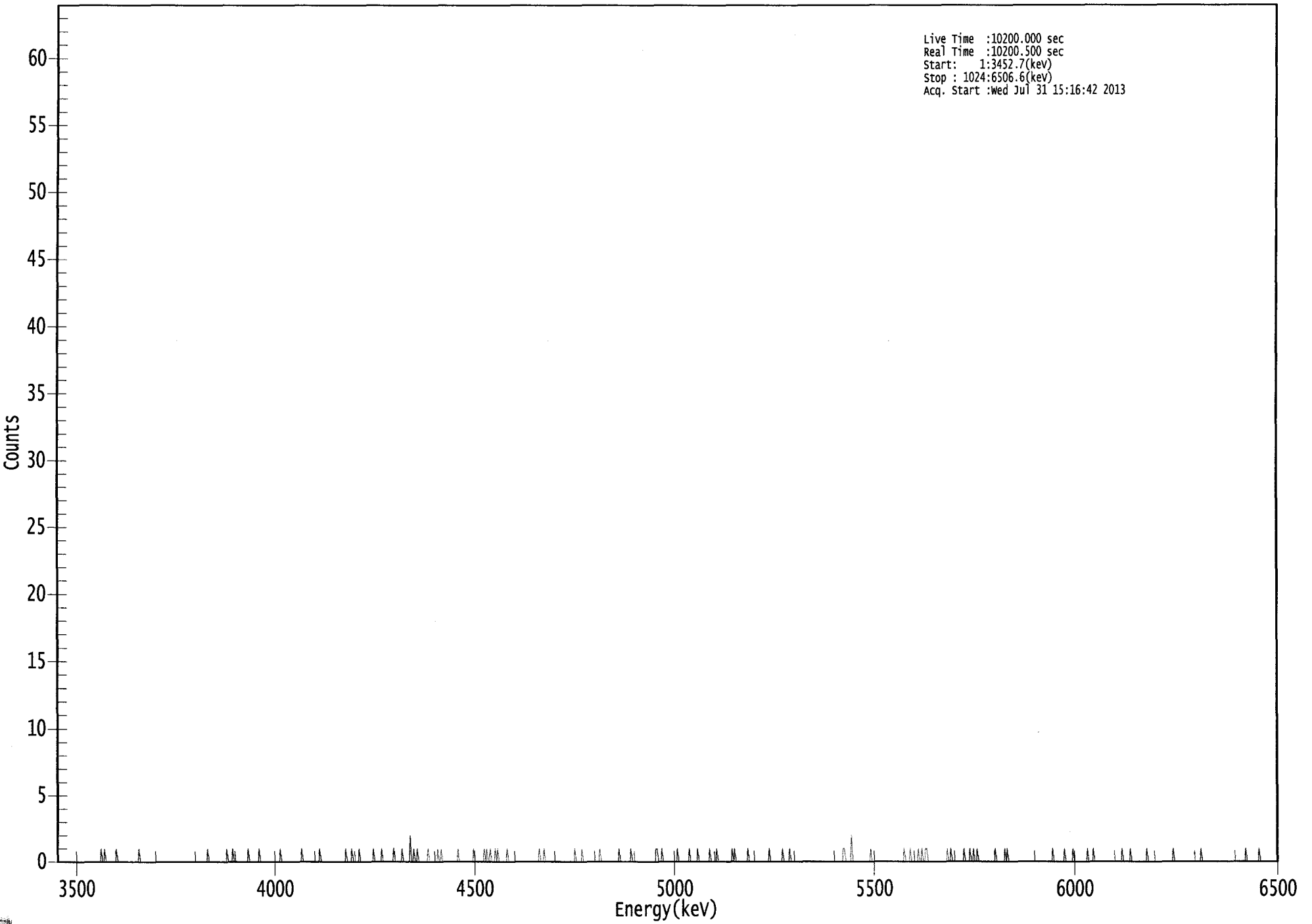
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.975	5685.50*	3.96E-001 +/- 2.39E-001	1.97E-001 +/- 6.70E-003
RA-226	0.941	4785.00*	4.90E-001 +/- 2.62E-001	2.18E-001 +/- 7.38E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064683.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Wed Jul 31 15:16:42 2013



76394

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: 10201

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

369: 1 0 1 0 0 0 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	1	0	0	0	0
841:	0	0	0	0	0	1	0	0
849:	0	0	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	1	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	1	0	0
897:	0	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	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	0	1
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	1	0	0	0
1001:	0	0	0	0	0	0	0	1
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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7/31/13

Sample Description: I-67 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 63330
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:44 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9587 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.1770 +/- 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	5.501	4.81	101.48	1.19	0.00E+000	3.0
RA-226	4.669	12.98	56.85	1.02	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

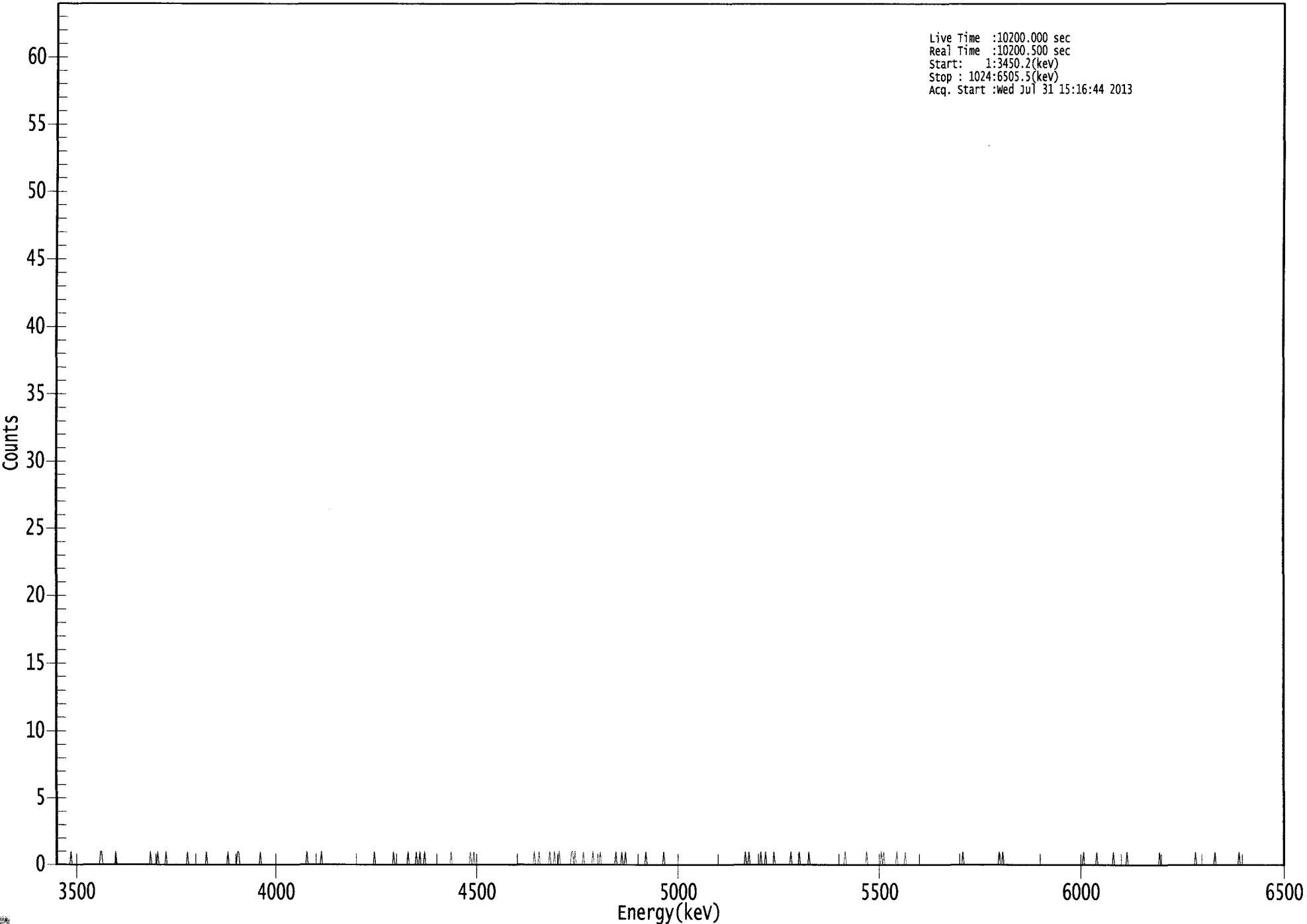
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.957	5685.50*	1.83E-001 +/- 1.86E-001	2.50E-001 +/- 8.55E-003
RA-226	0.982	4785.00*	4.66E-001 +/- 2.66E-001	2.26E-001 +/- 7.72E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064684.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :wed Jul 31 15:16:44 2013



ROI Type: 1

0399

 ***** 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: 10201

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

369: 0 0 0 0 0 0 0 0

Sample Title: 15

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

801: 0 0 0 0 0 0 0 0

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

KD
7/31/13

Apex-Alpha™

Sample Description: I-68 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 63331
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:47 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8879 +/- 0.0000
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Effective Efficiency: 0.1695 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.523	39.49	31.42	0.51	0.00E+000	3.0
RA-226	4.626	39.49	31.42	0.51	0.00E+000	3.7

 NUCLIDE ANALYSIS RESULTS

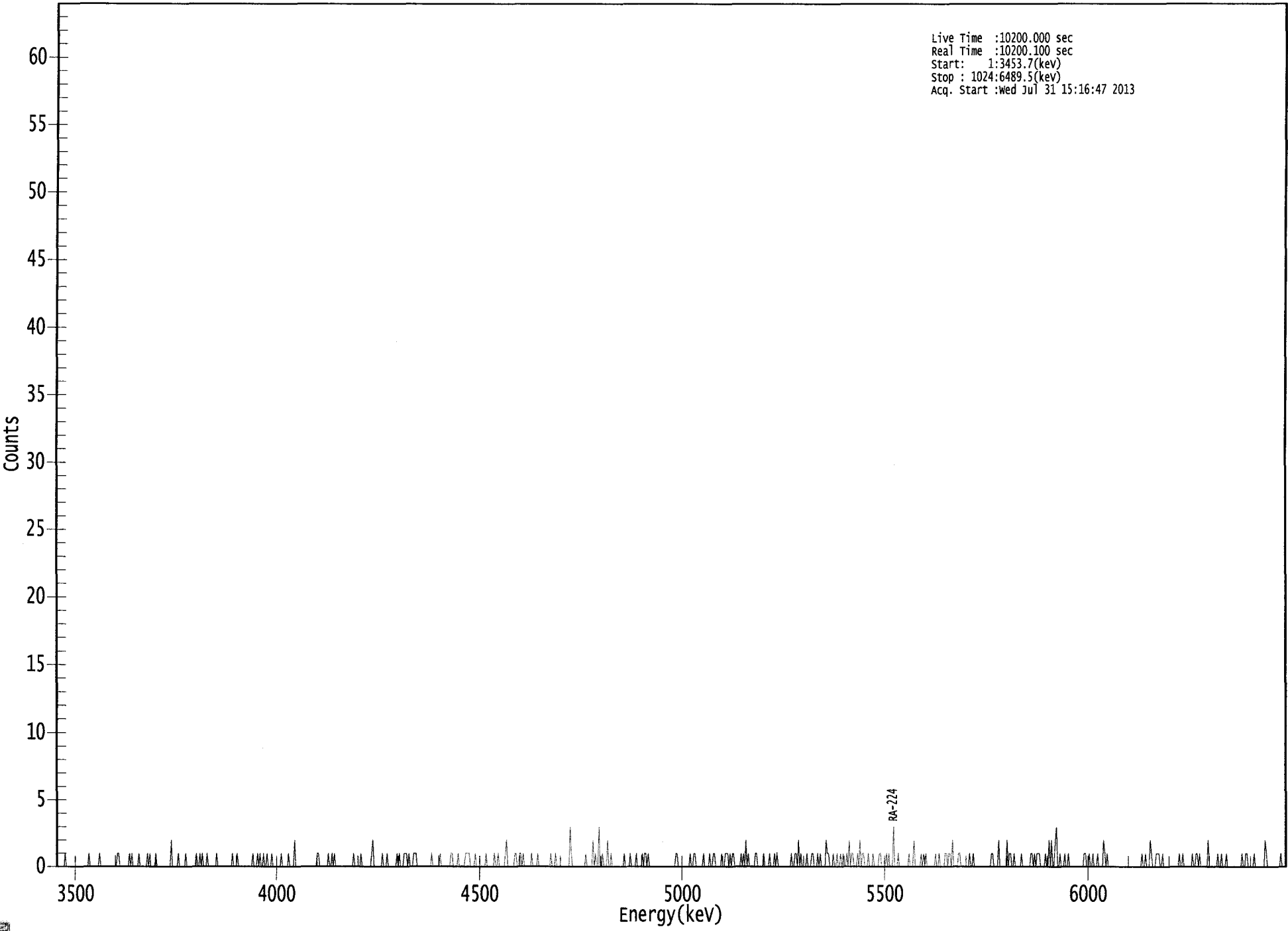
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	1.48E+000 +/- 4.69E-001	1.97E-001 +/- 6.73E-003
RA-226	0.968	4785.00*	1.40E+000 +/- 4.43E-001	1.86E-001 +/- 6.35E-003

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US EPA ARCHIVE DOCUMENT

0000064676.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :Wed Jul 31 15:16:47 2013



ROI Type: 1

0000

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 0 0 1 2

Sample Title: 16

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

801: 0 0 0 1 0 0 0 0

Sample Title: 16

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



DB
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Sample Description: I-68 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 63332
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:49 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8882 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Effective Efficiency: 0.1589 +/- 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	5.632	2.83	120.53	0.17	0.00E+000	6.0
RA-226	4.585	17.49	47.66	0.51	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

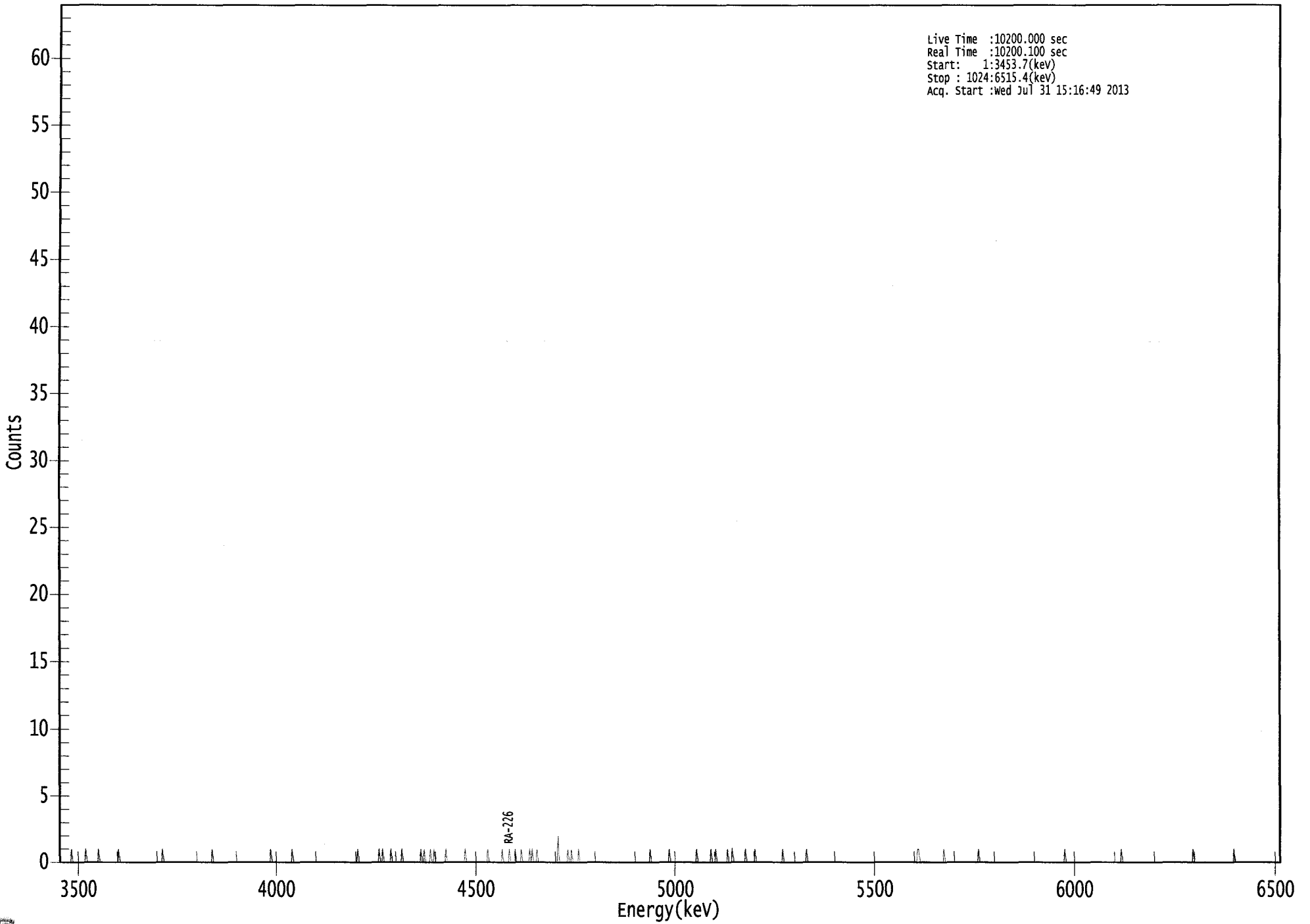
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.996	5685.50*	1.30E-001 +/- 1.57E-001	1.92E-001 +/- 6.62E-003
RA-226	0.949	4785.00*	7.61E-001 +/- 3.64E-001	2.28E-001 +/- 7.86E-003

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US EPA ARCHIVE DOCUMENT

0000064677.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :wed Jul 31 15:16:49 2013



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

369: 0 0 0 0 1 0 0 0

Sample Title: 17

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	0	0	1
385:	0	0	0	0	1	0	0	0
393:	0	0	0	1	0	1	0	0
401:	0	1	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	2	0	0	0	0
425:	0	0	0	1	0	0	1	0
433:	0	0	0	0	1	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	1	0	0	0	1
553:	0	0	0	0	0	0	0	0
561:	0	1	0	0	0	1	0	0
569:	0	0	0	0	0	0	0	0
577:	1	0	0	0	0	0	0	0
585:	1	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	1
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:	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:	1	1	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	1	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	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	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:	1	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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Apex-Alpha™

Sample Description: DUP 04 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 63333
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:51 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8555 +/- 0.0000
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Effective Efficiency: 0.1558 +/- 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	3.66	107.87	0.34	0.00E+000	2.9
RA-226	4.538	7.00	79.20	0.00	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

