

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-07099-OR

August 12, 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 # 13-07099

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/16/13	KC	Sample Log-In
		8-5-13	JL	Data Compilation
		8-7-13	ML	First Technical Data Review
		8/7/13	MS	Second Technical Data Review
		8/7/13		Data Entry/Electronic Deliverable
		8/7/13		Case Narrative
		8/8/13	RBS	Electronic Deliverable Proof
		8/8/13	MS	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		8/8/13	MS	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by:

Laboratory Manager

Date

Copy No. _____

Radiochemistry Services

US EPA ARCHIVE DOCUMENT

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET



EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07099

Lab Deadline

See Comments

Analysis

UUISO - Level 4

Sample Matrix

WA

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location	
Re-Analysis: 2Fractions 04,06,08,10,12,14 & 16 are TOTAL Fractions 05,07,09,11,13,15 & 17 are DISSOLVED	04	40	T1.3	
	05	40	T1.3	
	06	46	T1.3	
	07	46	T1.3	
	08	43	T1.3	
	09	43	T1.3	
	10	45	T1.3	
	11	45	T1.3	
	12	41	T1.3	
	13	41	T1.3	
	14	41	T1.3	
	15	41	T1.3	
	16	41	T1.3	
	17	41	T1.3	

Original Lab Deadline: 08/13/13
Rerun Lab Deadline: 08/13/13 MUST USE Fxn 08 as DUP

	Location (circle one)					Technician Initials
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe 7/31/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe 7/31/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0500 PM 7/31/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0930 PM 8/2/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0900 8/2/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1013 8/2/13 1350
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	

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EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-07099
Lab Deadline	8/6/2013
Analysis	ThISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location	
<p>Fractions 04,06,08,10,12,14 & 16 are TOTAL</p> <p>Fractions 05,07,09,11,13,15 & 17 are DISSOLVED</p>	04	40	T1.3	
	05	40	T1.3	
	06	46	T1.3	
	07	46	T1.3	
	08	43	T1.3	
	09	43	T1.3	
	10	45	T1.3	
	11	45	T1.3	
	12	41	T1.3	
	13	41	T1.3	
	14	41	T1.3	
	15	41	T1.3	
	16	41	T1.3	
	17	41	T1.3	
	MUST USE Fxn 08 as DUP			

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

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SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07099

Lab Deadline

8/6/2013

Analysis

Ra226 - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location	
<p>Fractions 04,06,08,10,12,14 & 16 are TOTAL</p> <p>Fractions 05,07,09,11,13,15 & 17 are DISSOLVED</p>	04	40	T1.3	
	05	40	T1.3	
	06	46	T1.3	
	07	46	T1.3	
	08	43	T1.3	
	09	43	T1.3	
	10	45	T1.3	
	11	45	T1.3	
	12	41	T1.3	
	13	41	T1.3	
	14	41	T1.3	
	15	41	T1.3	
	16	41	T1.3	
	17	41	T1.3	

MUST USE Fxn 08 as DUP

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>J Wolfe</i>	7/23/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>J Wolfe</i>	7/24/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>JW</i>	7/24/13 1955
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>JW</i>	7/29/13 1825
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>J Wolfe</i>	7/17/13 0150
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>KB</i>	7/13/13 1420
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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EBERLINE
SERVICES
Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07099

Lab Deadline

8/6/2013

Analysis

Ra228 - Level 4


Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fractions 04,06,08,10,12,14 & 16 are TOTAL Fractions 05,07,09,11,13,15 & 17 are DISSOLVED	04	40	T1.3
	05	40	T1.3
	06	46	T1.3
	07	46	T1.3
	08	43	T1.3
	09	43	T1.3
	10	45	T1.3
	11	45	T1.3
	12	41	T1.3
	MUST USE Fxn 08 as DUP	13	41
14		41	T1.3
15		41	T1.3
16		41	T1.3
17		41	T1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/24/13 1100
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/24/13 1100
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/24/13 1955
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/24/13 1825
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	7/17/11 0700
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	7/31/13 1420
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 1220
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/5/13 0751
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	8/12/11
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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	Sample Receiving Report (Volumes, pH, & CPM)	Internal Work Order 13-07099
		Received By
		KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	T1.3		
02	BLANK	0		WA	T1.3		
03	DUP	0		WA	T1.3		
04	DUP 01 TOT	2		WA	T1.3	8.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	36
			2	<2	<2	4.0000	40
05	DUP 01 DIS	2		WA	T1.3	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
			2				40
06	PZ-201A-SS TOT	2		WA	T1.3	8.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	40
			2	<2	<2	4.0000	46
07	PZ-201A-SS DIS	2		WA	T1.3	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
			2				46
08	D-85 TOT	3		WA	T1.3	12.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	43
			2	<2	<2	4.0000	40
			3	<2	<2	4.0000	37
09	D-85 DIS	3		WA	T1.3	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
			2				40
			3				37
10	PZ-106-SD TOT	2		WA	T1.3	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	39
			2	<2	<2	4.0000	45
11	PZ-106-SD DIS	2		WA	T1.3	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				39
			2				45
12	S-84 TOT	2		WA	T1.3	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	35
			2	<2	<2	4.0000	41
13	S-84 DIS	2		WA	T1.3	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				35
			2				41
14	PZ-106-SS TOT	2		WA	T1.3	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	41
			2	<2	<2	4.0000	34
15	PZ-106-SS DIS	2		WA	T1.3	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
			2				34
16	PZ-113-AD TOT	2		WA	T1.3	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	41
			2	<2	<2	4.0000	34
17	PZ-113-AD DIS	2		WA	T1.3	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
			2				34

*Key
07/16/13*

Received by: *Kristen Coulston*

Date: 7/16/13

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SECTION II
SAMPLE ACKNOWLEDGEMENT

Client Name	Contract/PO	Project Type	Date Received	Required Turnaround Days	Eberline Services Work Order
Engineering Management Support, Inc.	West Lake OU-1	Environmental	07/15/2013	28	13-07099
Project Name	Client WO	Sample Disp	Lab Deadline	Internal Deadline	Client Deadline
West Lake OU-1	West Lake OU-1	W	08/06/2013	08/12/2013	08/13/2013

Internal ID	Client ID	Sample Date	Matrix	Storage	Ra228	Ra228	TNISO	UUISO																																		TU
01	LCS	07/16/13	WA	T1.3	X	X	X	X																																4		
02	BLANK	07/16/13	WA	T1.3	X	X	X	X																																	4	
03	DUP	07/16/13	WA	T1.3	X	X	X	X																																	4	
04	DUP 01 TOT	07/09/13 00:00	WA	T1.3	X	X	X	X																																	4	
05	DUP 01 DIS	07/09/13 00:00	WA	T1.3	X	X	X	X																																	4	
06	PZ-201A-SS TOT	07/10/13 10:23	WA	T1.3	X	X	X	X																																	4	
07	PZ-201A-SS DIS	07/10/13 10:23	WA	T1.3	X	X	X	X																																	4	
08	D-85 TOT	07/10/13 10:52	WA	T1.3	X	X	X	X																																	4	
09	D-85 DIS	07/10/13 10:52	WA	T1.3	X	X	X	X																																	4	
10	PZ-106-SD TOT	07/10/13 11:41	WA	T1.3	X	X	X	X																																	4	
11	PZ-106-SD DIS	07/10/13 11:41	WA	T1.3	X	X	X	X																																	4	
12	S-84 TOT	07/10/13 11:46	WA	T1.3	X	X	X	X																																	4	
13	S-84 DIS	07/10/13 11:46	WA	T1.3	X	X	X	X																																	4	
14	PZ-106-SS TOT	07/10/13 12:43	WA	T1.3	X	X	X	X																																	4	
15	PZ-106-SS DIS	07/10/13 12:43	WA	T1.3	X	X	X	X																																	4	
16	PZ-113-AD TOT	07/10/13 13:02	WA	T1.3	X	X	X	X																																	4	
17	PZ-113-AD DIS	07/10/13 13:02	WA	T1.3	X	X	X	X																																	4	
																																									0	
																																										0
																																										0
Totals Per Analysis (non QA samples)					14	14	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		



EBERLINE SERVICES

Sample Log In Report

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

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

Invoice

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

Voice 303-640-3426
 Fax

Contact

Lyn Fitzgerald
 Voice 303-601-4255
 Fax

Report Data

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

Voice 303-940-3426
 Fax



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST
MP-001-2

WORK ORDER # 13-07099

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 Corbett DATE: 7/16/13

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**SECTION III
CASE NARRATIVE**



EBS-OR-35932

August 12, 2013

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

CASE NARRATIVE
Work Order # 13-07099-OR

SAMPLE RECEIPT

This work order contains seven 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 01 TOT	13-07099-04	PZ-106-SD DIS	13-07099-11
DUP 01 DIS	13-07099-05	S-84 TOT	13-07099-12
PZ-201A-SS TOT	13-07099-06	S-84 DIS	13-07099-13
PZ-201A-SS DIS	13-07099-07	PZ-106-SS TOT	13-07099-14
D-85 TOT	13-07099-08	PZ-106-SS DIS	13-07099-15
D-85 DIS	13-07099-09	PZ-113-AD TOT	13-07099-16
PZ-106-SD TOT	13-07099-10	PZ-113-AD DIS	13-07099-17

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

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ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

Samples were 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.

2nd Analytical Attempt

Due to low chemical recoveries for most samples, all samples were reanalyzed. These samples appear to contain an elemental interference. Samples demonstrated acceptable results for most Uranium reanalyses; however, chemical recovery was slightly low for sample fractions -04, -05, -08, -13 and -16 (Client IDs: DUP 01 TOT, DUP 01 DIS, D-85 TOT, S-84 DIS and PZ-113-AD TOT, respectively). This caused slightly high method detection limits for sample fractions -04, -05 and -16 (Client IDs: DUP 01 TOT, DUP 01 DIS and PZ-113-AD TOT). Due to limited sample volume a third analytical attempt was not possible. 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, Thorium-230 and Thorium-232 method blank demonstrated acceptable results. Results for the Thorium-228, Thorium-230 and 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.

ANALYTICAL RESULTS CONTINUED

RADIUM-226 CONTINUED

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

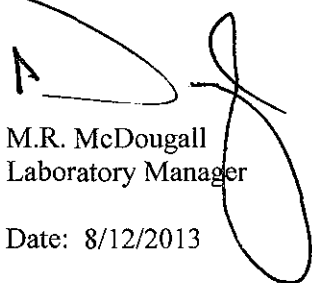
RADIUM-228

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 slightly low for sample fractions -03 and -08 (Client ID: D-85 TOT DUP & DO). Chemical recovery was acceptable for all other samples. The Radium-228 method blank demonstrated acceptable results. Results for the Radium-228 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 8/12/2013

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>
LCS13-07099-01	13-07099-01	07/31/2013 12:14:50	Radium-226	E903.0	10.93	1.42	2.71	0.18		pCi/l
LCS13-07099-01	13-07099-01	08/05/2013 08:01:31	Radium-228	E904.0	9.19	0.92	2.28	1.15		pCi/l
LCS13-07099-01	13-07099-01	07/28/2013 11:07:29	Thorium-228	HASL 300, 4.5.2	5.14	0.77	0.91	0.10		pCi/l
LCS13-07099-01	13-07099-01	07/28/2013 11:07:29	Thorium-230	HASL 300, 4.5.2	4.48	0.69	0.89	0.06		pCi/l
LCS13-07099-01	13-07099-01	07/28/2013 11:07:29	Thorium-232	HASL 300, 4.5.2	5.12	0.77	0.89	0.07		pCi/l
LCS13-07099-01	13-07099-01	08/02/2013 09:43:47	Uranium-234	HASL 300, 4.5.2	7.86	1.27	1.39	0.10		pCi/l
LCS13-07099-01	13-07099-01	08/02/2013 09:43:47	Uranium-235	HASL 300, 4.5.2	1.74	0.46	0.48	0.15		pCi/l
LCS13-07099-01	13-07099-01	08/02/2013 09:43:47	Uranium-238	HASL 300, 4.5.2	8.73	1.38	1.52	0.09		pCi/l
BLANK13-07099-02	13-07099-02	07/31/2013 12:15:19	Radium-226	E903.0	0.10	0.13	0.13	0.21	U	pCi/l
BLANK13-07099-02	13-07099-02	08/05/2013 08:01:32	Radium-228	E904.0	0.90	0.49	0.53	0.94	J	pCi/l
BLANK13-07099-02	13-07099-02	07/28/2013 11:07:30	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.06	0.12	U	pCi/l
BLANK13-07099-02	13-07099-02	07/28/2013 11:07:30	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.09	0.10	J	pCi/l
BLANK13-07099-02	13-07099-02	07/28/2013 11:07:30	Thorium-232	HASL 300, 4.5.2	0.07	0.06	0.06	0.06	J	pCi/l
BLANK13-07099-02	13-07099-02	08/02/2013 09:43:48	Uranium-234	HASL 300, 4.5.2	0.33	0.17	0.18	0.11		pCi/l
BLANK13-07099-02	13-07099-02	08/02/2013 09:43:48	Uranium-235	HASL 300, 4.5.2	0.08	0.11	0.11	0.16	U	pCi/l
BLANK13-07099-02	13-07099-02	08/02/2013 09:43:48	Uranium-238	HASL 300, 4.5.2	0.08	0.09	0.09	0.11	U	pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	07/31/2013 12:15:20	Radium-226	E903.0	6.23	1.28	1.84	0.32		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	08/05/2013 08:01:32	Radium-228	E904.0	6.34	2.24	2.66	4.10		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	07/28/2013 11:07:23	Thorium-228	HASL 300, 4.5.2	2.48	0.55	0.60	0.13		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	07/28/2013 11:07:23	Thorium-230	HASL 300, 4.5.2	4.31	0.86	1.01	0.09		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	07/28/2013 11:07:23	Thorium-232	HASL 300, 4.5.2	2.29	0.52	0.56	0.06		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	08/02/2013 09:43:50	Uranium-234	HASL 300, 4.5.2	2.57	0.92	0.93	0.32		pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	08/02/2013 09:43:50	Uranium-235	HASL 300, 4.5.2	0.64	0.47	0.47	0.34	J	pCi/l
D-85 TOT_07_10_2013 DUP	13-07099-03	08/02/2013 09:43:50	Uranium-238	HASL 300, 4.5.2	2.37	0.87	0.89	0.28		pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	07/31/2013 12:15:21	Radium-226	E903.0	1.18	0.45	0.52	0.21		pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	08/05/2013 08:01:33	Radium-228	E904.0	2.38	0.60	0.81	0.99		pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	07/28/2013 11:07:24	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.05	0.08	U	pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	07/28/2013 11:07:24	Thorium-230	HASL 300, 4.5.2	0.19	0.10	0.10	0.07		pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	07/28/2013 11:07:24	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.03	0.05	U	pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	08/02/2013 09:43:51	Uranium-234	HASL 300, 4.5.2	1.02	1.00	1.01	1.04	J	pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	08/02/2013 09:43:51	Uranium-235	HASL 300, 4.5.2	0.40	0.77	0.77	1.41	U	pCi/l
DUP 01 TOT_07_09_2013	13-07099-04	08/02/2013 09:43:51	Uranium-238	HASL 300, 4.5.2	0.58	0.76	0.76	1.04	U	pCi/l



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Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
DUP 01 DIS_07_09_2013	13-07099-05	07/31/2013 12:15:22	Radium-226	E903.0	1.56	0.58	0.67	0.36		pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	08/05/2013 08:01:36	Radium-228	E904.0	2.23	0.69	0.85	1.22		pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	07/28/2013 11:07:25	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.10	U	pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	07/28/2013 11:07:25	Thorium-230	HASL 300, 4.5.2	0.20	0.13	0.13	0.09	J	pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	07/28/2013 11:07:25	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.04	0.08	U	pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	08/02/2013 09:43:53	Uranium-234	HASL 300, 4.5.2	0.78	1.05	1.05	1.56	U	pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	08/02/2013 09:43:53	Uranium-235	HASL 300, 4.5.2	-0.05	0.64	0.64	1.34	U	pCi/l
DUP 01 DIS_07_09_2013	13-07099-05	08/02/2013 09:43:53	Uranium-238	HASL 300, 4.5.2	0.00	0.72	0.72	1.55	U	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	07/31/2013 12:15:23	Radium-226	E903.0	0.50	0.28	0.30	0.24	J	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	08/05/2013 08:01:37	Radium-228	E904.0	1.16	0.64	0.69	1.23	J	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	07/28/2013 11:07:26	Thorium-228	HASL 300, 4.5.2	0.00	0.06	0.06	0.14	U	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	07/28/2013 11:07:26	Thorium-230	HASL 300, 4.5.2	0.22	0.13	0.13	0.09		pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	07/28/2013 11:07:26	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.08	U	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	08/02/2013 09:43:54	Uranium-234	HASL 300, 4.5.2	3.12	0.90	0.93	0.30		pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	08/02/2013 09:43:54	Uranium-235	HASL 300, 4.5.2	0.64	0.41	0.42	0.35	J	pCi/l
PZ-201A-SS TOT_07_10_2013	13-07099-06	08/02/2013 09:43:54	Uranium-238	HASL 300, 4.5.2	1.91	0.70	0.71	0.48		pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	07/31/2013 12:15:24	Radium-226	E903.0	0.37	0.25	0.26	0.29	J	pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	08/05/2013 08:01:37	Radium-228	E904.0	0.77	0.51	0.54	0.99	J	pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	07/28/2013 11:07:27	Thorium-228	HASL 300, 4.5.2	-0.02	0.05	0.05	0.15	U	pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	07/28/2013 11:07:27	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.09	0.08	J	pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	07/28/2013 11:07:27	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.04	0.08	U	pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	08/02/2013 09:43:55	Uranium-234	HASL 300, 4.5.2	2.85	0.82	0.85	0.22		pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	08/02/2013 09:43:55	Uranium-235	HASL 300, 4.5.2	1.03	0.50	0.51	0.24		pCi/l
PZ-201A-SS DIS_07_10_2013	13-07099-07	08/02/2013 09:43:55	Uranium-238	HASL 300, 4.5.2	1.36	0.54	0.55	0.29		pCi/l
D-85 TOT_07_10_2013	13-07099-08	07/31/2013 12:15:25	Radium-226	E903.0	4.64	1.01	1.41	0.33		pCi/l
D-85 TOT_07_10_2013	13-07099-08	08/05/2013 08:01:38	Radium-228	E904.0	4.91	2.02	2.31	3.81	J	pCi/l
D-85 TOT_07_10_2013	13-07099-08	07/28/2013 11:07:28	Thorium-228	HASL 300, 4.5.2	2.68	0.86	0.90	0.13		pCi/l
D-85 TOT_07_10_2013	13-07099-08	07/28/2013 11:07:28	Thorium-230	HASL 300, 4.5.2	4.26	1.25	1.35	0.19		pCi/l
D-85 TOT_07_10_2013	13-07099-08	07/28/2013 11:07:28	Thorium-232	HASL 300, 4.5.2	2.50	0.81	0.84	0.13		pCi/l
D-85 TOT_07_10_2013	13-07099-08	08/02/2013 09:43:57	Uranium-234	HASL 300, 4.5.2	2.95	1.26	1.27	0.44		pCi/l
D-85 TOT_07_10_2013	13-07099-08	08/02/2013 09:43:57	Uranium-235	HASL 300, 4.5.2	1.31	0.89	0.90	0.78	J	pCi/l
D-85 TOT_07_10_2013	13-07099-08	08/02/2013 09:43:57	Uranium-238	HASL 300, 4.5.2	2.39	1.11	1.12	0.50		pCi/l



<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>
D-85 DIS_07_10_2013	13-07099-09	07/31/2013 12:15:26	Radium-226	E903.0	1.56	0.60	0.68	0.49		pCi/l
D-85 DIS_07_10_2013	13-07099-09	08/05/2013 08:01:29	Radium-228	E904.0	4.80	0.89	1.40	1.40		pCi/l
D-85 DIS_07_10_2013	13-07099-09	07/28/2013 11:08:28	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.11	U	pCi/l
D-85 DIS_07_10_2013	13-07099-09	07/28/2013 11:08:28	Thorium-230	HASL 300, 4.5.2	0.06	0.07	0.07	0.08	U	pCi/l
D-85 DIS_07_10_2013	13-07099-09	07/28/2013 11:08:28	Thorium-232	HASL 300, 4.5.2	0.05	0.07	0.07	0.10	U	pCi/l
D-85 DIS_07_10_2013	13-07099-09	08/02/2013 09:43:59	Uranium-234	HASL 300, 4.5.2	1.05	0.48	0.48	0.21		pCi/l
D-85 DIS_07_10_2013	13-07099-09	08/02/2013 09:43:59	Uranium-235	HASL 300, 4.5.2	0.36	0.30	0.30	0.26	J	pCi/l
D-85 DIS_07_10_2013	13-07099-09	08/02/2013 09:43:59	Uranium-238	HASL 300, 4.5.2	0.40	0.30	0.30	0.30	J	pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	07/31/2013 12:15:27	Radium-226	E903.0	0.66	0.30	0.33	0.23		pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	08/05/2013 08:01:30	Radium-228	E904.0	1.62	0.79	0.87	1.52	J	pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	07/28/2013 11:08:30	Thorium-228	HASL 300, 4.5.2	-0.01	0.03	0.03	0.07	U	pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	07/28/2013 11:08:30	Thorium-230	HASL 300, 4.5.2	0.18	0.11	0.11	0.06		pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	07/28/2013 11:08:30	Thorium-232	HASL 300, 4.5.2	0.08	0.07	0.07	0.07	J	pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	08/02/2013 09:44:00	Uranium-234	HASL 300, 4.5.2	1.11	0.53	0.53	0.33		pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	08/02/2013 09:44:00	Uranium-235	HASL 300, 4.5.2	0.62	0.44	0.44	0.41	J	pCi/l
PZ-106-SD TOT_07_10_2013	13-07099-10	08/02/2013 09:44:00	Uranium-238	HASL 300, 4.5.2	0.77	0.42	0.43	0.23		pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	07/31/2013 12:15:28	Radium-226	E903.0	0.80	0.42	0.45	0.41	J	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	08/05/2013 08:01:30	Radium-228	E904.0	1.79	0.76	0.86	1.44	J	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	07/28/2013 11:08:24	Thorium-228	HASL 300, 4.5.2	-0.01	0.03	0.03	0.08	U	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	07/28/2013 11:08:24	Thorium-230	HASL 300, 4.5.2	0.04	0.05	0.05	0.08	U	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	07/28/2013 11:08:24	Thorium-232	HASL 300, 4.5.2	0.01	0.04	0.04	0.09	U	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	08/02/2013 09:44:02	Uranium-234	HASL 300, 4.5.2	1.24	0.54	0.55	0.31		pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	08/02/2013 09:44:02	Uranium-235	HASL 300, 4.5.2	0.64	0.42	0.43	0.38	J	pCi/l
PZ-106-SD DIS_07_10_2013	13-07099-11	08/02/2013 09:44:02	Uranium-238	HASL 300, 4.5.2	0.10	0.18	0.18	0.31	U	pCi/l
S-84 TOT_07_10_2013	13-07099-12	07/31/2013 12:15:58	Radium-226	E903.0	1.30	0.54	0.61	0.27		pCi/l
S-84 TOT_07_10_2013	13-07099-12	08/05/2013 08:02:47	Radium-228	E904.0	2.88	0.79	1.02	1.36		pCi/l
S-84 TOT_07_10_2013	13-07099-12	07/28/2013 11:08:25	Thorium-228	HASL 300, 4.5.2	0.56	0.26	0.26	0.11		pCi/l
S-84 TOT_07_10_2013	13-07099-12	07/28/2013 11:08:25	Thorium-230	HASL 300, 4.5.2	0.70	0.29	0.30	0.10		pCi/l
S-84 TOT_07_10_2013	13-07099-12	07/28/2013 11:08:25	Thorium-232	HASL 300, 4.5.2	0.62	0.27	0.28	0.11		pCi/l
S-84 TOT_07_10_2013	13-07099-12	08/02/2013 10:40:25	Uranium-234	HASL 300, 4.5.2	1.33	0.74	0.75	0.48		pCi/l
S-84 TOT_07_10_2013	13-07099-12	08/02/2013 10:40:25	Uranium-235	HASL 300, 4.5.2	0.39	0.45	0.45	0.59	U	pCi/l
S-84 TOT_07_10_2013	13-07099-12	08/02/2013 10:40:25	Uranium-238	HASL 300, 4.5.2	1.32	0.74	0.74	0.48		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>
S-84 DIS_07_10_2013	13-07099-13	07/31/2013 12:16:00	Radium-226	E903.0	0.67	0.32	0.35	0.17		pCi/l
S-84 DIS_07_10_2013	13-07099-13	08/05/2013 08:02:47	Radium-228	E904.0	3.35	0.68	1.02	1.08		pCi/l
S-84 DIS_07_10_2013	13-07099-13	07/28/2013 11:08:27	Thorium-228	HASL 300, 4.5.2	0.10	0.07	0.07	0.07	J	pCi/l
S-84 DIS_07_10_2013	13-07099-13	07/28/2013 11:08:27	Thorium-230	HASL 300, 4.5.2	0.16	0.09	0.09	0.06		pCi/l
S-84 DIS_07_10_2013	13-07099-13	07/28/2013 11:08:27	Thorium-232	HASL 300, 4.5.2	0.04	0.04	0.04	0.05	U	pCi/l
S-84 DIS_07_10_2013	13-07099-13	08/02/2013 10:40:26	Uranium-234	HASL 300, 4.5.2	1.69	1.02	1.02	0.91	J	pCi/l
S-84 DIS_07_10_2013	13-07099-13	08/02/2013 10:40:26	Uranium-235	HASL 300, 4.5.2	1.00	0.86	0.86	0.97	J	pCi/l
S-84 DIS_07_10_2013	13-07099-13	08/02/2013 10:40:26	Uranium-238	HASL 300, 4.5.2	0.42	0.48	0.48	0.62	U	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	07/31/2013 12:15:53	Radium-226	E903.0	3.31	0.69	0.98	0.20		pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	08/05/2013 08:02:47	Radium-228	E904.0	0.85	0.65	0.68	1.30	J	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	07/28/2013 11:08:34	Thorium-228	HASL 300, 4.5.2	0.04	0.07	0.07	0.12	U	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	07/28/2013 11:08:34	Thorium-230	HASL 300, 4.5.2	0.07	0.08	0.08	0.10	U	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	07/28/2013 11:08:34	Thorium-232	HASL 300, 4.5.2	0.06	0.08	0.08	0.11	U	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	08/02/2013 10:40:18	Uranium-234	HASL 300, 4.5.2	1.18	0.52	0.53	0.34		pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	08/02/2013 10:40:18	Uranium-235	HASL 300, 4.5.2	0.37	0.33	0.33	0.39	J	pCi/l
PZ-106-SS TOT_07_10_2013	13-07099-14	08/02/2013 10:40:18	Uranium-238	HASL 300, 4.5.2	0.59	0.36	0.37	0.33	J	pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	07/31/2013 12:15:54	Radium-226	E903.0	3.55	0.70	1.03	0.17		pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	08/05/2013 08:02:48	Radium-228	E904.0	1.08	0.63	0.68	1.22	J	pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	07/28/2013 11:08:36	Thorium-228	HASL 300, 4.5.2	0.05	0.05	0.05	0.06	U	pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	07/28/2013 11:08:36	Thorium-230	HASL 300, 4.5.2	0.20	0.11	0.11	0.08		pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	07/28/2013 11:08:36	Thorium-232	HASL 300, 4.5.2	0.04	0.04	0.05	0.05	U	pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	08/02/2013 10:40:19	Uranium-234	HASL 300, 4.5.2	1.94	0.62	0.64	0.20		pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	08/02/2013 10:40:19	Uranium-235	HASL 300, 4.5.2	0.62	0.37	0.37	0.22		pCi/l
PZ-106-SS DIS_07_10_2013	13-07099-15	08/02/2013 10:40:19	Uranium-238	HASL 300, 4.5.2	0.54	0.31	0.31	0.20		pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	07/31/2013 12:15:56	Radium-226	E903.0	2.85	0.83	1.03	0.35		pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	08/05/2013 08:02:54	Radium-228	E904.0	5.11	0.75	1.38	1.11		pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	07/28/2013 11:08:31	Thorium-228	HASL 300, 4.5.2	0.20	0.11	0.11	0.07		pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	07/28/2013 11:08:31	Thorium-230	HASL 300, 4.5.2	0.10	0.08	0.08	0.08	J	pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	07/28/2013 11:08:31	Thorium-232	HASL 300, 4.5.2	-0.04	0.04	0.04	0.14	U	pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	08/02/2013 10:40:20	Uranium-234	HASL 300, 4.5.2	1.92	1.49	1.49	1.02	J	pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	08/02/2013 10:40:20	Uranium-235	HASL 300, 4.5.2	0.15	0.62	0.62	1.59	U	pCi/l
PZ-113-AD TOT_07_10_2013	13-07099-16	08/02/2013 10:40:20	Uranium-238	HASL 300, 4.5.2	0.16	0.50	0.50	1.17	U	pCi/l



EBERLINE ANALYTICAL CORPORATION

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

0022

<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>
PZ-113-AD DIS_07_10_2013	13-07099-17	07/31/2013 12:16:02	Radium-226	E903.0	2.56	0.70	0.88	0.27		pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	08/05/2013 08:02:54	Radium-228	E904.0	6.09	0.84	1.61	1.18		pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	07/28/2013 11:08:33	Thorium-228	HASL 300, 4.5.2	0.08	0.10	0.10	0.15	U	pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	07/28/2013 11:08:33	Thorium-230	HASL 300, 4.5.2	0.12	0.10	0.10	0.11	J	pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	07/28/2013 11:08:33	Thorium-232	HASL 300, 4.5.2	-0.01	0.04	0.04	0.11	U	pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	08/02/2013 10:40:21	Uranium-234	HASL 300, 4.5.2	0.56	0.36	0.36	0.30	J	pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	08/02/2013 10:40:21	Uranium-235	HASL 300, 4.5.2	0.35	0.33	0.33	0.38	J	pCi/l
PZ-113-AD DIS_07_10_2013	13-07099-17	08/02/2013 10:40:21	Uranium-238	HASL 300, 4.5.2	0.20	0.24	0.24	0.35	U	pCi/l



SECTION V
ANALYTICAL STANDARDS

QA/QC REVIEWED

Date 1/16/95 Initials [initials]

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

U-8

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

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

Description of Solution

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

Radioimpurities Refer to attached technical data sheet

Radioactive Daughters Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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

[Signature]
ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed



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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

Half Life, Years

Half Life, Days

^{234, 235, 238}U

4.468E+09

1.632E+12

Radionuclide ^{234, 235, 238}U

Reference Date 1/1/1995 0:00

Certified Activity 8.016E+00 μCi

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

Ampoule /Solution Gross 97.6400 Weight, Grams

Empty Ampoule 32.5020 Weight, Grams

Solution Net 65.1380 Weight, Grams

Total Activity in Ampoule 8.0160 μCi

Chemical Composition of Standard Solution

Uranyl nitrate in dilute HNO₃

Dilution Instructions:

Dilution Solvent Used

1M HNO₃

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 8.0160 μCi

Which Equals

1.780E+07 dpm at the date listed above

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

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

Expiration Date: September 6, 2013

Verified & Approved By

Date: 9/26/2012 0:00

QC Approval

Date: 9/26/12



QUALITY CONTROL PROGRAM
MP-009

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

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

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

Radionuclide of Interest ^{234, 235, 238}U Reference Date 1/1/1995 0:00
Parent Solution Conc. 1.7796E+04 dpm/ml

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

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

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

Expiration Date: September 6, 2013

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

Date: 9/26/2012 0:00
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 5.35€ grams
Volume of solution 5.035 millilitres
Total activity of U-232 3.61E+04 becquerels
which is equivalent to 9.76E-01 microcuries

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

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

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

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

Not measured

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

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

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

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

Approved
Signatory



Roger Wiltshire

Project Ref. AE2315

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



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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 $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution

²³²U(NO₃)₆ in 2M HNO₃


Dilution Instructions: Dilution Solvent Used 2M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: December 7, 2013

Verified & Approved By 

Date: 12/13/2012 0:00

QC Approval 

Date: 12/13/12

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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 STANDARD SOLUTIONS
SECONDARY DILUTION RECERTIFICATION

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

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

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

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


SECONDARY VOLUMETRIC DILUTION


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

NOTES:

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

Expiration Date: December 7, 2013

Verified & Approved By 

QC Approval 

Date: 12/13/2012 0:00

Date: 12/13/12

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

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Received
OCT 14 1991
TMA/Eberline
Oak Ridge Lab

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

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

Description of Solution

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

Radioimpurities

See attached technical data sheet

Radioactive Daughters

See attached technical data sheet

Radionuclide Concentration

0.207 μ Ci/gram.

Method of Calibration

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

Uncertainty of Measurement

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

NIST Traceability

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

Notes

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



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[Signature]
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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 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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Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

Chemical Composition of Standard Solution

²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions: Dilution Solvent Used 0.1N HNO₃

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360 μCi Which Equals 2.300E+06 dpm at the date listed above

And after dilution the activity of this solution is 2.300E+03 dpm/ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: March 4, 2014

Recertified By [Signature]
QC Approval [Signature]

Date: 3/21/2013 0:00

Date: 3/21/13

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Description of Solution

- | | |
|----------------------|---|
| a. Mass of solution: | 11.9712 g (in a 10 ml flame sealed ampoule) |
| b. Chemical form: | Th(NO ₃) ₄ in water |
| c. Carrier content: | None added |
| d. Density: | Approx. 1.21 g/ml @ 20°C. |

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

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

Radionuclide Concentration

(Th-232) 0.00779 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



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Arma U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed



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 11/1/1993 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

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

	MP-009	Date	11/9/2012 0:00
Solution Reference #	IPL 435-104-2	Solution #	Th-8b
Principal Radionuclide	Half Life, Years	Half Life, Days	
²²⁸ & ²³² Th	1.405E+10	5.132E+12	

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

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

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid


SECONDARY VOLUMETRIC DILUTION


Vol. Parent Solution:	500.0000 ml	Final Activity Concentration:	1.0355E+02 dpm/ml
Total Activity:	1.0355E+05 dpm		
Final Volume:	1000.00 ml		

NOTES:

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

Expiration Date: October 9, 2013

Verified & Approved By 

QC Approval 

Date: 11/9/2012 0:00

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661•309•1010
Fax 661•257•8303

Th-18

**CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION**

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

Physical Description:

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

Radioimpurities:

None detected (daughters in equilibrium)

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

Method of Calibration:

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

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

Uncertainty of Measurement:

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

Notes:

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

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



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

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

Dilution Instructions: Dilution Solvent Used 0.1 M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

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

Expiration Date: October 9, 2013

Verified & Approved By 

Date: 11/9/2012 0:00

QC Approval 

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM
MP-009

Rev.7: 9/29/99
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	Half Life, Years	Half Life, Days		
²²⁹ Th	7.340E+03	2.681E+06		
Radionuclide of Interest		Reference Date	1/15/2002 0:00	
²²⁹ Th				
Parent Solution Conc.	2.25E+03 dpm/ml			
Chemical Composition of Standard Solution				
TH(NO ₃) ₄ in 0.1M HNO ₃				

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

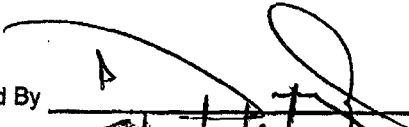

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	10.0000 ml	Final Activity Concentration:	2.2490E+01 dpm/ml
Total Activity:	2.2490E+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: October 9, 2013

Verified & Approved By 
QC Approval 

Date: 11/9/2012 0:00

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



Ba-6
(#6a)

National Institute of Standards & Technology

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

ORIGINAL

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

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	UIISO	2	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	0.44	96.18%	17.67%	100.00%	3.60%	8.17E+00	2.94E-01	7.86E+00	1.39E+00	U-8a	3.52E+01	3.60E+00	5.15E-01
U-238	0.98	109.58%	17.38%	100.00%	3.60%	7.97E+00	2.87E-01	8.73E+00	1.52E+00	U-8a	3.44E+01	3.60E+00	5.15E-01

Matrix Spike

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

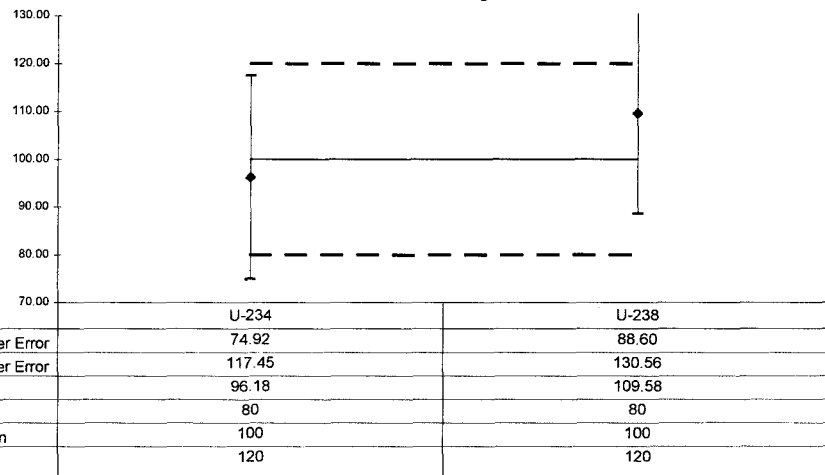
Replicate Sample

QC Summary

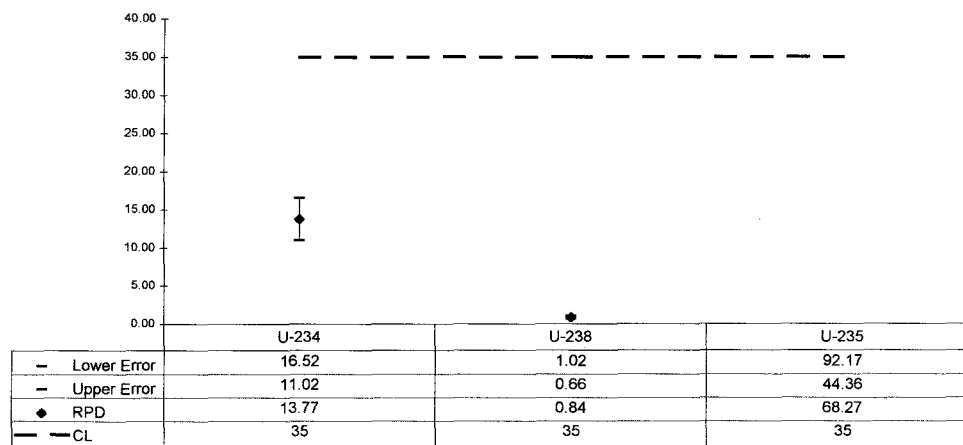
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.47	13.77	2.95E+00	1.27E+00	2.57E+00	9.35E-01	0.96	OK	OK			NA	OK
U-238	0.03	0.84	2.39E+00	1.12E+00	2.37E+00	8.87E-01	1.10	OK	OK			NA	OK
U-235	1.29	68.27	1.31E+00	8.97E-01	6.43E-01	4.70E-01		OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	UIISO	2	pCi	I	Engineering Management Support, Inc.

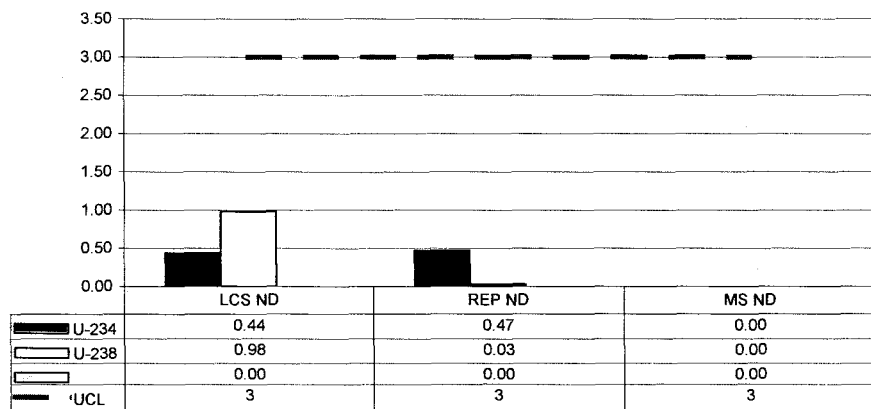
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

0013

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	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	0.59	105.71%	17.76%	100.00%	3.60%	4.87E+00	1.75E-01	5.14E+00	9.13E-01	Th-8b	1.04E+02	3.60E+00	1.04E-01
TH-230	2.21	81.62%	19.81%	100.00%	2.70%	5.48E+00	1.48E-01	4.48E+00	8.87E-01	Th-1b	2.35E+01	2.70E+00	5.18E-01
TH-232	0.56	105.27%	17.44%	100.00%	3.60%	4.87E+00	1.75E-01	5.12E+00	8.93E-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)

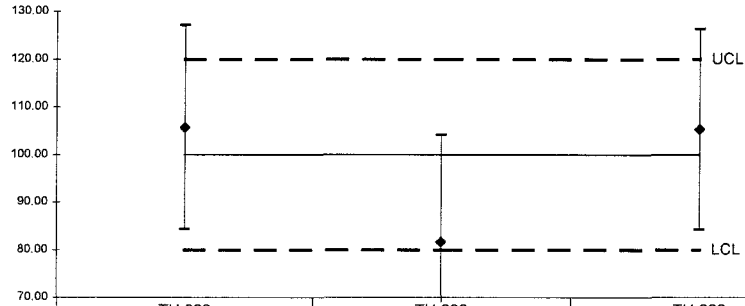
Replicate Sample

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	0.36	7.61	2.68E+00	8.96E-01	2.48E+00	6.01E-01	1.06	OK	OK			NA	OK
TH-230	0.05	1.01	4.26E+00	1.35E+00	4.31E+00	1.01E+00	0.82	OK	OK			NA	OK
TH-232	0.40	8.55	2.50E+00	8.42E-01	2.29E+00	5.56E-01	1.05	OK	OK			NA	OK

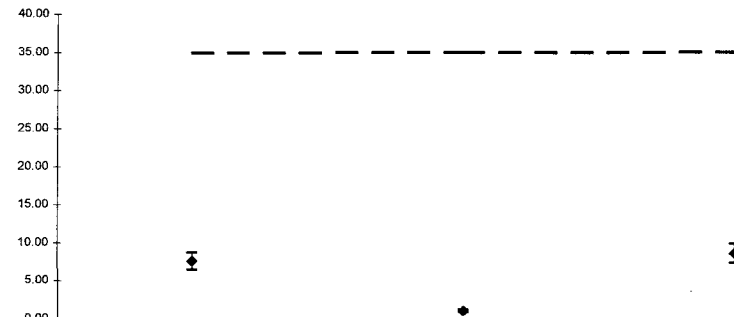
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



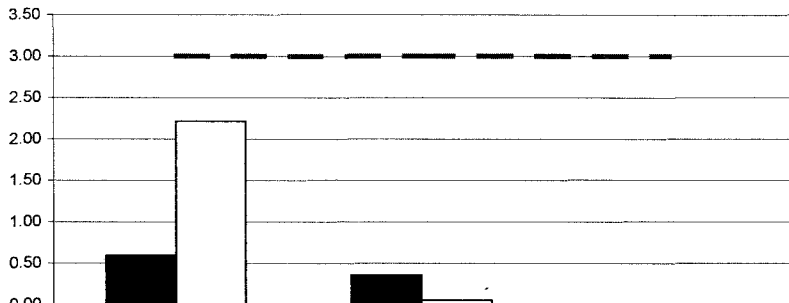
	TH-228	TH-230	TH-232
- Lower Error	84.36	59.12	84.24
- Upper Error	127.07	104.13	126.31
◆ %R	105.71	81.62	105.27
- LCL	80	80	80
- Mean	100	100	100
- UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
- Lower Error	8.72	1.15	9.80
- Upper Error	6.51	0.87	7.31
◆ RPD	7.61	1.01	8.55
- CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
■ TH-228	0.59	0.36	0.00
□ TH-230	2.21	0.05	0.00
- UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	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	0.43	105.80%	24.80%	100.00%	4.60%	1.03E+01	4.75E-01	1.09E+01	2.71E+00	Ra-5b	4.41E+01	4.60E+00	5.21E-01

Matrix Spike

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

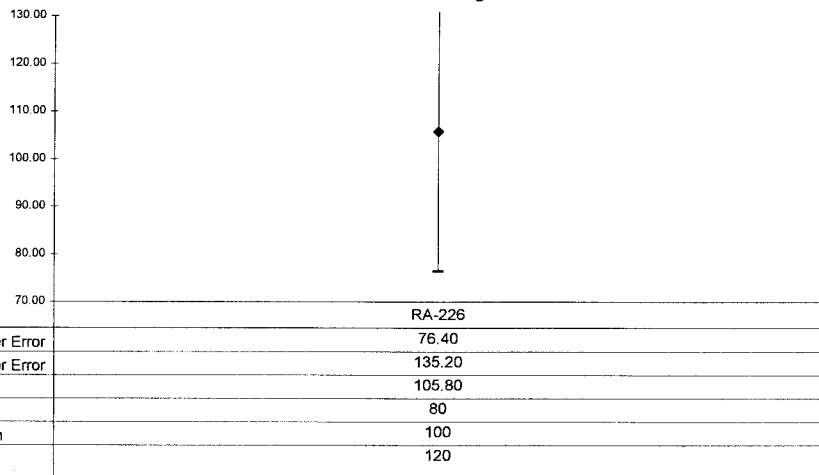
Replicate Sample

QC Summary

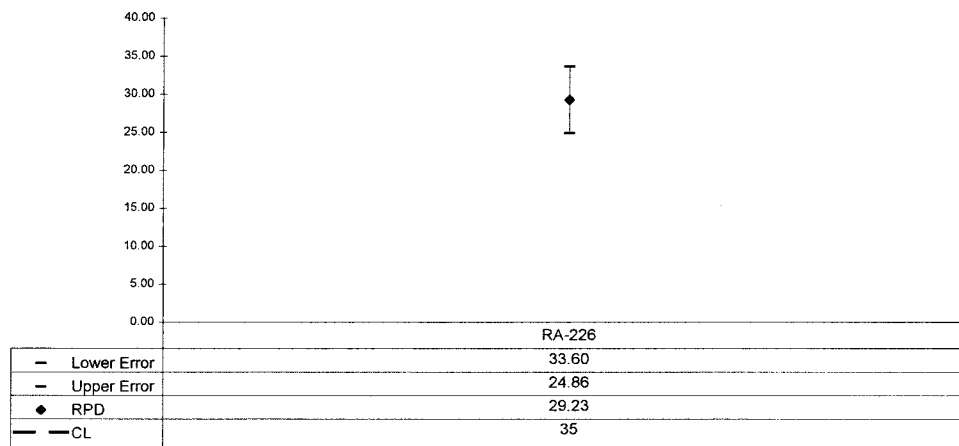
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	1.34	29.23	4.64E+00	1.41E+00	6.23E+00	1.84E+00	1.06	OK	OK			INV	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	Ra226	1	pCi	I	Engineering Management Support, Inc.

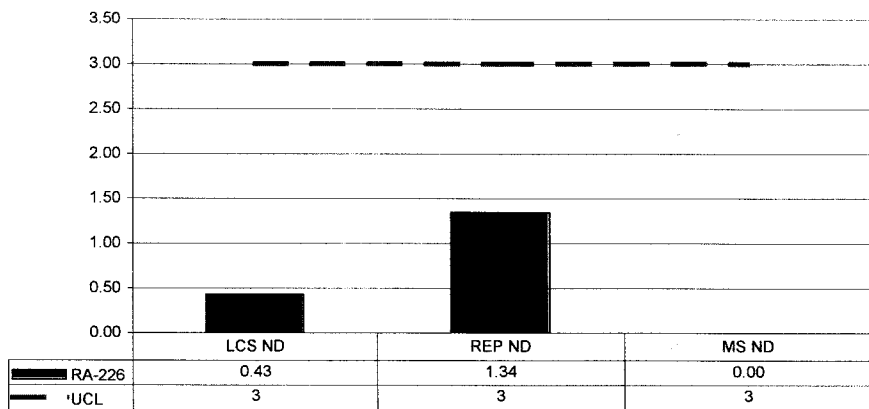
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	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	0.34	104.48%	24.78%	100.00%	5.10%	8.79E+00	4.48E-01	9.19E+00	2.28E+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)

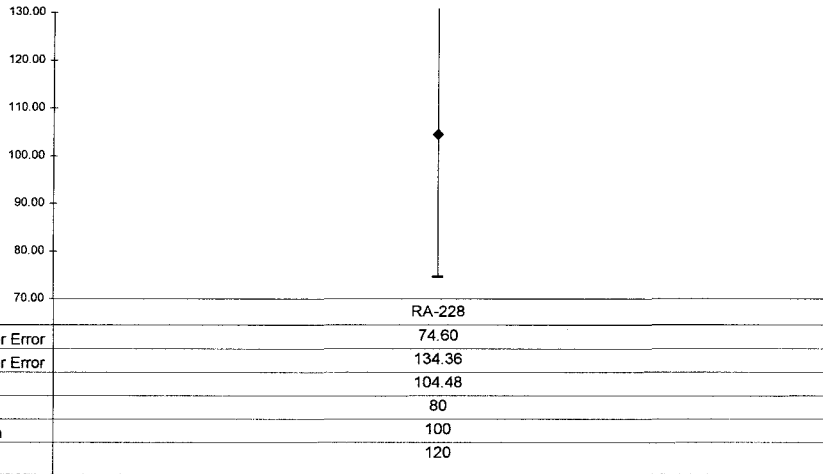
Replicate Sample

QC Summary

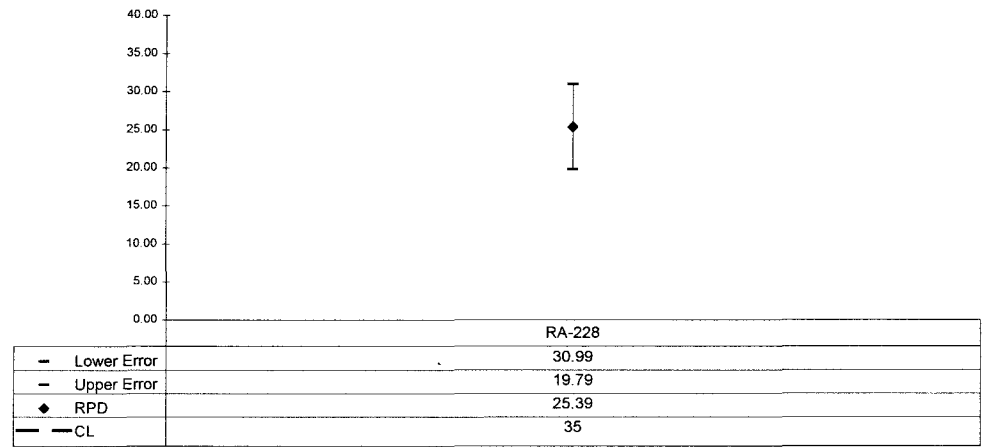
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.80	25.39	4.91E+00	2.31E+00	6.34E+00	2.66E+00	1.04	OK	OK			INV	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07099	Ra228	1	pCi	I	Engineering Management Support, Inc.

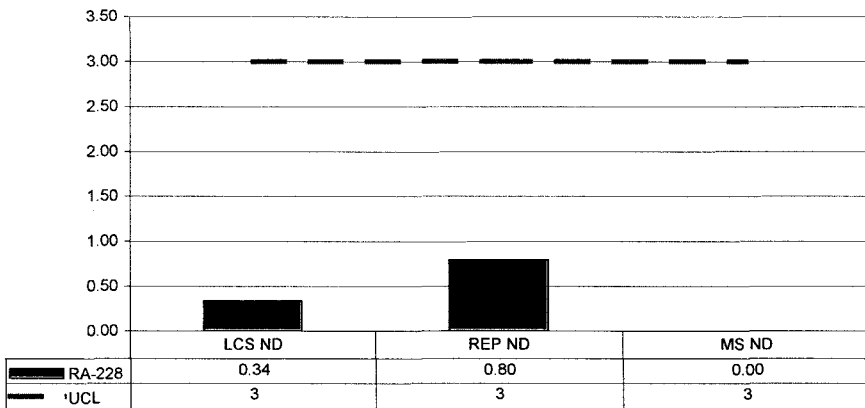
LCS % Recovery



Replicate Sample RPD



Normalized Difference




No Matrix Spike

SECTION VII
LABORATORY TECHNICIAN'S NOTES

ISO U NOTES


3

 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	13-07099
		Analysis Code	UISO
		Run Number	2

#	Date	Dept	User	Notes
1	07/30/13 10:22	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,8,9,12,13,16 AND 17 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN


J Wolfe
7/30/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	UUISO
		Run Number	2

#	Date	Dept	User	Notes
1	07/30/13 10:22	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,8,9,12,13,16 AND 17 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/01/13 17:08	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
8/1/13

 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	13-07099
		Analysis Code	UUISO
		Run Number	2

#	Date	Dept	User	Notes
1	07/30/13 10:22	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 4,5,8,9,12,13,16 AND 17 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/01/13 17:08	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	08/02/13 06:32	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.

US EPA ARCHIVE DOCUMENT


 8/2/13



Reagents Used in an Analysis

Internal Work Order

13-07099

Analysis Code

Run

UUISO

2

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/30/2013
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	8/1/2013
014204S	HCl - HF	6.5N - 0.04N	JDEMELAS	8/1/2013
014142D01	Hydrochloric Acid	0.5N	JDEMELAS	8/1/2013
014199S	Hydrochloric Acid	6.5N	JDEMELAS	8/1/2013
014196S	Hydrochloric Acid	8N	JDEMELAS	8/1/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	8/1/2013
014211S	HCl - NH4I	8N - 0.1M	JDEMELAS	8/1/2013
014042S	Carbon substrate	Solution	RMARTZ	8/2/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/2/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	8/2/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/2/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	8/2/2013

US EPA ARCHIVE DOCUMENT

Alpha #1


Date	Sample #	Client	Facility	CT Pin	Analysis	Test
7/3/13	1307110A(1-8)	EMS	1829	2hr 50mins	TH	U
8/1/17	Daily Pulse	UW	0728	1hr	UW	-
8/1/17	1707140A(1-4)	UW	0745	2hr	RAB	C
8/1/17	1307098B(1-3)	Engma	0915	2hr	UW	C
8/1/17	1307111A(1-2)	Engma	0916	2hr	UW	C
8/1/17	1307111A(7-14)	EMS	1217	2hr 50i	TH	U
8/1/17	Daily Pulse	UW	0517	1hr	UW	-
8/2/17	SECCAL	UW	0807	2hr	UW	-
8/2/17	1707099B(12-17)	Engma	1040	2hr	UW	C
8/2/17	1707116A(7-14)	UW	1040	2hr	TH	C

Alpha #3

Date	Sample #	Client	Location	CTTi	Analysis	Fee
7/30/13	Seed A (1-3)	Lab	1109	2hrs50-	Rate	KB
7/30/13	1307100A(6-14)	Engman	1305	2hr	Rate	-
7/30/13	1307100A(15-19)	Engman	1305	2hr	Rate	KB
7/30/13	1307100A(15-19)	Eng. Manag. Secu	1614	2hrs50min	Rate	KB
7/7/13	Daily Pulse	Lab	0522	1hr	Rate	-
7/31/13	1307110A(1-13)	Engman	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	1307110A(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	Daily Pulse	Lab	0525	1hr	Rate	-
8/1/13	1707129A(1-7)	Miss. Dept	0548	2hr	Rate	-
8/1/13	1707129A(1-4)	Lab	0548	2hr	Rate	-
8/1/13	1307111A(17-19)	Engman	0917	2hr	Rate	-
8/1/13	1707111A(1-6)	Engman	0917	2hr	Rate	-
8/1/13	1307111A(15-19)	EMS	1217	2hrs50-	Th	KB
8/1/13	1307120A(1-7)	ERA	1218	2hrs50-	Rate	KB
8/2/13	Daily Pulse	Lab	0527	1hr	Rate	-
8/2/13	SEC CAL	Lab	0528	2hr	Rate	-
8/2/13	1707170A(3-4)	Unitech	0909	2hr	Rate	-
8/2/13	1707099A(1-4)	Engman	0847	2hr	Rate	-

US EPA ARCHIVE DOCUMENT


ISO TH NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/22/13 17:35	PREP	LWALKER	SPIKED AND TRACED BEAKERS-ALIQUOTTED AND DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.


