

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-07100-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 # 13-07100

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/16/13	KC	Sample Log-In
		8-6-13	JG	Data Compilation
		8-7-13	MSA	First Technical Data Review
		8/7/13	MSA	Second Technical Data Review
		8/7/13	[Signature]	Data Entry/Electronic Deliverable
		8/7/13	[Signature]	Case Narrative
		8/7/13	KBA	Electronic Deliverable Proof
		8/7/13	MSA	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		8/7/13	MSA	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by: [Signature] 8/12/13
 Laboratory Manager Date

Copy No. _____

Radiochemistry Services

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SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET



Internal Chain of Custody

Work Order #	13-07100
Lab Deadline	8/6/2013
Analysis	UIISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fractions 04,06,08,10,12,14,16 & 18 are TOTAL</p> <p>Fractions 05,07,09,11,13,15,17 & 19 are DISSOLVED</p> <p>MUST USE Fxn 04 as DUP</p>	04	44	U1.1
	05	44	U1.1
	06	42	U1.1
	07	42	U1.1
	08	44	U1.1
	09	44	U1.1
	10	41	U1.1
	11	41	U1.1
	12	45	U1.1
	13	45	U1.1
	14	37	U1.1
	15	37	U1.1
	16	40	U1.1
	17	40	U1.1
	18	42	U1.1
	19	42	U1.1

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/23/13 1000
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/23/13 0400
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0400 km	7/26/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0950 km	7/30/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0950	7/17
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	7/17/13 0126
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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Internal Chain of Custody

Work Order #	13-07100
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 & 18 are TOTAL</p> <p>Fractions 05,07,09,11,13,15,17 & 19 are DISSOLVED</p> <p>MUST USE Fxn 04 as DUP</p>	04	44	U1.1
	05	44	U1.1
	06	42	U1.1
	07	42	U1.1
	08	44	U1.1
	09	44	U1.1
	10	41	U1.1
	11	41	U1.1
	12	45	U1.1
	13	45	U1.1
	14	37	U1.1
	15	37	U1.1
	16	40	U1.1
	17	40	U1.1
	18	42	U1.1
	19	42	U1.1

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/23/13 1000
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	7/23/13 1000
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0530 TUN	7/25/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1000 TUN	7/25/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1000	7/25
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1000	7/29/13 1557
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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Internal Chain of Custody

Work Order #

13-07100

Lab Deadline

8/6/2013

Analysis

Ra226 - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
Fractions 04,06,08,10,12,14,16 & 18 are TOTAL Fractions 05,07,09,11,13,15,17 & 19 are DISSOLVED	04	44	U1.1
	05	44	U1.1
	06	42	U1.1
	07	42	U1.1
	08	44	U1.1
	09	44	U1.1
	10	41	U1.1
	11	41	U1.1
	12	45	U1.1
	13	45	U1.1
MUST USE Fxn 04 as DUP	14	37	U1.1
	15	37	U1.1
	16	40	U1.1
	17	40	U1.1
	18	42	U1.1
	19	42	U1.1

	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	JW	7/23/13 1700
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/24/13 1710
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/25/13 1625
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/29/13 2005
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/17/13 0550
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	7/31/13 1832
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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Internal Chain of Custody

Work Order #	13-07100
Lab Deadline	8/6/2013
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fractions 04,06,08,10,12,14,16 & 18 are TOTAL</p> <p>Fractions 05,07,09,11,13,15,17 & 19 are DISSOLVED</p> <p>MUST USE Fxn 04 as DUP</p>	04	44	U1.1
	05	44	U1.1
	06	42	U1.1
	07	42	U1.1
	08	44	U1.1
	09	44	U1.1
	10	41	U1.1
	11	41	U1.1
	12	45	U1.1
	13	45	U1.1
	14	37	U1.1
	15	37	U1.1
	16	40	U1.1
	17	40	U1.1
	18	42	U1.1
	19	42	U1.1

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Wolfe	7/23/13 1000
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	yw	7/24/13 1710
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	yw	7/25/13 1625
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	yw	7/29/13 2005
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		7/170-0500
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	7/31/13 1832
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	yw	8/1/13 1230
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ycw	8/6/13 0759
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		Billman OTRs
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	8/6/13 1206
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

13-07100

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	U1.1		
02	BLANK	0		WA	U1.1		
03	DUP	0		WA	U1.1		
04	PZ-113-AS TOT / <i>DUP</i>	3		WA	U1.1	12.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	43
			2	<2	<2	4.0000	36
			3	<2	<2	4.0000	44
05	PZ-113-AS DIS /	3		WA	U1.1	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
			2				36
			3				44
06	PZ-109-SS TOT /	2		WA	U1.1	8.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	33
			2	<2	<2	4.0000	42
07	PZ-109-SS DIS /	2		WA	U1.1	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				33
			2				42
08	PZ-205-SS TOT /	2		WA	U1.1	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	44
			2	<2	<2	4.0000	44
09	PZ-205-SS DIS /	2		WA	U1.1	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				44
			2				44
10	DUP 02 TOT /	2		WA	U1.1	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	37
			2	<2	<2	4.0000	41
11	DUP 02 DIS /	2		WA	U1.1	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				37
			2				41
12	PZ-113-SS TOT /	2		WA	U1.1	8.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	45
			2	<2	<2	4.0000	44
13	PZ-113-SS DIS /	2		WA	U1.1	0.00	45
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
			2				44
14	PZ-104-SS TOT /	2		WA	U1.1	8.00	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	33
			2	<2	<2	4.0000	37
15	PZ-104-SS DIS /	2		WA	U1.1	0.00	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				33
			2				37
16	PZ-101-SS TOT /	2		WA	U1.1	8.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	40
			2	<2	<2	4.0000	35
17	PZ-101-SS DIS /	2		WA	U1.1	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
			2				35
18	PZ-104-SD TOT /	2		WA	U1.1	8.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	35
			2	<2	<2	4.0000	42
19	PZ-104-SD DIS /	2		WA	U1.1	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM

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very old 13

Received by: *Kristen Coulston*

Date: *7/16/13*



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(Volumes, pH, & CPM)

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
				1			35
				2			42

16yt
07/16/13

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Received by: Kristen Carlota Date: 7/16/13

SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST

MP-001-2

WORK ORDER # 13-07100

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

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

WERE SAMPLES:

Received in good condition?	<u>Y</u>	N	
If aqueous, properly preserved	<u>Y</u>	N	N/A

WERE CHAIN OF CUSTODY SEALS:

Present on outside of package?	<u>Y</u>	N
Unbroken on outside of package?	<u>Y</u>	N
Present on samples?	<u>Y</u>	N
Unbroken on samples?	<u>Y</u>	N
Was chain of custody present upon sample receipt?	<u>Y</u>	N

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

REMARKS: _____

SIGNATURE: Kristen Caulata DATE: 7/16/13

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**SECTION III
CASE NARRATIVE**



EBS-OR-35931

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 # 13-07100-OR

SAMPLE RECEIPT

This work order contains eight water samples received 07/15/2013. All samples were analyzed as total and dissolved for Isotopic Uranium, Isotopic Thorium and Radium-226/228.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
PZ-113-AS TOT	13-07100-04	PZ-113-SS TOT	13-07100-12
PZ-113-AS DIS	13-07100-05	PZ-113-SS DIS	13-07100-13
PZ-109-SS TOT	13-07100-06	PZ-104-SS TOT	13-07100-14
PZ-109-SS DIS	13-07100-07	PZ-104-SS DIS	13-07100-15
PZ-205-SS TOT	13-07100-08	PZ-101-SS TOT	13-07100-16
PZ-205-SS DIS	13-07100-09	PZ-101-SS DIS	13-07100-17
DUP 02 TOT	13-07100-10	PZ-104-SD TOT	13-07100-18
DUP 02 DIS	13-07100-11	PZ-104-SD DIS	13-07100-19

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

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ANALYTICAL RESULTS CONTINUED

ISOTOPIC URANIUM

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

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly low for sample fractions -10, -11, -16, -18 and -19 (Client IDs: DUP 02 TOT, DUP 02 DIS, PZ-101-SS TOT, PZ-104-SD TOT and PZ-104-SD DIS, respectively). Chemical recovery was acceptable for all other samples. The Uranium-234, Uranium-235, and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 and Uranium-238 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 and Thorium-230 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Thorium-232 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Thorium-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-226

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

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

ANALYTICAL RESULTS CONTINUED

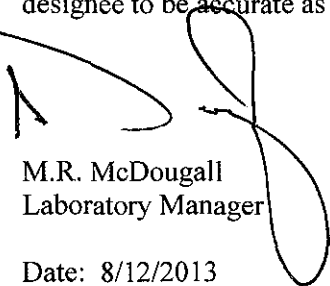
RADIUM-228

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

Samples demonstrated acceptable results for all Radium-228 analyses. Results for sample fraction -18 (Client ID: PZ-104-SD TOT) demonstrated a slightly high detection limit. Chemical recovery was acceptable for all samples. The Radium-228 method blank demonstrated acceptable results. Results for the Radium-228 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 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**

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
LCS13-07100-01	13-07100-01	07/31/2013 12:16:34	Radium-226	E903.0	9.83	1.15	2.38	0.19		pCi/l
LCS13-07100-01	13-07100-01	08/06/2013 08:10:25	Radium-228	E904.0	9.43	1.83	2.81	1.76		pCi/l
LCS13-07100-01	13-07100-01	07/29/2013 09:59:49	Thorium-228	HASL 300, 4.5.2	5.36	1.14	1.25	0.18		pCi/l
LCS13-07100-01	13-07100-01	07/29/2013 09:59:49	Thorium-230	HASL 300, 4.5.2	4.75	1.04	1.20	0.13		pCi/l
LCS13-07100-01	13-07100-01	07/29/2013 09:59:49	Thorium-232	HASL 300, 4.5.2	6.05	1.26	1.37	0.17		pCi/l
LCS13-07100-01	13-07100-01	07/30/2013 13:04:18	Uranium-234	HASL 300, 4.5.2	7.72	1.40	1.51	0.16		pCi/l
LCS13-07100-01	13-07100-01	07/30/2013 13:04:18	Uranium-235	HASL 300, 4.5.2	0.96	0.37	0.37	0.17		pCi/l
LCS13-07100-01	13-07100-01	07/30/2013 13:04:18	Uranium-238	HASL 300, 4.5.2	7.39	1.35	1.45	0.17		pCi/l
BLANK13-07100-02	13-07100-02	07/31/2013 12:16:31	Radium-226	E903.0	-0.03	0.06	0.06	0.19	U	pCi/l
BLANK13-07100-02	13-07100-02	08/06/2013 08:07:49	Radium-228	E904.0	0.20	0.41	0.41	0.86	U	pCi/l
BLANK13-07100-02	13-07100-02	07/29/2013 09:59:50	Thorium-228	HASL 300, 4.5.2	0.01	0.04	0.04	0.10	U	pCi/l
BLANK13-07100-02	13-07100-02	07/29/2013 09:59:50	Thorium-230	HASL 300, 4.5.2	0.11	0.10	0.10	0.10	J	pCi/l
BLANK13-07100-02	13-07100-02	07/29/2013 09:59:50	Thorium-232	HASL 300, 4.5.2	0.02	0.06	0.06	0.12	U	pCi/l
BLANK13-07100-02	13-07100-02	07/30/2013 13:04:19	Uranium-234	HASL 300, 4.5.2	0.16	0.09	0.10	0.08	J	pCi/l
BLANK13-07100-02	13-07100-02	07/30/2013 13:04:19	Uranium-235	HASL 300, 4.5.2	0.03	0.06	0.06	0.10	U	pCi/l
BLANK13-07100-02	13-07100-02	07/30/2013 13:04:19	Uranium-238	HASL 300, 4.5.2	0.09	0.07	0.07	0.06	J	pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/31/2013 12:16:32	Radium-226	E903.0	0.66	0.34	0.36	0.26		pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	08/06/2013 08:07:49	Radium-228	E904.0	0.68	0.52	0.54	1.02	J	pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/29/2013 09:59:46	Thorium-228	HASL 300, 4.5.2	0.07	0.06	0.06	0.06	J	pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/29/2013 09:59:46	Thorium-230	HASL 300, 4.5.2	0.23	0.11	0.12	0.07		pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/29/2013 09:59:46	Thorium-232	HASL 300, 4.5.2	0.02	0.03	0.03	0.06	U	pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/30/2013 13:04:20	Uranium-234	HASL 300, 4.5.2	0.63	0.23	0.23	0.13		pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/30/2013 13:04:20	Uranium-235	HASL 300, 4.5.2	0.07	0.10	0.10	0.16	U	pCi/l
PZ-113-AS TOT_07_10_2013 DUP	13-07100-03	07/30/2013 13:04:20	Uranium-238	HASL 300, 4.5.2	0.38	0.17	0.17	0.11		pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/31/2013 12:16:26	Radium-226	E903.0	0.65	0.30	0.33	0.19		pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	08/06/2013 08:07:49	Radium-228	E904.0	0.53	0.54	0.56	1.10	U	pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/29/2013 09:59:47	Thorium-228	HASL 300, 4.5.2	0.06	0.07	0.07	0.09	U	pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/29/2013 09:59:47	Thorium-230	HASL 300, 4.5.2	0.21	0.12	0.12	0.09		pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/29/2013 09:59:47	Thorium-232	HASL 300, 4.5.2	0.12	0.09	0.09	0.09	J	pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/30/2013 13:04:21	Uranium-234	HASL 300, 4.5.2	0.69	0.26	0.26	0.13		pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/30/2013 13:04:21	Uranium-235	HASL 300, 4.5.2	0.14	0.13	0.13	0.14	J	pCi/l
PZ-113-AS TOT_07_10_2013	13-07100-04	07/30/2013 13:04:21	Uranium-238	HASL 300, 4.5.2	0.62	0.24	0.25	0.13		pCi/l



Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-113-AS DIS_07_10_2013	13-07100-05	07/31/2013 12:16:29	Radium-226	E903.0	0.43	0.27	0.29	0.22	J	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	08/06/2013 08:07:50	Radium-228	E904.0	1.39	0.57	0.65	1.06	J	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/29/2013 12:39:48	Thorium-228	HASL 300, 4.5.2	0.09	0.08	0.08	0.09	J	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/29/2013 12:39:48	Thorium-230	HASL 300, 4.5.2	0.10	0.07	0.07	0.06	J	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/29/2013 12:39:48	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.07	U	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/30/2013 13:04:22	Uranium-234	HASL 300, 4.5.2	0.56	0.24	0.25	0.17		pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/30/2013 13:04:22	Uranium-235	HASL 300, 4.5.2	0.18	0.15	0.15	0.16	J	pCi/l
PZ-113-AS DIS_07_10_2013	13-07100-05	07/30/2013 13:04:22	Uranium-238	HASL 300, 4.5.2	0.22	0.17	0.17	0.21	J	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/31/2013 12:16:23	Radium-226	E903.0	1.46	0.45	0.54	0.21		pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	08/06/2013 08:07:54	Radium-228	E904.0	1.34	0.61	0.68	1.14	J	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/29/2013 12:39:49	Thorium-228	HASL 300, 4.5.2	0.06	0.08	0.08	0.14	U	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/29/2013 12:39:49	Thorium-230	HASL 300, 4.5.2	0.05	0.07	0.07	0.11	U	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/29/2013 12:39:49	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.07	U	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/30/2013 13:05:37	Uranium-234	HASL 300, 4.5.2	1.36	0.31	0.32	0.06		pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/30/2013 13:05:37	Uranium-235	HASL 300, 4.5.2	0.17	0.11	0.11	0.10	J	pCi/l
PZ-109-SS TOT_07_10_2013	13-07100-06	07/30/2013 13:05:37	Uranium-238	HASL 300, 4.5.2	0.54	0.18	0.18	0.08		pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/31/2013 12:16:24	Radium-226	E903.0	2.15	0.59	0.74	0.24		pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	08/06/2013 08:07:55	Radium-228	E904.0	1.88	0.73	0.84	1.34	J	pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/29/2013 12:39:42	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.12	U	pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/29/2013 12:39:42	Thorium-230	HASL 300, 4.5.2	0.13	0.09	0.09	0.09	J	pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/29/2013 12:39:42	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.04	0.05	U	pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/30/2013 13:05:39	Uranium-234	HASL 300, 4.5.2	1.40	0.30	0.32	0.05		pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/30/2013 13:05:39	Uranium-235	HASL 300, 4.5.2	0.13	0.09	0.09	0.09	J	pCi/l
PZ-109-SS DIS_07_10_2013	13-07100-07	07/30/2013 13:05:39	Uranium-238	HASL 300, 4.5.2	0.61	0.19	0.19	0.08		pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/31/2013 15:15:04	Radium-226	E903.0	1.06	0.38	0.44	0.21		pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	08/06/2013 08:07:55	Radium-228	E904.0	1.21	0.62	0.68	1.18	J	pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/29/2013 12:39:43	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.06	0.11	U	pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/29/2013 12:39:43	Thorium-230	HASL 300, 4.5.2	0.04	0.06	0.06	0.09	U	pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/29/2013 12:39:43	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.03	0.07	U	pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/30/2013 13:05:33	Uranium-234	HASL 300, 4.5.2	0.54	0.17	0.18	0.07		pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/30/2013 13:05:33	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.10	0.09	J	pCi/l
PZ-205-SS TOT_07_10_2013	13-07100-08	07/30/2013 13:05:33	Uranium-238	HASL 300, 4.5.2	0.45	0.16	0.16	0.06		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>
PZ-205-SS DIS_07_10_2013	13-07100-09	07/31/2013 15:15:05	Radium-226	E903.0	0.93	0.36	0.41	0.29		pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	08/06/2013 08:07:56	Radium-228	E904.0	0.77	0.73	0.76	1.49	J	pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/29/2013 12:39:44	Thorium-228	HASL 300, 4.5.2	0.01	0.03	0.03	0.08	U	pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/29/2013 12:39:44	Thorium-230	HASL 300, 4.5.2	0.14	0.09	0.10	0.07	J	pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/29/2013 12:39:44	Thorium-232	HASL 300, 4.5.2	0.06	0.06	0.06	0.06	U	pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/30/2013 13:05:34	Uranium-234	HASL 300, 4.5.2	0.47	0.16	0.17	0.06		pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/30/2013 13:05:34	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.09	0.10	J	pCi/l
PZ-205-SS DIS_07_10_2013	13-07100-09	07/30/2013 13:05:34	Uranium-238	HASL 300, 4.5.2	0.42	0.15	0.16	0.06		pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/31/2013 15:14:57	Radium-226	E903.0	2.78	0.72	0.93	0.38		pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	08/06/2013 08:07:47	Radium-228	E904.0	7.16	0.93	1.87	1.30		pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/29/2013 12:39:45	Thorium-228	HASL 300, 4.5.2	0.19	0.11	0.11	0.12	J	pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/29/2013 12:39:45	Thorium-230	HASL 300, 4.5.2	0.12	0.08	0.09	0.08	J	pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/29/2013 12:39:45	Thorium-232	HASL 300, 4.5.2	0.02	0.04	0.04	0.07	U	pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/30/2013 13:05:36	Uranium-234	HASL 300, 4.5.2	0.31	0.30	0.30	0.32	J	pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/30/2013 13:05:36	Uranium-235	HASL 300, 4.5.2	0.07	0.16	0.16	0.34	U	pCi/l
DUP 02 TOT_07_10_2013	13-07100-10	07/30/2013 13:05:36	Uranium-238	HASL 300, 4.5.2	0.05	0.13	0.13	0.28	U	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/31/2013 15:14:58	Radium-226	E903.0	3.45	0.80	1.08	0.28		pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	08/06/2013 08:07:48	Radium-228	E904.0	7.98	1.14	2.14	1.76		pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/29/2013 12:39:46	Thorium-228	HASL 300, 4.5.2	0.07	0.08	0.08	0.13	U	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/29/2013 12:39:46	Thorium-230	HASL 300, 4.5.2	0.09	0.07	0.07	0.07	J	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/29/2013 12:39:46	Thorium-232	HASL 300, 4.5.2	0.00	0.03	0.03	0.07	U	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/30/2013 13:05:44	Uranium-234	HASL 300, 4.5.2	0.33	0.29	0.29	0.28	J	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/30/2013 13:05:44	Uranium-235	HASL 300, 4.5.2	-0.04	0.15	0.15	0.38	U	pCi/l
DUP 02 DIS_07_10_2013	13-07100-11	07/30/2013 13:05:44	Uranium-238	HASL 300, 4.5.2	0.33	0.29	0.29	0.28	J	pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/31/2013 15:14:59	Radium-226	E903.0	2.12	0.51	0.68	0.17		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	08/06/2013 08:07:48	Radium-228	E904.0	1.31	0.69	0.75	1.33	J	pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/29/2013 12:39:47	Thorium-228	HASL 300, 4.5.2	0.20	0.11	0.11	0.06		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/29/2013 12:39:47	Thorium-230	HASL 300, 4.5.2	0.32	0.15	0.15	0.09		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/29/2013 12:39:47	Thorium-232	HASL 300, 4.5.2	0.17	0.10	0.10	0.06		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/30/2013 13:05:46	Uranium-234	HASL 300, 4.5.2	1.72	0.37	0.39	0.09		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/30/2013 13:05:46	Uranium-235	HASL 300, 4.5.2	0.19	0.12	0.12	0.07		pCi/l
PZ-113-SS TOT_07_11_2013	13-07100-12	07/30/2013 13:05:46	Uranium-238	HASL 300, 4.5.2	0.99	0.26	0.27	0.09		pCi/l