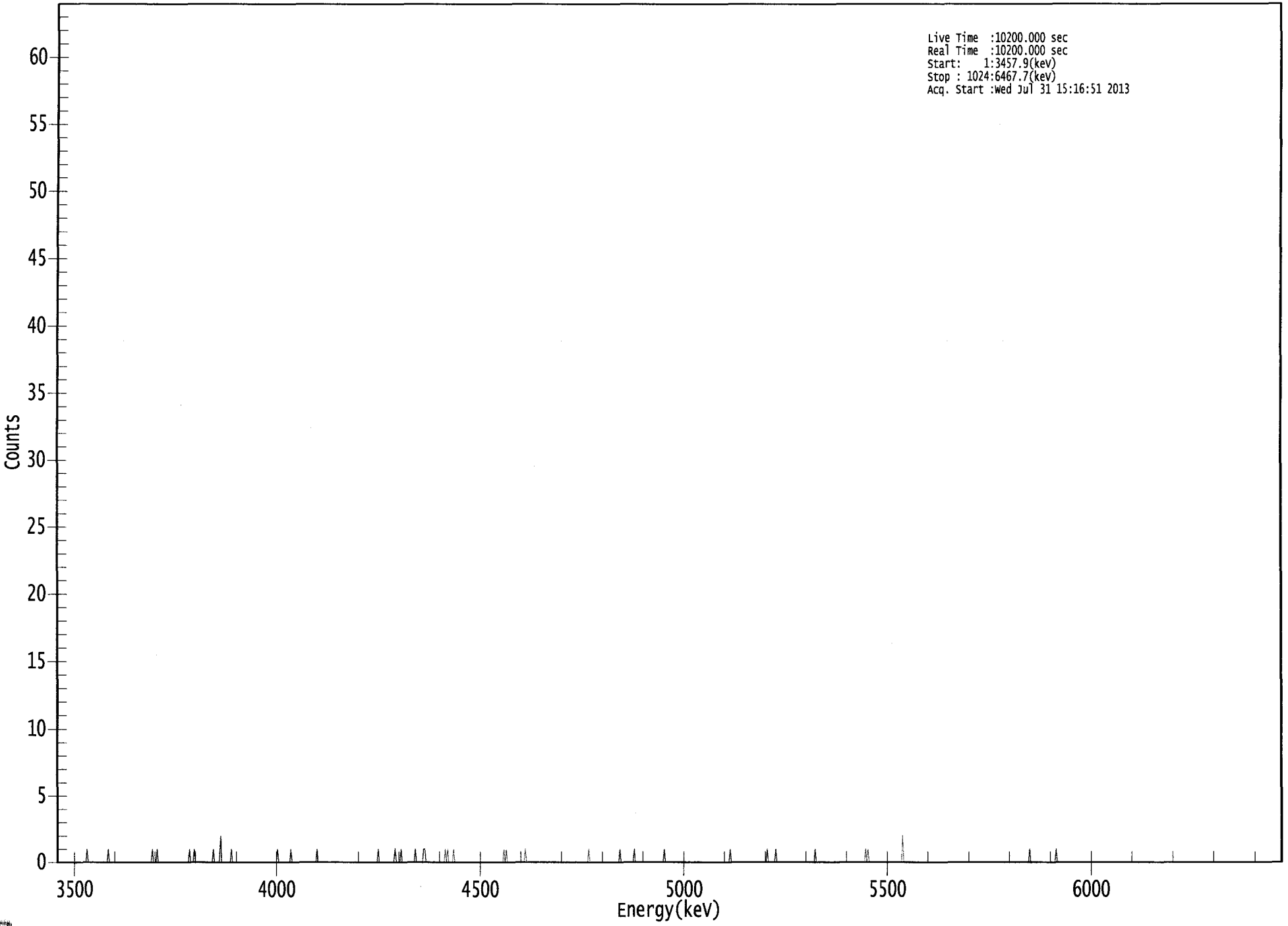
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	1.49E-001 +/- 1.61E-001	1.95E-001 +/- 6.72E-003
RA-226	0.924	4785.00*	2.70E-001 +/- 2.14E-001	2.31E-001 +/- 7.94E-003

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US EPA ARCHIVE DOCUMENT

0000064687.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :wed Jul 31 15:16:51 2013



ROI Type: 1

0114

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

369: 0 0 0 0 0 0 1 0

Sample Title: 18

Channel	1	2	3	4	5	6	7	8
377:	1	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	1	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	1
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	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	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	1	0	0	0	0	0
601:	0	1	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	1	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	2	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: 18

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	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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7/31/13

Sample Description: DUP 04 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307111A-RA
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 63334
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.080E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/12/2013 1:00:58 PM
 Acquisition Date/Time: 7/31/2013 3:16:54 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8180 +/- 0.0000
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Effective Efficiency: 0.1374 +/- 0.0024

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.643	-0.02	10615.	1.02	0.00E+000	3.0
RA-226	4.668	5.00	96.02	0.00	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

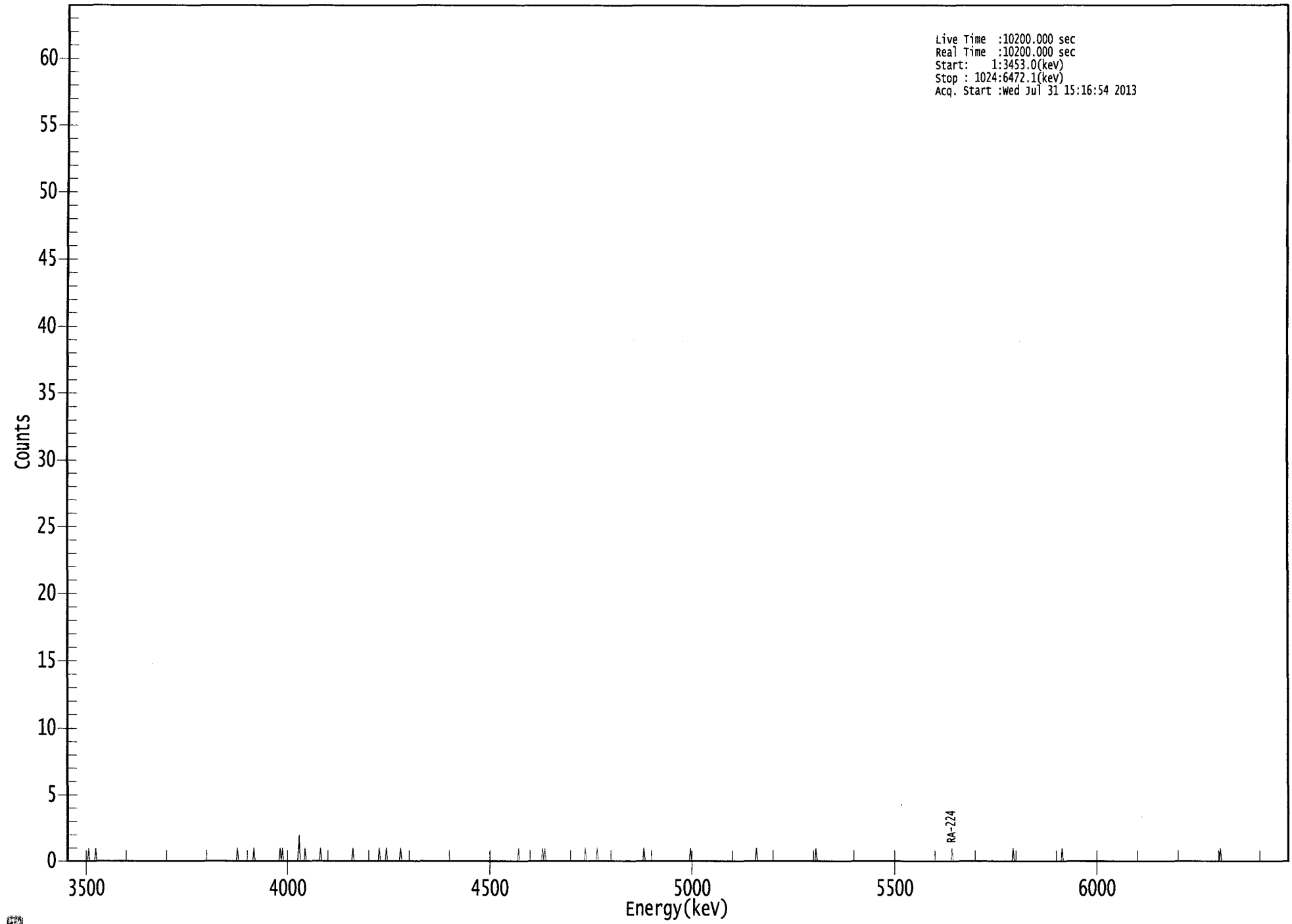
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.998	5685.50*	-8.49E-004 +/- 9.01E-002	2.67E-001 +/- 9.28E-003
RA-226	0.982	4785.00*	2.01E-001 +/- 1.93E-001	2.41E-001 +/- 8.33E-003

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US EPA ARCHIVE DOCUMENT

0000064688.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.0(keV)
Stop : 1024:6472.1(keV)
Acq. Start :wed Jul 31 15:16:54 2013



ROI Type: 1

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	1	0	0	0	0	0
25:	1	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	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	1
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	0	1	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	2	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	0	0	0	0	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	1	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

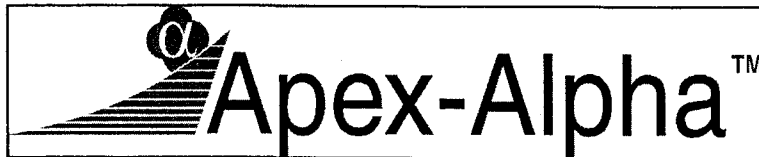
Sample Title: 19

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	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	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	1	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	1	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	1	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	1	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	1	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	1	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 7/31/2013
Time : 5:51:04 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	7/31/2013 5:32:09 AM
Alpha 004	21f	ALL	Passed	7/31/2013 5:32:10 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	7/31/2013 5:32:11 AM
Alpha 011	21f	ALL	Passed	7/31/2013 5:32:12 AM
Alpha 012	21f	ALL	Passed	7/31/2013 5:32:13 AM
Alpha 013	21f	ALL	Passed	7/31/2013 5:32:14 AM
Alpha 014	21f	ALL	Passed	7/31/2013 5:32:14 AM
Alpha 015	21f	Peak Energy	Action	7/31/2013 5:32:15 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	7/31/2013 5:32:16 AM
Alpha 019	AIM730	ALL	Passed	7/31/2013 5:32:17 AM
Alpha 020	AIM730	ALL	Passed	7/31/2013 5:32:18 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	7/31/2013 5:32:19 AM
Alpha 023	AIM730	ALL	Passed	7/31/2013 5:32:19 AM
Alpha 024	AIM730	ALL	Passed	7/31/2013 5:32:20 AM
Alpha 025	AIM730	ALL	Passed	7/31/2013 5:32:21 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	7/31/2013 5:32:22 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	7/31/2013 5:32:23 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	7/31/2013 5:32:23 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:25 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:26 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:28 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:29 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	7/31/2013 5:32:30 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:32 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:33 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:35 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	7/31/2013 5:32:36 AM

***** 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)

Work Order	13-07111
Analysis Code	Ra228
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	1
Matrix	WA
Method	904
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	992.377
Carrier	Yttrium
Carrier Conc (mg/ml)	34

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/17/13 00:00	1.0000E+00
02	MBL	BLANK		07/17/13 00:00	1.0000E+00
03	DUP	I-67 TOT	43	07/12/13 13:33	1.0000E+00
04	TRG	DUP 03 TOT	45	07/11/13 00:00	1.0000E+00
05	TRG	DUP 03 DIS	45	07/11/13 00:00	1.0000E+00
06	TRG	S-8 TOT	40	07/12/13 09:23	1.0000E+00
07	TRG	S-8 DIS	40	07/12/13 09:23	1.0000E+00
08	TRG	I-62 TOT	42	07/12/13 09:56	1.0000E+00
09	TRG	I-62 DIS	42	07/12/13 09:56	1.0000E+00
10	TRG	D-6 TOT	45	07/12/13 11:35	1.0000E+00
11	TRG	D-6 DIS	45	07/12/13 11:35	1.0000E+00
12	TRG	S-61 TOT	38	07/12/13 12:02	1.0000E+00
13	TRG	S-61 DIS	38	07/12/13 12:02	1.0000E+00
14	DO	I-67 TOT	43	07/12/13 13:33	1.0000E+00
15	TRG	I-67 DIS	43	07/12/13 13:33	1.0000E+00
16	TRG	I-68 TOT	39	07/12/13 14:35	1.0000E+00
17	TRG	I-68 DIS	39	07/12/13 14:35	1.0000E+00
18	TRG	DUP 04 TOT	39	07/12/13 00:00	1.0000E+00
19	TRG	DUP 04 DIS	39	07/12/13 00:00	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.

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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	0.9198	912.8	417.6	101.56	2.000	0.0923	0.1510	0.0587	86.32	87.67	1.00	1.00
02	MBL	0.9051	898.2	440.4	108.85	2.000	0.0925	0.1499	0.0574	84.41	91.88	1.00	1.00
03	DUP	0.9081	901.2	362.7	89.35	2.000	0.0934	0.1498	0.0564	82.94	74.11	1.00	1.00
04	TRG	0.9006	893.7	394.1	97.89	2.000	0.0926	0.1519	0.0593	87.21	85.37	1.00	1.00
05	TRG	0.9016	894.7	372.1	92.33	2.000	0.0925	0.1556	0.0631	92.79	85.67	1.00	1.00
06	TRG	0.9050	898.1	373.6	92.35	2.000	0.0933	0.1530	0.0597	87.79	81.08	1.00	1.00
07	TRG	0.9016	894.7	383.2	95.08	2.000	0.0916	0.1459	0.0543	79.85	75.92	1.00	1.00
08	TRG	0.9021	895.2	377.9	93.71	2.000	0.0916	0.1465	0.0549	80.74	75.66	1.00	1.00
09	TRG	0.9039	897.0	396.3	98.08	2.000	0.0929	0.1455	0.0526	77.35	75.87	1.00	1.00
10	TRG	0.9029	896.0	366.2	90.73	2.000	0.0916	0.1491	0.0575	84.56	76.72	1.00	1.00
11	TRG	0.9028	895.9	380.0	94.16	2.000	0.0919	0.1447	0.0528	77.65	73.11	1.00	1.00
12	TRG	0.9043	897.4	383.6	94.89	2.000	0.0929	0.1508	0.0579	85.15	80.80	1.00	1.00
13	TRG	0.9007	893.8	394.3	97.93	2.000	0.0938	0.1498	0.0560	82.35	80.65	1.00	1.00
14	DO	0.9034	896.5	406.6	100.68	2.000	0.0941	0.1509	0.0568	83.53	84.10	1.00	1.00
15	TRG	0.9030	896.1	387.0	95.87	2.000	0.0943	0.1515	0.0572	84.12	80.65	1.00	1.00
16	TRG	0.9032	896.3	358.5	88.79	2.000	0.0928	0.1479	0.0551	81.03	71.95	1.00	1.00
17	TRG	0.9057	898.8	359.6	88.82	2.000	0.0944	0.1515	0.0571	83.97	74.58	1.00	1.00
18	TRG	0.9027	895.8	345.2	85.55	2.000	0.0962	0.1557	0.0595	87.50	74.85	1.00	1.00
19	TRG	0.9014	894.5	329.6	81.80	2.000	0.0962	0.1583	0.0621	91.32	74.70	1.00	1.00

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

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
02	MBL			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
03	DUP			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
04	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
05	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
06	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
07	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
08	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
09	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
10	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
11	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
12	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
13	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
14	DO			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
15	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
16	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
17	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
18	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH
19	TRG			07/26/13 11:24	JWOLFE	07/30/13 11:55	LWALKER	08/08/13 04:11	TSMITH

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-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	8.17E+00	2.18E+00	2.48E+00	8.77E+00	93.13	OK		INV	
02	RA-228	MBL	BLANK	pCi/l	2.79E-01	5.35E-01	1.11E+00					OK	OK
03	RA-228	DUP	I-67 TOT	pCi/l	1.22E+00	6.84E-01	1.32E+00				NA	OK	
04	RA-228	TRG	DUP 03 TOT	pCi/l	4.43E+00	7.68E-01	1.21E+00					OK	
05	RA-228	TRG	DUP 03 DIS	pCi/l	4.29E+00	7.75E-01	1.25E+00					OK	
06	RA-228	TRG	S-8 TOT	pCi/l	6.72E-01	6.38E-01	1.29E+00					OK	
07	RA-228	TRG	S-8 DIS	pCi/l	1.03E+00	7.76E-01	1.55E+00					OK	
08	RA-228	TRG	I-62 TOT	pCi/l	1.38E+00	7.15E-01	1.38E+00					OK	
09	RA-228	TRG	I-62 DIS	pCi/l	6.98E-01	6.98E-01	1.42E+00					OK	
10	RA-228	TRG	D-6 TOT	pCi/l	3.13E+00	8.78E-01	1.59E+00					OK	
11	RA-228	TRG	D-6 DIS	pCi/l	4.07E+00	9.14E-01	1.57E+00					OK	
12	RA-228	TRG	S-61 TOT	pCi/l	1.27E+00	6.37E-01	1.22E+00					OK	
13	RA-228	TRG	S-61 DIS	pCi/l	1.53E+00	6.80E-01	1.28E+00					OK	
14	RA-228	DO	I-67 TOT	pCi/l	1.19E+00	6.26E-01	1.20E+00					OK	
15	RA-228	TRG	I-67 DIS	pCi/l	1.28E+00	6.02E-01	1.14E+00					OK	
16	RA-228	TRG	I-68 TOT	pCi/l	3.67E+00	8.24E-01	1.38E+00					OK	
17	RA-228	TRG	I-68 DIS	pCi/l	1.65E+00	6.74E-01	1.25E+00					OK	
18	RA-228	TRG	DUP 04 TOT	pCi/l	1.85E+00	7.31E-01	1.36E+00					OK	
19	RA-228	TRG	DUP 04 DIS	pCi/l	1.20E+00	6.69E-01	1.30E+00					OK	

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-Ra228-1

Run	1
Eberline Services Work Order	13-07111
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	07/17/13 00:00	1.00E+00	101.56	86.32	87.67	1.00	7/30/2013 11:55	8/8/2013 4:11
02	RA-228	MBL	07/17/13 00:00	1.00E+00	108.85	84.41	91.88	1.00	7/30/2013 11:55	8/8/2013 4:11
03	RA-228	DUP	07/12/13 13:33	1.00E+00	89.35	82.94	74.11	1.00	7/30/2013 11:55	8/8/2013 4:11
04	RA-228	TRG	07/11/13 00:00	1.00E+00	97.89	87.21	85.37	1.00	7/30/2013 11:55	8/8/2013 4:11
05	RA-228	TRG	07/11/13 00:00	1.00E+00	92.33	92.79	85.67	1.00	7/30/2013 11:55	8/8/2013 4:11
06	RA-228	TRG	07/12/13 09:23	1.00E+00	92.35	87.79	81.08	1.00	7/30/2013 11:55	8/8/2013 4:11
07	RA-228	TRG	07/12/13 09:23	1.00E+00	95.08	79.85	75.92	1.00	7/30/2013 11:55	8/8/2013 4:11
08	RA-228	TRG	07/12/13 09:56	1.00E+00	93.71	80.74	75.66	1.00	7/30/2013 11:55	8/8/2013 4:11
09	RA-228	TRG	07/12/13 09:56	1.00E+00	98.08	77.35	75.87	1.00	7/30/2013 11:55	8/8/2013 4:11
10	RA-228	TRG	07/12/13 11:35	1.00E+00	90.73	84.56	76.72	1.00	7/30/2013 11:55	8/8/2013 4:11
11	RA-228	TRG	07/12/13 11:35	1.00E+00	94.16	77.65	73.11	1.00	7/30/2013 11:55	8/8/2013 4:11
12	RA-228	TRG	07/12/13 12:02	1.00E+00	94.89	85.15	80.80	1.00	7/30/2013 11:55	8/8/2013 4:11
13	RA-228	TRG	07/12/13 12:02	1.00E+00	97.93	82.35	80.65	1.00	7/30/2013 11:55	8/8/2013 4:11
14	RA-228	DO	07/12/13 13:33	1.00E+00	100.68	83.53	84.10	1.00	7/30/2013 11:55	8/8/2013 4:11
15	RA-228	TRG	07/12/13 13:33	1.00E+00	95.87	84.12	80.65	1.00	7/30/2013 11:55	8/8/2013 4:11
16	RA-228	TRG	07/12/13 14:35	1.00E+00	88.79	81.03	71.95	1.00	7/30/2013 11:55	8/8/2013 4:11
17	RA-228	TRG	07/12/13 14:35	1.00E+00	88.82	83.97	74.58	1.00	7/30/2013 11:55	8/8/2013 4:11
18	RA-228	TRG	07/12/13 00:00	1.00E+00	85.55	87.50	74.85	1.00	7/30/2013 11:55	8/8/2013 4:11
19	RA-228	TRG	07/12/13 00:00	1.00E+00	81.80	91.32	74.70	1.00	7/30/2013 11:55	8/8/2013 4:11