J. Walker
7/22/13

US EPA ARCHIVE DOCUMENT

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	THISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/22/13 17:35	PREP	LWALKER	SPIKED AND TRACED BEAKERS-ALQUOTTED AND DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	07/23/13 07:59	PREP	JWOLFE	PRESERVED FRACTIONS 4,5,8,9,12,13,16 AND 17 WITH HNO3


J Wolfe
7/23/13

 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	13-07099
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/22/13 17:35	PREP	LWALKER	SPIKED AND TRACED BEAKERS-ALIQOTTED AND DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	07/23/13 07:59	PREP	JWOLFE	PRESERVED FRACTIONS 4,5,8,9,12,13,16 AND 17 WITH HNO3
3	07/25/13 18:26	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
7/25/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/22/13 17:35	PREP	LWALKER	SPIKED AND TRACED BEAKERS-ALIUOTTED AND DRIED SAMPLES DOWN-SUBMIT TO SEPARATIONS.
2	07/23/13 07:59	PREP	JWOLFE	PRESERVED FRACTIONS 4,5,8,9,12,13,16 AND 17 WITH HNO3
3	07/25/13 18:26	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to 35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
4	07/26/13 06:00	CHEM	RMARTZ	ADDED 0.75 ML 0.1MG/ML CERIUM CARRIER & 1 ML HF TO C-TUBES & LET SET SIT IN ICE BATH FOR ONE HOUR; SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

Handwritten signature: R. A. Street/B

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07099

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/23/2013
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/25/2013
013896P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/25/2013
014155S	Nitric Acid	8N	JDEMELAS	7/25/2013
014109P	Nitric Acid	Reagent Grade	JDEMELAS	7/25/2013
014177S	Hydrochloric Acid	8N	JDEMELAS	7/25/2013
014168S	Nitric Acid	8N	JDEMELAS	7/25/2013
014042S	Carbon substrate	Solution	RMARTZ	7/26/2013
014040S	Cerrium Carrier	0.1mg/ml	RMARTZ	7/26/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	7/26/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	7/26/2013


US EPA ARCHIVE DOCUMENT

Alphabet 1

Date	Sample #	Client	Location	CT Time	Analysis	Of Job
7/25/13	1307116A(1-4)	Udon	1008	2hr	Am241	C
7/25/13	1307116A(1-3)	Udon	1009	2hr	Am241	C
7/25/13	1307098A(7-14)	Eng. Manag. Serv	1724	2hr 50m	Uu	KB
7/25/13	1307099A(13-20)	Eng. Manag. Serv	KB 7/25/13	2hr 50m	Th	KB
7/25/13	1307092A(5)	Udon		2hr 50m	Uu	KB
7/25/13	1307098A(5-12)	Eng. Manag. Serv.	1626	2hr 50m	Th	KB
7/26/13	Dairy Pulser	Lab	0171	10min	NA	
7/26/13	SECCAL	Lab	0177	2hr	NA	
7/26/13	1707150A(1-4)	Udon	1107	2hr	NA	C
7/26/13	1707150A(1-4)	Udon	1107	2hr	NA	C
7/26/13	1307099A(11-17)	Eng. Manag. Serv.	1401	2hr 50m	Uu	KB
7/26/13	System Bkgd	Lab	1658	16:40 hrs	α	KB
7/27/13	Dairy Pulser	Lab	1021	10min	NA	KB
7/28/13	Dairy Pulser	Lab	1035	10min	NA	KB
7/28/13	1307099A(1-8)	Eng. Manag.	1107	2hr 50m	Th	AS

Date	Sample #	Circuit	Location	CT Time	Description	Notes
7/25/13	1307092A(1-4)	UWOL	1011	2hrs	Paint	C
7/25/13	1307092A(1-4)	UWOL	1012	2hrs	Paint	C
7/25/13	1307115A(1-3,10-11)	TEST America	1725	2hr 50min	Rate	KB
7/25/13	1307116A(1-4,6)	UWOL	1725	2hr 50min	Rate	KB
7/25/13	1307098A(1-4)	Eng. Manag. Secur	1726	2hr 50min	Th	KB
7/25/13	1307098A(13-12)	Eng. Manag. Secur	1627	2hr 50min	Th	KB
7/25/13	1307098A(13-20)	Eng. Manag. Secur	1627	2hr 50min	Th	KB
7/25/13	1307092A(3)	UWOL	1628	2hr 50min	UN	KB
7/26/13	Daily Pulse	LAB	0871	1hr		
7/26/13	SBCOL	LAB	0873	2hrs		
7/26/13	1707150A(1-4)	UWOL	0854	2hrs	UWOL	
7/26/13	1707094A(11-12,13)	TEST	0880	2hrs	UWOL	
7/26/13	1307099A(1-6)	Engn	0811	2hrs	UWOL	
7/26/13	1307148A(1-4)	TBE	1153	2hr 50min	Rate	KB
7/26/13	1307116A(1-4,6)	UWOL	1153	2hr 50min	Np	KB
7/26/13	1307099A(7-10)	Eng. Manag. Secur	1154	2hr 50min	UW	KB
7/26/13	System Bkgd	Lab	1655	16:40 hr		KB
7/27/13	Daily Pulse	Lab	1025	10min	NA	KB
7/28/13	Daily Pulse	Lab	1035	10min	NA	KB
7/28/13	1307092A(9-17)	Eng. Manag. Secur	1108	2hr 50min	Th	AG


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	13-07099
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/23/13 07:43	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- BEFORE PRECIPITATING FRACTIONS 3 AND 8- DRIED THESE SAMPLES DOWN AND DIGESTED WITH MIXED ACIDS DUE TO THE AMOUNT OF SOLIDS PRESENT

J Wolfe
 7/23/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/23/13 07:43	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- BEFORE PRECIPITATING FRACTIONS 3 AND 8- DRIED THESE SAMPLES DOWN AND DIGESTED WITH MIXED ACIDS DUE TO THE AMOUNT OF SOLIDS PRESENT
2	07/24/13 19:46	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	07/29/13 18:22	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
 7/29/13



Reagents Used in an Analysis

Internal Work Order

13-07099

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/23/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/23/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/23/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/23/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/23/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	7/23/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	7/23/2013
014169S	EDTA	0.25M	LWALKER	7/24/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	7/29/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	7/29/2013

US EPA ARCHIVE DOCUMENT

Alphabet 1

Date	Sample #	Client	Location	CT/Time	Analysis	Test
7/25/13	1307116A(1-4)	Udon	1008	2hr	Am241	C
7/25/13	1307116A(1-7)	Udon	1009	2hr	Am241	C
7/25/13	1307098A(7-14)	Eng. Manag. Serv	1724	2hr50m	Uu	KB
7/25/13	1307099A(13-20)	Eng. Manag. Serv	1725	2hr50m	Th	KB
7/25/13	1307092A(3)	Udon		2hr50m	Uu	KB
7/25/13	1307098A(5-12)	Eng. Manag. Serv	1626	2hr50m	Th	KB
7/26/13	Daily Pulse	Uu	0171	10m	m	-
7/26/13	SECCAL	Uu	0177	2hr	m	-
7/26/13	1707150A(1-4)	Udon	1607	2hr	Rac	C
7/26/13	1707150A(1-4)	Udon	1607	2hr	NP277	C
7/26/13	1307099A(11-17)	Eng. Manag. Serv	1401	2hr50m	Uu	KB
7/26/13	System Bkgd	Lab	1655	16:40 hrs	a	KB
7/27/13	Daily Pulse	Lab	1021	10min	NA	KB
7/28/13	Daily Pulse	Lab	1035	10min	NA	KB
7/28/13	1307099A(1-8)	Eng. Manag	1107	2hr50m	Th	AS
7/29/13	Daily Pulse	Uu	0177	10m	m	-
7/29/13	1707109A(1-8)	Account	0177	2hr	Rac	C
7/29/13	1307109A(1-4)	Udon	0932	2hr	Am241	C
7/29/13	1307109ANT(4)	Udon	0972	2hr	Uu	C
7/29/13	1307120A(1-3)	Enviro Res. A	0972	2hr	Uu	C
7/29/13	1307100A(5-12)	Eng. Manag. Serv	1239	2hr50m	Th	KB
7/29/13	1307110A(1-8)	Eng. Manag. Serv	1653	2hr50m	Rac	KB
7/29/13	Daily Pulse	Uu	0178	10m	m	-
7/29/13	1707118A(1-4)	Udon	0920	2hr	Am241	C
7/30/13	1307118A(1-4)	Udon	0920	2hr	Am241	C
7/30/13	1307154A(9-12)	Urenco	1215	2hr50m	Uu	KB
7/30/13	1307158A(1-4)	Udon	1216	2hr50m	NP	KB
7/31/13	Daily Pulse	Uu	0172	10m	m	-
7/31/13	1707128A(1-4)	Udon	0917	2hr	Am241	C
7/31/13	1307128A(1-3)	Udon	0913	2hr	Am241	C
7/31/13	1307110A(14-20)	EMS	1214	2hr50m	Uu	KB
7/31/13	1307099A(1)	EMS	1214	2hr50m	Rac	KB

US EPA ARCHIVE DOCUMENT

Alpha#2


Date	Sample #	Client	Location	CT	Time	Analysis	Stat
7/28/17	Daily Pulse	Weg	0170	low	run		
7/28/17	1307120A(4-7)	EMT	0933	2hr	4hr	c	
7/28/17	1307158A(1-4)	Udon	0933	2hr	4hr	c	
7/28/17	1307150A(1,2)	Udon	0934	2hr	Pulse	c	
7/29/17	1307100A(13-19)	Eng. Manay. Serv.	1240	2hr	50 = Th	ICB	
7/29/17	Daily Pulse	Weg	0124	low	run		
7/29/17	1307158A(1-4,7)	Udon	0919	2hr	Pulse	c	
7/29/17	1307158A(1-4)	Udon	0919	2hr	Pulse	c	
7/29/17	1307158A(1-9)	Udon	1000	2hr	Th	c	
7/29/17	1307128A(1-4,6)	Udon	1307	2hr	HP	c	
7/29/17	1207100A(1-5)	Eng. Man	1304	2hr	4hr	c	
7/29/17	Daily Pulse	Weg	0172	low	run		
7/29/17	1307128A(4,6)	Udon	0914	2hr	4hr	c	
7/29/17	1307167A(1-4)	Udon	0914	2hr	4hr	c	
7/29/17	1307168A(1-4)	Udon	0914	2hr	4hr	c	
7/31/17	1307099A(2-11)	EMS	1215	2hr	50 = Rank	ICB	

US EPA ARCHIVE DOCUMENT

Alpha #3

Date	Sample #	Client	Location	CT/Time	Analysis	Test
7/30/13	Seed A (1-3)	Lab	1109	2hrs 50m	Rate	ICB
7/30/13	1307100A(1-14)	Engman	1305	2hr	Rate	c
7/30/13	1307100A(1-14)	Engman	1305	2hr	Rate	c
7/30/13	1307100A(15-19)	Eng. Manag. Secu	1614	2hrs 50m	Rate	ICB
7/17/13	Daily Price	WMS	0722	1hr	Rate	c
7/31/13	1307110A(1-13)	Engman	2115	2hr	Rate	c
7/31/13	1307099A(12-17)	EMS	1215	2hrs 50m	Rate	ICB
7/31/13	1307100A(1-7)	EMS	1214	2hrs 50m	Rate	ICB


RA-228 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/23/13 07:43	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- BEFORE PRECIPITATING FRACTIONS 3 AND 8- DRIED THESE SAMPLES DOWN AND DIGESTED WITH MIXED ACIDS DUE TO THE AMOUNT OF SOLIDS PRESENT

J Wolfe
7/23/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07099
		Analysis Code	Ra228
		Run Number	1


#	Date	Dept	User	Notes
1	07/23/13 07:43	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- BEFORE PRECIPITATING FRACTIONS 3 AND 8- DRIED THESE SAMPLES DOWN AND DIGESTED WITH MIXED ACIDS DUE TO THE AMOUNT OF SOLIDS PRESENT
2	08/01/13 12:51	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/02/13 16:14	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
 8/2/13

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	13-07099
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/23/13 07:43	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- BEFORE PRECIPITATING FRACTIONS 3 AND 8- DRIED THESE SAMPLES DOWN AND DIGESTED WITH MIXED ACIDS DUE TO THE AMOUNT OF SOLIDS PRESENT
2	08/01/13 12:51	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/02/13 16:14	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/05/13 06:27	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)

8-5-13




Reagents Used in an Analysis

Internal Work Order

13-07099

Analysis Code

Run

Ra228

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/23/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/23/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/23/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/23/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/23/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	7/23/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	7/23/2013
011504D31	Ammonium Sulfide	2%	LWALKER	8/2/2013
014008D01	Lead Carrier	1.5 mg/ml	LWALKER	8/2/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	8/2/2013
013065D06	Sodium Hydroxide	10M	LWALKER	8/2/2013
014060S	Yttrium Carrier	9 mg/ml	LWALKER	8/2/2013
014116S	Ammonium Oxalate	5%	TSMITH	8/5/2013
013910D07	Nitric Acid	1N	TSMITH	8/5/2013
013910D08	Nitric Acid	6N	TSMITH	8/5/2013
013065D06	Sodium Hydroxide	10M	TSMITH	8/5/2013
013065D08	Sodium Hydroxide	18M	TSMITH	8/5/2013

Date	Sample #	Client	Location	CT Time	Analysis	Lab
8/2/13	1307078AD(1)	Accutest	1128	30mins	αβ	ICB
9/2/13	1307078AD(2-11)	Accutest	1236	2hrs	αβ	ICB
8/2/13	1307140CL(1-3,5)	UCOR	1508	30mins	CL36	ICB
8/2/13	1307171CL(1-3,5,7)	UCOR	1509	30mins	CL36	ICB
8/3/13	Weekly Blood	Lab	0877	12hrs	αβ	ICB
8/1/13	Plasma	Lab	0518	60	LM	C
8/1/13	BFTec	Lab	0622	30	LM	C
8/5/13	1707098(12-17)	Empire	0807	2L	PLA	C

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Location	CT Time	Analysis	Fee
8/1/13	1707079SN(1-4)	Unitech	1050	2h	SN707	C
8/1/13	1707082SN(1-4)	Unitech	1050	2h	SN707	C
8/1/13	1707106SN(1-4)	Unitech	1050	2h	SN707	C
8/1/13	ET70E	LAB	0507	70m	LAB	C
8/1/13	BLLADAE	LAB	0540	6m	LAB	C
8/2/13	1307110RA(1-2)	Engman	0759	2h	RAE	C
8/2/13	130709234(1-4,8)	Ucon	6012	2h	SN904	C
8/2/13	130710734(1-5,8,9)	TestAM	1012	2h	SN904	C
8/2/13	1307077AB(1-6)	Accustest	1219	2hrs	2B	KB
8/2/13	1307128CL(1-3,5,7)	UCOR	1504	30mins	CL36	KB
8/2/13	1307172CL(1-3,5)	UCOR	1505	30mins	CL36	KB
8/3/13	Weekly DICSD	Lab	0948	12 hrs	2B	KB
8/15/13	ET70E	LAB	0518	70m	LAB	C
8/15/13	BLLADAE	LAB	0511	6m	LAB	C
8/15/13	1307099RA(1-4)	Engman	0802	2h	RAE	C

US EPA ARCHIVE DOCUMENT

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

Work Order	13-07099	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	UIISO	01	LCS	LCS		07/16/13 00:00	1.0000E+00
Run	2	02	MBL	BLANK		07/16/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	D-85 TOT	43	07/10/13 10:52	5.0000E-01
Lab Deadline	8/6/2013	04	TRG	DUP 01 TOT	40	07/09/13 00:00	5.0000E-01
Client	Engineering Management Support, Inc.	05	TRG	DUP 01 DIS	40	07/09/13 00:00	5.0000E-01
Project	West Lake OU-1	06	TRG	PZ-201A-SS TOT	46	07/10/13 10:23	5.0000E-01
Report Level	4	07	TRG	PZ-201A-SS DIS	46	07/10/13 10:23	5.0000E-01
Activity Units	pCi	08	DO	D-85 TOT	43	07/10/13 10:52	5.0000E-01
Aliquot Units	I	09	TRG	D-85 DIS	43	07/10/13 10:52	5.0000E-01
Matrix	WA	10	TRG	PZ-106-SD TOT	45	07/10/13 11:41	5.0000E-01
Method	HASL 300, 4.5.2	11	TRG	PZ-106-SD DIS	45	07/10/13 11:41	5.0000E-01
Instrument Type	Alpha Spectroscopy	12	TRG	S-84 TOT	41	07/10/13 11:46	5.0000E-01
Radiometric Tracer	U-232	13	TRG	S-84 DIS	41	07/10/13 11:46	5.0000E-01
Radiometric Sol#	U-10a	14	TRG	PZ-106-SS TOT	41	07/10/13 12:43	5.0000E-01
Tracer Act (dpm/g)	19.045	15	TRG	PZ-106-SS DIS	41	07/10/13 12:43	5.0000E-01
Carrier		16	TRG	PZ-113-AD TOT	41	07/10/13 13:02	5.0000E-01
Carrier Conc (mg/ml)		17	TRG	PZ-113-AD DIS	41	07/10/13 13:02	5.0000E-01

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

10001

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	0.6117	11.6		0.00								
02	MBL	0.6097	11.6		0.00								
03	DUP	0.6090	11.6		0.00								
04	TRG	0.6053	11.5		0.00								
05	TRG	0.6057	11.5		0.00								
06	TRG	0.6043	11.5		0.00								
07	TRG	0.6050	11.5		0.00								
08	DO	0.6039	11.5		0.00								
09	TRG	0.6041	11.5		0.00								
10	TRG	0.6048	11.5		0.00								
11	TRG	0.6038	11.5		0.00								
12	TRG	0.6045	11.5		0.00								
13	TRG	0.6039	11.5		0.00								
14	TRG	0.6023	11.5		0.00								
15	TRG	0.6002	11.4		0.00								
16	TRG	0.6030	11.5		0.00								
17	TRG	0.6046	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.

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US EPA ARCHIVE DOCUMENT

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/30/13 10:19	JWOLFE				
02	MBL			07/30/13 10:19	JWOLFE				
03	DUP			07/30/13 10:19	JWOLFE				
04	TRG			07/30/13 10:19	JWOLFE				
05	TRG			07/30/13 10:19	JWOLFE				
06	TRG			07/30/13 10:19	JWOLFE				
07	TRG			07/30/13 10:19	JWOLFE				
08	DO			07/30/13 10:19	JWOLFE				
09	TRG			07/30/13 10:19	JWOLFE				
10	TRG			07/30/13 10:19	JWOLFE				
11	TRG			07/30/13 10:19	JWOLFE				
12	TRG			07/30/13 10:19	JWOLFE				
13	TRG			07/30/13 10:19	JWOLFE				
14	TRG			07/30/13 10:19	JWOLFE				
15	TRG			07/30/13 10:19	JWOLFE				
16	TRG			07/30/13 10:19	JWOLFE				
17	TRG			07/30/13 10:19	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: 13-07099-UISO-2

Run	2
Analysis Code	UISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	7.86E+00	1.27E+00	1.03E-01	8.17E+00	96.18	OK		OK	
02	U-234	MBL	BLANK	pCi/l	3.25E-01	1.74E-01	1.06E-01					OK	OK
03	U-234	DUP	D-85 TOT	pCi/l	2.57E+00	9.17E-01	3.18E-01				NA	OK	
04	U-234	TRG	DUP 01 TOT	pCi/l	1.02E+00	1.00E+00	1.04E+00					INV	
05	U-234	TRG	DUP 01 DIS	pCi/l	7.80E-01	1.05E+00	1.56E+00					INV	
06	U-234	TRG	PZ-201A-SS TOT	pCi/l	3.12E+00	9.01E-01	3.00E-01					OK	
07	U-234	TRG	PZ-201A-SS DIS	pCi/l	2.85E+00	8.23E-01	2.25E-01					OK	
08	U-234	DO	D-85 TOT	pCi/l	2.95E+00	1.26E+00	4.43E-01					OK	
09	U-234	TRG	D-85 DIS	pCi/l	1.05E+00	4.78E-01	2.10E-01					OK	
10	U-234	TRG	PZ-106-SD TOT	pCi/l	1.11E+00	5.27E-01	3.34E-01					OK	
11	U-234	TRG	PZ-106-SD DIS	pCi/l	1.24E+00	5.38E-01	3.10E-01					OK	
12	U-234	TRG	S-84 TOT	pCi/l	1.33E+00	7.42E-01	4.81E-01					OK	
13	U-234	TRG	S-84 DIS	pCi/l	1.69E+00	1.02E+00	9.06E-01					OK	
14	U-234	TRG	PZ-106-SS TOT	pCi/l	1.18E+00	5.21E-01	3.43E-01					OK	
15	U-234	TRG	PZ-106-SS DIS	pCi/l	1.94E+00	6.22E-01	2.03E-01					OK	
16	U-234	TRG	PZ-113-AD TOT	pCi/l	1.92E+00	1.49E+00	1.02E+00					INV	
17	U-234	TRG	PZ-113-AD DIS	pCi/l	5.56E-01	3.62E-01	3.04E-01					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UUISO-2

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	07/16/13 00:00	1.00E+00	74.08	0.00	0.00			
02	U-234	MBL	07/16/13 00:00	1.00E+00	62.65	0.00	0.00			
03	U-234	DUP	07/10/13 10:52	5.00E-01	46.37	0.00	0.00			
04	U-234	TRG	07/09/13 00:00	5.00E-01	12.40	0.00	0.00			
05	U-234	TRG	07/09/13 00:00	5.00E-01	10.75	0.00	0.00			
06	U-234	TRG	07/10/13 10:23	5.00E-01	53.53	0.00	0.00			
07	U-234	TRG	07/10/13 10:23	5.00E-01	61.19	0.00	0.00			
08	U-234	DO	07/10/13 10:52	5.00E-01	26.22	0.00	0.00			
09	U-234	TRG	07/10/13 10:52	5.00E-01	58.87	0.00	0.00			
10	U-234	TRG	07/10/13 11:41	5.00E-01	52.40	0.00	0.00			
11	U-234	TRG	07/10/13 11:41	5.00E-01	61.16	0.00	0.00			
12	U-234	TRG	07/10/13 11:46	5.00E-01	33.20	0.00	0.00			
13	U-234	TRG	07/10/13 11:46	5.00E-01	22.88	0.00	0.00			
14	U-234	TRG	07/10/13 12:43	5.00E-01	53.96	0.00	0.00			
15	U-234	TRG	07/10/13 12:43	5.00E-01	60.94	0.00	0.00			
16	U-234	TRG	07/10/13 13:02	5.00E-01	10.88	0.00	0.00			
17	U-234	TRG	07/10/13 13:02	5.00E-01	52.69	0.00	0.00			

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UISO-2

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	08/02/13 09:43		A_Spec	Alpha_035	170	4.00 E+02	3.00 E-03	18.3
02	U-234	MBL	08/02/13 09:43		A_Spec	Alpha_036	170	1.47 E+01	2.00 E-03	19.1
03	U-234	DUP	08/02/13 09:43		A_Spec	Alpha_038	170	3.87 E+01	2.00 E-03	17.2
04	U-234	TRG	08/02/13 09:43		A_Spec	Alpha_039	170	4.66 E+00	2.00 E-03	19.7
05	U-234	TRG	08/02/13 09:43		A_Spec	Alpha_040	170	3.00 E+00	0.00 E+00	19
06	U-234	TRG	08/02/13 09:43		A_Spec	Alpha_041	170	6.22 E+01	5.00 E-03	19.8
07	U-234	TRG	08/02/13 09:43		A_Spec	Alpha_042	170	6.07 E+01	2.00 E-03	18.5
08	U-234	DO	08/02/13 09:43		A_Spec	Alpha_045	170	2.78 E+01	1.00 E-03	19.1
09	U-234	TRG	08/02/13 09:43		A_Spec	Alpha_046	170	2.08 E+01	1.00 E-03	17.9
10	U-234	TRG	08/02/13 09:44		A_Spec	Alpha_047	170	2.00 E+01	0.00 E+00	18.2
11	U-234	TRG	08/02/13 09:44		A_Spec	Alpha_048	170	2.40 E+01	0.00 E+00	16.8
12	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_003	170.02	1.45 E+01	3.00 E-03	17.5
13	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_004	170	1.41 E+01	1.10 E-02	19.4
14	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_010	170.02	2.36 E+01	8.00 E-03	19.7
15	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_011	170.02	4.57 E+01	2.00 E-03	20.5
16	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_012	170.03	7.83 E+00	1.00 E-03	19.9
17	U-234	TRG	08/02/13 10:40		A_Spec	Alpha_013	170	1.03 E+01	4.00 E-03	18.7



Run 2

Analysis Code UISO

Eberline Services Work Order 13-07099

Client Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UUISO-2

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/l	8.73E+00	1.38E+00	9.34E-02	7.97E+00	109.58	OK		OK	
02	U-238	MBL	BLANK	pCi/l	8.09E-02	8.79E-02	1.06E-01					OK	OK
03	U-238	DUP	D-85 TOT	pCi/l	2.37E+00	8.70E-01	2.76E-01				NA	OK	
04	U-238	TRG	DUP 01 TOT	pCi/l	5.77E-01	7.62E-01	1.04E+00					INV	
05	U-238	TRG	DUP 01 DIS	pCi/l	0.00E+00	7.17E-01	1.55E+00					INV	
06	U-238	TRG	PZ-201A-SS TOT	pCi/l	1.91E+00	6.96E-01	4.79E-01					OK	
07	U-238	TRG	PZ-201A-SS DIS	pCi/l	1.36E+00	5.39E-01	2.95E-01					OK	
08	U-238	DO	D-85 TOT	pCi/l	2.39E+00	1.11E+00	5.05E-01					OK	
09	U-238	TRG	D-85 DIS	pCi/l	4.02E-01	3.01E-01	3.01E-01					OK	
10	U-238	TRG	PZ-106-SD TOT	pCi/l	7.66E-01	4.23E-01	2.31E-01					OK	
11	U-238	TRG	PZ-106-SD DIS	pCi/l	1.03E-01	1.75E-01	3.09E-01					OK	
12	U-238	TRG	S-84 TOT	pCi/l	1.32E+00	7.39E-01	4.79E-01					OK	
13	U-238	TRG	S-84 DIS	pCi/l	4.16E-01	4.81E-01	6.25E-01					OK	
14	U-238	TRG	PZ-106-SS TOT	pCi/l	5.88E-01	3.65E-01	3.28E-01					OK	
15	U-238	TRG	PZ-106-SS DIS	pCi/l	5.36E-01	3.08E-01	2.02E-01					OK	
16	U-238	TRG	PZ-113-AD TOT	pCi/l	1.61E-01	4.95E-01	1.17E+00					INV	
17	U-238	TRG	PZ-113-AD DIS	pCi/l	2.05E-01	2.42E-01	3.54E-01					OK	

	
Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UISO-2

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	07/16/13 00:00	1.00E+00	74.08	0.00	0.00			
02	U-238	MBL	07/16/13 00:00	1.00E+00	62.65	0.00	0.00			
03	U-238	DUP	07/10/13 10:52	5.00E-01	46.37	0.00	0.00			
04	U-238	TRG	07/09/13 00:00	5.00E-01	12.40	0.00	0.00			
05	U-238	TRG	07/09/13 00:00	5.00E-01	10.75	0.00	0.00			
06	U-238	TRG	07/10/13 10:23	5.00E-01	53.53	0.00	0.00			
07	U-238	TRG	07/10/13 10:23	5.00E-01	61.19	0.00	0.00			
08	U-238	DO	07/10/13 10:52	5.00E-01	26.22	0.00	0.00			
09	U-238	TRG	07/10/13 10:52	5.00E-01	58.87	0.00	0.00			
10	U-238	TRG	07/10/13 11:41	5.00E-01	52.40	0.00	0.00			
11	U-238	TRG	07/10/13 11:41	5.00E-01	61.16	0.00	0.00			
12	U-238	TRG	07/10/13 11:46	5.00E-01	33.20	0.00	0.00			
13	U-238	TRG	07/10/13 11:46	5.00E-01	22.88	0.00	0.00			
14	U-238	TRG	07/10/13 12:43	5.00E-01	53.96	0.00	0.00			
15	U-238	TRG	07/10/13 12:43	5.00E-01	60.94	0.00	0.00			
16	U-238	TRG	07/10/13 13:02	5.00E-01	10.88	0.00	0.00			
17	U-238	TRG	07/10/13 13:02	5.00E-01	52.69	0.00	0.00			

	Run	2
	Analysis Code	UISO
Eberline Services Work Order	13-07099	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UUISO-2

	
Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	08/02/13 09:43		A_Spec	Alpha_035	170	4.47 E+02	2.00 E-03	18.3
02	U-238	MBL	08/02/13 09:43		A_Spec	Alpha_036	170	3.66 E+00	2.00 E-03	19.1
03	U-238	DUP	08/02/13 09:43		A_Spec	Alpha_038	170	3.58 E+01	1.00 E-03	17.2
04	U-238	TRG	08/02/13 09:43		A_Spec	Alpha_039	170	2.66 E+00	2.00 E-03	19.7
05	U-238	TRG	08/02/13 09:43		A_Spec	Alpha_040	170	1.00 E+00	0.00 E+00	19
06	U-238	TRG	08/02/13 09:43		A_Spec	Alpha_041	170	3.83 E+01	2.20 E-02	19.8
07	U-238	TRG	08/02/13 09:43		A_Spec	Alpha_042	170	2.90 E+01	6.00 E-03	18.5
08	U-238	DO	08/02/13 09:43		A_Spec	Alpha_045	170	2.27 E+01	2.00 E-03	19.1
09	U-238	TRG	08/02/13 09:43		A_Spec	Alpha_046	170	8.00 E+00	0.00 E+00	17.9
10	U-238	TRG	08/02/13 09:44		A_Spec	Alpha_047	170	1.38 E+01	1.00 E-03	18.2
11	U-238	TRG	08/02/13 09:44		A_Spec	Alpha_048	170	2.00 E+00	0.00 E+00	16.8
12	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_003	170.02	1.45 E+01	3.00 E-03	17.5
13	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_004	170	3.49 E+00	3.00 E-03	19.4
14	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_010	170.02	1.18 E+01	7.00 E-03	19.7
15	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_011	170.02	1.27 E+01	2.00 E-03	20.5
16	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_012	170.03	6.60 E-01	2.00 E-03	19.9
17	U-238	TRG	08/02/13 10:40		A_Spec	Alpha_013	170	3.81 E+00	7.00 E-03	18.7

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UISO-2

	
Run	2
Analysis Code	UISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/l	1.74E+00	4.63E-01	1.45E-01					OK	
02	U-235	MBL	BLANK	pCi/l	8.21E-02	1.08E-01	1.64E-01					OK	OK
03	U-235	DUP	D-85 TOT	pCi/l	6.43E-01	4.68E-01	3.42E-01				NA	OK	
04	U-235	TRG	DUP 01 TOT	pCi/l	4.00E-01	7.70E-01	1.41E+00					INV	
05	U-235	TRG	DUP 01 DIS	pCi/l	-5.45E-02	6.38E-01	1.34E+00					INV	
06	U-235	TRG	PZ-201A-SS TOT	pCi/l	6.38E-01	4.15E-01	3.49E-01					OK	
07	U-235	TRG	PZ-201A-SS DIS	pCi/l	1.03E+00	5.04E-01	2.42E-01					OK	
08	U-235	DO	D-85 TOT	pCi/l	1.31E+00	8.92E-01	7.85E-01					OK	
09	U-235	TRG	D-85 DIS	pCi/l	3.63E-01	3.04E-01	2.60E-01					OK	
10	U-235	TRG	PZ-106-SD TOT	pCi/l	6.18E-01	4.35E-01	4.11E-01					OK	
11	U-235	TRG	PZ-106-SD DIS	pCi/l	6.38E-01	4.25E-01	3.82E-01					OK	
12	U-235	TRG	S-84 TOT	pCi/l	3.94E-01	4.54E-01	5.93E-01					OK	
13	U-235	TRG	S-84 DIS	pCi/l	1.00E+00	8.57E-01	9.72E-01					OK	
14	U-235	TRG	PZ-106-SS TOT	pCi/l	3.69E-01	3.28E-01	3.89E-01					OK	
15	U-235	TRG	PZ-106-SS DIS	pCi/l	6.20E-01	3.66E-01	2.19E-01					OK	
16	U-235	TRG	PZ-113-AD TOT	pCi/l	1.48E-01	6.20E-01	1.59E+00					INV	
17	U-235	TRG	PZ-113-AD DIS	pCi/l	3.54E-01	3.27E-01	3.75E-01					OK	

0500

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UISO-2

	
Run	2
Analysis Code	UISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

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	U-235	LCS	07/16/13 00:00	1.00E+00	74.08	0.00	0.00			
02	U-235	MBL	07/16/13 00:00	1.00E+00	62.65	0.00	0.00			
03	U-235	DUP	07/10/13 10:52	5.00E-01	46.37	0.00	0.00			
04	U-235	TRG	07/09/13 00:00	5.00E-01	12.40	0.00	0.00			
05	U-235	TRG	07/09/13 00:00	5.00E-01	10.75	0.00	0.00			
06	U-235	TRG	07/10/13 10:23	5.00E-01	53.53	0.00	0.00			
07	U-235	TRG	07/10/13 10:23	5.00E-01	61.19	0.00	0.00			
08	U-235	DO	07/10/13 10:52	5.00E-01	26.22	0.00	0.00			
09	U-235	TRG	07/10/13 10:52	5.00E-01	58.87	0.00	0.00			
10	U-235	TRG	07/10/13 11:41	5.00E-01	52.40	0.00	0.00			
11	U-235	TRG	07/10/13 11:41	5.00E-01	61.16	0.00	0.00			
12	U-235	TRG	07/10/13 11:46	5.00E-01	33.20	0.00	0.00			
13	U-235	TRG	07/10/13 11:46	5.00E-01	22.88	0.00	0.00			
14	U-235	TRG	07/10/13 12:43	5.00E-01	53.96	0.00	0.00			
15	U-235	TRG	07/10/13 12:43	5.00E-01	60.94	0.00	0.00			
16	U-235	TRG	07/10/13 13:02	5.00E-01	10.88	0.00	0.00			
17	U-235	TRG	07/10/13 13:02	5.00E-01	52.69	0.00	0.00			

1600

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-UUISO-2

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	08/02/13 09:43		A_Spec	Alpha_035	170	7.20 E+01	0.00 E+00	18.3
02	U-235	MBL	08/02/13 09:43		A_Spec	Alpha_036	170	3.00 E+00	0.00 E+00	19.1
03	U-235	DUP	08/02/13 09:43		A_Spec	Alpha_038	170	7.83 E+00	1.00 E-03	17.2
04	U-235	TRG	08/02/13 09:43		A_Spec	Alpha_039	170	1.49 E+00	3.00 E-03	19.7
05	U-235	TRG	08/02/13 09:43		A_Spec	Alpha_040	170	-1.70 E-01	1.00 E-03	19
06	U-235	TRG	08/02/13 09:43		A_Spec	Alpha_041	170	1.03 E+01	4.00 E-03	19.8
07	U-235	TRG	08/02/13 09:43		A_Spec	Alpha_042	170	1.78 E+01	1.00 E-03	18.5
08	U-235	DO	08/02/13 09:43		A_Spec	Alpha_045	170	1.00 E+01	0.00 E+00	19.1
09	U-235	TRG	08/02/13 09:43		A_Spec	Alpha_046	170	5.83 E+00	1.00 E-03	17.9
10	U-235	TRG	08/02/13 09:44		A_Spec	Alpha_047	170	9.00 E+00	0.00 E+00	18.2
11	U-235	TRG	08/02/13 09:44		A_Spec	Alpha_048	170	1.00 E+01	0.00 E+00	16.8
12	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_003	170.02	3.49 E+00	3.00 E-03	17.5
13	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_004	170	6.81 E+00	7.00 E-03	19.4
14	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_010	170.02	5.98 E+00	6.00 E-03	19.7
15	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_011	170.02	1.18 E+01	1.00 E-03	20.5
16	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_012	170.03	4.90 E-01	3.00 E-03	19.9
17	U-235	TRG	08/02/13 10:40		A_Spec	Alpha_013	170	5.32 E+00	4.00 E-03	18.7

Run	2
Analysis Code	UUISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

2600

215

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*
<i>35</i>	01	LCS	LCS	07/16/13 00:00	1.0000	0.6117	11.6498	0.00		
	02	MBL	BLANK	07/16/13 00:00	1.0000	0.6097	11.6117	0.00		
<i>0847</i>	03	DUP	D-85 TOT	07/10/13 10:52	0.5000	0.6090	11.5984	0.00		
	04	TRG	DUP 01 TOT	07/09/13 00:00	0.5000	0.6053	11.5279	0.00		
	05	TRG	DUP 01 DIS	07/09/13 00:00	0.5000	0.6057	11.5356	0.00		
	06	TRG	PZ-201A-SS TOT	07/10/13 10:23	0.5000	0.6043	11.5089	0.00		
	07	TRG	PZ-201A-SS DIS	07/10/13 10:23	0.5000	0.6050	11.5222	0.00		
	08	DO	D-85 TOT	07/10/13 10:52	0.5000	0.6039	11.5013	0.00		
	09	TRG	D-85 DIS	07/10/13 10:52	0.5000	0.6041	11.5051	0.00		
	10	TRG	PZ-106-SD TOT	07/10/13 11:41	0.5000	0.6048	11.5184	0.00		
	11	TRG	PZ-106-SD DIS	07/10/13 11:41	0.5000	0.6038	11.4994	0.00		
<i>2/13</i>	12	TRG	S-84 TOT	07/10/13 11:46	0.5000	0.6045	11.5127	0.00		
	13	TRG	S-84 DIS	07/10/13 11:46	0.5000	0.6039	11.5013	0.00		
<i>1040</i>	14	TRG	PZ-106-SS TOT	07/10/13 12:43	0.5000	0.6023	11.4708	0.00		
	15	TRG	PZ-106-SS DIS	07/10/13 12:43	0.5000	0.6002	11.4308	0.00		
	16	TRG	PZ-113-AD TOT	07/10/13 13:02	0.5000	0.6030	11.4841	0.00		
	17	TRG	PZ-113-AD DIS	07/10/13 13:02	0.5000	0.6046	11.5146	0.00		

Internal Work Order					Run	Analysis Code				Date	Technician			Technician Initials		Witness Initials	
13-07099					2	UIISO				7/30/2013 10:18	JWOLFE						
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	7/30/2013	0.500	0.5149				8.17	0.294	0.00	0.000	0.00	0.000	0.00	0.000	
U-238	U-8a	34.350	7/30/2013	0.500	0.5149				7.97	0.287	0.00	0.000	0.00	0.000	0.00	0.000	

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	U-232	U-10a	19.045	7/30/2013	0.6117	0.6300	0.6117 g									
02	U-232	U-10a	19.045	7/30/2013	0.6097	0.6300	0.6097 g									
03	U-232	U-10a	19.045	7/30/2013	0.6090	0.6300	-0.6090 g									
04	U-232	U-10a	19.045	7/30/2013	0.6053	0.6300	-0.6053 g									
05	U-232	U-10a	19.045	7/30/2013	0.6057	0.6300	-0.6057 g									
06	U-232	U-10a	19.045	7/30/2013	0.6043	0.6300	-0.6043 g									
07	U-232	U-10a	19.045	7/30/2013	0.6050	0.6300	-0.6050 g									
08	U-232	U-10a	19.045	7/30/2013	0.6039	0.6300	-0.6041 g					0.5149 g				
09	U-232	U-10a	19.045	7/30/2013	0.6041	0.6300	-0.6041 g									
10	U-232	U-10a	19.045	7/30/2013	0.6048	0.6300	-0.6038 g									
11	U-232	U-10a	19.045	7/30/2013	0.6038	0.6300	-0.6045 g									
12	U-232	U-10a	19.045	7/30/2013	0.6045	0.6300	-0.6039 g									
13	U-232	U-10a	19.045	7/30/2013	0.6039	0.6300	-0.6035 g									
14	U-232	U-10a	19.045	7/30/2013	0.6023	0.6300	-0.6002 g									
15	U-232	U-10a	19.045	7/30/2013	0.6002	0.6300	-0.6016 g									
16	U-232	U-10a	19.045	7/30/2013	0.6030	0.6300						Matrix Spike				
17	U-232	U-10a	19.045	7/30/2013	0.6046	0.6300										

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07099	2	UUISO	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	D-85 TOT	DUP					5.0000E-01	5.0000E-01				
04	DUP 01 TOT	TRG					5.0000E-01	5.0000E-01				
05	DUP 01 DIS	TRG					5.0000E-01	5.0000E-01				
06	PZ-201A-SS TOT	TRG					5.0000E-01	5.0000E-01				
07	PZ-201A-SS DIS	TRG					5.0000E-01	5.0000E-01				
08	D-85 TOT	DO					5.0000E-01	5.0000E-01				
09	D-85 DIS	TRG					5.0000E-01	5.0000E-01				
10	PZ-106-SD TOT	TRG					5.0000E-01	5.0000E-01				
11	PZ-106-SD DIS	TRG					5.0000E-01	5.0000E-01				
12	S-84 TOT	TRG					5.0000E-01	5.0000E-01				
13	S-84 DIS	TRG					5.0000E-01	5.0000E-01				
14	PZ-106-SS TOT	TRG					5.0000E-01	5.0000E-01				
15	PZ-106-SS DIS	TRG					5.0000E-01	5.0000E-01				
16	PZ-113-AD TOT	TRG					5.0000E-01	5.0000E-01				
17	PZ-113-AD DIS	TRG					5.0000E-01	5.0000E-01				

Comments	
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Technician: J Wolfe Date: 7/30/13

0095



105
8/2/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 01
 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: 8/2/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:47 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.612 mL
 Effective Efficiency: 0.1353 +/- 0.0089
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.7408 +/- 0.0502

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 1.068157 +/- 0.092113
 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	266.32	12.03	0.68	0.00E+000	9.9
U-234	4.729	400.49	9.80	0.51	0.00E+000	11.8
U-235	4.420	72.00	23.26	0.00	0.00E+000	3.7
U-238	4.151	446.66	9.28	0.34	0.00E+000	18.9

T = Tracer Peak used for Effective Efficiency

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

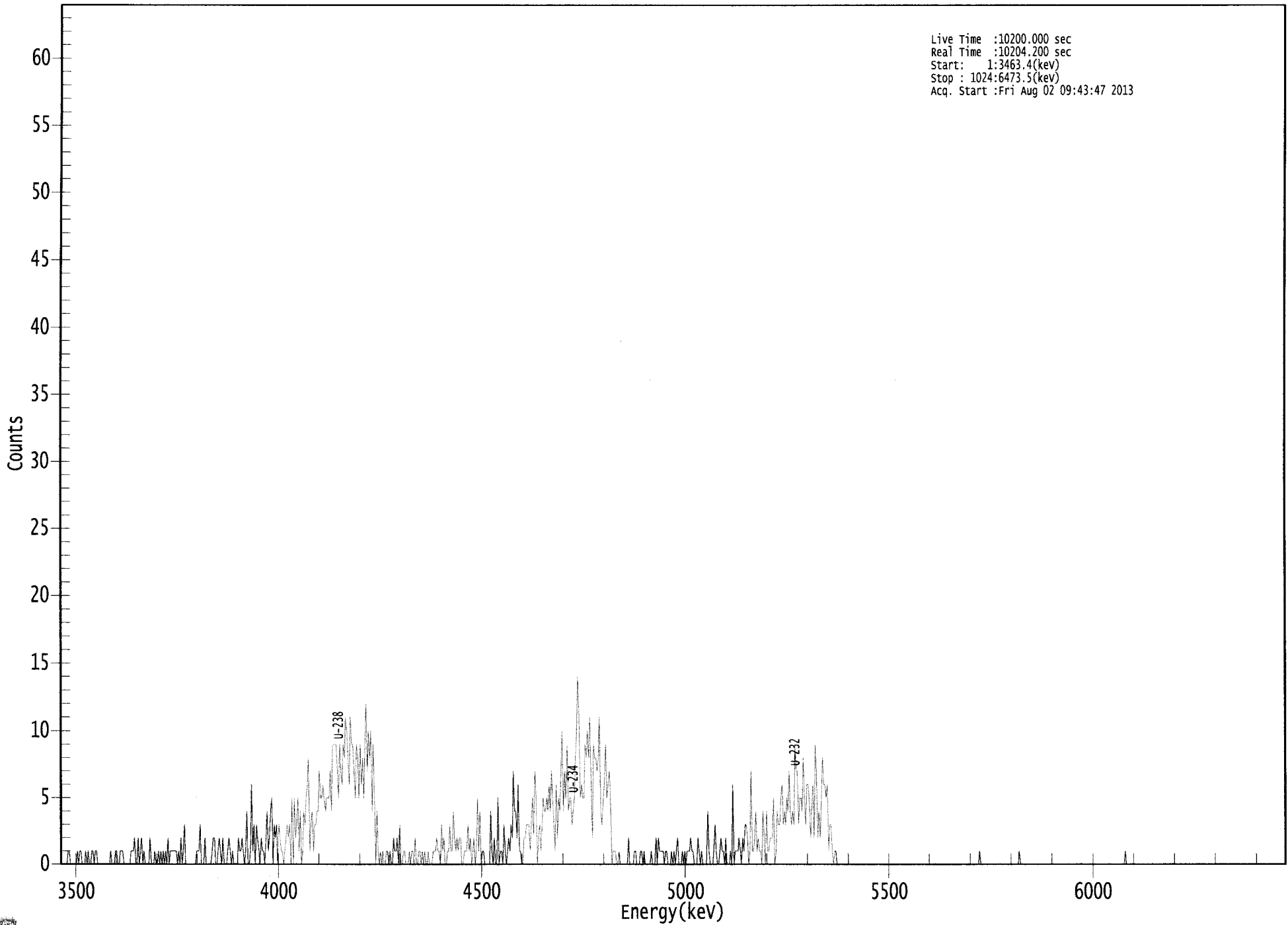
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.23E+000 +/- 6.72E-001	1.11E-001 +/- 1.42E-002
U-234	0.992	4761.50*	7.86E+000 +/- 1.27E+000	1.03E-001 +/- 1.32E-002
U-235	0.991	4385.50*	1.74E+000 +/- 4.63E-001	1.45E-001 +/- 1.87E-002
U-238	0.992	4184.40*	8.73E+000 +/- 1.38E+000	9.34E-002 +/- 1.20E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064931.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Fri Aug 02 09:43:47 2013



ROI Type: 1

ROI Type: 3

6697

 ***** 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: 10204

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

369: 1 1 0 3 1 0 1 2

Sample Title: 01

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

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

KCB
8/2/13

Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 02
 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: 8/2/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:48 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.610 mL
 Effective Efficiency: 0.1197 +/- 0.0083
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.6265 +/- 0.0447

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 5.240	234.83	12.80	0.17	0.00E+000	15.4
U-234	4.762	14.66	51.88	0.34	0.00E+000	4.4
U-235	4.413	3.00	130.67	0.00	0.00E+000	3.0
U-238	4.107	3.66	107.87	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

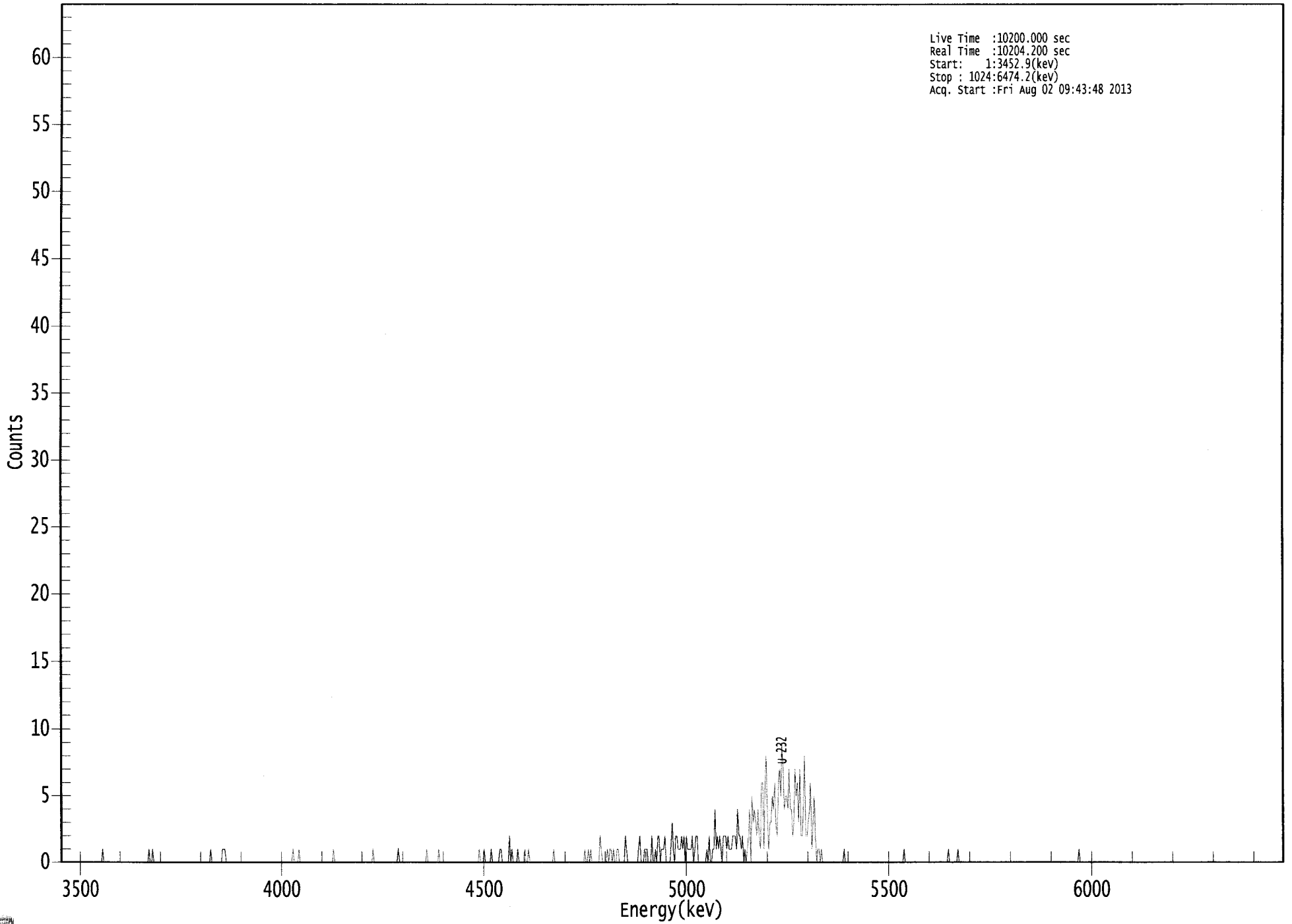
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.973	5302.50*	5.21E+000 +/- 7.07E-001	9.26E-002 +/- 1.26E-002
U-234	1.000	4761.50*	3.25E-001 +/- 1.74E-001	1.06E-001 +/- 1.44E-002
U-235	0.995	4385.50*	8.21E-002 +/- 1.08E-001	1.64E-001 +/- 2.23E-002
U-238	0.958	4184.40*	8.09E-002 +/- 8.79E-002	1.06E-001 +/- 1.43E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064934.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Fri Aug 02 09:43:48 2013



ROI Type: 1

ROI Type: 3

2010

 ***** 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: 10204

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	1	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	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:	1	1	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:	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:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	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	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	1	0	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	1	0	0	0	0
361:	0	1	0	0	0	0	0	0

369: 1 1 0 0 0 0 0 0

Sample Title: 02

Channel	1	2	3	4	5	6	7	8
377:	2	0	1	0	0	0	0	1
385:	0	0	0	0	0	1	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	1	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:	0	0	1	0	1	0	0	0
449:	0	0	0	0	2	1	0	0
457:	0	0	1	0	1	1	0	1
465:	0	0	1	1	0	0	0	0
473:	0	2	1	0	0	0	0	0
481:	0	0	0	0	1	2	0	0
489:	0	1	1	1	0	0	0	2
497:	0	0	1	0	2	2	0	1
505:	1	1	2	0	0	0	0	1
513:	3	1	0	2	2	1	1	1
521:	2	1	2	0	2	1	1	1
529:	1	2	0	1	2	2	0	0
537:	0	0	0	0	0	1	0	2
545:	0	0	1	1	4	1	2	1
553:	2	1	0	2	2	2	1	2
561:	1	1	1	2	2	2	1	4
569:	2	2	1	2	0	1	0	1
577:	2	4	0	5	3	4	3	2
585:	4	2	1	6	6	1	6	8
593:	3	1	3	3	5	4	6	3
601:	2	6	7	5	9	7	4	5
609:	5	4	7	4	4	2	3	7
617:	5	6	3	7	2	2	4	8
625:	2	2	3	4	6	1	3	5
633:	2	0	1	1	0	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	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	0	0	0	1
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	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	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: D-85 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 03
 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: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:50 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.609 mL
 Effective Efficiency: 0.0798 +/- 0.0067
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 0.4637 +/- 0.0395

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	5.252	156.49	15.70	0.51	0.00E+000	3.3
U-234	4.722	38.66	31.68	0.34	0.00E+000	3.0
U-235	4.431	7.83	70.93	0.17	0.00E+000	3.0
U-238	4.133	35.83	32.83	0.17	0.00E+000	3.4

T = Tracer Peak used for Effective Efficiency

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

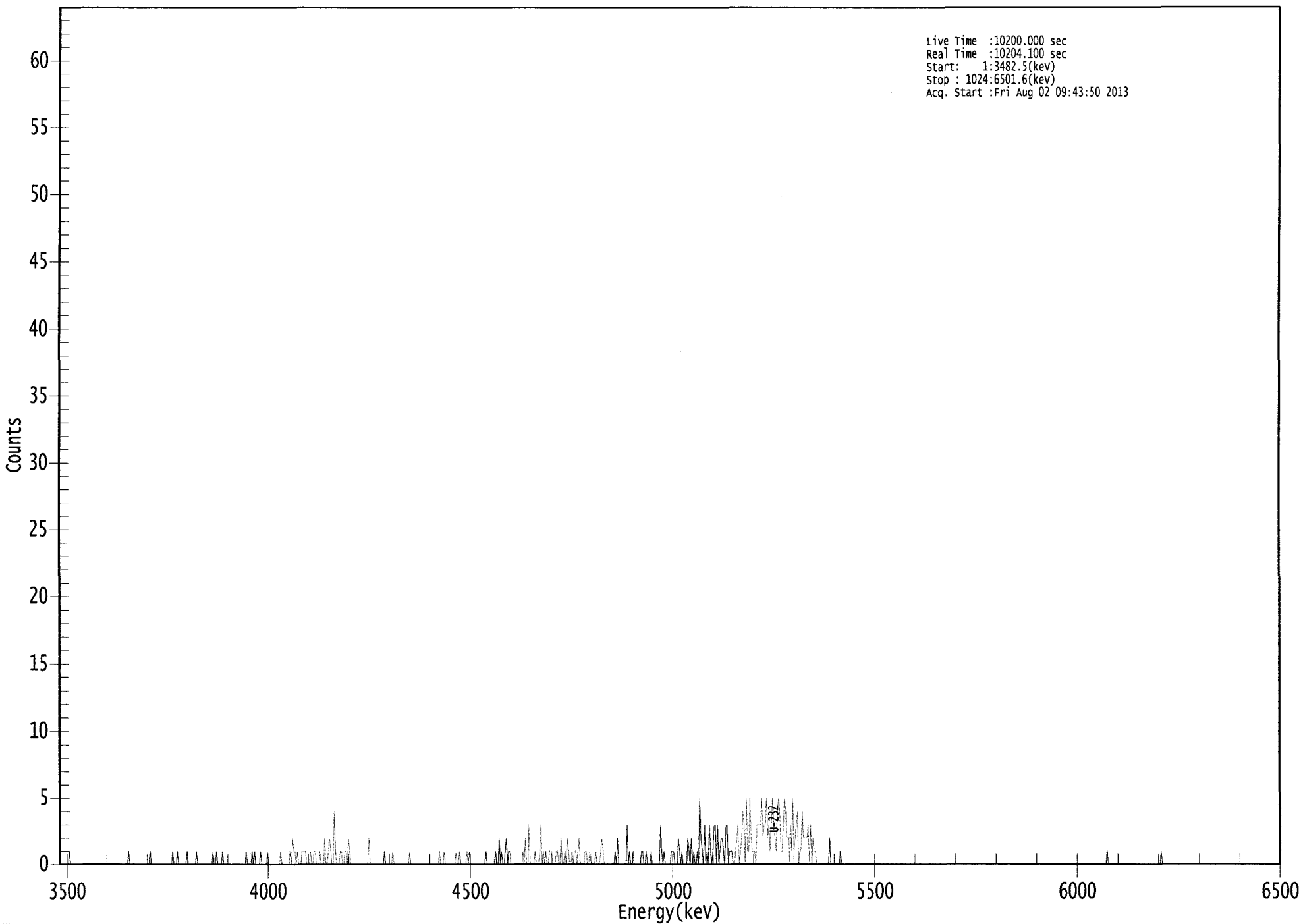
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.982	5302.50*	1.04E+001 +/- 1.70E+000	3.49E-001 +/- 5.70E-002
U-234	0.989	4761.50*	2.57E+000 +/- 9.17E-001	3.18E-001 +/- 5.19E-002
U-235	0.985	4385.50*	6.43E-001 +/- 4.68E-001	3.42E-001 +/- 5.59E-002
U-238	0.981	4184.40*	2.37E+000 +/- 8.70E-001	2.76E-001 +/- 4.51E-002

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US EPA ARCHIVE DOCUMENT

0000064926.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Fri Aug 02 09:43:50 2013



ROI Type: 1

ROI Type: 3

0107

 ***** 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: 10204

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

369: 0 2 0 1 0 0 1 2

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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

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Apex-Alpha™

Sample Description: DUP 01 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 04
 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: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:51 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.0244 +/- 0.0036
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.1240 +/- 0.0185

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	47.49	28.62	0.51	0.00E+000	4.5
U-234	4.756	4.66	94.59	0.34	0.00E+000	3.0
U-235	4.458	1.49	190.02	0.51	0.00E+000	6.0
U-238	4.128	2.66	128.85	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

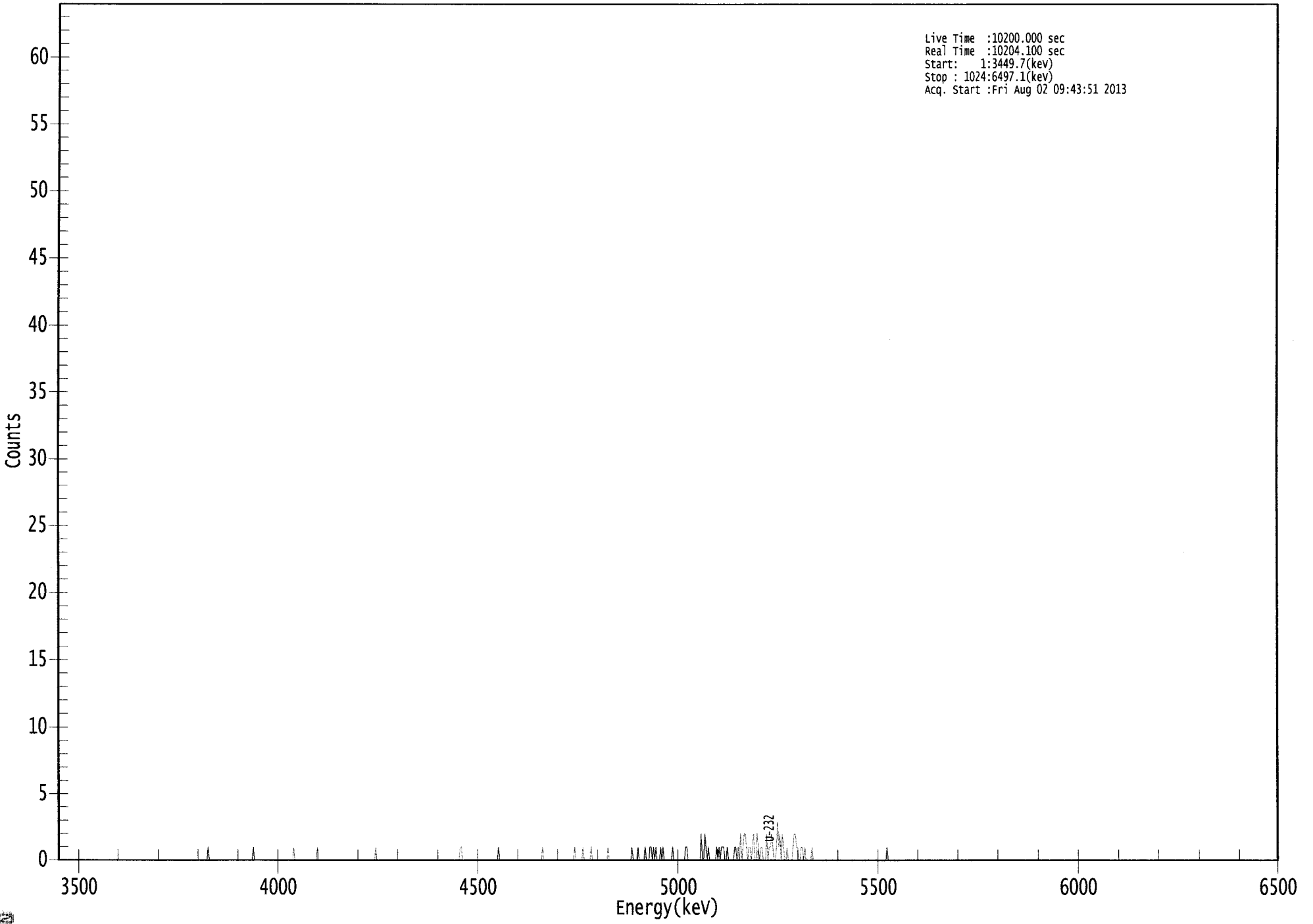
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.966	5302.50*	1.04E+001 +/- 3.00E+000	1.14E+000 +/- 3.31E-001
U-234	1.000	4761.50*	1.02E+000 +/- 1.00E+000	1.04E+000 +/- 3.02E-001
U-235	0.963	4385.50*	4.00E-001 +/- 7.70E-001	1.41E+000 +/- 4.09E-001
U-238	0.978	4184.40*	5.77E-001 +/- 7.62E-001	1.04E+000 +/- 3.00E-001

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US EPA ARCHIVE DOCUMENT

0000064947.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Fri Aug 02 09:43:51 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: 04

Elapsed Live time: 10200

Elapsed Real Time: 10204

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	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	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	1	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	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	0	0	0	0	0	0	0
337:	0	0	1	1	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 1 0 0 0 0 0

Sample Title: 04

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

801: 0 0 0 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



Sample Description: DUP 01 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 05
 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: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:53 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.606 mL
 Effective Efficiency: 0.0204 +/- 0.0033
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 0.1075 +/- 0.0174

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	39.83	31.13	0.17	0.00E+000	7.4
U-234	4.747	3.00	130.67	0.00	0.00E+000	3.0
U-235	4.398	-0.17	1169.4	0.17	0.00E+000	0.0
U-238	4.148	0.00	1960.0	0.00	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

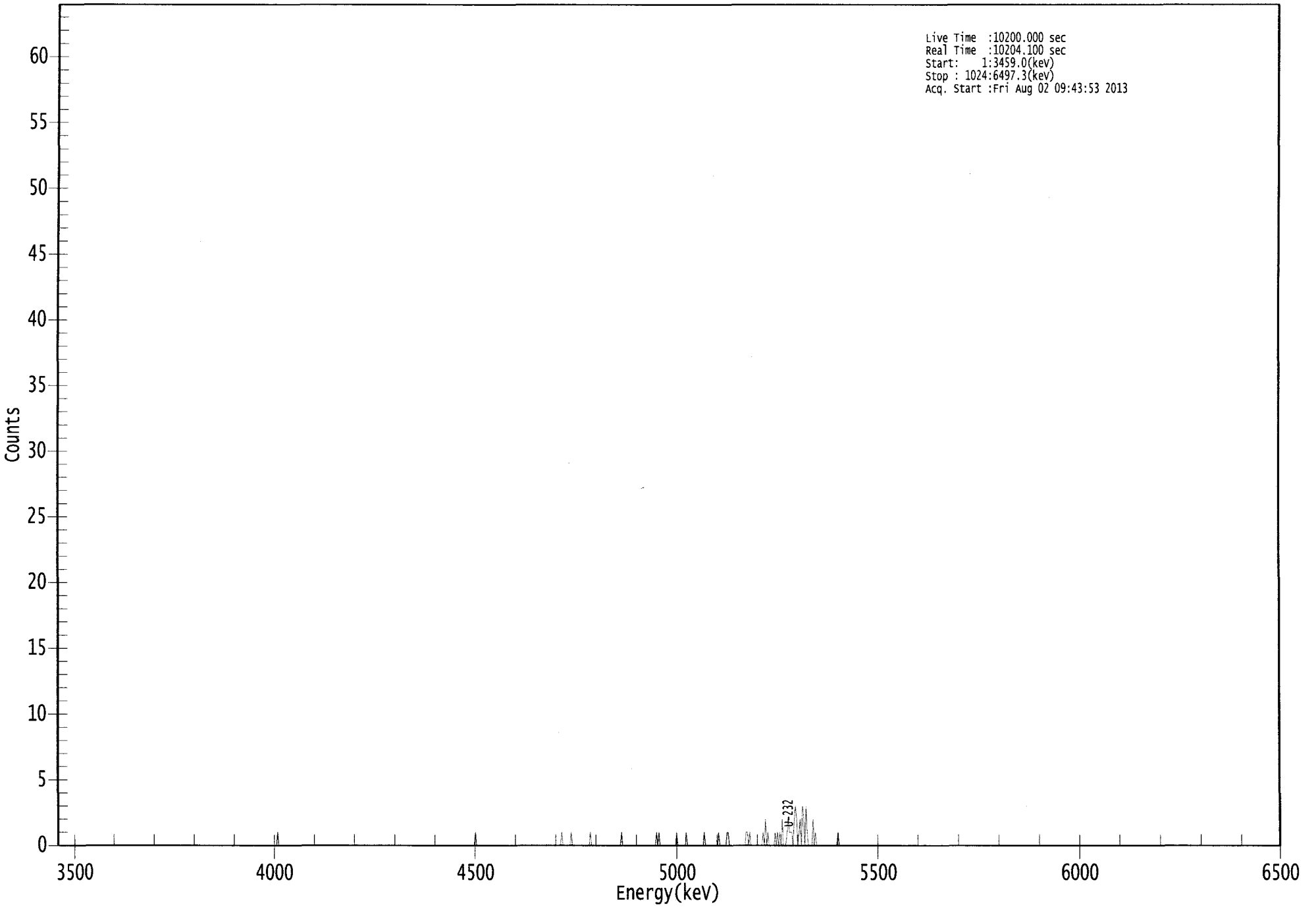
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	1.04E+001 +/- 3.26E+000	1.09E+000 +/- 3.41E-001
U-234	0.999	4761.50*	7.80E-001 +/- 1.05E+000	1.56E+000 +/- 4.90E-001
U-235	0.999	4385.50*	-5.45E-002 +/- 6.38E-001	1.34E+000 +/- 4.21E-001
U-238	0.991	4184.40*	0.00E+000 +/- 7.17E-001	1.55E+000 +/- 4.88E-001

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US EPA ARCHIVE DOCUMENT

000064963.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Fri Aug 02 09:43:53 2013



ROI Type: 1

ROI Type: 3

2117

 ***** 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: 10204

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

369: 0 0 0 0 0 0 0 0

Sample Title: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	1
425:	0	0	0	0	0	0	0	1
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	1	0
505:	1	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	1	0	0	0	0	0
561:	0	1	1	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	1	0	1	0	0	0
585:	0	0	0	0	0	0	0	1
593:	0	2	0	1	0	0	0	0
601:	0	1	0	1	0	1	0	2
609:	0	0	0	1	2	1	1	1
617:	0	2	3	2	0	1	2	0
625:	3	2	0	3	1	0	0	0
633:	0	2	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	1	0
657:	0	0	0	0	0	0	0	0
665:	0	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: 05

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



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Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:54 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.1059 +/- 0.0078
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 0.5353 +/- 0.0404

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 5.249	206.00	13.69	0.00	0.00E+000	9.6
U-234	4.709	62.15	25.06	0.85	0.00E+000	3.0
U-235	4.423	10.32	63.32	0.68	0.00E+000	3.0
U-238	4.135	38.26	33.45	3.74	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

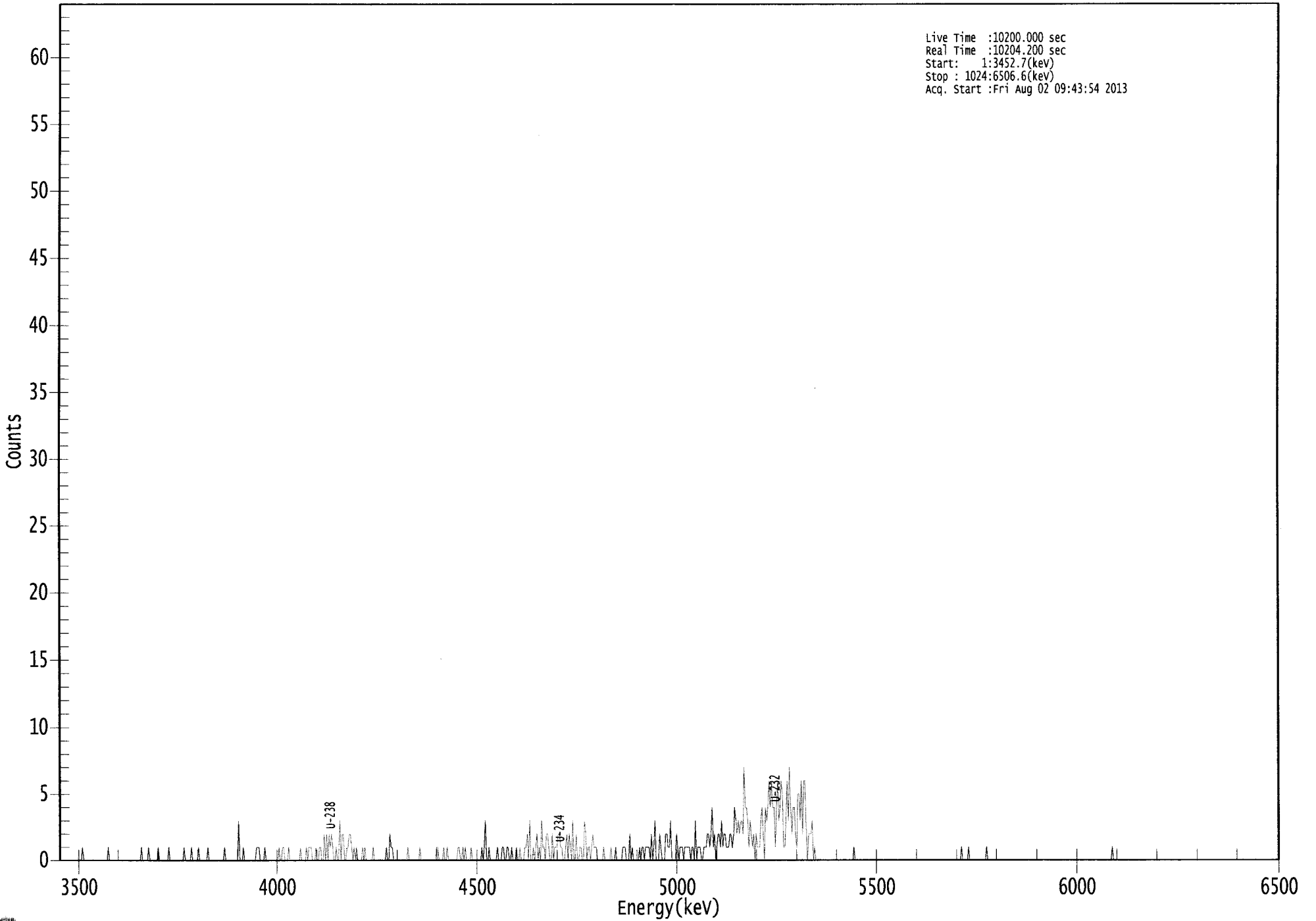
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.980	5302.50*	1.03E+001 +/- 1.49E+000	3.01E-001 +/- 4.34E-002
U-234	0.981	4761.50*	3.12E+000 +/- 9.01E-001	3.00E-001 +/- 4.33E-002
U-235	0.990	4385.50*	6.38E-001 +/- 4.15E-001	3.49E-001 +/- 5.03E-002
U-238	0.983	4184.40*	1.91E+000 +/- 6.96E-001	4.79E-001 +/- 6.90E-002