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Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-113-SS DIS_07_11_2013	13-07100-13	07/31/2013 15:15:00	Radium-226	E903.0	1.99	0.51	0.66	0.21		pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	08/06/2013 08:07:48	Radium-228	E904.0	1.79	0.63	0.75	1.16	J	pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/29/2013 12:40:07	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.12	U	pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/29/2013 12:40:07	Thorium-230	HASL 300, 4.5.2	0.12	0.08	0.08	0.07	J	pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/29/2013 12:40:07	Thorium-232	HASL 300, 4.5.2	0.03	0.06	0.06	0.10	U	pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/30/2013 13:05:40	Uranium-234	HASL 300, 4.5.2	1.49	0.31	0.32	0.07		pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/30/2013 13:05:40	Uranium-235	HASL 300, 4.5.2	0.12	0.09	0.09	0.08	J	pCi/l
PZ-113-SS DIS_07_11_2013	13-07100-13	07/30/2013 13:05:40	Uranium-238	HASL 300, 4.5.2	0.83	0.22	0.23	0.11		pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/31/2013 15:15:02	Radium-226	E903.0	1.99	0.49	0.65	0.22		pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	08/06/2013 08:10:22	Radium-228	E904.0	1.23	0.67	0.73	1.30	J	pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/29/2013 12:40:08	Thorium-228	HASL 300, 4.5.2	0.05	0.06	0.06	0.08	U	pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/29/2013 12:40:08	Thorium-230	HASL 300, 4.5.2	0.11	0.08	0.08	0.06	J	pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/29/2013 12:40:08	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.04	0.06	U	pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/30/2013 13:05:42	Uranium-234	HASL 300, 4.5.2	0.52	0.17	0.18	0.06		pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/30/2013 13:05:42	Uranium-235	HASL 300, 4.5.2	0.11	0.09	0.09	0.07	J	pCi/l
PZ-104-SS TOT_07_11_2013	13-07100-14	07/30/2013 13:05:42	Uranium-238	HASL 300, 4.5.2	0.22	0.11	0.11	0.08		pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/31/2013 15:15:03	Radium-226	E903.0	1.76	0.57	0.68	0.28		pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	08/06/2013 08:10:22	Radium-228	E904.0	1.15	0.78	0.82	1.54	J	pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/29/2013 12:40:09	Thorium-228	HASL 300, 4.5.2	0.02	0.07	0.07	0.15	U	pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/29/2013 12:40:09	Thorium-230	HASL 300, 4.5.2	0.05	0.06	0.06	0.07	U	pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/29/2013 12:40:09	Thorium-232	HASL 300, 4.5.2	0.04	0.06	0.06	0.09	U	pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/30/2013 16:13:31	Uranium-234	HASL 300, 4.5.2	0.31	0.13	0.13	0.05		pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/30/2013 16:13:31	Uranium-235	HASL 300, 4.5.2	0.02	0.04	0.05	0.10	U	pCi/l
PZ-104-SS DIS_07_11_2013	13-07100-15	07/30/2013 16:13:31	Uranium-238	HASL 300, 4.5.2	0.12	0.08	0.08	0.08	J	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/31/2013 15:15:31	Radium-226	E903.0	23.66	2.04	5.40	0.24		pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	08/06/2013 08:10:23	Radium-228	E904.0	3.48	0.74	1.08	1.21		pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/29/2013 12:40:10	Thorium-228	HASL 300, 4.5.2	-0.01	0.07	0.07	0.19	U	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/29/2013 12:40:10	Thorium-230	HASL 300, 4.5.2	0.24	0.15	0.16	0.09	J	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/29/2013 12:40:10	Thorium-232	HASL 300, 4.5.2	0.05	0.08	0.08	0.13	U	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/30/2013 16:13:33	Uranium-234	HASL 300, 4.5.2	0.55	0.41	0.42	0.30	J	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/30/2013 16:13:33	Uranium-235	HASL 300, 4.5.2	0.09	0.24	0.24	0.52	U	pCi/l
PZ-101-SS TOT_07_11_2013	13-07100-16	07/30/2013 16:13:33	Uranium-238	HASL 300, 4.5.2	0.28	0.32	0.32	0.42	U	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>
PZ-101-SS DIS_07_11_2013	13-07100-17	07/31/2013 15:15:32	Radium-226	E903.0	27.91	2.37	6.36	0.21		pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	08/06/2013 08:10:23	Radium-228	E904.0	2.74	0.81	1.02	1.45		pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/29/2013 12:40:11	Thorium-228	HASL 300, 4.5.2	0.08	0.08	0.08	0.10	U	pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/29/2013 12:40:11	Thorium-230	HASL 300, 4.5.2	0.19	0.11	0.11	0.09	J	pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/29/2013 12:40:11	Thorium-232	HASL 300, 4.5.2	0.04	0.05	0.05	0.07	U	pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/30/2013 16:13:28	Uranium-234	HASL 300, 4.5.2	0.53	0.25	0.25	0.14		pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/30/2013 16:13:28	Uranium-235	HASL 300, 4.5.2	0.00	0.09	0.09	0.19	U	pCi/l
PZ-101-SS DIS_07_11_2013	13-07100-17	07/30/2013 16:13:28	Uranium-238	HASL 300, 4.5.2	0.48	0.23	0.24	0.12		pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/31/2013 15:15:33	Radium-226	E903.0	4.08	0.86	1.22	0.22		pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	08/06/2013 10:04:58	Radium-228	E904.0	-0.15	1.06	1.06	2.28	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/29/2013 12:40:12	Thorium-228	HASL 300, 4.5.2	-0.04	0.07	0.07	0.22	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/29/2013 12:40:12	Thorium-230	HASL 300, 4.5.2	0.09	0.10	0.10	0.15	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/29/2013 12:40:12	Thorium-232	HASL 300, 4.5.2	-0.04	0.05	0.05	0.17	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/30/2013 16:13:30	Uranium-234	HASL 300, 4.5.2	0.10	0.17	0.17	0.29	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/30/2013 16:13:30	Uranium-235	HASL 300, 4.5.2	0.00	0.21	0.21	0.46	U	pCi/l
PZ-104-SD TOT_07_11_2013	13-07100-18	07/30/2013 16:13:30	Uranium-238	HASL 300, 4.5.2	0.22	0.25	0.25	0.29	U	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/31/2013 15:15:34	Radium-226	E903.0	7.39	1.50	2.16	0.51		pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	08/06/2013 10:04:58	Radium-228	E904.0	2.50	0.88	1.05	1.62		pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/29/2013 12:40:13	Thorium-228	HASL 300, 4.5.2	0.03	0.05	0.05	0.09	U	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/29/2013 12:40:13	Thorium-230	HASL 300, 4.5.2	0.12	0.09	0.09	0.09	J	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/29/2013 12:40:13	Thorium-232	HASL 300, 4.5.2	0.08	0.07	0.07	0.07	J	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/30/2013 16:17:20	Uranium-234	HASL 300, 4.5.2	0.21	0.24	0.24	0.28	U	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/30/2013 16:17:20	Uranium-235	HASL 300, 4.5.2	-0.01	0.14	0.14	0.30	U	pCi/l
PZ-104-SD DIS_07_11_2013	13-07100-19	07/30/2013 16:17:20	Uranium-238	HASL 300, 4.5.2	0.17	0.20	0.20	0.24	U	pCi/l



SECTION V
ANALYTICAL STANDARDS

QA/QC REVIEWED

Date 1/16/95 Initials WA

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

U-8

Radionuclide:	U-238NAT	Customer:	TMA EBERLINE
Half Life:	$(4.468 \pm 0.005) \times 10^9$ years	P.O.No.:	OR2778
Catalog No.:	7338	Reference Date:	January 1 1995 12:00 PST.
Source No.:	479-50	Contained Radioactivity:	(Total U) 8.016 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

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

 ERIC ALLAS
QUALITY CONTROL

29 DECEMBER 1994
Date Signed



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

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

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

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

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

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

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

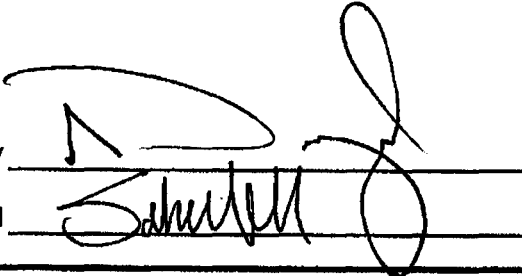
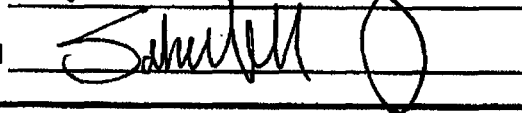
Chemical Composition of Standard Solution
Uranyl nitrate in dilute HNO₃

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 
QC Approval 

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



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

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

Radionuclide of Interest 234, 235, 238 U Reference Date 1/1/1995 0:00
Parent Solution Conc. 1.7796E+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 **5.356 grams**
Volume of solution **5.035 millilitres**
Total activity of U-232 **3.61E+04 becquerels**
which is equivalent to **9.76E-01 microcuries**

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

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

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

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

Not measured

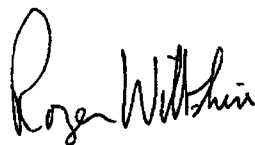
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO₃ solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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

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

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

Approved
Signatory



Roger Wiltshire

Project Ref. AE2315

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



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

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

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

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

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

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



Dilution Instructions: Dilution Solvent Used 2M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: December 7, 2013

Verified & Approved By 
QC Approval 

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

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 2M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

NOTES:

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

Expiration Date: December 7, 2013

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

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	Customer:	TMA EBERLINE
Half Life:	(7.54 ± 0.03) x 10 ⁴ years	P.O.No.:	TT4944
Catalog No.:	7230	Reference Date:	November 1 1991 12:00 PST.
Source No.:	388-116	Contained Radioactivity:	1.036 μCi.

Description of Solution

a. Mass of solution:	5.0042	grams.
b. Chemical form:	Th(NO ₃) ₄ in 0.1N HNO ₃	
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 μCi/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:	±2.0%
b. Random uncertainty in assay:	±0.5%
c. Random uncertainty in weighing(s):	±0.2%
d. Total uncertainty at the 99% confidence level:	±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)



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

Solution Reference # **MP-009**
IPL 388-116

Date **3/4/2013 0:00**
Solution # **Th-1b**

Principal Radionuclide

Half Life, Years

Half Life, Days

²³⁰Th

7.540E+04

2.754E+07

Radionuclide of Interest

²³⁰Thorium

Reference Date

11/1/1991 0:00

Parent Solution Conc. **2.30E+03** dpm/ml

Chemical Composition of Standard Solution

²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions:

Dilution Solvent Used

0.1N HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: **10.0000** ml
Total Activity: **2.2999E+04** dpm
Final 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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EBERLINE SERVICES - OAK RIDGE LABORATORY RADIOACTIVE REFERENCE SOLUTIONS PRIMARY DILUTION RECERTIFICATION MP 009

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

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

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

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

Chemical Composition of Standard Solution
²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions: Dilution Solvent Used 0.1N HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: March 4, 2014

Recertified By [Signature] Date: 3/21/2013 0:00
QC Approval [Signature] Date: 3/21/13

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CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Description of Solution

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

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

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

Radionuclide Concentration

(Th-232) 0.00779 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

- | | |
|--|-------------|
| a. Systematic uncertainty in instrument calibration: | $\pm 3.0\%$ |
| 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).



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

Arma U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed



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Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: October 9, 2013

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

Date: 10/9/2012 0:00
Date: 11/12/12

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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 11/9/2012 0:00
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**

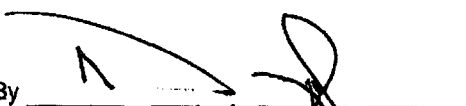
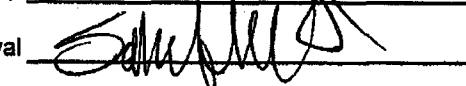
SECONDARY VOLUMETRIC DILUTION

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.

Alan 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

US EPA ARCHIVE DOCUMENT

0039



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
IPL 867-54

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

Principal Radionuclide
²²⁶Th

Half Life, Years
7.340E+03

Half Life, Days
2.681E+06

Radionuclide of Interest ²²⁶Th
Parent Solution Conc. 2.25E+03 dpm/ml

Reference Date 1/15/2002 0:00

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

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

Final Activity Concentration: 2.2490E+01 dpm/ml

NOTES:

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

Expiration Date: October 9, 2013

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

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

ORIGINAL

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM

QCP-009

Rev.8: 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

SOLUTION REFERENCE # NIST SRM4251C CURRENT DATE 6/16/2013 0:00
SOLUTION # Ba-6

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

Radionuclide ¹³³Barium Reference Date 9/1/1993 0:00
Certified Activity μCi
Certified Concentration 1.318E+01 $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution

¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used 1M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 66.5577 μCi Which Equals 1.478E+08 dpm at the date listed above

And after dilution the activity of this solution is 1.478E+05 dpm/ml This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

Expiration Date: June 16, 2014

Verified & Approved By [Signature]

Date: 7/1/13

QC Approval [Signature]

Date: 7/2/13



QUALITY CONTROL PROGRAM
QCP-009

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

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

Solution Reference # QCP-009-1-A Date 6/18/13
NIST SRM4251C Solution # Ba-6a

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

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

Chemical Composition of Standard Solution
¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used 1M HCl

SECONDARY VOLUMETRIC DILUTION

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

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

Expiration Date: June 18, 2014

Verified & Approved By [Signature] Date: 7/1/13
QC Approval [Signature] Date: 7/2/13

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

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

Description of Solution

a. Mass of solution:	5.1864 g (in a 5 ml Flame Sealed Ampoule)
b. Chemical form:	Ra(NO ₃) ₂ in 1 N HNO ₃
c. Carrier content:	None added
d. Density:	1.0318 g/ml @ 20°C.