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07111-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	08/08/13 10:12		LB4110A	A3	30	168	1.916666667	0.4719
02	RA-228	MBL	08/08/13 07:53		LB4110R	B1	120	183	1.366666667	0.4754
03	RA-228	DUP	08/08/13 07:53		LB4110R	B2	120	210	1.2	0.4658
04	RA-228	TRG	08/08/13 07:53		LB4110R	B3	120	442	1.366666667	0.4713
05	RA-228	TRG	08/08/13 07:53		LB4110R	B4	120	456	1.516666667	0.4773
06	RA-228	TRG	08/08/13 07:53		LB4110R	C1	120	208	1.4	0.4705
07	RA-228	TRG	08/08/13 07:53		LB4110R	C2	120	269	1.766666667	0.4676
08	RA-228	TRG	08/08/13 07:53		LB4110R	C3	120	235	1.333333333	0.4614
09	RA-228	TRG	08/08/13 07:53		LB4110R	C4	120	217	1.483333333	0.4714
10	RA-228	TRG	08/08/13 07:55		LB4110A	A3	120	406	1.916666667	0.4719
11	RA-228	TRG	08/08/13 07:55		LB4110A	B1	120	408	1.616666667	0.4626
12	RA-228	TRG	08/08/13 07:55		LB4110A	B2	120	221	1.216666667	0.4691
13	RA-228	TRG	08/08/13 07:55		LB4110A	B3	120	234	1.233333333	0.449
14	RA-228	DO	08/08/13 07:55		LB4110A	B4	120	222	1.25	0.4619
15	RA-228	TRG	08/08/13 07:55		LB4110A	C1	120	199	1.033333333	0.4667
16	RA-228	TRG	08/08/13 07:55		LB4110A	C3	120	341	1.233333333	0.4699
17	RA-228	TRG	08/08/13 07:55		LB4110A	C4	120	220	1.083333333	0.4692
18	RA-228	TRG	08/08/13 07:55		LB4110A	D2	120	257	1.3	0.4682
19	RA-228	TRG	08/08/13 07:55		LB4110A	D4	120	210	1.2	0.4741

Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07111
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*
01	LCS	LCS	07/17/13 00:00	1.0000	0.9198	912.7884	417.6000	101.56	1.00	1.00
02	MBL	BLANK	07/17/13 00:00	1.0000	0.9051	898.2004	440.4000	108.85	1.00	1.00
03	DUP	I-67 TOT	07/12/13 13:33	1.0000	0.9081	901.1776	362.7000	89.35	1.00	1.00
04	TRG	DUP 03 TOT	07/11/13 00:00	1.0000	0.9006	893.7347	394.1000	97.89	1.00	1.00
05	TRG	DUP 03 DIS	07/11/13 00:00	1.0000	0.9016	894.7271	372.1000	92.33	1.00	1.00
06	TRG	S-8 TOT	07/12/13 09:23	1.0000	0.9050	898.1012	373.6000	92.35	1.00	1.00
07	TRG	S-8 DIS	07/12/13 09:23	1.0000	0.9016	894.7271	383.2000	95.08	1.00	1.00
08	TRG	I-62 TOT	07/12/13 09:56	1.0000	0.9021	895.2233	377.9000	93.71	1.00	1.00
09	TRG	I-62 DIS	07/12/13 09:56	1.0000	0.9039	897.0096	396.3000	98.08	1.00	1.00
10	TRG	D-6 TOT	07/12/13 11:35	1.0000	0.9029	896.0172	366.2000	90.73	1.00	1.00
11	TRG	D-6 DIS	07/12/13 11:35	1.0000	0.9028	895.9180	380.0000	94.16	1.00	1.00
12	TRG	S-61 TOT	07/12/13 12:02	1.0000	0.9043	897.4065	383.6000	94.89	1.00	1.00
13	TRG	S-61 DIS	07/12/13 12:02	1.0000	0.9007	893.8340	394.3000	97.93	1.00	1.00
14	DO	I-67 TOT	07/12/13 13:33	1.0000	0.9034	896.5134	406.6000	100.68	1.00	1.00
15	TRG	I-67 DIS	07/12/13 13:33	1.0000	0.9030	896.1164	387.0000	95.87	1.00	1.00
16	TRG	I-68 TOT	07/12/13 14:35	1.0000	0.9032	896.3149	358.5000	88.79	1.00	1.00
17	TRG	I-68 DIS	07/12/13 14:35	1.0000	0.9057	898.7958	359.6000	88.82	1.00	1.00
18	TRG	DUP 04 TOT	07/12/13 00:00	1.0000	0.9027	895.8187	345.2000	85.55	1.00	1.00
19	TRG	DUP 04 DIS	07/12/13 00:00	1.0000	0.9014	894.5286	329.6000	81.80	1.00	1.00

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07111	1	Ra228	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equip	Aliquot	Net Equip	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-67 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 03 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 03 DIS	TRG					1.0000E+00	1.0000E+00				
06	S-8 TOT	TRG					1.0000E+00	1.0000E+00				
07	S-8 DIS	TRG					1.0000E+00	1.0000E+00				
08	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-62 DIS	TRG					1.0000E+00	1.0000E+00				
10	D-6 TOT	TRG					1.0000E+00	1.0000E+00				
11	D-6 DIS	TRG					1.0000E+00	1.0000E+00				
12	S-61 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-61 DIS	TRG					1.0000E+00	1.0000E+00				
14	I-67 TOT	DO					1.0000E+00	1.0000E+00				
15	I-67 DIS	TRG					1.0000E+00	1.0000E+00				
16	I-68 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-68 DIS	TRG					1.0000E+00	1.0000E+00				
18	DUP 04 TOT	TRG					1.0000E+00	1.0000E+00				
19	DUP 04 DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7/26/13

0435

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07111	1	Ra228	Yttirum	34.0000	TSMITH

TRetec	Engineering Management Support, Inc.	Sample	Carrier Data		Filter Data		Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	
Fraction	Client ID	Type					
01	LCS	LCS	2.0000	0.0923	0.1510	0.0587	86.32
02	BLANK	MBL	2.0000	0.0925	0.1499	0.0574	84.41
03	DUP	DUP	2.0000	0.0934	0.1498	0.0564	82.94
04	DUP 03 TOT	TRG	2.0000	0.0926	0.1519	0.0593	87.21
05	DUP 03 DIS	TRG	2.0000	0.0925	0.1556	0.0631	92.79
06	S-8 TOT	TRG	2.0000	0.0933	0.1530	0.0597	87.79
07	S-8 DIS	TRG	2.0000	0.0916	0.1459	0.0543	79.85
08	I-62 TOT	TRG	2.0000	0.0916	0.1465	0.0549	80.74
09	I-62 DIS	TRG	2.0000	0.0929	0.1455	0.0526	77.35
10	D-6 TOT	TRG	2.0000	0.0916	0.1491	0.0575	84.56
11	D-6 DIS	TRG	2.0000	0.0919	0.1447	0.0528	77.65
12	S-61 TOT	TRG	2.0000	0.0929	0.1508	0.0579	85.15
13	S-61 DIS	TRG	2.0000	0.0938	0.1498	0.0560	82.35
14	I-67 TOT	DO	2.0000	0.0941	0.1509	0.0568	83.53
15	I-67 DIS	TRG	2.0000	0.0943	0.1515	0.0572	84.12
16	I-68 TOT	TRG	2.0000	0.0928	0.1479	0.0551	81.03
17	I-68 DIS	TRG	2.0000	0.0944	0.1515	0.0571	83.97
18	DUP 04 TOT	TRG	2.0000	0.0962	0.1557	0.0595	87.50
19	DUP 04 DIS	TRG	2.0000	0.0962	0.1583	0.0621	91.32

Technician: _____

T Smith

Date: _____

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8/8/13
A

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A3	1307111-10	10	406	120	1400	8/8/13 9:55
B1	1307111-11	13	408	120	1400	8/8/13 9:55
B2	1307111-12	22	221	120	1400	8/8/13 9:55
B3	1307111-13	21	234	120	1400	8/8/13 9:55
C1	1307111-15	14	199	120	1400	8/8/13 9:55
B4	1307111-14	23	222	120	1400	8/8/13 9:55
C3	1307111-16	23	341	120	1400	8/8/13 9:55
C4	1307111-17	5	220	120	1400	8/8/13 9:55
D2	1307111-18	25	257	120	1400	8/8/13 9:55
D4	1307111-19	21	210	120	1400	8/8/13 9:55

C
8/8/17
P

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	13071111-06	7	208	120	1400	8/8/13 9:53
B1	13071111-02	16	183	120	1400	8/8/13 9:53
C2	13071111-07	14	269	120	1400	8/8/13 9:53
C3	13071111-08	13	235	120	1400	8/8/13 9:53
B2	13071111-03	11	210	120	1400	8/8/13 9:53
B3	13071111-04	16	442	120	1400	8/8/13 9:53
B4	13071111-05	13	456	120	1400	8/8/13 9:53
C4	13071111-09	7	217	120	1400	8/8/13 9:53

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(A)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A3	1307111-01	2	168	30	1400	8/8/13 10:42

GPC Detector Report
(ALL Backgrounds)

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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/8/2013	1.67E-02	P	-2.13E+01	2.83E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/8/2013	6.67E-02	P	-1.81E+01	2.54E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/8/2013	0.00E+00	P	-1.76E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	8/8/2013	1.67E-02	P	-1.87E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/8/2013	1.33E-01	P	-9.69E-02	7.52E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/8/2013	5.00E-02	P	-7.81E-02	7.22E-02	2.23E-01
LB4110A - B3	Alpha	11/18/2007	8/8/2013	6.67E-02	P	-6.30E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/8/2013	8.33E-02	P	-1.40E-01	7.89E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	8/8/2013	8.33E-02	P	-1.49E-01	8.87E-02	3.26E-01
LB4110A - C2	Alpha	11/18/2007	8/8/2013	6.67E-02	P	-1.77E-01	8.67E-02	3.50E-01
LB4110A - C3	Alpha	11/18/2007	8/8/2013	5.00E-02	P	-1.72E-01	1.00E-01	3.73E-01
LB4110A - C4	Alpha	11/18/2007	8/8/2013	3.33E-02	P	-6.27E-02	6.84E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/8/2013	1.00E-01	P	-5.36E-02	8.34E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/8/2013	5.00E-02	P	-6.99E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/8/2013	5.00E-02	P	-4.85E-02	7.07E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/8/2013	1.67E-02	P	-5.72E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/8/2013	3.33E-02	P	-9.82E-02	1.01E-01	3.00E-01
LB4110R - A2	Alpha	11/24/2006	8/8/2013	0.00E+00	P	-8.92E-02	7.64E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/8/2013	8.33E-02	P	-7.33E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/8/2013	1.67E-02	P	-5.27E-02	7.09E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/8/2013	3.33E-02	P	-9.43E-02	6.16E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	8/8/2013	5.00E-02	P	-6.95E-02	6.33E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/8/2013	6.67E-02	P	-6.49E-02	7.00E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/8/2013	8.33E-02	P	-6.38E-02	7.03E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/8/2013	1.67E-02	P	-7.69E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/8/2013	8.33E-02	P	-7.56E-02	7.10E-02	2.18E-01
LB4110R - C3	Alpha	11/24/2006	8/8/2013	3.33E-02	P	-8.78E-02	8.44E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	8/8/2013	6.67E-02	P	-6.19E-02	8.12E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/8/2013	0.00E+00	P	-1.03E-01	7.03E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/8/2013	0.00E+00	P	-7.77E-02	6.97E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/8/2013	0.00E+00	P	-8.27E-02	6.95E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/8/2013	0.00E+00	P	-7.50E-02	7.42E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

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GPC Detector Report
(ALL Backgrounds)

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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/8/2013	7.30E+00	P	-2.89E+02	7.63E+00	3.05E+02
LB4110A - A2	Beta	11/18/2007	8/8/2013	4.02E+00	P	-3.04E+01	2.59E+00	3.55E+01
LB4110A - A3	Beta	11/18/2007	8/8/2013	1.92E+00	P	-5.02E+01	2.63E+00	5.55E+01
LB4110A - A4	Beta	11/18/2007	8/8/2013	7.60E+00	P	-3.25E+01	3.21E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	8/8/2013	1.62E+00	P	-1.04E+01	3.23E+00	1.68E+01
LB4110A - B2	Beta	11/18/2007	8/8/2013	1.22E+00	P	-7.63E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/8/2013	1.23E+00	P	1.15E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/8/2013	1.25E+00	P	-7.62E+00	1.98E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/8/2013	1.03E+00	P	-5.39E+00	2.12E+00	9.63E+00
LB4110A - C2	Beta	11/18/2007	8/8/2013	2.22E+00	F	3.81E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/8/2013	1.23E+00	P	4.72E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/8/2013	1.08E+00	P	-1.76E+00	2.10E+00	5.96E+00
LB4110A - D1	Beta	11/18/2007	8/8/2013	1.92E+00	P	-2.31E+00	2.56E+00	7.44E+00
LB4110A - D2	Beta	11/18/2007	8/8/2013	1.30E+00	P	-6.42E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/8/2013	4.07E+00	P	1.29E+00	4.48E+00	7.66E+00
LB4110A - D4	Beta	11/18/2007	8/8/2013	1.20E+00	P	-4.25E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/8/2013	1.20E+00	P	-6.09E+01	3.67E+00	6.82E+01
LB4110R - A2	Beta	11/24/2006	8/8/2013	1.60E+00	P	-4.83E+01	2.01E+00	5.24E+01
LB4110R - A3	Beta	11/24/2006	8/8/2013	5.00E+00	P	-4.47E+01	2.74E+00	5.02E+01
LB4110R - A4	Beta	11/24/2006	8/8/2013	4.98E+00	P	-4.46E+01	1.99E+00	4.86E+01
LB4110R - B1	Beta	11/24/2006	8/8/2013	1.37E+00	P	-4.70E+01	2.02E+00	5.10E+01
LB4110R - B2	Beta	11/24/2006	8/8/2013	1.20E+00	P	-4.69E+01	2.05E+00	5.10E+01
LB4110R - B3	Beta	11/24/2006	8/8/2013	1.37E+00	P	-4.67E+01	2.65E+00	5.20E+01
LB4110R - B4	Beta	11/24/2006	8/8/2013	1.52E+00	P	-4.71E+01	1.92E+00	5.09E+01
LB4110R - C1	Beta	11/24/2006	8/8/2013	1.40E+00	P	-4.69E+01	2.97E+00	5.28E+01
LB4110R - C2	Beta	11/24/2006	8/8/2013	1.77E+00	P	-4.68E+01	2.71E+00	5.22E+01
LB4110R - C3	Beta	11/24/2006	8/8/2013	1.33E+00	P	-4.73E+01	2.52E+00	5.23E+01
LB4110R - C4	Beta	11/24/2006	8/8/2013	1.48E+00	P	-5.34E+01	2.95E+00	5.93E+01
LB4110R - D1	Beta	11/24/2006	8/8/2013	0.00E+00	P	-4.45E+01	5.56E+00	5.56E+01
LB4110R - D2	Beta	11/24/2006	8/8/2013	0.00E+00	P	-4.78E+01	1.88E+00	5.15E+01
LB4110R - D3	Beta	11/24/2006	8/8/2013	0.00E+00	P	-5.12E+01	5.54E+00	6.22E+01
LB4110R - D4	Beta	11/24/2006	8/8/2013	0.00E+00	P	-4.75E+01	2.24E+00	5.20E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

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GPC Detector Report
(ALL Efficiencies)

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/8/2013	0.2358	P	-0.0131	0.2158	0.4448
LB4110A - A2	Alpha	11/18/2007	8/8/2013	0.2121	P	-0.0506	0.1741	0.3988
LB4110A - A3	Alpha	11/18/2007	8/8/2013	0.2077	P	-0.0740	0.1633	0.4005
LB4110A - A4	Alpha	11/18/2007	8/8/2013	0.2141	P	-0.0524	0.1820	0.4164
LB4110A - B1	Alpha	11/18/2007	8/8/2013	0.2083	P	0.1943	0.2243	0.2544
LB4110A - B2	Alpha	11/18/2007	8/8/2013	0.2049	P	0.1924	0.2213	0.2503
LB4110A - B3	Alpha	11/18/2007	8/8/2013	0.2393	P	0.1278	0.2323	0.3368
LB4110A - B4	Alpha	11/18/2007	8/8/2013	0.2282	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/8/2013	0.2151	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	8/8/2013	0.2203	P	0.1971	0.2252	0.2533
LB4110A - C3	Alpha	11/18/2007	8/8/2013	0.2464	P	0.2233	0.2494	0.2756
LB4110A - C4	Alpha	11/18/2007	8/8/2013	0.2142	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	8/8/2013	0.2126	P	0.2029	0.2329	0.2628
LB4110A - D2	Alpha	11/18/2007	8/8/2013	0.2415	P	0.2277	0.2581	0.2884
LB4110A - D3	Alpha	11/18/2007	8/8/2013	0.2508	P	0.2310	0.2634	0.2958
LB4110A - D4	Alpha	11/18/2007	8/8/2013	0.1800	P	0.1643	0.1993	0.2342
LB4110R - A1	Alpha	11/24/2006	8/8/2013	0.0948	F	0.1983	0.2385	0.2787
LB4110R - A2	Alpha	11/24/2006	8/8/2013	0.0991	F	0.1851	0.2201	0.2551
LB4110R - A3	Alpha	11/24/2006	8/8/2013	0.1669	F	0.1924	0.2244	0.2563
LB4110R - A4	Alpha	11/24/2006	8/8/2013	0.1707	F	0.2118	0.2454	0.2789
LB4110R - B1	Alpha	11/24/2006	8/8/2013	0.2196	P	0.1832	0.2257	0.2682
LB4110R - B2	Alpha	11/24/2006	8/8/2013	0.2063	P	0.1754	0.2170	0.2586
LB4110R - B3	Alpha	11/24/2006	8/8/2013	0.2443	P	0.2015	0.2438	0.2861
LB4110R - B4	Alpha	11/24/2006	8/8/2013	0.2196	P	0.1883	0.2313	0.2743
LB4110R - C1	Alpha	11/24/2006	8/8/2013	0.2104	P	0.1833	0.2150	0.2466
LB4110R - C2	Alpha	11/24/2006	8/8/2013	0.2208	P	0.1932	0.2245	0.2558
LB4110R - C3	Alpha	11/24/2006	8/8/2013	0.2354	P	0.2034	0.2394	0.2754
LB4110R - C4	Alpha	11/24/2006	8/8/2013	0.2093	P	0.1826	0.2222	0.2618
LB4110R - D1	Alpha	11/24/2006	8/8/2013	0.0000	F	0.0053	0.1996	0.3940
LB4110R - D2	Alpha	11/24/2006	8/8/2013	0.0000	F	0.0067	0.2270	0.4474
LB4110R - D3	Alpha	11/24/2006	8/8/2013	0.0000	F	0.0066	0.2230	0.4394
LB4110R - D4	Alpha	11/24/2006	8/8/2013	0.0000	F	0.0039	0.1797	0.3556
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

GPC Detector Report
(ALL Efficiencies)