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US EPA ARCHIVE DOCUMENT

0000064949.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3452.7(keV)
Stop : 1024:6506.6(keV)
Acq. Start :Fri Aug 02 09:43:54 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 1 0 0 0 1 1 0 0

Sample Title: 06

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

KB
8/2/13

Apex-Alpha™

Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:55 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.1130 +/- 0.0081
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.6119 +/- 0.0450

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 5.255	219.98	13.25	1.02	0.00E+000	3.8
U-234	4.701	60.66	25.25	0.34	0.00E+000	5.2
U-235	4.419	17.83	46.68	0.17	0.00E+000	3.0
U-238	4.126	28.98	37.15	1.02	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

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

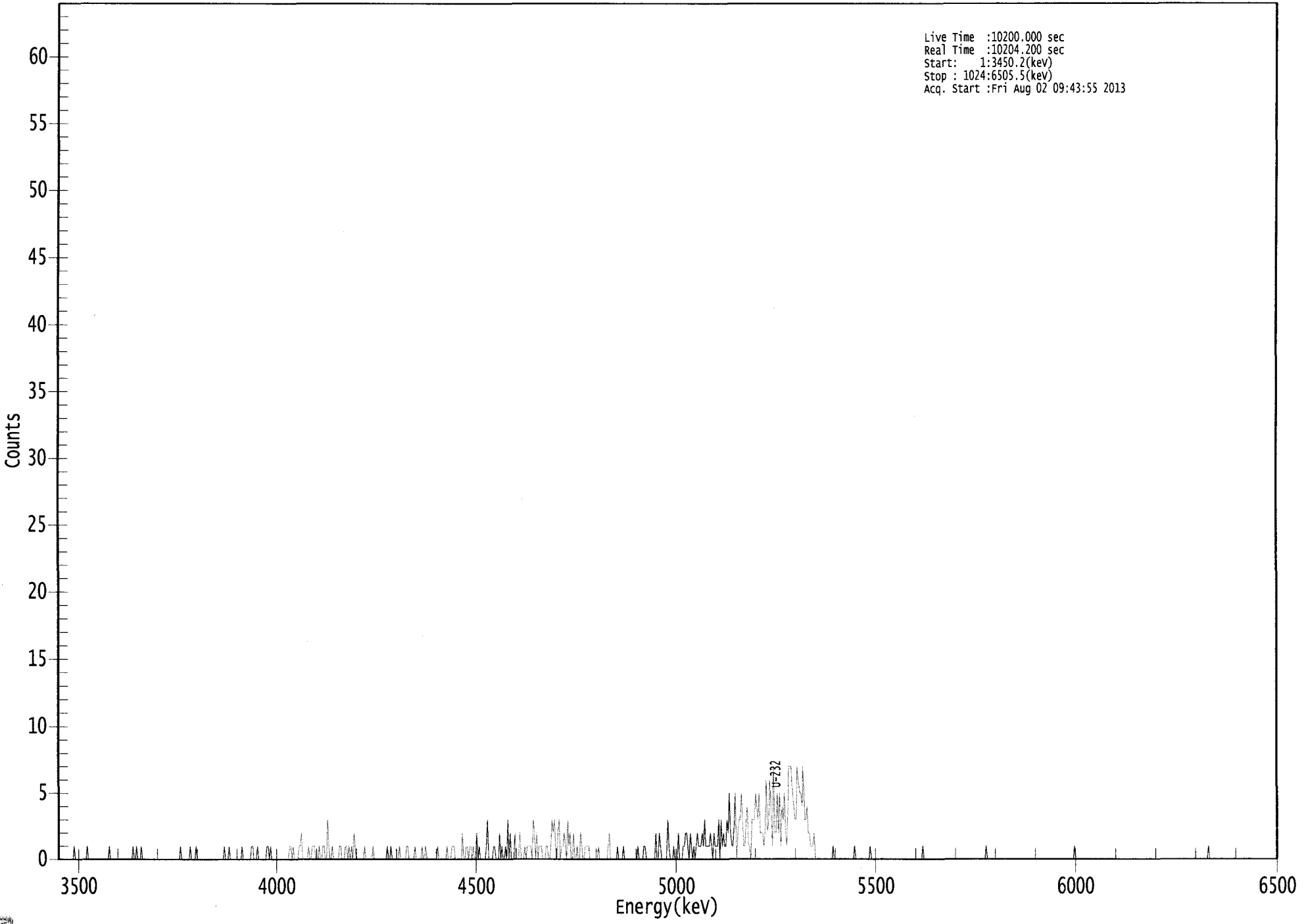
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.984	5302.50*	1.03E+001 +/- 1.45E+000	2.96E-001 +/- 4.15E-002
U-234	0.975	4761.50*	2.85E+000 +/- 8.23E-001	2.25E-001 +/- 3.15E-002
U-235	0.992	4385.50*	1.03E+000 +/- 5.04E-001	2.42E-001 +/- 3.39E-002
U-238	0.976	4184.40*	1.36E+000 +/- 5.39E-001	2.95E-001 +/- 4.13E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064950.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Fri Aug 02 09:43:55 2013



ROI Type: 1

ROI Type: 3

0127

 ***** 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: 10204

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

369: 0 0 0 2 0 1 0 0

Sample Title: 07

Channel	1	2	3	4	5	6	7	8
377:	1	0	3	0	2	0	0	0
385:	2	0	0	0	2	0	0	0
393:	1	0	1	1	1	1	0	3
401:	2	0	2	0	1	1	1	0
409:	0	0	1	1	0	0	1	3
417:	2	3	1	0	2	3	0	1
425:	1	2	1	0	3	1	2	0
433:	0	2	0	0	1	0	0	2
441:	1	0	0	1	1	1	1	0
449:	0	0	0	0	0	0	1	0
457:	0	0	0	0	0	0	1	2
465:	0	0	0	0	0	0	1	0
473:	0	0	0	1	0	0	0	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	0	1	1	0	0
497:	0	0	0	0	0	0	2	0
505:	0	2	1	0	0	0	0	0
513:	3	1	0	0	0	1	0	0
521:	0	2	0	0	0	1	1	2
529:	2	1	0	2	1	0	1	0
537:	1	2	1	1	1	2	1	3
545:	1	1	1	1	2	1	0	2
553:	1	1	1	3	0	3	1	2
561:	1	1	3	2	5	2	1	1
569:	3	5	0	2	3	3	5	3
577:	1	1	3	4	1	1	0	3
585:	3	3	5	4	3	5	2	2
593:	2	1	2	6	2	3	6	4
601:	1	7	2	2	5	2	5	1
609:	4	3	5	2	1	4	7	7
617:	7	5	4	3	3	7	6	5
625:	5	4	7	3	3	4	2	2
633:	1	1	1	2	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	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	1	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	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: 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	1	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	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	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



ICB
8/2/13

Sample Description: D-85 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:57 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: 0.0501 +/- 0.0052
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Chem. Recovery Factor: 0.2622 +/- 0.0277

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 5.250	97.32	19.95	0.68	0.00E+000	3.5
U-234	4.709	27.83	37.29	0.17	0.00E+000	3.7
U-235	4.411	10.00	65.01	0.00	0.00E+000	3.0
U-238	4.112	22.66	41.53	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

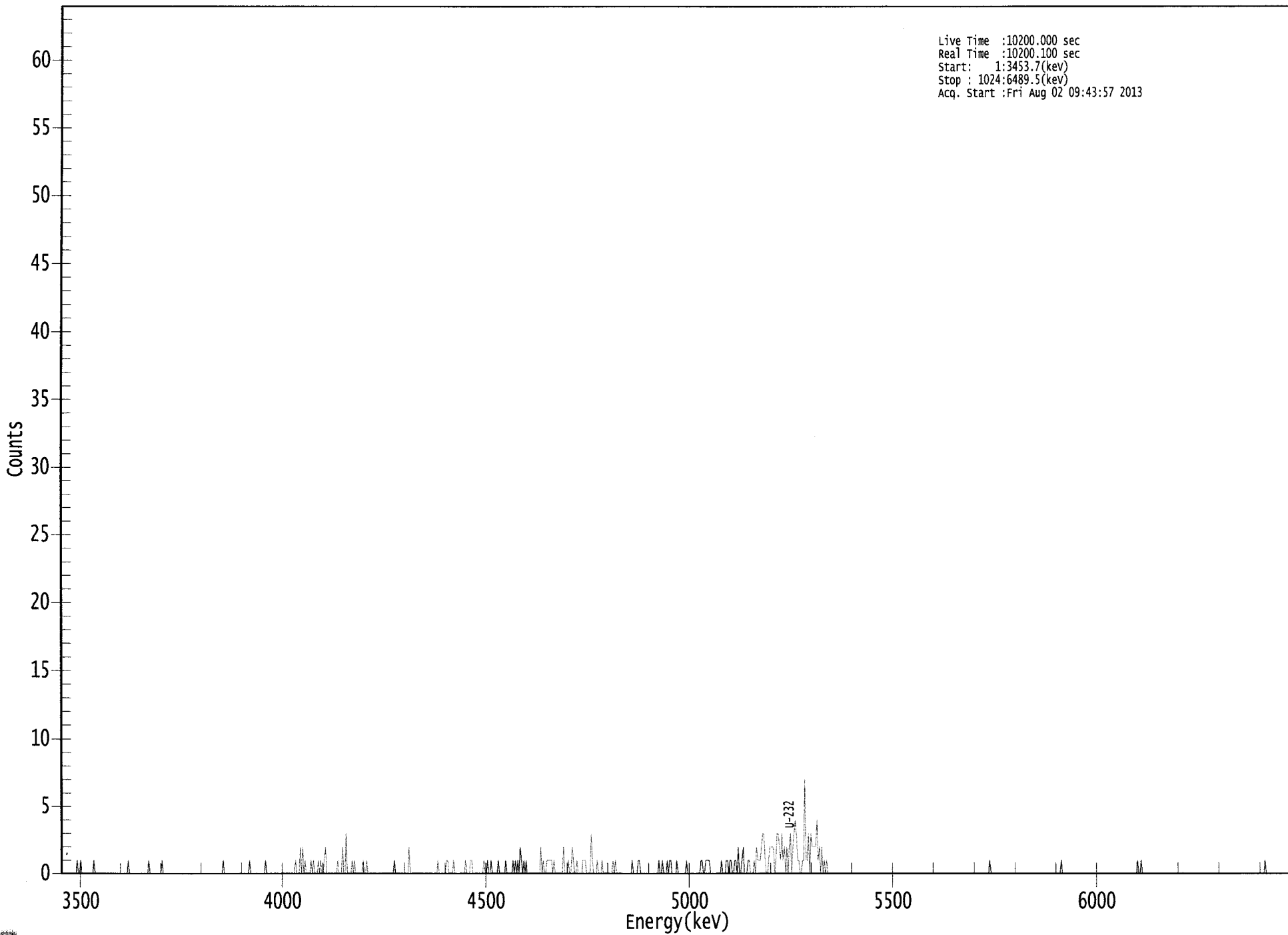
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.980	5302.50*	1.03E+001 +/- 2.11E+000	5.99E-001 +/- 1.22E-001
U-234	0.981	4761.50*	2.95E+000 +/- 1.26E+000	4.43E-001 +/- 9.05E-002
U-235	0.995	4385.50*	1.31E+000 +/- 8.92E-001	7.85E-001 +/- 1.60E-001
U-238	0.964	4184.40*	2.39E+000 +/- 1.11E+000	5.05E-001 +/- 1.03E-001

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064951.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :Fri Aug 02 09:43:57 2013



ROI Type: 1

ROI Type: 3

2013

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	1	0	0
17:	1	0	0	0	0	0	0	0
25:	0	0	0	1	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	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	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	1	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	1	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	1	0	0	0	2
201:	0	2	0	1	0	0	0	0
209:	1	0	1	0	0	0	1	0
217:	1	0	0	1	2	0	0	0
225:	0	0	0	0	0	0	1	0
233:	0	0	2	0	0	3	0	0
241:	0	0	1	0	1	0	0	0
249:	0	0	0	1	0	0	1	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	0	0	0	0	0	0
289:	0	2	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	1	0	0	0	0	0	0
321:	1	1	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0
337:	1	0	0	0	1	1	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	1	0	0	1	0	0
361:	0	0	0	1	0	0	0	0

369: 0 1 0 0 0 0 0 1

Sample Title: 08

Channel	1	2	3	4	5	6	7	8
377:	0	1	0	1	0	2	1	0
385:	1	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	2	0
401:	1	0	0	1	1	1	1	1
409:	0	1	0	0	0	0	0	0
417:	0	2	0	0	0	1	0	0
425:	2	1	0	0	1	0	0	0
433:	0	1	1	1	0	0	0	0
441:	3	1	0	0	0	1	0	0
449:	0	1	0	0	0	0	0	0
457:	0	0	1	0	1	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	1	0	0	0	0	1
481:	1	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	1	0	0	1	0	0	0	1
505:	0	1	1	0	0	0	0	1
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	0	0	0
529:	0	0	0	1	1	0	0	1
537:	1	1	1	0	0	0	0	0
545:	0	0	0	0	1	0	0	0
553:	1	1	0	1	1	0	0	1
561:	1	0	2	0	0	1	2	0
569:	0	0	1	1	0	0	0	1
577:	0	2	1	1	1	2	3	3
585:	1	0	0	1	2	2	2	2
593:	0	1	3	3	2	1	3	1
601:	2	0	2	0	2	3	0	2
609:	3	4	3	1	1	0	0	1
617:	1	7	1	1	3	0	3	2
625:	2	2	2	4	1	2	0	2
633:	0	1	0	1	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	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	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: 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	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	1	0	0	1
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	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

103
8/2/13

Apex-Alpha™

Sample Description: D-85 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:59 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: 0.1053 +/- 0.0078
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.5887 +/- 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 5.257	204.83	13.70	0.17	0.00E+000	4.6
U-234	4.735	20.83	43.15	0.17	0.00E+000	3.0
U-235	4.406	5.83	82.55	0.17	0.00E+000	3.0
U-238	4.082	8.00	73.50	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

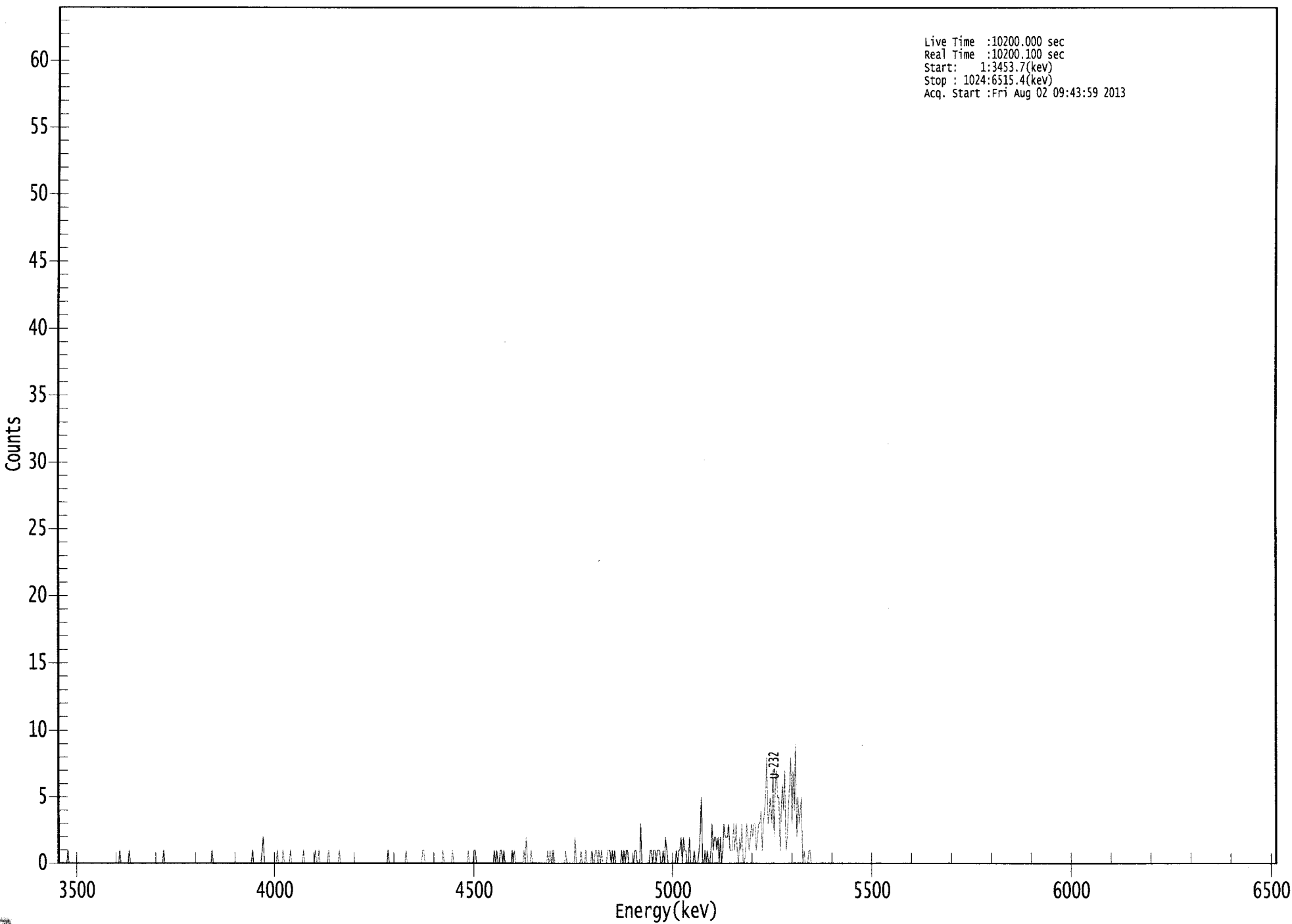
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.985	5302.50*	1.03E+001 +/- 1.49E+000	2.11E-001 +/- 3.04E-002
U-234	0.995	4761.50*	1.05E+000 +/- 4.78E-001	2.10E-001 +/- 3.03E-002
U-235	0.997	4385.50*	3.63E-001 +/- 3.04E-001	2.60E-001 +/- 3.74E-002
U-238	0.928	4184.40*	4.02E-001 +/- 3.01E-001	3.01E-001 +/- 4.34E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064952.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Fri Aug 02 09:43:59 2013



ROI Type: 1

ROI Type: 3

257

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	1	0	0	0
57:	0	0	0	0	1	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	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	1	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	0	0
169:	0	0	0	0	1	2	0	0
177:	0	0	0	0	0	0	0	0
185:	0	1	0	0	0	0	1	0
193:	0	0	0	0	1	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	0
217:	0	1	0	0	1	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	1	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	1	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	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	1	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	1	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 1 0 0 1 1 0 1

Sample Title: 09

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

801: 0 0 0 0 0 0 0 0

Sample Title: 09

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

08
8/2/13

Apex-Alpha™

Sample Description: PZ-106-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:44:00 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: 0.0955 +/- 0.0073
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.5240 +/- 0.0413

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	185.83	14.39	0.17	0.00E+000	4.7
U-234	4.713	20.00	44.91	0.00	0.00E+000	2.9
U-235	4.417	9.00	68.87	0.00	0.00E+000	2.9
U-238	4.148	13.83	53.08	0.17	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

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

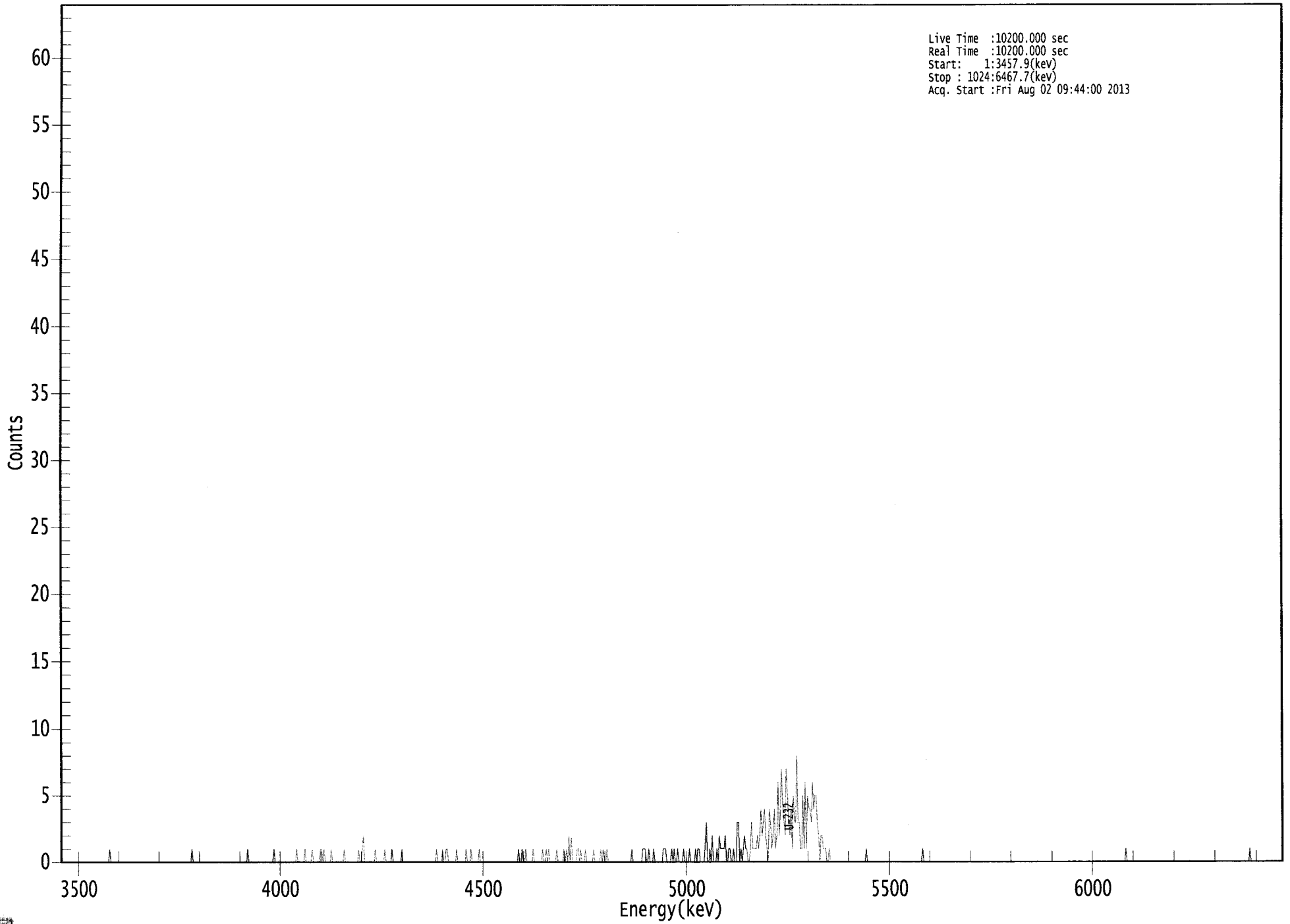
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.985	5302.50*	1.03E+001 +/- 1.56E+000	2.32E-001 +/- 3.50E-002
U-234	0.983	4761.50*	1.11E+000 +/- 5.27E-001	3.34E-001 +/- 5.03E-002
U-235	0.993	4385.50*	6.18E-001 +/- 4.35E-001	4.11E-001 +/- 6.20E-002
U-238	0.991	4184.40*	7.66E-001 +/- 4.23E-001	2.31E-001 +/- 3.49E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064953.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Fri Aug 02 09:44:00 2013



ROI Type: 1

ROI Type: 3

2716
5142

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	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	1	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:	0	0	0	0	0	0	0	0
169:	0	0	0	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	0	1	0
201:	0	0	0	0	0	1	0	0
209:	0	0	0	1	0	0	0	0
217:	0	0	1	1	0	1	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	1	0
241:	0	0	0	0	0	0	0	0
249:	0	0	1	0	0	1	2	0
257:	0	0	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	1	0	0	0	0	0	1	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	1	0	0	1	1	0	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	1	0	0	0
345:	1	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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

ICS
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Apex-Alpha™

Sample Description: PZ-106-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:44:02 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.1027 +/- 0.0077
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 0.6116 +/- 0.0468

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 5.250	199.66	13.88	0.34	0.00E+000	3.8
U-234	4.715	24.00	40.83	0.00	0.00E+000	3.7
U-235	4.387	10.00	65.01	0.00	0.00E+000	5.9
U-238	4.120	2.00	169.74	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

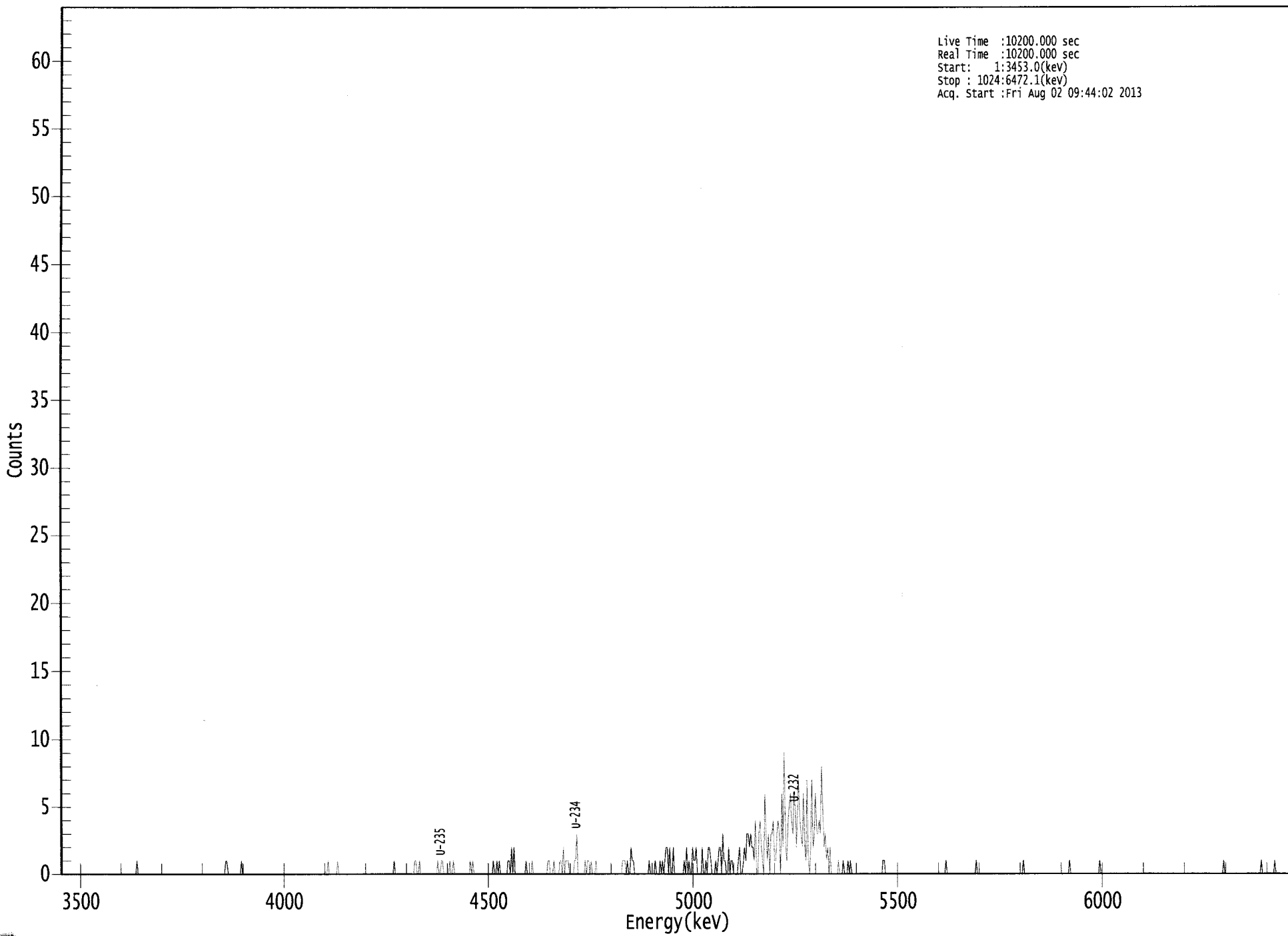
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.980	5302.50*	1.03E+001 +/- 1.51E+000	2.47E-001 +/- 3.61E-002
U-234	0.985	4761.50*	1.24E+000 +/- 5.38E-001	3.10E-001 +/- 4.52E-002
U-235	1.000	4385.50*	6.38E-001 +/- 4.25E-001	3.82E-001 +/- 5.58E-002
U-238	0.971	4184.40*	1.03E-001 +/- 1.75E-001	3.09E-001 +/- 4.51E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064954.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.0(keV)
Stop : 1024:6472.1(keV)
Acq. Start :Fri Aug 02 09:44:02 2013



ROI Type: 1

ROI Type: 3

44

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 1 0 2 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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

Apex-Alpha™

ICB
8/2/13

Sample Description: S-84 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 10:40:25 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.0580 +/- 0.0057
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 0.3320 +/- 0.0330

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	112.81	18.57	1.19	0.00E+000	3.0
U-234	4.721	14.49	52.54	0.51	0.00E+000	3.0
U-235	4.427	3.49	113.53	0.51	0.00E+000	3.0
U-238	4.128	14.49	52.54	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

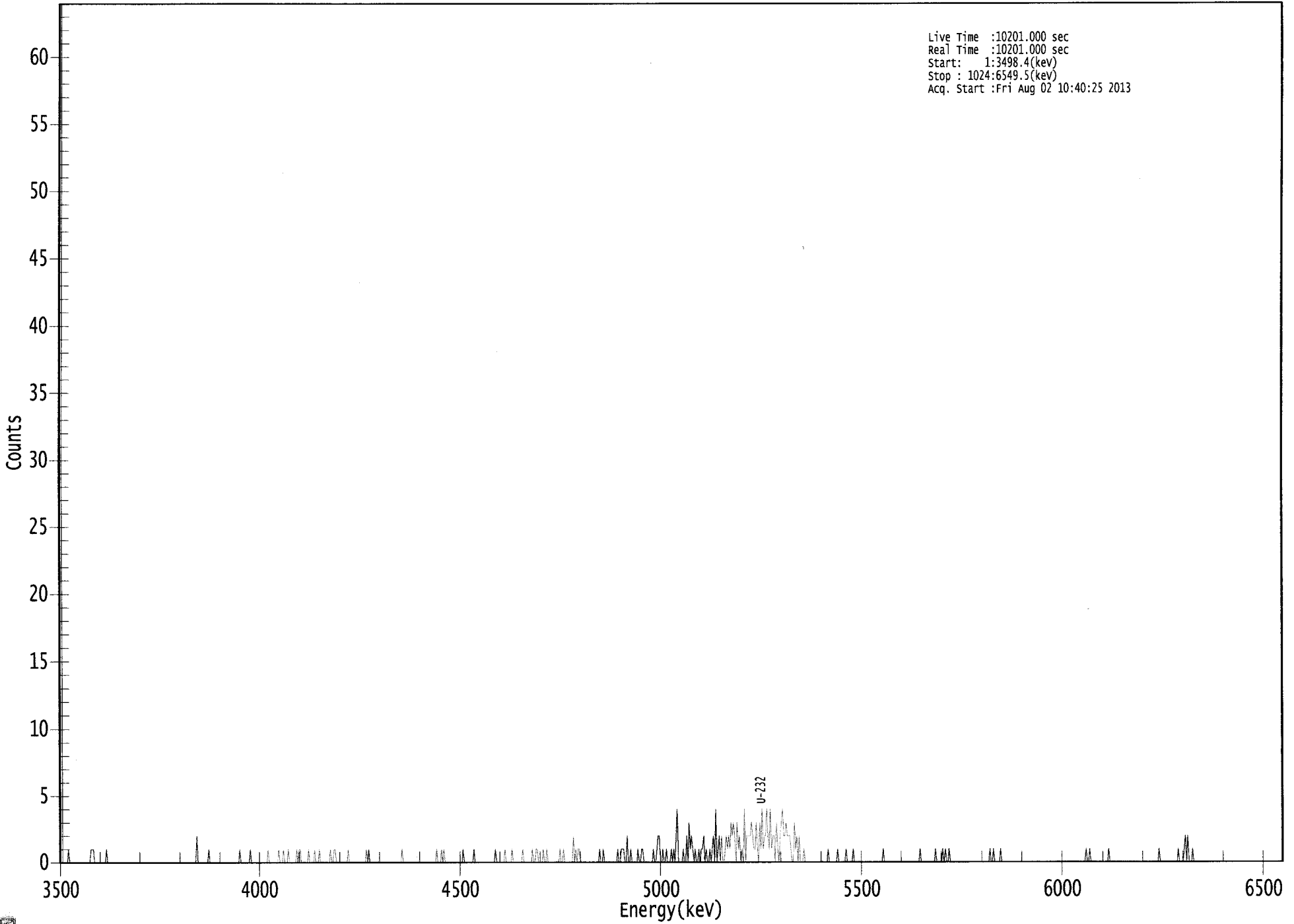
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.982	5302.50*	1.03E+001 +/- 1.98E+000	6.04E-001 +/- 1.15E-001
U-234	0.989	4761.50*	1.33E+000 +/- 7.42E-001	4.81E-001 +/- 9.18E-002
U-235	0.988	4385.50*	3.94E-001 +/- 4.54E-001	5.93E-001 +/- 1.13E-001
U-238	0.978	4184.40*	1.32E+000 +/- 7.39E-001	4.79E-001 +/- 9.14E-002

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US EPA ARCHIVE DOCUMENT

0000064955.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Fri Aug 02 10:40:25 2013



ROI Type: 1

ROI Type: 3

0.510

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

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

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	1	0	0	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	1	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	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	1
937:	0	0	0	0	1	2	0	2
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

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Apex-Alpha™

Sample Description: S-84 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 10:40:26 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: 0.0444 +/- 0.0049
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.2288 +/- 0.0258

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 5.238	86.30	21.34	1.70	0.00E+000	4.9
U-234	4.737	14.13	56.03	1.87	0.00E+000	4.4
U-235	4.383	6.81	82.43	1.19	0.00E+000	2.9
U-238	4.095	3.49	113.53	0.51	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

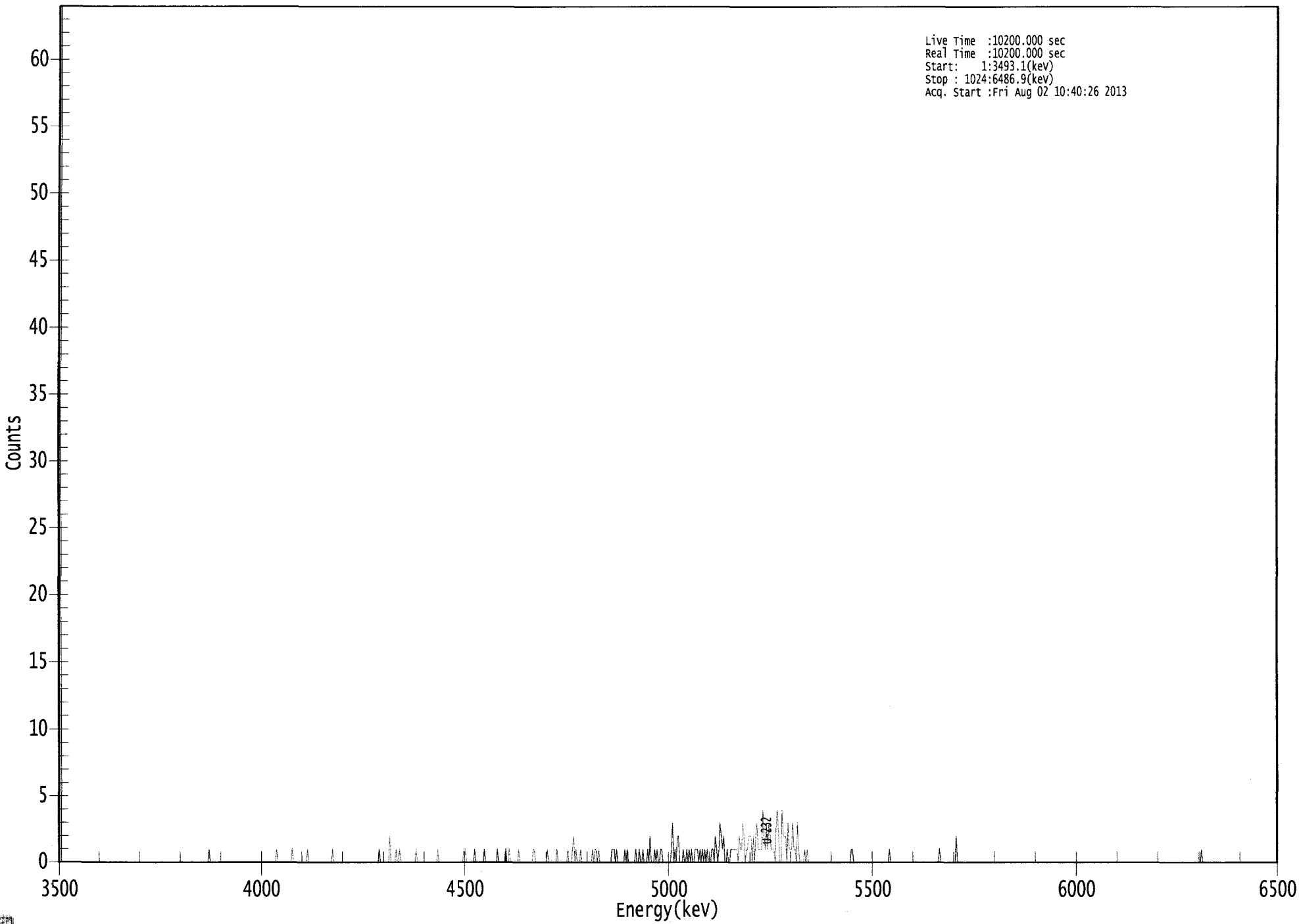
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.971	5302.50*	1.03E+001 +/- 2.25E+000	8.79E-001 +/- 1.92E-001
U-234	0.996	4761.50*	1.69E+000 +/- 1.02E+000	9.06E-001 +/- 1.98E-001
U-235	1.000	4385.50*	1.00E+000 +/- 8.57E-001	9.72E-001 +/- 2.12E-001
U-238	0.944	4184.40*	4.16E-001 +/- 4.81E-001	6.25E-001 +/- 1.36E-001

AG
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US EPA ARCHIVE DOCUMENT

0000064956.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(keV)
Stop : 1024:6486.9(keV)
Acq. Start :Fri Aug 02 10:40:26 2013



ROI Type: 1

ROI Type: 3

2510

 ***** 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	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	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:	1	0	0	0	0	0	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	1	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	1	0
273:	0	0	0	0	0	0	0	2
281:	0	0	0	0	1	0	0	1
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	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	1	1	0
345:	0	0	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 1 0 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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

108
8/21/13

Apex-Alpha™

Sample Description: PZ-106-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 10:40:18 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.602 mL
 Effective Efficiency: 0.1061 +/- 0.0078
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.5396 +/- 0.0409

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	205.81	13.71	1.19	0.00E+000	7.2
U-234	4.724	23.64	41.65	1.36	0.00E+000	2.9
U-235	4.386	5.98	87.79	1.02	0.00E+000	2.9
U-238	4.110	11.81	60.30	1.19	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

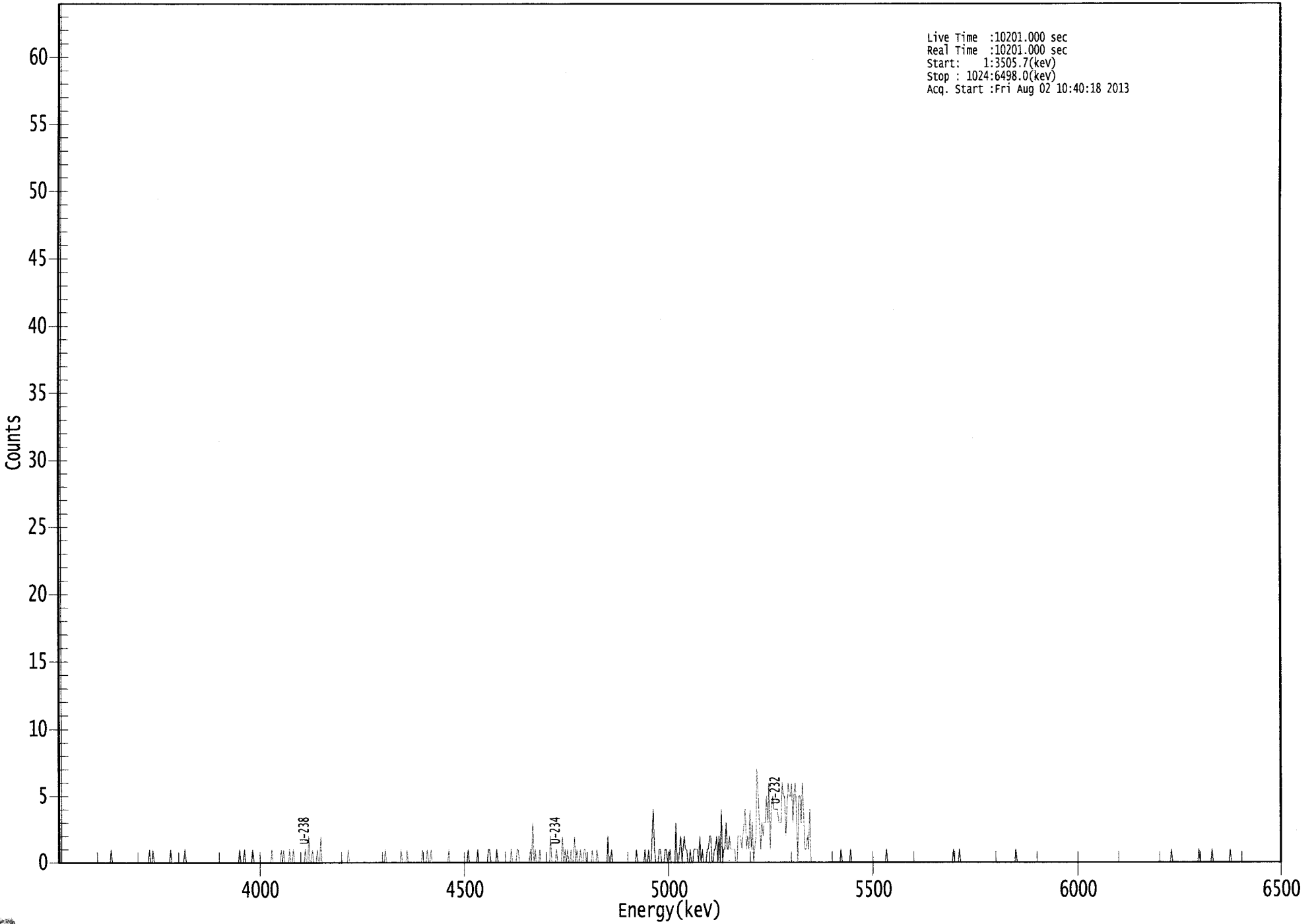
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.989	5302.50*	1.03E+001 +/- 1.49E+000	3.30E-001 +/- 4.76E-002
U-234	0.990	4761.50*	1.18E+000 +/- 5.21E-001	3.43E-001 +/- 4.95E-002
U-235	1.000	4385.50*	3.69E-001 +/- 3.28E-001	3.89E-001 +/- 5.61E-002
U-238	0.961	4184.40*	5.88E-001 +/- 3.65E-001	3.28E-001 +/- 4.74E-002

AG
8/21/13

US EPA ARCHIVE DOCUMENT

0000064957.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Fri Aug 02 10:40:18 2013



ROI Type: 1

ROI Type: 3

0162

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

Sample Title: 14

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	1	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0	1
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	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	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	1	0	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	0
185:	0	0	0	1	0	1	0	0
193:	0	0	1	0	0	1	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	2	0	0	1	0	0
217:	0	1	0	0	2	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	1
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	0	1	0	0
313:	1	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	1
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	1	1	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0

Sample Title: 14

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

801: 0 1 0 0 0 0 0 0

Sample Title: 14

Channel	1	2	3	4	5	6	7	8
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	1	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	1	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	1	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: PZ-106-SS DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
Batch Identification: 1307099B-UU
Sample Identification: 15
Sample Geometry: Shelf 2
Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
Sample Date/Time: 7/10/2013 7:28:24 AM
Acquisition Date/Time: 8/2/2013 10:40:19 AM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
Tracer Quantity: 0.600 mL
Effective Efficiency: 0.1250 +/- 0.0086
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Chem. Recovery Factor: 0.6094 +/- 0.0430

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 5.250	241.49	12.63	0.51	0.00E+000	4.2
U-234	4.721	45.66	29.13	0.34	0.00E+000	3.1
U-235	4.407	11.83	57.46	0.17	0.00E+000	2.6
U-238	4.137	12.66	55.94	0.34	0.00E+000	2.6

T = Tracer Peak used for Effective Efficiency

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

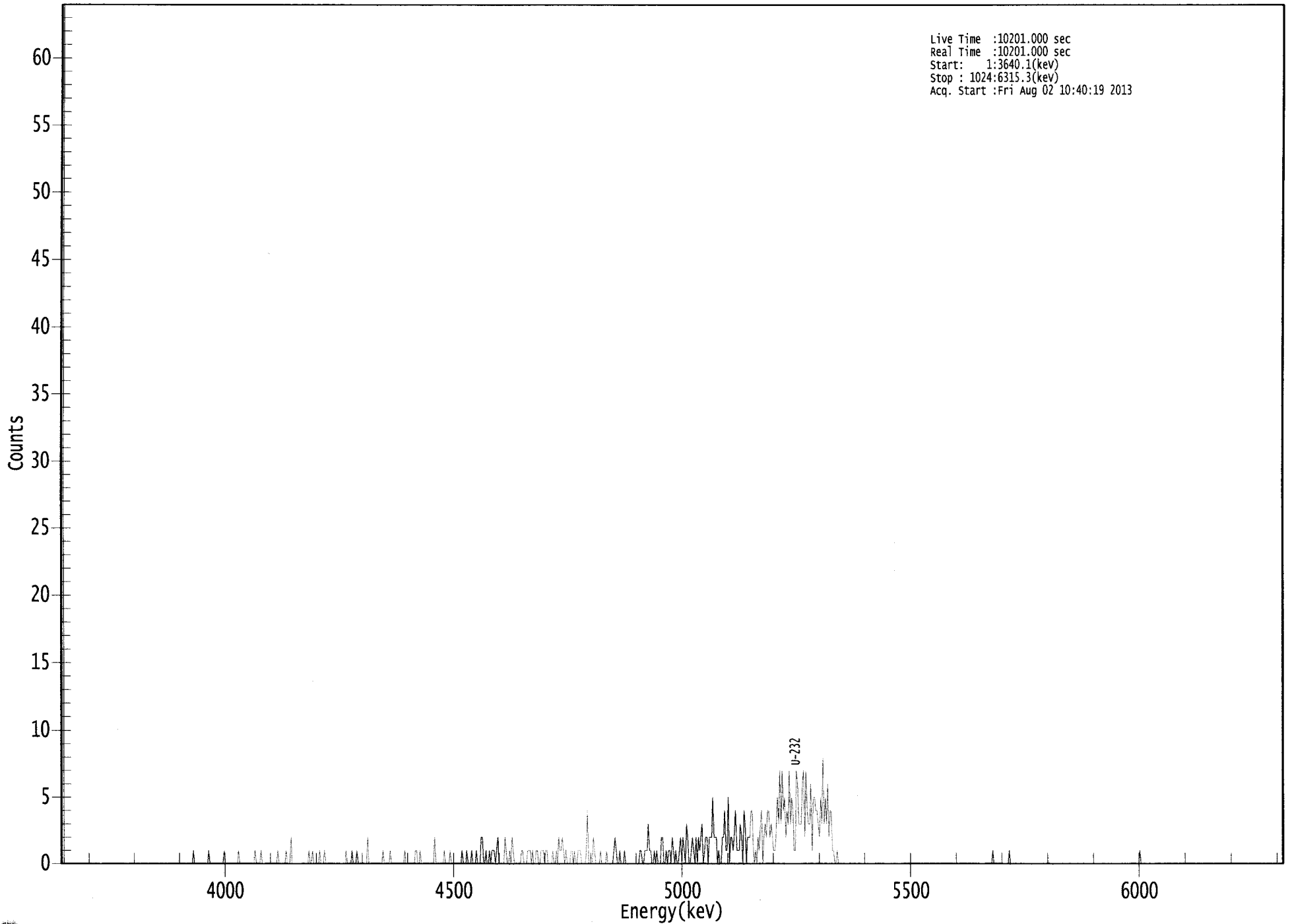
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.981	5302.50*	1.03E+001 +/- 1.38E+000	2.23E-001 +/- 2.99E-002
U-234	0.988	4761.50*	1.94E+000 +/- 6.22E-001	2.03E-001 +/- 2.72E-002
U-235	0.997	4385.50*	6.20E-001 +/- 3.66E-001	2.19E-001 +/- 2.93E-002
U-238	0.984	4184.40*	5.36E-001 +/- 3.08E-001	2.02E-001 +/- 2.71E-002

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064958.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3640.1(kev)
Stop : 1024:6315.3(kev)
Acq. Start :Fri Aug 02 10:40:19 2013



ROI Type: 1

ROI Type: 3

0157

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

Sample Title: 15

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

369: 0 0 0 0 2 1 0 0

Sample Title: 15

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 15

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

8/2/13 KCS

Apex-Alpha™

Sample Description: PZ-113-AD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 10:40:20 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: 0.0216 +/- 0.0034
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Chem. Recovery Factor: 0.1088 +/- 0.0173

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 5.268	42.00	30.60	0.00	0.00E+000	5.2
U-234	4.734	7.83	70.93	0.17	0.00E+000	3.0
U-235	4.490	0.49	417.07	0.51	0.00E+000	3.0
U-238	4.060	0.66	305.47	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

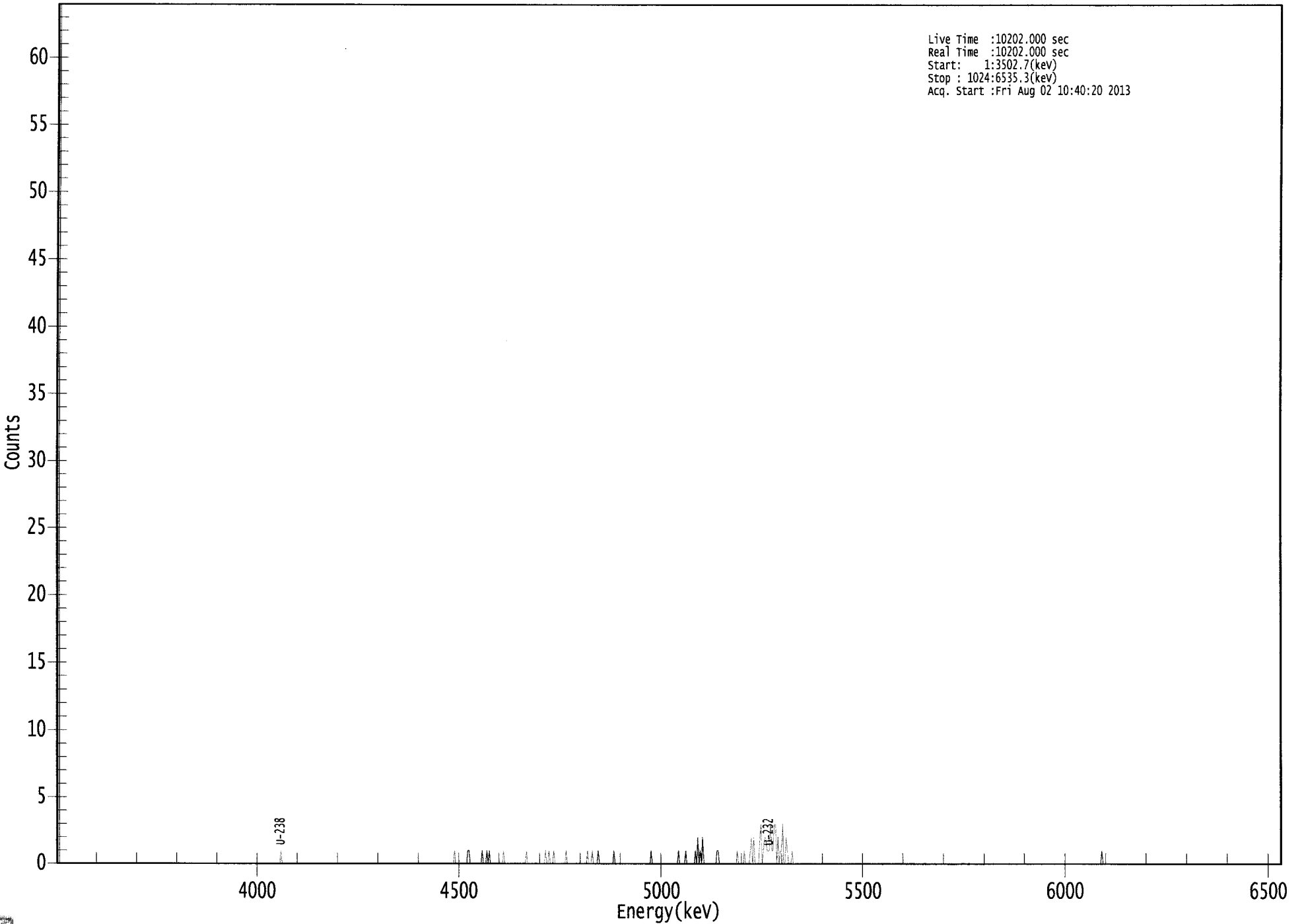
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	1.03E+001 +/- 3.19E+000	1.47E+000 +/- 4.55E-001
U-234	0.995	4761.50*	1.92E+000 +/- 1.49E+000	1.02E+000 +/- 3.17E-001
U-235	0.925	4385.50*	1.48E-001 +/- 6.20E-001	1.59E+000 +/- 4.91E-001
U-238	0.896	4184.40*	1.61E-001 +/- 4.95E-001	1.17E+000 +/- 3.61E-001

AG
8/2/13

US EPA ARCHIVE DOCUMENT

0000064959.CNF

Live Time :10202.000 sec
Real Time :10202.000 sec
Start: 1:3502.7(kev)
Stop : 1024:6535.3(kev)
Acq. Start :Fri Aug 02 10:40:20 2013



ROI Type: 1

ROI Type: 3

0172

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

Sample Title: 16

Elapsed Live time: 10202

Elapsed Real Time: 10202

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10202	10202	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0
337:	0	0	0	0	0	0	0
345:	1	1	0	0	0	0	0
353:	0	0	0	0	1	0	0
361:	1	0	1	0	0	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 16

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

145
8/2/13

Apex-Alpha™

Sample Description: PZ-113-AD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 10:40:21 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: 0.0985 +/- 0.0075
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.5269 +/- 0.0413

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	191.64	14.22	1.36	0.00E+000	8.9
U-234	4.752	10.32	63.32	0.68	0.00E+000	2.8
U-235	4.406	5.32	91.11	0.68	0.00E+000	2.8
U-238	4.162	3.81	117.33	1.19	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

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

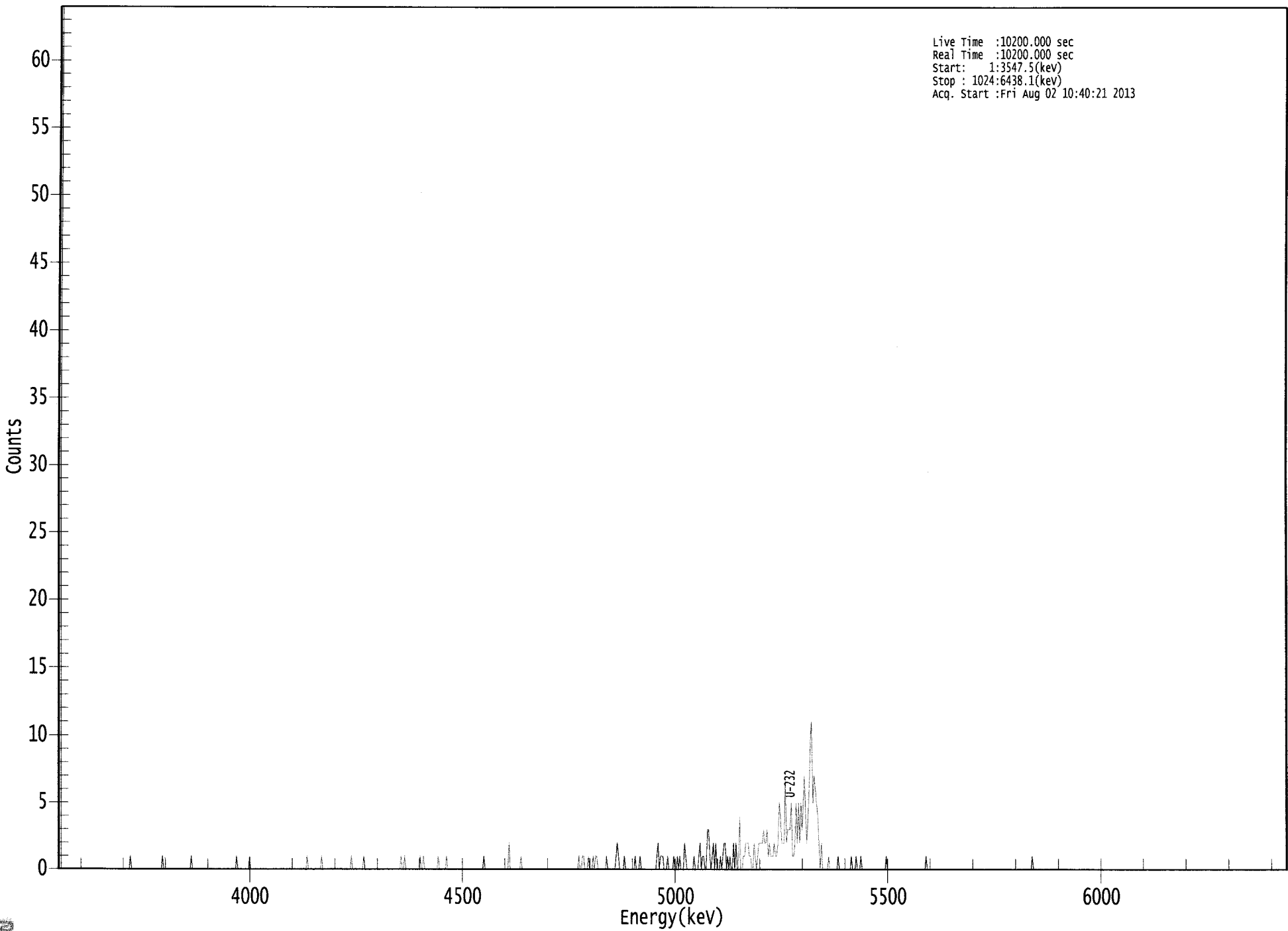
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	1.03E+001 +/- 1.54E+000	3.70E-001 +/- 5.52E-002
U-234	0.999	4761.50*	5.56E-001 +/- 3.62E-001	3.04E-001 +/- 4.54E-002
U-235	0.997	4385.50*	3.54E-001 +/- 3.27E-001	3.75E-001 +/- 5.60E-002
U-238	0.997	4184.40*	2.05E-001 +/- 2.42E-001	3.54E-001 +/- 5.28E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064960.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Fri Aug 02 10:40:21 2013



ROI Type: 1

ROI Type: 3

0177

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

Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

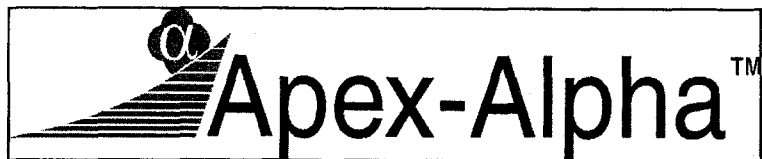
Sample Title: 17

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	2	0	0	0	0	0	0	0
385:	0	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	1	0	0	1	1	0
441:	0	0	1	0	0	0	1	0
449:	1	1	0	0	0	0	0	0
457:	0	1	0	0	0	0	0	0
465:	0	1	2	1	0	0	0	0
473:	1	0	0	0	0	0	0	0
481:	0	1	0	0	0	1	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	1	2	0	1	1
505:	1	0	0	0	1	0	0	0
513:	0	1	0	0	1	0	1	0
521:	0	0	2	1	0	0	0	0
529:	0	0	1	0	0	0	1	2
537:	0	1	1	0	0	3	3	1
545:	0	1	2	0	2	0	0	0
553:	1	0	1	2	2	0	1	0
561:	1	0	0	2	0	2	0	0
569:	4	0	0	1	1	2	2	2
577:	1	1	0	0	2	1	0	1
585:	2	2	2	2	3	2	2	3
593:	1	2	1	1	1	2	1	1
601:	2	5	4	2	2	2	7	2
609:	3	3	3	5	1	1	2	5
617:	2	5	2	5	3	5	7	4
625:	2	4	6	10	11	5	7	6
633:	5	4	2	0	2	0	0	0
641:	0	0	1	0	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	1	0	0
665:	0	1	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	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	1	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	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	1	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 8/2/2013
Time : 5:28:46 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/2/2013 5:14:00 AM
Alpha 004	21f	ALL	Passed	8/2/2013 5:14:01 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	8/2/2013 5:14:02 AM
Alpha 011	21f	ALL	Passed	8/2/2013 5:14:03 AM
Alpha 012	21f	ALL	Passed	8/2/2013 5:14:03 AM
Alpha 013	21f	ALL	Passed	8/2/2013 5:14:04 AM
Alpha 014	21f	ALL	Passed	8/2/2013 5:14:05 AM
Alpha 015	21f	Peak Energy	Action	8/2/2013 5:14:06 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/2/2013 5:14:07 AM
Alpha 019	AIM730	ALL	Passed	8/2/2013 5:14:07 AM
Alpha 020	AIM730	ALL	Passed	8/2/2013 5:14:08 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/2/2013 5:14:09 AM
Alpha 023	AIM730	ALL	Passed	8/2/2013 5:14:10 AM
Alpha 024	AIM730	ALL	Passed	8/2/2013 5:14:11 AM
Alpha 025	AIM730	ALL	Passed	8/2/2013 5:14:12 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/2/2013 5:14:12 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/2/2013 5:14:13 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/2/2013 5:14:14 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:15 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:16 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:17 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:19 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/2/2013 5:14:20 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:22 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:24 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:25 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:27 AM

US EPA ARCHIVE DOCUMENT

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	8/2/2013 5:14:28 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:30 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:32 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/2/2013 5:14:33 AM

APPROVED BY: _____ ✓

APPROVAL DATE: 8/2/13

***** 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)

ThISO
Run 1

Work Order	13-07099	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	ThISO	01	LCS	LCS		07/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/16/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 01 TOT	40	07/09/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 01 DIS	40	07/09/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-201A-SS TOT	46	07/10/13 10:23	1.0000E+00
Report Level	4	07	TRG	PZ-201A-SS DIS	46	07/10/13 10:23	1.0000E+00
Activity Units	pCi	08	DO	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Aliquot Units	I	09	TRG	D-85 DIS	43	07/10/13 10:52	1.0000E+00
Matrix	WA	10	TRG	PZ-106-SD TOT	45	07/10/13 11:41	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	PZ-106-SD DIS	45	07/10/13 11:41	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	S-84 TOT	41	07/10/13 11:46	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	S-84 DIS	41	07/10/13 11:46	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	PZ-106-SS TOT	41	07/10/13 12:43	1.0000E+00
Tracer Act (dpm/g)	22.466	15	TRG	PZ-106-SS DIS	41	07/10/13 12:43	1.0000E+00
Carrier		16	TRG	PZ-113-AD TOT	41	07/10/13 13:02	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-113-AD DIS	41	07/10/13 13:02	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.