Radioimpurities None detected (other than daughters)

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

Radionuclide Concentration
(Ra-226) 0.1929 μCi/g.

Method of Calibration

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

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



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

Ana H. Kuen
 QUALITY CONTROL

Feb. 3, 1994
 Date Signed



QUALITY CONTROL PROGRAM
MP 009

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

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

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

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

Radionuclide ²²⁶Radium Reference Date 2/1/1994 0:00
Certified Activity 1.001E+00 μCi
Certified Concentration $\mu\text{Ci per gram}$

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: November 9, 2013

Verified & Approved By 

Date: 11/9/2012

QC Approval 

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml
Total Activity: 4.4440E+04 dpm
Final Volume: 1000.00 ml
Final Activity Concentration: 4.4440E+01 dpm/ml

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

NOTES:

Expiration Date: November 9, 2013

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

Date: 11/9/2012 0:00

Date: 11/12/12

US EPA ARCHIVE DOCUMENT

RA-11

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

*99% Confidence Level

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

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

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

SOURCE PREPARED BY:

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

Q A APPROVED:

pcw 11/7/01

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

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM
MP-009

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

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

SOLUTION REFERENCE # Analytics 62680-416 CURRENT DATE 3/11/2013 0:00
SOLUTION # Ra-11

Principal Radionuclide ²²⁸Ra Half Life, Years 5.750E+00 Half Life, Days 2.100E+03

Radionuclide ²²⁸Ra Reference Date 11/7/2001 0:00
Certified Activity 6.986E-02 μCi
Certified Concentration $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution
²²⁸Ra(NO₃)₂ in 0.5 M HCl

Dilution Instructions: Dilution Solvent Used 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: March 26, 2014

Recertified By [Signature] Date: 5/30/13
QC Approval [Signature] Date: 5/30/13

US EPA ARCHIVE DOCUMENT

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	UUISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	0.68	93.58%	19.51%	100.00%	3.60%	8.25E+00	2.97E-01	7.72E+00	1.51E+00	U-8a	3.52E+01	3.60E+00	5.20E-01
U-238	0.88	91.84%	19.64%	100.00%	3.60%	8.05E+00	2.90E-01	7.39E+00	1.45E+00	U-8a	3.44E+01	3.60E+00	5.20E-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)

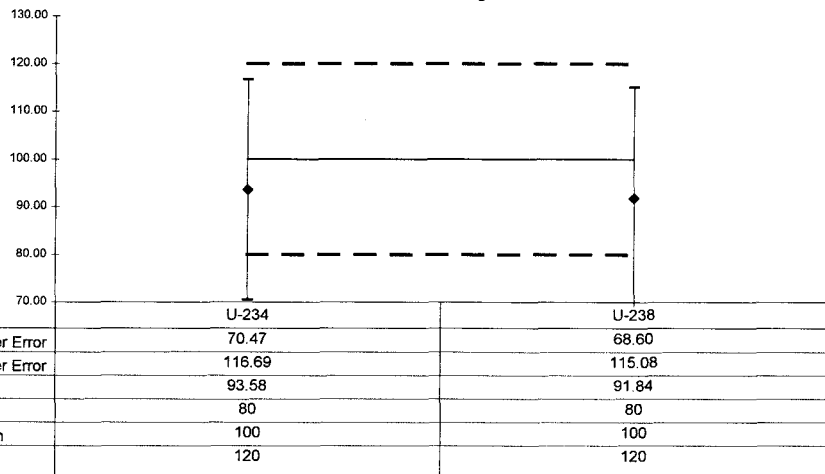
Replicate Sample

QC Summary

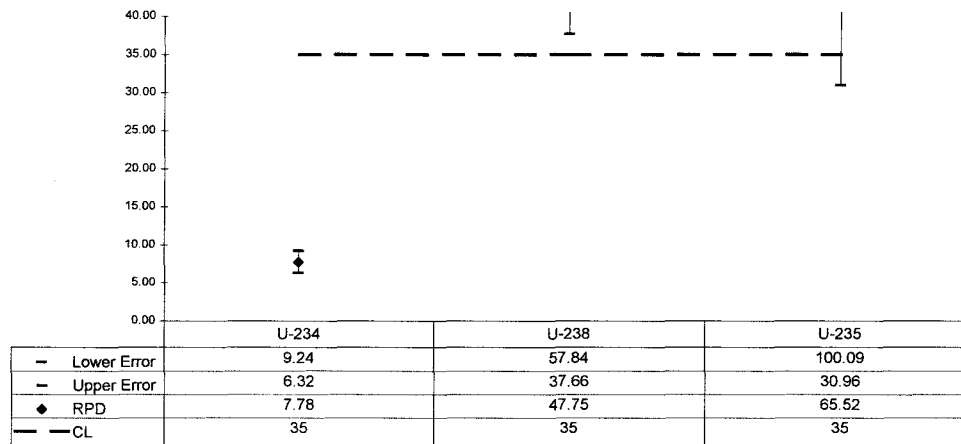
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.29	7.78	6.86E-01	2.62E-01	6.35E-01	2.34E-01	0.94	OK	OK			NA	OK
U-238	1.54	47.75	6.16E-01	2.47E-01	3.79E-01	1.74E-01	0.92	OK	OK			NA	OK
U-235	0.85	65.52	1.44E-01	1.29E-01	7.32E-02	1.01E-01		OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	UISO	1	pCi	I	Engineering Management Support, Inc.

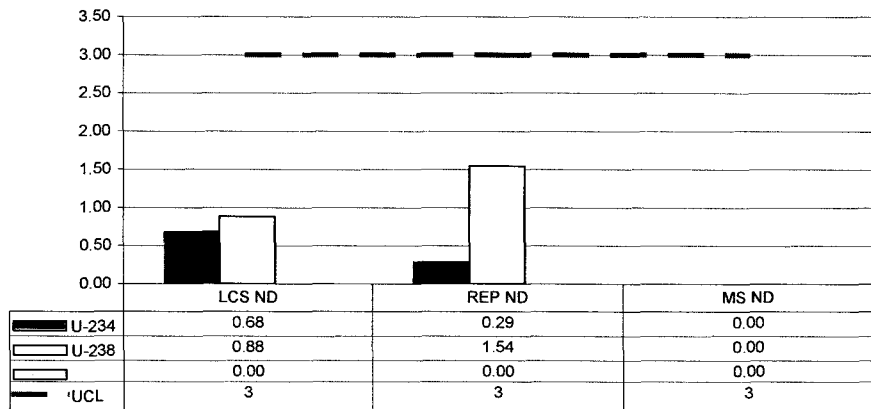
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	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	0.77	110.21%	23.34%	100.00%	3.60%	4.86E+00	1.75E-01	5.36E+00	1.25E+00	Th-8b	1.04E+02	3.60E+00	1.04E-01
TH-230	1.24	86.27%	25.17%	100.00%	2.70%	5.51E+00	1.49E-01	4.75E+00	1.20E+00	Th-1b	2.35E+01	2.70E+00	5.20E-01
TH-232	1.70	124.45%	22.59%	100.00%	3.60%	4.86E+00	1.75E-01	6.05E+00	1.37E+00	Th-8b	1.04E+02	3.60E+00	1.04E-01

Matrix Spike

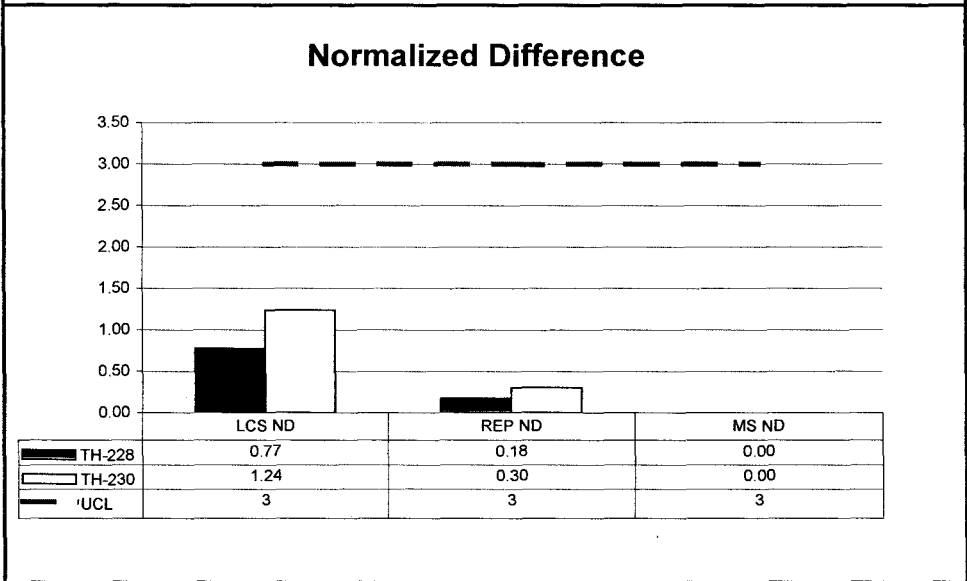
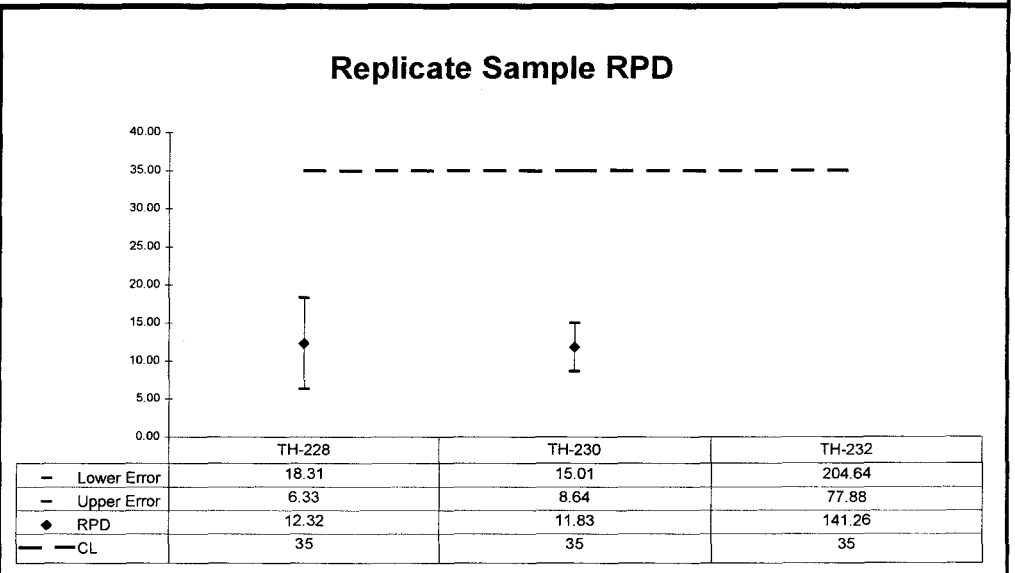
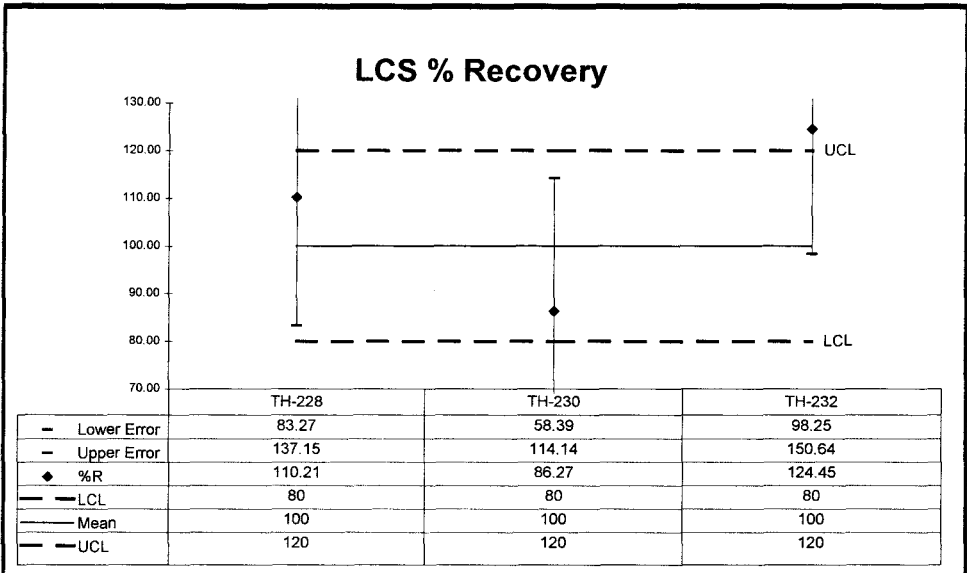
Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)

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	0.18	12.32	6.24E-02	6.79E-02	7.06E-02	6.15E-02	1.10	OK	OK			NA	OK
TH-230	0.30	11.83	2.07E-01	1.20E-01	2.33E-01	1.17E-01	0.86	OK	OK			NA	OK
TH-232	2.00	141.26	1.18E-01	8.95E-02	2.03E-02	3.46E-02	1.24	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	ThISO	1	pCi	I	Engineering Management Support, Inc.