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/8/2013	0.5402	P	0.2107	0.5625	0.9143
LB4110A - A2	Beta	11/18/2007	8/8/2013	0.4918	P	0.1616	0.4648	0.7679
LB4110A - A3	Beta	11/18/2007	8/8/2013	0.4636	P	0.0896	0.4572	0.8248
LB4110A - A4	Beta	11/18/2007	8/8/2013	0.5158	P	0.1424	0.4891	0.8359
LB4110A - B1	Beta	11/18/2007	8/8/2013	0.4975	P	0.4634	0.5298	0.5961
LB4110A - B2	Beta	11/18/2007	8/8/2013	0.5025	P	0.4631	0.5268	0.5905
LB4110A - B3	Beta	11/18/2007	8/8/2013	0.5405	P	0.3166	0.5314	0.7462
LB4110A - B4	Beta	11/18/2007	8/8/2013	0.5363	P	0.4918	0.5539	0.6159
LB4110A - C1	Beta	11/18/2007	8/8/2013	0.4881	P	0.4510	0.5026	0.5542
LB4110A - C2	Beta	11/18/2007	8/8/2013	0.4839	P	0.4292	0.5010	0.5729
LB4110A - C3	Beta	11/18/2007	8/8/2013	0.5884	P	0.5290	0.5906	0.6523
LB4110A - C4	Beta	11/18/2007	8/8/2013	0.4984	P	0.4578	0.5248	0.5919
LB4110A - D1	Beta	11/18/2007	8/8/2013	0.5126	P	0.4785	0.5530	0.6276
LB4110A - D2	Beta	11/18/2007	8/8/2013	0.5373	P	0.4888	0.5872	0.6856
LB4110A - D3	Beta	11/18/2007	8/8/2013	0.6028	P	0.5374	0.6150	0.6925
LB4110A - D4	Beta	11/18/2007	8/8/2013	0.4286	P	0.3847	0.4720	0.5593
LB4110R - A1	Beta	11/24/2006	8/8/2013	0.4108	F	0.4743	0.5672	0.6602
LB4110R - A2	Beta	11/24/2006	8/8/2013	0.3720	F	0.4157	0.5085	0.6014
LB4110R - A3	Beta	11/24/2006	8/8/2013	0.4699	W	0.4504	0.5385	0.6265
LB4110R - A4	Beta	11/24/2006	8/8/2013	0.5185	W	0.5031	0.5914	0.6798
LB4110R - B1	Beta	11/24/2006	8/8/2013	0.5276	P	0.4462	0.5422	0.6381
LB4110R - B2	Beta	11/24/2006	8/8/2013	0.5073	P	0.4246	0.5196	0.6145
LB4110R - B3	Beta	11/24/2006	8/8/2013	0.6090	P	0.4938	0.5917	0.6896
LB4110R - B4	Beta	11/24/2006	8/8/2013	0.5239	P	0.4540	0.5489	0.6439
LB4110R - C1	Beta	11/24/2006	8/8/2013	0.4627	P	0.4160	0.5016	0.5872
LB4110R - C2	Beta	11/24/2006	8/8/2013	0.5151	P	0.4440	0.5284	0.6127
LB4110R - C3	Beta	11/24/2006	8/8/2013	0.5644	P	0.4754	0.5706	0.6657
LB4110R - C4	Beta	11/24/2006	8/8/2013	0.4940	P	0.4258	0.5250	0.6242
LB4110R - D1	Beta	11/24/2006	8/8/2013	0.0000	F	0.0118	0.4774	0.9430
LB4110R - D2	Beta	11/24/2006	8/8/2013	0.0000	F	0.0140	0.5364	1.0589
LB4110R - D3	Beta	11/24/2006	8/8/2013	0.0000	F	0.0135	0.5210	1.0286
LB4110R - D4	Beta	11/24/2006	8/8/2013	0.0000	F	0.0082	0.4289	0.8496
LB510C - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/7/2013	6.67E-02	P	-2.13E+01	2.83E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/7/2013	8.33E-02	P	-1.81E+01	2.54E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/7/2013	1.00E-01	P	-1.76E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	8/7/2013	1.50E-01	P	-1.87E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/7/2013	6.67E-02	P	-9.70E-02	7.51E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/7/2013	3.33E-02	P	-7.81E-02	7.23E-02	2.23E-01
LB4110A - B3	Alpha	11/18/2007	8/7/2013	8.33E-02	P	-6.31E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/7/2013	1.00E-01	P	-1.40E-01	7.89E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	8/7/2013	1.17E-01	P	-1.49E-01	8.87E-02	3.26E-01
LB4110A - C2	Alpha	11/18/2007	8/7/2013	1.67E-02	P	-1.77E-01	8.67E-02	3.51E-01
LB4110A - C3	Alpha	11/18/2007	8/7/2013	1.17E-01	P	-1.72E-01	1.00E-01	3.73E-01
LB4110A - C4	Alpha	11/18/2007	8/7/2013	1.17E-01	P	-6.27E-02	6.84E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/7/2013	1.67E-02	P	-5.36E-02	8.34E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/7/2013	6.67E-02	P	-6.99E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/7/2013	1.17E-01	P	-4.85E-02	7.08E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/7/2013	0.00E+00	P	-5.72E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/7/2013	1.00E-01	P	-9.82E-02	1.01E-01	3.00E-01
LB4110R - A2	Alpha	11/24/2006	8/7/2013	1.67E-02	P	-8.92E-02	7.65E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/7/2013	8.33E-02	P	-7.34E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/7/2013	1.67E-02	P	-5.27E-02	7.09E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/7/2013	1.17E-01	P	-9.43E-02	6.16E-02	2.18E-01
LB4110R - B2	Alpha	11/24/2006	8/7/2013	0.00E+00	P	-6.95E-02	6.33E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/7/2013	1.83E-01	W	-6.49E-02	7.00E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/7/2013	8.33E-02	P	-6.39E-02	7.03E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/7/2013	1.67E-02	P	-7.69E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/7/2013	1.67E-02	P	-7.56E-02	7.10E-02	2.18E-01
LB4110R - C3	Alpha	11/24/2006	8/7/2013	1.33E-01	P	-8.78E-02	8.45E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	8/7/2013	3.33E-02	P	-6.19E-02	8.12E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/7/2013	0.00E+00	P	-1.02E-01	7.03E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/7/2013	0.00E+00	P	-7.76E-02	6.98E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/7/2013	0.00E+00	P	-8.26E-02	6.95E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/7/2013	0.00E+00	P	-7.50E-02	7.43E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/7/2013	8.77E+00	P	-2.90E+02	7.63E+00	3.05E+02
LB4110A - A2	Beta	11/18/2007	8/7/2013	3.32E+00	P	-3.04E+01	2.59E+00	3.56E+01
LB4110A - A3	Beta	11/18/2007	8/7/2013	1.50E+00	P	-5.02E+01	2.63E+00	5.55E+01
LB4110A - A4	Beta	11/18/2007	8/7/2013	8.38E+00	P	-3.25E+01	3.20E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	8/7/2013	1.78E+00	P	-1.04E+01	3.23E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	8/7/2013	1.35E+00	P	-7.64E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/7/2013	1.42E+00	P	1.15E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/7/2013	1.23E+00	P	-7.62E+00	1.98E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/7/2013	1.33E+00	P	-5.39E+00	2.12E+00	9.63E+00
LB4110A - C2	Beta	11/18/2007	8/7/2013	1.20E+00	P	3.82E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/7/2013	1.52E+00	P	4.72E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/7/2013	2.12E+00	P	-1.76E+00	2.10E+00	5.96E+00
LB4110A - D1	Beta	11/18/2007	8/7/2013	2.12E+00	P	-2.31E+00	2.57E+00	7.44E+00
LB4110A - D2	Beta	11/18/2007	8/7/2013	1.28E+00	P	-6.42E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/7/2013	4.03E+00	P	1.29E+00	4.48E+00	7.67E+00
LB4110A - D4	Beta	11/18/2007	8/7/2013	9.17E-01	P	-4.25E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/7/2013	9.83E-01	P	-6.09E+01	3.67E+00	6.82E+01
LB4110R - A2	Beta	11/24/2006	8/7/2013	9.33E-01	P	-4.83E+01	2.01E+00	5.24E+01
LB4110R - A3	Beta	11/24/2006	8/7/2013	3.07E+00	P	-4.48E+01	2.73E+00	5.02E+01
LB4110R - A4	Beta	11/24/2006	8/7/2013	2.47E+00	P	-4.46E+01	1.99E+00	4.86E+01
LB4110R - B1	Beta	11/24/2006	8/7/2013	1.05E+00	P	-4.70E+01	2.02E+00	5.10E+01
LB4110R - B2	Beta	11/24/2006	8/7/2013	9.83E-01	P	-4.70E+01	2.05E+00	5.10E+01
LB4110R - B3	Beta	11/24/2006	8/7/2013	1.03E+00	P	-4.67E+01	2.65E+00	5.20E+01
LB4110R - B4	Beta	11/24/2006	8/7/2013	1.50E+00	P	-4.71E+01	1.92E+00	5.09E+01
LB4110R - C1	Beta	11/24/2006	8/7/2013	1.45E+00	P	-4.69E+01	2.97E+00	5.28E+01
LB4110R - C2	Beta	11/24/2006	8/7/2013	1.45E+00	P	-4.68E+01	2.71E+00	5.23E+01
LB4110R - C3	Beta	11/24/2006	8/7/2013	1.47E+00	P	-4.73E+01	2.52E+00	5.24E+01
LB4110R - C4	Beta	11/24/2006	8/7/2013	2.08E+00	P	-5.34E+01	2.95E+00	5.93E+01
LB4110R - D1	Beta	11/24/2006	8/7/2013	0.00E+00	P	-4.45E+01	5.57E+00	5.56E+01
LB4110R - D2	Beta	11/24/2006	8/7/2013	0.00E+00	P	-4.78E+01	1.88E+00	5.16E+01
LB4110R - D3	Beta	11/24/2006	8/7/2013	0.00E+00	P	-5.12E+01	5.54E+00	6.23E+01
LB4110R - D4	Beta	11/24/2006	8/7/2013	0.00E+00	P	-4.75E+01	2.24E+00	5.20E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/7/2013	0.2457	P	-0.0132	0.2158	0.4449
LB4110A - A2	Alpha	11/18/2007	8/7/2013	0.2000	P	-0.0507	0.1740	0.3988
LB4110A - A3	Alpha	11/18/2007	8/7/2013	0.1953	P	-0.0741	0.1632	0.4005
LB4110A - A4	Alpha	11/18/2007	8/7/2013	0.2206	P	-0.0525	0.1820	0.4164
LB4110A - B1	Alpha	11/18/2007	8/7/2013	0.2150	P	0.1943	0.2243	0.2544
LB4110A - B2	Alpha	11/18/2007	8/7/2013	0.2110	P	0.1924	0.2213	0.2503
LB4110A - B3	Alpha	11/18/2007	8/7/2013	0.2351	P	0.1277	0.2323	0.3368
LB4110A - B4	Alpha	11/18/2007	8/7/2013	0.2262	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/7/2013	0.2162	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	8/7/2013	0.2244	P	0.1971	0.2252	0.2533
LB4110A - C3	Alpha	11/18/2007	8/7/2013	0.2554	P	0.2233	0.2494	0.2756
LB4110A - C4	Alpha	11/18/2007	8/7/2013	0.2254	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	8/7/2013	0.2220	P	0.2030	0.2329	0.2628
LB4110A - D2	Alpha	11/18/2007	8/7/2013	0.2482	P	0.2277	0.2581	0.2884
LB4110A - D3	Alpha	11/18/2007	8/7/2013	0.2456	P	0.2310	0.2634	0.2959
LB4110A - D4	Alpha	11/18/2007	8/7/2013	0.1842	P	0.1643	0.1993	0.2342
LB4110R - A1	Alpha	11/24/2006	8/7/2013	0.0884	F	0.1994	0.2386	0.2778
LB4110R - A2	Alpha	11/24/2006	8/7/2013	0.0999	F	0.1859	0.2202	0.2544
LB4110R - A3	Alpha	11/24/2006	8/7/2013	0.1677	F	0.1926	0.2244	0.2562
LB4110R - A4	Alpha	11/24/2006	8/7/2013	0.1764	F	0.2122	0.2454	0.2786
LB4110R - B1	Alpha	11/24/2006	8/7/2013	0.2204	P	0.1832	0.2257	0.2682
LB4110R - B2	Alpha	11/24/2006	8/7/2013	0.2072	P	0.1754	0.2170	0.2586
LB4110R - B3	Alpha	11/24/2006	8/7/2013	0.2478	P	0.2015	0.2438	0.2861
LB4110R - B4	Alpha	11/24/2006	8/7/2013	0.2155	P	0.1883	0.2313	0.2743
LB4110R - C1	Alpha	11/24/2006	8/7/2013	0.2104	P	0.1833	0.2150	0.2466
LB4110R - C2	Alpha	11/24/2006	8/7/2013	0.2168	P	0.1932	0.2245	0.2558
LB4110R - C3	Alpha	11/24/2006	8/7/2013	0.2348	P	0.2034	0.2394	0.2754
LB4110R - C4	Alpha	11/24/2006	8/7/2013	0.2104	P	0.1826	0.2222	0.2619
LB4110R - D1	Alpha	11/24/2006	8/7/2013	0.0000	F	0.0057	0.1998	0.3938
LB4110R - D2	Alpha	11/24/2006	8/7/2013	0.0000	F	0.0072	0.2271	0.4471
LB4110R - D3	Alpha	11/24/2006	8/7/2013	0.0000	F	0.0071	0.2231	0.4392
LB4110R - D4	Alpha	11/24/2006	8/7/2013	0.0000	F	0.0043	0.1798	0.3554
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/7/2013	0.5500	P	0.2106	0.5625	0.9144
LB4110A - A2	Beta	11/18/2007	8/7/2013	0.4830	P	0.1615	0.4648	0.7680
LB4110A - A3	Beta	11/18/2007	8/7/2013	0.4602	P	0.0895	0.4572	0.8249
LB4110A - A4	Beta	11/18/2007	8/7/2013	0.5150	P	0.1422	0.4891	0.8360
LB4110A - B1	Beta	11/18/2007	8/7/2013	0.5002	P	0.4634	0.5298	0.5962
LB4110A - B2	Beta	11/18/2007	8/7/2013	0.5099	P	0.4632	0.5268	0.5905
LB4110A - B3	Beta	11/18/2007	8/7/2013	0.5266	P	0.3165	0.5314	0.7462
LB4110A - B4	Beta	11/18/2007	8/7/2013	0.5286	P	0.4918	0.5539	0.6159
LB4110A - C1	Beta	11/18/2007	8/7/2013	0.5078	P	0.4510	0.5026	0.5542
LB4110A - C2	Beta	11/18/2007	8/7/2013	0.5029	P	0.4292	0.5010	0.5729
LB4110A - C3	Beta	11/18/2007	8/7/2013	0.6056	P	0.5290	0.5907	0.6523
LB4110A - C4	Beta	11/18/2007	8/7/2013	0.5249	P	0.4578	0.5248	0.5919
LB4110A - D1	Beta	11/18/2007	8/7/2013	0.5283	P	0.4785	0.5531	0.6276
LB4110A - D2	Beta	11/18/2007	8/7/2013	0.5460	P	0.4888	0.5872	0.6856
LB4110A - D3	Beta	11/18/2007	8/7/2013	0.6007	P	0.5374	0.6150	0.6925
LB4110A - D4	Beta	11/18/2007	8/7/2013	0.4251	P	0.3847	0.4720	0.5593
LB4110R - A1	Beta	11/24/2006	8/7/2013	0.4022	F	0.4748	0.5673	0.6598
LB4110R - A2	Beta	11/24/2006	8/7/2013	0.3611	F	0.4161	0.5086	0.6011
LB4110R - A3	Beta	11/24/2006	8/7/2013	0.4617	W	0.4505	0.5385	0.6265
LB4110R - A4	Beta	11/24/2006	8/7/2013	0.5154	W	0.5032	0.5915	0.6797
LB4110R - B1	Beta	11/24/2006	8/7/2013	0.5300	P	0.4462	0.5422	0.6381
LB4110R - B2	Beta	11/24/2006	8/7/2013	0.5038	P	0.4246	0.5196	0.6146
LB4110R - B3	Beta	11/24/2006	8/7/2013	0.6073	P	0.4938	0.5917	0.6896
LB4110R - B4	Beta	11/24/2006	8/7/2013	0.5194	P	0.4540	0.5490	0.6439
LB4110R - C1	Beta	11/24/2006	8/7/2013	0.4640	P	0.4161	0.5016	0.5872
LB4110R - C2	Beta	11/24/2006	8/7/2013	0.5068	P	0.4440	0.5284	0.6127
LB4110R - C3	Beta	11/24/2006	8/7/2013	0.5549	P	0.4754	0.5706	0.6658
LB4110R - C4	Beta	11/24/2006	8/7/2013	0.4988	P	0.4258	0.5250	0.6242
LB4110R - D1	Beta	11/24/2006	8/7/2013	0.0000	F	0.0129	0.4777	0.9424
LB4110R - D2	Beta	11/24/2006	8/7/2013	0.0000	F	0.0151	0.5368	1.0584
LB4110R - D3	Beta	11/24/2006	8/7/2013	0.0000	F	0.0146	0.5213	1.0280
LB4110R - D4	Beta	11/24/2006	8/7/2013	0.0000	F	0.0091	0.4291	0.8491
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

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212113

VAX/VMS Peak Search Report Generated 31-JUL-2013 10:50:18.90

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711101_GE5_BAFIL_194082.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : SPIKE
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:35:04
Sample ID : 1307111-01 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.14 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	20.91	37	44	0.50	206.00	200	19	4.12E-02	42.1	1.46E+00
2	1	21.53	48	24	0.51	212.00	200	19	5.38E-02	31.0	
3	0	30.95	2068	102	0.72	302.40	289	25	2.30E+00	2.6	
4	2	35.11	411	38	0.61	342.27	333	26	4.57E-01	6.1	1.35E+00
5	2	35.97	89	8	0.62	350.58	333	26	9.84E-02	23.0	
6	0	53.28	35	30	0.15	516.69	506	21	3.84E-02	43.9	
7	2	61.34	93	36	0.65	594.00	583	25	1.03E-01	20.0	1.51E+00
8	2	61.97	138	19	0.71	600.00	583	25	1.54E-01	12.3	
9	5	65.10	38	13	0.65	630.10	625	25	4.18E-02	23.9	3.57E+00
10	5	65.90	51	20	0.40	637.73	625	25	5.70E-02	22.5	
11	5	66.51	21	31	0.67	643.63	625	25	2.31E-02	59.1	
12	1	79.54	43	16	0.76	768.67	761	33	4.74E-02	26.4	7.56E-01
13	1	80.93	827	20	0.69	781.98	761	33	9.19E-01	3.7	
14	8	110.59	14	5	0.33	1066.59	1065	24	1.57E-02	27.7	1.33E+00
15	8	111.71	206	17	0.86	1077.30	1065	24	2.29E-01	8.5	
16	0	115.97	25	39	0.46	1118.15	1113	14	2.77E-02	51.1	
17	0	160.72	13	26	0.74	1547.61	1533	19	1.44E-02	77.4	
18	0	275.88	36	16	0.54	2652.64	2636	25	3.99E-02	28.0	
19	1	301.66	90	5	1.06	2900.00	2887	27	9.95E-02	13.5	3.33E+00
20	1	302.49	90	2	1.06	2908.00	2887	27	9.96E-02	9.4	
21	1	332.50	12	3	1.10	3196.00	3181	28	1.38E-02	66.8	8.52E-01
22	1	332.92	27	1	1.10	3200.00	3181	28	2.99E-02	27.9	
23	1	333.52	17	0	0.99	3205.77	3181	28	1.94E-02	18.5	
24	0	354.94	385	11	0.99	3411.25	3395	29	4.28E-01	5.4	
25	0	382.82	92	15	0.73	3678.77	3662	27	1.02E-01	13.4	
26	0	385.84	139	17	0.94	3707.83	3693	28	1.55E-01	10.2	
27	1	389.51	53	4	1.16	3743.00	3730	26	5.90E-02	13.9	2.40E+00
28	1	390.24	13	4	1.16	3750.00	3730	26	1.48E-02	41.6	
29	0	413.87	13	11	0.68	3976.73	3952	27	1.47E-02	55.2	

Total number of lines in spectrum 29
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 7 24.14%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.176E+02	4.176E+02	0.707E+02	16.93	
Total Activity :			4.176E+02	4.176E+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	1.249E+02	1.249E+02	0.311E+02	24.93	
AM-241	432.20Y	1.00	7.780E+00	7.780E+00	3.121E+00	40.12	
Total Activity :			1.326E+02	1.326E+02			

Grand Total Activity : 5.502E+02 5.502E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.176E+02	4.176E+02	16.93	OK
	302.84	17.80	2.575E+00	5.870E+02	5.871E+02	32.45	OK
	356.01	60.00	4.312E+00	4.470E+02	4.471E+02	18.03	OK

Final Mean for 3 Valid Peaks = 4.176E+02+/- 7.069E+01 (16.93%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.249E+02	1.249E+02	24.93	OK

Final Mean for 1 Valid Peaks = 1.249E+02+/- 3.113E+01 (24.93%)

AM-241	59.54	35.90*	1.000E+02	7.780E+00	7.780E+00	40.12	OK
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Final Mean for 1 Valid Peaks = 7.780E+00+/- 3.121E+00 (40.12%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.176E+02	7.069E+01	1.381E+01	2.033E+00	30.240
TH-234	1.249E+02	3.113E+01	1.730E+01	2.225E-01	7.219
AM-241	7.780E+00	3.121E+00	2.530E+00	2.848E-02	3.075