1005

ThISO
Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.4569	10.3		0.00								
02	MBL	0.2284	5.1		0.00								
03	DUP	0.2281	5.1		0.00								
04	TRG	0.2279	5.1		0.00								
05	TRG	0.2280	5.1		0.00								
06	TRG	0.2275	5.1		0.00								
07	TRG	0.2279	5.1		0.00								
08	DO	0.2277	5.1		0.00								
09	TRG	0.2278	5.1		0.00								
10	TRG	0.2273	5.1		0.00								
11	TRG	0.2278	5.1		0.00								
12	TRG	0.2280	5.1		0.00								
13	TRG	0.2272	5.1		0.00								
14	TRG	0.2274	5.1		0.00								
15	TRG	0.2271	5.1		0.00								
16	TRG	0.2273	5.1		0.00								
17	TRG	0.2271	5.1		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.

0158

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			07/22/13 16:54	LWALKER				
02	MBL			07/22/13 16:54	LWALKER				
03	DUP			07/22/13 16:54	LWALKER				
04	TRG			07/22/13 16:54	LWALKER				
05	TRG			07/22/13 16:54	LWALKER				
06	TRG			07/22/13 16:54	LWALKER				
07	TRG			07/22/13 16:54	LWALKER				
08	DO			07/22/13 16:54	LWALKER				
09	TRG			07/22/13 16:54	LWALKER				
10	TRG			07/22/13 16:54	LWALKER				
11	TRG			07/22/13 16:54	LWALKER				
12	TRG			07/22/13 16:54	LWALKER				
13	TRG			07/22/13 16:54	LWALKER				
14	TRG			07/22/13 16:54	LWALKER				
15	TRG			07/22/13 16:54	LWALKER				
16	TRG			07/22/13 16:54	LWALKER				
17	TRG			07/22/13 16:54	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.

1307

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	5.14E+00	7.74E-01	9.59E-02	4.87E+00	105.71	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	2.55E-02	6.19E-02	1.19E-01					OK	OK
03	TH-228	DUP	D-85 TOT	pCi/l	2.48E+00	5.54E-01	1.30E-01				NA	OK	
04	TH-228	TRG	DUP 01 TOT	pCi/l	2.58E-02	4.56E-02	8.19E-02					OK	
05	TH-228	TRG	DUP 01 DIS	pCi/l	4.74E-02	6.61E-02	9.98E-02					OK	
06	TH-228	TRG	PZ-201A-SS TOT	pCi/l	-9.65E-04	5.92E-02	1.44E-01					OK	
07	TH-228	TRG	PZ-201A-SS DIS	pCi/l	-2.24E-02	5.39E-02	1.46E-01					OK	
08	TH-228	DO	D-85 TOT	pCi/l	2.68E+00	8.60E-01	1.35E-01					OK	
09	TH-228	TRG	D-85 DIS	pCi/l	5.18E-02	7.03E-02	1.10E-01					OK	
10	TH-228	TRG	PZ-106-SD TOT	pCi/l	-5.18E-03	3.07E-02	7.28E-02					OK	
11	TH-228	TRG	PZ-106-SD DIS	pCi/l	-9.99E-03	3.05E-02	8.29E-02					OK	
12	TH-228	TRG	S-84 TOT	pCi/l	5.64E-01	2.57E-01	1.14E-01					OK	
13	TH-228	TRG	S-84 DIS	pCi/l	9.57E-02	7.28E-02	6.70E-02					OK	
14	TH-228	TRG	PZ-106-SS TOT	pCi/l	3.82E-02	6.77E-02	1.21E-01					OK	
15	TH-228	TRG	PZ-106-SS DIS	pCi/l	5.09E-02	5.30E-02	5.55E-02					OK	
16	TH-228	TRG	PZ-113-AD TOT	pCi/l	1.99E-01	1.12E-01	6.97E-02					OK	
17	TH-228	TRG	PZ-113-AD DIS	pCi/l	7.95E-02	9.60E-02	1.46E-01					OK	



Run
1

Analysis Code
THISO

Eberline Services Work Order
13-07099

Client
Engineering Management Support, Inc.

0180

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	07/16/13 00:00	1.00E+00	126.82	0.00	0.00			
02	TH-228	MBL	07/16/13 00:00	1.00E+00	112.14	0.00	0.00			
03	TH-228	DUP	07/10/13 10:52	1.00E+00	96.15	0.00	0.00			
04	TH-228	TRG	07/09/13 00:00	1.00E+00	101.30	0.00	0.00			
05	TH-228	TRG	07/09/13 00:00	1.00E+00	71.39	0.00	0.00			
06	TH-228	TRG	07/10/13 10:23	1.00E+00	89.70	0.00	0.00			
07	TH-228	TRG	07/10/13 10:23	1.00E+00	103.63	0.00	0.00			
08	TH-228	DO	07/10/13 10:52	1.00E+00	56.56	0.00	0.00			
09	TH-228	TRG	07/10/13 10:52	1.00E+00	83.96	0.00	0.00			
10	TH-228	TRG	07/10/13 11:41	1.00E+00	95.49	0.00	0.00			
11	TH-228	TRG	07/10/13 11:41	1.00E+00	100.62	0.00	0.00			
12	TH-228	TRG	07/10/13 11:46	1.00E+00	59.33	0.00	0.00			
13	TH-228	TRG	07/10/13 11:46	1.00E+00	122.72	0.00	0.00			
14	TH-228	TRG	07/10/13 12:43	1.00E+00	71.29	0.00	0.00			
15	TH-228	TRG	07/10/13 12:43	1.00E+00	106.80	0.00	0.00			
16	TH-228	TRG	07/10/13 13:02	1.00E+00	93.55	0.00	0.00			
17	TH-228	TRG	07/10/13 13:02	1.00E+00	75.98	0.00	0.00			



Run 1

Analysis Code ThISO

Eberline Services Work Order 13-07099

Client Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	07/28/13 11:07		A_Spec	Alpha_003	170.02	4.29 E+02	1.30 E-02	17.5
02	TH-228	MBL	07/28/13 11:07		A_Spec	Alpha_004	170	2.09 E+00	2.30 E-02	19.4
03	TH-228	DUP	07/28/13 11:07		A_Spec	Alpha_010	170.02	1.74 E+02	1.90 E-02	19.7
04	TH-228	TRG	07/28/13 11:07		A_Spec	Alpha_011	170	1.98 E+00	6.00 E-03	20.5
05	TH-228	TRG	07/28/13 11:07		A_Spec	Alpha_012	170	2.49 E+00	3.00 E-03	19.9
06	TH-228	TRG	07/28/13 11:07		A_Spec	Alpha_013	170	-5.99 E-02	1.80 E-02	18.7
07	TH-228	TRG	07/28/13 11:07		A_Spec	Alpha_014	170	-1.59 E+00	2.70 E-02	18.5
08	TH-228	DO	07/28/13 11:07		A_Spec	Alpha_015	170	8.28 E+01	1.00 E-03	14.8
09	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_033	170	2.98 E+00	6.00 E-03	18.5
10	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_034	170	-3.40 E-01	2.00 E-03	18.6
11	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_035	170	-6.80 E-01	4.00 E-03	18.3
12	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_036	170	2.37 E+01	2.00 E-03	19.1
13	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_038	170	7.49 E+00	3.00 E-03	17.2
14	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_039	170	1.98 E+00	6.00 E-03	19.7
15	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_040	170	3.83 E+00	1.00 E-03	19
16	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_041	170	1.37 E+01	2.00 E-03	19.8
17	TH-228	TRG	07/28/13 11:08		A_Spec	Alpha_042	170	4.13 E+00	1.10 E-02	18.5

Run	1
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.



Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	4.48E+00	6.93E-01	6.29E-02	5.48E+00	81.62	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.32E-01	8.98E-02	9.76E-02					OK	OK
03	TH-230	DUP	D-85 TOT	pCi/l	4.31E+00	8.60E-01	9.25E-02				NA	OK	
04	TH-230	TRG	DUP 01 TOT	pCi/l	1.85E-01	1.02E-01	6.70E-02					OK	
05	TH-230	TRG	DUP 01 DIS	pCi/l	1.99E-01	1.27E-01	8.94E-02					OK	
06	TH-230	TRG	PZ-201A-SS TOT	pCi/l	2.24E-01	1.27E-01	9.48E-02					OK	
07	TH-230	TRG	PZ-201A-SS DIS	pCi/l	1.13E-01	8.43E-02	8.31E-02					OK	
08	TH-230	DO	D-85 TOT	pCi/l	4.26E+00	1.25E+00	1.90E-01					OK	
09	TH-230	TRG	D-85 DIS	pCi/l	6.26E-02	6.85E-02	8.18E-02					OK	
10	TH-230	TRG	PZ-106-SD TOT	pCi/l	1.77E-01	1.06E-01	6.25E-02					OK	
11	TH-230	TRG	PZ-106-SD DIS	pCi/l	3.60E-02	5.01E-02	7.58E-02					OK	
12	TH-230	TRG	S-84 TOT	pCi/l	6.99E-01	2.90E-01	9.78E-02					OK	
13	TH-230	TRG	S-84 DIS	pCi/l	1.59E-01	9.24E-02	6.01E-02					OK	
14	TH-230	TRG	PZ-106-SS TOT	pCi/l	6.61E-02	7.61E-02	9.94E-02					OK	
15	TH-230	TRG	PZ-106-SS DIS	pCi/l	1.96E-01	1.07E-01	7.84E-02					OK	
16	TH-230	TRG	PZ-113-AD TOT	pCi/l	1.05E-01	8.20E-02	8.09E-02					OK	
17	TH-230	TRG	PZ-113-AD DIS	pCi/l	1.16E-01	1.02E-01	1.13E-01					OK	



Run
1

Analysis Code
THISO

Eberline Services Work Order
13-07099

Client
Engineering Management Support, Inc.

13-07099

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	07/16/13 00:00	1.00E+00	126.82	0.00	0.00			
02	TH-230	MBL	07/16/13 00:00	1.00E+00	112.14	0.00	0.00			
03	TH-230	DUP	07/10/13 10:52	1.00E+00	96.15	0.00	0.00			
04	TH-230	TRG	07/09/13 00:00	1.00E+00	101.30	0.00	0.00			
05	TH-230	TRG	07/09/13 00:00	1.00E+00	71.39	0.00	0.00			
06	TH-230	TRG	07/10/13 10:23	1.00E+00	89.70	0.00	0.00			
07	TH-230	TRG	07/10/13 10:23	1.00E+00	103.63	0.00	0.00			
08	TH-230	DO	07/10/13 10:52	1.00E+00	56.56	0.00	0.00			
09	TH-230	TRG	07/10/13 10:52	1.00E+00	83.96	0.00	0.00			
10	TH-230	TRG	07/10/13 11:41	1.00E+00	95.49	0.00	0.00			
11	TH-230	TRG	07/10/13 11:41	1.00E+00	100.62	0.00	0.00			
12	TH-230	TRG	07/10/13 11:46	1.00E+00	59.33	0.00	0.00			
13	TH-230	TRG	07/10/13 11:46	1.00E+00	122.72	0.00	0.00			
14	TH-230	TRG	07/10/13 12:43	1.00E+00	71.29	0.00	0.00			
15	TH-230	TRG	07/10/13 12:43	1.00E+00	106.80	0.00	0.00			
16	TH-230	TRG	07/10/13 13:02	1.00E+00	93.55	0.00	0.00			
17	TH-230	TRG	07/10/13 13:02	1.00E+00	75.98	0.00	0.00			

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07099
Cifent	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	07/28/13 11:07		A_Spec	Alpha_003	170.02	3.73 E+02	3.00 E-03	17.5
02	TH-230	MBL	07/28/13 11:07		A_Spec	Alpha_004	170	1.08 E+01	1.30 E-02	19.4
03	TH-230	DUP	07/28/13 11:07		A_Spec	Alpha_010	170.02	3.07 E+02	7.00 E-03	19.7
04	TH-230	TRG	07/28/13 11:07		A_Spec	Alpha_011	170	1.45 E+01	3.00 E-03	20.5
05	TH-230	TRG	07/28/13 11:07		A_Spec	Alpha_012	170	1.07 E+01	2.00 E-03	19.9
06	TH-230	TRG	07/28/13 11:07		A_Spec	Alpha_013	170	1.42 E+01	5.00 E-03	18.7
07	TH-230	TRG	07/28/13 11:07		A_Spec	Alpha_014	170	8.15 E+00	5.00 E-03	18.5
08	TH-230	DO	07/28/13 11:07		A_Spec	Alpha_015	170	1.34 E+02	5.00 E-03	14.8
09	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_033	170	3.66 E+00	2.00 E-03	18.5
10	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_034	170	1.18 E+01	1.00 E-03	18.6
11	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_035	170	2.49 E+00	3.00 E-03	18.3
12	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_036	170	2.98 E+01	1.00 E-03	19.1
13	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_038	170	1.27 E+01	2.00 E-03	17.2
14	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_039	170	3.49 E+00	3.00 E-03	19.7
15	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_040	170	1.50 E+01	0.00 E+00	19
16	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_041	170	7.32 E+00	4.00 E-03	19.8
17	TH-230	TRG	07/28/13 11:08		A_Spec	Alpha_042	170	6.15 E+00	5.00 E-03	18.5

Run	1
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	5.12E+00	7.71E-01	7.16E-02	4.87E+00	105.27	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	6.89E-02	5.97E-02	5.82E-02					OK	OK
03	TH-232	DUP	D-85 TOT	pCi/l	2.29E+00	5.17E-01	5.85E-02				NA	OK	
04	TH-232	TRG	DUP 01 TOT	pCi/l	-2.17E-03	2.54E-02	5.32E-02					OK	
05	TH-232	TRG	DUP 01 DIS	pCi/l	1.55E-02	3.72E-02	7.79E-02					OK	
06	TH-232	TRG	PZ-201A-SS TOT	pCi/l	3.94E-02	5.49E-02	8.29E-02					OK	
07	TH-232	TRG	PZ-201A-SS DIS	pCi/l	1.83E-02	3.96E-02	7.81E-02					OK	
08	TH-232	DO	D-85 TOT	pCi/l	2.50E+00	8.13E-01	1.32E-01					OK	
09	TH-232	TRG	D-85 DIS	pCi/l	5.12E-02	6.76E-02	1.02E-01					OK	
10	TH-232	TRG	PZ-106-SD TOT	pCi/l	8.46E-02	7.35E-02	7.15E-02					OK	
11	TH-232	TRG	PZ-106-SD DIS	pCi/l	1.44E-02	4.01E-02	8.65E-02					OK	
12	TH-232	TRG	S-84 TOT	pCi/l	6.23E-01	2.71E-01	1.12E-01					OK	
13	TH-232	TRG	S-84 DIS	pCi/l	3.55E-02	4.31E-02	5.23E-02					OK	
14	TH-232	TRG	PZ-106-SS TOT	pCi/l	6.28E-02	7.61E-02	1.07E-01					OK	
15	TH-232	TRG	PZ-106-SS DIS	pCi/l	3.70E-02	4.49E-02	5.45E-02					OK	
16	TH-232	TRG	PZ-113-AD TOT	pCi/l	-3.68E-02	3.61E-02	1.35E-01					OK	
17	TH-232	TRG	PZ-113-AD DIS	pCi/l	-1.28E-02	3.92E-02	1.07E-01					OK	



Run 1

Analysis Code THISO

Eberline Services Work Order 13-07099

Client Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-THISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-232	LCS	07/16/13 00:00	1.00E+00	126.82	0.00	0.00			
02	TH-232	MBL	07/16/13 00:00	1.00E+00	112.14	0.00	0.00			
03	TH-232	DUP	07/10/13 10:52	1.00E+00	96.15	0.00	0.00			
04	TH-232	TRG	07/09/13 00:00	1.00E+00	101.30	0.00	0.00			
05	TH-232	TRG	07/09/13 00:00	1.00E+00	71.39	0.00	0.00			
06	TH-232	TRG	07/10/13 10:23	1.00E+00	89.70	0.00	0.00			
07	TH-232	TRG	07/10/13 10:23	1.00E+00	103.63	0.00	0.00			
08	TH-232	DO	07/10/13 10:52	1.00E+00	56.56	0.00	0.00			
09	TH-232	TRG	07/10/13 10:52	1.00E+00	83.96	0.00	0.00			
10	TH-232	TRG	07/10/13 11:41	1.00E+00	95.49	0.00	0.00			
11	TH-232	TRG	07/10/13 11:41	1.00E+00	100.62	0.00	0.00			
12	TH-232	TRG	07/10/13 11:46	1.00E+00	59.33	0.00	0.00			
13	TH-232	TRG	07/10/13 11:46	1.00E+00	122.72	0.00	0.00			
14	TH-232	TRG	07/10/13 12:43	1.00E+00	71.29	0.00	0.00			
15	TH-232	TRG	07/10/13 12:43	1.00E+00	106.80	0.00	0.00			
16	TH-232	TRG	07/10/13 13:02	1.00E+00	93.55	0.00	0.00			
17	TH-232	TRG	07/10/13 13:02	1.00E+00	75.98	0.00	0.00			

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

5610

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	07/28/13 11:07		A_Spec	Alpha_003	170.02	4.28 E+02	5.00 E-03	17.5
02	TH-232	MBL	07/28/13 11:07		A_Spec	Alpha_004	170	5.66 E+00	2.00 E-03	19.4
03	TH-232	DUP	07/28/13 11:07		A_Spec	Alpha_010	170.02	1.64 E+02	1.00 E-03	19.7
04	TH-232	TRG	07/28/13 11:07		A_Spec	Alpha_011	170	-1.70 E-01	1.00 E-03	20.5
05	TH-232	TRG	07/28/13 11:07		A_Spec	Alpha_012	170	8.30 E-01	1.00 E-03	19.9
06	TH-232	TRG	07/28/13 11:07		A_Spec	Alpha_013	170	2.49 E+00	3.00 E-03	18.7
07	TH-232	TRG	07/28/13 11:07		A_Spec	Alpha_014	170	1.32 E+00	4.00 E-03	18.5
08	TH-232	DO	07/28/13 11:07		A_Spec	Alpha_015	170	7.88 E+01	1.00 E-03	14.8
09	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_033	170	3.00 E+00	0.00 E+00	18.5
10	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_034	170	5.66 E+00	2.00 E-03	18.6
11	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_035	170	1.00 E+00	0.00 E+00	18.3
12	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_036	170	2.67 E+01	2.00 E-03	19.1
13	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_038	170	2.83 E+00	1.00 E-03	17.2
14	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_039	170	3.32 E+00	4.00 E-03	19.7
15	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_040	170	2.83 E+00	1.00 E-03	19
16	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_041	170	-2.57 E+00	2.10 E-02	19.8
17	TH-232	TRG	07/28/13 11:08		A_Spec	Alpha_042	170	-6.80 E-01	4.00 E-03	18.5

Run	1
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

9610

2154

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	07/16/13 00:00	1.0000	0.4569	10.2647		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.2284	5.1312		0.00		
03	DUP	D-85 TOT	07/10/13 10:52	1.0000	0.2281	5.1245		0.00		
04	TRG	DUP 01 TOT	07/09/13 00:00	1.0000	0.2279	5.1200		0.00		
05	TRG	DUP 01 DIS	07/09/13 00:00	1.0000	0.2280	5.1222		0.00		
06	TRG	PZ-201A-SS TOT	07/10/13 10:23	1.0000	0.2275	5.1110		0.00		
07	TRG	PZ-201A-SS DIS	07/10/13 10:23	1.0000	0.2279	5.1200		0.00		
08	DO	D-85 TOT	07/10/13 10:52	1.0000	0.2277	5.1155		0.00		
09	TRG	D-85 DIS	07/10/13 10:52	1.0000	0.2278	5.1178		0.00		
10	TRG	PZ-106-SD TOT	07/10/13 11:41	1.0000	0.2273	5.1065		0.00		
11	TRG	PZ-106-SD DIS	07/10/13 11:41	1.0000	0.2278	5.1178		0.00		
12	TRG	S-84 TOT	07/10/13 11:46	1.0000	0.2280	5.1222		0.00		
13	TRG	S-84 DIS	07/10/13 11:46	1.0000	0.2272	5.1043		0.00		
14	TRG	PZ-106-SS TOT	07/10/13 12:43	1.0000	0.2274	5.1088		0.00		
15	TRG	PZ-106-SS DIS	07/10/13 12:43	1.0000	0.2271	5.1020		0.00		
16	TRG	PZ-113-AD TOT	07/10/13 13:02	1.0000	0.2273	5.1065		0.00		
17	TRG	PZ-113-AD DIS	07/10/13 13:02	1.0000	0.2271	5.1020		0.00		

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07099		1	ThISO		7/22/2013 16:34	LWALKER		<i>[Signature]</i>			

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Th-228	Th-8b	103.560	7/22/2013	0.100	0.1043				4.87	0.175	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	7/22/2013	0.500	0.5175				5.48	0.148	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	7/22/2013	0.100	0.1043				4.87	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	7/22/2013	0.4569	0.2200															
02	Th-229	Th-18a	22.466	7/22/2013	0.2284	0.2200															
03	Th-229	Th-18a	22.466	7/22/2013	0.2281	0.2200															
04	Th-229	Th-18a	22.466	7/22/2013	0.2279	0.2200															
05	Th-229	Th-18a	22.466	7/22/2013	0.2280	0.2200															
06	Th-229	Th-18a	22.466	7/22/2013	0.2275	0.2200															
07	Th-229	Th-18a	22.466	7/22/2013	0.2279	0.2200															
08	Th-229	Th-18a	22.466	7/22/2013	0.2277	0.2200															
09	Th-229	Th-18a	22.466	7/22/2013	0.2278	0.2200															
10	Th-229	Th-18a	22.466	7/22/2013	0.2273	0.2200															
11	Th-229	Th-18a	22.466	7/22/2013	0.2278	0.2200															
12	Th-229	Th-18a	22.466	7/22/2013	0.2280	0.2200															
13	Th-229	Th-18a	22.466	7/22/2013	0.2272	0.2200															
14	Th-229	Th-18a	22.466	7/22/2013	0.2274	0.2200															
15	Th-229	Th-18a	22.466	7/22/2013	0.2271	0.2200															
16	Th-229	Th-18a	22.466	7/22/2013	0.2273	0.2200															
17	Th-229	Th-18a	22.466	7/22/2013	0.2271	0.2200															

0.4569 g
0.2284 g
-0.2281 g
-0.2279 g
-0.2280 g
-0.2275 g
-0.2279 g
-0.2277 g
-0.2278 g
-0.2273 g
-0.2278 g
-0.2273 g
-0.2272 g
-0.2274 g
-0.2271 g
-0.2273 g
-0.2271 g

0.2279 -
0.2278 -

0.5175 g
0.1043 g

Matrix Spike

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07099	1	ThISO	liters	8/6/2013	LWALKER

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	D-85 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 01 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 01 DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	D-85 TOT	DO					1.0000E+00	1.0000E+00				
09	D-85 DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-106-SD TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-106-SD DIS	TRG					1.0000E+00	1.0000E+00				
12	S-84 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-84 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-106-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-106-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-113-AD TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-113-AD DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J. Walker Date: 7, 22, 13

0199



Apex-Alpha™

C
7/29/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/26/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:29 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.457 mL
 Effective Efficiency: 0.2215 +/- 0.0132
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.2682 +/- 0.0792

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 1.052720 +/- 0.086768
 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	5.851	22.28	44.39	2.72	0.00E+000	3.0
TH-228	5.377	428.79	9.49	2.21	0.00E+000	5.0
TH-229 T	4.882	386.49	9.98	0.51	0.00E+000	12.7
TH-230	4.644	373.49	10.15	0.51	0.00E+000	32.9
TH-232	3.961	428.15	9.48	0.85	0.00E+000	5.4

T = Tracer Peak used for Effective Efficiency

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

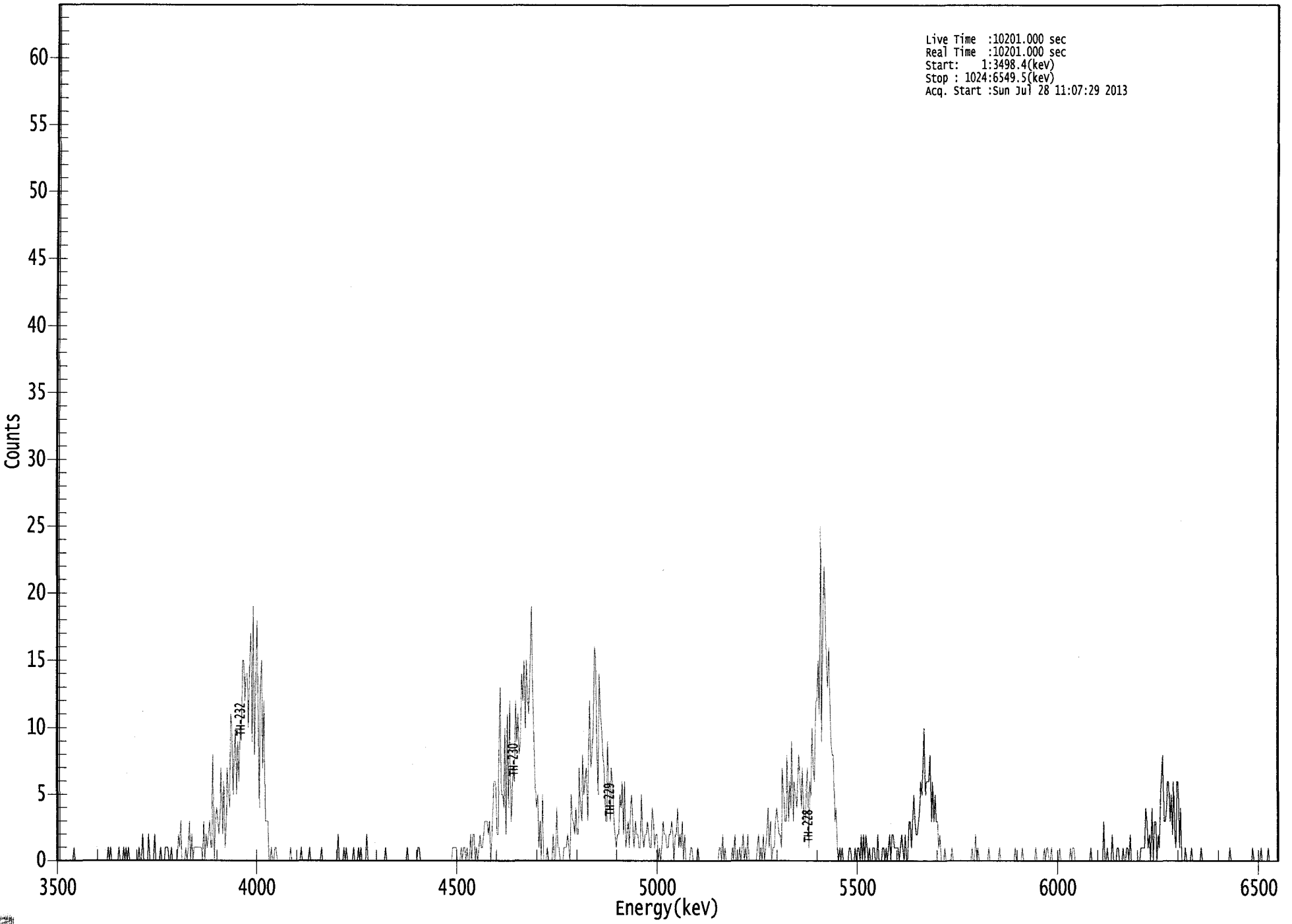
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	2.73E-001 +/- 1.26E-001	1.05E-001 +/- 1.23E-002
TH-228	0.997	5400.00*	5.14E+000 +/- 7.74E-001	9.59E-002 +/- 1.12E-002
TH-229	0.999	4872.00*	4.65E+000 +/- 5.43E-001	6.31E-002 +/- 7.37E-003
TH-230	0.996	4672.00*	4.48E+000 +/- 6.93E-001	6.29E-002 +/- 7.35E-003
TH-232	0.993	3997.00*	5.12E+000 +/- 7.71E-001	7.16E-002 +/- 8.37E-003

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064277.CNF

Live Time : 10201.000 sec
Real Time : 10201.000 sec
Start: 1:3498.4(keV)
Stop : 1024:6549.5(keV)
Acq. Start : Sun Jul 28 11:07:29 2013



ROI Type: 1

ROI Type: 3

10201

 ***** 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	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	1	0	0
49:	0	0	0	0	1	0	0	0
57:	1	0	1	0	1	0	0	0
65:	0	0	0	0	0	1	0	0
73:	2	0	0	0	0	2	0	0
81:	0	0	2	0	0	0	0	1
89:	0	0	0	1	1	1	0	0
97:	1	0	0	0	0	0	2	1
105:	3	0	0	0	1	0	1	3
113:	0	2	0	1	1	1	1	1
121:	1	1	0	3	0	2	1	2
129:	3	1	1	8	0	3	4	3
137:	2	4	7	2	6	1	3	7
145:	5	4	11	10	5	8	10	5
153:	9	6	10	9	15	15	12	14
161:	14	10	15	17	9	19	8	12
169:	18	12	4	13	15	7	12	3
177:	3	3	0	0	1	0	0	1
185:	1	0	0	0	0	0	0	0
193:	0	0	0	0	1	0	0	0
201:	0	0	0	0	0	1	0	0
209:	0	0	0	0	1	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	2	0	0	0
241:	0	1	0	1	0	0	0	0
249:	0	1	0	0	0	1	0	1
257:	0	0	0	0	2	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	1	0
297:	0	0	0	0	0	0	0	1
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	1	1	1
337:	0	0	0	1	0	1	1	0
345:	1	0	0	2	0	2	2	0
353:	1	0	1	2	1	1	2	3
361:	3	3	2	3	0	2	5	6

369: 6 2 2 8 13 5 5 4

Sample Title: 01

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

801: 0 0 0 1 0 0 0 0

Sample Title: 01

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



C
Frac

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/26/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:30 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.2176 +/- 0.0173
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 1.1214 +/- 0.0914

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	5.739	4.47	109.71	1.53	0.00E+000	8.8
TH-228	5.379	2.09	242.09	3.91	0.00E+000	2.9
TH-229 T	4.870	189.79	14.32	2.21	0.00E+000	9.8
TH-230	4.607	10.79	66.43	2.21	0.00E+000	4.4
TH-232	3.948	5.66	85.23	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

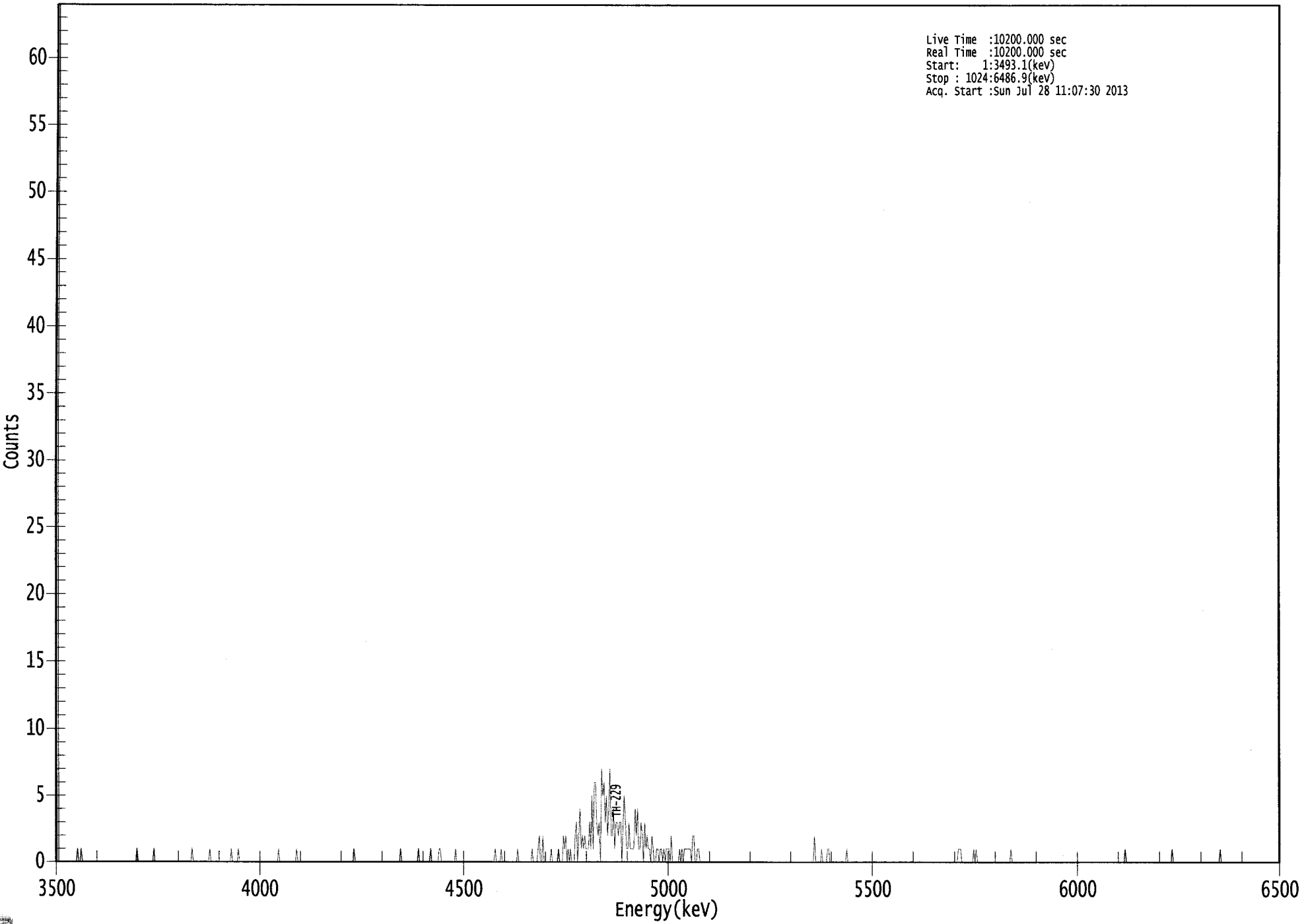
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.938	5850.00*	5.58E-002 +/- 6.19E-002	8.88E-002 +/- 1.38E-002
TH-228	0.998	5400.00*	2.55E-002 +/- 6.19E-002	1.19E-001 +/- 1.85E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 3.61E-001	9.78E-002 +/- 1.52E-002
TH-230	0.978	4672.00*	1.32E-001 +/- 8.98E-002	9.76E-002 +/- 1.52E-002
TH-232	0.987	3997.00*	6.89E-002 +/- 5.97E-002	5.82E-002 +/- 9.06E-003

AG
7/28/13

US EPA ARCHIVE DOCUMENT

0000064276.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Sun Jul 28 11:07:30 2013



ROI Type: 1

ROI Type: 3

0200

 ***** 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	1	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	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	1	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	1	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	1	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	1	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	1	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	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	1	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	1	1	0	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 1 0 0 0 0 1 0 0

Sample Title: 02

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

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



*C
Free*

Sample Description: D-85 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:23 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1891 +/- 0.0160
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.9615 +/- 0.0830

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	5.820	13.45	59.08	2.55	0.00E+000	2.9
TH-228	5.377	173.77	15.03	3.23	0.00E+000	4.1
TH-229 T	4.886	164.79	15.39	2.21	0.00E+000	6.6
TH-230	4.638	306.81	11.22	1.19	0.00E+000	5.2
TH-232	3.964	163.83	15.32	0.17	0.00E+000	7.6

T = Tracer Peak used for Effective Efficiency

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

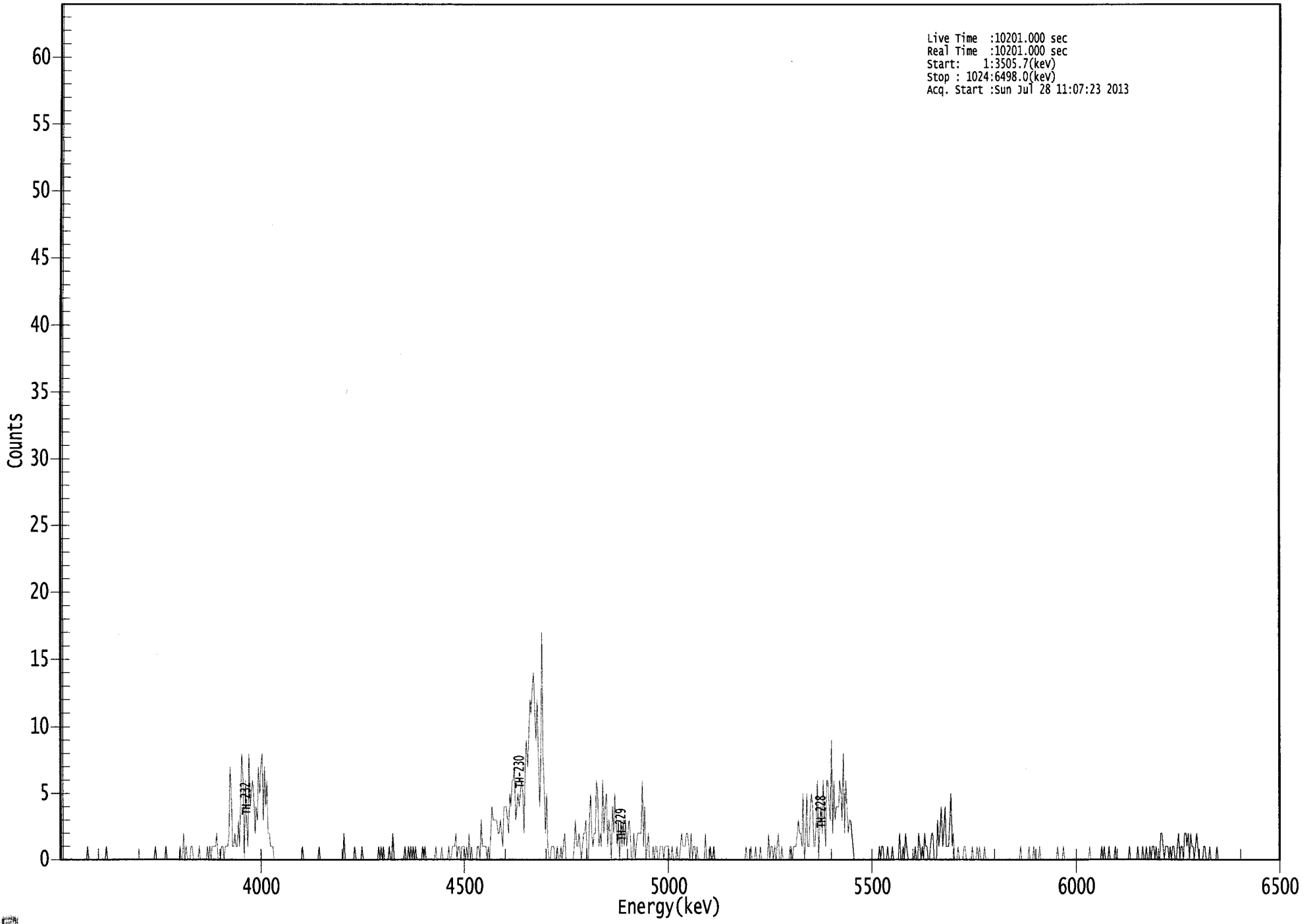
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.995	5850.00*	1.94E-001 +/- 1.19E-001	1.21E-001 +/- 2.00E-002
TH-228	0.997	5400.00*	2.48E+000 +/- 5.54E-001	1.30E-001 +/- 2.15E-002
TH-229	0.999	4872.00*	2.32E+000 +/- 3.84E-001	1.13E-001 +/- 1.86E-002
TH-230	0.994	4672.00*	4.31E+000 +/- 8.60E-001	9.25E-002 +/- 1.53E-002
TH-232	0.994	3997.00*	2.29E+000 +/- 5.17E-001	5.85E-002 +/- 9.67E-003

*AG
7/29/13*

US EPA ARCHIVE DOCUMENT

000064270.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Sun Jul 28 11:07:23 2013



ROI Type: 1

ROI Type: 3

0211

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

Sample Title: 03

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 2 2 3 2 1 4 4 4

Sample Title: 03

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

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	1	0	0	0	0	1	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
873:	0	0	1	0	1	0	0	0
881:	1	0	0	0	0	1	0	0
889:	0	0	0	0	0	0	0	0
897:	0	1	0	0	0	0	0	0
905:	1	0	0	0	1	0	0	1
913:	0	0	1	0	1	1	0	1
921:	0	0	0	2	2	1	0	1
929:	1	1	0	1	0	1	1	0
937:	0	1	2	0	1	1	0	2
945:	2	1	2	0	2	1	1	0
953:	1	2	1	0	0	0	0	1
961:	1	0	0	0	1	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



7/29

Sample Description: DUP 01 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.2078 +/- 0.0167
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
 Chem. Recovery Factor: 1.0130 +/- 0.0835

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.811	1.49	190.02	0.51	0.00E+000	2.6
TH-228	5.336	1.98	176.34	1.02	0.00E+000	2.6
TH-229 T	4.884	180.83	14.58	0.17	0.00E+000	3.8
TH-230	4.624	14.49	52.54	0.51	0.00E+000	2.6
TH-232	3.949	-0.17	1169.5	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

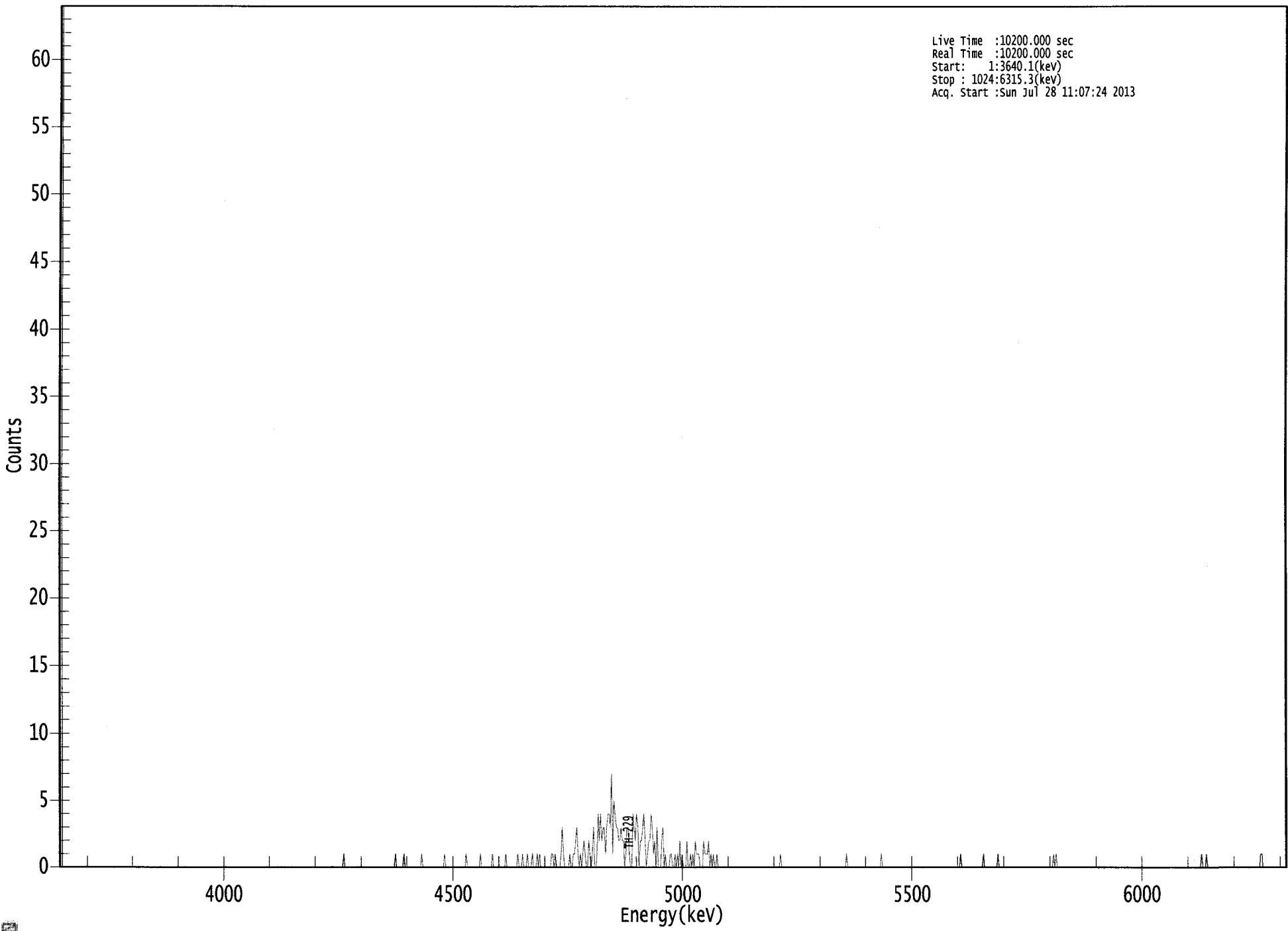
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.992	5850.00*	1.95E-002 +/- 3.72E-002	6.88E-002 +/- 1.09E-002
TH-228	0.979	5400.00*	2.58E-002 +/- 4.56E-002	8.19E-002 +/- 1.29E-002
TH-229	0.999	4872.00*	2.32E+000 +/- 3.66E-001	5.35E-002 +/- 8.45E-003
TH-230	0.988	4672.00*	1.85E-001 +/- 1.02E-001	6.70E-002 +/- 1.06E-002
TH-232	0.988	3997.00*	-2.17E-003 +/- 2.54E-002	5.32E-002 +/- 8.41E-003

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064271.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3640.1(keV)
Stop : 1024:6315.3(keV)
Acq. Start :Sun Jul 28 11:07:24 2013



ROI Type: 1

ROI Type: 3

9128

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

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	1	0	1
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	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	1	1	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
Hra

Sample Description: DUP 01 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 05
 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: 7/9/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:25 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1420 +/- 0.0135
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Chem. Recovery Factor: 0.7139 +/- 0.0691

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.842	4.32	102.62	0.68	0.00E+000	3.0
TH-228	5.342	2.49	138.29	0.51	0.00E+000	3.0
TH-229 T	4.871	123.66	17.65	0.34	0.00E+000	13.3
TH-230	4.668	10.66	61.14	0.34	0.00E+000	3.0
TH-232	3.861	0.83	239.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

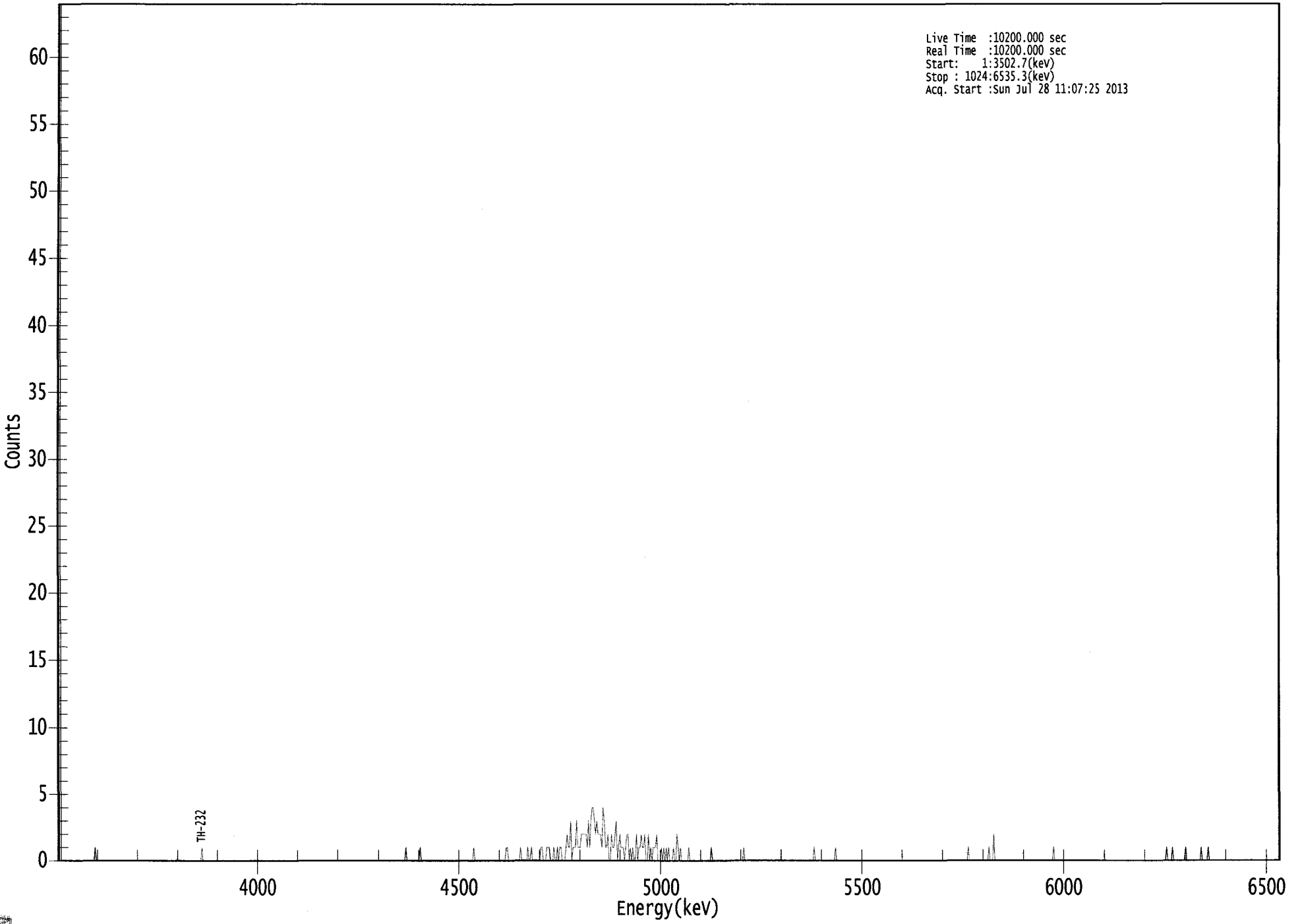
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	8.28E-002 +/- 8.64E-002	1.08E-001 +/- 2.02E-002
TH-228	0.982	5400.00*	4.74E-002 +/- 6.61E-002	9.98E-002 +/- 1.86E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 4.33E-001	8.96E-002 +/- 1.67E-002
TH-230	1.000	4672.00*	1.99E-001 +/- 1.27E-001	8.94E-002 +/- 1.67E-002
TH-232	0.908	3997.00*	1.55E-002 +/- 3.72E-002	7.79E-002 +/- 1.45E-002

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7/29/13

US EPA ARCHIVE DOCUMENT

0000064272.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3502.7(kev)
Stop : 1024:6535.3(kev)
Acq. Start :Sun Jul 28 11:07:25 2013



ROI Type: 1

ROI Type: 3

0221

 ***** 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	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	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	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	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	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: 05

Channel	1	2	3	4	5	6	7	8
377:	1	1	0	0	0	0	0	0
385:	0	0	0	0	1	0	0	0
393:	0	0	1	0	0	1	0	0
401:	0	0	0	0	0	1	1	0
409:	0	0	1	1	1	0	0	0
417:	1	0	0	1	0	1	1	0
425:	0	0	1	2	1	1	3	0
433:	1	1	1	3	1	1	1	2
441:	2	2	2	2	1	3	1	3
449:	4	4	3	2	3	2	2	2
457:	1	4	3	1	1	2	0	0
465:	2	1	1	2	3	0	1	2
473:	1	1	1	0	1	2	2	0
481:	1	0	1	0	0	2	0	1
489:	1	2	1	1	2	0	0	2
497:	0	1	0	1	1	1	2	0
505:	0	0	1	0	1	0	1	0
513:	1	0	0	0	1	0	0	2
521:	1	0	1	0	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	1
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	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	1	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	1	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	1	0	0	0
785:	2	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: 05

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



C/ra

Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 06
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:26 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1676 +/- 0.0148
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.8970 +/- 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	5.751	2.62	173.91	2.38	0.00E+000	2.8
TH-228	5.408	-0.06	6134.1	3.06	0.00E+000	2.8
TH-229 T	4.865	145.66	16.26	0.34	0.00E+000	3.8
TH-230	4.661	14.15	53.90	0.85	0.00E+000	4.2
TH-232	3.919	2.49	138.29	0.51	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

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

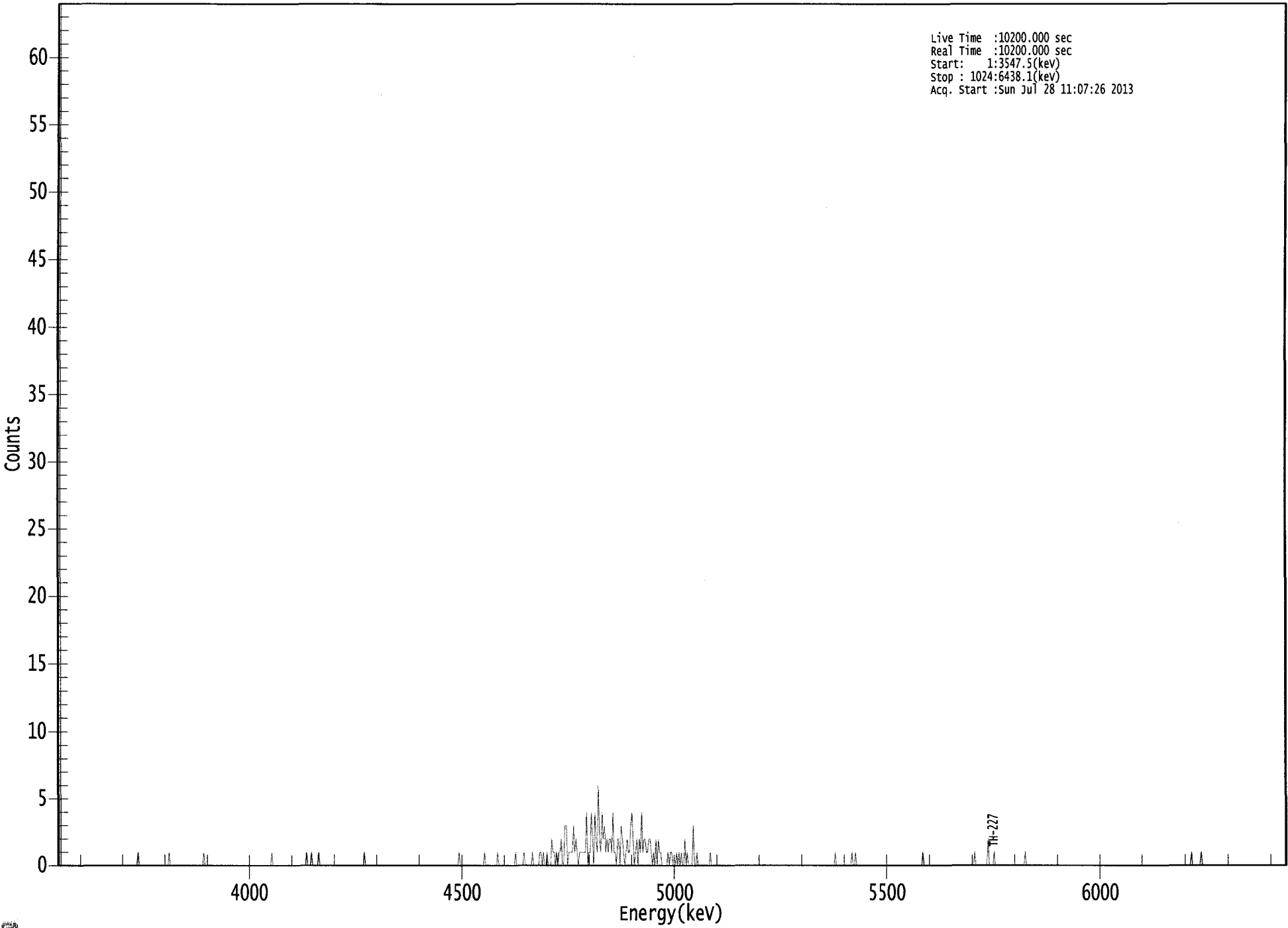
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.951	5850.00*	4.25E-002 +/- 7.43E-002	1.33E-001 +/- 2.31E-002
TH-228	1.000	5400.00*	-9.65E-004 +/- 5.92E-002	1.44E-001 +/- 2.50E-002
TH-229	1.000	4872.00*	2.31E+000 +/- 4.02E-001	7.59E-002 +/- 1.32E-002
TH-230	0.999	4672.00*	2.24E-001 +/- 1.27E-001	9.48E-002 +/- 1.65E-002
TH-232	0.968	3997.00*	3.94E-002 +/- 5.49E-002	8.29E-002 +/- 1.44E-002

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064273.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(keV)
Stop : 1024:6438.1(keV)
Acq. Start :Sun Jul 28 11:07:26 2013



ROI Type: 1

ROI Type: 3

9226

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	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	1	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	1	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	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	1	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:	1	0	0	0	1	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:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0

Sample Title: 06

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

Sample Title: 06

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



CFR

Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 07
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:27 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1913 +/- 0.0160
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.0363 +/- 0.0890

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	4.79	111.13	2.21	0.00E+000	2.9
TH-228	5.373	-1.59	239.69	4.59	0.00E+000	2.9
TH-229 T	4.872	166.47	15.27	1.53	0.00E+000	4.0
TH-230	4.592	8.15	72.72	0.85	0.00E+000	4.4
TH-232	3.960	1.32	215.97	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

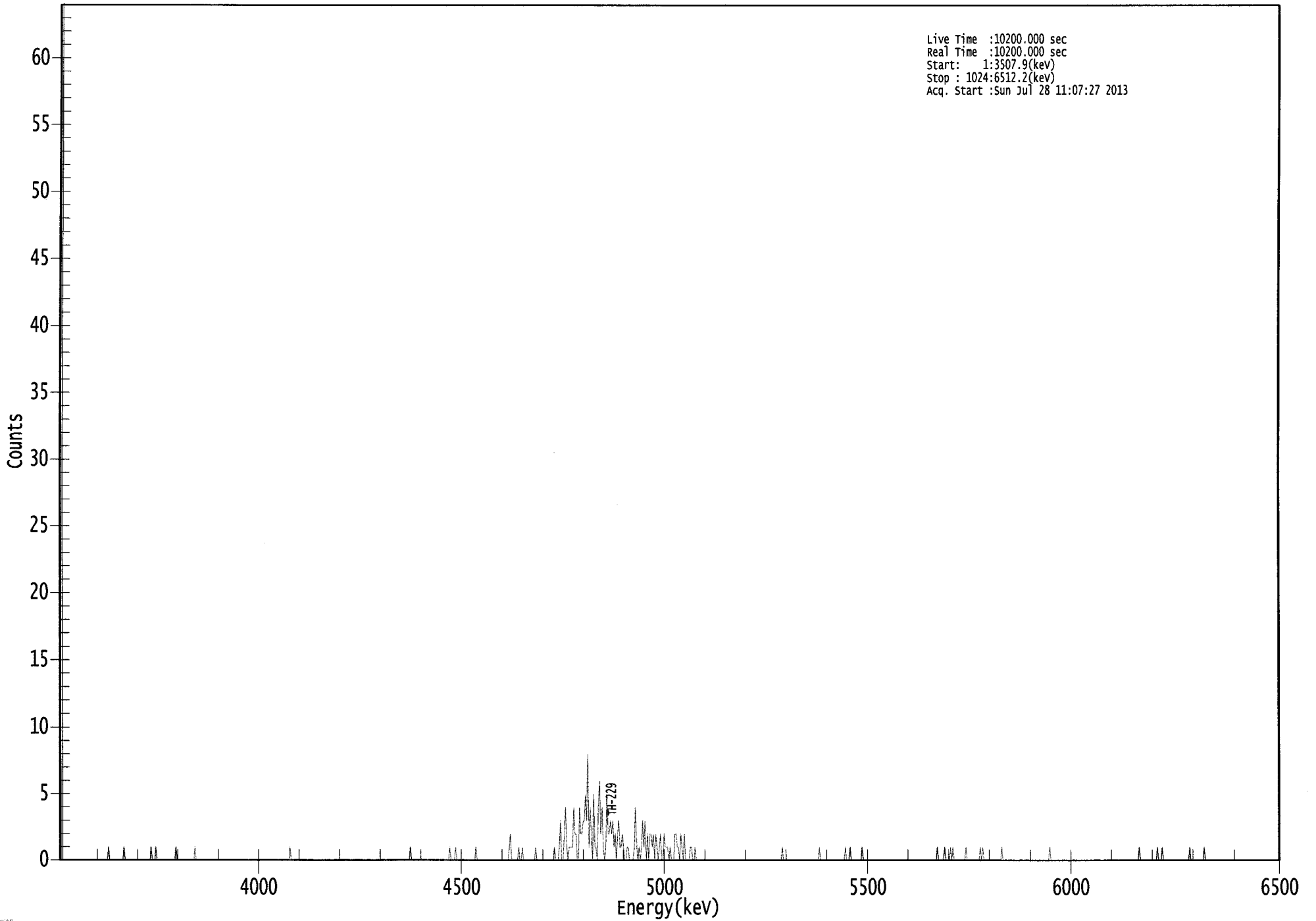
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.979	5850.00*	6.82E-002 +/- 7.66E-002	1.14E-001 +/- 1.87E-002
TH-228	0.996	5400.00*	-2.24E-002 +/- 5.39E-002	1.46E-001 +/- 2.40E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 3.81E-001	9.89E-002 +/- 1.63E-002
TH-230	0.967	4672.00*	1.13E-001 +/- 8.43E-002	8.31E-002 +/- 1.37E-002
TH-232	0.993	3997.00*	1.83E-002 +/- 3.96E-002	7.81E-002 +/- 1.28E-002

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064274.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Sun Jul 28 11:07:27 2013



ROI Type: 1

ROI Type: 3

0231

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	1	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	1	0	0
81:	0	1	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	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:	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	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	0	0	0	0	1	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	2	0	0	0	0
385:	0	0	1	0	0	1	0	0
393:	0	0	0	0	0	0	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	1	0	0	0	1	3	0	0
425:	2	4	1	0	1	1	1	1
433:	4	2	2	0	0	4	2	2
441:	3	3	5	3	8	1	4	2
449:	0	5	1	1	0	4	6	2
457:	4	1	0	1	5	2	2	3
465:	2	3	1	2	0	2	3	1
473:	1	2	1	0	0	1	1	0
481:	0	0	0	1	4	1	0	1
489:	0	1	3	1	3	0	2	0
497:	2	2	1	2	0	2	1	0
505:	1	2	0	0	2	1	1	1
513:	0	1	0	0	0	2	2	1
521:	1	0	2	1	0	2	0	0
529:	0	0	1	1	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	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	1	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	1	0	0	0
665:	1	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	0
729:	0	0	0	0	0	0	0	0
737:	0	1	0	0	0	0	0	1
745:	0	0	0	0	1	0	1	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	1	0	1
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 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	1
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	1	0	0	0	1	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	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	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C Free

Sample Description: D-85 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 08
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:07:28 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.0836 +/- 0.0102
 Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
 Chem. Recovery Factor: 0.5656 +/- 0.0696

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	6.83	76.08	0.17	0.00E+000	3.0
TH-228	5.380	82.83	21.56	0.17	0.00E+000	7.5
TH-229 T	4.877	72.66	23.06	0.34	0.00E+000	6.0
TH-230	4.647	134.15	16.98	0.85	0.00E+000	15.0
TH-232	3.966	78.83	22.10	0.17	0.00E+000	7.7