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	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	0.41	95.11%	24.18%	100.00%	4.60%	1.03E+01	4.75E-01	9.83E+00	2.38E+00	Ra-5b	4.41E+01	4.60E+00	5.20E-01

Matrix Spike

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

Replicate Sample

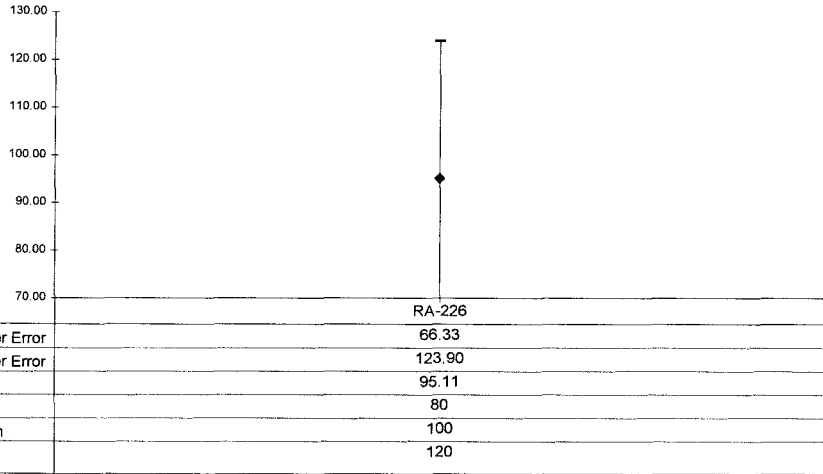
QC Summary

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.02	0.94	6.54E-01	3.34E-01	6.61E-01	3.64E-01	0.95	OK	OK			OK	OK

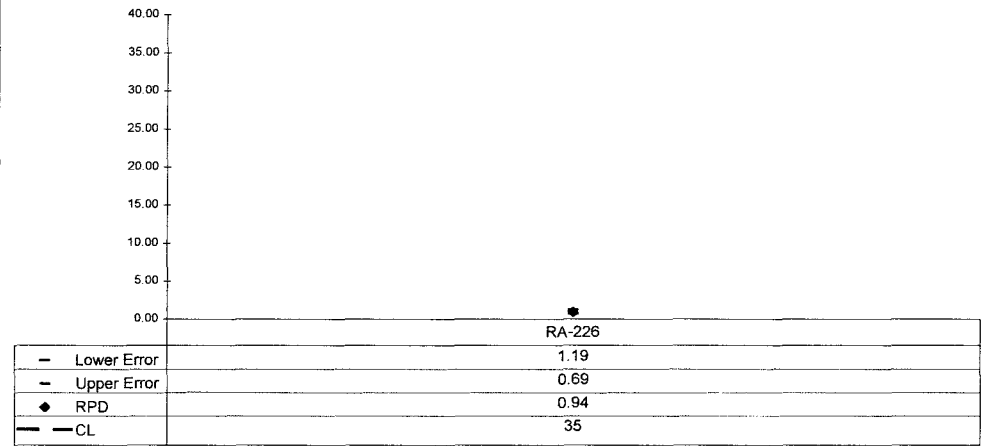


WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	Ra226	1	pCi	I	Engineering Management Support, Inc.

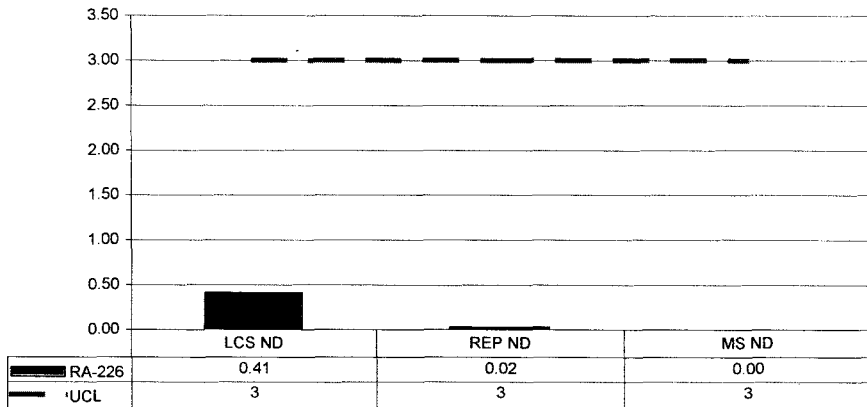
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	Ra228	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.41	106.73%	29.80%	100.00%	5.10%	8.83E+00	4.51E-01	9.43E+00	2.81E+00	Ra-11	3.78E+01	5.10E+00	5.19E-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)

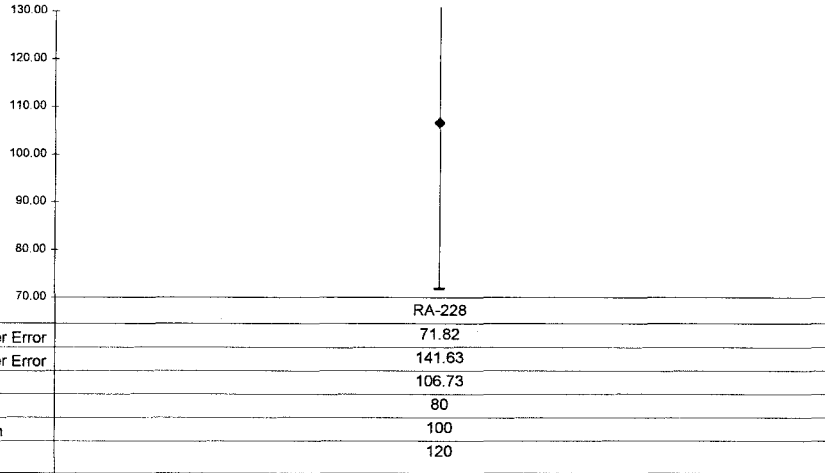
Replicate Sample

QC Summary

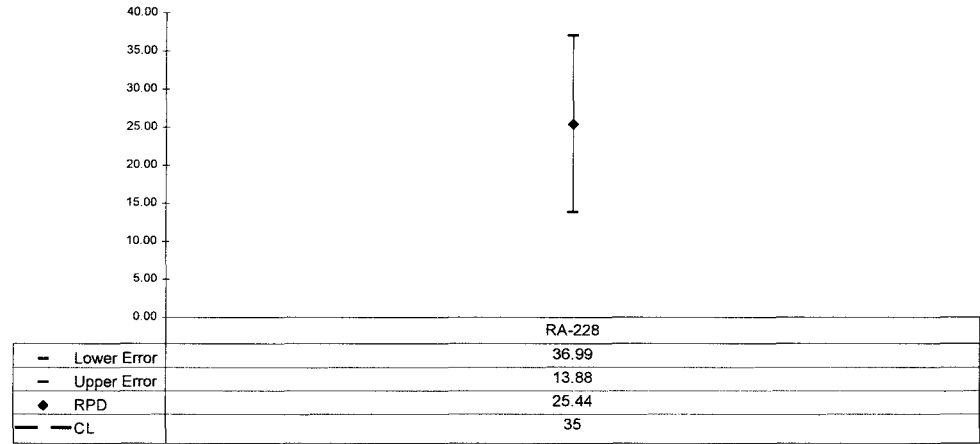
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.39	25.44	5.27E-01	5.56E-01	6.81E-01	5.41E-01	1.07	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07100	Ra228	1	pCi	I	Engineering Management Support, Inc.

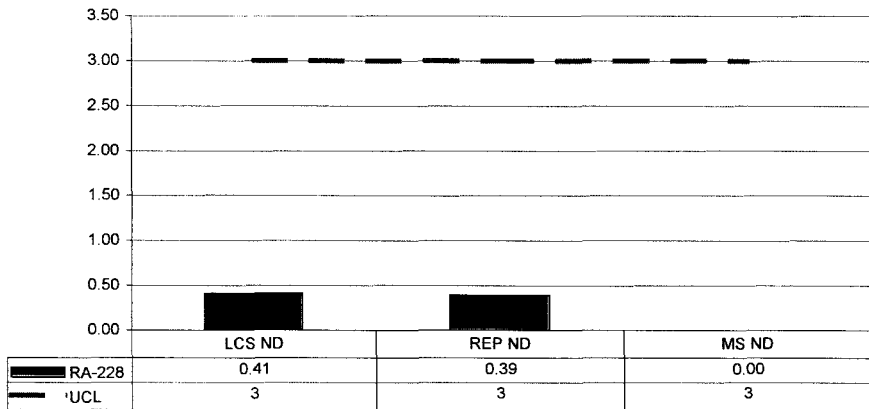
LCS % Recovery



Replicate Sample RPD




Normalized Difference



No Matrix Spike

SECTION VII
LABORATORY TECHNICIAN'S NOTES


ISO U NOTES

 EBERLINE SERVICES Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07100
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/25/13 05:39	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3 - DRIED SAMPLES DOWN


J Wolfe
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	13-07100
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/25/13 05:39	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3 - DRIED SAMPLES DOWN
2	07/29/13 18:15	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to 35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

John Demelas
 7/29/13

 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	13-07100
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/25/13 05:39	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3 - DRIED SAMPLES DOWN
2	07/29/13 18:15	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	07/30/13 06:11	CHEM	RMARTZ	ADDED 0.1 ML NEODYMIUM CARRIER, 0.3 ML TITANOUS CHLORIDE, & 1 ML HF TO C-TUBES; LET SET SIT IN ICE BATH FOR ONE HOUR. SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

US EPA ARCHIVE DOCUMENT

JPM/13



Reagents Used in an Analysis

Internal Work Order

13-07100

Analysis Code

Run

UUISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/29/2013
014159S	HCl - HF	6.5N - 0.04N	JDEMELAS	7/29/2013
014101S	Hydrochloric Acid	0.5N	JDEMELAS	7/29/2013
013896P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/29/2013
014187S	Hydrochloric Acid	8N	JDEMELAS	7/29/2013
014191S	HCl - NH4I	8N - 0.1M	JDEMELAS	7/29/2013
014103S	Hydrochloric Acid	6.5N	JDEMELAS	7/29/2013
014042S	Carbon substrate	Solution	RMARTZ	7/30/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	7/30/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	7/30/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	7/30/2013
013434P	Titanous Chloride	Reagent Grade	RMARTZ	7/30/2013