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.890E+00		1.387E+01	2.651E+01	8.985E+00	0.109
CD-109	1.549E+01		1.012E+02	1.878E+02	1.807E+01	0.082
PA-231	-8.903E-02		9.021E-01	1.633E+00	1.838E-02	-0.055
PA-234	2.242E+00	+	1.394E+00	2.172E+00	2.445E-02	1.032
NP-237	1.569E+01		2.721E+01	5.302E+01	4.677E+00	0.296

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7/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 11:07:48.10

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711102_GE5_BAFIL_194085.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : BLANK
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:52:31
Sample ID : 1307111-02 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.15 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	8.56	10	0	0.15	87.50	85	7	1.11E-02	31.6	
2	0	21.17	83	27	0.55	208.50	199	18	9.24E-02	18.3	
3	0	30.93	2063	93	0.79	302.22	290	23	2.29E+00	2.5	
4	4	35.02	377	34	0.63	341.43	327	32	4.19E-01	6.5	1.33E+00
5	4	35.91	80	19	0.57	350.00	327	32	8.87E-02	25.9	
6	0	51.76	37	4	0.32	502.02	493	17	4.12E-02	20.8	
7	0	53.22	30	11	0.43	516.04	510	14	3.33E-02	29.5	
8	0	61.66	277	35	0.75	597.07	583	30	3.08E-01	8.0	
9	4	65.18	48	10	0.64	630.87	627	26	5.28E-02	17.3	1.43E+00
10	4	65.93	94	32	0.66	638.00	627	26	1.04E-01	17.0	
11	2	79.55	68	8	0.77	768.68	757	37	7.52E-02	24.9	8.12E-01
12	2	80.93	872	10	0.70	781.94	757	37	9.69E-01	3.5	
13	0	111.54	235	21	0.71	1075.70	1060	26	2.61E-01	8.0	
14	1	115.32	8	8	0.77	1112.00	1103	24	8.73E-03	124.0	3.10E+00
15	1	115.74	58	11	0.77	1116.00	1103	24	6.43E-02	18.6	
16	0	123.79	13	5	0.59	1193.21	1183	15	1.40E-02	43.9	
17	1	159.84	14	8	0.94	1539.18	1528	29	1.55E-02	61.5	3.03E+00
18	1	160.45	53	9	0.86	1545.00	1528	29	5.85E-02	16.8	
19	0	275.56	47	0	0.49	2649.60	2634	25	5.22E-02	14.6	
20	0	301.98	132	3	0.95	2903.13	2888	28	1.47E-01	9.0	
21	0	332.78	43	28	1.11	3198.63	3178	29	4.81E-02	28.8	
22	1	354.39	11	5	1.12	3406.00	3393	31	1.27E-02	176.1	4.48E+00
23	1	355.01	484	8	1.12	3412.00	3393	31	5.38E-01	4.2	
24	8	382.10	26	0	1.27	3671.89	3661	27	2.87E-02	34.6	2.04E+00
25	8	382.74	28	0	0.50	3678.00	3661	27	3.12E-02	31.8	
26	8	383.27	18	0	1.14	3683.14	3661	27	2.05E-02	31.1	
27	1	385.13	12	3	1.16	3701.00	3691	30	1.31E-02	96.6	1.66E+00
28	1	385.76	169	12	1.16	3707.00	3691	30	1.87E-01	8.2	
29	2	389.81	171	8	1.41	3745.89	3729	25	1.90E-01	4.4	2.63E+01
30	2	390.20	27	6	1.05	3749.63	3729	25	2.96E-02	21.0	

Total number of lines in spectrum 30
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 7 23.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
CO-57	270.90D	1.00	1.453E+01	1.454E+01	1.369E+01	94.12	
BA-133	10.50Y	1.00	4.404E+02	4.404E+02	0.739E+02	16.78	
Total Activity :			4.549E+02	4.550E+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			
PA-231	3.28E+04Y	1.00	7.150E-01	7.150E-01	4.532E-01	63.38	
PA-234	4.47E+09Y	1.00	3.850E+00	3.850E+00	1.417E+00	36.81	
TH-234	4.47E+09Y	1.00	2.505E+02	2.505E+02	0.412E+02	16.46	
Total Activity :			2.550E+02	2.550E+02			

Grand Total Activity : 7.100E+02 7.100E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
CO-57	122.06	85.51*	3.044E+00	1.453E+01	1.454E+01	94.12	OK
	136.48	10.60	2.254E+00	-----	Line Not Found	-----	Absent

Final Mean for 1 Valid Peaks = 1.454E+01+/- 1.369E+01 (94.12%)

BA-133	81.00	33.00*	1.802E+01	4.404E+02	4.404E+02	16.78	OK
	302.84	17.80	2.575E+00	8.675E+02	8.676E+02	31.98	OK
	356.01	60.00	4.312E+00	5.619E+02	5.620E+02	16.72	OK

Final Mean for 3 Valid Peaks = 4.404E+02+/- 7.389E+01 (16.78%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-231	9.28	42.00*	1.000E+02	7.150E-01	7.150E-01	63.38	OK
	10.11	20.20	1.000E+02	1.487E+00	1.487E+00	63.38	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	6.724E+03	6.724E+03	30.38	OK

Final Mean for 3 Valid Peaks = 7.150E-01+/- 4.532E-01 (63.38%)

PA-234	9.89	89.00	1.000E+02	3.374E-01	3.374E-01	63.38	OK
	21.72	64.90*	1.000E+02	3.850E+00	3.850E+00	36.81	OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----	Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 3.850E+00+/- 1.417E+00 (36.81%)

TH-234	63.29	3.80*	8.750E+01	2.505E+02	2.505E+02	16.46	OK
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Final Mean for 1 Valid Peaks = 2.505E+02+/- 4.123E+01 (16.46%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.454E+01	1.369E+01	2.758E+01	9.350E+00	0.527
BA-133	4.404E+02	7.389E+01	1.047E+01	1.542E+00	42.051
PA-231	7.150E-01	4.532E-01	1.086E+00	1.223E-02	0.658
PA-234	3.850E+00	1.417E+00	1.046E+00	1.177E-02	3.682
TH-234	2.505E+02	4.123E+01	2.063E+01	2.655E-01	12.139

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	7.618E+01	9.128E+01	1.860E+02	1.790E+01	0.410
NP-237	-2.270E+01	2.450E+01	3.862E+01	3.406E+00	-0.588
AM-241	8.770E-01	1.534E+00	2.571E+00	2.894E-02	0.341

KS
7/26/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 11:22:36.86

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711103_GE2_BAFIL_194086.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-67 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:07:20
Sample ID : 1307111-03 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.87	1987	99	1.42	30.98	26	16	2.21E+00	2.3	8.03E+00
2	2	35.15	410	93	1.53	35.27	26	16	4.56E-01	6.4	
3	0	52.84	64	80	1.71	52.95	50	7	7.09E-02	26.3	
4	1	59.02	18	50	1.45	59.13	57	12	1.97E-02	59.1	1.22E+01
5	1	61.95	185	45	1.46	62.06	57	12	2.05E-01	9.4	
6	1	65.75	94	37	1.47	65.87	57	12	1.04E-01	15.2	
7	1	81.00	717	50	1.50	81.11	76	12	7.97E-01	4.0	6.20E+00
8	1	83.75	25	44	1.50	83.86	76	12	2.74E-02	74.2	
9	0	93.68	43	100	1.66	93.79	89	10	4.78E-02	46.1	
10	0	111.42	138	155	1.42	111.53	107	9	1.54E-01	18.3	
11	0	144.19	29	64	1.85	144.30	140	7	3.21E-02	49.8	
12	0	161.07	20	65	1.24	161.19	158	7	2.21E-02	70.8	
13	0	179.33	30	47	1.43	179.44	177	7	3.32E-02	41.9	
14	0	188.88	55	107	3.15	189.00	183	14	6.13E-02	42.7	
15	0	240.05	18	44	1.02	240.16	236	8	1.95E-02	70.8	
16	0	276.08	65	20	2.03	276.19	273	6	7.28E-02	16.3	
17	0	293.78	15	33	7.53	293.89	287	12	1.64E-02	82.1	
18	1	302.79	126	14	1.71	302.90	299	24	1.40E-01	9.9	7.48E-01
19	1	306.73	23	13	1.79	306.84	299	24	2.53E-02	38.0	
20	1	310.05	9	13	1.79	310.16	299	24	1.03E-02	83.2	
21	0	334.63	86	31	1.59	334.74	330	10	9.60E-02	16.0	
22	0	356.09	474	52	1.44	356.20	352	9	5.26E-01	5.4	
23	1	386.72	144	12	1.86	386.83	382	13	1.60E-01	11.1	1.65E+01
24	1	390.99	39	12	1.86	391.10	382	13	4.35E-02	24.1	
25	3	414.46	28	23	2.28	414.57	411	16	3.08E-02	34.3	2.94E+00
26	3	418.19	29	15	2.28	418.29	411	16	3.23E-02	35.1	
27	3	421.85	15	9	2.29	421.95	411	16	1.65E-02	57.3	
28	0	437.25	79	6	1.54	437.36	432	9	8.73E-02	12.7	
29	1	464.90	6	2	1.92	465.00	463	11	7.13E-03	44.1	1.22E+00
30	1	468.07	21	3	1.93	468.18	463	11	2.35E-02	26.1	
31	3	507.49	5	1	2.37	507.59	506	10	6.07E-03	46.9	6.69E-01
32	3	510.99	18	1	2.37	511.09	506	10	2.01E-02	28.7	
33	0	963.03	4	3	2.25	963.12	959	6	4.44E-03	84.8	

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	%Error	Flags
			Uncorrected	Decay Corr					
BA-133	10.50Y	1.00	3.627E+02	3.627E+02	0.698E+02	19.23			
Total Activity :			3.627E+02	3.627E+02					

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	%Error	Flags
			Uncorrected	Decay Corr					
TH-234	4.47E+09Y	1.00	6.331E+02	6.331E+02	1.330E+02	21.00			
AM-241	432.20Y	1.00	6.031E+00	6.031E+00	7.150E+00	118.55			
Total Activity :			6.391E+02	6.391E+02					

Grand Total Activity : 1.002E+03 1.002E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.627E+02	3.627E+02	19.23	OK
	302.84	17.80	7.560E+00	2.818E+02	2.819E+02	35.89	OK
	356.01	60.00	7.170E+00	3.307E+02	3.308E+02	18.59	OK

Final Mean for 3 Valid Peaks = 3.627E+02+/- 6.976E+01 (19.23%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.331E+02	6.331E+02	21.00	OK

Final Mean for 1 Valid Peaks = 6.331E+02+/- 1.330E+02 (21.00%)

AM-241	59.54	35.90*	2.461E+01	6.031E+00	6.031E+00	118.55	OK
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Final Mean for 1 Valid Peaks = 6.031E+00+/- 7.150E+00 (118.55%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.627E+02	6.976E+01	1.828E+01	3.113E+00	19.840
TH-234	6.331E+02	1.330E+02	1.210E+02	1.000E+01	5.231
AM-241	6.031E+00	7.150E+00	1.197E+01	9.261E-01	0.504

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.383E+00	5.346E+00	1.008E+01	1.548E+00	0.435
CD-109	-1.255E+01	1.078E+02	1.533E+02	1.760E+01	-0.082
PA-231	2.525E+01	4.059E+00	8.070E+00	1.537E-01	3.129
PA-234	4.144E+00	1.772E+00	3.300E+00	6.806E-02	1.256
NP-237	7.749E+00	3.227E+01	4.854E+01	5.480E+00	0.160

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31/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 11:23:31.61

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130711104_GE3_BAFIL_194087.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP 03 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:08:04
Sample ID : 1307111-04 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.85 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.78	1957	95	1.47	31.10	26	16	2.17E+00	2.4	4.02E+00
2	3	35.01	461	91	1.56	35.33	26	16	5.12E-01	5.8	
3	0	52.09	68	91	2.95	52.41	49	7	7.56E-02	26.2	
4	3	61.77	252	81	1.82	62.08	58	13	2.80E-01	8.1	1.82E+00
5	3	65.70	112	94	1.83	66.02	58	13	1.24E-01	18.1	
6	0	80.93	822	150	1.67	81.25	76	10	9.13E-01	4.5	
7	0	91.91	35	85	1.44	92.22	89	7	3.92E-02	46.3	
8	4	111.76	250	66	1.81	112.08	107	14	2.78E-01	7.9	9.84E-01
9	4	116.18	53	55	2.13	116.50	107	14	5.90E-02	32.1	
10	10	158.08	9	35	2.59	158.39	157	8	1.01E-02	95.0	5.50E+00
11	10	161.58	29	48	2.08	161.89	157	8	3.26E-02	42.1	
12	0	188.03	21	74	3.64	188.34	183	8	2.33E-02	74.8	
13	0	276.51	63	28	1.95	276.82	273	7	7.02E-02	18.7	
14	2	302.76	110	18	1.63	303.07	299	18	1.22E-01	11.1	1.52E+00
15	2	307.35	35	21	1.99	307.66	299	18	3.89E-02	27.5	
16	2	312.47	11	21	1.99	312.77	299	18	1.24E-02	71.7	
17	0	333.60	73	30	1.38	333.91	330	7	8.14E-02	17.0	
18	0	337.87	27	6	1.33	338.18	337	4	2.99E-02	24.4	
19	0	355.91	529	38	1.75	356.21	351	10	5.88E-01	4.9	
20	0	364.31	13	12	1.65	364.62	362	6	1.44E-02	50.4	
21	1	383.77	98	23	1.87	384.07	381	9	1.09E-01	14.8	5.05E+00
22	1	386.61	188	30	1.60	386.92	381	9	2.08E-01	8.8	
23	0	390.97	54	14	1.35	391.27	390	5	5.97E-02	18.1	
24	2	414.34	37	6	2.08	414.64	409	16	4.13E-02	21.2	1.66E+00
25	2	417.87	22	9	2.09	418.18	409	16	2.48E-02	37.1	
26	2	421.57	11	11	2.09	421.87	409	16	1.21E-02	57.8	
27	0	436.93	91	15	1.59	437.23	432	10	1.01E-01	13.2	
28	0	445.89	8	4	2.89	446.19	443	6	8.56E-03	56.2	
29	0	467.24	22	10	1.39	467.54	465	7	2.46E-02	31.0	
30	0	510.87	27	4	2.85	511.17	507	8	3.00E-02	23.1	

Summary of Nuclide Activity

Sample ID : 1307111-04

Acquisition date : 31-JUL-2013 11:08:04

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.940E+02	3.941E+02	0.715E+02	18.15	
Total Activity :			3.940E+02	3.941E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.528E+02	7.528E+02	1.318E+02	17.50	
Total Activity :			7.528E+02	7.528E+02			

Grand Total Activity : 1.147E+03 1.147E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.940E+02	3.941E+02	18.15	OK
	302.84	17.80	6.222E+00	2.973E+02	2.973E+02	30.27	OK
	356.01	60.00	5.860E+00	4.520E+02	4.520E+02	16.75	OK

Final Mean for 3 Valid Peaks = 3.941E+02+/- 7.154E+01 (18.15%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.528E+02	7.528E+02	17.50	OK

Final Mean for 1 Valid Peaks = 7.528E+02+/- 1.318E+02 (17.50%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.941E+02	7.154E+01	1.746E+01	2.670E+00	22.569
TH-234	7.528E+02	1.318E+02	1.225E+02	6.579E+00	6.146

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.268E+00	6.123E+00	9.377E+00	1.071E+00	-0.242
CD-109	-6.850E+01	1.304E+02	1.698E+02	1.400E+01	-0.404
PA-231	2.113E+00	1.596E+00	3.142E+00	4.469E-02	0.673
PA-234	3.142E+00	1.500E+00	2.782E+00	3.956E-02	1.130
NP-237	1.449E+01	3.257E+01	4.980E+01	4.026E+00	0.291
AM-241	2.923E+01	9.114E+00	1.825E+01	8.973E-01	1.602

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VAX/VMS Peak Search Report Generated 31-JUL-2013 11:23:49.61

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_13071105_GE5_BAFIL_194088.CNF
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP 03 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:08:32
Sample ID : 130711-05 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	16.00	14	7	0.64	158.93	151	14	1.60E-02	46.8	
2	0	18.27	6	9	0.25	180.67	172	13	6.37E-03	119.2	
3	0	20.81	123	21	1.65	205.08	187	30	1.36E-01	14.4	
4	5	29.07	26	45	0.87	284.30	278	38	2.84E-02	53.0	2.97E+00
5	5	29.45	44	65	0.66	287.95	278	38	4.91E-02	47.3	
6	5	30.95	1905	52	0.74	302.33	278	38	2.12E+00	2.5	
7	0	35.00	324	122	0.53	341.25	332	17	3.60E-01	10.0	
8	0	61.65	252	22	0.90	596.92	585	23	2.80E-01	7.5	
9	4	65.71	99	40	0.75	635.87	622	34	1.10E-01	17.8	1.75E+00
10	4	66.34	72	47	0.88	641.99	622	34	7.95E-02	27.1	
11	4	79.46	50	21	0.76	767.91	760	36	5.57E-02	21.8	1.04E+00
12	4	80.92	737	17	0.72	781.85	760	36	8.19E-01	3.9	
13	0	102.13	9	15	0.51	985.43	976	13	9.61E-03	87.1	
14	0	111.78	177	49	0.72	1077.99	1068	19	1.97E-01	11.1	
15	1	115.35	17	38	0.85	1112.26	1102	31	1.92E-02	81.1	1.90E+00
16	1	115.85	33	41	0.77	1117.00	1102	31	3.65E-02	46.5	
17	0	161.21	46	23	2.76	1552.35	1534	36	5.11E-02	28.4	
18	0	275.56	57	0	0.54	2649.58	2635	25	6.33E-02	13.2	
19	1	301.45	24	8	1.06	2898.00	2889	27	2.66E-02	47.0	8.41E+00
20	1	302.28	135	4	1.06	2906.00	2889	27	1.50E-01	8.7	
21	0	306.27	28	2	0.56	2944.31	2932	21	3.07E-02	21.2	
22	0	332.60	76	5	0.54	3196.92	3181	27	8.40E-02	12.9	
23	0	354.96	439	7	0.80	3411.50	3394	36	4.87E-01	5.0	
24	0	382.77	89	8	0.91	3678.33	3664	25	9.91E-02	12.1	
25	1	385.24	37	3	1.16	3702.00	3692	27	4.11E-02	32.1	1.13E+00
26	1	385.86	124	2	1.16	3708.00	3692	27	1.38E-01	10.6	
27	0	413.26	24	5	0.75	3970.87	3954	24	2.69E-02	26.3	

Summary of Nuclide Activity

Sample ID : 130711-05

Acquisition date : 31-JUL-2013 11:08:32

Total number of lines in spectrum 27
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 5 18.52%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.721E+02	3.721E+02	0.637E+02	17.12	
Total Activity :			3.721E+02	3.721E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.278E+02	2.278E+02	0.357E+02	15.66	
Total Activity :			2.278E+02	2.278E+02			

Grand Total Activity : 5.999E+02 5.999E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.721E+02	3.721E+02	17.12	OK
	302.84	17.80	2.575E+00	8.837E+02	8.838E+02	31.59	OK
	356.01	60.00	4.312E+00	5.092E+02	5.092E+02	17.53	OK

Final Mean for 3 Valid Peaks = 3.721E+02+/- 6.371E+01 (17.12%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.278E+02	2.278E+02	15.66	OK

Final Mean for 1 Valid Peaks = 2.278E+02+/- 3.568E+01 (15.66%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.721E+02	6.371E+01	1.528E+01	2.250E+00	24.355
TH-234	2.278E+02	3.568E+01	3.883E+01	4.995E-01	5.867

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.851E+00		1.386E+01	2.692E+01	9.124E+00	0.180
CD-109	5.337E+00		8.427E+01	1.580E+02	1.521E+01	0.034
PA-231	7.749E-02		7.723E-01	1.471E+00	1.656E-02	0.053
PA-234	5.683E+00	+	1.654E+00	2.064E+00	2.324E-02	2.753
NP-237	-1.155E+01		2.245E+01	3.835E+01	3.382E+00	-0.301
AM-241	8.799E-01		1.151E+00	2.109E+00	2.375E-02	0.417

KLS
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VAX/VMS Peak Search Report Generated 31-JUL-2013 11:38:19.68