T = Tracer Peak used for Effective Efficiency

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

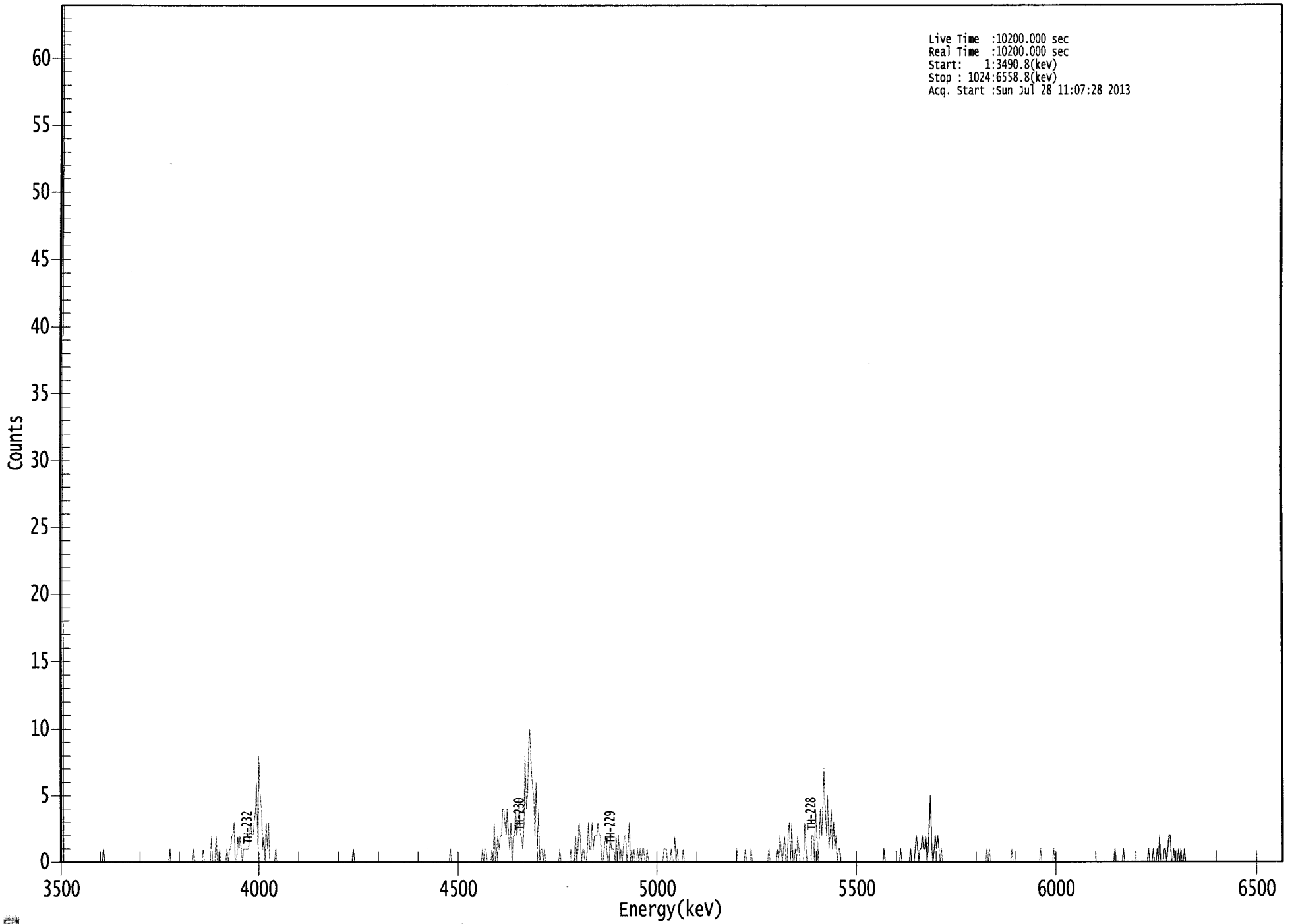
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	2.22E-001 +/- 1.77E-001	1.36E-001 +/- 3.24E-002
TH-228	0.998	5400.00*	2.68E+000 +/- 8.60E-001	1.35E-001 +/- 3.21E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 5.52E-001	1.52E-001 +/- 3.63E-002
TH-230	0.997	4672.00*	4.26E+000 +/- 1.25E+000	1.90E-001 +/- 4.54E-002
TH-232	0.995	3997.00*	2.50E+000 +/- 8.13E-001	1.32E-001 +/- 3.16E-002

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064275.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :Sun Jul 28 11:07:28 2013



ROI Type: 1

ROI Type: 3

0235
9920

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 2 2 4 4 3 2 4

Sample Title: 08

Channel	1	2	3	4	5	6	7	8
377:	2	1	3	0	2	2	4	2
385:	3	5	2	2	1	3	8	4
393:	5	9	10	7	6	5	2	6
401:	1	4	0	1	1	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	1	0	0	0	0
425:	0	0	0	0	1	0	0	0
433:	2	0	1	3	2	0	1	1
441:	0	0	1	3	1	1	3	1
449:	2	2	2	3	2	2	0	0
457:	1	2	1	0	0	2	1	1
465:	1	0	2	0	2	0	1	0
473:	1	2	2	0	1	3	0	1
481:	0	1	0	0	1	0	1	0
489:	1	1	0	0	1	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	1	1	0	0	0
513:	1	0	0	2	0	1	0	0
521:	0	0	1	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	1
569:	0	0	0	0	0	0	1	0
577:	0	0	0	1	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	2	1	0	1	2
609:	0	0	2	3	0	3	0	0
617:	1	0	2	1	0	0	0	0
625:	3	1	0	0	0	0	2	2
633:	0	4	2	0	2	4	2	4
641:	7	4	2	5	1	2	4	1
649:	3	1	2	0	1	1	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	1	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	1	0	0	0	0	0	0	0
713:	1	0	0	0	1	2	1	0
721:	1	1	2	1	1	2	0	1
729:	3	5	1	0	1	2	1	2
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	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	1	0	1	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: 08

Channel	1	2	3	4	5	6	7	8
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:	1	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	1	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	1	0	0	1	0
921:	2	0	0	0	1	1	0	1
929:	2	2	0	0	1	0	0	0
937:	1	0	1	0	0	1	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



gpa

Sample Description: D-85 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 09
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:28 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1552 +/- 0.0142
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Chem. Recovery Factor: 0.8396 +/- 0.0784

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	-0.85	246.69	0.85	0.00E+000	0.0
TH-228	5.366	2.98	134.36	1.02	0.00E+000	4.5
TH-229 T	4.868	135.00	16.93	0.00	0.00E+000	8.6
TH-230	4.643	3.66	107.87	0.34	0.00E+000	3.0
TH-232	3.968	3.00	130.67	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

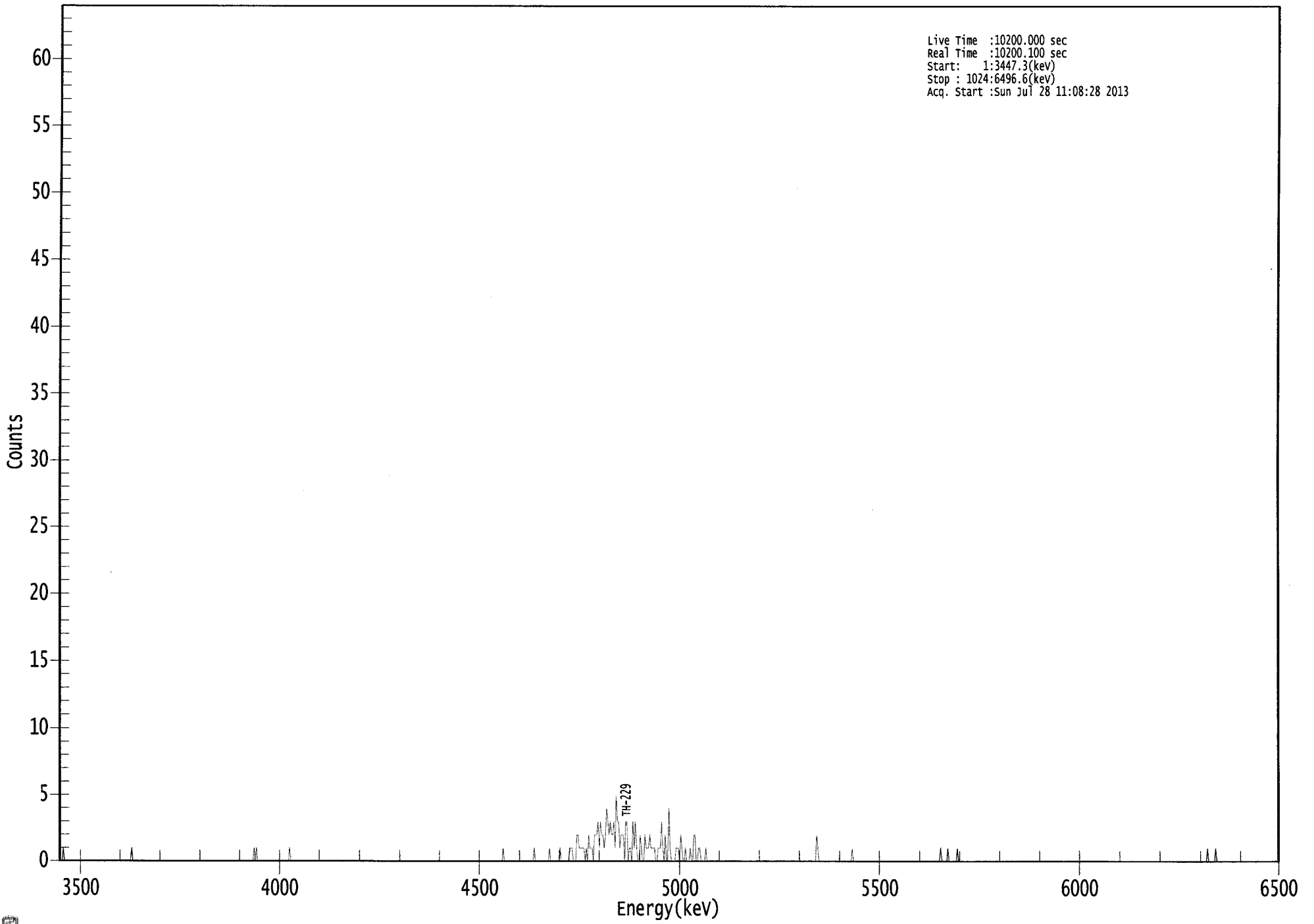
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-1.49E-002 +/- 3.69E-002	1.05E-001 +/- 1.89E-002
TH-228	0.994	5400.00*	5.18E-002 +/- 7.03E-002	1.10E-001 +/- 1.97E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 4.17E-001	1.03E-001 +/- 1.85E-002
TH-230	0.996	4672.00*	6.26E-002 +/- 6.85E-002	8.18E-002 +/- 1.47E-002
TH-232	0.996	3997.00*	5.12E-002 +/- 6.76E-002	1.02E-001 +/- 1.84E-002

AG
 7/29/13

US EPA ARCHIVE DOCUMENT

0000064286.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :Sun Jul 28 11:08:28 2013



ROI Type: 1

ROI Type: 3

0241

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 0 0

Sample Title: 09

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	1	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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Sample Description: PZ-106-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 10
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:30 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.1772 +/- 0.0153
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.9549 +/- 0.0842

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	5.761	3.15	126.67	0.85	0.00E+000	3.0
TH-228	5.297	-0.34	592.90	0.34	0.00E+000	0.0
TH-229 T	4.865	153.83	15.81	0.17	0.00E+000	6.9
TH-230	4.659	11.83	57.46	0.17	0.00E+000	3.0
TH-232	3.994	5.66	85.23	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

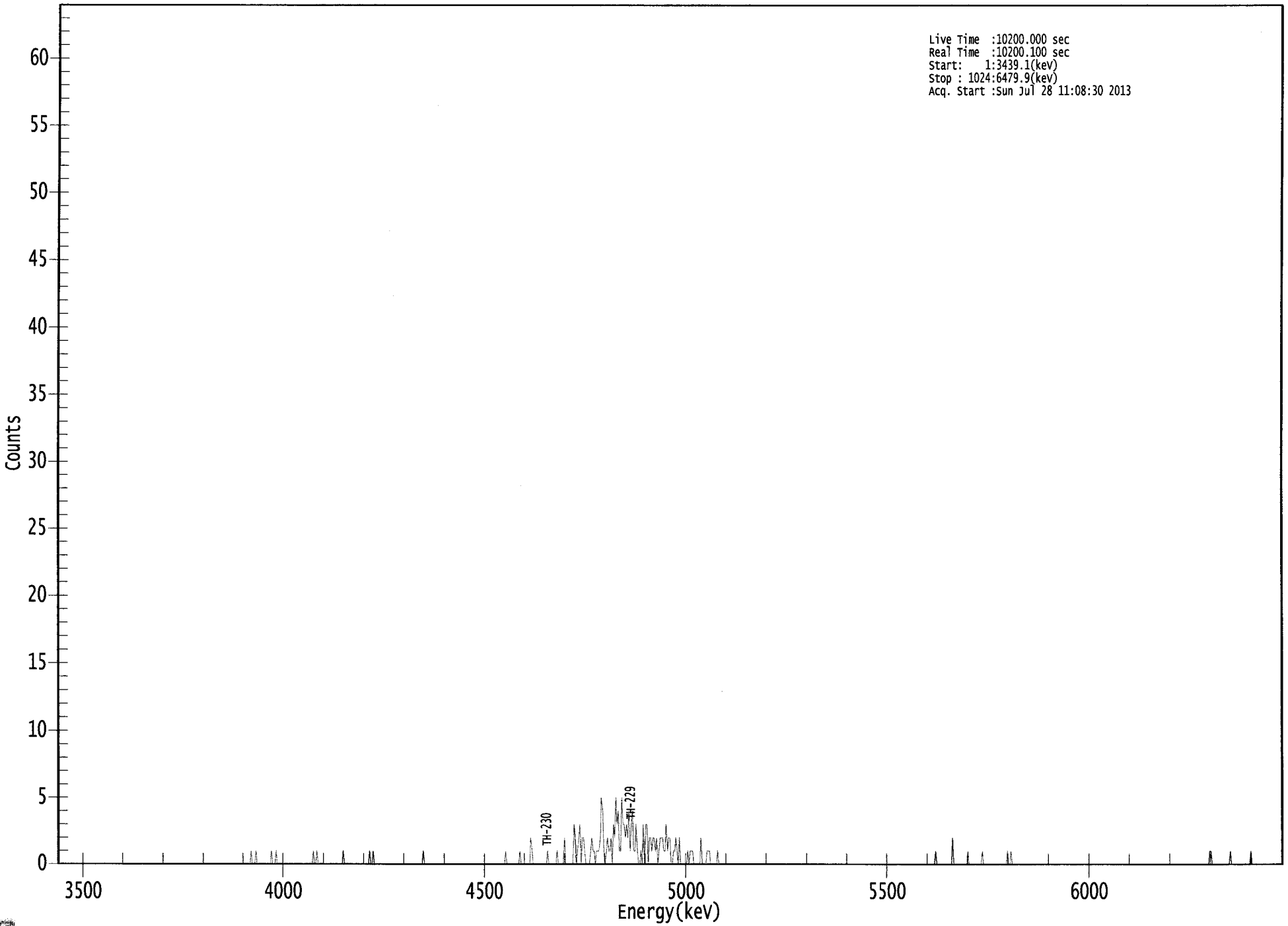
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.960	5850.00*	4.84E-002 +/- 6.18E-002	9.20E-002 +/- 1.56E-002
TH-228	0.946	5400.00*	-5.18E-003 +/- 3.07E-002	7.28E-002 +/- 1.23E-002
TH-229	1.000	4872.00*	2.31E+000 +/- 3.92E-001	6.27E-002 +/- 1.06E-002
TH-230	0.999	4672.00*	1.77E-001 +/- 1.06E-001	6.25E-002 +/- 1.06E-002
TH-232	1.000	3997.00*	8.46E-002 +/- 7.35E-002	7.15E-002 +/- 1.21E-002

AG
7/29/13

US EPA ARCHIVE DOCUMENT

0000064285.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Sun Jul 28 11:08:30 2013



ROI Type: 1

ROI Type: 3

0245

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

Sample Title: 10

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 1

Sample Title: 10

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	0	2	1	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	1	0	0	0	0	0
417:	0	0	1	0	0	0	0	0
425:	2	0	0	0	0	0	0	0
433:	3	2	0	1	2	3	0	2
441:	2	1	0	0	0	0	1	2
449:	1	1	0	1	1	1	2	5
457:	4	1	0	1	2	1	1	2
465:	0	3	2	5	3	4	1	1
473:	5	3	3	2	3	2	4	1
481:	3	4	1	1	3	1	0	0
489:	1	0	3	0	3	3	0	2
497:	2	1	2	2	1	2	0	1
505:	2	2	2	1	1	3	1	2
513:	2	0	0	1	1	2	1	0
521:	2	0	0	0	0	0	0	1
529:	0	1	1	1	0	0	0	0
537:	0	0	2	0	0	0	0	1
545:	1	1	0	0	0	0	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	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	1	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	2	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	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	1	0	0	1	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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



CF/ra

Sample Description: PZ-106-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 11
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:24 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1837 +/- 0.0156
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.0062 +/- 0.0873

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.816	6.47	87.07	1.53	0.00E+000	4.4
TH-228	5.299	-0.68	304.44	0.68	0.00E+000	0.0
TH-229 T	4.903	159.83	15.51	0.17	0.00E+000	10.3
TH-230	4.622	2.49	138.29	0.51	0.00E+000	2.9
TH-232	3.902	1.00	277.19	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

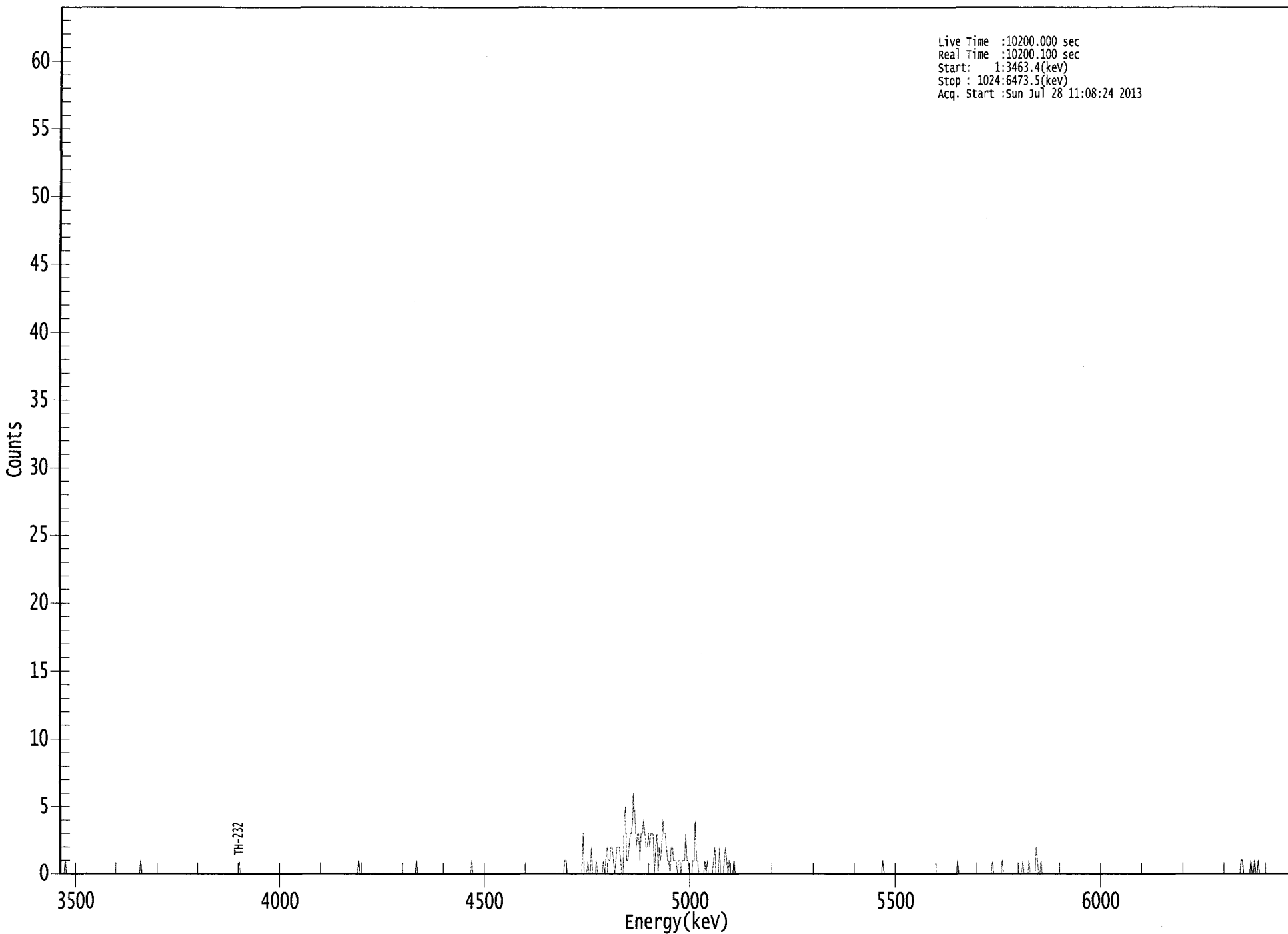
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	9.59E-002 +/- 8.50E-002	1.05E-001 +/- 1.75E-002
TH-228	0.949	5400.00*	-9.99E-003 +/- 3.05E-002	8.29E-002 +/- 1.38E-002
TH-229	0.995	4872.00*	2.32E+000 +/- 3.86E-001	6.05E-002 +/- 1.01E-002
TH-230	0.987	4672.00*	3.60E-002 +/- 5.01E-002	7.58E-002 +/- 1.26E-002
TH-232	0.954	3997.00*	1.44E-002 +/- 4.01E-002	8.65E-002 +/- 1.44E-002

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Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Sun Jul 28 11:08:24 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 11

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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	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	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	1	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	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	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: 11

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

801: 0 0 0 1 0 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	2	1	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	0	0	0	0	0
977:	0	0	1	1	0	0	0	0
985:	0	0	1	0	0	1	0	0
993:	1	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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Sample Description: S-84 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 12
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:25 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.228 mL
 Effective Efficiency: 0.1133 +/- 0.0120
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.5933 +/- 0.0635

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	5.807	5.83	82.55	0.17	0.00E+000	0.0
TH-228	5.392	23.66	40.63	0.34	0.00E+000	8.9
TH-229 T	4.880	98.66	19.77	0.34	0.00E+000	4.9
TH-230	4.648	29.83	36.01	0.17	0.00E+000	3.0
TH-232	3.967	26.66	38.24	0.34	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

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

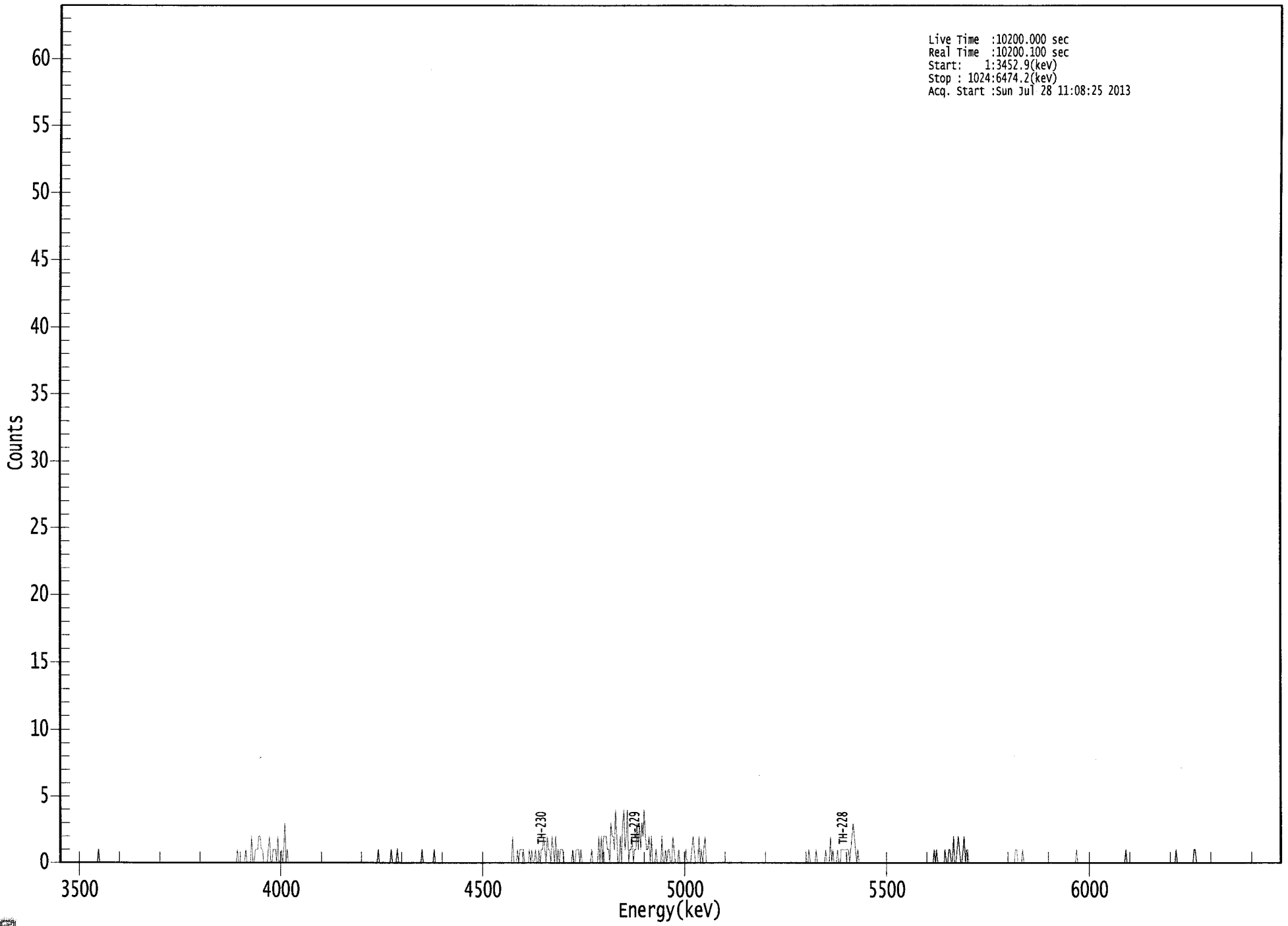
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.990	5850.00*	1.40E-001 +/- 1.19E-001	1.00E-001 +/- 2.07E-002
TH-228	1.000	5400.00*	5.64E-001 +/- 2.57E-001	1.14E-001 +/- 2.36E-002
TH-229	1.000	4872.00*	2.32E+000 +/- 4.80E-001	1.12E-001 +/- 2.32E-002
TH-230	0.997	4672.00*	6.99E-001 +/- 2.90E-001	9.78E-002 +/- 2.02E-002
TH-232	0.995	3997.00*	6.23E-001 +/- 2.71E-001	1.12E-001 +/- 2.31E-002

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US EPA ARCHIVE DOCUMENT

0000064279.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3452.9(keV)
Stop : 1024:6474.2(keV)
Acq. Start :Sun Jul 28 11:08:25 2013



ROI Type: 1

ROI Type: 3

0256
9520

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	1	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	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	1	0	0
153:	0	0	0	0	1	0	0	0
161:	0	2	0	0	1	1	1	2
169:	2	1	1	0	0	0	0	1
177:	2	0	0	1	1	1	0	2
185:	0	0	1	0	1	3	0	1
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	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	1	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	0	0	0	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 12

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

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



*C
Ara*

Sample Description: S-84 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 13
 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:27 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.2113 +/- 0.0170
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 1.2272 +/- 0.1008

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	5.846	2.49	138.29	0.51	0.00E+000	3.0
TH-228	5.307	7.49	74.41	0.51	0.00E+000	3.0
TH-229 T	4.886	183.32	14.51	0.68	0.00E+000	7.9
TH-230	4.632	12.66	55.94	0.34	0.00E+000	4.4
TH-232	3.968	2.83	120.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

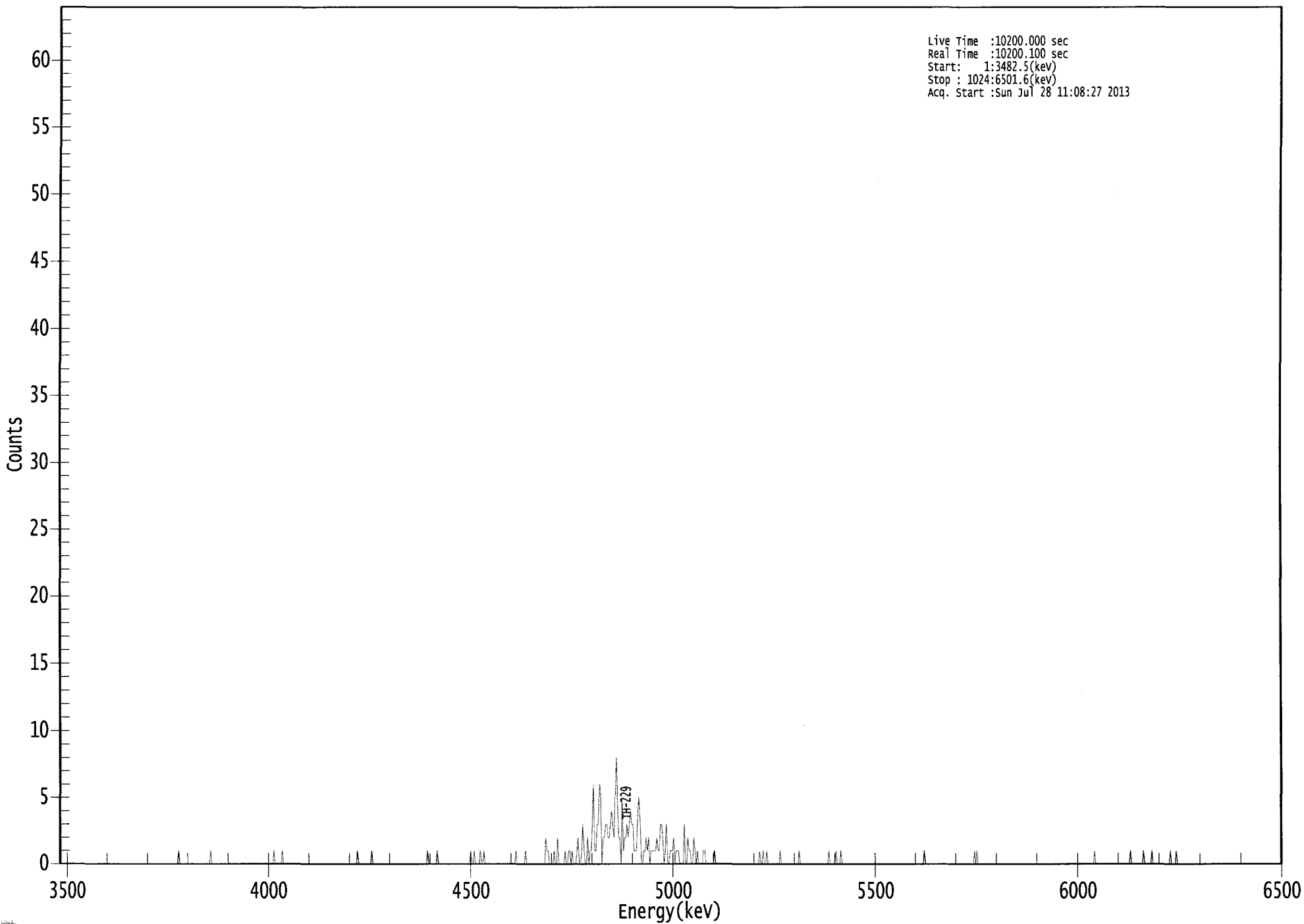
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	3.21E-002 +/- 4.47E-002	6.76E-002 +/- 1.06E-002
TH-228	0.956	5400.00*	9.57E-002 +/- 7.28E-002	6.70E-002 +/- 1.05E-002
TH-229	0.999	4872.00*	2.31E+000 +/- 3.63E-001	7.11E-002 +/- 1.12E-002
TH-230	0.992	4672.00*	1.59E-001 +/- 9.24E-002	6.01E-002 +/- 9.45E-003
TH-232	0.996	3997.00*	3.55E-002 +/- 4.31E-002	5.23E-002 +/- 8.23E-003

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7/29/13*

US EPA ARCHIVE DOCUMENT

0000064280.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3482.5(keV)
Stop : 1024:6501.6(keV)
Acq. Start :Sun Jul 28 11:08:27 2013



ROI Type: 1

ROI Type: 3

0261

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

Sample Title: 13

Elapsed Live time: 10200
 Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	1	0	0	0
185:	0	0	0	1	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	1	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	1	0	0	0
353:	0	1	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: 13

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

801: 0 0 0 0 0 0 0 0

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



*C
File*

Sample Description: PZ-106-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Th 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: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:34 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.1401 +/- 0.0134
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.7129 +/- 0.0695

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	6.009	0.49	416.98	0.51	0.00E+000	3.0
TH-228	5.402	1.98	176.34	1.02	0.00E+000	3.0
TH-229 T	4.869	121.66	17.80	0.34	0.00E+000	3.7
TH-230	4.623	3.49	113.53	0.51	0.00E+000	3.0
TH-232	3.914	3.32	119.77	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

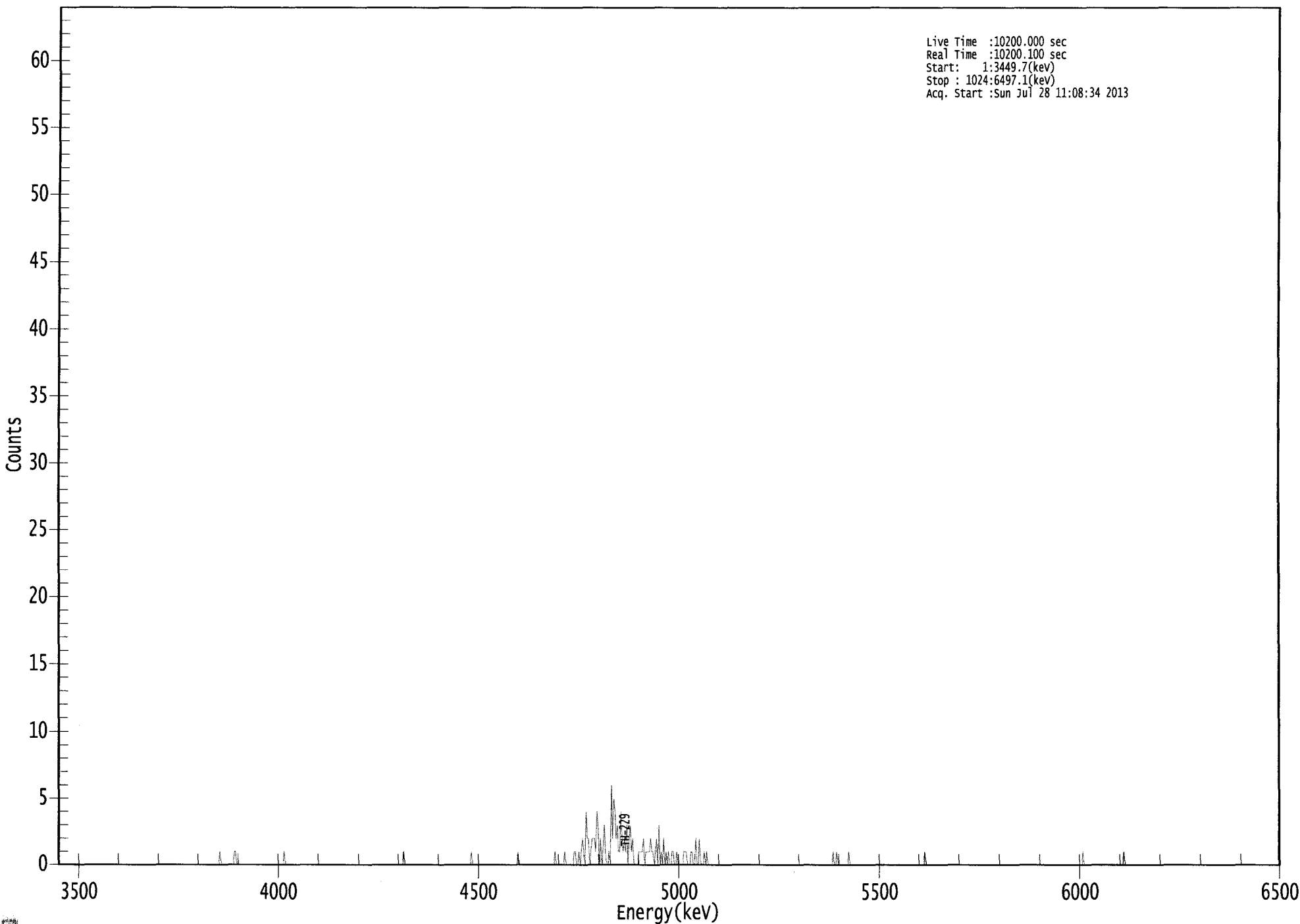
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.877	5850.00*	9.52E-003 +/- 3.97E-002	1.02E-001 +/- 1.92E-002
TH-228	1.000	5400.00*	3.82E-002 +/- 6.77E-002	1.21E-001 +/- 2.28E-002
TH-229	1.000	4872.00*	2.31E+000 +/- 4.35E-001	9.09E-002 +/- 1.71E-002
TH-230	0.987	4672.00*	6.61E-002 +/- 7.61E-002	9.94E-002 +/- 1.87E-002
TH-232	0.964	3997.00*	6.28E-002 +/- 7.61E-002	1.07E-001 +/- 2.01E-002

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US EPA ARCHIVE DOCUMENT

0000064281.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Sun Jul 28 11:08:34 2013



ROI Type: 1

ROI Type: 3

0255

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

Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0

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



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Sample Description: PZ-106-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:36 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.2029 +/- 0.0166
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.0680 +/- 0.0892

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	5.857	1.83	152.56	0.17	0.00E+000	3.0
TH-228	5.320	3.83	102.72	0.17	0.00E+000	3.0
TH-229 T	4.868	176.00	14.82	0.00	0.00E+000	10.4
TH-230	4.653	15.00	52.27	0.00	0.00E+000	3.0
TH-232	3.922	2.83	120.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

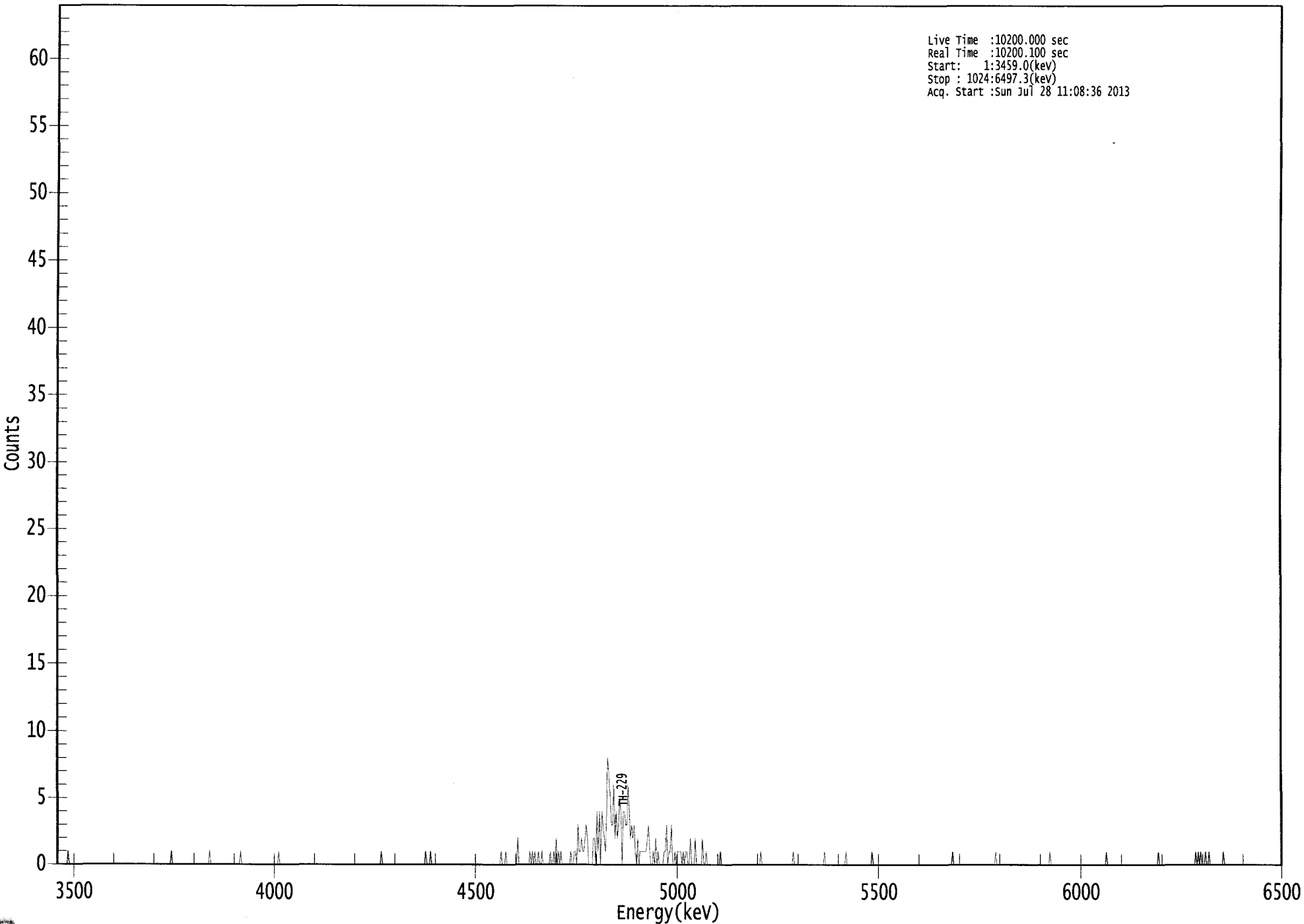
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	2.45E-002 +/- 3.77E-002	5.60E-002 +/- 8.96E-003
TH-228	0.967	5400.00*	5.09E-002 +/- 5.30E-002	5.55E-002 +/- 8.89E-003
TH-229	1.000	4872.00*	2.31E+000 +/- 3.70E-001	7.87E-002 +/- 1.26E-002
TH-230	0.998	4672.00*	1.96E-001 +/- 1.07E-001	7.84E-002 +/- 1.26E-002
TH-232	0.971	3997.00*	3.70E-002 +/- 4.49E-002	5.45E-002 +/- 8.73E-003

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US EPA ARCHIVE DOCUMENT

0000064284.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Sun Jul 28 11:08:36 2013



ROI Type: 1

ROI Type: 3

5271

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

369: 0 0 0 0 1 0 0 0

Sample Title: 15

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

801: 0 0 0 0 0 0 0 0

Sample Title: 15

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



C Fra

Sample Description: PZ-113-AD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000642
 Batch Identification: 1307099A-TH
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha 041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 63329
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:31 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.1851 +/- 0.0157
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 0.9355 +/- 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	5.810	4.32	102.62	0.68	0.00E+000	3.0
TH-228	5.353	13.66	53.80	0.34	0.00E+000	3.0
TH-229 T	4.877	160.66	15.48	0.34	0.00E+000	4.7
TH-230	4.662	7.32	76.28	0.68	0.00E+000	4.5
TH-232	4.032	-2.57	96.68	3.57	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

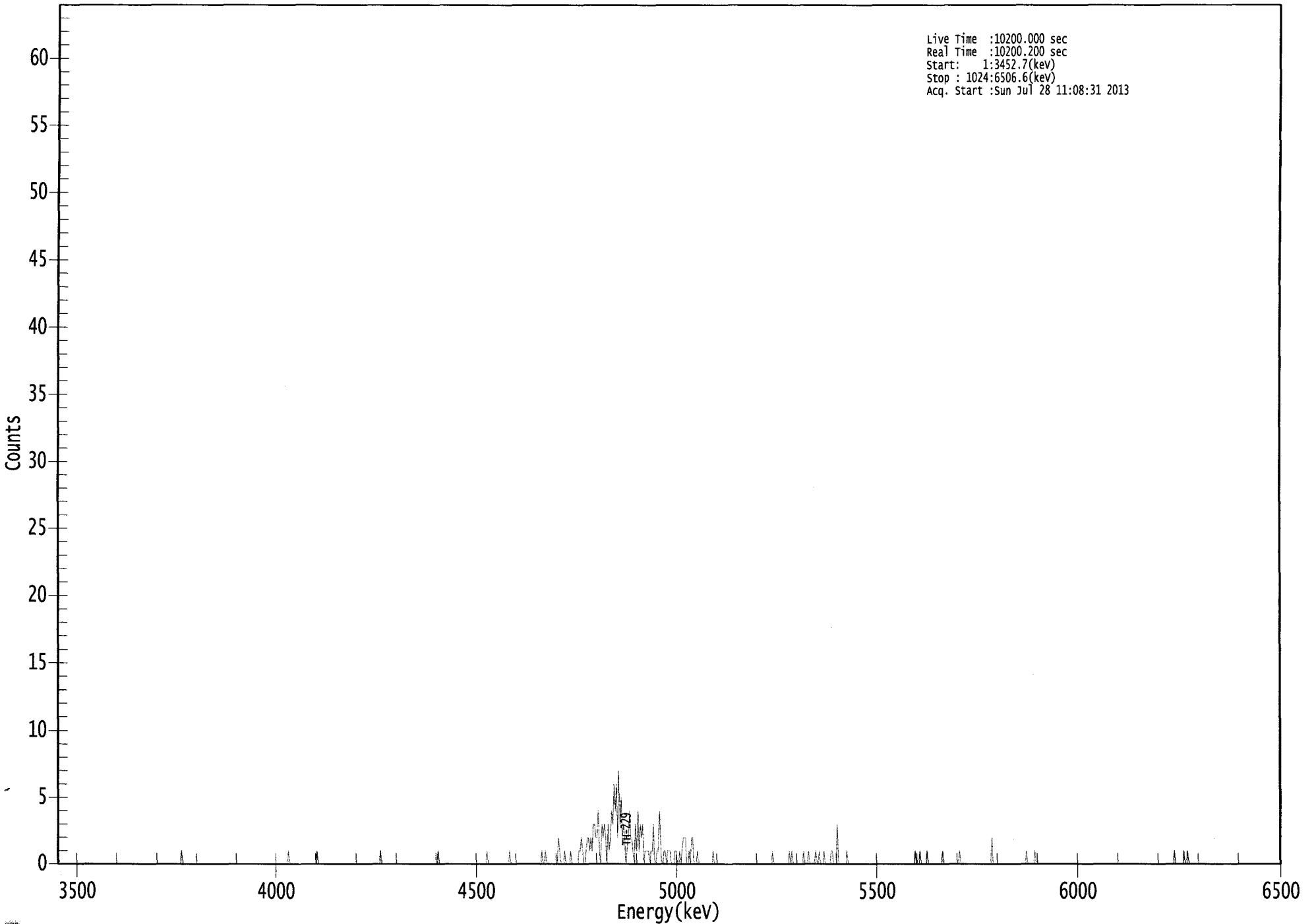
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.992	5850.00*	6.35E-002 +/- 6.60E-002	8.30E-002 +/- 1.38E-002
TH-228	0.989	5400.00*	1.99E-001 +/- 1.12E-001	6.97E-002 +/- 1.16E-002
TH-229	1.000	4872.00*	2.31E+000 +/- 3.84E-001	6.88E-002 +/- 1.14E-002
TH-230	0.999	4672.00*	1.05E-001 +/- 8.20E-002	8.09E-002 +/- 1.35E-002
TH-232	0.994	3997.00*	-3.68E-002 +/- 3.61E-002	1.35E-001 +/- 2.25E-002

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7/29/13

US EPA ARCHIVE DOCUMENT

0000064282.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Sun Jul 28 11:08:31 2013



ROI Type: 1

ROI Type: 3

0276

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	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:	1	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	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	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	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	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	0	0	0
361:	1	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 16

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	0
401:	0	0	0	0	0	0	1	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	2	1	0	0
425:	0	1	0	0	0	0	1	0
433:	0	0	0	0	0	1	1	2
441:	1	0	0	1	2	2	1	2
449:	1	3	3	2	2	4	1	0
457:	3	2	3	2	0	3	1	2
465:	4	3	6	4	6	2	7	3
473:	5	2	3	2	0	1	2	4
481:	2	2	1	0	3	1	4	1
489:	3	2	3	0	1	1	1	1
497:	0	1	1	3	0	0	1	1
505:	4	2	0	0	1	1	0	1
513:	1	1	0	0	0	1	1	0
521:	0	1	0	1	2	2	2	0
529:	0	1	0	2	2	0	0	0
537:	1	0	0	0	0	0	0	0
545:	0	0	0	0	0	1	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	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	1
601:	0	0	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	1	0	0	0	1	0	0
633:	0	0	0	1	0	0	1	0
641:	0	0	1	0	0	0	0	0
649:	1	1	0	0	0	3	0	0
657:	0	0	0	0	0	1	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	1	0
721:	0	0	1	0	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	0	0	0	1	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	2	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	1	0	0	0	0
817:	0	0	1	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	1	0
937:	0	0	0	0	0	0	1	0
945:	0	1	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Sample Description: PZ-113-AD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307099A-TH
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 8:11:52 AM
 Acquisition Date/Time: 7/28/2013 11:08:33 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.227 mL
 Effective Efficiency: 0.1403 +/- 0.0135
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.7598 +/- 0.0741

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.821	2.49	138.29	0.51	0.00E+000	3.0
TH-228	5.364	4.13	119.29	1.87	0.00E+000	3.0
TH-229 T	4.867	121.66	17.80	0.34	0.00E+000	4.0
TH-230	4.609	6.15	85.19	0.85	0.00E+000	3.0
TH-232	3.961	-0.68	304.44	0.68	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

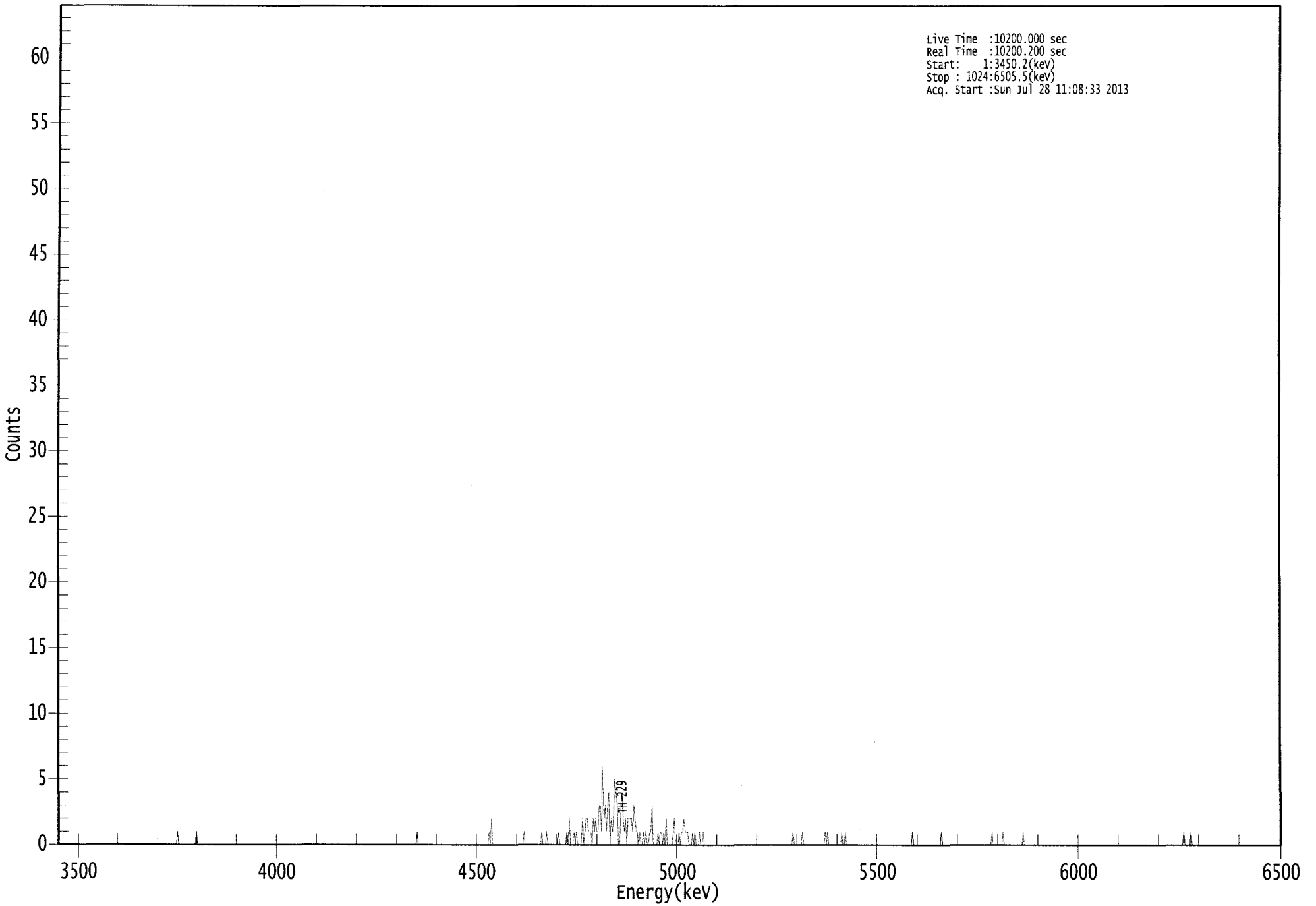
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.995	5850.00*	4.83E-002 +/- 6.74E-002	1.02E-001 +/- 1.92E-002
TH-228	0.993	5400.00*	7.95E-002 +/- 9.60E-002	1.46E-001 +/- 2.74E-002
TH-229	1.000	4872.00*	2.31E+000 +/- 4.34E-001	9.07E-002 +/- 1.71E-002
TH-230	0.980	4672.00*	1.16E-001 +/- 1.02E-001	1.13E-001 +/- 2.13E-002
TH-232	0.993	3997.00*	-1.28E-002 +/- 3.92E-002	1.07E-001 +/- 2.00E-002

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 7/28/13

US EPA ARCHIVE DOCUMENT

0000064318.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start : 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Sun Jul 28 11:08:33 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: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 17

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
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	1	0	0	0
425:	0	0	0	1	0	2	0	0
433:	0	1	0	1	0	0	0	0
441:	2	0	1	2	2	1	1	1
449:	0	2	1	2	1	1	3	3
457:	1	6	2	3	1	3	4	0
465:	2	1	2	5	4	3	0	0
473:	3	4	2	1	2	0	2	2
481:	2	2	1	3	2	1	1	0
489:	1	0	0	1	0	1	0	0
497:	1	1	3	0	0	0	0	1
505:	0	1	1	0	1	0	2	0
513:	0	0	0	0	1	2	0	0
521:	0	1	0	1	1	2	1	1
529:	1	0	0	0	1	0	1	0
537:	0	0	1	0	0	1	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	1	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	1	0	1	0	0
649:	0	0	0	0	0	0	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	0	0	0	0	0	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	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	0	0
777:	0	0	0	0	0	0	1	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: 17

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 7/28/2013
Time : 10:56:07 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	7/28/2013 10:34:32 AM
Alpha 004	21f	ALL	Passed	7/28/2013 10:34:33 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	7/28/2013 10:34:33 AM
Alpha 011	21f	ALL	Passed	7/28/2013 10:34:34 AM
Alpha 012	21f	ALL	Passed	7/28/2013 10:34:35 AM
Alpha 013	21f	ALL	Passed	7/28/2013 10:34:36 AM
Alpha 014	21f	ALL	Passed	7/28/2013 10:34:37 AM
Alpha 015	21f	ALL	Passed	7/28/2013 10:34:37 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	7/28/2013 10:34:38 AM
Alpha 019	AIM730	ALL	Passed	7/28/2013 10:34:39 AM
Alpha 020	AIM730	ALL	Passed	7/28/2013 10:34:40 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	7/28/2013 10:34:41 AM
Alpha 023	AIM730	ALL	Passed	7/28/2013 10:34:41 AM
Alpha 024	AIM730	ALL	Passed	7/28/2013 10:34:42 AM
Alpha 025	AIM730	ALL	Passed	7/28/2013 10:34:43 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	7/28/2013 10:34:44 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	7/27/2013 1:17:57 PM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	7/27/2013 1:17:58 PM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:46 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:48 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:49 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:51 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:52 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:53 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:55 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:56 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:34:58 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	7/28/2013 10:34:59 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:35:01 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:35:02 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	7/28/2013 10:35:04 AM

APPROVED BY: AGAPPROVAL DATE: 7/28/13

***** 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)

Ra226

Run 1

Work Order	13-07099	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		07/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/16/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 01 TOT	40	07/09/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 01 DIS	40	07/09/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-201A-SS TOT	46	07/10/13 10:23	1.0000E+00
Report Level	4	07	TRG	PZ-201A-SS DIS	46	07/10/13 10:23	1.0000E+00
Activity Units	pCi	08	DO	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Aliquot Units	1	09	TRG	D-85 DIS	43	07/10/13 10:52	1.0000E+00
Matrix	WA	10	TRG	PZ-106-SD TOT	45	07/10/13 11:41	1.0000E+00
Method	E903.0	11	TRG	PZ-106-SD DIS	45	07/10/13 11:41	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	S-84 TOT	41	07/10/13 11:46	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	S-84 DIS	41	07/10/13 11:46	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-106-SS TOT	41	07/10/13 12:43	1.0000E+00
Tracer Act (dpm/g)	992.916	15	TRG	PZ-106-SS DIS	41	07/10/13 12:43	1.0000E+00
Carrier		16	TRG	PZ-113-AD TOT	41	07/10/13 13:02	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-113-AD DIS	41	07/10/13 13:02	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	0.9218	915.3	407.4	98.82		0.0231	0.0299	0.0068		98.82	2.44	1.00
02	MBL	0.9101	903.7	424.5	104.29		0.0229	0.0290	0.0061		104.29	2.20	1.00
03	DUP	0.9117	905.2	122.4	30.02		0.0228	0.0270	0.0042		30.02	1.25	1.00
04	TRG	0.9077	901.3	384.2	94.64		0.0229	0.0301	0.0072		94.64	2.55	1.00
05	TRG	0.9072	900.8	363.3	89.54		0.0223	0.0301	0.0078		89.54	2.72	1.00
06	TRG	0.9083	901.9	384.1	94.55		0.0230	0.0291	0.0061		94.55	2.20	1.00
07	TRG	0.9102	903.8	439.3	107.91		0.0225	0.0291	0.0066		107.91	2.37	1.00
08	DO	0.9122	905.7	141.2	34.61		0.0224	0.0266	0.0042		34.61	1.25	1.00
09	TRG	0.9073	900.9	331.4	81.67		0.0227	0.0306	0.0079		81.67	2.74	1.00
10	TRG	0.9095	903.1	383.3	94.23		0.0227	0.0289	0.0062		94.23	2.23	1.00
11	TRG	0.9080	901.6	381.5	93.94		0.0228	0.0296	0.0068		93.94	2.44	1.00
12	TRG	0.9070	900.6	329.5	81.22		0.0227	0.0326	0.0099		81.22	3.25	1.00
13	TRG	0.9052	898.8	423.4	104.58		0.0226	0.0306	0.0080		104.58	2.77	1.00
14	TRG	0.9047	898.3	399.9	98.83		0.0225	0.0293	0.0068		98.83	2.44	1.00
15	TRG	0.9058	899.4	392.7	96.93		0.0229	0.0297	0.0068		96.93	2.44	1.00
16	TRG	0.9045	898.1	565.5	139.79		0.0230	0.0369	0.0139		110.00	5.35	1.00
17	TRG	0.9070	900.6	377.4	93.03		0.0224	0.0325	0.0101		93.03	3.31	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			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
02	MBL			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
03	DUP			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
04	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
05	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
06	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
07	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
08	DO			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
09	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
10	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
11	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
12	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
13	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
14	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
15	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
16	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	LWALKER		
17	TRG			07/23/13 07:52	JWOLFE	07/29/13 16:56	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.

0291

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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	1.09E+01	1.42E+00	1.85E-01	1.03E+01	105.80	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	9.78E-02	1.31E-01	2.07E-01					OK	OK
03	RA-226	DUP	D-85 TOT	pCi/l	6.23E+00	1.28E+00	3.18E-01				INV	OK	
04	RA-226	TRG	DUP 01 TOT	pCi/l	1.18E+00	4.54E-01	2.12E-01					OK	
05	RA-226	TRG	DUP 01 DIS	pCi/l	1.56E+00	5.79E-01	3.60E-01					OK	
06	RA-226	TRG	PZ-201A-SS TOT	pCi/l	4.98E-01	2.76E-01	2.38E-01					OK	
07	RA-226	TRG	PZ-201A-SS DIS	pCi/l	3.66E-01	2.53E-01	2.86E-01					OK	
08	RA-226	DO	D-85 TOT	pCi/l	4.64E+00	1.01E+00	3.30E-01					OK	
09	RA-226	TRG	D-85 DIS	pCi/l	1.56E+00	5.96E-01	4.93E-01					OK	
10	RA-226	TRG	PZ-106-SD TOT	pCi/l	6.60E-01	2.99E-01	2.29E-01					OK	
11	RA-226	TRG	PZ-106-SD DIS	pCi/l	7.98E-01	4.21E-01	4.07E-01					OK	
12	RA-226	TRG	S-84 TOT	pCi/l	1.30E+00	5.42E-01	2.74E-01					OK	
13	RA-226	TRG	S-84 DIS	pCi/l	6.66E-01	3.21E-01	1.65E-01					OK	
14	RA-226	TRG	PZ-106-SS TOT	pCi/l	3.31E+00	6.87E-01	2.02E-01					OK	
15	RA-226	TRG	PZ-106-SS DIS	pCi/l	3.55E+00	7.02E-01	1.67E-01					OK	
16	RA-226	TRG	PZ-113-AD TOT	pCi/l	2.85E+00	8.34E-01	3.47E-01					OK	
17	RA-226	TRG	PZ-113-AD DIS	pCi/l	2.56E+00	6.97E-01	2.71E-01					OK	

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-Ra226-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	07/16/13 00:00	1.00E+00	98.82	0.00	98.82		7/29/2013 16:56	
02	RA-226	MBL	07/16/13 00:00	1.00E+00	100.00	0.00	104.29		7/29/2013 16:56	
03	RA-226	DUP	07/10/13 10:52	1.00E+00	30.02	0.00	30.02		7/29/2013 16:56	
04	RA-226	TRG	07/09/13 00:00	1.00E+00	94.64	0.00	94.64		7/29/2013 16:56	
05	RA-226	TRG	07/09/13 00:00	1.00E+00	89.54	0.00	89.54		7/29/2013 16:56	
06	RA-226	TRG	07/10/13 10:23	1.00E+00	94.55	0.00	94.55		7/29/2013 16:56	
07	RA-226	TRG	07/10/13 10:23	1.00E+00	100.00	0.00	107.91		7/29/2013 16:56	
08	RA-226	DO	07/10/13 10:52	1.00E+00	34.61	0.00	34.61		7/29/2013 16:56	
09	RA-226	TRG	07/10/13 10:52	1.00E+00	81.67	0.00	81.67		7/29/2013 16:56	
10	RA-226	TRG	07/10/13 11:41	1.00E+00	94.23	0.00	94.23		7/29/2013 16:56	
11	RA-226	TRG	07/10/13 11:41	1.00E+00	93.94	0.00	93.94		7/29/2013 16:56	
12	RA-226	TRG	07/10/13 11:46	1.00E+00	81.22	0.00	81.22		7/29/2013 16:56	
13	RA-226	TRG	07/10/13 11:46	1.00E+00	100.00	0.00	104.58		7/29/2013 16:56	
14	RA-226	TRG	07/10/13 12:43	1.00E+00	98.83	0.00	98.83		7/29/2013 16:56	
15	RA-226	TRG	07/10/13 12:43	1.00E+00	96.93	0.00	96.93		7/29/2013 16:56	
16	RA-226	TRG	07/10/13 13:02	1.00E+00	100.00	0.00	110.00		7/29/2013 16:56	
17	RA-226	TRG	07/10/13 13:02	1.00E+00	93.03	0.00	93.03		7/29/2013 16:56	

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-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 12:14		A_Spec	Alpha_015	170	2.47 E+02	1.00 E-03	14.8
02	RA-226	MBL	07/31/13 12:15		A_Spec	Alpha_018	170	2.98 E+00	6.00 E-03	17.8
03	RA-226	DUP	07/31/13 12:15		A_Spec	Alpha_019	170	9.37 E+01	2.00 E-03	16.6
04	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_020	170	2.67 E+01	2.00 E-03	16.1
05	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_022	170	2.96 E+01	8.00 E-03	15.3
06	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_023	170	1.38 E+01	7.00 E-03	17.1
07	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_024	170.02	9.96 E+00	1.20 E-02	17.1
08	RA-226	DO	07/31/13 12:15		A_Spec	Alpha_025	170.02	8.41 E+01	5.00 E-03	17.4
09	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_027	170.02	3.03 E+01	2.20 E-02	17.3
10	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_029	170	2.05 E+01	9.00 E-03	19.5
11	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_031	170	1.65 E+01	1.50 E-02	14.2
12	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_033	170	2.27 E+01	2.00 E-03	18.5
13	RA-226	TRG	07/31/13 12:16		A_Spec	Alpha_034	170	1.68 E+01	1.00 E-03	18.6
14	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_035	170	9.23 E+01	4.00 E-03	18.3
15	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_036	170	1.02 E+02	2.00 E-03	19.1
16	RA-226	TRG	07/31/13 12:15		A_Spec	Alpha_038	170	4.63 E+01	4.00 E-03	17.2
17	RA-226	TRG	07/31/13 12:16		A_Spec	Alpha_039	170	5.33 E+01	4.00 E-03	19.7



Run 1

Analysis Code Ra226

Eberline Services Work Order 13-07099

Client Engineering Management Support, Inc.