Alpha #2

Date	Sample #	Client	Location	CT Item	Analysis	Steel
7/20/13	Daily Pulse	URS	0170	low	run	
7/23/13	1307120A(4-7)	ERT	0933	2hrs	4 hrs	c
7/25/13	1307158A(1-4)	ULON	0933	2hrs	ULON	c
7/25/13	1307150A(1-2)	ULON	0934	2hrs	Pulse	c
7/29/13	1307100A(13-19)	Eng. Manag. Serv.	1240	2hrs	Th	100
7/20/13	Daily Pulse	URS	0124	low	run	
7/20/13	1307158A(1-4,7)	ULON	0959	2hrs	Pulse	c
7/20/13	1307158A(1-4)	ULON	0959	2hrs	Pulse	c
7/20/13	1307158A(1-4)	ULON	1000	2hrs	Th	c
7/20/13	1307128A(1-4,6)	ULON	1002	2hrs	NP	c
7/30/13	1307100A(1-5)	Eng Man	1304	2hrs	ULON	c

Alpha #3

Date	Sample #	Client	Location	CT Time	Analysis	Tech
7/30/13	Seed A (1-3)	Lab	1109	2hrs 50m	Rate	KB
7/30/13	1707100A(6-14)	Eng. Main	1307	2hr	Unit	
7/30/13	7/30/13			2h		
7/30/13	1307100A(15-19)	Eng. Manag. Sec	1614	2hrs 30m	UM	KB


ISO TH NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07100
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 12:03	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3- DRIED SAMPLES DOWN

J Wolfe
7/24/13


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	13-07100
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 12:03	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3- DRIED SAMPLES DOWN
2	07/26/13 17:38	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
7/26/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07100
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 12:03	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 4,5,10,11,16,17 AND 19 WITH HNO3- DRIED SAMPLES DOWN
2	07/26/13 17:38	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to 35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	07/29/13 06:04	CHEM	RMARTZ	ADDED 0.75 ML 0.1MG/ML CERIUM CARRIER & 1 ML HF TO C-TUBES & LET SET SIT IN ICE BATH FOR ONE HOUR; SET UP FILTERS BY ADDING ALCOHOL & CARBON SUBSTRATE THEN ADDED SAMPLES; WHEN SAMPLES WERE THROUGH FILTERS, ADDED 10 ML DI H2O RINSES FROM C-TUBES, REMOVED FILTERS, LET DRY IN DESSICATOR, THEN SENT SET TO COUNT ROOM.

Handwritten signature: RMartz
 7/29/13



Reagents Used in an Analysis

Internal Work Order

13-07100

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014076P	Anion Exchange Resin	Reagent Grade	JDEMELAS	7/26/2013
014177S	Hydrochloric Acid	8N	JDEMELAS	7/26/2013
013896P	Hydrochloric Acid	Reagent Grade	JDEMELAS	7/26/2013
014168S	Nitric Acid	8N	JDEMELAS	7/26/2013
014109P	Nitric Acid	Reagent Grade	JDEMELAS	7/26/2013
014184S	Nitric Acid	8N	JDEMELAS	7/26/2013
014042S	Carbon substrate	Solution	RMARTZ	7/29/2013
014040S	Cerrium Carrier	0.1mg/ml	RMARTZ	7/29/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	7/29/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	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	1774	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(3)	Udon		2hr 50m	Uu	KB
7/25/13	1307098A(5-12)	Eng. Manag. Serv	1626	2hr 50m	Th	KB
7/26/13	Daily Pulser	Lab	0171	10min	Uu	—
7/26/13	SECCAL	Lab	0177	2hr	Uu	—
7/26/13	1707150A(1-4)	Udon	1607	2hr	Na6	C
7/26/13	1707150A(1-4)	Udon	1607	2hr	Na6 277	C
7/26/13	1307099A(11-17)	Eng. Manag. Serv	1401	2hr 50m	Uu	KB
7/26/13	System Bkgd	Lab	1655	16:40 hrs	α	KB
7/27/13	Daily Pulser	Lab	1021	10min	NA	KB
7/28/13	Daily Pulser	Lab	1035	10min	NA	KB
7/28/13	1307099A(1-8)	Eng. Manag	1107	2hr 50m	Th	AS
7/29/13	Daily Pulser	Lab	0170	10min	Uu	—
7/29/13	1707150A(1-8)	Acantest	0153	2hr	Na6	C
7/29/13	1307109A(1-4)	Udon	0932	2hr	Uu 241	C
7/29/13	1307109A(1-4)	Udon	0932	2hr	Uu 241	C
7/29/13	1307109A(1-3)	Enviro. Serv	0932	2hr	Uu 241	C
7/29/13	1307100A(5-12)	Eng. Manag. Serv	1239	2hr 50m	Th	KB

US EPA ARCHIVE DOCUMENT

Alpha #2


Date	Sample #	Client	Location	CT	Time	Manager	Stat
7/28	D914P415	Log	0170	6	m		
7/28/13	1307120A(4-7)	ERT	0933	2hr	Wetso		
7/28/13	1307158A(1-4)	ULON	0933	2hr	Wetso		
7/28/13	1307150A(1-2)	ULON	0934	2hr	Phiso		
7/29/13	1307100A(13-19)	Eng. Manay Sew.	1240	2hr50 =	Th		10/5

Alpha # 3

Date	Sample #	Client	Location	CT Time	Analysis	Spec
7/25/13	1307092A(1-4)	Udon	1011	2hr	PANT	C
7/25/13	1307092A(1-4)	Udon	1012	2hr	THAT	C
7/25/13	1307115A(1-3, 10-11)	TEST America	1725	2hr 50min	Rate	KB
7/25/13	1307116A(1-4, 6)	Udon	1725	2hr 50min	Rate	KB
7/25/13	1307098A(1-4)	Eng. Manag. Serv	1726	2hr 50min	Th	KB
7/25/13	1307098A(13-12)	Eng. Manag. Serv	1627	2hr 50min	Th	KB
7/25/13	1307098A(13-20)	Eng. Manag. Serv	1627	2hr 50min	Th	KB
7/25/13	1307092A(3)	Udon	1628	2hr 50min	UW	KB
7/26/13	Daily Pulse	URS	0871	1hr		
7/26/13	SBCOH	URS	0873	2hr 30min		
7/26/13	1707150A(1-4)	Udon	0854	2hr	UW	C
7/26/13	1707094A(1-12, 17)	TEST	0885	2hr	UW	C
7/26/13	1307099A(1-6)	Eng. Manag.	0811	2hr	UW	C
7/26/13	1307148A(1-4)	TBE	1153	2hr 50min	Rate	KB
7/26/13	1307116A(1-4, 6)	Udon	1153	2hr 50min	Np	KB
7/26/13	1307099A(7-10)	Eng. Manag. Serv	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.	1108	2hr 50min	Th	AG
7/28/13	Daily Pulse	URS	0870	1hr		C
7/28/13	1707108A(1-11)	Acoustic	0874	2hr	Rate	C
7/28/13	1707150A(1-4)	Udon	0934	2hr	Rate	C
7/28/13	1707150A(1-4)	Udon	0934	2hr	PANT	C
7/28/13	1707150A(1-4)	Udon	0935	2hr	THAT	C
7/28/13	1707150A(1-4)	Udon	0935	2hr	THAT	C
7/28/13	1707100A(1-4)	Eng. Manag.	0935	2hr	THAT	C

US EPA ARCHIVE DOCUMENT


RA-226 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07100
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 11:54	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH PB AND BA CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
7/24/13

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	13-07100
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 11:54	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH PB AND BA CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	07/25/13 16:28	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	07/29/13 20:02	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS-(SYRINGE FILTERED-PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT)-SUBMIT TO COUNT ROOM.

J Walker
 7/29/13



Reagents Used in an Analysis

Internal Work Order

13-07100

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/24/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/24/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/24/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/24/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/24/2013
014169S	EDTA	0.25M	LWALKER	7/25/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	7/29/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	7/29/2013

US EPA ARCHIVE DOCUMENT

Alpha #3


Date	Sample #	Client	Location	CTTi	Analysis	Test
7/30/13	Seed A (1-3)	Lab	1109	2hrs 50m	Rate	CB
7/30/13	1307100A(6-14)	Eng Man.	1305	2hr	unz	-
7/30/13	4130113			2h		
7/30/13	1307100A(15-19)	Eng. Manag. Sec	1614	2hrs 50m	un	CB
7/17/13	Daily Price	un	0772	1m	un	
7/31/13	1307110A(1-13)	Eng Man	0115	2hr	unz	-
7/31/13	1307099A(12-17)	EMS	1215	2hrs 50m	Rate	CB
7/31/13	1307100A(1-7)	EMS	1214	2hrs 50m	Rate	CB

Alphabet 1

Date	Sample#	Client	Location	CT/In	Analysis	Test
7/25/13	1307116A(1-4)	Udon	1008	2hrs	Am241	C
7/25/13	1307116A(1-3)	Udon	1009	2hrs	Am241	C
7/25/13	1307098A(7-14)	Eng. Manag. Serv	1724	2hrs	Uu	KB
7/25/13	1307099A(13-20)	Eng. Manag. Serv	US 712512	2hrs	Th	KB
7/25/13	1307092A(3)	Udon		2hrs	Uu	KB
7/25/13	1307098A(5-12)	Eng. Manag. Serv	1626	2hrs	Th	KB
7/26/13	Daily Pulse	Uu	0171	10	Uu	-
7/26/13	SECCAL	Uu	0177	2hrs	Uu	-
7/26/13	1707150A(1-4)	Udon	1607	2hrs	Rak	C
7/26/13	1707150A(1-4)	Udon	1607	2hrs	NP 277	C
7/26/13	1307099A(11-17)	Eng. Manag. Serv	1401	2hrs	Uu	KB
7/26/13	System Bkgd	Lab	1655	16.40 hrs	α	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	2hrs	Th	AS
7/29/13	Daily Pulse	Uu	0170	10	Uu	-
7/29/13	1707109A(1-8)	Acadest	0173	2hrs	Rak	C
7/29/13	1307109A(1-4)	Udon	0932	2hrs	Uu	C
7/29/13	1307109A(1-4)	Udon	0932	2hrs	Uu	C
7/29/13	1307120A(1-3)	Enviro/MS.A	0932	2hrs	Uu	C
7/29/13	1307100A(5-12)	Eng. Manag. Serv	1239	2hrs	Th	KB
7/29/13	1307110A(1-8)	Eng. Manag. Serv	1653	2hrs	Rak	KB
7/29/13	Daily Pulse	Uu	0178	10	Uu	-
7/30/13	1707118A(1-4)	Udon	0920	2hrs	Am241	C
7/30/13	1307118A(1-4)	Udon	0920	2hrs	Am241	C
7/30/13	1307159A(9-12)	Urenco	1215	2hrs	Uu	KB
7/30/13	1307158A(1-4)	Udon	1216	2hrs	NP	KB
7/30/13	Daily Pulse	Uu	0172	10	Uu	-
7/30/13	1707128A(1-4,6)	Udon	0917	2hrs	Am241	C
7/30/13	1307128A(1-3)	Udon	0913	2hrs	Am241	C
7/31/13	1307110A(14-20)	EMS	1214	2hrs	Uu	KB
7/31/13	1307099A(1)	EMS	1214	2hrs	Rak	KB
7/31/13	1307100A(8-15)	EMS	1515	2hrs	Rak	KB