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711106_GE2_BAFIL_194090.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-8 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:23:02
Sample ID : 1307111-06 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.95	1904	93	1.41	31.06	27	12	2.12E+00	2.4	1.10E+01
2	2	35.07	446	84	1.53	35.19	27	12	4.96E-01	6.0	
3	0	52.51	50	68	2.13	52.63	50	6	5.51E-02	29.9	
4	2	61.86	176	79	1.60	61.97	58	11	1.96E-01	10.7	1.62E+00
5	2	65.93	81	78	1.61	66.04	58	11	9.02E-02	19.9	
6	0	81.05	738	121	1.43	81.16	76	8	8.20E-01	4.5	
7	0	93.12	36	73	1.46	93.23	89	8	4.05E-02	45.0	
8	0	111.61	172	103	1.45	111.73	107	8	1.91E-01	12.8	
9	0	232.04	23	32	3.11	232.15	229	6	2.59E-02	43.3	
10	0	276.53	56	30	1.78	276.64	272	8	6.23E-02	21.6	
11	0	303.15	98	42	1.31	303.25	299	7	1.09E-01	14.9	
12	0	333.83	68	14	1.37	333.94	330	7	7.56E-02	15.2	
13	2	351.89	14	3	1.66	352.00	351	12	1.57E-02	29.5	1.50E+00
14	2	356.06	515	4	1.49	356.16	351	12	5.72E-01	4.4	
15	1	383.72	131	19	1.86	383.83	374	23	1.45E-01	10.8	3.66E+00
16	1	387.00	164	17	1.86	387.10	374	23	1.82E-01	10.4	
17	1	390.92	34	15	1.86	391.03	374	23	3.73E-02	31.1	
18	0	417.54	94	23	5.25	417.64	409	19	1.04E-01	16.2	
19	0	436.94	103	5	1.61	437.04	432	10	1.15E-01	10.6	
20	0	468.57	32	10	2.62	468.67	464	12	3.54E-02	26.0	
21	0	510.92	32	2	2.04	511.02	507	8	3.56E-02	19.2	
22	0	598.18	7	3	2.78	598.29	596	6	7.78E-03	54.4	
23	0	663.26	11	0	1.10	663.36	660	9	1.22E-02	30.2	
24	0	2613.09	7	0	1.66	2613.14	2609	7	7.78E-03	37.8	

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	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	pCi/filter 3.736E+02	pCi/filter 3.736E+02	0.735E+02	19.67	
Total Activity :			3.736E+02	3.736E+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	pCi/filter 6.050E+02	pCi/filter 6.050E+02	1.411E+02	23.32	
Total Activity :			6.050E+02	6.050E+02			

Grand Total Activity : 9.786E+02 9.786E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.736E+02	3.736E+02	19.67	OK
	302.84	17.80	7.560E+00	2.182E+02	2.182E+02	42.28	OK
	356.01	60.00	7.170E+00	3.592E+02	3.592E+02	17.55	OK

Final Mean for 3 Valid Peaks = 3.736E+02+/- 7.349E+01 (19.67%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.050E+02	6.050E+02	23.32	OK

Final Mean for 1 Valid Peaks = 6.050E+02+/- 1.411E+02 (23.32%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.736E+02	7.349E+01	2.222E+01	3.784E+00	16.815
TH-234	6.050E+02	1.411E+02	1.443E+02	1.192E+01	4.193

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	7.536E-02	4.967E+00	8.797E+00	1.351E+00	0.009
CD-109	-1.544E+02	1.291E+02	1.799E+02	2.066E+01	-0.858
PA-231	2.442E+01	3.922E+00	7.842E+00	1.494E-01	3.114
PA-234	3.336E+00	1.641E+00	3.178E+00	6.554E-02	1.050
NP-237	-9.046E+00	4.177E+01	5.766E+01	6.510E+00	-0.157
AM-241	1.404E+01	9.283E+00	1.769E+01	1.369E+00	0.794

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VAX/VMS Peak Search Report Generated 31-JUL-2013 11:39:29.50

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130711107_GE3_BAFIL_194091.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-8 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:24:09
Sample ID : 1307111-07 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.88 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.93	46	133	1.73	28.25	26	14	5.14E-02	48.9	1.11E+01
2	3	30.84	2010	93	1.43	31.16	26	14	2.23E+00	2.3	
3	3	34.85	437	92	1.75	35.17	26	14	4.85E-01	6.1	
4	0	52.82	66	89	2.49	53.14	50	8	7.34E-02	27.7	
5	3	61.72	264	54	1.82	62.04	58	15	2.93E-01	7.6	2.76E+00
6	3	65.93	109	69	1.83	66.25	58	15	1.21E-01	17.6	
7	3	69.37	24	71	1.84	69.68	58	15	2.70E-02	64.4	
8	2	80.94	800	60	1.53	81.26	76	14	8.88E-01	3.8	6.11E+00
9	2	84.89	15	62	1.70	85.21	76	14	1.72E-02	81.1	
10	0	92.20	25	70	1.73	92.52	90	6	2.81E-02	56.0	
11	1	111.78	202	54	1.59	112.09	108	12	2.25E-01	9.3	3.34E+00
12	1	115.83	51	49	1.60	116.14	108	12	5.62E-02	26.4	
13	0	276.67	49	47	1.44	276.98	272	10	5.42E-02	30.1	
14	1	302.72	142	16	1.49	303.03	298	19	1.58E-01	9.2	3.07E+00
15	1	306.86	38	15	1.81	307.16	298	19	4.22E-02	26.0	
16	1	311.61	9	14	1.81	311.92	298	19	1.03E-02	72.7	
17	1	333.68	77	22	1.72	333.98	329	16	8.58E-02	13.8	1.05E+00
18	1	337.86	29	13	1.83	338.17	329	16	3.26E-02	30.3	
19	0	355.96	457	24	1.58	356.26	352	9	5.08E-01	5.1	
20	0	367.08	6	22	1.86	367.39	362	7	6.98E-03	128.0	
21	2	383.65	126	11	2.06	383.96	380	18	1.40E-01	10.9	1.69E+00
22	2	386.82	211	9	1.95	387.13	380	18	2.34E-01	8.6	
23	2	390.95	41	7	2.06	391.25	380	18	4.51E-02	27.4	
24	1	414.53	38	5	1.89	414.83	411	22	4.25E-02	19.2	1.30E+00
25	1	417.87	39	4	1.90	418.17	411	22	4.28E-02	22.9	
26	1	421.84	13	4	1.90	422.14	411	22	1.49E-02	43.8	
27	1	426.77	8	3	1.90	427.07	411	22	9.02E-03	54.7	
28	0	436.95	88	8	1.72	437.25	433	8	9.80E-02	12.0	
29	4	467.00	22	7	2.50	467.30	463	13	2.40E-02	30.1	2.02E+00
30	4	472.12	14	6	2.58	472.42	463	13	1.59E-02	35.6	
31	0	510.16	18	2	1.80	510.46	506	9	1.99E-02	28.0	

Summary of Nuclide Activity

Sample ID : 1307111-07

Acquisition date : 31-JUL-2013 11:24:09

Total number of lines in spectrum 31
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 5 16.13%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.832E+02	3.832E+02	0.672E+02	17.55		
NP-237	2.14E+06Y	1.00	2.104E+01	2.104E+01	3.420E+01	162.54		
Total Activity :			4.042E+02	4.043E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.879E+02	7.879E+02	1.310E+02	16.62		
Total Activity :			7.879E+02	7.879E+02				

Grand Total Activity : 1.192E+03 1.192E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.832E+02	3.832E+02	17.55	OK
	302.84	17.80	6.222E+00	3.861E+02	3.861E+02	27.60	OK
	356.01	60.00	5.860E+00	3.904E+02	3.904E+02	17.00	OK

Final Mean for 3 Valid Peaks = 3.832E+02+/- 6.724E+01 (17.55%)

NP-237	86.50	12.60*	1.749E+01	2.104E+01	2.104E+01	162.54	OK
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Final Mean for 1 Valid Peaks = 2.104E+01+/- 3.420E+01 (162.54%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.879E+02	7.879E+02	16.62	OK

Final Mean for 1 Valid Peaks = 7.879E+02+/- 1.310E+02 (16.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.832E+02	6.724E+01	1.840E+01	2.814E+00	20.824
TH-234	7.879E+02	1.310E+02	1.122E+02	6.027E+00	7.022
NP-237	2.104E+01	3.420E+01	5.246E+01	4.241E+00	0.401

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.536E+00	6.290E+00	9.800E+00	1.120E+00	-0.157
CD-109	1.586E+01	1.226E+02	1.775E+02	1.463E+01	0.089
PA-231	2.580E+00	1.499E+00	3.055E+00	4.345E-02	0.844
PA-234	3.074E+00	1.471E+00	2.735E+00	3.890E-02	1.124
AM-241	3.457E+01	9.442E+00	1.860E+01	9.145E-01	1.859

103
7/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 11:40:02.90

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711108_GE5_BAFIL_194092.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-62 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:24:43
Sample ID : 1307111-08 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.11 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	7.72	11	9	0.88	79.50	74	11	1.27E-02	57.1	
2	3	20.13	30	7	0.61	198.56	195	22	3.35E-02	17.6	5.78E+00
3	3	20.96	51	10	0.45	206.53	195	22	5.64E-02	22.1	
4	3	21.65	25	5	0.42	213.12	195	22	2.79E-02	31.8	
5	0	30.94	1953	97	0.72	302.32	290	24	2.17E+00	2.6	
6	2	35.05	405	15	0.65	341.72	333	28	4.50E-01	5.5	1.32E+00
7	2	36.12	74	2	0.57	352.00	333	28	8.27E-02	21.3	
8	0	51.64	32	9	0.43	500.90	491	17	3.50E-02	27.7	
9	0	53.12	45	7	0.25	515.07	508	14	5.00E-02	19.4	
10	0	61.64	259	27	0.98	596.84	583	23	2.87E-01	7.6	
11	4	65.78	106	14	0.96	636.61	623	32	1.18E-01	14.0	1.11E+00
12	4	67.17	24	4	0.88	649.89	623	32	2.66E-02	26.4	
13	1	79.56	45	29	0.76	768.86	760	37	4.95E-02	28.5	1.60E+00
14	1	80.90	748	20	0.71	781.67	760	37	8.32E-01	4.0	
15	0	111.63	198	31	0.60	1076.58	1065	21	2.20E-01	9.3	
16	0	116.00	43	23	1.40	1118.47	1105	23	4.82E-02	28.6	
17	0	301.95	99	7	1.12	2902.79	2888	25	1.10E-01	11.3	
18	0	306.62	19	7	1.19	2947.58	2938	18	2.12E-02	32.7	
19	1	332.50	22	7	1.21	3195.95	3182	26	2.41E-02	40.2	1.55E+00
20	1	333.22	72	4	0.99	3202.86	3182	26	7.95E-02	7.8	
21	0	354.97	387	8	0.96	3411.62	3394	37	4.30E-01	5.3	
22	1	381.80	12	0	1.15	3669.00	3662	28	1.31E-02	34.5	3.68E+00
23	1	382.64	90	5	1.27	3677.11	3662	28	9.97E-02	10.5	
24	1	385.13	12	7	1.16	3701.00	3693	25	1.31E-02	95.7	1.44E+01
25	1	385.65	313	12	1.16	3706.00	3693	25	3.47E-01	4.5	

Total number of lines in spectrum 25
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 7 28.00%

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	3.778E+02	3.779E+02	0.651E+02	17.22		
Total Activity :			3.778E+02	3.779E+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	2.335E+02	2.335E+02	0.369E+02	15.82		
Total Activity :			2.335E+02	2.335E+02				

Grand Total Activity : 6.113E+02 6.114E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.778E+02	3.779E+02	17.22	OK
	302.84	17.80	2.575E+00	6.480E+02	6.481E+02	34.74	OK
	356.01	60.00	4.312E+00	4.496E+02	4.496E+02	17.94	OK

Final Mean for 3 Valid Peaks = 3.779E+02+/- 6.505E+01 (17.22%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.335E+02	2.335E+02	15.82	OK

Final Mean for 1 Valid Peaks = 2.335E+02+/- 3.695E+01 (15.82%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.779E+02	6.505E+01	1.214E+01	1.788E+00	31.120
TH-234	2.335E+02	3.695E+01	2.063E+01	2.655E-01	11.316

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.221E+00		1.512E+01	2.810E+01	9.525E+00	0.043
CD-109	-1.766E+01		8.532E+01	1.533E+02	1.475E+01	-0.115
PA-231	8.187E-01	+	9.349E-01	1.454E+00	1.637E-02	0.563
PA-234	1.163E+00	+	7.419E-01	2.024E+00	2.279E-02	0.575
NP-237	-1.616E+01		2.485E+01	4.131E+01	3.644E+00	-0.391
AM-241	-4.486E-01		1.434E+00	2.064E+00	2.324E-02	-0.217

417117

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711109_GE2_BAFIL_194093.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : I-62 DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:39:05
 Sample ID : 1307111-09 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1892	100	1.39	31.02	27	14	2.10E+00	2.4	4.44E+00
2	3	35.22	464	103	1.53	35.33	27	14	5.16E-01	5.8	
3	0	52.51	49	65	2.27	52.63	50	6	5.40E-02	29.9	
4	2	61.97	170	70	1.60	62.08	57	13	1.89E-01	11.2	2.65E+00
5	2	65.77	92	64	1.61	65.89	57	13	1.02E-01	18.5	
6	0	81.00	783	122	1.37	81.11	77	8	8.70E-01	4.3	
7	0	92.64	23	77	1.82	92.75	90	7	2.58E-02	65.7	
8	3	111.86	190	48	1.61	111.97	107	14	2.11E-01	9.1	1.19E+00
9	3	115.69	66	55	1.88	115.80	107	14	7.29E-02	23.5	
10	0	160.69	22	70	1.82	160.80	157	7	2.39E-02	68.4	
11	0	186.10	20	55	1.11	186.21	182	6	2.19E-02	64.8	
12	0	223.65	49	50	4.59	223.76	218	11	5.39E-02	31.5	
13	0	239.25	6	27	1.73	239.36	239	4	6.73E-03	134.0	
14	0	276.06	61	22	2.02	276.17	272	10	6.83E-02	18.8	
15	4	302.85	142	10	1.56	302.96	297	24	1.57E-01	9.0	2.38E+00
16	4	307.47	24	10	2.38	307.58	297	24	2.68E-02	38.1	
17	4	317.13	10	7	2.39	317.24	297	24	1.10E-02	66.7	
18	0	324.02	7	14	1.19	324.13	321	6	7.54E-03	94.6	
19	1	333.82	66	12	1.81	333.92	328	14	7.38E-02	14.5	1.50E+00
20	1	337.78	16	5	1.82	337.89	328	14	1.80E-02	43.3	
21	0	356.03	510	36	1.38	356.13	352	8	5.67E-01	4.9	
22	1	380.89	11	2	1.69	381.00	380	15	1.19E-02	19.8	7.51E+00
23	1	384.06	117	12	1.86	384.17	380	15	1.30E-01	11.5	
24	1	386.90	174	10	1.60	387.00	380	15	1.93E-01	8.6	
25	1	391.06	46	12	1.86	391.17	380	15	5.14E-02	21.8	
26	1	414.72	20	25	1.88	414.83	411	11	2.27E-02	45.4	5.95E+00
27	1	418.07	20	33	1.89	418.17	411	11	2.22E-02	48.7	
28	0	437.05	78	15	1.36	437.16	433	7	8.72E-02	13.8	
29	0	468.66	9	18	1.08	468.76	465	7	9.81E-03	85.9	
30	0	511.38	23	4	3.08	511.48	507	11	2.54E-02	28.4	
31	0	609.47	13	4	1.64	609.57	605	8	1.46E-02	37.9	
32	0	927.69	7	2	1.08	927.78	923	7	7.78E-03	49.6	

Total number of lines in spectrum 32
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 4 12.50%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	%Error	Flags
			Uncorrected	Decay Corr					
BA-133	10.50Y	1.00	3.963E+02	3.963E+02	0.773E+02	19.51			
Total Activity :			3.963E+02	3.963E+02					

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	%Error	Flags
			Uncorrected	Decay Corr					
TH-234	4.47E+09Y	1.00	5.828E+02	5.828E+02	1.413E+02	24.25			
Total Activity :			5.828E+02	5.828E+02					

Grand Total Activity : 9.791E+02 9.792E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.963E+02	3.963E+02	19.51	OK
	302.84	17.80	7.560E+00	3.161E+02	3.161E+02	34.93	OK
	356.01	60.00	7.170E+00	3.560E+02	3.560E+02	18.01	OK

Final Mean for 3 Valid Peaks = 3.963E+02+/- 7.734E+01 (19.51%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	5.828E+02	5.828E+02	24.25	OK

Final Mean for 1 Valid Peaks = 5.828E+02+/- 1.413E+02 (24.25%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.963E+02	7.734E+01	1.915E+01	3.261E+00	20.694
TH-234	5.828E+02	1.413E+02	1.392E+02	1.150E+01	4.188

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.723E+00	4.847E+00	8.601E+00	1.321E+00	0.317
CD-109	-4.556E+01	1.255E+02	1.699E+02	1.951E+01	-0.268
PA-231	2.405E+01	3.807E+00	7.663E+00	1.459E-01	3.139
PA-234	2.412E+00	1.641E+00	3.102E+00	6.399E-02	0.778
NP-237	1.100E+01	3.479E+01	5.243E+01	5.920E+00	0.210
AM-241	1.809E+01	9.893E+00	1.818E+01	1.407E+00	0.995

7 (17111)

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711110_GE3_BAFIL_194094.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-6 TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:40:11
 Sample ID : 1307111-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.83 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.80	1797	84	1.57	31.12	26	13	2.00E+00	2.5	8.22E+00
2	3	35.05	468	65	1.68	35.37	26	13	5.21E-01	5.4	
3	0	52.23	65	77	3.26	52.55	49	7	7.18E-02	25.7	
4	1	61.63	210	78	1.51	61.95	58	12	2.34E-01	9.7	3.12E+00
5	1	65.67	104	93	1.52	65.98	58	12	1.16E-01	16.5	
6	0	80.88	764	121	1.54	81.19	76	8	8.49E-01	4.4	
7	2	111.83	215	60	1.71	112.15	108	13	2.39E-01	8.7	1.41E+00
8	2	116.38	45	51	1.76	116.69	108	13	5.03E-02	30.7	
9	0	191.66	22	62	4.04	191.97	188	8	2.49E-02	64.3	
10	0	276.58	49	46	2.06	276.89	273	10	5.43E-02	29.5	
11	0	302.45	105	50	1.31	302.76	299	7	1.17E-01	13.4	
12	2	333.65	65	10	1.79	333.95	330	12	7.26E-02	14.5	2.17E+00
13	2	338.04	22	8	2.02	338.35	330	12	2.46E-02	34.3	
14	1	351.69	14	12	1.84	351.99	350	13	1.57E-02	38.8	1.89E+00
15	1	355.85	447	14	1.58	356.15	350	13	4.97E-01	4.9	
16	0	377.03	13	13	2.72	377.33	374	7	1.49E-02	51.4	
17	1	383.69	122	9	1.87	383.99	380	16	1.36E-01	11.4	2.67E+00
18	1	386.75	187	9	1.87	387.05	380	16	2.08E-01	9.5	
19	1	390.55	42	9	1.88	390.85	380	16	4.67E-02	25.2	
20	0	407.14	16	0	3.00	407.44	404	7	1.78E-02	25.0	
21	4	414.50	32	11	2.52	414.80	411	10	3.59E-02	30.3	4.85E+00
22	4	417.36	21	17	2.52	417.66	411	10	2.31E-02	40.5	
23	0	436.71	99	2	1.81	437.01	433	8	1.10E-01	10.4	
24	0	468.83	16	14	1.40	469.13	464	9	1.72E-02	49.7	
25	0	510.87	21	2	4.46	511.16	507	8	2.34E-02	24.7	

Total number of lines in spectrum 25
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 4 16.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.662E+02	3.662E+02	0.662E+02	18.08	
Total Activity :			3.662E+02	3.662E+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	6.278E+02	6.278E+02	1.294E+02	20.62	
Total Activity :			6.278E+02	6.278E+02			