7620

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	07/16/13 00:00	1.0000	0.9218	915.2700	407.4000	98.82	2.44	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9101	903.6529	424.5000	104.29	2.20	1.00
03	DUP	D-85 TOT	07/10/13 10:52	1.0000	0.9117	905.2415	122.4000	30.02	1.25	1.00
04	TRG	DUP 01 TOT	07/09/13 00:00	1.0000	0.9077	901.2699	384.2000	94.64	2.55	1.00
05	TRG	DUP 01 DIS	07/09/13 00:00	1.0000	0.9072	900.7734	363.3000	89.54	2.72	1.00
06	TRG	PZ-201A-SS TOT	07/10/13 10:23	1.0000	0.9083	901.8656	384.1000	94.55	2.20	1.00
07	TRG	PZ-201A-SS DIS	07/10/13 10:23	1.0000	0.9102	903.7521	439.3000	107.91	2.37	1.00
08	DO	D-85 TOT	07/10/13 10:52	1.0000	0.9122	905.7380	141.2000	34.61	1.25	1.00
09	TRG	D-85 DIS	07/10/13 10:52	1.0000	0.9073	900.8727	331.4000	81.67	2.74	1.00
10	TRG	PZ-106-SD TOT	07/10/13 11:41	1.0000	0.9095	903.0571	383.3000	94.23	2.23	1.00
11	TRG	PZ-106-SD DIS	07/10/13 11:41	1.0000	0.9080	901.5677	381.5000	93.94	2.44	1.00
12	TRG	S-84 TOT	07/10/13 11:46	1.0000	0.9070	900.5748	329.5000	81.22	3.25	1.00
13	TRG	S-84 DIS	07/10/13 11:46	1.0000	0.9052	898.7876	423.4000	104.58	2.77	1.00
14	TRG	PZ-106-SS TOT	07/10/13 12:43	1.0000	0.9047	898.2911	399.9000	98.83	2.44	1.00
15	TRG	PZ-106-SS DIS	07/10/13 12:43	1.0000	0.9058	899.3833	392.7000	96.93	2.44	1.00
16	TRG	PZ-113-AD TOT	07/10/13 13:02	1.0000	0.9045	898.0925	565.5000	139.79	5.35	1.00
17	TRG	PZ-113-AD DIS	07/10/13 13:02	1.0000	0.9070	900.5748	377.4000	93.03	3.31	1.00

18-31

53-39

5629

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07099	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	D-85 TOT	DUP					1.0000E+00	1.0000E+00				
04	DUP 01 TOT	TRG					1.0000E+00	1.0000E+00				
05	DUP 01 DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-201A-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-201A-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	D-85 TOT	DO					1.0000E+00	1.0000E+00				
09	D-85 DIS	TRG					1.0000E+00	1.0000E+00				
10	PZ-106-SD TOT	TRG					1.0000E+00	1.0000E+00				
11	PZ-106-SD DIS	TRG					1.0000E+00	1.0000E+00				
12	S-84 TOT	TRG					1.0000E+00	1.0000E+00				
13	S-84 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-106-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-106-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-113-AD TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-113-AD DIS	TRG					1.0000E+00	1.0000E+00				

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

Technician: _____

J Wolfe Date: 7/23/13

0297

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07099	1	Ra226			LWALKER

TRetek 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		0.0231	0.0299	0.0068	
02	BLANK	MBL		0.0229	0.0290	0.0061	
03	DUP	DUP		0.0228	0.0270	0.0042	
04	DUP 01 TOT	TRG		0.0229	0.0301	0.0072	
05	DUP 01 DIS	TRG		0.0223	0.0301	0.0078	
06	PZ-201A-SS TOT	TRG		0.0230	0.0291	0.0061	
07	PZ-201A-SS DIS	TRG		0.0225	0.0291	0.0066	
08	D-85 TOT	DO		0.0224	0.0266	0.0042	
09	D-85 DIS	TRG		0.0227	0.0306	0.0079	
10	PZ-106-SD TOT	TRG		0.0227	0.0289	0.0062	
11	PZ-106-SD DIS	TRG		0.0228	0.0296	0.0068	
12	S-84 TOT	TRG		0.0227	0.0326	0.0099	
13	S-84 DIS	TRG		0.0226	0.0306	0.0080	
14	PZ-106-SS TOT	TRG		0.0225	0.0293	0.0068	
15	PZ-106-SS DIS	TRG		0.0229	0.0297	0.0068	
16	PZ-113-AD TOT	TRG		0.0230	0.0369	0.0139	
17	PZ-113-AD DIS	TRG		0.0224	0.0325	0.0101	

Technician: *J. Walker*

Date: 7, 29, 13

0298



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7/31/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:14:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9882 +/- 0.0000
 Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
 Effective Efficiency: 0.1460 +/- 0.0026

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.433592 +/- 0.031504
 Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.536	439.83	9.35	0.17	0.00E+000	4.2
RA-226	4.696	246.83	12.48	0.17	0.00E+000	5.9

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

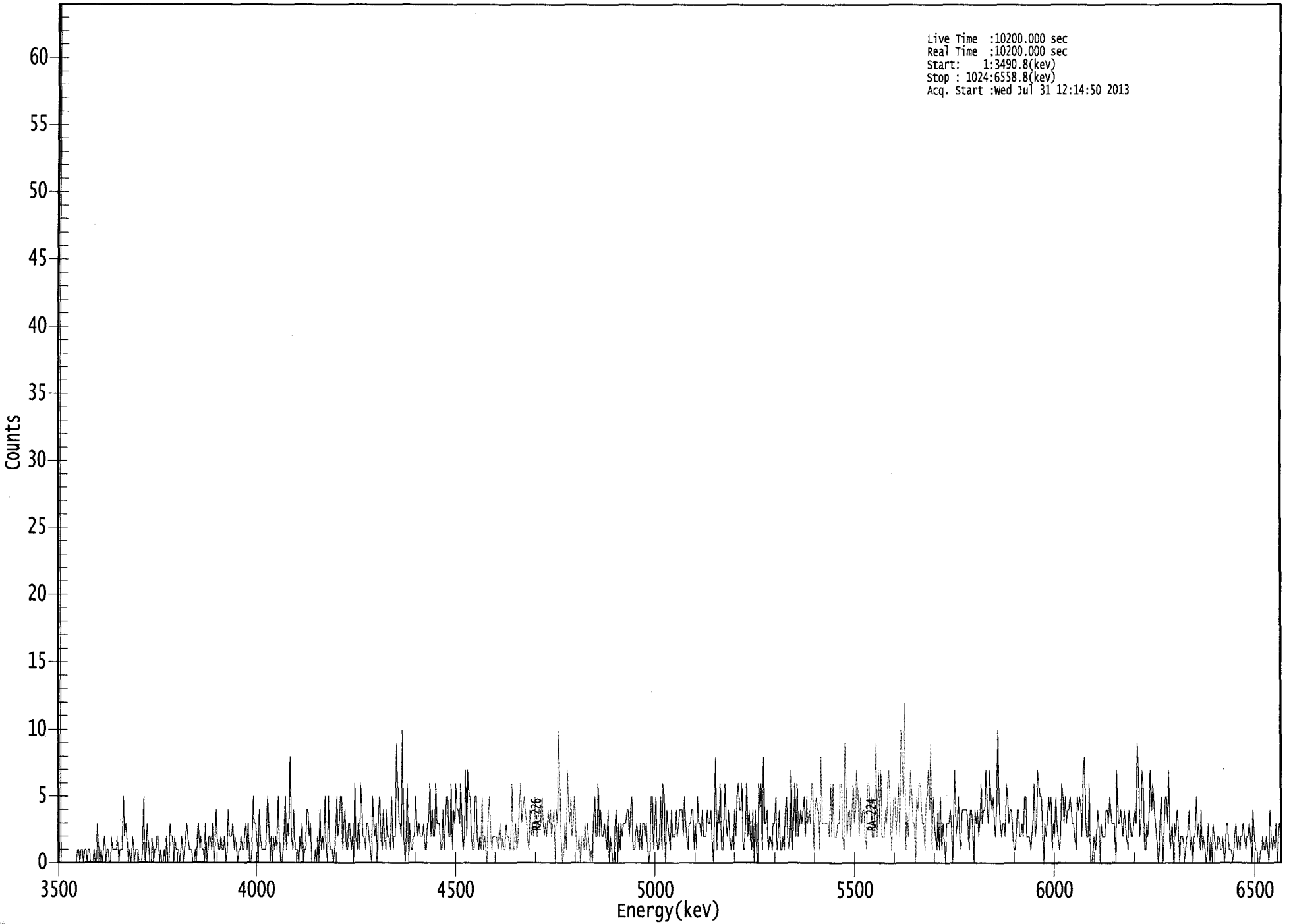
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	2.05E+001 +/- 2.05E+000	1.94E-001 +/- 6.86E-003
RA-226	0.990	4785.00*	1.09E+001 +/- 1.42E+000	1.85E-001 +/- 6.53E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064657.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :wed Jul 31 12:14:50 2013



ROI Type: 1

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

Sample Title: 01

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 2 1 2 3 1 2 1 1

Sample Title: 01

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

801: 1 1 2 4 4 2 2 3

Sample Title: 01

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

105
7/31/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1776 +/- 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	5.500	-0.59	726.33	4.59	0.00E+000	3.1
RA-226	4.639	2.98	134.36	1.02	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

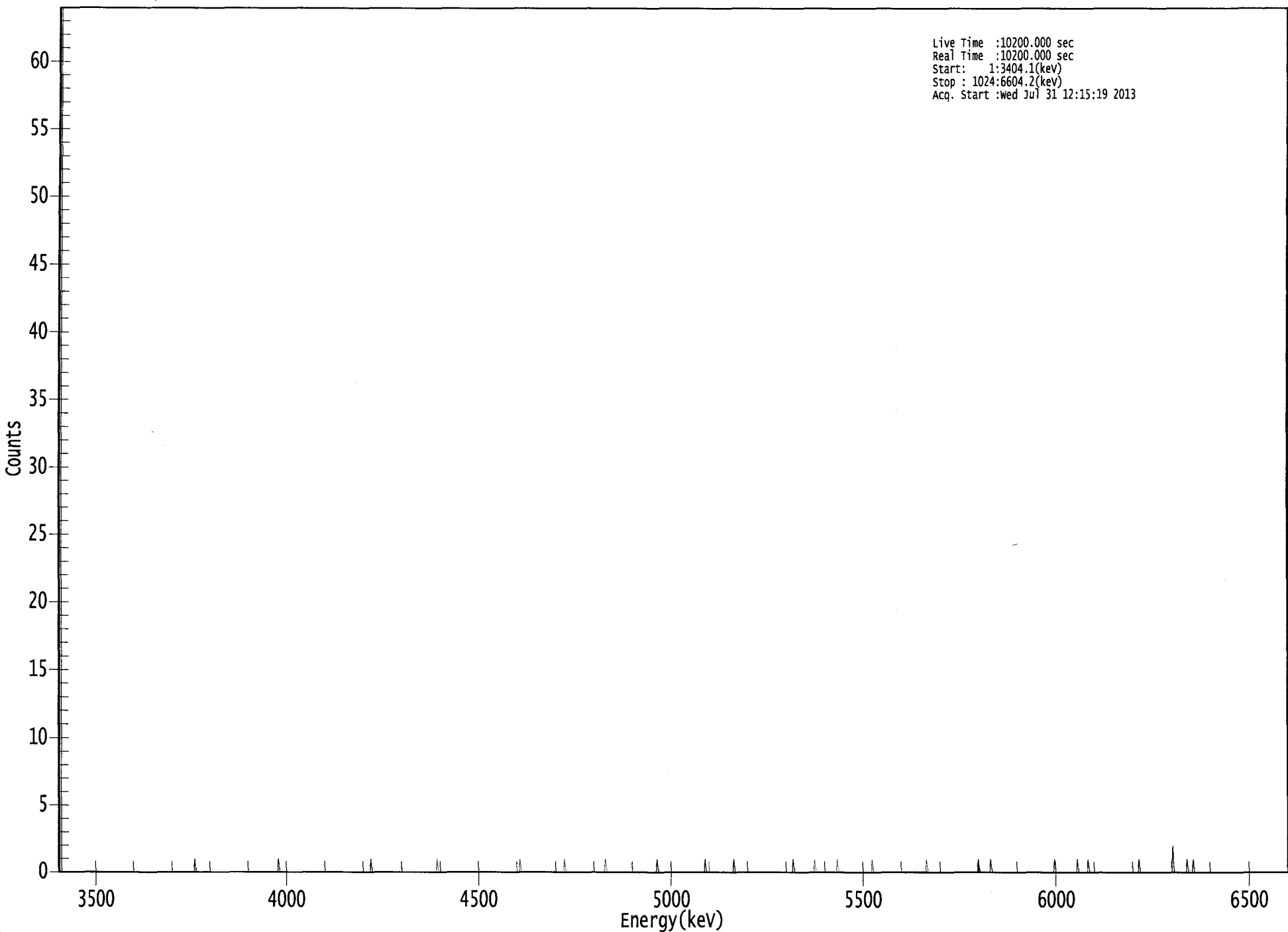
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.956	5685.50*	-2.04E-002 +/- 1.48E-001	3.56E-001 +/- 1.30E-002
RA-226	0.973	4785.00*	9.78E-002 +/- 1.31E-001	2.07E-001 +/- 7.53E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064617.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :wed Jul 31 12:15:19 2013



ROI Type: 1

5050

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

Sample Title: 02

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	1	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	1	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	1	0	0	0
617:	0	0	0	0	0	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	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	1	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	1	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: 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	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	1	0	0	0	0	0	0	0
857:	0	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	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	2
937:	0	0	0	1	0	0	0	0
945:	1	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB
7/15/13

Apex-Alpha™

Sample Description: D-85 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 1.250E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:20 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.3002 +/- 0.0000
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
 Effective Efficiency: 0.0498 +/- 0.0009

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.544	46.13	29.53	1.87	0.00E+000	4.2
RA-226	4.604	93.66	20.30	0.34	0.00E+000	5.6

 NUCLIDE ANALYSIS RESULTS

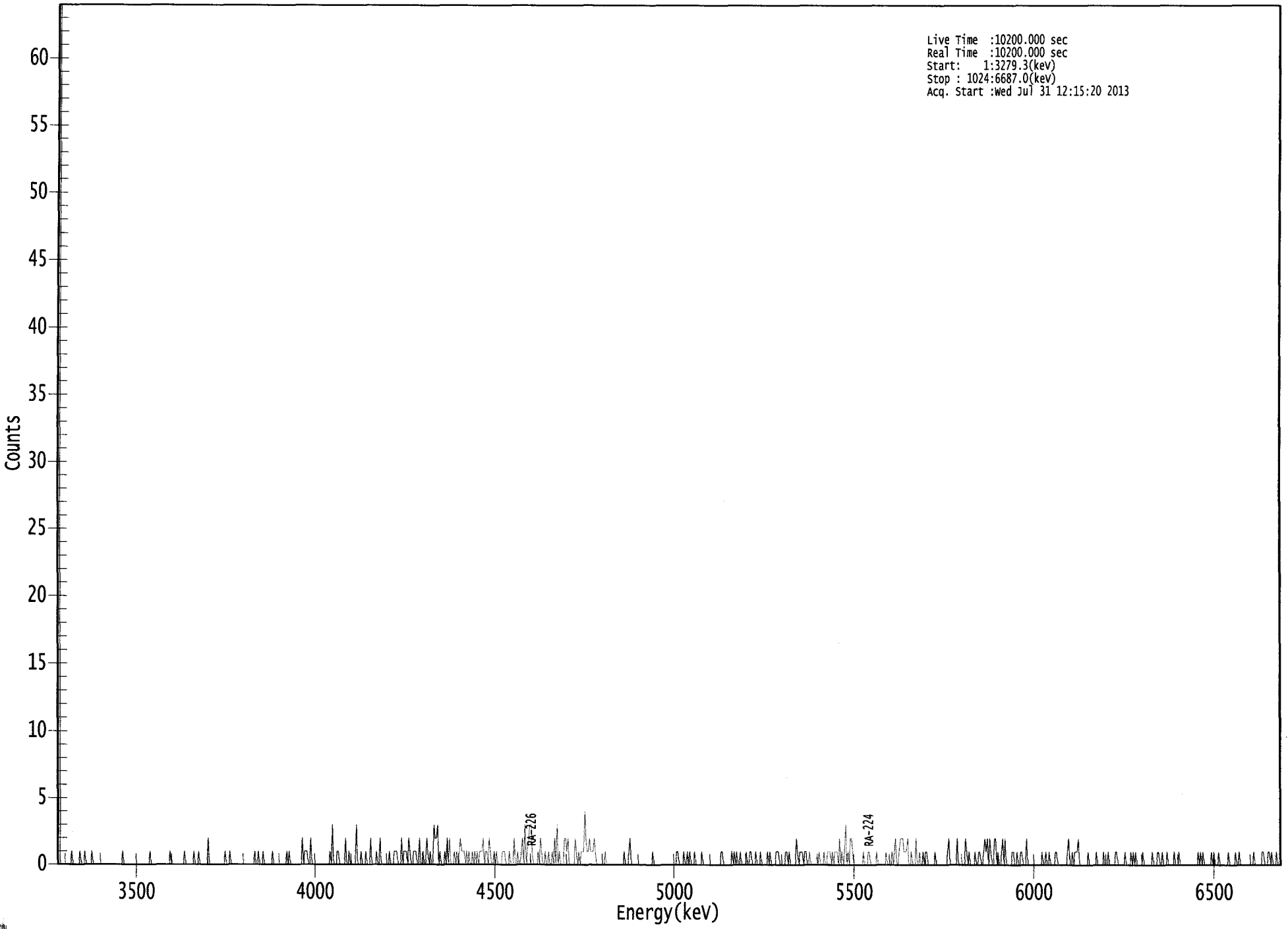
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.974	5685.50*	3.25E+000 +/- 9.66E-001	5.33E-001 +/- 1.85E-002
RA-226	0.958	4785.00*	6.23E+000 +/- 1.28E+000	3.18E-001 +/- 1.10E-002

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US EPA ARCHIVE DOCUMENT

0000064620.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3279.3(kev)
Stop : 1024:6687.0(kev)
Acq. Start :wed Jul 31 12:15:20 2013



ROI Type: 1

0120

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

369: 1 0 0 0 0 1 1 1

Sample Title: 03

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

801: 1 0 0 1 0 0 1 1

Sample Title: 03

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



Apex-Alpha™

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Sample Description: DUP 01 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/9/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:21 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9464 +/- 0.0000
 Counting Efficiency: 0.1612 +/- 0.0029 on 7/20/2013 6:29:23 PM
 Effective Efficiency: 0.1525 +/- 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	5.528	3.62	137.02	2.38	0.00E+000	3.3
RA-226	4.591	26.66	38.24	0.34	0.00E+000	3.3

 NUCLIDE ANALYSIS RESULTS

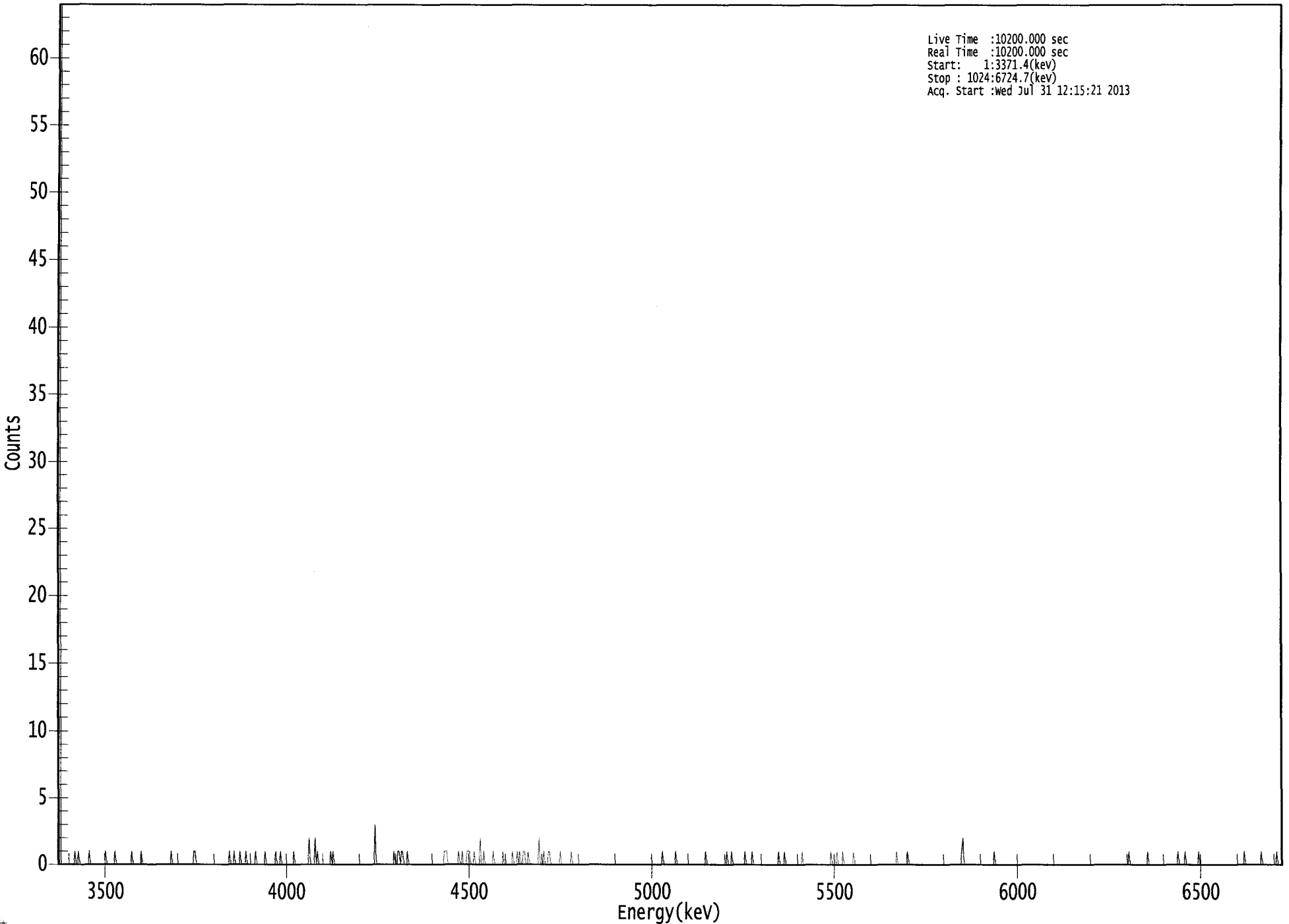
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	1.70E-001 +/- 2.33E-001	3.85E-001 +/- 1.34E-002
RA-226	0.952	4785.00*	1.18E+000 +/- 4.54E-001	2.12E-001 +/- 7.38E-003

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US EPA ARCHIVE DOCUMENT

0000064619.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3371.4(kev)
Stop : 1024:6724.7(kev)
Acq. Start :wed Jul 31 12:15:21 2013



ROI Type: 1

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 1 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

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	1
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:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	1	0
953:	0	1	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	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	1
1001:	0	0	0	0	0	1	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	1	0	0	0	0	0



KCB
7/31/13

Sample Description: DUP 01 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.720E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/9/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8954 +/- 0.0000
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1371 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.513	7.96	79.20	2.04	0.00E+000	3.1
RA-226	4.574	29.64	36.95	1.36	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

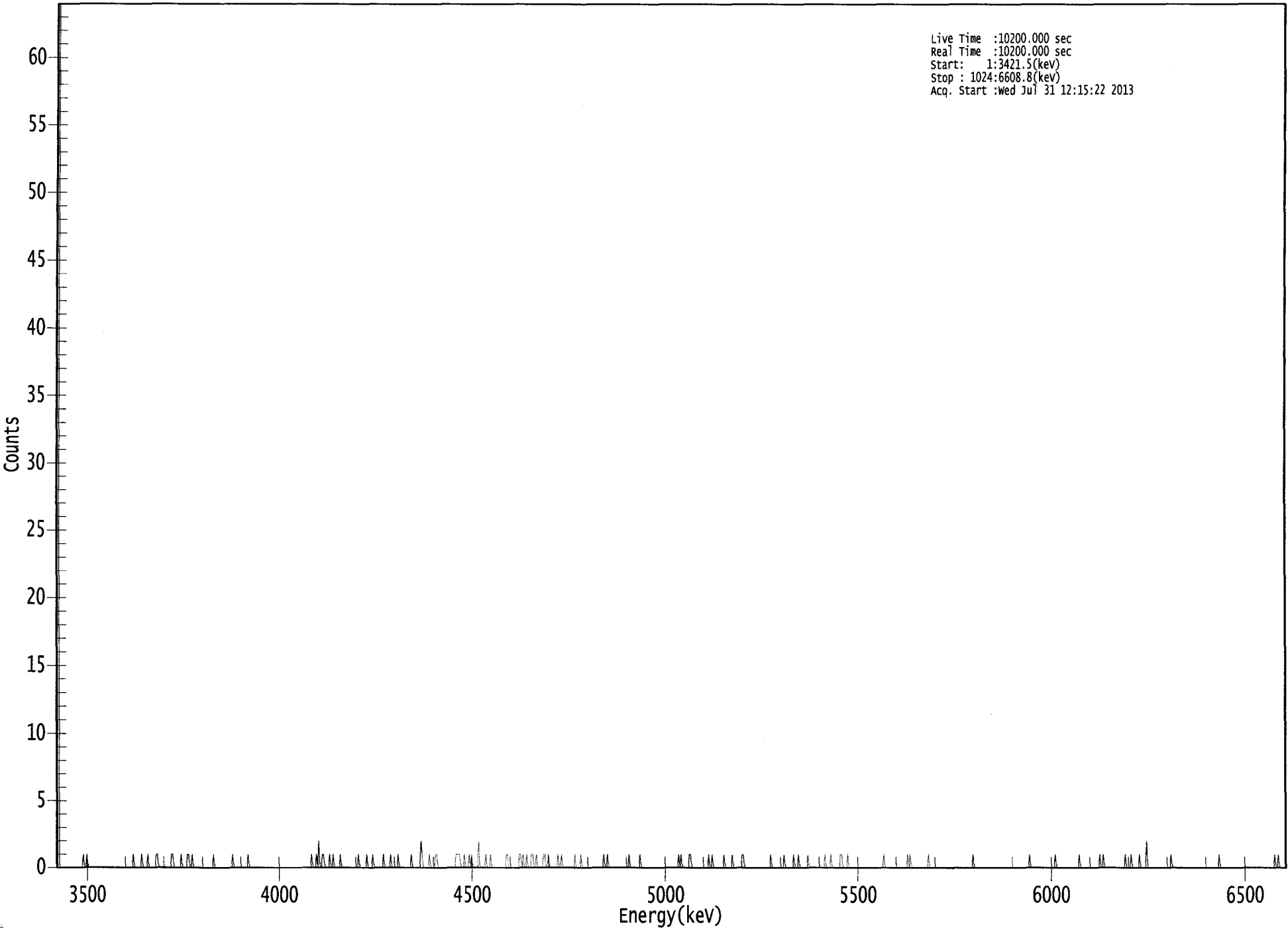
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	4.43E-001 +/- 3.51E-001	4.34E-001 +/- 1.62E-002
RA-226	0.944	4785.00*	1.56E+000 +/- 5.79E-001	3.60E-001 +/- 1.35E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064621.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Wed Jul 31 12:15:22 2013



ROI Type: 1

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	1	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:	1	0	0	0	0	0	0	1
73:	0	0	0	0	1	0	0	0
81:	0	0	0	1	1	0	0	0
89:	0	0	0	0	0	0	0	0
97:	1	1	0	0	0	0	0	0
105:	1	0	0	0	0	1	1	0
113:	0	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	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:	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	1	0	0
217:	0	1	0	2	0	0	1	1
225:	0	0	0	0	1	0	0	1
233:	0	0	0	0	0	1	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	1	0	0	0
257:	0	0	0	1	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	1	0	0	0	0	0	1
281:	0	0	0	0	0	1	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	2	1	0	0	0	0	0	1
313:	0	0	0	0	1	1	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	1	1
337:	1	0	0	0	1	0	0	0
345:	1	0	1	0	0	0	0	0
353:	2	0	0	0	0	0	1	0
361:	0	0	1	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 1

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

Sample Title: 05

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

100
7/31/13

Apex-Alpha™

Sample Description: PZ-201A-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 06
 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: 2.200E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:23 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9455 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
 Effective Efficiency: 0.1617 +/- 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	5.436	3.64	123.16	1.36	0.00E+000	3.1
RA-226	4.603	13.81	55.34	1.19	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

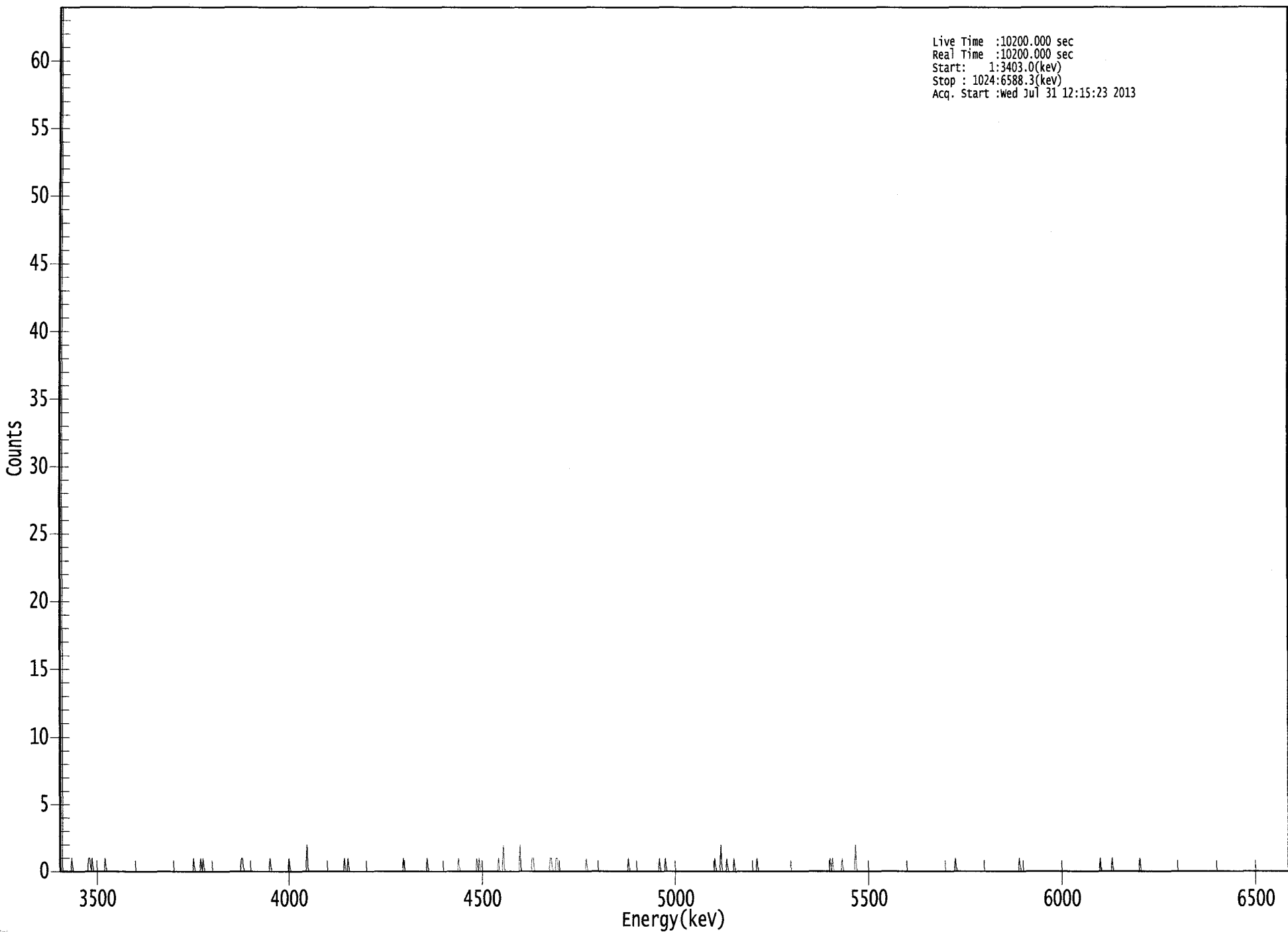
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.922	5685.50*	1.39E-001 +/- 1.71E-001	2.62E-001 +/- 9.06E-003
RA-226	0.958	4785.00*	4.98E-001 +/- 2.76E-001	2.38E-001 +/- 8.21E-003

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US EPA ARCHIVE DOCUMENT

0000064622.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 12:15:23 2013



0325

ROI Type: 1

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 2 0 0 0 0 0

Sample Title: 06

Channel								
377:	0	0	0	0	0	0	0	0
385:	2	0	0	0	0	0	0	0
393:	0	0	1	1	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	1	0	0	0	1	1
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:	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	1	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	1	0	0	0
505:	0	1	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	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	1	0	0	0	0	2
553:	0	0	0	0	1	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	1	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	1	0	0	0
649:	0	0	0	0	1	0	0	0
657:	0	0	0	0	0	0	0	2
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	1

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	1	0	0	0	0	0
873:	0	0	0	0	1	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	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	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

208
7/31/13

Apex-Alpha™

Sample Description: PZ-201A-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 07
 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: 2.370E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:24 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	5.576	3.43	157.62	3.57	0.00E+000	3.1
RA-226	4.590	9.96	69.15	2.04	0.00E+000	3.1

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

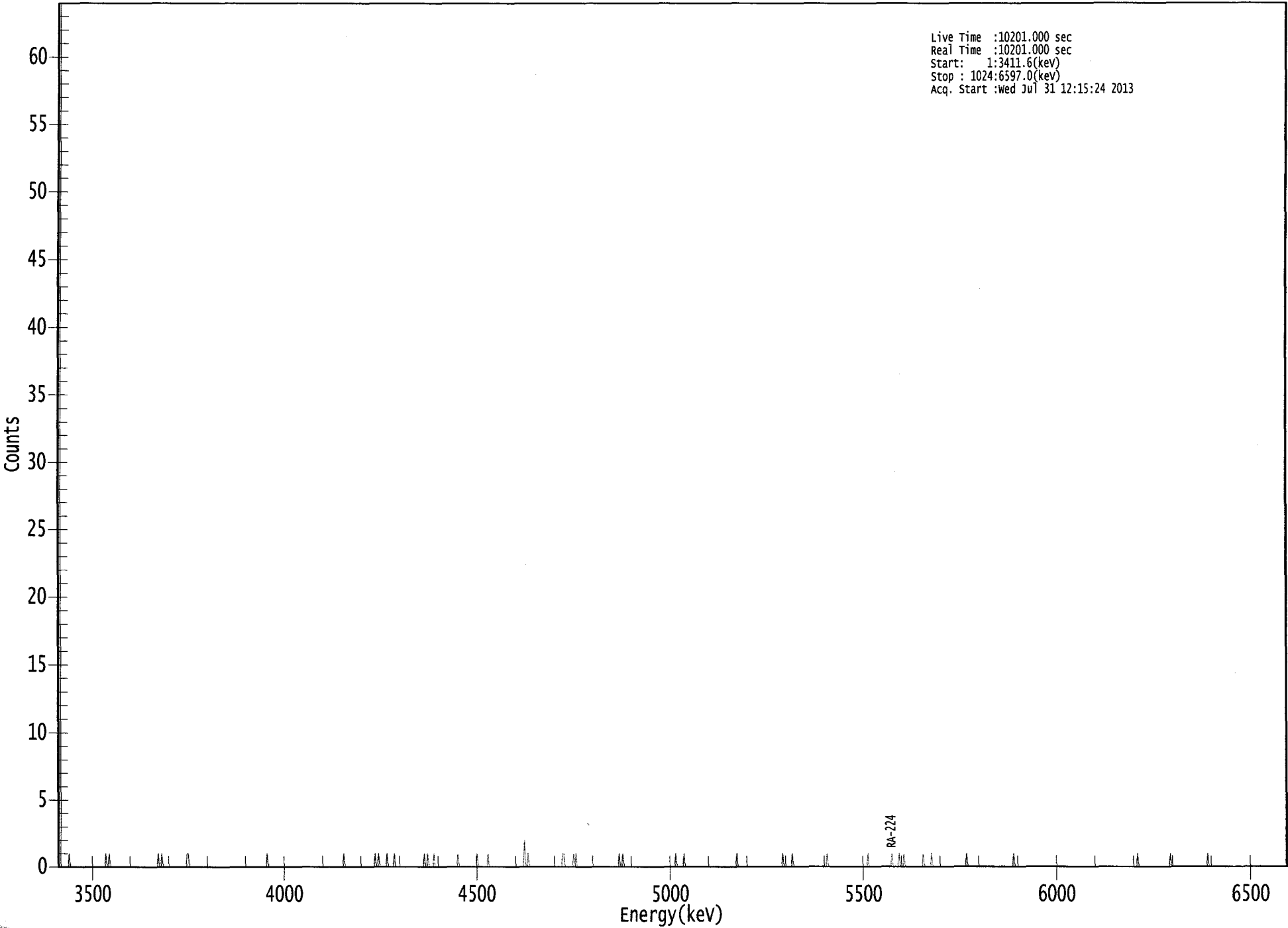
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.984	5685.50*	1.33E-001 +/- 2.10E-001	3.67E-001 +/- 1.35E-002
RA-226	0.951	4785.00*	3.66E-001 +/- 2.53E-001	2.86E-001 +/- 1.05E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064618.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :wed Jul 31 12:15:24 2013



ROI Type: 1

0330

 ***** 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	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:	1	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	1	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	1	1	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	1
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	1	0	0	1	0	0	0
273:	0	0	0	1	0	0	0	0
281:	0	1	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	1	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	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 07

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	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	1	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	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

KS
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Apex-Alpha™

Sample Description: D-85 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 08
 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: 1.250E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:25 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.3461 +/- 0.0000
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Effective Efficiency: 0.0601 +/- 0.0011

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.509	35.66	33.00	0.34	0.00E+000	3.9
RA-226	4.614	84.15	21.49	0.85	0.00E+000	3.9

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

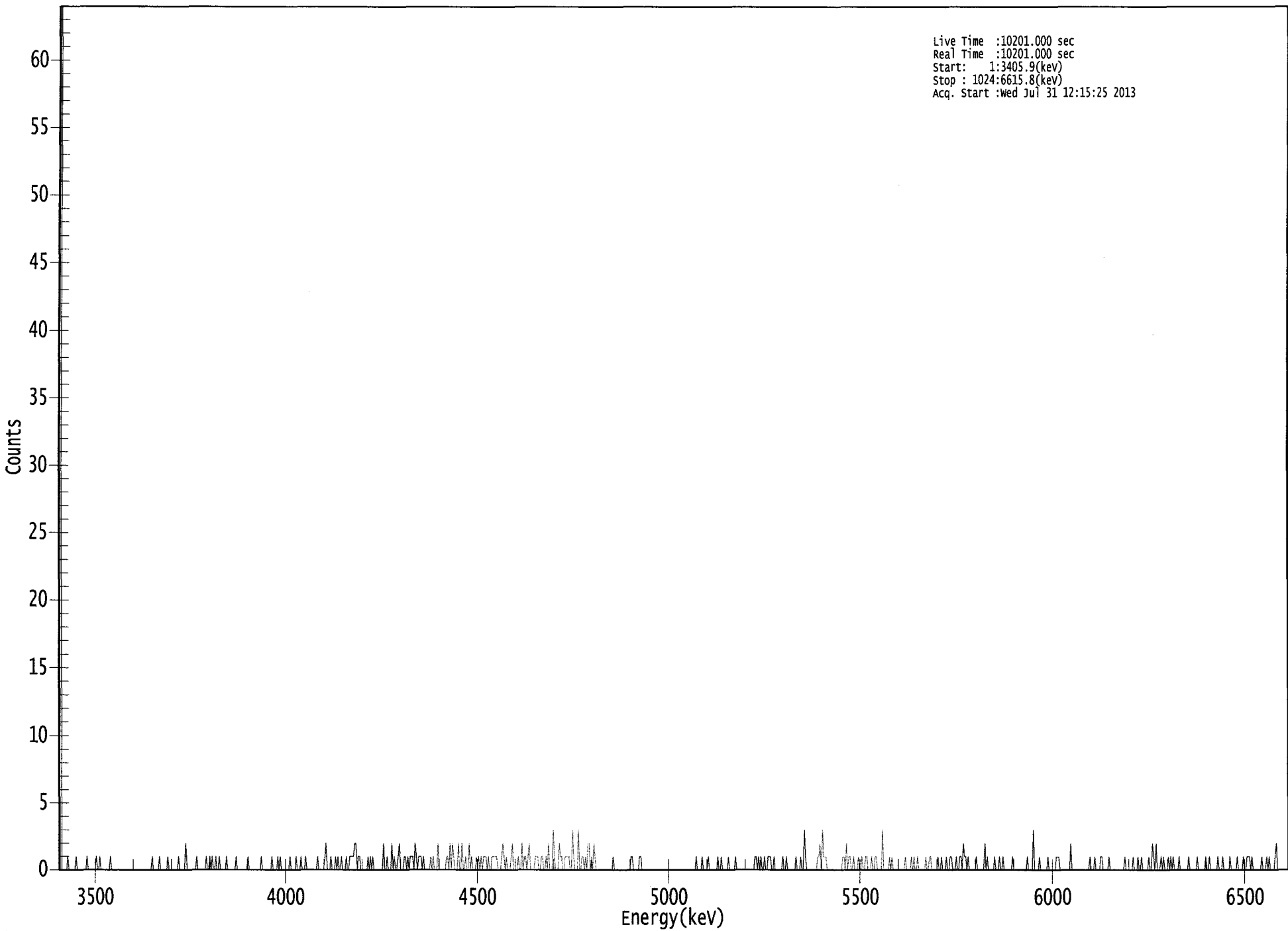
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.960	5685.50*	2.08E+000 +/- 6.91E-001	2.79E-001 +/- 1.02E-002
RA-226	0.963	4785.00*	4.64E+000 +/- 1.01E+000	3.30E-001 +/- 1.21E-002

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US EPA ARCHIVE DOCUMENT

0000064623.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Wed Jul 31 12:15:25 2013



ROI Type: 1

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

Sample Title: 08

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 1 2 1 0 1 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 1 0

Sample Title: 08

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

KS
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Apex-Alpha™

Sample Description: D-85 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 09
 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: 2.740E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:26 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8167 +/- 0.0000
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Effective Efficiency: 0.1411 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.505	10.96	65.33	2.04	0.00E+000	4.8
RA-226	4.606	30.26	38.12	3.74	0.00E+000	4.0

 NUCLIDE ANALYSIS RESULTS

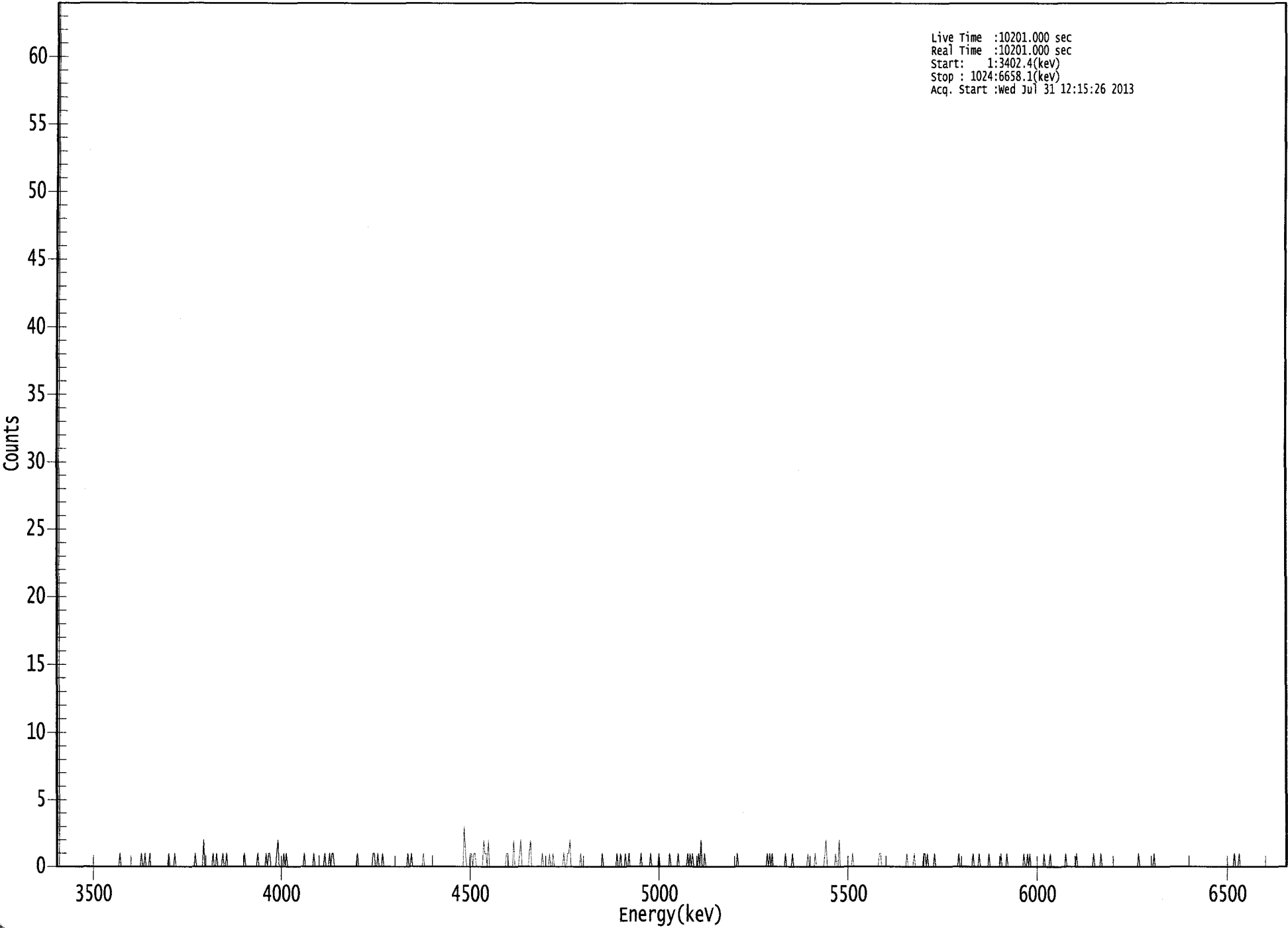
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	5.97E-001 +/- 3.91E-001	4.24E-001 +/- 1.56E-002
RA-226	0.959	4785.00*	1.56E+000 +/- 5.96E-001	4.93E-001 +/- 1.81E-002

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US EPA ARCHIVE DOCUMENT

0000064624.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 12:15:26 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: 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	1	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	1
73:	0	0	1	0	0	0	1	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	0	1	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	1	0	0	0
121:	0	0	0	2	0	0	0	0
129:	0	0	0	1	0	0	1	0
137:	0	0	0	1	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	0
161:	0	0	0	0	0	0	0	0
169:	1	0	0	0	0	0	0	1
177:	0	1	1	0	0	0	0	0
185:	1	2	0	0	0	0	1	0
193:	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	1
217:	0	0	0	0	0	0	0	0
225:	1	0	0	0	1	0	1	1
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:	1	1	0	0	1	0	0	0
273:	1	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:	1	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	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	3	1	0	0
345:	0	1	1	0	1	1	0	0
353:	0	0	0	0	2	1	1	0
361:	2	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 1

Sample Title: 09

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

801: 0 0 0 0 0 1 0 0

Sample Title: 09

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

145
7/31/13

Apex-Alpha™

Sample Description: PZ-106-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 10
 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: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:27 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9423 +/- 0.0000
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Effective Efficiency: 0.1833 +/- 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	6.26	102.11	3.74	0.00E+000	3.1
RA-226	4.574	20.47	45.18	1.53	0.00E+000	4.7

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

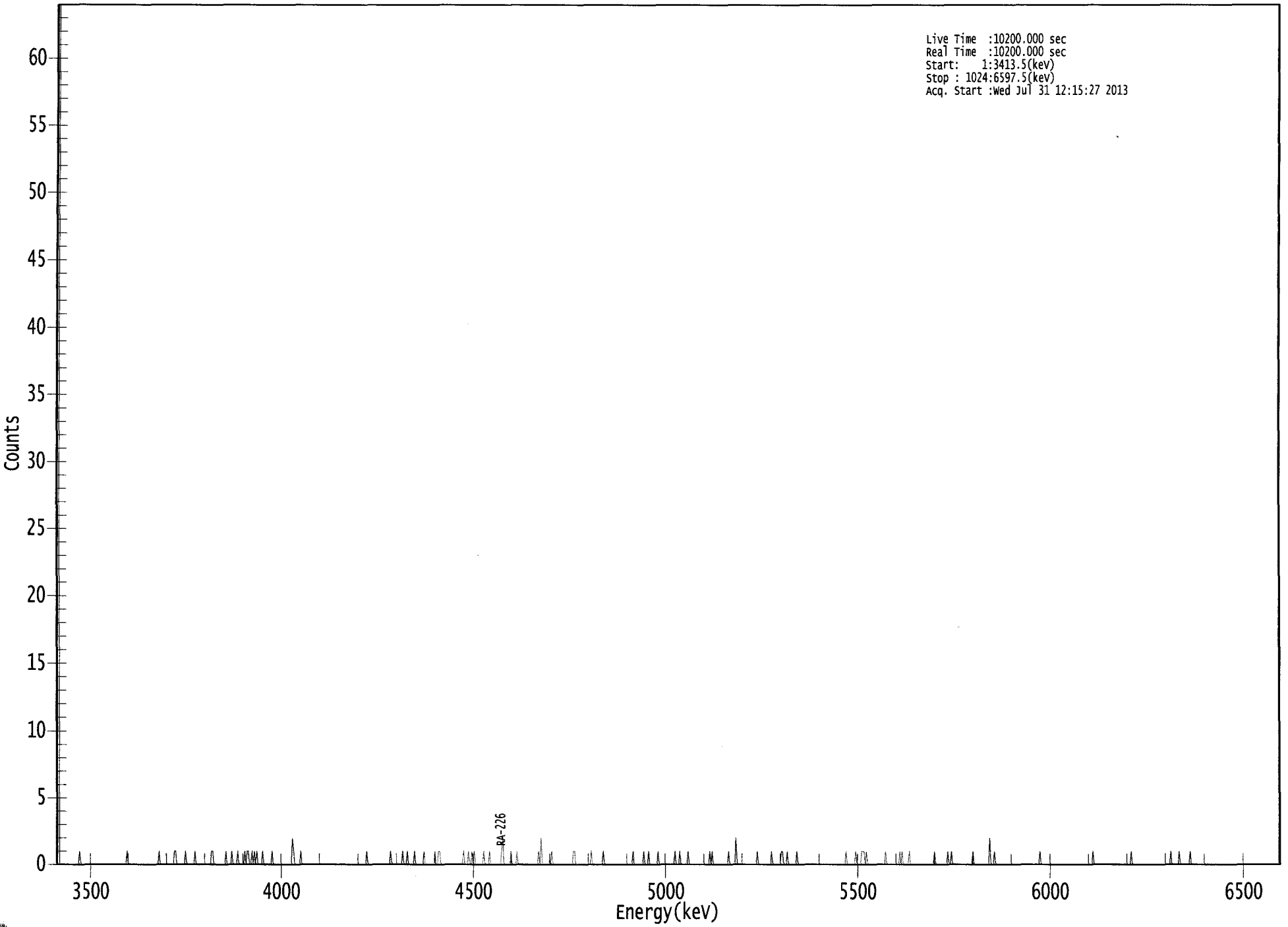
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.975	5685.50*	2.14E-001 +/- 2.18E-001	3.27E-001 +/- 1.18E-002
RA-226	0.944	4785.00*	6.60E-001 +/- 2.99E-001	2.29E-001 +/- 8.25E-003

AG
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US EPA ARCHIVE DOCUMENT

000064625.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 12:15:27 2013



ROI Type: 1

0345

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

369: 0 0 0 0 0 1 2 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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

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Apex-Alpha™

Sample Description: PZ-106-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 11
 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: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:28 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9394 +/- 0.0000
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM
 Effective Efficiency: 0.1332 +/- 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	5.505	3.32	119.77	0.68	0.00E+000	3.1
RA-226	4.625	16.45	52.52	2.55	0.00E+000	3.1

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

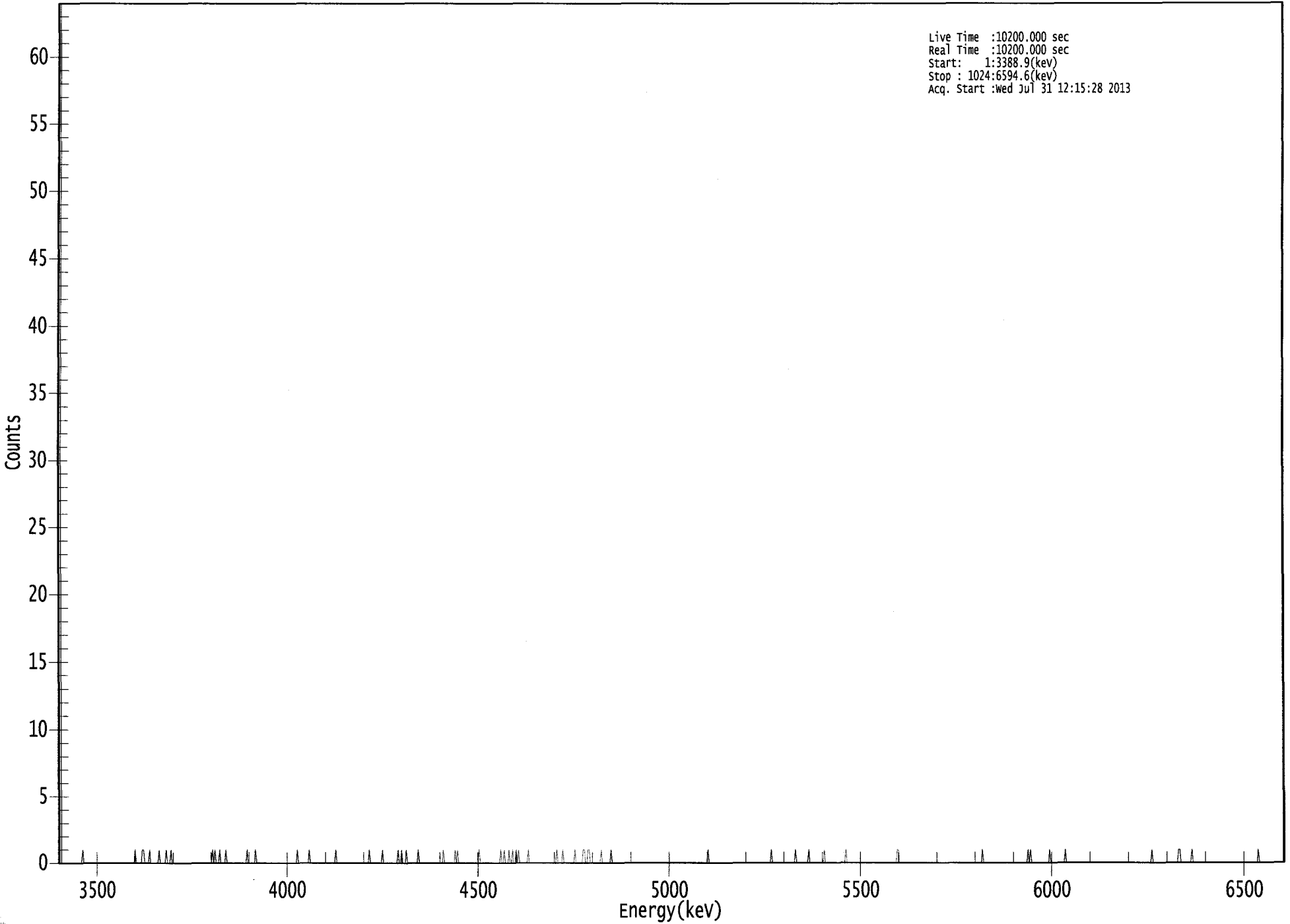
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	1.71E-001 +/- 2.04E-001	2.90E-001 +/- 1.38E-002
RA-226	0.967	4785.00*	7.98E-001 +/- 4.21E-001	4.07E-001 +/- 1.93E-002

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US EPA ARCHIVE DOCUMENT

0000064626.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3388.9(kev)
Stop : 1024:6594.6(kev)
Acq. Start :Wed Jul 31 12:15:28 2013



ROI Type: 1

0000064626

 ***** 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	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:	1	0	0	0	0	0	1	1
73:	0	0	0	0	1	0	0	0
81:	0	0	0	0	1	0	0	0
89:	0	0	1	0	0	0	1	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	1	0	1	0	0	0	1
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	1	0
161:	0	0	0	0	0	1	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	0	0	1	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	1	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	1	0	0	1
289:	0	0	0	1	0	0	0	0
297:	0	0	0	0	0	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	0	0	1	0	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 1 0 0 1 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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

103
7/31/13

Apex-Alpha™

Sample Description: S-84 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 12
 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: 3.250E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:58 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8122 +/- 0.0000
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Effective Efficiency: 0.1501 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.535	14.64	53.94	1.36	0.00E+000	4.5
RA-226	4.574	22.66	41.53	0.34	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

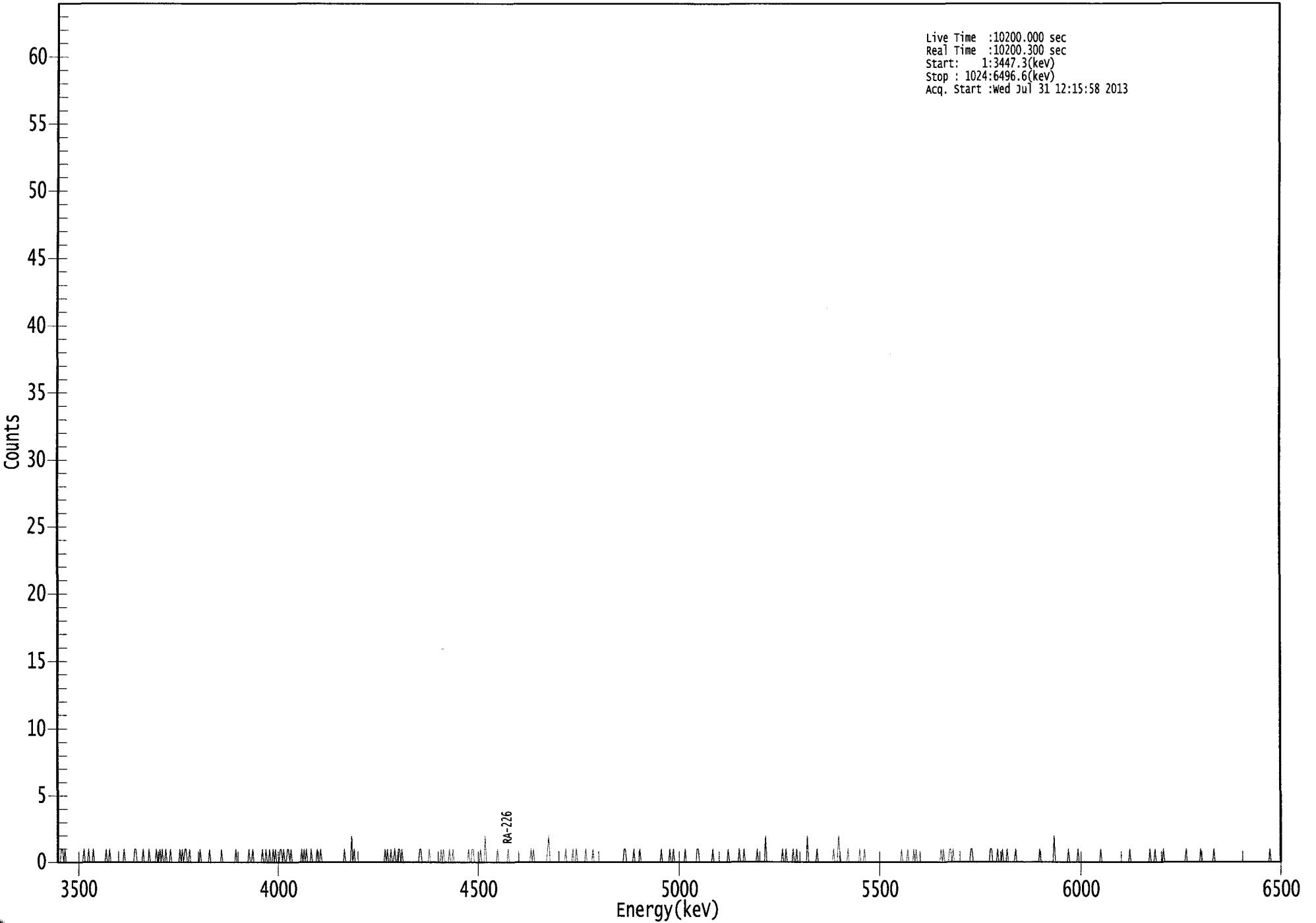
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	8.89E-001 +/- 4.81E-001	4.16E-001 +/- 1.43E-002
RA-226	0.944	4785.00*	1.30E+000 +/- 5.42E-001	2.74E-001 +/- 9.43E-003

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US EPA ARCHIVE DOCUMENT

0000064636.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3447.3(keV)
Stop : 1024:6496.6(keV)
Acq. Start :wed Jul 31 12:15:58 2013



ROI Type: 1

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 0 0 0 0 0 0

Sample Title: 12

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

801: 0 0 1 0 0 0 0 0

Sample Title: 12

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

WBS
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Apex-Alpha™

Sample Description: S-84 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 13
 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: 2.770E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:16:00 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Effective Efficiency: 0.1856 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.538	3.15	126.67	0.85	0.00E+000	3.0
RA-226	4.588	16.83	48.06	0.17	0.00E+000	5.9