Date	Sample #	Client	Location	CT	Time	Analysis	Stat
7/20/13	Daily Pulse	Weg	0170	low	run		
7/20/13	1307120A(4-7)	ERT	0933	2hr	Wtso	c	
7/20/13	1307158A(1-4)	ULON	0933	2hr	Wtso	c	
7/20/13	1307150A(1-2)	ULON	0934	2hr	Ptso	c	
7/20/13	1307100A(13-19)	Eng. Manag. Serv.	1240	2hr50 =	Th	KB	
7/20/13	Daily Pulse	Weg	0174	low	run		
7/20/13	1307158A(1-4,7)	ULON	0933	2hr	Ptso	c	
7/20/13	1307158A(1-4)	ULON	0933	2hr	Ptnt	c	
7/20/13	1307158A(1-4)	ULON	1000	2hr	Thso	c	
7/20/13	1307128A(1-4,6)	ULON	1307	2hr	NP27	c	
7/20/13	1307100A(1-5)	Eng Man	1301	2hr	Wtso	c	
7/21/13	Daily Pulse	Weg	0172	low	run		
7/21/13	1307128A(1-4,6)	ULON	0914	2hr	Am27	c	
7/21/13	1307167A(1-4)	ULON	0914	2hr	Wtso	c	
7/21/13	1307168A(1-4)	ULON	0914	2hr	Wtso	c	
7/31/13	1307099A(2-11)	EMS	1215	2hr50 =	Raw	KB	
7/31/13	1307100A(10-19)	EMS	1515	2hr50 min	Raw	KB	
7/31/13	1307111A(1-6)	EMS	1516	2hr50 min	Raw	KB	


RA-228 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07100
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 11:54	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH PB AND BA CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS


J Wolfe
 7/24/13

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	13-07100
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 11:54	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH PB AND BA CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/01/13 12:52	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/05/13 16:39	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

L. Walker
 8/5/13

 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	13-07100
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/24/13 11:54	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH PB AND BA CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/01/13 12:52	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/05/13 16:39	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/06/13 06:29	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)

8-6-13
JM



Reagents Used in an Analysis

Internal Work Order

13-07100

Analysis Code

Run

Ra228

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/24/2013
013930D01	Ammonium Sulfate	200 mg/ml	JWOLFE	7/24/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/24/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/24/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/24/2013
014008D01	Lead Carrier	1.5 mg/ml	LWALKER	8/5/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	8/5/2013
013065D06	Sodium Hydroxide	10M	LWALKER	8/5/2013
014060S	Yttrium Carrier	9 mg/ml	LWALKER	8/5/2013
011504D32	Ammonium Sulfide	2%	LWALKER	8/5/2013
014116S	Ammonium Oxalate	5%	TSMITH	8/6/2013
013910D07	Nitric Acid	1N	TSMITH	8/6/2013
013910D08	Nitric Acid	6N	TSMITH	8/6/2013
013065D06	Sodium Hydroxide	10M	TSMITH	8/6/2013
013065D08	Sodium Hydroxide	18M	TSMITH	8/6/2013

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Facility	CT Time	Analysis	Notes
8/1/13	1307078AD(1)	Accutest	1128	30mins	αβ	ICB
8/2/13	1307078AB(2-11)	Accutest	1234	2hrs	αβ	ICB
8/2/13	1307140CL(3,5)	UCOR	1508	30mins	CL36	ICB
8/2/13	1307171CL(3,5,7)	UCOR	1509	30mins	CL36	ICB
8/3/13	Weekly Blood	Lab	0817	12hrs	αβ	ICB
8/13	Blood	Lab	0818	40	LM	✓
8/13	BFEC	Lab	0622	30	LM	✓
8/15/13	1707098A(1-17)	Engma	0807	2L	RTG	✓
8/15/13	170709454(1-1)	Test Am.	0859	2L	RTG	✓
8/15/13	170709454(1)	Test Am.	0859	2L	RTG	✓
8/15/13	1308011AB(1-1)	MATERION AC	1159	2hrs	αβ	ICB
8/16/13	Blood	Lab	084	40	LM	✓
8/16/13	BFEC	Lab	0615	30	LM	✓
8/16/13	1308006A(1-5)	UCOR	0751	2L	RTG	✓
8/16/13	1307100A(14-17)	Engma	0811	2L	RTG	✓
8/16/13	1307100A(11)	Engma	0811	70min	RTG	✓
8/16/13	1707100A(18,19)	Engma	1005	2L	RTG	✓
8/16/13	1707171B(11)	UCOR	0950	30min	Ph210	✓

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
8/2/13	ETFOE	LAB	0507	70m	LAB	C
8/2/13	BUCDOR	LAB	0540	6m	LAB	C
8/2/13	1707110RA(2-2)	Engman	0759	2h	RA8	C
8/2/13	130709254(2-4,8)	UCOR	1012	2h	SN904	C
8/2/13	130710754(1-5,8,9)	TestAm	1012	2h	SN904	C
8/2/13	1307077AB(1-6)	Accutest	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	ETFOE	LAB	0518	70m	LAB	C
8/15/13	BUCDOR	LAB	0544	6m	LAB	C
8/15/13	1307099RA(1-4)	Engman	0802	2h	RA8	C
8/15/13	170709454(6-7)	TestAm	1014	2h	SN904	C
8/16/13	ETFOE	LAB	0541	30m	LAB	C
8/16/13	BUCDOR	LAB	0546	6m	LAB	C
8/16/13	1707100RA(2-3)	Engman	0808	2h	RA8	C

Date	Sample #	Client	Sample Time	CT Time	Analysis	Notes
8/2/13	1307078AD(1)	Accutest	1128	30mins	αβ	ICB
8/2/13	1307078AB(2-11)	Accutest	1236	2hrs	αβ	ICB
8/2/13	1307140CL(3,5)	UCOR	1508	30mins	CL36	ICB
8/2/13	1307171CL(3,5,7)	UCOR	1509	30mins	CL36	ICB
8/3/13	Weekly Blood	Lab	0817	12hrs	αβ	ICB
8/11	Blood	Lab	0118	60	LM	✓
8/11	BFTec	Lab	0622	30	LM	✓
8/15/13	1707098A(12-17)	Engpha	0807	2L	RTK	✓
8/15/13	170709454(1-5)	Test Am.	0859	2L	RTK	✓
8/15/13	170709454(1)	Test Am.	0859	2L	RTK	✓
8/15/13	1308011AB(1-4)	MATERION AC	1159	2hrs	αβ	ICB
8/16/13	Blood	Lab	054	60	LM	✓
8/16/13	BFTec	Lab	0611	30	LM	✓
8/16/13	1308006A(1-5)	UCOR	0751	2L	RTK	✓
8/16/13	1307100RA(14-17)	Engpha	0811	2L	RTK	✓
8/16/13	1307100RA(1)	Engpha	0811	70min	RTK	✓

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

Work Order	13-07100
Analysis Code	UISO
Run	1
Date Received	7/15/2013
Lab Deadline	8/6/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	I
Matrix	WA
Method	HASL 300, 4.5.2
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	U-232
Radiometric Sol#	U-10a
Tracer Act (dpm/g)	19.047
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/16/13 00:00	1.0000E+00
02	MBL	BLANK		07/16/13 00:00	1.0000E+00
03	DUP	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
04	DO	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
05	TRG	PZ-113-AS DIS	44	07/10/13 14:00	1.0000E+00
06	TRG	PZ-109-SS TOT	42	07/10/13 14:30	1.0000E+00
07	TRG	PZ-109-SS DIS	42	07/10/13 14:30	1.0000E+00
08	TRG	PZ-205-SS TOT	44	07/10/13 15:30	1.0000E+00
09	TRG	PZ-205-SS DIS	44	07/10/13 15:30	1.0000E+00
10	TRG	DUP 02 TOT	41	07/10/13 00:00	1.0000E+00
11	TRG	DUP 02 DIS	41	07/10/13 00:00	1.0000E+00
12	TRG	PZ-113-SS TOT	45	07/11/13 08:50	1.0000E+00
13	TRG	PZ-113-SS DIS	45	07/11/13 08:50	1.0000E+00
14	TRG	PZ-104-SS TOT	37	07/11/13 09:37	1.0000E+00
15	TRG	PZ-104-SS DIS	37	07/11/13 09:37	1.0000E+00
16	TRG	PZ-101-SS TOT	40	07/11/13 09:40	1.0000E+00
17	TRG	PZ-101-SS DIS	40	07/11/13 09:40	1.0000E+00
18	TRG	PZ-104-SD TOT	42	07/11/13 10:29	1.0000E+00
19	TRG	PZ-104-SD DIS	42	07/11/13 10:29	1.0000E+00

0002

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	0.6130	11.7		0.00								
02	MBL	0.6075	11.6		0.00								
03	DUP	0.6102	11.6		0.00								
04	DO	0.6048	11.5		0.00								
05	TRG	0.6019	11.5		0.00								
06	TRG	0.6008	11.4		0.00								
07	TRG	0.6046	11.5		0.00								
08	TRG	0.6043	11.5		0.00								
09	TRG	0.5988	11.4		0.00								
10	TRG	0.5937	11.3		0.00								
11	TRG	0.6032	11.5		0.00								
12	TRG	0.6025	11.5		0.00								
13	TRG	0.5960	11.4		0.00								
14	TRG	0.6029	11.5		0.00								
15	TRG	0.6040	11.5		0.00								
16	TRG	0.6040	11.5		0.00								
17	TRG	0.6044	11.5		0.00								
18	TRG	0.6034	11.5		0.00								
19	TRG	0.6010	11.4		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.

000

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

0097

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	7.72E+00	1.40E+00	1.64E-01	8.25E+00	93.58	OK		OK	
02	U-234	MBL	BLANK	pCi/l	1.55E-01	9.50E-02	7.72E-02					OK	OK
03	U-234	DUP	PZ-113-AS TOT	pCi/l	6.35E-01	2.29E-01	1.32E-01				NA	OK	
04	U-234	DO	PZ-113-AS TOT	pCi/l	6.86E-01	2.58E-01	1.28E-01					OK	
05	U-234	TRG	PZ-113-AS DIS	pCi/l	5.55E-01	2.44E-01	1.74E-01					OK	
06	U-234	TRG	PZ-109-SS TOT	pCi/l	1.36E+00	3.08E-01	5.75E-02					OK	
07	U-234	TRG	PZ-109-SS DIS	pCi/l	1.40E+00	3.02E-01	5.31E-02					OK	
08	U-234	TRG	PZ-205-SS TOT	pCi/l	5.37E-01	1.73E-01	6.64E-02					OK	
09	U-234	TRG	PZ-205-SS DIS	pCi/l	4.74E-01	1.65E-01	6.36E-02					OK	
10	U-234	TRG	DUP 02 TOT	pCi/l	3.09E-01	3.01E-01	3.17E-01					OK	
11	U-234	TRG	DUP 02 DIS	pCi/l	3.34E-01	2.93E-01	2.82E-01					OK	
12	U-234	TRG	PZ-113-SS TOT	pCi/l	1.72E+00	3.67E-01	8.73E-02					OK	
13	U-234	TRG	PZ-113-SS DIS	pCi/l	1.49E+00	3.07E-01	7.19E-02					OK	
14	U-234	TRG	PZ-104-SS TOT	pCi/l	5.23E-01	1.73E-01	6.30E-02					OK	
15	U-234	TRG	PZ-104-SS DIS	pCi/l	3.13E-01	1.31E-01	5.49E-02					OK	
16	U-234	TRG	PZ-101-SS TOT	pCi/l	5.54E-01	4.14E-01	2.95E-01					OK	
17	U-234	TRG	PZ-101-SS DIS	pCi/l	5.34E-01	2.47E-01	1.37E-01					OK	
18	U-234	TRG	PZ-104-SD TOT	pCi/l	1.02E-01	1.74E-01	2.94E-01					OK	
19	U-234	TRG	PZ-104-SD DIS	pCi/l	2.15E-01	2.36E-01	2.81E-01					OK	