Grand Total Activity : 9.939E+02 9.940E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.662E+02	3.662E+02	18.08	OK
	302.84	17.80	6.222E+00	2.852E+02	2.852E+02	33.76	OK
	356.01	60.00	5.860E+00	3.819E+02	3.820E+02	16.80	OK

Final Mean for 3 Valid Peaks = 3.662E+02+/- 6.622E+01 (18.08%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.278E+02	6.278E+02	20.62	OK

Final Mean for 1 Valid Peaks = 6.278E+02+/- 1.294E+02 (20.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.662E+02	6.622E+01	2.015E+01	3.081E+00	18.177
TH-234	6.278E+02	1.294E+02	1.317E+02	7.071E+00	4.768

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.532E+00	5.866E+00	1.002E+01	1.144E+00	0.253
CD-109	-2.151E+01	9.953E+01	1.704E+02	1.405E+01	-0.126
PA-231	1.214E+00	1.617E+00	3.062E+00	4.355E-02	0.397
PA-234	3.178E+00	1.390E+00	2.640E+00	3.754E-02	1.204
NP-237	2.934E+01	3.000E+01	5.376E+01	4.346E+00	0.546
AM-241	2.468E+01	9.190E+00	1.802E+01	8.858E-01	1.370

717117

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711111_GE5_BAFIL_194095.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-6 DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:40:34
 Sample ID : 1307111-11 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.22	54	29	0.16	208.97	203	13	5.98E-02	26.2	
2	0	25.34	7	15	0.16	248.51	239	12	7.70E-03	118.1	
3	0	30.96	1938	53	0.80	302.51	289	31	2.15E+00	2.6	
4	1	35.09	377	34	0.62	342.10	331	27	4.18E-01	6.5	7.84E-01
5	1	35.96	82	16	0.62	350.47	331	27	9.11E-02	21.0	
6	4	51.73	35	25	0.91	501.80	492	33	3.83E-02	36.0	1.61E+00
7	4	53.20	49	14	0.82	515.89	492	33	5.39E-02	24.8	
8	0	61.65	261	12	0.79	596.95	586	24	2.90E-01	6.9	
9	0	65.89	116	27	0.86	637.63	625	23	1.29E-01	13.5	
10	1	79.45	33	26	0.73	767.73	761	31	3.68E-02	30.4	1.25E+00
11	1	80.90	753	28	0.67	781.67	761	31	8.36E-01	3.9	
12	0	111.78	167	58	0.86	1078.00	1063	27	1.86E-01	13.2	
13	3	275.16	18	6	1.21	2645.71	2638	21	2.02E-02	38.9	1.80E+00
14	3	275.81	45	2	0.92	2651.99	2638	21	4.95E-02	16.8	
15	0	301.98	106	2	1.30	2903.11	2888	26	1.18E-01	10.1	
16	1	332.30	11	10	1.10	3194.00	3184	25	1.24E-02	76.5	1.94E+00
17	1	332.82	61	6	1.10	3199.00	3184	25	6.79E-02	14.4	
18	0	354.92	384	6	0.73	3411.05	3393	33	4.27E-01	5.3	
19	5	382.44	75	2	1.02	3675.13	3661	28	8.34E-02	12.4	9.16E-01
20	5	382.94	12	2	1.16	3680.00	3661	28	1.31E-02	75.9	
21	4	384.71	60	7	1.04	3696.91	3691	28	6.72E-02	10.1	3.50E+00
22	4	385.82	65	7	0.92	3707.63	3691	28	7.22E-02	20.1	

Total number of lines in spectrum 22
 Number of unidentified lines 16
 Number of lines tentatively identified by NID 6 27.27%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.800E+02	3.800E+02	0.652E+02	17.15	
Total Activity :			3.800E+02	3.800E+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	2.361E+02	2.361E+02	0.339E+02	14.34	
Total Activity :			2.361E+02	2.361E+02			

Grand Total Activity : 6.160E+02 6.161E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.800E+02	3.800E+02	17.15	OK
	302.84	17.80	2.575E+00	6.932E+02	6.933E+02	33.27	OK
	356.01	60.00	4.312E+00	4.458E+02	4.458E+02	17.91	OK

Final Mean for 3 Valid Peaks = 3.800E+02 +/- 6.518E+01 (17.15%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.361E+02	2.361E+02	14.34	OK

Final Mean for 1 Valid Peaks = 2.361E+02 +/- 3.385E+01 (14.34%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.800E+02	6.518E+01	1.139E+01	1.677E+00	33.353
TH-234	2.361E+02	3.385E+01	2.345E+01	3.017E-01	10.068

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.353E+00		1.359E+01	2.567E+01	8.703E+00	0.053
CD-109	6.607E+01		9.188E+01	1.846E+02	1.777E+01	0.358
PA-231	-3.200E-01		7.260E-01	1.258E+00	1.416E-02	-0.254
PA-234	2.489E+00	+	1.310E+00	1.937E+00	2.180E-02	1.285
NP-237	-3.270E+01		2.487E+01	3.594E+01	3.170E+00	-0.910
AM-241	1.123E-01		1.498E+00	2.322E+00	2.614E-02	0.048

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VAX/VMS Peak Search Report Generated 31-JUL-2013 12:09:55.51

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711112_GE2_BAFIL_194096.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-61 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:54:32
Sample ID : 1307111-12 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 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	30.92	1997	97	1.42	31.04	26	14	2.22E+00	2.3	8.19E+00
2	2	35.15	469	112	1.53	35.27	26	14	5.21E-01	5.8	
3	9	52.65	51	52	3.07	52.77	50	20	5.62E-02	26.7	3.60E+00
4	9	61.79	235	90	2.17	61.90	50	20	2.61E-01	9.6	
5	9	65.80	120	99	2.35	65.91	50	20	1.33E-01	18.8	
6	2	77.17	19	37	1.64	77.28	76	12	2.10E-02	46.4	2.98E+00
7	2	81.09	758	45	1.46	81.21	76	12	8.42E-01	3.8	
8	1	109.03	16	43	1.55	109.14	107	13	1.79E-02	75.7	2.84E+00
9	1	111.91	168	39	1.55	112.02	107	13	1.87E-01	9.9	
10	1	116.03	45	34	1.56	116.14	107	13	4.98E-02	27.3	
11	0	165.30	17	85	1.01	165.41	161	7	1.83E-02	97.3	
12	0	261.29	13	25	2.52	261.40	258	8	1.39E-02	74.0	
13	0	276.43	76	50	1.97	276.54	271	10	8.44E-02	20.8	
14	1	302.88	154	18	1.46	302.99	299	12	1.71E-01	8.9	3.42E+00
15	1	307.03	36	33	1.79	307.14	299	12	3.97E-02	29.4	
16	2	333.55	76	14	1.99	333.65	330	14	8.44E-02	14.3	2.78E+00
17	2	338.55	13	20	2.00	338.65	330	14	1.41E-02	58.7	
18	3	351.44	20	4	2.21	351.55	350	12	2.18E-02	21.2	2.80E+00
19	3	356.02	521	4	1.46	356.13	350	12	5.79E-01	4.4	
20	5	383.80	72	32	2.14	383.91	381	9	7.99E-02	19.2	8.82E+00
21	5	386.83	142	56	1.50	386.94	381	9	1.58E-01	10.7	
22	0	391.14	30	19	1.10	391.24	390	5	3.31E-02	30.1	
23	3	415.10	28	9	2.28	415.20	411	14	3.09E-02	31.0	1.74E+00
24	3	418.33	20	8	2.28	418.43	411	14	2.24E-02	44.2	
25	3	437.10	83	7	1.80	437.21	433	15	9.25E-02	12.3	9.86E-01
26	3	444.25	9	1	2.31	444.36	433	15	1.04E-02	60.6	
27	0	468.40	12	12	1.32	468.50	465	7	1.28E-02	58.4	
28	0	511.58	27	2	2.49	511.69	507	10	2.97E-02	22.2	

Summary of Nuclide Activity

Sample ID : 1307111-12

Acquisition date : 31-JUL-2013 11:54:32

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	3.836E+02	3.836E+02	0.732E+02	19.09	
Total Activity :			3.836E+02	3.836E+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	8.047E+02	8.047E+02	1.709E+02	21.24	
Total Activity :			8.047E+02	8.047E+02			

Grand Total Activity : 1.188E+03 1.188E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.799E+01	3.836E+02	3.836E+02	3.836E+02	19.09	OK	
	302.84	17.80	7.560E+00	3.429E+02	3.430E+02	3.430E+02	34.80	OK	
	356.01	60.00	7.170E+00	3.638E+02	3.639E+02	3.639E+02	17.51	OK	

Final Mean for 3 Valid Peaks = 3.836E+02 +/- 7.324E+01 (19.09%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	2.305E+01	8.047E+02	8.047E+02	8.047E+02	21.24	OK	

Final Mean for 1 Valid Peaks = 8.047E+02 +/- 1.709E+02 (21.24%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.836E+02	7.324E+01	1.800E+01	3.065E+00	21.309
TH-234	8.047E+02	1.709E+02	1.315E+02	1.087E+01	6.120

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.638E-01		5.459E+00	9.087E+00	1.396E+00	0.095
CD-109	-4.328E+01		1.041E+02	1.615E+02	1.854E+01	-0.268
PA-231	2.515E+01		3.840E+00	7.744E+00	1.475E-01	3.248
PA-234	4.440E+00		1.688E+00	3.213E+00	6.626E-02	1.382
NP-237	-3.489E-02		3.088E+01	5.044E+01	5.696E+00	-0.001
AM-241	3.024E+01		1.009E+01	2.011E+01	1.556E+00	1.504

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VAX/VMS Peak Search Report Generated 31-JUL-2013 12:11:09.72

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711113_GE3_BAFIL_194097.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : S-61 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:55:47
Sample ID : 1307111-13 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.87 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.78	1955	81	1.48	31.10	26	15	2.17E+00	2.3	6.86E+00
2	4	35.01	474	96	1.66	35.33	26	15	5.27E-01	5.6	
3	0	52.56	69	102	2.22	52.88	49	8	7.62E-02	28.2	
4	0	61.50	246	129	1.37	61.82	58	7	2.73E-01	10.0	
5	0	65.91	104	85	1.68	66.22	65	5	1.15E-01	17.0	
6	0	80.85	823	137	1.71	81.17	76	10	9.14E-01	4.4	
7	0	92.57	30	73	1.19	92.88	90	6	3.32E-02	48.6	
8	0	111.80	208	107	1.43	112.11	108	7	2.31E-01	10.8	
9	0	276.38	61	31	1.76	276.68	274	8	6.79E-02	20.4	
10	2	302.72	130	22	1.65	303.03	299	14	1.45E-01	10.2	4.91E-01
11	2	307.01	37	21	1.99	307.32	299	14	4.11E-02	30.8	
12	2	333.55	81	24	1.83	333.85	330	16	8.98E-02	14.7	1.45E+00
13	2	337.96	25	20	2.02	338.27	330	16	2.73E-02	39.5	
14	0	355.90	521	22	1.48	356.21	351	10	5.78E-01	4.7	
15	0	365.33	33	14	2.34	365.63	362	9	3.61E-02	26.9	
16	1	383.53	91	25	1.87	383.83	381	9	1.01E-01	15.2	4.05E+00
17	1	386.65	199	24	1.53	386.95	381	9	2.21E-01	8.0	
18	0	414.17	25	25	1.11	414.47	411	6	2.80E-02	37.2	
19	0	436.77	103	4	1.52	437.07	432	8	1.14E-01	10.4	
20	1	464.70	6	0	1.76	465.00	464	11	6.20E-03	0.0	4.48E+00
21	1	471.66	9	0	1.94	471.96	464	11	1.03E-02	37.5	
22	0	511.17	22	4	2.65	511.47	507	10	2.44E-02	28.3	
23	0	570.37	7	2	2.91	570.67	567	7	8.21E-03	47.0	

Total number of lines in spectrum 23
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 4 17.39%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.943E+02	3.943E+02	0.713E+02	18.08	
Total Activity :			3.943E+02	3.943E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.343E+02	7.343E+02	1.548E+02	21.08	
AM-241	432.20Y	1.00	7.115E+01	7.115E+01	1.492E+01	20.97	
Total Activity :			8.054E+02	8.054E+02			

Grand Total Activity : 1.200E+03 1.200E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.943E+02	3.943E+02	18.08	OK
	302.84	17.80	6.222E+00	3.538E+02	3.538E+02	29.05	OK
	356.01	60.00	5.860E+00	4.446E+02	4.447E+02	16.57	OK

Final Mean for 3 Valid Peaks = 3.943E+02 +/- 7.130E+01 (18.08%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.343E+02	7.343E+02	21.08	OK

Final Mean for 1 Valid Peaks = 7.343E+02 +/- 1.548E+02 (21.08%)

AM-241	59.54	35.90*	2.893E+01	7.115E+01	7.115E+01	20.97	OK
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Final Mean for 1 Valid Peaks = 7.115E+01 +/- 1.492E+01 (20.97%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.943E+02	7.130E+01	1.746E+01	2.670E+00	22.582
TH-234	7.343E+02	1.548E+02	1.475E+02	7.922E+00	4.978
AM-241	7.115E+01	1.492E+01	1.355E+01	6.663E-01	5.250

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.556E-01		5.674E+00	9.941E+00	1.136E+00	0.016
CD-109	-6.856E+01		1.186E+02	1.525E+02	1.258E+01	-0.449
PA-231	2.524E+00		1.469E+00	3.003E+00	4.272E-02	0.840
PA-234	4.859E+00		1.506E+00	2.954E+00	4.202E-02	1.645
NP-237	7.226E+00		3.269E+01	4.838E+01	3.911E+00	0.149

KB
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VAX/VMS Peak Search Report Generated 31-JUL-2013 12:11:38.75

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711114_GE5_BAFIL_194098.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-67 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 11:56:22
Sample ID : 1307111-14 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	19.82	20	9	0.60	195.57	186	31	2.21E-02	46.2	1.02E+00
2	2	20.75	46	8	0.55	204.52	186	31	5.07E-02	26.3	
3	2	21.34	60	7	0.61	210.18	186	31	6.61E-02	19.0	
4	0	30.96	1833	129	0.66	302.48	290	29	2.04E+00	3.0	
5	4	35.05	396	31	0.73	341.72	330	29	4.40E-01	6.4	8.62E-01
6	4	35.95	121	8	0.76	350.35	330	29	1.34E-01	18.5	
7	0	43.47	11	3	0.68	422.52	417	12	1.17E-02	45.5	
8	0	53.41	41	20	0.67	517.90	508	17	4.55E-02	30.1	
9	0	61.66	249	51	0.35	597.07	582	31	2.76E-01	9.6	
10	0	65.90	95	35	0.47	637.75	627	23	1.06E-01	17.0	
11	0	71.20	8	11	0.29	688.62	681	11	8.89E-03	78.2	
12	0	80.94	805	66	0.60	782.03	769	23	8.95E-01	4.1	
13	0	83.80	19	14	0.98	809.53	799	17	2.12E-02	44.8	
14	0	111.73	158	44	0.97	1077.49	1066	21	1.76E-01	12.0	
15	0	115.83	32	30	0.68	1116.81	1105	26	3.58E-02	43.1	
16	0	178.66	8	8	0.11	1719.71	1709	17	9.27E-03	69.9	
17	0	275.54	33	11	0.69	2649.40	2632	25	3.67E-02	27.6	
18	0	301.99	120	0	1.04	2903.22	2889	26	1.33E-01	9.1	
19	1	332.50	164	9	1.10	3196.00	3185	23	1.82E-01	5.7	1.30E+01
20	1	332.92	11	5	1.10	3200.00	3185	23	1.24E-02	76.1	
21	0	354.88	337	17	1.01	3410.71	3394	30	3.75E-01	6.0	
22	1	381.79	17	1	1.04	3668.89	3661	29	1.87E-02	38.5	1.14E+00
23	1	382.74	74	8	1.16	3678.00	3661	29	8.27E-02	13.9	
24	0	385.72	141	31	0.87	3706.67	3690	27	1.57E-01	11.3	
25	0	389.80	40	3	0.55	3745.81	3728	29	4.41E-02	18.1	
26	0	414.06	16	8	0.28	3978.62	3957	28	1.80E-02	42.5	

Total number of lines in spectrum 26
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.066E+02	4.066E+02	0.705E+02	17.35		
Total Activity :			4.066E+02	4.066E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	2.247E+02	2.247E+02	0.440E+02	19.59		
Total Activity :			2.247E+02	2.247E+02				

Grand Total Activity : 6.313E+02 6.314E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.066E+02	4.066E+02	17.35	OK
	302.84	17.80	2.575E+00	7.861E+02	7.862E+02	32.10	OK
	356.01	60.00	4.312E+00	3.917E+02	3.917E+02	18.78	OK

Final Mean for 3 Valid Peaks = 4.066E+02 +/- 7.055E+01 (17.35%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.247E+02	2.247E+02	19.59	OK

Final Mean for 1 Valid Peaks = 2.247E+02 +/- 4.404E+01 (19.59%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.066E+02	7.055E+01	1.097E+01	1.615E+00	37.080
TH-234	2.247E+02	4.404E+01	2.545E+01	3.275E-01	8.829

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.655E+00		1.491E+01	2.413E+01	8.180E+00	-0.400
CD-109	6.329E+01		8.685E+01	1.766E+02	1.699E+01	0.358
PA-231	2.658E-01		8.595E-01	1.662E+00	1.870E-02	0.160
PA-234	2.753E+00	+	1.051E+00	1.950E+00	2.195E-02	1.412
NP-237	-1.590E+01		2.481E+01	4.059E+01	3.580E+00	-0.392
AM-241	2.447E-01		1.412E+00	2.245E+00	2.527E-02	0.109

145
2131112

VAX/VMS Peak Search Report Generated 31-JUL-2013 12:36:09.25

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711115_GE2_BAFIL_194100.CM
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-67 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 12:20:51
Sample ID : 1307111-15 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.92	1958	92	1.40	31.03	26	13	2.18E+00	2.4	7.31E+00
2	2	35.11	443	79	1.53	35.23	26	13	4.93E-01	6.0	
3	0	53.74	47	98	4.21	53.86	50	8	5.24E-02	39.4	
4	3	61.86	241	54	1.76	61.98	58	15	2.68E-01	8.0	1.67E+00
5	3	65.82	95	56	1.77	65.93	58	15	1.05E-01	17.6	
6	0	80.97	765	114	1.42	81.08	76	8	8.50E-01	4.4	
7	0	92.94	37	74	1.27	93.05	90	7	4.06E-02	42.3	
8	5	111.88	196	49	1.74	111.99	108	15	2.17E-01	8.8	1.81E+00
9	5	116.02	35	67	2.28	116.14	108	15	3.87E-02	46.8	
10	0	162.33	48	63	4.51	162.45	159	9	5.39E-02	32.5	
11	0	185.99	21	86	0.86	186.10	183	7	2.28E-02	78.1	
12	0	276.63	72	46	1.98	276.74	273	10	8.01E-02	21.1	
13	0	303.04	146	52	1.34	303.15	299	8	1.62E-01	11.9	
14	1	333.73	44	11	1.81	333.84	328	14	4.84E-02	20.1	4.32E+00
15	1	337.73	25	17	1.82	337.83	328	14	2.74E-02	29.4	
16	0	356.00	504	36	1.39	356.11	352	8	5.60E-01	4.9	
17	0	364.86	12	14	1.99	364.97	362	6	1.35E-02	56.0	
18	1	383.83	129	10	1.86	383.94	380	15	1.43E-01	11.2	4.86E+00
19	1	386.78	194	7	1.86	386.89	380	15	2.16E-01	8.9	
20	1	391.06	51	4	1.86	391.17	380	15	5.62E-02	19.5	
21	4	414.65	34	9	2.51	414.76	409	21	3.79E-02	26.2	1.24E+00
22	4	418.69	23	7	2.51	418.80	409	21	2.60E-02	38.9	
23	0	436.87	84	7	1.42	436.97	432	9	9.34E-02	12.3	
24	0	469.17	15	18	1.26	469.28	465	7	1.63E-02	55.6	
25	0	511.26	38	2	2.74	511.36	507	9	4.21E-02	17.7	