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

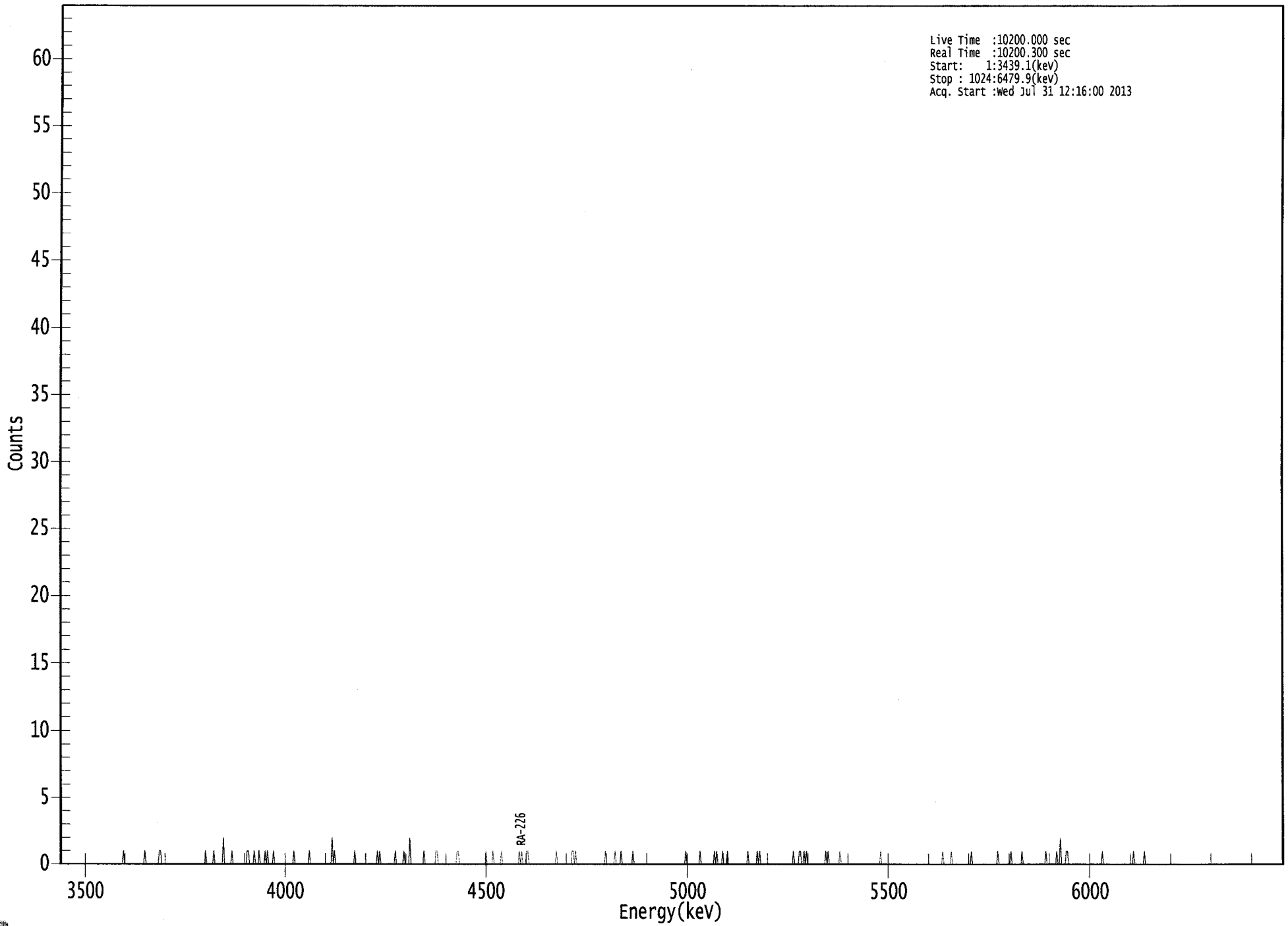
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.972	5685.50*	1.32E-001 +/- 1.67E-001	2.51E-001 +/- 8.58E-003
RA-226	0.951	4785.00*	6.66E-001 +/- 3.21E-001	1.65E-001 +/- 5.63E-003

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US EPA ARCHIVE DOCUMENT

0000064631.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :wed Jul 31 12:16:00 2013



ROI Type: 1

0350

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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	1	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	1	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	1	0	0	0	0	0
129:	0	1	0	0	0	0	0	0
137:	0	2	0	0	0	0	0	0
145:	1	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	1	0
161:	0	0	0	1	0	0	0	1
169:	0	0	0	0	1	0	1	0
177:	0	0	0	1	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	1	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	2	0	1	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	1
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	1	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	1	0	0	0	0	0	0
289:	1	0	0	0	0	2	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	0	0	0	0
313:	0	0	0	1	1	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	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	1	0	0
361:	0	0	0	1	0	0	0	0

369: 0 0 1 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 1 0 0

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	1	0	0	0	0	0	0
833:	0	0	1	0	0	2	0	0
841:	0	0	1	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:	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	1	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	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Apex-Alpha™

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Sample Description: PZ-106-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 14
 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: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:53 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9883 +/- 0.0000
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Effective Efficiency: 0.1804 +/- 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	5.523	14.81	53.27	1.19	0.00E+000	2.9
RA-226	4.586	92.32	20.49	0.68	0.00E+000	3.4

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	5.62E-001 +/- 3.00E-001	2.50E-001 +/- 8.58E-003
RA-226	0.949	4785.00*	3.31E+000 +/- 6.87E-001	2.02E-001 +/- 6.92E-003

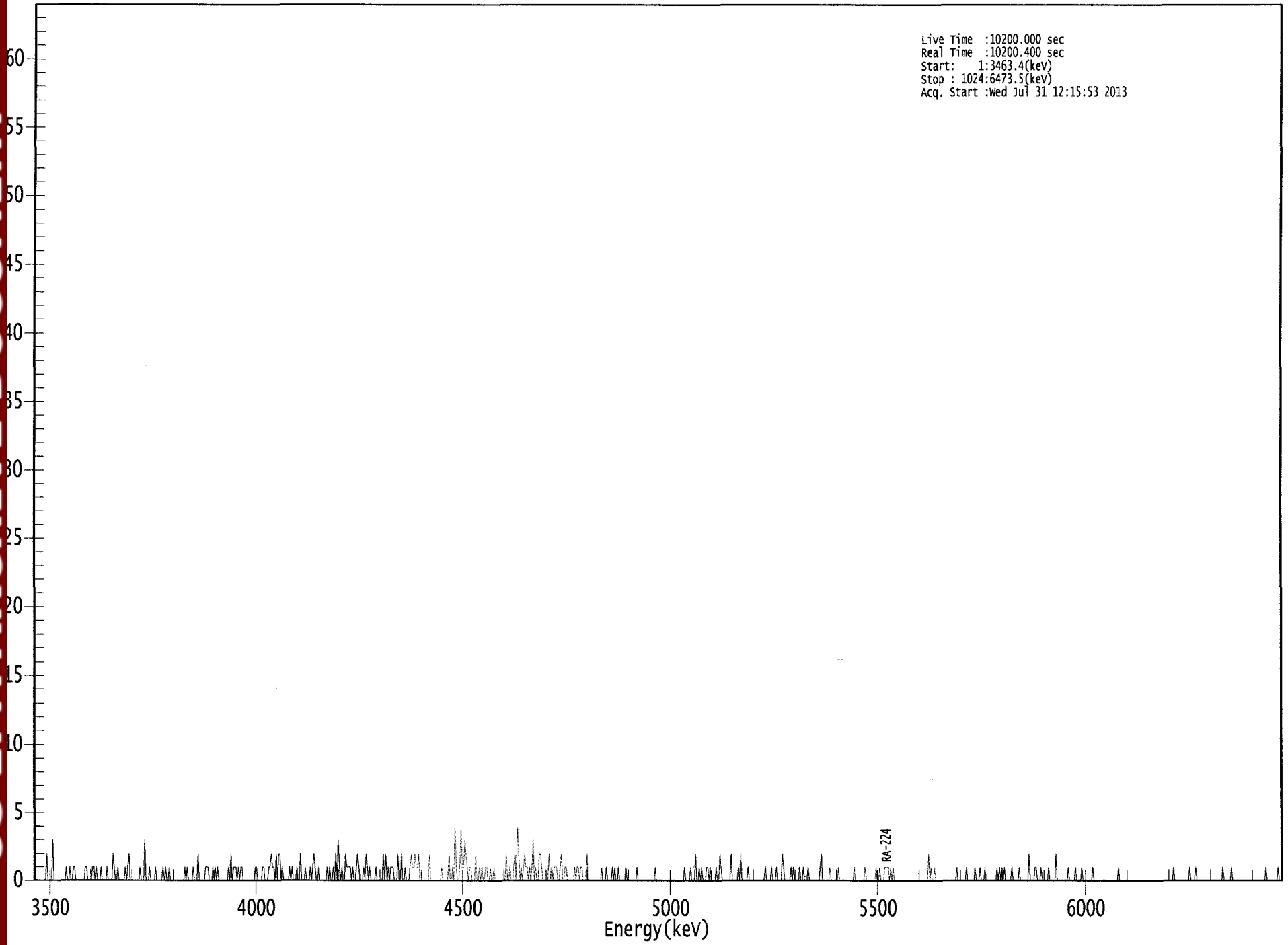
AG
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US EPA ARCHIVE DOCUMENT

0000064635.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :wed Jul 31 12:15:53 2013

US EPA ARCHIVE DOCUMENT



ROI Type: 1

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

Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 1 1 0 0 1

Sample Title: 14

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

801: 0 0 1 0 0 0 0 0 0

Sample Title: 14

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

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Apex-Alpha™

Sample Description: PZ-106-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 15
 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: 2.440E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:54 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9693 +/- 0.0000
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Effective Efficiency: 0.1851 +/- 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	5.518	28.15	37.59	0.85	0.00E+000	3.0
RA-226	4.596	101.66	19.48	0.34	0.00E+000	5.4

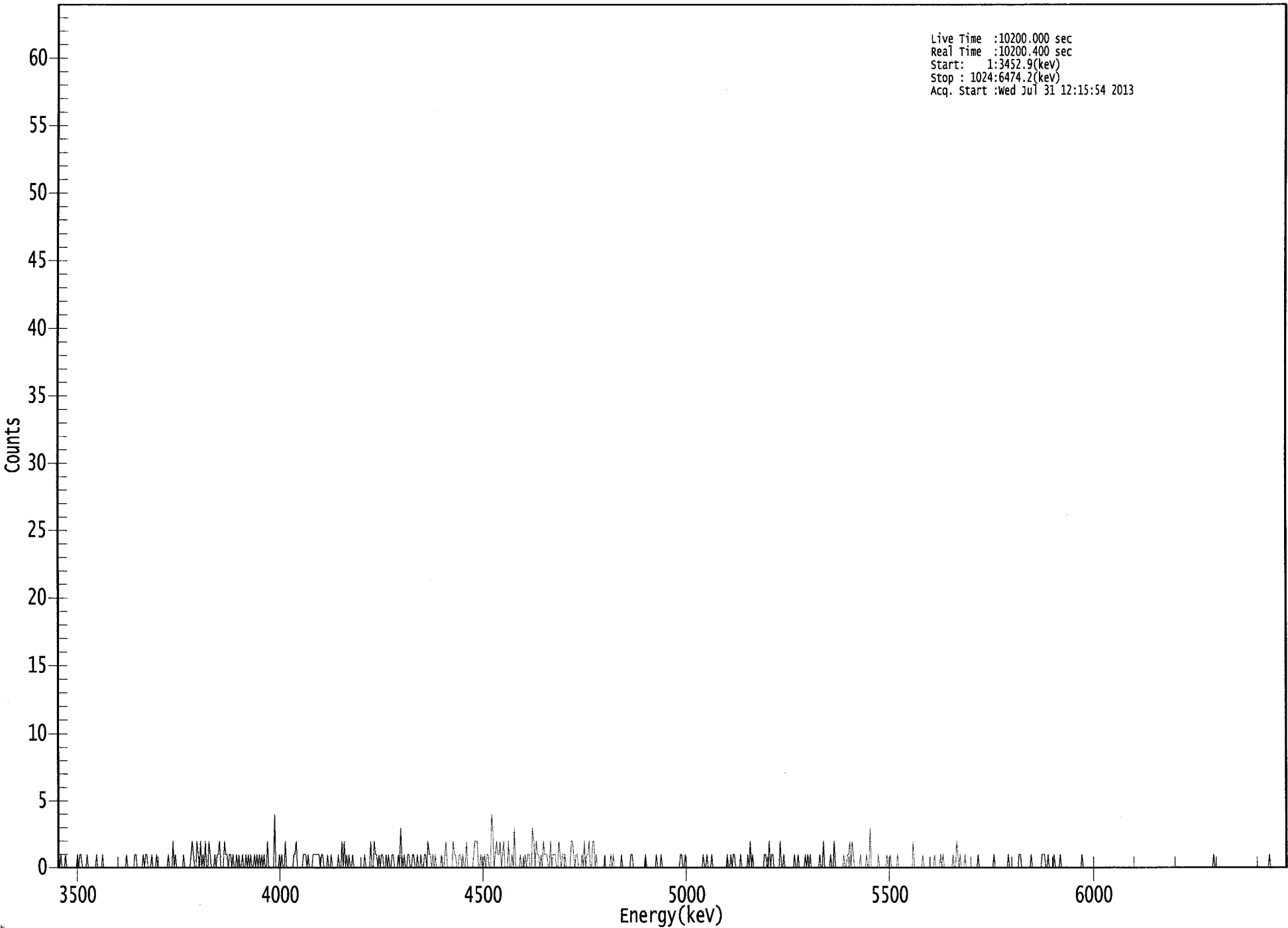
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	1.04E+000 +/- 3.93E-001	2.21E-001 +/- 7.56E-003
RA-226	0.954	4785.00*	3.55E+000 +/- 7.02E-001	1.67E-001 +/- 5.69E-003

AG
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000064637.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3452.9(keV)
Stop : 1024:6474.2(keV)
Acq. Start :Wed Jul 31 12:15:54 2013



ROI Type: 1

0370

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

369: 1 2 0 1 2 0 0 0

Sample Title: 15

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

801: 0 1 1 0 0 0 0 0

Sample Title: 15

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

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7/31/13

Apex-Alpha™

Sample Description: PZ-113-AD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 16
 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: 4.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:15:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Effective Efficiency: 0.1722 +/- 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	5.509	9.49	65.59	0.51	0.00E+000	3.0
RA-226	4.597	46.32	29.04	0.68	0.00E+000	3.0

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

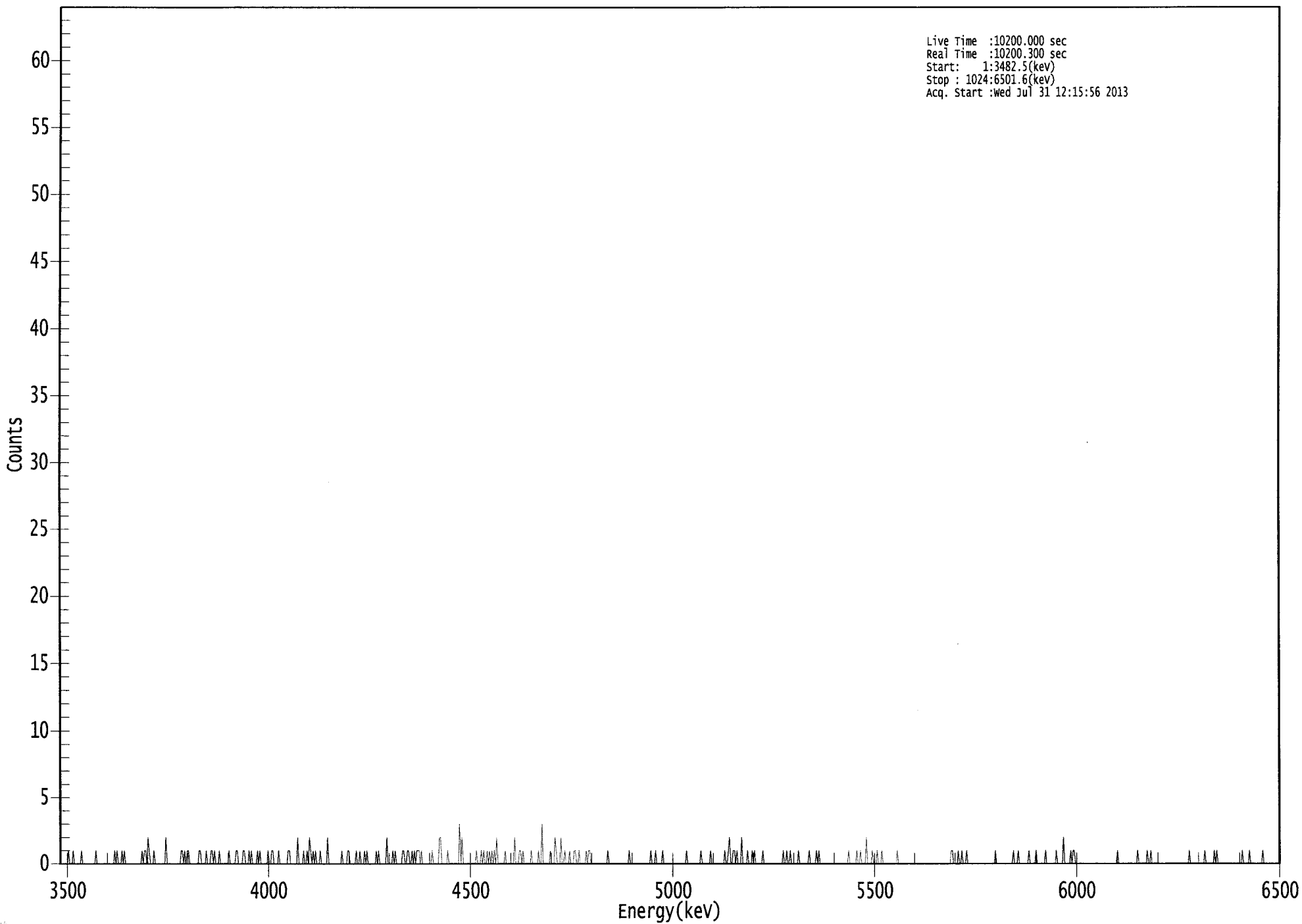
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.960	5685.50*	6.19E-001 +/- 4.06E-001	3.42E-001 +/- 1.18E-002
RA-226	0.955	4785.00*	2.85E+000 +/- 8.34E-001	3.47E-001 +/- 1.19E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064627.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Wed Jul 31 12:15:56 2013



ROI Type: 1

6275

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

369: 0 0 0 0 0 0 1 0

Sample Title: 16

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

801: 1 0 0 0 1 0 0 0

Sample Title: 16

Channel	1	2	3	4	5	6	7	8
809:	0	0	0	0	0	1	0	0
817:	0	0	0	1	0	0	0	0
825:	0	0	0	1	0	0	0	0
833:	0	0	0	0	1	0	0	0
841:	0	0	2	0	0	0	0	0
849:	1	0	1	1	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	1
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	1	0	0	0	0	0	0	0
913:	1	0	0	1	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:	1	0	0	0	0	0	0	0
969:	1	0	1	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	1	0	0
1001:	0	0	0	0	0	0	0	0
1009:	1	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

ICB
7/13/13

Apex-Alpha™

Sample Description: PZ-113-AD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307099A-RA
 Sample Identification: 17
 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: 3.310E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 10:33:15 AM
 Acquisition Date/Time: 7/31/2013 12:16:02 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9303 +/- 0.0000
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Effective Efficiency: 0.1828 +/- 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	5.535	19.98	45.14	1.02	0.00E+000	3.0
RA-226	4.583	53.32	27.04	0.68	0.00E+000	6.0

 NUCLIDE ANALYSIS RESULTS

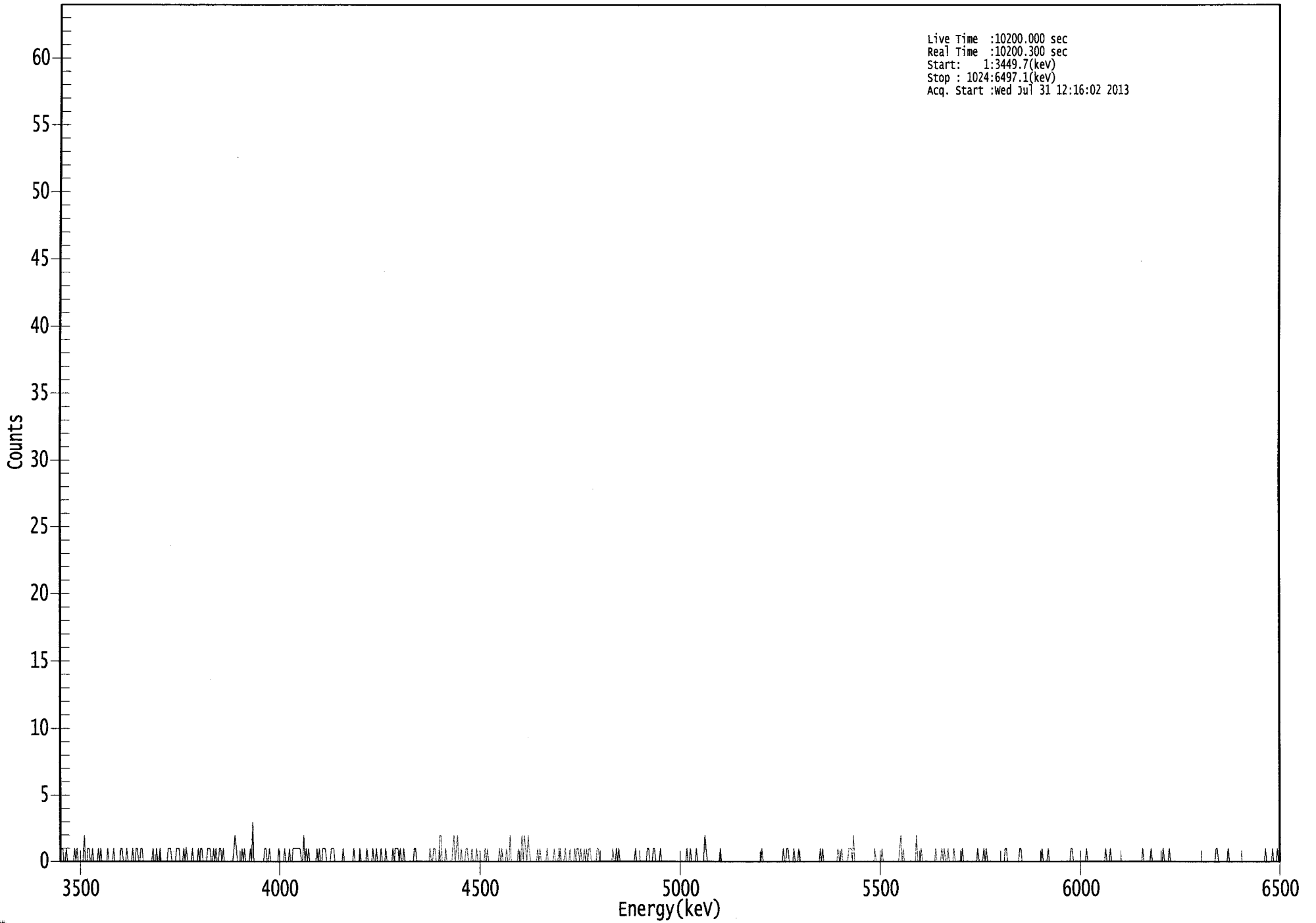
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	1.02E+000 +/- 4.59E-001	3.20E-001 +/- 1.09E-002
RA-226	0.948	4785.00*	2.56E+000 +/- 6.97E-001	2.71E-001 +/- 9.19E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064634.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Wed Jul 31 12:16:02 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	2	3	4	5	6	7	8	9
1:	0	1	1	0	0	1	0	0	
9:	0	0	0	0	1	0	1	0	
17:	0	0	0	0	2	0	0	1	
25:	1	0	0	1	0	0	0	0	
33:	1	0	1	0	0	0	0	0	
41:	1	0	0	0	0	1	0	0	
49:	0	0	0	1	1	0	0	0	
57:	1	0	0	0	0	1	0	0	
65:	1	1	0	0	1	1	0	0	
73:	0	0	0	0	0	0	1	0	
81:	0	1	0	0	1	0	0	0	
89:	0	0	0	1	1	1	0	0	
97:	0	0	1	1	1	0	0	0	
105:	1	0	1	0	0	0	0	1	
113:	0	0	0	0	1	0	1	1	
121:	0	0	0	0	1	1	1	0	
129:	0	1	0	1	0	0	1	1	
137:	0	1	0	0	0	0	0	0	
145:	0	0	1	2	1	0	0	0	
153:	0	1	0	1	0	0	0	0	
161:	1	0	3	0	0	0	0	0	
169:	0	0	0	0	1	1	0	0	
177:	1	0	0	0	0	0	0	0	
185:	1	0	0	0	0	1	0	0	
193:	0	1	0	0	1	1	1	1	
201:	1	1	1	0	0	2	0	1	
209:	0	1	0	0	0	0	0	0	
217:	1	0	1	0	0	1	1	1	
225:	0	0	0	0	1	1	1	0	
233:	0	0	0	0	0	0	1	0	
241:	0	0	0	0	0	0	0	1	
249:	0	0	0	0	1	0	0	0	
257:	0	0	1	0	0	0	0	1	
265:	0	0	1	0	0	0	1	0	
273:	0	0	1	0	0	0	0	0	
281:	1	0	1	1	1	0	1	0	
289:	0	1	0	0	0	0	0	0	
297:	0	0	1	1	0	0	0	0	
305:	0	0	0	0	0	0	0	1	
313:	0	0	1	1	0	0	0	2	
321:	2	0	0	0	1	0	0	0	
329:	0	0	1	2	0	1	2	0	
337:	0	1	0	0	0	1	1	0	
345:	0	0	1	0	0	0	1	0	
353:	0	0	0	0	0	1	0	1	
361:	0	0	0	0	0	0	0	0	

369: 0 1 0 1 0 0 0 1

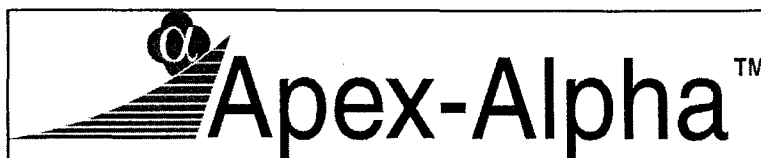
Sample Title: 17

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

801: 0 0 0 0 0 1 1 0

Sample Title: 17

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	1	0	0	0	0	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	1	1	0	0	0	0	0	0
857:	0	0	0	0	0	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	1	0	0
881:	0	1	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	1	0	0	0
913:	0	0	0	1	0	0	0	0
921:	0	0	0	0	0	1	0	0
929:	0	0	1	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	1	1	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	1	0	0	0	0	0
1017:	1	0	0	0	1	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	13-07099	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra228	01	LCS	LCS		07/16/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/16/13 00:00	1.0000E+00
Date Received	7/15/2013	03	DUP	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Lab Deadline	8/6/2013	04	TRG	DUP 01 TOT	40	07/09/13 00:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	DUP 01 DIS	40	07/09/13 00:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-201A-SS TOT	46	07/10/13 10:23	1.0000E+00
Report Level	4	07	TRG	PZ-201A-SS DIS	46	07/10/13 10:23	1.0000E+00
Activity Units	pCi	08	DO	D-85 TOT	43	07/10/13 10:52	1.0000E+00
Aliquot Units	I	09	TRG	D-85 DIS	43	07/10/13 10:52	1.0000E+00
Matrix	WA	10	TRG	PZ-106-SD TOT	45	07/10/13 11:41	1.0000E+00
Method	E904.0	11	TRG	PZ-106-SD DIS	45	07/10/13 11:41	1.0000E+00
Instrument Type	Alpha/Beta GPC	12	TRG	S-84 TOT	41	07/10/13 11:46	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	S-84 DIS	41	07/10/13 11:46	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-106-SS TOT	41	07/10/13 12:43	1.0000E+00
Tracer Act (dpm/g)	992.916	15	TRG	PZ-106-SS DIS	41	07/10/13 12:43	1.0000E+00
Carrier	Yttrium	16	TRG	PZ-113-AD TOT	41	07/10/13 13:02	1.0000E+00
Carrier Conc (mg/ml)	34	17	TRG	PZ-113-AD DIS	41	07/10/13 13:02	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.

2013

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	0.9218	915.3	407.4	98.82	2.000	0.0935	0.1507	0.0572	84.12	83.12	1.00	1.00
02	MBL	0.9101	903.7	424.5	104.29	2.000	0.0941	0.1503	0.0562	82.65	86.19	1.00	1.00
03	DUP	0.9117	905.2	122.4	30.02	2.000	0.0938	0.1477	0.0539	79.26	23.79	1.00	1.00
04	TRG	0.9077	901.3	384.2	94.64	2.000	0.0935	0.1516	0.0581	85.44	80.86	1.00	1.00
05	TRG	0.9072	900.8	363.3	89.54	2.000	0.0934	0.1504	0.0570	83.82	75.05	1.00	1.00
06	TRG	0.9083	901.9	384.1	94.55	2.000	0.0934	0.1518	0.0584	85.88	81.20	1.00	1.00
07	TRG	0.9102	903.8	439.3	107.91	2.000	0.0934	0.1500	0.0566	83.24	89.82	1.00	1.00
08	DO	0.9122	905.7	141.2	34.61	2.000	0.0938	0.1482	0.0544	80.00	27.69	1.00	1.00
09	TRG	0.9073	900.9	331.4	81.67	2.000	0.0935	0.1501	0.0566	83.24	67.98	1.00	1.00
10	TRG	0.9095	903.1	383.3	94.23	2.000	0.0934	0.1472	0.0538	79.12	74.55	1.00	1.00
11	TRG	0.9080	901.6	381.5	93.94	2.000	0.0965	0.1505	0.0540	79.41	74.60	1.00	1.00
12	TRG	0.9070	900.6	329.5	81.22	2.000	0.0965	0.1529	0.0564	82.94	67.37	1.00	1.00
13	TRG	0.9052	898.8	423.4	104.58	2.000	0.0961	0.1510	0.0549	80.74	84.43	1.00	1.00
14	TRG	0.9047	898.3	399.9	98.83	2.000	0.0962	0.1522	0.0560	82.35	81.39	1.00	1.00
15	TRG	0.9058	899.4	392.7	96.93	2.000	0.0965	0.1521	0.0556	81.76	79.26	1.00	1.00
16	TRG	0.9045	898.1	565.5	139.79	2.000	0.0957	0.1515	0.0558	82.06	90.26	1.00	1.00
17	TRG	0.9070	900.6	377.4	93.03	2.000	0.0964	0.1540	0.0576	84.71	78.80	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.

0209

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			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
02	MBL			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
03	DUP			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
04	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
05	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
06	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
07	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
08	DO			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
09	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
10	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
11	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
12	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
13	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
14	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
15	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
16	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	TSMITH
17	TRG			07/23/13 07:53	JWOLFE	07/29/13 16:56	LWALKER	08/05/13 04:22	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.

0309

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	9.19E+00	9.24E-01	1.15E+00	8.79E+00	104.48	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	8.96E-01	4.94E-01	9.43E-01					OK	OK
03	RA-228	DUP	D-85 TOT	pCi/l	6.34E+00	2.24E+00	4.10E+00				INV	INV	
04	RA-228	TRG	DUP 01 TOT	pCi/l	2.38E+00	6.00E-01	9.88E-01					OK	
05	RA-228	TRG	DUP 01 DIS	pCi/l	2.23E+00	6.90E-01	1.22E+00					OK	
06	RA-228	TRG	PZ-201A-SS TOT	pCi/l	1.16E+00	6.37E-01	1.23E+00					OK	
07	RA-228	TRG	PZ-201A-SS DIS	pCi/l	7.67E-01	5.06E-01	9.91E-01					OK	
08	RA-228	DO	D-85 TOT	pCi/l	4.91E+00	2.02E+00	3.81E+00					INV	
09	RA-228	TRG	D-85 DIS	pCi/l	4.80E+00	8.90E-01	1.40E+00					OK	
10	RA-228	TRG	PZ-106-SD TOT	pCi/l	1.62E+00	7.88E-01	1.52E+00					OK	
11	RA-228	TRG	PZ-106-SD DIS	pCi/l	1.79E+00	7.61E-01	1.44E+00					OK	
12	RA-228	TRG	S-84 TOT	pCi/l	2.88E+00	7.89E-01	1.36E+00					OK	
13	RA-228	TRG	S-84 DIS	pCi/l	3.35E+00	6.81E-01	1.08E+00					OK	
14	RA-228	TRG	PZ-106-SS TOT	pCi/l	8.50E-01	6.53E-01	1.30E+00					OK	
15	RA-228	TRG	PZ-106-SS DIS	pCi/l	1.08E+00	6.30E-01	1.22E+00					OK	
16	RA-228	TRG	PZ-113-AD TOT	pCi/l	5.11E+00	7.52E-01	1.11E+00					OK	
17	RA-228	TRG	PZ-113-AD DIS	pCi/l	6.09E+00	8.36E-01	1.18E+00					OK	

	Run	1
	Analysis Code	Ra228
Eberline Services Work Order	13-07099	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	07/16/13 00:00	1.00E+00	98.82	84.12	83.12	1.00	7/29/2013 16:56	8/5/2013 4:22
02	RA-228	MBL	07/16/13 00:00	1.00E+00	104.29	82.65	86.19	1.00	7/29/2013 16:56	8/5/2013 4:22
03	RA-228	DUP	07/10/13 10:52	1.00E+00	30.02	79.26	23.79	1.00	7/29/2013 16:56	8/5/2013 4:22
04	RA-228	TRG	07/09/13 00:00	1.00E+00	94.64	85.44	80.86	1.00	7/29/2013 16:56	8/5/2013 4:22
05	RA-228	TRG	07/09/13 00:00	1.00E+00	89.54	83.82	75.05	1.00	7/29/2013 16:56	8/5/2013 4:22
06	RA-228	TRG	07/10/13 10:23	1.00E+00	94.55	85.88	81.20	1.00	7/29/2013 16:56	8/5/2013 4:22
07	RA-228	TRG	07/10/13 10:23	1.00E+00	107.91	83.24	89.82	1.00	7/29/2013 16:56	8/5/2013 4:22
08	RA-228	DO	07/10/13 10:52	1.00E+00	34.61	80.00	27.69	1.00	7/29/2013 16:56	8/5/2013 4:22
09	RA-228	TRG	07/10/13 10:52	1.00E+00	81.67	83.24	67.98	1.00	7/29/2013 16:56	8/5/2013 4:22
10	RA-228	TRG	07/10/13 11:41	1.00E+00	94.23	79.12	74.55	1.00	7/29/2013 16:56	8/5/2013 4:22
11	RA-228	TRG	07/10/13 11:41	1.00E+00	93.94	79.41	74.60	1.00	7/29/2013 16:56	8/5/2013 4:22
12	RA-228	TRG	07/10/13 11:46	1.00E+00	81.22	82.94	67.37	1.00	7/29/2013 16:56	8/5/2013 4:22
13	RA-228	TRG	07/10/13 11:46	1.00E+00	104.58	80.74	84.43	1.00	7/29/2013 16:56	8/5/2013 4:22
14	RA-228	TRG	07/10/13 12:43	1.00E+00	98.83	82.35	81.39	1.00	7/29/2013 16:56	8/5/2013 4:22
15	RA-228	TRG	07/10/13 12:43	1.00E+00	96.93	81.76	79.26	1.00	7/29/2013 16:56	8/5/2013 4:22
16	RA-228	TRG	07/10/13 13:02	1.00E+00	139.79	82.06	90.26	1.00	7/29/2013 16:56	8/5/2013 4:22
17	RA-228	TRG	07/10/13 13:02	1.00E+00	93.03	84.71	78.80	1.00	7/29/2013 16:56	8/5/2013 4:22

Run	1	Analysis Code	Ra228	Eberline Services Work Order	13-07099	Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07099-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	08/05/13 08:01		LB4110R	A1	120	719	1.216666667	0.4776
02	RA-228	MBL	08/05/13 08:01		LB4110R	A2	120	157	0.833333333	0.4699
03	RA-228	DUP	08/05/13 08:01		LB4110R	A3	120	268	1.283333333	0.4809
04	RA-228	TRG	08/05/13 08:01		LB4110R	A4	120	241	0.816666667	0.4732
05	RA-228	TRG	08/05/13 08:01		LB4110R	B1	120	257	1.1	0.4754
06	RA-228	TRG	08/05/13 08:01		LB4110R	B2	120	221	1.266666667	0.4658
07	RA-228	TRG	08/05/13 08:01		LB4110R	B3	120	173	1.016666667	0.4713
08	RA-228	DO	08/05/13 08:01		LB4110R	B4	120	280	1.483333333	0.4773
09	RA-228	TRG	08/05/13 08:01		LB4110R	C1	120	381	1.166666667	0.4705
10	RA-228	TRG	08/05/13 08:01		LB4110R	C2	120	287	1.65	0.4676
11	RA-228	TRG	08/05/13 08:01		LB4110R	C3	120	269	1.433333333	0.4614
12	RA-228	TRG	08/05/13 08:02		LB4110A	C1	120	268	1.05	0.4667
13	RA-228	TRG	08/05/13 08:02		LB4110A	C2	120	323	1	0.4578
14	RA-228	TRG	08/05/13 08:02		LB4110A	C3	120	225	1.45	0.4699
15	RA-228	TRG	08/05/13 08:02		LB4110A	C4	120	207	1.2	0.4692
16	RA-228	TRG	08/05/13 08:02		LB4110A	D2	120	493	1.283333333	0.4682
17	RA-228	TRG	08/05/13 08:02		LB4110A	D4	120	491	1.116666667	0.4741

Run	1
Eberline Services Work Order	13-07099
Client	Engineering Management Support, Inc.

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	07/16/13 00:00	1.0000	0.9218	915.2700	407.4000	98.82	1.00	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9101	903.6529	424.5000	104.29	1.00	1.00
03	DUP	D-85 TOT	07/10/13 10:52	1.0000	0.9117	905.2415	122.4000	30.02	1.00	1.00
04	TRG	DUP 01 TOT	07/09/13 00:00	1.0000	0.9077	901.2699	384.2000	94.64	1.00	1.00
05	TRG	DUP 01 DIS	07/09/13 00:00	1.0000	0.9072	900.7734	363.3000	89.54	1.00	1.00
06	TRG	PZ-201A-SS TOT	07/10/13 10:23	1.0000	0.9083	901.8656	384.1000	94.55	1.00	1.00
07	TRG	PZ-201A-SS DIS	07/10/13 10:23	1.0000	0.9102	903.7521	439.3000	107.91	1.00	1.00
08	DO	D-85 TOT	07/10/13 10:52	1.0000	0.9122	905.7380	141.2000	34.61	1.00	1.00
09	TRG	D-85 DIS	07/10/13 10:52	1.0000	0.9073	900.8727	331.4000	81.67	1.00	1.00
10	TRG	PZ-106-SD TOT	07/10/13 11:41	1.0000	0.9095	903.0571	383.3000	94.23	1.00	1.00
11	TRG	PZ-106-SD DIS	07/10/13 11:41	1.0000	0.9080	901.5677	381.5000	93.94	1.00	1.00
12	TRG	S-84 TOT	07/10/13 11:46	1.0000	0.9070	900.5748	329.5000	81.22	1.00	1.00
13	TRG	S-84 DIS	07/10/13 11:46	1.0000	0.9052	898.7876	423.4000	104.58	1.00	1.00
14	TRG	PZ-106-SS TOT	07/10/13 12:43	1.0000	0.9047	898.2911	399.9000	98.83	1.00	1.00
15	TRG	PZ-106-SS DIS	07/10/13 12:43	1.0000	0.9058	899.3833	392.7000	96.93	1.00	1.00
16	TRG	PZ-113-AD TOT	07/10/13 13:02	1.0000	0.9045	898.0925	565.5000	139.79	1.00	1.00
17	TRG	PZ-113-AD DIS	07/10/13 13:02	1.0000	0.9070	900.5748	377.4000	93.03	1.00	1.00

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07099	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 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	D-85 TOT	DUP						1.0000E+00	1.0000E+00				
04	DUP 01 TOT	TRG						1.0000E+00	1.0000E+00				
05	DUP 01 DIS	TRG						1.0000E+00	1.0000E+00				
06	PZ-201A-SS TOT	TRG						1.0000E+00	1.0000E+00				
07	PZ-201A-SS DIS	TRG						1.0000E+00	1.0000E+00				
08	D-85 TOT	DO						1.0000E+00	1.0000E+00				
09	D-85 DIS	TRG						1.0000E+00	1.0000E+00				
10	PZ-106-SD TOT	TRG						1.0000E+00	1.0000E+00				
11	PZ-106-SD DIS	TRG						1.0000E+00	1.0000E+00				
12	S-84 TOT	TRG						1.0000E+00	1.0000E+00				
13	S-84 DIS	TRG						1.0000E+00	1.0000E+00				
14	PZ-106-SS TOT	TRG						1.0000E+00	1.0000E+00				
15	PZ-106-SS DIS	TRG						1.0000E+00	1.0000E+00				
16	PZ-113-AD TOT	TRG						1.0000E+00	1.0000E+00				
17	PZ-113-AD DIS	TRG						1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7/23/13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07099	1	Ra228	Yttrium	34.0000	TSMITH

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	2.0000	0.0935	0.1507	0.0572	84.12
02	BLANK	MBL	2.0000	0.0941	0.1503	0.0562	82.65
03	DUP	DUP	2.0000	0.0938	0.1477	0.0539	79.26
04	DUP 01 TOT	TRG	2.0000	0.0935	0.1516	0.0581	85.44
05	DUP 01 DIS	TRG	2.0000	0.0934	0.1504	0.0570	83.82
06	PZ-201A-SS TOT	TRG	2.0000	0.0934	0.1518	0.0584	85.88
07	PZ-201A-SS DIS	TRG	2.0000	0.0934	0.1500	0.0566	83.24
08	D-85 TOT	DO	2.0000	0.0938	0.1482	0.0544	80.00
09	D-85 DIS	TRG	2.0000	0.0935	0.1501	0.0566	83.24
10	PZ-106-SD TOT	TRG	2.0000	0.0934	0.1472	0.0538	79.12
11	PZ-106-SD DIS	TRG	2.0000	0.0965	0.1505	0.0540	79.41
12	S-84 TOT	TRG	2.0000	0.0965	0.1529	0.0564	82.94
13	S-84 DIS	TRG	2.0000	0.0961	0.1510	0.0549	80.74
14	PZ-106-SS TOT	TRG	2.0000	0.0962	0.1522	0.0560	82.35
15	PZ-106-SS DIS	TRG	2.0000	0.0965	0.1521	0.0556	81.76
16	PZ-113-AD TOT	TRG	2.0000	0.0957	0.1515	0.0558	82.06
17	PZ-113-AD DIS	TRG	2.0000	0.0964	0.1540	0.0576	84.71

Technician: *T Smith*

Date: 8, 5, 13

5597

8/17/17
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Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307099-09	43	381	120	1400	8/5/13 10:01
C2	1307099-10	14	287	120	1400	8/5/13 10:01
C3	1307099-11	20	269	120	1400	8/5/13 10:01
A1	1307099-01	21	719	120	1400	8/5/13 10:01
A2	1307099-02	14	157	120	1400	8/5/13 10:01
A3	1307099-03	20	268	120	1400	8/5/13 10:01
A4	1307099-04	12	241	120	1400	8/5/13 10:01
B1	1307099-05	8	257	120	1400	8/5/13 10:01
B2	1307099-06	19	221	120	1400	8/5/13 10:01
B3	1307099-07	17	173	120	1400	8/5/13 10:01
B4	1307099-08	11	280	120	1400	8/5/13 10:01

81547
A

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307099-12	19	268	120	1400	8/5/13 10:02
C2	1307099-13	42	323	120	1400	8/5/13 10:02
C3	1307099-14	20	225	120	1400	8/5/13 10:02
C4	1307099-15	18	207	120	1400	8/5/13 10:02
D2	1307099-16	11	493	120	1400	8/5/13 10:02
D4	1307099-17	19	491	120	1400	8/5/13 10:02

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GPC Detector Report
(ALL Backgrounds)

C
8/15/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/5/2013	3.33E-02	P	-2.14E+01	2.83E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/5/2013	6.67E-02	P	-1.81E+01	2.54E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/5/2013	0.00E+00	P	-1.77E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	8/5/2013	3.33E-02	P	-1.87E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/5/2013	1.67E-02	P	-9.70E-02	7.51E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/5/2013	0.00E+00	P	-7.81E-02	7.23E-02	2.23E-01
LB4110A - B3	Alpha	11/18/2007	8/5/2013	0.00E+00	P	-6.31E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/5/2013	8.33E-02	P	-1.40E-01	7.88E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	8/5/2013	1.67E-02	P	-1.49E-01	8.87E-02	3.27E-01
LB4110A - C2	Alpha	11/18/2007	8/5/2013	3.33E-02	P	-1.77E-01	8.68E-02	3.51E-01
LB4110A - C3	Alpha	11/18/2007	8/5/2013	3.33E-02	P	-1.72E-01	1.00E-01	3.73E-01
LB4110A - C4	Alpha	11/18/2007	8/5/2013	3.33E-02	P	-6.28E-02	6.83E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/5/2013	1.00E-01	P	-5.35E-02	8.34E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/5/2013	8.33E-02	P	-7.00E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/5/2013	1.67E-02	P	-4.85E-02	7.08E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/5/2013	8.33E-02	P	-5.72E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/5/2013	1.33E-01	P	-9.82E-02	1.01E-01	3.01E-01
LB4110R - A2	Alpha	11/24/2006	8/5/2013	6.67E-02	P	-8.92E-02	7.65E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-7.34E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-5.26E-02	7.09E-02	1.95E-01
LB4110R - B1	Alpha	11/24/2006	8/5/2013	1.67E-02	P	-9.43E-02	6.15E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	8/5/2013	1.17E-01	P	-6.94E-02	6.34E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-6.48E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-6.40E-02	7.02E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/5/2013	1.67E-02	P	-7.69E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-7.56E-02	7.10E-02	2.18E-01
LB4110R - C3	Alpha	11/24/2006	8/5/2013	6.67E-02	P	-8.79E-02	8.45E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	8/5/2013	5.00E-02	P	-6.19E-02	8.12E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/5/2013	0.00E+00	P	-1.02E-01	7.04E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/5/2013	0.00E+00	P	-7.75E-02	6.98E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/5/2013	0.00E+00	P	-8.25E-02	6.96E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/5/2013	0.00E+00	P	-7.48E-02	7.44E-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

0499

8/15/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/5/2013	7.47E+00	P	-2.90E+02	7.63E+00	3.05E+02
LB4110A - A2	Beta	11/18/2007	8/5/2013	4.30E+00	P	-3.04E+01	2.59E+00	3.56E+01
LB4110A - A3	Beta	11/18/2007	8/5/2013	1.38E+00	P	-5.02E+01	2.63E+00	5.55E+01
LB4110A - A4	Beta	11/18/2007	8/5/2013	7.72E+00	P	-3.25E+01	3.20E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	8/5/2013	1.60E+00	P	-1.04E+01	3.23E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	8/5/2013	1.05E+00	P	-7.64E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/5/2013	1.23E+00	P	1.14E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/5/2013	1.08E+00	P	-7.63E+00	1.98E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/5/2013	1.05E+00	P	-5.39E+00	2.12E+00	9.64E+00
LB4110A - C2	Beta	11/18/2007	8/5/2013	1.00E+00	P	3.82E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/5/2013	1.45E+00	P	4.72E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/5/2013	1.20E+00	P	-1.76E+00	2.10E+00	5.96E+00
LB4110A - D1	Beta	11/18/2007	8/5/2013	2.00E+00	P	-2.31E+00	2.57E+00	7.44E+00
LB4110A - D2	Beta	11/18/2007	8/5/2013	1.28E+00	P	-6.44E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/5/2013	4.32E+00	P	1.28E+00	4.48E+00	7.67E+00
LB4110A - D4	Beta	11/18/2007	8/5/2013	1.12E+00	P	-4.26E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/5/2013	1.22E+00	P	-6.09E+01	3.67E+00	6.83E+01
LB4110R - A2	Beta	11/24/2006	8/5/2013	8.33E-01	P	-4.84E+01	2.01E+00	5.24E+01
LB4110R - A3	Beta	11/24/2006	8/5/2013	1.28E+00	P	-4.48E+01	2.74E+00	5.03E+01
LB4110R - A4	Beta	11/24/2006	8/5/2013	8.17E-01	P	-4.47E+01	1.99E+00	4.86E+01
LB4110R - B1	Beta	11/24/2006	8/5/2013	1.10E+00	P	-4.70E+01	2.02E+00	5.11E+01
LB4110R - B2	Beta	11/24/2006	8/5/2013	1.27E+00	P	-4.70E+01	2.05E+00	5.11E+01
LB4110R - B3	Beta	11/24/2006	8/5/2013	1.02E+00	P	-4.68E+01	2.65E+00	5.21E+01
LB4110R - B4	Beta	11/24/2006	8/5/2013	1.48E+00	P	-4.71E+01	1.92E+00	5.10E+01
LB4110R - C1	Beta	11/24/2006	8/5/2013	1.17E+00	P	-4.69E+01	2.97E+00	5.28E+01
LB4110R - C2	Beta	11/24/2006	8/5/2013	1.65E+00	P	-4.69E+01	2.71E+00	5.23E+01
LB4110R - C3	Beta	11/24/2006	8/5/2013	1.43E+00	P	-4.73E+01	2.52E+00	5.24E+01
LB4110R - C4	Beta	11/24/2006	8/5/2013	4.23E+00	P	-5.34E+01	2.95E+00	5.93E+01
LB4110R - D1	Beta	11/24/2006	8/5/2013	0.00E+00	P	-4.45E+01	5.57E+00	5.56E+01
LB4110R - D2	Beta	11/24/2006	8/5/2013	0.00E+00	P	-4.78E+01	1.88E+00	5.16E+01
LB4110R - D3	Beta	11/24/2006	8/5/2013	0.00E+00	P	-5.12E+01	5.55E+00	6.23E+01
LB4110R - D4	Beta	11/24/2006	8/5/2013	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

0401

GPC Detector Report
(ALL Efficiencies)

81517

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/5/2013	0.2400	P	-0.0134	0.2158	0.4450
LB4110A - A2	Alpha	11/18/2007	8/5/2013	0.2010	P	-0.0509	0.1740	0.3989
LB4110A - A3	Alpha	11/18/2007	8/5/2013	0.2000	P	-0.0742	0.1632	0.4006
LB4110A - A4	Alpha	11/18/2007	8/5/2013	0.2155	P	-0.0527	0.1819	0.4165
LB4110A - B1	Alpha	11/18/2007	8/5/2013	0.2069	P	0.1943	0.2244	0.2544
LB4110A - B2	Alpha	11/18/2007	8/5/2013	0.2142	P	0.1924	0.2213	0.2503
LB4110A - B3	Alpha	11/18/2007	8/5/2013	0.2376	P	0.1277	0.2323	0.3369
LB4110A - B4	Alpha	11/18/2007	8/5/2013	0.2343	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/5/2013	0.2194	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	8/5/2013	0.2230	P	0.1971	0.2252	0.2533
LB4110A - C3	Alpha	11/18/2007	8/5/2013	0.2558	P	0.2233	0.2494	0.2756
LB4110A - C4	Alpha	11/18/2007	8/5/2013	0.2213	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	8/5/2013	0.2204	P	0.2030	0.2329	0.2628
LB4110A - D2	Alpha	11/18/2007	8/5/2013	0.2470	P	0.2277	0.2581	0.2885
LB4110A - D3	Alpha	11/18/2007	8/5/2013	0.2595	P	0.2310	0.2635	0.2959
LB4110A - D4	Alpha	11/18/2007	8/5/2013	0.1870	P	0.1643	0.1993	0.2342
LB4110R - A1	Alpha	11/24/2006	8/5/2013	0.2347	P	0.2005	0.2387	0.2768
LB4110R - A2	Alpha	11/24/2006	8/5/2013	0.2068	P	0.1868	0.2202	0.2537
LB4110R - A3	Alpha	11/24/2006	8/5/2013	0.2124	P	0.1929	0.2244	0.2560
LB4110R - A4	Alpha	11/24/2006	8/5/2013	0.2423	P	0.2125	0.2455	0.2784
LB4110R - B1	Alpha	11/24/2006	8/5/2013	0.2211	P	0.1831	0.2257	0.2682
LB4110R - B2	Alpha	11/24/2006	8/5/2013	0.2031	P	0.1754	0.2170	0.2586
LB4110R - B3	Alpha	11/24/2006	8/5/2013	0.2470	P	0.2015	0.2438	0.2862
LB4110R - B4	Alpha	11/24/2006	8/5/2013	0.2188	P	0.1883	0.2313	0.2743
LB4110R - C1	Alpha	11/24/2006	8/5/2013	0.2128	P	0.1833	0.2150	0.2467
LB4110R - C2	Alpha	11/24/2006	8/5/2013	0.2166	P	0.1932	0.2245	0.2559
LB4110R - C3	Alpha	11/24/2006	8/5/2013	0.2338	P	0.2034	0.2394	0.2755
LB4110R - C4	Alpha	11/24/2006	8/5/2013	0.2064	P	0.1826	0.2222	0.2619
LB4110R - D1	Alpha	11/24/2006	8/5/2013	0.0000	F	0.0066	0.2000	0.3933
LB4110R - D2	Alpha	11/24/2006	8/5/2013	0.0000	F	0.0082	0.2274	0.4466
LB4110R - D3	Alpha	11/24/2006	8/5/2013	0.0000	F	0.0081	0.2234	0.4387
LB4110R - D4	Alpha	11/24/2006	8/5/2013	0.0000	F	0.0051	0.1800	0.3550
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

0002

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/5/2013	0.5556	P	0.2104	0.5625	0.9146
LB4110A - A2	Beta	11/18/2007	8/5/2013	0.4848	P	0.1613	0.4647	0.7681
LB4110A - A3	Beta	11/18/2007	8/5/2013	0.4545	P	0.0893	0.4572	0.8251
LB4110A - A4	Beta	11/18/2007	8/5/2013	0.5190	P	0.1420	0.4891	0.8362
LB4110A - B1	Beta	11/18/2007	8/5/2013	0.4995	P	0.4635	0.5298	0.5962
LB4110A - B2	Beta	11/18/2007	8/5/2013	0.5154	P	0.4632	0.5269	0.5906
LB4110A - B3	Beta	11/18/2007	8/5/2013	0.5386	P	0.3164	0.5314	0.7464
LB4110A - B4	Beta	11/18/2007	8/5/2013	0.5393	P	0.4919	0.5539	0.6160
LB4110A - C1	Beta	11/18/2007	8/5/2013	0.5102	P	0.4510	0.5026	0.5543
LB4110A - C2	Beta	11/18/2007	8/5/2013	0.4985	P	0.4291	0.5010	0.5729
LB4110A - C3	Beta	11/18/2007	8/5/2013	0.6061	P	0.5289	0.5906	0.6523
LB4110A - C4	Beta	11/18/2007	8/5/2013	0.5238	P	0.4577	0.5248	0.5919
LB4110A - D1	Beta	11/18/2007	8/5/2013	0.5190	P	0.4786	0.5531	0.6276
LB4110A - D2	Beta	11/18/2007	8/5/2013	0.5421	P	0.4889	0.5873	0.6856
LB4110A - D3	Beta	11/18/2007	8/5/2013	0.6051	P	0.5374	0.6150	0.6926
LB4110A - D4	Beta	11/18/2007	8/5/2013	0.4319	P	0.3848	0.4720	0.5593
LB4110R - A1	Beta	11/24/2006	8/5/2013	0.5559	P	0.4754	0.5674	0.6594
LB4110R - A2	Beta	11/24/2006	8/5/2013	0.5005	P	0.4166	0.5087	0.6008
LB4110R - A3	Beta	11/24/2006	8/5/2013	0.5033	P	0.4506	0.5386	0.6265
LB4110R - A4	Beta	11/24/2006	8/5/2013	0.5859	P	0.5034	0.5915	0.6797
LB4110R - B1	Beta	11/24/2006	8/5/2013	0.5314	P	0.4462	0.5422	0.6382
LB4110R - B2	Beta	11/24/2006	8/5/2013	0.5016	P	0.4245	0.5196	0.6146
LB4110R - B3	Beta	11/24/2006	8/5/2013	0.6085	P	0.4937	0.5916	0.6896
LB4110R - B4	Beta	11/24/2006	8/5/2013	0.5251	P	0.4540	0.5490	0.6439
LB4110R - C1	Beta	11/24/2006	8/5/2013	0.4671	P	0.4161	0.5017	0.5872
LB4110R - C2	Beta	11/24/2006	8/5/2013	0.5128	P	0.4440	0.5284	0.6128
LB4110R - C3	Beta	11/24/2006	8/5/2013	0.5628	P	0.4753	0.5706	0.6658
LB4110R - C4	Beta	11/24/2006	8/5/2013	0.4915	P	0.4258	0.5250	0.6242
LB4110R - D1	Beta	11/24/2006	8/5/2013	0.0000	F	0.0150	0.4782	0.9414
LB4110R - D2	Beta	11/24/2006	8/5/2013	0.0000	F	0.0175	0.5374	1.0572
LB4110R - D3	Beta	11/24/2006	8/5/2013	0.0000	F	0.0169	0.5219	1.0268
LB4110R - D4	Beta	11/24/2006	8/5/2013	0.0000	F	0.0110	0.4296	0.8482
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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81511

SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

7/30/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709901_GE5_BAFIL_193996.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : SPIKE
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 07:21:51
 Sample ID : 1307099-01 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 00:15:01.19 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	21.04	65	49	0.33	207.29	198	18	7.17E-02	28.4	
2	3	28.58	37	33	0.72	279.62	274	47	4.13E-02	27.3	4.76E+00
3	3	29.24	28	47	0.54	286.00	274	47	3.06E-02	54.2	
4	3	31.02	2010	39	0.73	303.04	274	47	2.23E+00	2.4	
5	3	35.08	455	23	0.75	341.97	332	26	5.06E-01	5.5	2.02E+00
6	3	36.11	54	23	0.57	351.90	332	26	6.03E-02	25.4	
7	0	40.92	16	0	0.87	398.06	391	15	1.78E-02	25.0	
8	0	53.19	52	39	1.79	515.76	502	27	5.76E-02	36.8	
9	0	61.71	300	28	0.86	597.49	584	31	3.34E-01	7.2	
10	0	65.98	126	52	0.64	638.46	624	31	1.40E-01	16.7	
11	2	79.55	33	22	0.72	768.71	760	31	3.62E-02	32.0	9.68E-01
12	2	80.92	807	12	0.66	781.87	760	31	8.97E-01	3.6	
13	0	111.68	223	45	0.79	1076.99	1064	28	2.48E-01	9.9	
14	0	115.96	50	46	0.39	1118.10	1108	25	5.50E-02	35.2	
15	0	160.35	21	25	0.64	1544.06	1533	18	2.37E-02	47.3	
16	0	275.44	39	9	0.79	2648.40	2634	24	4.39E-02	21.9	
17	0	301.96	119	5	0.77	2902.89	2887	27	1.32E-01	9.9	
18	0	306.42	17	9	1.41	2945.75	2931	23	1.91E-02	40.0	
19	8	332.01	31	0	1.18	3191.25	3184	26	3.46E-02	18.7	1.88E+00
20	8	332.40	11	2	1.10	3195.00	3184	26	1.24E-02	78.5	
21	8	333.02	39	2	0.47	3200.95	3184	26	4.32E-02	19.9	
22	0	354.93	420	15	0.80	3411.22	3395	29	4.66E-01	5.2	
23	1	382.53	151	7	1.16	3676.00	3660	28	1.68E-01	7.6	4.16E+00
24	1	383.15	12	6	1.16	3682.00	3660	28	1.31E-02	80.7	
25	5	385.14	36	12	1.18	3701.11	3692	29	4.04E-02	33.0	2.79E+00
26	5	385.86	74	16	1.16	3708.00	3692	29	8.24E-02	19.3	
27	5	386.36	24	7	0.68	3712.76	3692	29	2.64E-02	44.4	

Summary of Nuclide Activity

Sample ID : 1307099-01

Acquisition date : 30-JUL-2013 07:21:51

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.074E+02	4.074E+02	0.688E+02	16.89	
Total Activity :			4.074E+02	4.074E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	2.714E+02	2.714E+02	0.404E+02	14.90	
Total Activity :			2.714E+02	2.714E+02			

Grand Total Activity : 6.787E+02 6.788E+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	4.074E+02	4.074E+02	16.89	OK
	302.84	17.80	2.575E+00	7.769E+02	7.770E+02	33.03	OK
	356.01	60.00	4.312E+00	4.873E+02	4.873E+02	17.87	OK

Final Mean for 3 Valid Peaks = 4.074E+02+/- 6.881E+01 (16.89%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.714E+02	2.714E+02	14.90	OK

Final Mean for 1 Valid Peaks = 2.714E+02+/- 4.044E+01 (14.90%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.074E+02	6.881E+01	1.033E+01	1.522E+00	39.423
TH-234	2.714E+02	4.044E+01	2.817E+01	3.624E-01	9.633

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-7.720E+00		1.544E+01	2.590E+01	8.778E+00	-0.298
CD-109	1.476E+01		1.196E+02	2.172E+02	2.090E+01	0.068
PA-231	3.239E-01		7.892E-01	1.570E+00	1.768E-02	0.206
PA-234	2.985E+00	+	1.703E+00	2.095E+00	2.359E-02	1.425
NP-237	8.753E+00		3.037E+01	5.652E+01	4.986E+00	0.155
AM-241	2.628E+00		1.154E+00	2.591E+00	2.916E-02	1.014

F/20

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709902_GE5_BAFIL_193997.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : BLANK
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 07:40:20
 Sample ID : 1307099-02 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 00:15:01.16 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	11.03	18	0	0.21	111.22	105	12	2.00E-02	23.6	
2	0	13.72	7	5	0.31	137.08	133	9	7.22E-03	70.7	
3	0	21.14	93	41	0.51	208.27	197	21	1.03E-01	20.3	
4	0	25.26	8	13	0.28	247.75	241	13	8.89E-03	99.4	
5	0	30.97	1960	165	0.76	302.53	291	23	2.18E+00	2.8	
6	4	35.06	398	52	0.61	341.81	330	27	4.43E-01	6.8	1.98E+00
7	4	35.99	72	15	0.61	350.69	330	27	8.06E-02	22.6	
8	0	48.56	9	7	0.85	471.39	463	14	1.00E-02	70.7	
9	0	53.64	25	51	0.30	520.06	506	17	2.80E-02	68.0	
10	3	61.43	134	20	0.85	594.80	586	26	1.49E-01	13.7	8.64E-01
11	3	61.95	150	25	0.73	599.84	586	26	1.66E-01	13.0	
12	1	65.41	68	15	0.66	633.00	624	28	7.54E-02	20.4	1.94E+00
13	1	66.03	89	17	0.66	639.00	624	28	9.88E-02	15.8	
14	0	80.92	841	38	0.66	781.84	774	20	9.34E-01	3.8	
15	0	111.69	213	34	0.53	1077.15	1066	24	2.36E-01	9.5	
16	0	136.51	7	13	0.47	1315.30	1302	15	8.31E-03	95.7	
17	0	160.51	20	18	0.40	1545.61	1529	24	2.22E-02	48.0	
18	0	275.61	30	5	0.57	2650.05	2638	20	3.33E-02	23.0	
19	0	301.94	122	8	0.40	2902.73	2889	25	1.36E-01	10.0	
20	2	332.70	158	2	1.19	3197.89	3182	26	1.75E-01	5.8	1.03E+01
21	2	333.23	11	2	1.10	3203.00	3182	26	1.24E-02	55.9	
22	4	354.19	21	6	1.11	3404.11	3395	28	2.30E-02	79.7	6.55E-01
23	4	354.94	364	14	0.88	3411.32	3395	28	4.05E-01	5.7	
24	4	382.54	101	11	1.13	3676.11	3663	25	1.13E-01	10.0	3.22E+00
25	4	383.20	17	8	1.40	3682.46	3663	25	1.84E-02	45.2	
26	1	385.34	63	16	1.16	3703.00	3690	29	7.03E-02	22.4	2.93E+00
27	1	385.97	131	12	1.16	3709.00	3690	29	1.46E-01	10.4	
28	2	388.98	20	3	1.41	3737.89	3730	27	2.22E-02	27.8	3.57E+00
29	2	389.93	77	4	1.16	3747.00	3730	27	8.57E-02	9.4	
30	0	413.41	34	0	0.73	3972.32	3956	27	3.78E-02	17.1	

Total number of lines in spectrum 30
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 9 30.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.245E+02	4.245E+02	0.724E+02	17.05	
Total Activity :			4.245E+02	4.245E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	1.287E+00	1.287E+00	0.609E+00	47.32	
PA-234	4.47E+09Y	1.00	4.296E+00	4.296E+00	1.752E+00	40.77	
TH-234	4.47E+09Y	1.00	1.350E+02	1.350E+02	0.355E+02	26.27	
AM-241	432.20Y	1.00	1.119E+01	1.119E+01	0.311E+01	27.80	
Total Activity :			1.518E+02	1.518E+02			

Grand Total Activity : 5.763E+02 5.763E+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	4.245E+02	4.245E+02	17.05	OK
	302.84	17.80	2.575E+00	8.012E+02	8.013E+02	33.09	OK
	356.01	60.00	4.312E+00	4.230E+02	4.231E+02	18.40	OK

Final Mean for 3 Valid Peaks = 4.245E+02 +/- 7.238E+01 (17.05%)

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	1.287E+00	1.287E+00	47.32	OK
	10.11	20.20	1.000E+02	2.676E+00	2.676E+00	47.32	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	6.210E+03	6.210E+03	31.54	OK

Final Mean for 3 Valid Peaks = 1.287E+00 +/- 6.091E-01 (47.32%)