Total number of lines in spectrum 25
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 4 16.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.870E+02	3.870E+02	0.756E+02	19.54	
Total Activity :			3.870E+02	3.870E+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	8.270E+02	8.270E+02	1.531E+02	18.51	
Total Activity :			8.270E+02	8.270E+02			

Grand Total Activity : 1.214E+03 1.214E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.870E+02	3.870E+02	19.54	OK
	302.84	17.80	7.560E+00	3.255E+02	3.256E+02	38.23	OK
	356.01	60.00	7.170E+00	3.518E+02	3.518E+02	18.05	OK

Final Mean for 3 Valid Peaks = 3.870E+02 +/- 7.563E+01 (19.54%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	8.270E+02	8.270E+02	18.51	OK

Final Mean for 1 Valid Peaks = 8.270E+02 +/- 1.531E+02 (18.51%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.870E+02	7.563E+01	2.067E+01	3.520E+00	18.719
TH-234	8.270E+02	1.531E+02	1.116E+02	9.219E+00	7.413

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.198E+00		5.733E+00	9.058E+00	1.391E+00	-0.132
CD-109	-1.303E+02		1.221E+02	1.727E+02	1.983E+01	-0.754
PA-231	2.872E+01		4.047E+00	8.144E+00	1.551E-01	3.527
PA-234	2.776E+00		1.654E+00	3.010E+00	6.209E-02	0.922
NP-237	-4.642E+00		3.961E+01	5.559E+01	6.277E+00	-0.083
AM-241	3.058E+01		9.621E+00	1.900E+01	1.471E+00	1.609

05
7/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 12:36:38.25

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711116_GE3_BAFIL_194101.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : I-68 TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 12:21:18
 Sample ID : 1307111-16 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.27 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.83	1764	85	1.41	31.15	26	13	1.96E+00	2.5	1.58E+00
2	3	35.06	444	76	1.58	35.38	26	13	4.93E-01	5.7	
3	0	52.32	48	112	2.92	52.64	48	9	5.37E-02	42.1	
4	4	61.73	267	58	1.61	62.05	57	16	2.97E-01	7.4	2.17E+00
5	4	65.82	123	69	2.02	66.14	57	16	1.36E-01	15.2	
6	0	81.11	748	114	1.85	81.43	77	10	8.31E-01	4.5	
7	2	111.62	169	48	1.75	111.93	108	17	1.88E-01	9.9	3.57E+00
8	2	114.83	19	48	1.60	115.15	108	17	2.11E-02	72.3	
9	0	160.71	35	50	1.17	161.03	158	7	3.91E-02	37.5	
10	0	185.79	15	63	1.77	186.10	184	6	1.67E-02	87.6	
11	0	206.38	22	31	2.02	206.69	204	6	2.41E-02	46.1	
12	0	276.91	39	23	1.57	277.22	274	8	4.29E-02	28.1	
13	0	284.01	15	11	2.27	284.32	282	6	1.69E-02	42.4	
14	0	290.84	15	18	2.15	291.15	288	7	1.65E-02	51.1	
15	0	302.77	100	32	2.22	303.08	298	8	1.11E-01	14.0	
16	1	333.60	79	11	1.81	333.90	328	13	8.73E-02	12.9	9.47E-01
17	1	337.69	31	12	1.83	337.99	328	13	3.40E-02	26.7	
18	0	355.91	455	35	1.43	356.22	352	9	5.06E-01	5.2	
19	1	383.67	101	26	1.87	383.97	381	9	1.12E-01	14.4	3.96E+00
20	1	386.75	180	29	1.70	387.05	381	9	2.00E-01	10.0	
21	4	414.94	33	9	2.52	415.24	410	19	3.68E-02	28.2	2.34E+00
22	4	417.90	27	7	2.52	418.20	410	19	2.99E-02	36.8	
23	4	421.86	12	4	1.90	422.16	410	19	1.30E-02	53.5	
24	2	436.75	100	8	1.77	437.05	431	17	1.11E-01	10.9	2.10E+00
25	2	441.87	7	1	1.91	442.17	431	17	7.71E-03	73.8	
26	0	467.73	30	9	1.24	468.03	464	8	3.30E-02	25.9	
27	0	511.48	9	7	1.47	511.78	507	7	1.00E-02	59.1	

Total number of lines in spectrum 27
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 5 18.52%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	2-Sigma Error	%Error	Flags
			Uncorrected	Decay Corr					
BA-133	10.50Y	1.00	3.585E+02	3.585E+02			0.654E+02	18.23	
Total Activity :			3.585E+02	3.585E+02					

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	2-Sigma Error	%Error	Flags
			Uncorrected	Decay Corr					
PA-231	3.28E+04Y	1.00	2.098E+03	2.098E+03			0.698E+03	33.26	
TH-234	4.47E+09Y	1.00	7.968E+02	7.968E+02			1.296E+02	16.27	
Total Activity :			2.895E+03	2.895E+03					

Grand Total Activity : 3.253E+03 3.253E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr 2-Sigma		%Error	Status
				pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.8999E+01	3.585E+02	3.585E+02	18.23	OK
	302.84	17.80	6.222E+00	2.711E+02	2.712E+02	34.76	OK
	356.01	60.00	5.860E+00	3.888E+02	3.888E+02	17.22	OK

Final Mean for 3 Valid Peaks = 3.585E+02 +/- 6.538E+01 (18.23%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr 2-Sigma		%Error	Status
				pCi/filter	pCi/filter		
PA-231	9.28	42.00*	1.000E+02	----- Line Out Of Range -----		----	Absent
	10.11	20.20	1.000E+02	----- Line Out Of Range -----		----	Absent
	283.67	1.60	6.406E+00	4.463E+02	4.463E+02	86.71	OK
	302.67	2.30	6.224E+00	2.098E+03	2.098E+03	33.26	OK

Final Mean for 2 Valid Peaks = 2.098E+03 +/- 6.977E+02 (33.26%)

TH-234	63.29	3.80*	2.648E+01	7.968E+02	7.968E+02	16.27	OK
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Final Mean for 1 Valid Peaks = 7.968E+02 +/- 1.296E+02 (16.27%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.585E+02	6.538E+01	1.840E+01	2.814E+00	19.482
PA-231	2.098E+03	6.977E+02	3.063E+00	4.356E-02	684.961
TH-234	7.968E+02	1.296E+02	1.043E+02	5.601E+00	7.641

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.155E+00	6.142E+00	1.014E+01	1.158E+00	0.114
CD-109	-5.858E+01	1.038E+02	1.561E+02	1.287E+01	-0.375
PA-234	3.017E+00	1.397E+00	2.631E+00	3.742E-02	1.147
NP-237	1.103E+01	2.818E+01	4.804E+01	3.884E+00	0.230
AM-241	3.434E+01	9.073E+00	1.814E+01	8.918E-01	1.893

KP
7/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 12:36:58.45

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711117_GE5_BAFIL_194102.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : I-68 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 12:21:42
Sample ID : 1307111-17 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.20 0.1%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	15.62	12	6	0.18	155.26	148	13	1.29E-02	53.9	
2	0	21.22	68	59	0.57	209.04	197	22	7.52E-02	31.7	
3	3	28.61	26	34	0.72	279.96	272	46	2.93E-02	56.5	1.93E+00
4	3	29.45	33	32	0.54	288.00	272	46	3.66E-02	47.5	
5	3	30.99	1952	42	0.73	302.73	272	46	2.17E+00	2.4	
6	1	35.10	400	49	0.62	342.17	333	25	4.45E-01	6.6	1.22E+00
7	1	35.90	92	17	0.62	349.88	333	25	1.03E-01	24.1	
8	0	37.48	6	3	0.14	365.04	360	10	6.98E-03	62.2	
9	1	52.90	24	9	0.62	513.00	509	16	2.72E-02	24.1	5.05E+00
10	1	53.42	42	13	0.62	518.00	509	16	4.70E-02	20.4	
11	0	61.69	257	16	1.17	597.34	587	27	2.85E-01	7.1	
12	1	65.34	20	19	0.72	632.39	627	29	2.19E-02	46.6	3.49E+00
13	1	65.93	87	23	0.66	638.00	627	29	9.68E-02	16.1	
14	1	66.62	28	13	0.59	644.63	627	29	3.16E-02	43.5	
15	0	70.35	32	3	1.10	680.42	672	19	3.59E-02	20.8	
16	0	80.97	712	85	0.59	782.33	768	25	7.91E-01	4.7	
17	0	111.58	204	23	0.90	1076.03	1060	27	2.26E-01	8.9	
18	0	116.13	42	30	0.15	1119.76	1105	22	4.65E-02	32.0	
19	0	160.35	22	14	0.42	1544.02	1533	22	2.46E-02	38.8	
20	1	275.50	81	8	1.03	2649.00	2635	24	9.01E-02	10.7	3.36E+00
21	1	276.02	10	5	1.03	2654.00	2635	24	1.16E-02	61.0	
22	1	301.58	106	0	0.97	2899.25	2888	28	1.18E-01	9.1	1.03E+01
23	1	302.18	63	0	1.06	2905.00	2888	28	7.01E-02	15.6	
24	0	332.68	56	0	0.95	3197.64	3181	29	6.22E-02	13.4	
25	0	354.91	408	9	0.87	3411.03	3394	30	4.54E-01	5.2	
26	0	382.59	76	7	1.16	3676.61	3660	28	8.47E-02	13.5	
27	3	384.65	16	5	1.20	3696.39	3692	24	1.73E-02	26.9	4.77E+00
28	3	385.65	177	15	1.16	3706.00	3692	24	1.96E-01	7.4	
29	0	413.38	30	4	0.79	3972.10	3957	26	3.28E-02	23.4	

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	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.596E+02	3.596E+02	0.645E+02	17.93		
Total Activity :			3.596E+02	3.596E+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	2.318E+02	2.318E+02	0.344E+02	14.84		
Total Activity :			2.318E+02	2.318E+02				

Grand Total Activity : 5.914E+02 5.914E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.596E+02	3.596E+02	17.93	OK
	302.84	17.80	2.575E+00	4.136E+02	4.136E+02	40.87	OK
	356.01	60.00	4.312E+00	4.741E+02	4.741E+02	17.77	OK

Final Mean for 3 Valid Peaks = 3.596E+02+/- 6.449E+01 (17.93%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.318E+02	2.318E+02	14.84	OK

Final Mean for 1 Valid Peaks = 2.318E+02+/- 3.441E+01 (14.84%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.596E+02	6.449E+01	1.280E+01	1.884E+00	28.097
TH-234	2.318E+02	3.441E+01	2.817E+01	3.624E-01	8.230

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.425E+00		1.475E+01	2.802E+01	9.497E+00	0.122
CD-109	-2.486E+01		8.655E+01	1.533E+02	1.475E+01	-0.162
PA-231	6.185E-01		7.583E-01	1.609E+00	1.811E-02	0.384
PA-234	3.133E+00	+	1.989E+00	2.068E+00	2.328E-02	1.515
NP-237	-1.694E+01		2.533E+01	4.196E+01	3.701E+00	-0.404
AM-241	-4.557E-02		1.529E+00	2.321E+00	2.612E-02	-0.020

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VAX/VMS Peak Search Report Generated 31-JUL-2013 12:57:57.25

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130711118_GE2_BAFIL_194103.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP 04 TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 12:42:41
Sample ID : 1307111-18 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.90	1890	98	1.38	31.02	26	14	2.10E+00	2.4	5.95E+00
2	2	35.15	460	90	1.53	35.27	26	14	5.11E-01	5.8	
3	0	52.91	71	123	1.80	53.02	48	9	7.84E-02	30.8	
4	0	61.38	163	133	1.36	61.50	58	7	1.81E-01	14.2	
5	0	65.68	63	115	1.10	65.80	65	5	6.96E-02	29.3	
6	1	81.01	682	54	1.50	81.13	77	12	7.58E-01	4.1	5.18E+00
7	1	83.75	24	43	1.50	83.86	77	12	2.62E-02	78.3	
8	0	90.95	28	89	1.80	91.07	89	8	3.09E-02	61.0	
9	2	111.95	186	49	1.71	112.06	108	13	2.06E-01	9.4	1.67E+00
10	2	115.59	29	43	1.71	115.70	108	13	3.19E-02	47.7	
11	0	143.07	29	83	2.09	143.18	140	9	3.27E-02	58.3	
12	0	161.82	29	63	1.00	161.93	159	7	3.22E-02	49.0	
13	0	185.60	20	65	1.96	185.72	182	7	2.27E-02	68.8	
14	0	197.87	30	56	3.15	197.98	195	8	3.35E-02	46.2	
15	0	276.48	44	38	1.88	276.59	272	9	4.84E-02	29.8	
16	0	303.56	134	74	1.62	303.67	299	10	1.49E-01	14.7	
17	0	324.48	12	6	1.24	324.58	322	6	1.33E-02	43.3	
18	3	333.35	53	15	2.19	333.45	328	15	5.88E-02	19.7	1.93E+00
19	3	338.46	16	24	2.20	338.57	328	15	1.75E-02	55.9	
20	0	356.03	499	28	1.53	356.14	351	10	5.55E-01	4.9	
21	0	364.99	13	11	2.39	365.10	362	6	1.46E-02	48.0	
22	1	383.74	105	33	1.86	383.85	381	9	1.17E-01	13.2	2.65E+01
23	1	386.83	124	54	1.56	386.93	381	9	1.38E-01	11.5	
24	0	391.31	33	18	1.89	391.41	390	6	3.72E-02	27.5	
25	2	411.07	8	2	1.88	411.17	409	16	8.82E-03	45.4	1.30E+00
26	2	414.75	23	5	2.07	414.85	409	16	2.59E-02	31.2	
27	2	418.05	33	7	2.08	418.15	409	16	3.71E-02	25.1	
28	0	436.91	67	9	1.38	437.01	433	7	7.49E-02	14.2	
29	3	466.65	15	4	2.33	466.75	463	26	1.67E-02	35.8	4.80E-01
30	3	473.03	11	5	2.34	473.14	463	26	1.18E-02	51.7	
31	0	512.41	20	13	2.76	512.51	507	12	2.22E-02	44.3	
32	0	1105.41	6	0	1.16	1105.50	1102	7	6.67E-03	40.8	

Summary of Nuclide Activity

Sample ID : 1307111-18

Acquisition date : 31-JUL-2013 12:42:41

Total number of lines in spectrum 32
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 4 12.50%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.452E+02	3.452E+02	0.668E+02	19.35	
Total Activity :			3.452E+02	3.452E+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	5.586E+02	5.586E+02	1.667E+02	29.84	
AM-241	432.20Y	1.00	5.538E+01	5.538E+01	1.645E+01	29.70	
Total Activity :			6.140E+02	6.140E+02			

Grand Total Activity : 9.592E+02 9.593E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.452E+02	3.452E+02	19.35	OK
	302.84	17.80	7.560E+00	2.998E+02	2.998E+02	41.91	OK
	356.01	60.00	7.170E+00	3.487E+02	3.487E+02	18.03	OK

Final Mean for 3 Valid Peaks = 3.452E+02 +/- 6.682E+01 (19.35%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	5.586E+02	5.586E+02	29.84	OK

Final Mean for 1 Valid Peaks = 5.586E+02 +/- 1.667E+02 (29.84%)

AM-241	59.54	35.90*	2.461E+01	5.538E+01	5.538E+01	29.70	OK
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Final Mean for 1 Valid Peaks = 5.538E+01 +/- 1.645E+01 (29.70%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.452E+02	6.682E+01	1.957E+01	3.332E+00	17.641
TH-234	5.586E+02	1.667E+02	1.850E+02	1.529E+01	3.020
AM-241	5.538E+01	1.645E+01	1.533E+01	1.187E+00	3.611

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.425E+00		5.810E+00	8.899E+00	1.367E+00	-0.273
CD-109	3.841E+01		1.013E+02	1.574E+02	1.807E+01	0.244
PA-231	2.791E+01		3.965E+00	8.003E+00	1.524E-01	3.488
PA-234	2.446E+00		1.715E+00	3.063E+00	6.319E-02	0.798
NP-237	1.922E+01		3.018E+01	4.850E+01	5.476E+00	0.396

KS
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VAX/VMS Peak Search Report Generated 31-JUL-2013 12:58:25.78

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130711119_GE3_BAFIL_194104.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : DUP 04 DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 12:43:06
Sample ID : 1307111-19 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.24 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	28.00	42	102	1.90	28.32	26	15	4.67E-02	34.7	3.28E+00
2	4	30.84	1749	79	1.43	31.16	26	15	1.94E+00	2.5	
3	4	34.99	430	72	1.93	35.31	26	15	4.78E-01	7.7	
4	0	52.38	82	56	2.26	52.70	49	7	9.11E-02	18.7	
5	1	61.82	204	59	1.51	62.14	57	16	2.26E-01	9.2	3.50E+00
6	1	65.60	90	55	1.52	65.92	57	16	1.00E-01	17.6	
7	1	69.54	17	53	1.52	69.86	57	16	1.84E-02	73.8	
8	0	81.00	688	137	1.69	81.32	76	10	7.64E-01	5.0	
9	2	111.73	170	42	1.75	112.05	107	14	1.88E-01	9.7	2.21E+00
10	2	115.86	45	44	1.76	116.17	107	14	5.05E-02	27.9	
11	0	223.34	29	39	3.95	223.65	220	9	3.26E-02	42.3	
12	0	276.82	59	36	1.96	277.12	271	12	6.59E-02	24.0	
13	4	302.79	132	6	1.61	303.10	297	19	1.47E-01	9.1	1.52E+00
14	4	306.93	24	5	2.40	307.24	297	19	2.62E-02	37.2	
15	4	311.12	13	4	2.41	311.43	297	19	1.39E-02	56.1	
16	3	333.69	49	21	1.87	334.00	330	12	5.49E-02	20.5	1.52E+00
17	3	338.25	13	16	2.22	338.55	330	12	1.46E-02	67.9	
18	0	355.94	450	37	1.47	356.25	352	9	5.00E-01	5.3	
19	1	383.53	80	24	1.87	383.83	381	9	8.92E-02	16.3	2.64E+00
20	1	386.69	167	20	1.53	386.99	381	9	1.86E-01	8.9	
21	0	391.12	41	9	1.41	391.42	390	5	4.56E-02	19.7	
22	5	411.70	7	0	1.72	412.00	411	19	8.02E-03	4.9	4.31E+00
23	5	417.07	26	4	2.78	417.37	411	19	2.91E-02	34.1	
24	5	420.72	11	5	2.09	421.02	411	19	1.23E-02	57.6	
25	0	436.76	84	8	1.50	437.07	433	8	9.35E-02	12.4	
26	1	466.88	18	9	1.93	467.18	463	14	1.97E-02	35.4	9.89E-01
27	1	472.52	6	4	1.94	472.82	463	14	6.97E-03	81.6	
28	0	510.87	29	0	3.05	511.17	506	12	3.22E-02	18.6	

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 pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.295E+02	3.296E+02	0.615E+02	18.68	
Total Activity :			3.295E+02	3.296E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	6.081E+02	6.081E+02	1.194E+02	19.64	
Total Activity :			6.081E+02	6.081E+02			

Grand Total Activity : 9.376E+02 9.377E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.295E+02	3.296E+02	18.68	OK
	302.84	17.80	6.222E+00	3.591E+02	3.591E+02	27.43	OK
	356.01	60.00	5.860E+00	3.847E+02	3.848E+02	17.27	OK

Final Mean for 3 Valid Peaks = 3.296E+02 +/- 6.155E+01 (18.68%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.081E+02	6.081E+02	19.64	OK

Final Mean for 1 Valid Peaks = 6.081E+02 +/- 1.194E+02 (19.64%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.296E+02	6.155E+01	1.778E+01	2.719E+00	18.535
TH-234	6.081E+02	1.194E+02	1.043E+02	5.601E+00	5.831

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.064E+00		6.633E+00	1.022E+01	1.167E+00	-0.202
CD-109	6.396E+00		1.135E+02	1.837E+02	1.515E+01	0.035
PA-231	2.120E+00		1.502E+00	3.002E+00	4.269E-02	0.706
PA-234	3.379E+00		1.413E+00	2.691E+00	3.827E-02	1.256
NP-237	4.240E+00		3.136E+01	5.141E+01	4.156E+00	0.082
AM-241	2.722E+01		8.504E+00	1.680E+01	8.261E-01	1.620