PA-234	9.89	89.00	1.000E+02	6.073E-01	6.073E-01	47.32	OK
	21.72	64.90*	1.000E+02	4.296E+00	4.296E+00	40.77	OK
	37.93	23.75	1.000E+02	9.169E+00	9.169E+00	45.44	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 4.296E+00 +/- 1.752E+00 (40.77%)

TH-234	63.29	3.80*	8.750E+01	1.350E+02	1.350E+02	26.27	OK
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Final Mean for 1 Valid Peaks = 1.350E+02 +/- 3.547E+01 (26.27%)

AM-241	59.54	35.90*	1.000E+02	1.119E+01	1.119E+01	27.80	OK
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Final Mean for 1 Valid Peaks = 1.119E+01 +/- 3.111E+00 (27.80%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.245E+02	7.238E+01	2.160E+01	3.180E+00	19.659
PA-231	1.287E+00	6.091E-01	1.499E+00	1.688E-02	0.858
PA-234	4.296E+00	1.752E+00	9.985E-01	1.124E-02	4.302
TH-234	1.350E+02	3.547E+01	3.121E+01	4.015E-01	4.327
AM-241	1.119E+01	3.111E+00	2.340E+00	2.634E-02	4.781

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.662E+00		1.506E+01	2.940E+01	9.966E+00	0.295
CD-109	-4.760E+00		8.968E+01	1.641E+02	1.579E+01	-0.029
NP-237	1.127E+01		2.234E+01	4.465E+01	3.939E+00	0.252

7/17/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709903_GE5_BAFIL_193998.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-85 TOT
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 07:58:03
 Sample ID : 1307099-03 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 00:15:01.01 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	21.13	34	4	0.97	208.13	200	17	3.74E-02	22.3	
2	0	30.93	617	18	0.71	302.19	289	23	6.86E-01	4.4	
3	0	34.95	98	34	0.69	340.73	333	15	1.09E-01	16.9	
4	0	61.76	40	34	0.71	598.06	588	20	4.48E-02	33.7	
5	1	65.61	28	8	0.66	635.00	625	22	3.15E-02	30.4	8.97E-01
6	1	66.20	17	9	0.73	640.63	625	22	1.86E-02	43.8	
7	0	80.98	242	27	0.65	782.47	772	20	2.69E-01	7.8	
8	6	110.35	19	1	0.89	1064.26	1062	26	2.09E-02	16.7	4.30E+00
9	6	111.36	72	7	0.76	1074.00	1062	26	7.98E-02	13.8	
10	6	111.88	40	6	0.77	1079.00	1062	26	4.43E-02	21.9	
11	0	301.90	34	0	0.94	2902.29	2890	22	3.78E-02	17.1	
12	0	354.89	127	8	1.05	3410.82	3393	29	1.41E-01	10.0	
13	1	385.55	23	3	1.16	3705.00	3691	27	2.51E-02	33.8	6.20E-01
14	1	386.07	21	2	1.16	3710.00	3691	27	2.28E-02	32.3	

Summary of Nuclide Activity

Sample ID : 1307099-03

Acquisition date : 30-JUL-2013 07:58:03

Total number of lines in spectrum 14
 Number of unidentified lines 9
 Number of lines tentatively identified by NID 5 35.71%

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	1.224E+02	1.224E+02	0.267E+02	21.83		
Total Activity :			1.224E+02	1.224E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	3.641E+01	3.641E+01	2.462E+01	67.63		
Total Activity :			3.641E+01	3.641E+01				

Grand Total Activity : 1.588E+02 1.588E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	1.224E+02	1.224E+02	21.83	OK
	302.84	17.80	2.575E+00	2.227E+02	2.227E+02	43.28	OK
	356.01	60.00	4.312E+00	1.473E+02	1.473E+02	24.64	OK

Final Mean for 3 Valid Peaks = 1.224E+02 +/- 2.671E+01 (21.83%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	3.641E+01	3.641E+01	67.63	OK

Final Mean for 1 Valid Peaks = 3.641E+01 +/- 2.462E+01 (67.63%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	1.224E+02	2.671E+01	8.456E+00	1.245E+00	14.472
TH-234	3.641E+01	2.462E+01	1.730E+01	2.225E-01	2.105

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.004E+00		7.373E+00	1.071E+01	3.632E+00	-0.560
CD-109	-3.314E+01		7.222E+01	1.254E+02	1.207E+01	-0.264
PA-231	-6.997E-01		6.806E-01	1.008E+00	1.134E-02	-0.694
PA-234	1.557E+00	+	6.959E-01	1.342E+00	1.510E-02	1.160
NP-237	-2.436E+00		1.911E+01	3.553E+01	3.134E+00	-0.069
AM-241	4.621E-01		8.622E-01	1.624E+00	1.828E-02	0.285

717017

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709904_GE5_BAFIL_193999.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 01 TOT
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 08:18:32
 Sample ID : 1307099-04 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.17 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	9.26	10	13	0.33	94.20	88	13	1.11E-02	80.8	
2	0	21.24	49	46	0.61	209.17	202	15	5.46E-02	33.9	
3	0	25.35	24	16	0.72	248.68	238	16	2.68E-02	42.3	
4	0	30.94	1899	72	0.74	302.31	289	26	2.11E+00	2.6	
5	2	35.06	386	52	0.63	341.81	330	29	4.29E-01	6.9	1.95E+00
6	2	36.12	48	24	0.57	352.00	330	29	5.38E-02	36.3	
7	0	53.28	50	18	0.50	516.63	506	18	5.54E-02	22.2	
8	0	61.75	213	45	0.87	597.88	583	32	2.37E-01	10.6	
9	1	65.47	34	21	0.72	633.63	628	24	3.76E-02	28.7	1.81E+00
10	1	66.03	72	21	0.66	639.00	628	24	7.96E-02	19.9	
11	2	79.62	41	2	0.84	769.40	758	35	4.53E-02	41.0	1.43E+00
12	2	80.93	761	13	0.64	782.01	758	35	8.46E-01	3.8	
13	0	111.84	186	76	0.69	1078.60	1062	28	2.07E-01	13.3	
14	0	116.03	60	10	0.24	1118.81	1108	23	6.66E-02	17.8	
15	0	275.70	41	3	0.53	2650.92	2637	25	4.58E-02	17.8	
16	1	301.87	161	9	1.06	2902.00	2887	27	1.79E-01	6.7	5.82E+00
17	1	302.28	11	6	1.06	2906.00	2887	27	1.20E-02	88.4	
18	0	332.87	58	2	0.69	3199.47	3188	21	6.42E-02	13.9	
19	0	354.88	361	13	0.96	3410.72	3394	29	4.01E-01	5.7	
20	0	382.59	48	10	0.84	3676.57	3660	27	5.28E-02	20.4	
21	1	384.92	12	15	1.16	3699.00	3690	28	1.31E-02	89.5	1.51E+00
22	1	385.66	145	17	1.04	3706.11	3690	28	1.61E-01	9.8	

Total number of lines in spectrum 22
 Number of unidentified lines 15
 Number of lines tentatively identified by NID 7 31.82%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.842E+02	3.842E+02	0.656E+02	17.07		
Total Activity :			3.842E+02	3.842E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
PA-231	3.28E+04Y	1.00	7.150E-01	7.150E-01	11.56E-01	161.61		
PA-234	4.47E+09Y	1.00	2.276E+00	2.276E+00	1.545E+00	67.90		
TH-234	4.47E+09Y	1.00	1.924E+02	1.924E+02	0.417E+02	21.70		
Total Activity :			1.954E+02	1.954E+02				

Grand Total Activity : 5.796E+02 5.796E+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 Decay Corr		2-Sigma %Error	Status
				pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.842E+02	3.842E+02	17.07	OK
	302.84	17.80	2.575E+00	7.071E+01	7.072E+01	178.70	OK
	356.01	60.00	4.312E+00	4.188E+02	4.189E+02	18.36	OK

Final Mean for 3 Valid Peaks = 3.842E+02 +/- 6.556E+01 (17.07%)

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	7.150E-01	7.150E-01	161.61	OK
	10.11	20.20	1.000E+02	1.487E+00	1.487E+00	161.61	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	5.481E+02	5.481E+02	178.42	OK

Final Mean for 3 Valid Peaks = 7.150E-01 +/- 1.156E+00 (161.61%)

PA-234	9.89	89.00	1.000E+02	3.374E-01	3.374E-01	161.61	OK
	21.72	64.90*	1.000E+02	2.276E+00	2.276E+00	67.90	OK
	37.93	23.75	1.000E+02	6.123E+00	6.123E+00	72.71	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 2.276E+00 +/- 1.545E+00 (67.90%)

TH-234	63.29	3.80*	8.750E+01	1.924E+02	1.924E+02	21.70	OK
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Final Mean for 1 Valid Peaks = 1.924E+02 +/- 4.174E+01 (21.70%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.842E+02	6.556E+01	1.555E+01	2.289E+00	24.712
PA-231	7.150E-01	1.156E+00	1.680E+00	1.891E-02	0.426
PA-234	2.276E+00	1.545E+00	9.485E-01	1.068E-02	2.399
TH-234	1.924E+02	4.174E+01	2.817E+01	3.624E-01	6.830

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.887E+00		1.447E+01	2.722E+01	9.227E+00	0.069
CD-109	6.429E+00		9.789E+01	1.803E+02	1.735E+01	0.036
NP-237	-1.532E+01		2.498E+01	4.179E+01	3.686E+00	-0.367
AM-241	2.903E-01		1.612E+00	2.523E+00	2.840E-02	0.115

7/30/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709905_GE5_BAFIL_194003.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 01 DIS
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 08:34:48
 Sample ID : 1307099-05 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	1	20.64	16	17	0.55	203.48	189	26	1.80E-02	81.8	7.95E-01
2	1	21.22	72	10	0.49	208.99	189	26	8.04E-02	16.0	
3	0	30.96	1879	143	0.80	302.43	290	26	2.09E+00	2.9	
4	3	35.05	355	20	0.66	341.73	333	25	3.94E-01	6.2	5.49E-01
5	3	35.96	93	5	0.62	350.46	333	25	1.03E-01	20.4	
6	0	53.05	50	10	0.99	514.41	507	14	5.50E-02	19.9	
7	0	61.73	237	29	1.00	597.76	585	25	2.63E-01	8.3	
8	3	65.73	124	11	0.88	636.09	625	27	1.37E-01	10.7	1.16E+00
9	3	66.72	31	5	0.73	645.63	625	27	3.43E-02	28.1	
10	1	79.35	31	32	0.76	766.80	757	37	3.40E-02	38.1	1.72E+00
11	1	80.90	720	21	0.71	781.67	757	37	8.00E-01	4.1	
12	2	111.67	215	22	0.86	1076.93	1053	35	2.39E-01	8.1	1.45E+00
13	2	112.17	9	10	0.84	1081.74	1053	35	9.54E-03	152.3	
14	0	116.23	37	24	1.17	1120.70	1107	20	4.08E-02	32.1	
15	0	161.24	9	22	0.21	1552.61	1533	22	1.02E-02	104.0	
16	0	275.55	38	9	0.59	2649.48	2635	23	4.22E-02	22.3	
17	1	301.45	46	0	0.95	2897.98	2887	27	5.07E-02	20.7	2.58E+00
18	1	302.07	101	0	1.06	2904.00	2887	27	1.12E-01	10.1	
19	3	332.50	41	5	1.10	3196.00	3181	28	4.60E-02	22.3	3.89E-01
20	3	333.21	22	3	0.80	3202.79	3181	28	2.45E-02	33.2	
21	0	354.91	348	21	1.02	3411.01	3395	31	3.86E-01	6.0	
22	1	382.21	40	11	1.16	3673.00	3661	29	4.39E-02	25.7	7.11E-01
23	1	382.74	44	10	1.16	3678.00	3661	29	4.87E-02	24.0	
24	0	385.66	130	18	0.89	3706.05	3691	27	1.44E-01	10.9	

Total number of lines in spectrum 24
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 6 25.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.633E+02	3.633E+02	0.629E+02	17.31	
Total Activity :			3.633E+02	3.633E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	2.140E+02	2.140E+02	0.367E+02	17.14	
Total Activity :			2.140E+02	2.140E+02			

Grand Total Activity : 5.773E+02 5.773E+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	3.633E+02	3.633E+02	17.31	OK
	302.84	17.80	2.575E+00	6.592E+02	6.592E+02	33.23	OK
	356.01	60.00	4.312E+00	4.035E+02	4.035E+02	18.80	OK

Final Mean for 3 Valid Peaks = 3.633E+02 +/- 6.291E+01 (17.31%)

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	2.140E+02	2.140E+02	17.14	OK

Final Mean for 1 Valid Peaks = 2.140E+02 +/- 3.668E+01 (17.14%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.633E+02	6.291E+01	1.403E+01	2.066E+00	25.896
TH-234	2.140E+02	3.668E+01	1.730E+01	2.225E-01	12.375

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.066E+01		1.477E+01	2.922E+01	9.905E+00	0.365
CD-109	4.337E+01		8.094E+01	1.629E+02	1.568E+01	0.266
PA-231	4.934E-01		9.210E-01	1.813E+00	2.041E-02	0.272
PA-234	3.348E+00	+	1.080E+00	1.983E+00	2.232E-02	1.688
NP-237	-1.050E+01		2.567E+01	4.438E+01	3.914E+00	-0.236
AM-241	-2.428E-01		1.602E+00	2.368E+00	2.666E-02	-0.102

100
7/30/13

VAX/VMS Peak Search Report Generated 30-JUL-2013 17:00:00.28

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709906_GE5_BAFIL_194039.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-201A-SS TOT
Deposition Date :
Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 16:44:43
Sample ID : 1307099-06 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE5 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.13 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	21.03	93	21	0.66	207.23	196	21	1.03E-01	16.1	
2	0	24.93	15	8	0.34	244.60	240	10	1.71E-02	42.0	
3	0	30.97	1968	90	0.73	302.57	291	22	2.19E+00	2.6	
4	3	35.03	429	27	0.61	341.48	331	28	4.76E-01	5.8	2.17E+00
5	3	35.77	104	30	0.69	348.58	331	28	1.16E-01	24.4	
6	0	38.96	8	6	0.29	379.26	369	15	8.49E-03	84.9	
7	0	45.18	9	4	1.00	438.91	429	16	1.05E-02	57.1	
8	0	53.14	56	10	0.67	515.32	508	14	6.22E-02	18.1	
9	0	61.64	258	33	0.91	596.85	582	28	2.87E-01	8.2	
10	6	64.68	10	1	0.36	626.01	624	27	1.06E-02	36.5	8.93E-01
11	6	65.77	119	21	1.17	636.52	624	27	1.32E-01	13.7	
12	7	79.71	63	11	1.35	770.25	758	33	7.03E-02	39.1	1.04E+00
13	7	80.92	761	16	0.63	781.89	758	33	8.45E-01	3.8	
14	0	111.69	170	63	0.53	1077.13	1062	28	1.89E-01	13.7	
15	0	115.79	45	14	0.46	1116.43	1105	21	5.00E-02	23.1	
16	9	275.40	58	2	1.03	2648.00	2635	23	6.43E-02	12.1	2.16E+00
17	9	276.07	8	2	0.42	2654.50	2635	23	8.52E-03	56.8	
18	1	301.66	56	8	1.06	2900.00	2885	29	6.20E-02	21.4	2.51E+00
19	1	302.07	58	5	1.06	2904.00	2885	29	6.44E-02	19.2	
20	0	332.73	48	5	0.85	3198.18	3182	25	5.33E-02	16.9	
21	0	354.87	415	0	0.86	3410.58	3394	32	4.61E-01	4.9	
22	8	381.88	54	2	1.00	3669.82	3661	26	6.04E-02	14.0	3.28E+00
23	8	382.76	43	7	1.10	3678.28	3661	26	4.77E-02	21.3	
24	0	385.59	132	25	0.85	3705.37	3688	31	1.46E-01	11.6	
25	0	413.10	25	4	1.02	3969.40	3953	27	2.73E-02	26.9	

Summary of Nuclide Activity

Sample ID : 1307099-06

Acquisition date : 30-JUL-2013 16:44:43

Total number of lines in spectrum 25
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 6 24.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.841E+02	3.841E+02	0.655E+02	17.05	
Total Activity :			3.841E+02	3.841E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	8.647E+00	8.647E+00	6.326E+00	73.15	
Total Activity :			8.647E+00	8.647E+00			

Grand Total Activity : 3.927E+02 3.928E+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	3.841E+02	3.841E+02	17.05	OK
	302.84	17.80	2.575E+00	3.796E+02	3.797E+02	46.60	OK
	356.01	60.00	4.312E+00	4.817E+02	4.818E+02	17.48	OK

Final Mean for 3 Valid Peaks = 3.841E+02 +/- 6.550E+01 (17.05%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	8.647E+00	8.647E+00	73.15	OK

Final Mean for 1 Valid Peaks = 8.647E+00 +/- 6.326E+00 (73.15%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.841E+02	6.550E+01	1.139E+01	1.678E+00	33.715
TH-234	8.647E+00	6.326E+00	2.063E+01	2.655E-01	0.419

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	6.371E+00		1.496E+01	2.889E+01	9.795E+00	0.221
CD-109	6.254E+01		9.572E+01	1.896E+02	1.824E+01	0.330
PA-231	6.346E-01		8.439E-01	1.735E+00	1.953E-02	0.366
PA-234	4.303E+00	+	1.397E+00	1.970E+00	2.218E-02	2.184
NP-237	-1.974E+01		2.608E+01	4.254E+01	3.752E+00	-0.464
AM-241	9.371E-01		1.280E+00	2.278E+00	2.564E-02	0.411

K/S
4/30/13

VAX/VMS Peak Search Report Generated 30-JUL-2013 17:15:45.44

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709907_GE5_BAFIL_194040.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-201A-SS DIS
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 17:00:25
 Sample ID : 1307099-07 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 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	3	20.49	21	24	0.50	202.00	192	23	2.35E-02	61.4	2.04E+00
2	3	21.25	48	16	0.41	209.32	192	23	5.35E-02	27.1	
3	6	29.63	30	45	0.72	289.72	283	35	3.30E-02	47.7	1.77E+00
4	6	30.98	2122	47	0.74	302.63	283	35	2.36E+00	2.3	
5	4	35.03	366	63	0.58	341.53	333	23	4.07E-01	7.4	2.44E+00
6	4	35.91	98	36	0.59	349.94	333	23	1.08E-01	21.3	
7	6	51.75	31	9	0.62	502.00	493	17	3.41E-02	27.1	1.45E+00
8	6	52.30	10	1	0.34	507.25	493	17	1.10E-02	44.8	
9	0	53.27	39	4	1.08	516.52	510	14	4.37E-02	18.9	
10	3	61.55	192	50	0.75	596.01	586	27	2.13E-01	11.1	2.95E+00
11	3	62.07	99	27	0.65	601.00	586	27	1.10E-01	20.7	
12	1	65.72	70	11	0.66	636.00	627	28	7.80E-02	18.1	1.16E+00
13	1	66.24	36	14	0.66	641.00	627	28	3.97E-02	35.9	
14	0	80.92	870	25	0.64	781.88	773	19	9.67E-01	3.6	
15	0	111.66	214	39	0.78	1076.89	1064	28	2.38E-01	9.9	
16	0	115.93	69	25	0.34	1117.81	1101	29	7.71E-02	20.9	
17	0	160.33	29	21	0.61	1543.82	1534	19	3.27E-02	34.1	
18	1	274.88	20	4	1.13	2643.02	2636	25	2.24E-02	30.1	3.62E+00
19	1	275.71	76	5	1.03	2651.00	2636	25	8.44E-02	10.4	
20	0	301.77	137	6	0.82	2901.08	2886	26	1.52E-01	9.4	
21	0	306.27	30	2	0.42	2944.27	2930	25	3.32E-02	20.7	
22	2	332.08	18	4	1.33	3191.89	3182	27	1.95E-02	48.1	6.14E-01
23	2	332.77	41	4	1.02	3198.55	3182	27	4.51E-02	22.2	
24	0	354.83	406	5	0.91	3410.27	3394	29	4.51E-01	5.1	
25	0	382.61	82	11	0.99	3676.77	3660	30	9.07E-02	13.9	
26	1	384.81	19	13	1.04	3697.89	3691	26	2.06E-02	50.6	4.77E+00
27	1	385.65	221	16	1.16	3706.00	3691	26	2.46E-01	6.5	
28	0	390.03	35	13	0.17	3748.01	3733	25	3.93E-02	25.2	

Total number of lines in spectrum 28
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 5 17.86%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.393E+02	4.393E+02	0.741E+02	16.86		
Total Activity :			4.393E+02	4.393E+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	8.921E+01	8.921E+01	3.705E+01	41.53		
Total Activity :			8.921E+01	8.921E+01				

Grand Total Activity : 5.285E+02 5.286E+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	4.393E+02	4.393E+02	16.86	OK
	302.84	17.80	2.575E+00	8.942E+02	8.943E+02	32.37	OK
	356.01	60.00	4.312E+00	4.712E+02	4.713E+02	17.69	OK

Final Mean for 3 Valid Peaks = 4.393E+02 +/- 7.408E+01 (16.86%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	8.921E+01	8.921E+01	41.53	OK

Final Mean for 1 Valid Peaks = 8.921E+01 +/- 3.705E+01 (41.53%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.393E+02	7.408E+01	1.988E+01	2.928E+00	22.095
TH-234	8.921E+01	3.705E+01	2.237E+01	2.878E-01	3.988

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.484E+00		1.531E+01	2.744E+01	9.303E+00	-0.091
CD-109	-2.915E+01		8.824E+01	1.550E+02	1.491E+01	-0.188
PA-231	-1.609E-01		8.396E-01	1.508E+00	1.698E-02	-0.107
PA-234	2.226E+00	+	1.210E+00	2.249E+00	2.532E-02	0.990
NP-237	4.950E+00		2.322E+01	4.438E+01	3.914E+00	0.112
AM-241	7.661E-01		1.705E+00	2.759E+00	3.105E-02	0.278

103
7/30/13

VAX/VMS Peak Search Report Generated 30-JUL-2013 17:31:14.84

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709908_GE5_BAFIL_194042.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : D-85 TOT
Deposition Date :
Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 17:15:52
Sample ID : 1307099-08 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 00:15:01.00 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	7.28	8	5	0.13	75.22	67	12	8.55E-03	72.4	
2	0	21.19	31	10	0.55	208.70	197	21	3.44E-02	31.6	
3	0	30.93	639	18	0.70	302.19	290	23	7.10E-01	4.3	
4	0	35.01	122	11	0.61	341.29	333	15	1.36E-01	10.8	
5	0	36.15	12	13	0.25	352.29	347	10	1.32E-02	66.8	
6	0	61.86	61	22	0.59	599.02	588	19	6.76E-02	20.3	
7	0	66.13	43	4	0.81	639.92	627	26	4.77E-02	18.9	
8	2	79.51	41	0	0.84	768.37	759	34	4.59E-02	16.0	9.39E-01
9	2	80.93	280	4	0.69	781.94	759	34	3.11E-01	6.2	
10	0	111.65	56	20	0.91	1076.77	1066	20	6.23E-02	21.3	
11	0	301.81	32	0	0.40	2901.47	2888	23	3.56E-02	17.7	
12	4	354.68	161	2	1.10	3408.79	3393	29	1.79E-01	7.0	4.79E+00
13	4	355.12	21	2	1.12	3413.00	3393	29	2.31E-02	52.3	
14	7	385.34	67	6	1.16	3703.00	3687	28	7.43E-02	12.6	2.14E+00
15	7	386.24	19	0	0.55	3711.64	3687	28	2.15E-02	21.1	

Summary of Nuclide Activity

Sample ID : 1307099-08

Acquisition date : 30-JUL-2013 17:15:52

Total number of lines in spectrum 15
 Number of unidentified lines 9
 Number of lines tentatively identified by NID 6 40.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	1.412E+02	1.412E+02	0.278E+02	19.65	
Total Activity :			1.412E+02	1.412E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	5.495E+01	5.495E+01	2.248E+01	40.90	
Total Activity :			5.495E+01	5.495E+01			

Grand Total Activity : 1.962E+02 1.962E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	1.412E+02	1.412E+02	19.65	OK
	302.84	17.80	2.575E+00	2.096E+02	2.097E+02	44.13	OK
	356.01	60.00	4.312E+00	2.414E+01	2.415E+01	105.56	OK

Final Mean for 3 Valid Peaks = 1.412E+02+/- 2.776E+01 (19.65%)

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	5.495E+01	5.495E+01	40.90	OK

Final Mean for 1 Valid Peaks = 5.495E+01+/- 2.248E+01 (40.90%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	1.412E+02	2.776E+01	6.858E+00	1.010E+00	20.597
TH-234	5.495E+01	2.248E+01	1.653E+01	2.127E-01	3.324

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.054E+00		9.557E+00	1.782E+01	6.041E+00	-0.115
CD-109	1.248E+01		6.021E+01	1.220E+02	1.174E+01	0.102
PA-231	-1.179E-01		6.387E-01	1.184E+00	1.333E-02	-0.100
PA-234	1.434E+00	+	9.093E-01	1.103E+00	1.241E-02	1.301
NP-237	1.383E+00		1.909E+01	3.677E+01	3.243E+00	0.038
AM-241	-4.812E-01		1.008E+00	1.394E+00	1.570E-02	-0.345

KD
7/30/13

VAX/VMS Peak Search Report Generated 30-JUL-2013 17:46:50.50

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709909_GE5_BAFIL_194043.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : D-85 DIS
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 17:31:31
 Sample ID : 1307099-09 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.12 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.19	62	12	0.22	208.70	202	15	6.85E-02	18.5	
2	0	30.97	1675	79	0.74	302.54	289	25	1.86E+00	2.8	
3	1	35.08	347	25	0.62	342.02	333	26	3.86E-01	6.8	1.23E+00
4	1	35.96	111	14	0.62	350.46	333	26	1.23E-01	19.9	
5	0	53.17	47	10	0.53	515.58	508	14	5.17E-02	20.8	
6	0	61.75	202	26	0.92	597.91	584	24	2.25E-01	8.9	
7	0	65.84	80	23	0.44	637.12	626	23	8.87E-02	17.3	
8	0	74.08	11	4	0.20	716.24	711	11	1.26E-02	41.1	
9	4	79.55	38	8	1.01	768.77	758	37	4.23E-02	34.5	8.08E-01
10	4	80.93	656	12	0.62	781.98	758	37	7.29E-01	4.1	
11	0	108.61	13	6	1.22	1047.61	1036	19	1.41E-02	49.3	
12	0	111.70	153	45	0.81	1077.18	1066	21	1.70E-01	12.3	
13	0	115.77	53	18	0.79	1116.29	1104	22	5.85E-02	22.3	
14	0	275.60	42	9	0.92	2649.98	2637	24	4.69E-02	20.9	
15	4	301.24	13	3	0.85	2896.02	2889	26	1.44E-02	55.3	2.84E+00
16	4	302.18	122	4	1.06	2905.00	2889	26	1.35E-01	7.8	
17	0	332.71	29	7	1.06	3198.01	3185	21	3.28E-02	23.8	
18	0	354.84	335	8	0.99	3410.31	3394	30	3.72E-01	5.7	
19	1	382.42	47	2	1.16	3675.00	3662	26	5.25E-02	18.7	1.27E+00
20	1	383.26	46	2	1.16	3683.00	3662	26	5.06E-02	13.9	
21	0	385.51	126	5	0.74	3704.63	3691	24	1.40E-01	9.5	

Summary of Nuclide Activity

Sample ID : 1307099-09

Acquisition date : 30-JUL-2013 17:31:31

Total number of lines in spectrum 21
 Number of unidentified lines 15
 Number of lines tentatively identified by NID 6 28.57%

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	3.314E+02	3.314E+02	0.574E+02	17.31	
Total Activity :			3.314E+02	3.314E+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	1.828E+02	1.828E+02	0.334E+02	18.28	
Total Activity :			1.828E+02	1.828E+02			

Grand Total Activity : 5.141E+02 5.142E+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	3.314E+02	3.314E+02	17.31	OK
	302.84	17.80	2.575E+00	7.973E+02	7.974E+02	30.67	OK
	356.01	60.00	4.312E+00	3.887E+02	3.887E+02	18.47	OK

Final Mean for 3 Valid Peaks = 3.314E+02 +/- 5.738E+01 (17.31%)

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	1.828E+02	1.828E+02	18.28	OK

Final Mean for 1 Valid Peaks = 1.828E+02 +/- 3.341E+01 (18.28%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.314E+02	5.738E+01	1.017E+01	1.497E+00	32.603
TH-234	1.828E+02	3.341E+01	1.154E+01	1.484E-01	15.841

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.185E+00		1.299E+01	2.250E+01	7.627E+00	-0.230
CD-109	-3.489E+01		9.412E+01	1.635E+02	1.574E+01	-0.213
PA-231	-1.055E-01		7.669E-01	1.404E+00	1.580E-02	-0.075
PA-234	2.854E+00	+	1.063E+00	1.700E+00	1.914E-02	1.678
NP-237	8.996E+00		2.449E+01	4.737E+01	4.178E+00	0.190
AM-241	1.529E+00		1.119E+00	2.266E+00	2.551E-02	0.675

KB
7/30/13

VAX/VMS Peak Search Report Generated 30-JUL-2013 18:02:13.73

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709910_GE5_BAFIL_194047.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-106-SD TOT
 Deposition Date :
 Sample Date : 30-JUL-2013 00:00:00 Acquisition date : 30-JUL-2013 17:46:55
 Sample ID : 1307099-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.12 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.18	55	45	0.44	208.58	200	17	6.07E-02	31.6	
2	0	25.20	23	6	0.58	247.17	241	12	2.57E-02	29.6	
3	0	30.96	1889	105	0.75	302.43	290	25	2.10E+00	2.7	
4	3	35.14	416	38	0.75	342.62	331	28	4.63E-01	6.3	2.57E+00
5	3	35.92	74	36	0.56	350.05	331	28	8.23E-02	28.4	
6	0	52.20	11	21	0.57	506.23	491	17	1.17E-02	104.7	
7	0	53.32	49	13	0.57	517.06	508	18	5.42E-02	22.7	
8	4	61.22	46	28	0.63	592.88	587	30	5.07E-02	31.7	1.46E+00
9	4	61.72	203	39	0.78	597.65	587	30	2.26E-01	9.8	
10	0	65.91	76	53	0.42	637.80	627	21	8.48E-02	23.2	
11	2	79.41	52	7	0.82	767.34	758	37	5.76E-02	19.7	1.28E+00
12	2	80.93	759	6	0.67	781.97	758	37	8.44E-01	3.7	
13	0	111.66	209	41	0.75	1076.88	1060	28	2.32E-01	9.9	
14	0	116.25	29	33	0.36	1120.92	1106	19	3.23E-02	43.9	
15	0	159.93	24	13	0.13	1540.00	1524	25	2.61E-02	36.9	
16	1	275.29	10	4	1.03	2647.00	2636	24	1.16E-02	74.9	8.12E+00
17	1	275.81	99	5	1.03	2652.00	2636	24	1.10E-01	7.2	
18	0	301.90	110	8	0.69	2902.30	2886	29	1.22E-01	10.9	
19	0	306.27	28	2	0.64	2944.28	2931	22	3.13E-02	20.9	
20	0	332.58	51	5	0.35	3196.71	3183	26	5.64E-02	16.4	
21	0	354.88	390	9	0.91	3410.73	3394	32	4.33E-01	5.3	
22	0	382.45	68	6	0.76	3675.28	3659	27	7.50E-02	14.5	
23	1	385.56	144	9	1.27	3705.11	3691	26	1.60E-01	9.2	3.19E+00
24	1	386.29	42	2	1.04	3712.11	3691	26	4.65E-02	19.4	

Summary of Nuclide Activity

Sample ID : 1307099-10

Acquisition date : 30-JUL-2013 17:46:55

Total number of lines in spectrum 24
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 6 25.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.833E+02	3.833E+02	0.649E+02	16.94	
Total Activity :			3.833E+02	3.833E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	1.838E+02	1.838E+02	0.367E+02	19.98	
AM-241	432.20Y	1.00	3.814E+00	3.814E+00	2.424E+00	63.56	
Total Activity :			1.876E+02	1.876E+02			

Grand Total Activity : 5.708E+02 5.709E+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	3.833E+02	3.833E+02	16.94	OK
	302.84	17.80	2.575E+00	7.182E+02	7.183E+02	34.26	OK
	356.01	60.00	4.312E+00	4.526E+02	4.527E+02	17.95	OK

Final Mean for 3 Valid Peaks = 3.833E+02 +/- 6.495E+01 (16.94%)

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	1.838E+02	1.838E+02	19.98	OK

Final Mean for 1 Valid Peaks = 1.838E+02 +/- 3.671E+01 (19.98%)

AM-241	59.54	35.90*	1.000E+02	3.814E+00	3.814E+00	63.56	OK
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Final Mean for 1 Valid Peaks = 3.814E+00 +/- 2.424E+00 (63.56%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.833E+02	6.495E+01	1.312E+01	1.932E+00	29.206
TH-234	1.838E+02	3.671E+01	2.545E+01	3.275E-01	7.219
AM-241	3.814E+00	2.424E+00	2.132E+00	2.400E-02	1.789

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.001E+01		1.489E+01	2.394E+01	8.115E+00	-0.418
CD-109	-2.491E+01		8.890E+01	1.573E+02	1.514E+01	-0.158
PA-231	-2.231E-01		8.806E-01	1.559E+00	1.755E-02	-0.143
PA-234	2.528E+00	+	1.603E+00	1.929E+00	2.171E-02	1.311
NP-237	-6.281E+00		2.453E+01	4.355E+01	3.841E+00	-0.144

C
7/17/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709911_GE5_BAFIL_194052.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-106-SD DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 07:03:00
 Sample ID : 1307099-11 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 00:15:01.17 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	8.80	10	9	0.22	89.83	83	13	1.08E-02	73.5	
2	0	21.33	92	36	0.57	210.05	201	24	1.03E-01	23.0	
3	0	30.94	2070	72	0.74	302.28	289	26	2.30E+00	2.5	
4	1	35.11	444	19	0.62	342.25	333	28	4.93E-01	5.4	2.55E+00
5	1	35.86	99	12	0.62	349.49	333	28	1.10E-01	22.2	
6	0	53.33	47	30	0.46	517.12	504	19	5.26E-02	30.8	
7	1	61.61	233	23	0.71	596.62	584	26	2.59E-01	8.0	1.82E+00
8	1	62.03	26	23	0.71	600.62	584	26	2.93E-02	69.0	
9	0	65.89	82	55	0.43	637.69	627	22	9.07E-02	22.5	
10	0	80.96	756	64	0.69	782.27	772	22	8.40E-01	4.3	
11	0	84.41	21	11	1.29	815.34	801	22	2.34E-02	40.4	
12	0	101.89	21	6	0.52	983.09	972	17	2.29E-02	31.8	
13	0	111.63	214	66	0.86	1076.59	1062	32	2.38E-01	11.9	
14	3	275.72	75	3	1.36	2651.09	2635	26	8.36E-02	10.1	1.42E+00
15	3	276.02	10	3	1.03	2654.00	2635	26	1.16E-02	62.8	
16	0	301.96	111	5	0.54	2902.86	2888	25	1.23E-01	10.2	
17	10	332.28	42	7	1.33	3193.89	3183	27	4.62E-02	21.7	6.41E-01
18	10	332.95	20	3	0.38	3200.26	3183	27	2.24E-02	36.0	
19	10	333.65	7	1	0.45	3206.99	3183	27	8.27E-03	34.9	
20	0	354.92	374	6	1.00	3411.06	3394	32	4.16E-01	5.4	
21	4	382.21	18	1	1.16	3673.00	3660	30	1.96E-02	57.6	1.51E+00
22	4	382.81	68	2	0.76	3678.76	3660	30	7.58E-02	15.5	
23	4	383.64	20	1	0.76	3686.67	3660	30	2.18E-02	21.3	
24	0	385.59	117	12	0.97	3705.39	3693	24	1.30E-01	10.7	
25	0	413.92	29	9	0.44	3977.27	3955	29	3.17E-02	27.9	

Summary of Nuclide Activity

Sample ID : 1307099-11

Acquisition date : 31-JUL-2013 07:03:00

Total number of lines in spectrum 25
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 6 24.00%

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	3.815E+02	3.815E+02	0.670E+02	17.55		
Total Activity :			3.815E+02	3.815E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
PA-231	3.28E+04Y	1.00	6.924E-01	6.924E-01	10.18E-01	147.09		
PA-234	4.47E+09Y	1.00	4.275E+00	4.275E+00	1.975E+00	46.21		
TH-234	4.47E+09Y	1.00	2.378E+01	2.378E+01	3.284E+01	138.08		
Total Activity :			2.875E+01	2.875E+01				

Grand Total Activity : 4.103E+02 4.103E+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 Decay Corr		2-Sigma %Error	Status
				pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.815E+02	3.815E+02	17.55	OK
	302.84	17.80	2.575E+00	7.271E+02	7.272E+02	33.38	OK
	356.01	60.00	4.312E+00	4.342E+02	4.342E+02	17.99	OK

Final Mean for 3 Valid Peaks = 3.815E+02+/- 6.697E+01 (17.55%)

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	6.924E-01	6.924E-01	147.09	OK
	10.11	20.20	1.000E+02	1.440E+00	1.440E+00	147.09	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	5.636E+03	5.636E+03	31.85	OK

Final Mean for 3 Valid Peaks = 6.924E-01+/- 1.018E+00 (147.09%)

PA-234	9.89	89.00	1.000E+02	3.268E-01	3.268E-01	147.09	OK
	21.72	64.90*	1.000E+02	4.275E+00	4.275E+00	46.21	OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----	Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 4.275E+00+/- 1.975E+00 (46.21%)

TH-234	63.29	3.80*	8.750E+01	2.378E+01	2.378E+01	138.08	OK
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Final Mean for 1 Valid Peaks = 2.378E+01+/- 3.284E+01 (138.08%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.815E+02	6.697E+01	1.904E+01	2.803E+00	20.041
PA-231	6.924E-01	1.018E+00	1.192E+00	1.342E-02	0.581
PA-234	4.275E+00	1.975E+00	1.499E+00	1.688E-02	2.851
TH-234	2.378E+01	3.284E+01	2.943E+01	3.786E-01	0.808

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.992E+00	1.270E+01	2.248E+01	7.619E+00	-0.178
CD-109	4.354E+01	9.490E+01	1.842E+02	1.772E+01	0.236
NP-237	-1.358E+00	2.790E+01	4.411E+01	3.891E+00	-0.031
AM-241	-1.238E-01	1.568E+00	2.353E+00	2.649E-02	-0.053

717111

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709912_GE5_BAFIL_194054.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : S-84 TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 07:23:13
 Sample ID : 1307099-12 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.09 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	3	20.07	29	1	0.50	198.00	192	32	3.26E-02	23.1	2.26E+00
2	3	20.80	54	3	0.49	204.96	192	32	5.99E-02	19.8	
3	3	21.43	29	5	0.51	211.00	192	32	3.19E-02	36.0	
4	0	30.98	1683	126	0.73	302.62	293	23	1.87E+00	3.1	
5	1	35.08	323	10	0.62	341.96	328	30	3.59E-01	6.7	1.12E+00
6	1	35.96	95	2	0.62	350.46	328	30	1.06E-01	19.0	
7	0	38.03	16	15	0.65	370.27	359	20	1.78E-02	64.2	
8	0	53.42	38	24	0.75	517.98	505	17	4.21E-02	32.6	
9	1	61.13	41	9	0.65	592.00	586	23	4.60E-02	30.7	1.24E+00
10	1	61.75	186	14	0.71	597.96	586	23	2.06E-01	9.1	
11	6	65.61	38	2	0.66	635.00	626	30	4.22E-02	27.9	1.31E+00
12	6	66.15	28	2	0.35	640.13	626	30	3.12E-02	31.8	
13	6	66.66	30	5	0.66	645.00	626	30	3.34E-02	36.0	
14	5	79.31	35	6	1.12	766.47	757	36	3.93E-02	28.3	2.12E+00
15	5	79.79	42	7	0.69	771.00	757	36	4.69E-02	42.2	
16	5	80.91	653	11	0.72	781.73	757	36	7.25E-01	4.2	
17	0	93.00	11	13	0.38	897.76	890	12	1.19E-02	67.1	
18	0	111.69	146	53	0.60	1077.09	1063	25	1.62E-01	14.2	
19	0	159.51	5	7	0.24	1536.04	1526	13	5.28E-03	100.0	
20	0	160.44	30	2	0.67	1544.90	1538	15	3.33E-02	19.9	
21	0	275.63	41	2	0.77	2650.20	2638	22	4.50E-02	17.5	
22	0	302.06	100	6	0.94	2903.91	2889	28	1.12E-01	11.0	
23	0	332.62	47	11	1.17	3197.11	3182	25	5.21E-02	20.2	
24	0	354.97	334	3	0.73	3411.53	3394	35	3.71E-01	5.6	
25	1	382.32	34	9	1.16	3674.00	3662	25	3.74E-02	28.2	1.55E+00
26	1	382.94	47	9	1.16	3680.00	3662	25	5.27E-02	17.9	
27	0	385.63	107	16	0.71	3705.82	3691	27	1.18E-01	12.1	

Summary of Nuclide Activity

Sample ID : 1307099-12

Acquisition date : 31-JUL-2013 07:23:13

Total number of lines in spectrum 27
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 7 25.93%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.295E+02	3.295E+02	0.573E+02	17.38	
Total Activity :			3.295E+02	3.295E+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	1.677E+02	1.677E+02	0.315E+02	18.76	
AM-241	432.20Y	1.00	3.466E+00	3.466E+00	2.133E+00	61.53	
Total Activity :			1.711E+02	1.711E+02			

Grand Total Activity : 5.007E+02 5.007E+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	3.295E+02	3.295E+02	17.38	OK
	302.84	17.80	2.575E+00	6.577E+02	6.577E+02	34.35	OK
	356.01	60.00	4.312E+00	3.871E+02	3.872E+02	18.30	OK

Final Mean for 3 Valid Peaks = 3.295E+02 +/- 5.729E+01 (17.38%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.677E+02	1.677E+02	18.76	OK

Final Mean for 1 Valid Peaks = 1.677E+02 +/- 3.145E+01 (18.76%)

AM-241	59.54	35.90*	1.000E+02	3.466E+00	3.466E+00	61.53	OK
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Final Mean for 1 Valid Peaks = 3.466E+00 +/- 2.133E+00 (61.53%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.295E+02	5.729E+01	1.033E+01	1.522E+00	31.889
TH-234	1.677E+02	3.145E+01	1.531E+01	1.969E-01	10.955
AM-241	3.466E+00	2.133E+00	1.521E+00	1.712E-02	2.279

---- 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+00		1.308E+01	2.399E+01	8.132E+00	-0.065
CD-109	-6.193E+01		7.793E+01	1.254E+02	1.207E+01	-0.494
PA-231	-3.111E-01		7.277E-01	1.265E+00	1.423E-02	-0.246
PA-234	1.328E+00	+	9.591E-01	1.907E+00	2.146E-02	0.697
NP-237	6.797E+00		2.414E+01	4.630E+01	4.084E+00	0.147

771110

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130709913_GE5_BAFIL_194057.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : S-84 DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 07:44:30
 Sample ID : 1307099-13 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.18 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	4.73	18	14	0.35	50.81	46	12	1.95E-02	49.9	
2	0	21.14	84	22	0.71	208.19	196	20	9.37E-02	17.0	
3	0	24.94	22	3	0.97	244.69	238	13	2.43E-02	27.3	
4	0	30.96	1999	111	0.78	302.42	290	32	2.22E+00	2.8	
5	1	35.07	372	10	0.62	341.87	331	31	4.13E-01	6.0	1.01E+00
6	1	35.88	96	3	0.62	349.66	331	31	1.06E-01	21.6	
7	0	40.57	11	9	1.06	394.72	386	17	1.25E-02	66.6	
8	0	48.65	19	0	0.16	472.26	465	14	2.11E-02	22.9	
9	1	61.20	58	10	0.71	592.62	584	27	6.49E-02	24.2	1.76E+00
10	1	61.73	184	10	0.71	597.75	584	27	2.05E-01	9.2	
11	4	64.78	30	2	0.66	627.00	625	29	3.30E-02	11.5	2.04E+00
12	4	65.51	47	4	0.66	634.00	625	29	5.27E-02	24.3	
13	4	66.23	74	3	0.78	640.87	625	29	8.24E-02	16.7	
14	4	67.25	16	0	0.48	650.67	625	29	1.76E-02	22.7	
15	2	79.41	52	31	0.84	767.36	753	40	5.79E-02	31.1	9.22E-01
16	2	80.93	839	16	0.70	781.96	753	40	9.32E-01	3.6	
17	0	96.44	6	13	0.47	930.83	920	13	6.67E-03	114.5	
18	0	111.63	227	44	0.86	1076.54	1062	24	2.52E-01	9.2	
19	0	115.78	49	13	1.11	1116.38	1106	20	5.43E-02	21.1	
20	0	160.20	43	12	0.47	1542.64	1530	24	4.78E-02	22.2	
21	0	207.87	12	4	0.13	2000.08	1993	14	1.30E-02	42.9	
22	1	275.08	19	5	1.03	2645.00	2632	25	2.08E-02	42.7	3.73E-01
23	1	275.71	31	4	1.03	2651.00	2632	25	3.46E-02	20.5	
24	3	302.08	156	2	1.13	2904.07	2888	26	1.74E-01	7.7	1.19E+00
25	3	302.60	16	0	1.06	2909.00	2888	26	1.82E-02	46.1	
26	8	332.50	74	3	1.10	3196.00	3181	28	8.20E-02	10.4	1.75E+00
27	8	333.51	8	0	0.47	3205.60	3181	28	8.98E-03	37.9	
28	0	354.99	374	17	1.11	3411.78	3395	30	4.16E-01	5.6	
29	3	381.73	17	2	1.26	3668.33	3663	27	1.86E-02	24.7	9.39E+00
30	3	382.94	145	9	1.16	3680.00	3663	27	1.61E-01	6.9	
31	6	385.35	135	23	1.27	3703.11	3691	25	1.51E-01	10.9	2.36E+00
32	6	386.34	30	5	0.62	3712.61	3691	25	3.33E-02	19.2	
33	0	389.83	30	6	0.66	3746.09	3730	30	3.39E-02	24.1	

Total number of lines in spectrum 33
 Number of unidentified lines 27
 Number of lines tentatively identified by NID 6 18.18%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	4.233E+02	4.234E+02	0.714E+02	16.86	
Total Activity :			4.233E+02	4.234E+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	2.680E+01	2.680E+01	0.628E+01	23.43	
AM-241	432.20Y	1.00	4.888E+00	4.888E+00	2.377E+00	48.62	
Total Activity :			3.168E+01	3.168E+01			

Grand Total Activity : 4.550E+02 4.550E+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		Decay Corr	2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	%Error	
BA-133	81.00	33.00*	1.802E+01	4.233E+02	4.234E+02	16.86	OK	
	302.84	17.80	2.575E+00	1.070E+02	1.070E+02	95.96	OK	
	356.01	60.00	4.312E+00	4.347E+02	4.347E+02	18.33	OK	

Final Mean for 3 Valid Peaks = 4.234E+02+/- 7.139E+01 (16.86%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr	2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	%Error	
TH-234	63.29	3.80*	8.750E+01	2.680E+01	2.680E+01	23.43	OK	

Final Mean for 1 Valid Peaks = 2.680E+01+/- 6.279E+00 (23.43%)

AM-241	59.54	35.90*	1.000E+02	4.888E+00	4.888E+00	48.62	OK
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Final Mean for 1 Valid Peaks = 4.888E+00+/- 2.377E+00 (48.62%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.234E+02	7.139E+01	1.235E+01	1.818E+00	34.280
TH-234	2.680E+01	6.279E+00	1.294E+01	1.665E-01	2.070
AM-241	4.888E+00	2.377E+00	2.132E+00	2.400E-02	2.293

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.309E+00		1.532E+01	2.750E+01	9.324E+00	-0.084
CD-109	-5.941E+01		7.836E+01	1.271E+02	1.224E+01	-0.467
PA-231	-1.445E-01		7.882E-01	1.427E+00	1.606E-02	-0.101
PA-234	3.903E+00	+	1.338E+00	1.962E+00	2.208E-02	1.990
NP-237	-2.520E+00		2.058E+01	3.796E+01	3.349E+00	-0.066

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7/17/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709914_GE5_BAFIL_194061.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-106-SS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:07:45
 Sample ID : 1307099-14 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 00:15:01.14 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	3.91	22	25	0.38	42.91	40	7	2.39E-02	46.3	
2	0	10.34	10	15	1.22	104.60	93	15	1.11E-02	90.1	
3	0	19.91	15	19	0.62	196.47	191	11	1.63E-02	63.6	
4	0	21.18	91	21	0.60	208.63	201	17	1.01E-01	16.3	
5	0	25.30	27	12	0.67	248.11	240	16	2.99E-02	34.6	
6	0	30.97	1954	71	0.79	302.54	291	28	2.17E+00	2.6	
7	1	35.03	353	51	0.62	341.54	328	29	3.92E-01	7.5	1.55E+00
8	1	35.91	114	31	0.57	350.00	328	29	1.27E-01	17.2	
9	0	53.10	47	33	0.48	514.87	505	19	5.23E-02	32.8	
10	0	61.70	205	40	0.93	597.46	586	24	2.28E-01	9.8	
11	0	65.96	127	29	0.95	638.30	624	29	1.41E-01	13.6	
12	2	79.52	62	21	0.84	768.47	757	37	6.94E-02	23.6	8.43E-01
13	2	80.91	792	12	0.66	781.77	757	37	8.80E-01	3.7	
14	0	111.62	185	21	0.54	1076.42	1063	24	2.06E-01	9.1	
15	0	115.98	46	23	0.89	1118.31	1104	21	5.14E-02	25.8	
16	0	205.29	23	3	1.76	1975.30	1964	24	2.60E-02	25.3	
17	1	275.08	16	5	1.13	2645.01	2635	25	1.77E-02	51.3	6.17E+00
18	1	275.81	72	8	1.03	2652.00	2635	25	7.99E-02	10.7	
19	0	301.97	96	9	0.75	2903.02	2888	26	1.07E-01	12.0	
20	5	332.30	34	6	1.10	3194.00	3183	26	3.77E-02	21.4	5.51E-01
21	5	332.96	23	3	0.88	3200.37	3183	26	2.60E-02	28.9	
22	0	354.89	354	11	0.74	3410.76	3393	32	3.93E-01	5.7	
23	4	382.74	118	2	1.16	3678.00	3661	27	1.32E-01	7.8	3.95E+00
24	4	383.56	14	1	0.86	3685.88	3661	27	1.61E-02	26.9	
25	4	385.38	64	11	1.20	3703.39	3691	26	7.07E-02	21.9	8.37E-01
26	4	385.93	66	10	0.78	3708.69	3691	26	7.29E-02	19.1	

Summary of Nuclide Activity

Sample ID : 1307099-14

Acquisition date : 31-JUL-2013 08:07:45

Total number of lines in spectrum 26
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.999E+02	3.999E+02	0.677E+02	16.93	
Total Activity :			3.999E+02	3.999E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	7.150E-01	7.150E-01	12.89E-01	180.33	
PA-234	4.47E+09Y	1.00	4.223E+00	4.223E+00	1.385E+00	32.80	
TH-234	4.47E+09Y	1.00	1.852E+02	1.852E+02	0.372E+02	20.08	
Total Activity :			1.901E+02	1.901E+02			

Grand Total Activity : 5.900E+02 5.900E+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		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.999E+02	3.999E+02	16.93		OK	
	302.84	17.80	2.575E+00	6.293E+02	6.294E+02	35.63		OK	
	356.01	60.00	4.312E+00	4.106E+02	4.106E+02	18.41		OK	

Final Mean for 3 Valid Peaks = 3.999E+02+/- 6.771E+01 (16.93%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
PA-231	9.28	42.00*	1.000E+02	7.150E-01	7.150E-01	180.33		OK	
	10.11	20.20	1.000E+02	1.487E+00	1.487E+00	180.33		OK	
	283.67	1.60	2.191E+00	-----	Line Not Found	-----		Absent	
	302.67	2.30	2.572E+00	4.878E+03	4.878E+03	34.20		OK	

Final Mean for 3 Valid Peaks = 7.150E-01+/- 1.289E+00 (180.33%)

PA-234	9.89	89.00	1.000E+02	3.374E-01	3.374E-01	180.33		OK
	21.72	64.90*	1.000E+02	4.223E+00	4.223E+00	32.80		OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----		Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----		Absent

Final Mean for 2 Valid Peaks = 4.223E+00+/- 1.385E+00 (32.80%)

TH-234	63.29	3.80*	8.750E+01	1.852E+02	1.852E+02	20.08		OK
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Final Mean for 1 Valid Peaks = 1.852E+02+/- 3.718E+01 (20.08%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.999E+02	6.771E+01	1.240E+01	1.825E+00	32.263
PA-231	7.150E-01	1.289E+00	1.605E+00	1.807E-02	0.445
PA-234	4.223E+00	1.385E+00	8.953E-01	1.008E-02	4.717
TH-234	1.852E+02	3.718E+01	2.817E+01	3.624E-01	6.573

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.750E+00	1.388E+01	2.526E+01	8.562E+00	-0.069
CD-109	5.874E+00	8.906E+01	1.659E+02	1.597E+01	0.035
NP-237	-1.725E+01	2.529E+01	4.179E+01	3.686E+00	-0.413
AM-241	1.010E+00	1.501E+00	2.563E+00	2.885E-02	0.394

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709915_GE5_BAFIL_194064.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-106-SS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:28:10
 Sample ID : 1307099-15 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.17 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	15.18	11	7	0.21	151.06	145	13	1.25E-02	55.7	
2	0	21.30	82	47	0.39	209.82	201	19	9.10E-02	24.4	
3	7	29.74	48	47	0.70	290.74	285	30	5.33E-02	32.9	1.71E+00
4	7	30.95	1904	55	0.77	302.40	285	30	2.12E+00	2.5	
5	2	35.06	358	41	0.59	341.82	333	27	3.98E-01	6.8	2.11E+00
6	2	36.00	83	10	0.69	350.86	333	27	9.20E-02	26.9	
7	0	39.80	9	3	0.36	387.25	384	9	1.00E-02	45.9	
8	0	40.68	5	7	0.13	395.74	392	9	5.05E-03	114.8	
9	0	51.93	31	16	0.87	503.72	494	15	3.48E-02	32.5	
10	0	53.19	41	16	0.66	515.78	509	13	4.54E-02	25.6	
11	0	59.16	12	20	0.14	573.11	563	15	1.33E-02	75.5	
12	0	61.75	210	38	0.99	597.91	586	23	2.34E-01	9.5	
13	0	65.98	124	29	1.35	638.48	626	25	1.38E-01	13.4	
14	0	69.92	16	14	0.74	676.36	665	17	1.77E-02	52.7	
15	2	79.57	37	32	0.84	768.96	759	36	4.13E-02	38.7	7.84E-01
16	2	80.93	778	17	0.66	782.01	759	36	8.64E-01	3.8	
17	0	84.20	15	15	0.76	813.35	802	15	1.71E-02	53.3	
18	0	111.72	177	59	0.75	1077.40	1062	27	1.97E-01	12.6	
19	0	116.27	39	40	0.62	1121.08	1106	26	4.31E-02	42.1	
20	0	146.05	23	7	1.29	1406.86	1395	22	2.51E-02	33.4	
21	1	160.14	50	17	0.86	1542.00	1527	25	5.55E-02	18.4	3.51E+00
22	1	160.66	9	9	0.86	1547.00	1527	25	9.68E-03	59.5	
23	0	275.63	54	3	0.77	2650.26	2636	25	6.04E-02	15.0	
24	0	301.96	110	9	0.81	2902.90	2888	25	1.22E-01	10.9	
25	0	332.72	55	10	0.80	3198.06	3182	26	6.07E-02	17.6	
26	0	337.16	22	5	0.66	3240.67	3225	25	2.44E-02	28.6	
27	0	354.97	355	21	0.65	3411.53	3395	31	3.94E-01	5.9	
28	0	382.67	77	11	0.42	3677.36	3662	27	8.58E-02	14.0	
29	0	385.71	142	6	0.69	3706.53	3692	26	1.58E-01	8.9	
30	0	390.05	31	7	0.53	3748.20	3729	27	3.48E-02	23.2	

Summary of Nuclide Activity

Sample ID : 1307099-15

Acquisition date : 31-JUL-2013 08:28:10

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	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.927E+02	3.927E+02	0.668E+02	17.01	
Total Activity :			3.927E+02	3.927E+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	1.898E+02	1.898E+02	0.368E+02	19.37	
AM-241	432.20Y	1.00	1.004E+00	1.004E+00	1.516E+00	150.98	
Total Activity :			1.908E+02	1.908E+02			

Grand Total Activity : 5.835E+02 5.836E+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		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.927E+02	3.927E+02	3.927E+02	17.01	OK	
	302.84	17.80	2.575E+00	7.196E+02	7.197E+02	7.197E+02	34.27	OK	
	356.01	60.00	4.312E+00	4.120E+02	4.120E+02	4.120E+02	18.71	OK	

Final Mean for 3 Valid Peaks = 3.927E+02+/- 6.681E+01 (17.01%)

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*	8.750E+01	1.898E+02	1.898E+02	1.898E+02	19.37	OK	

Final Mean for 1 Valid Peaks = 1.898E+02+/- 3.677E+01 (19.37%)

AM-241	59.54	35.90*	1.000E+02	1.004E+00	1.004E+00	1.004E+00	150.98	OK
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Final Mean for 1 Valid Peaks = 1.004E+00+/- 1.516E+00 (150.98%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.927E+02	6.681E+01	1.510E+01	2.224E+00	26.005
TH-234	1.898E+02	3.677E+01	2.472E+01	3.181E-01	7.679
AM-241	1.004E+00	1.516E+00	2.590E+00	2.915E-02	0.388

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.097E+00		1.595E+01	3.005E+01	1.019E+01	0.136
CD-109	-5.528E+00		9.827E+01	1.781E+02	1.714E+01	-0.031
PA-231	6.439E-02		8.515E-01	1.594E+00	1.794E-02	0.040
PA-234	3.790E+00	+	1.857E+00	2.184E+00	2.459E-02	1.735
NP-237	-2.987E+00		2.520E+01	4.438E+01	3.914E+00	-0.067

7/31/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709916_GE5_BAFIL_194067.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:01:50
 Sample ID : 1307099-16 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:00:20.09 Elapsed real time: 0 00:00:20.12 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	30.93	26	19	0.52	302.14	295	13	1.28E+00	40.4	
2	0	80.90	25	0	0.28	781.64	771	17	1.24E+00	20.0	

Summary of Nuclide Activity
Sample ID : 1307099-16

Page : 2
Acquisition date : 31-JUL-2013 09:01:50

Total number of lines in spectrum	2	
Number of unidentified lines	1	
Number of lines tentatively identified by NID	1	50.00%

**** There are no nuclides meeting summary criteria ****

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Line Activity Report
Sample ID : 1307099-16

Page : 3
Acquisition date : 31-JUL-2013 09:01:50

Flag: "*" = Keyline

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	0.000E+00		0.000E+00	1.398E+02	4.739E+01	0.000
CD-109	0.000E+00		0.000E+00	8.482E+02	8.163E+01	0.000
BA-133	5.655E+02	+	2.421E+02	5.870E+02	8.643E+01	0.963
PA-231	0.000E+00		0.000E+00	8.657E+00	9.745E-02	0.000
PA-234	-1.915E-01		8.485E+00	1.923E+01	2.165E-01	-0.010
TH-234	-1.132E+02		1.936E+02	3.297E+02	4.242E+00	-0.343
NP-237	8.461E+01		1.694E+02	6.221E+02	5.487E+01	0.136
AM-241	-9.690E-02		1.074E+01	2.755E+01	3.102E-01	-0.004

C
7/17/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130709917_GE5_BAFIL_194072.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-AD DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:21:35
 Sample ID : 1307099-17 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 00:15:01.16 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	16.43	11	8	0.53	163.07	156	11	1.21E-02	59.3	
2	1	20.80	31	20	0.50	205.00	195	26	3.39E-02	41.7	2.43E+00
3	1	21.32	56	14	0.51	210.00	195	26	6.23E-02	22.2	
4	0	30.98	1961	67	0.72	302.67	289	31	2.18E+00	2.6	
5	2	35.11	410	16	0.68	342.24	330	31	4.56E-01	5.8	1.34E+00
6	2	35.91	97	9	0.57	350.00	330	31	1.08E-01	20.2	
7	2	52.15	20	2	0.55	505.79	504	24	2.24E-02	17.2	1.39E+00
8	2	53.33	38	17	0.75	517.14	504	24	4.28E-02	32.5	
9	0	61.77	269	36	0.88	598.10	586	28	2.99E-01	8.1	
10	1	65.51	57	28	0.66	634.00	625	27	6.38E-02	25.3	2.49E+00
11	1	66.66	29	24	0.66	645.00	625	27	3.26E-02	40.4	
12	5	79.50	58	9	0.85	768.22	761	33	6.39E-02	15.5	2.02E+00
13	5	80.91	747	10	0.73	781.75	761	33	8.31E-01	3.8	
14	0	89.94	8	2	0.48	868.43	862	12	8.81E-03	47.2	
15	0	111.55	172	47	0.62	1075.76	1060	28	1.91E-01	12.2	
16	0	116.11	24	55	0.78	1119.53	1107	22	2.72E-02	68.6	
17	0	191.12	9	12	0.50	1839.35	1827	17	9.62E-03	80.1	
18	0	275.70	48	7	0.43	2650.89	2636	24	5.35E-02	17.8	
19	2	301.76	194	8	1.06	2901.00	2887	28	2.15E-01	6.1	7.56E+00
20	2	302.40	18	5	1.00	2907.09	2887	28	1.99E-02	55.4	
21	4	332.30	20	10	1.10	3194.00	3181	26	2.25E-02	45.8	5.96E-01
22	4	332.96	29	5	0.72	3200.37	3181	26	3.24E-02	25.6	
23	0	354.98	378	9	0.79	3411.69	3395	31	4.20E-01	5.4	
24	1	382.21	70	6	1.16	3673.00	3661	27	7.80E-02	14.9	2.54E+00
25	1	382.84	47	6	1.16	3679.00	3661	27	5.23E-02	21.9	
26	0	385.69	167	6	1.00	3706.34	3690	30	1.86E-01	8.3	

Summary of Nuclide Activity

Sample ID : 1307099-17

Acquisition date : 31-JUL-2013 09:21:35

Total number of lines in spectrum 26
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
CD-109	464.00D	1.00	5.554E+01	5.558E+01	5.274E+01	94.90	
BA-133	10.50Y	1.00	3.774E+02	3.774E+02	0.642E+02	17.02	
Total Activity :			4.329E+02	4.330E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	2.430E+02	2.430E+02	0.408E+02	16.81	
Total Activity :			2.430E+02	2.430E+02			

Grand Total Activity : 6.759E+02 6.759E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
CD-109	88.03	3.72*	1.153E+01	5.554E+01	5.558E+01	94.90	OK

Final Mean for 1 Valid Peaks = 5.558E+01 +/- 5.274E+01 (94.90%)

BA-133	81.00	33.00*	1.802E+01	3.774E+02	3.774E+02	17.02	OK
	302.84	17.80	2.575E+00	1.175E+02	1.175E+02	113.88	OK
	356.01	60.00	4.312E+00	4.387E+02	4.387E+02	18.04	OK

Final Mean for 3 Valid Peaks = 3.774E+02 +/- 6.422E+01 (17.02%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.430E+02	2.430E+02	16.81	OK

Final Mean for 1 Valid Peaks = 2.430E+02 +/- 4.084E+01 (16.81%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	5.558E+01	5.274E+01	1.525E+02	1.468E+01	0.364
BA-133	3.774E+02	6.422E+01	1.425E+01	2.098E+00	26.490
TH-234	2.430E+02	4.084E+01	2.593E+01	3.336E-01	9.371

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.041E+00		1.342E+01	2.332E+01	7.905E+00	-0.216
PA-231	3.436E-01		7.644E-01	1.539E+00	1.732E-02	0.223
PA-234	2.593E+00	+	1.155E+00	1.786E+00	2.010E-02	1.452
NP-237	3.735E+00		2.545E+01	4.763E+01	4.201E+00	0.078
AM-241	2.667E-01		1.466E+00	2.322E+00	2.614E-02	0.115