Run
1

Analysis Code
UISO

Eberline Services Work Order
13-07100

Client
Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-234	LCS	07/16/13 00:00	1.00E+00	62.26	0.00	0.00			
02	U-234	MBL	07/16/13 00:00	1.00E+00	111.71	0.00	0.00			
03	U-234	DUP	07/10/13 14:00	1.00E+00	85.49	0.00	0.00			
04	U-234	DO	07/10/13 14:00	1.00E+00	63.97	0.00	0.00			
05	U-234	TRG	07/10/13 14:00	1.00E+00	81.38	0.00	0.00			
06	U-234	TRG	07/10/13 14:30	1.00E+00	104.25	0.00	0.00			
07	U-234	TRG	07/10/13 14:30	1.00E+00	112.41	0.00	0.00			
08	U-234	TRG	07/10/13 15:30	1.00E+00	114.96	0.00	0.00			
09	U-234	TRG	07/10/13 15:30	1.00E+00	104.54	0.00	0.00			
10	U-234	TRG	07/10/13 00:00	1.00E+00	23.25	0.00	0.00			
11	U-234	TRG	07/10/13 00:00	1.00E+00	22.93	0.00	0.00			
12	U-234	TRG	07/11/13 08:50	1.00E+00	96.01	0.00	0.00			
13	U-234	TRG	07/11/13 08:50	1.00E+00	111.70	0.00	0.00			
14	U-234	TRG	07/11/13 09:37	1.00E+00	109.12	0.00	0.00			
15	U-234	TRG	07/11/13 09:37	1.00E+00	109.27	0.00	0.00			
16	U-234	TRG	07/11/13 09:40	1.00E+00	20.23	0.00	0.00			
17	U-234	TRG	07/11/13 09:40	1.00E+00	55.83	0.00	0.00			
18	U-234	TRG	07/11/13 10:29	1.00E+00	22.60	0.00	0.00			
19	U-234	TRG	07/11/13 10:29	1.00E+00	26.27	0.00	0.00			

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UUISO-1

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07100
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-234	LCS	07/30/13 13:04		A_Spec	Alpha_024	170.02	3.10 E+02	7.00 E-03	17.1
02	U-234	MBL	07/30/13 13:04		A_Spec	Alpha_025	170	1.13 E+01	4.00 E-03	17.4
03	U-234	DUP	07/30/13 13:04		A_Spec	Alpha_027	170.02	3.53 E+01	1.00 E-02	17.3
04	U-234	DO	07/30/13 13:04		A_Spec	Alpha_029	170	3.22 E+01	5.00 E-03	19.5
05	U-234	TRG	07/30/13 13:04		A_Spec	Alpha_031	170	2.41 E+01	1.10 E-02	14.2
06	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_033	170	9.88 E+01	1.00 E-03	18.5
07	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_034	170	1.10 E+02	1.00 E-03	18.6
08	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_035	170	4.25 E+01	3.00 E-03	18.3
09	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_036	170	3.57 E+01	2.00 E-03	19.1
10	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_038	170	4.66 E+00	2.00 E-03	17.2
11	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_039	170	5.66 E+00	2.00 E-03	19.7
12	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_040	170	1.18 E+02	0.00 E+00	19
13	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_041	170	1.24 E+02	5.00 E-03	19.8
14	U-234	TRG	07/30/13 13:05		A_Spec	Alpha_042	170	3.97 E+01	2.00 E-03	18.5
15	U-234	TRG	07/30/13 16:13		A_Spec	Alpha_033	170	2.38 E+01	1.00 E-03	18.5
16	U-234	TRG	07/30/13 16:13		A_Spec	Alpha_034	170	7.83 E+00	1.00 E-03	18.6
17	U-234	TRG	07/30/13 16:13		A_Spec	Alpha_035	170	2.05 E+01	3.00 E-03	18.3
18	U-234	TRG	07/30/13 16:13		A_Spec	Alpha_036	170	1.66 E+00	2.00 E-03	19.1
19	U-234	TRG	07/30/13 16:17		A_Spec	Alpha_038	170	3.66 E+00	2.00 E-03	17.2

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/l	7.39E+00	1.35E+00	1.70E-01	8.05E+00	91.84	OK		OK	
02	U-238	MBL	BLANK	pCi/l	9.31E-02	7.16E-02	5.69E-02					OK	OK
03	U-238	DUP	PZ-113-AS TOT	pCi/l	3.79E-01	1.72E-01	1.07E-01				NA	OK	
04	U-238	DO	PZ-113-AS TOT	pCi/l	6.16E-01	2.43E-01	1.27E-01					OK	
05	U-238	TRG	PZ-113-AS DIS	pCi/l	2.20E-01	1.68E-01	2.12E-01					OK	
06	U-238	TRG	PZ-109-SS TOT	pCi/l	5.35E-01	1.80E-01	8.23E-02					OK	
07	U-238	TRG	PZ-109-SS DIS	pCi/l	6.08E-01	1.86E-01	7.60E-02					OK	
08	U-238	TRG	PZ-205-SS TOT	pCi/l	4.49E-01	1.56E-01	6.02E-02					OK	
09	U-238	TRG	PZ-205-SS DIS	pCi/l	4.19E-01	1.54E-01	6.33E-02					OK	
10	U-238	TRG	DUP 02 TOT	pCi/l	5.48E-02	1.32E-01	2.76E-01					OK	
11	U-238	TRG	DUP 02 DIS	pCi/l	3.32E-01	2.92E-01	2.81E-01					OK	
12	U-238	TRG	PZ-113-SS TOT	pCi/l	9.85E-01	2.61E-01	8.69E-02					OK	
13	U-238	TRG	PZ-113-SS DIS	pCi/l	8.29E-01	2.19E-01	1.15E-01					OK	
14	U-238	TRG	PZ-104-SS TOT	pCi/l	2.23E-01	1.12E-01	8.27E-02					OK	
15	U-238	TRG	PZ-104-SS DIS	pCi/l	1.18E-01	8.21E-02	7.85E-02					OK	
16	U-238	TRG	PZ-101-SS TOT	pCi/l	2.82E-01	3.16E-01	4.22E-01					OK	
17	U-238	TRG	PZ-101-SS DIS	pCi/l	4.84E-01	2.33E-01	1.24E-01					OK	
18	U-238	TRG	PZ-104-SD TOT	pCi/l	2.24E-01	2.47E-01	2.93E-01					OK	
19	U-238	TRG	PZ-104-SD DIS	pCi/l	1.65E-01	2.03E-01	2.44E-01					OK	

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

8500

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-238	LCS	07/16/13 00:00	1.00E+00	62.26	0.00	0.00			
02	U-238	MBL	07/16/13 00:00	1.00E+00	111.71	0.00	0.00			
03	U-238	DUP	07/10/13 14:00	1.00E+00	85.49	0.00	0.00			
04	U-238	DO	07/10/13 14:00	1.00E+00	63.97	0.00	0.00			
05	U-238	TRG	07/10/13 14:00	1.00E+00	81.38	0.00	0.00			
06	U-238	TRG	07/10/13 14:30	1.00E+00	104.25	0.00	0.00			
07	U-238	TRG	07/10/13 14:30	1.00E+00	112.41	0.00	0.00			
08	U-238	TRG	07/10/13 15:30	1.00E+00	114.96	0.00	0.00			
09	U-238	TRG	07/10/13 15:30	1.00E+00	104.54	0.00	0.00			
10	U-238	TRG	07/10/13 00:00	1.00E+00	23.25	0.00	0.00			
11	U-238	TRG	07/10/13 00:00	1.00E+00	22.93	0.00	0.00			
12	U-238	TRG	07/11/13 08:50	1.00E+00	96.01	0.00	0.00			
13	U-238	TRG	07/11/13 08:50	1.00E+00	111.70	0.00	0.00			
14	U-238	TRG	07/11/13 09:37	1.00E+00	109.12	0.00	0.00			
15	U-238	TRG	07/11/13 09:37	1.00E+00	109.27	0.00	0.00			
16	U-238	TRG	07/11/13 09:40	1.00E+00	20.23	0.00	0.00			
17	U-238	TRG	07/11/13 09:40	1.00E+00	55.83	0.00	0.00			
18	U-238	TRG	07/11/13 10:29	1.00E+00	22.60	0.00	0.00			
19	U-238	TRG	07/11/13 10:29	1.00E+00	26.27	0.00	0.00			

Client	Engineering Management Support, Inc.
	13-07100
Eberline Services Work Order	13-07100
Analysis Code	UUISO
Run	1

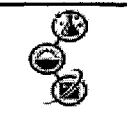
Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	07/30/13 13:04		A_Spec	Alpha_024	170.02	2.98 E+02	8.00 E-03	17.1
02	U-238	MBL	07/30/13 13:04		A_Spec	Alpha_025	170	6.83 E+00	1.00 E-03	17.4
03	U-238	DUP	07/30/13 13:04		A_Spec	Alpha_027	170.02	2.11 E+01	5.00 E-03	17.3
04	U-238	DO	07/30/13 13:04		A_Spec	Alpha_029	170	2.90 E+01	0.00 E+00	19.5
05	U-238	TRG	07/30/13 13:04		A_Spec	Alpha_031	170	9.60 E+00	2.00 E-02	14.2
06	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_033	170	3.90 E+01	0.00 E+00	18.5
07	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_034	170	4.80 E+01	0.00 E+00	18.6
08	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_035	170	3.57 E+01	2.00 E-03	18.3
09	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_036	170	3.17 E+01	2.00 E-03	19.1
10	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_038	170	8.30 E-01	1.00 E-03	17.2
11	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_039	170	5.66 E+00	2.00 E-03	19.7
12	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_040	170	6.80 E+01	0.00 E+00	19
13	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_041	170	6.93 E+01	2.20 E-02	19.8
14	U-238	TRG	07/30/13 13:05		A_Spec	Alpha_042	170	1.70 E+01	6.00 E-03	18.5
15	U-238	TRG	07/30/13 16:13		A_Spec	Alpha_033	170	9.00 E+00	0.00 E+00	18.5
16	U-238	TRG	07/30/13 16:13		A_Spec	Alpha_034	170	4.00 E+00	0.00 E+00	18.6
17	U-238	TRG	07/30/13 16:13		A_Spec	Alpha_035	170	1.87 E+01	2.00 E-03	18.3
18	U-238	TRG	07/30/13 16:13		A_Spec	Alpha_036	170	3.66 E+00	2.00 E-03	19.1
19	U-238	TRG	07/30/13 16:17		A_Spec	Alpha_038	170	2.83 E+00	1.00 E-03	17.2

	
Run	1
Analysis Code	UISO
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-235	LCS	LCS	pCi/l	9.63E-01	3.68E-01	1.73E-01					OK	
02	U-235	MBL	BLANK	pCi/l	3.38E-02	5.75E-02	1.01E-01					OK	OK
03	U-235	DUP	PZ-113-AS TOT	pCi/l	7.32E-02	1.00E-01	1.63E-01				NA	OK	
04	U-235	DO	PZ-113-AS TOT	pCi/l	1.44E-01	1.29E-01	1.38E-01					OK	
05	U-235	TRG	PZ-113-AS DIS	pCi/l	1.79E-01	1.50E-01	1.60E-01					OK	
06	U-235	TRG	PZ-109-SS TOT	pCi/l	1.70E-01	1.12E-01	1.02E-01					OK	
07	U-235	TRG	PZ-109-SS DIS	pCi/l	1.26E-01	9.33E-02	9.41E-02					OK	
08	U-235	TRG	PZ-205-SS TOT	pCi/l	1.56E-01	1.03E-01	9.36E-02					OK	
09	U-235	TRG	PZ-205-SS DIS	pCi/l	1.15E-01	9.18E-02	9.84E-02					OK	
10	U-235	TRG	DUP 02 TOT	pCi/l	6.79E-02	1.63E-01	3.42E-01					OK	
11	U-235	TRG	DUP 02 DIS	pCi/l	-3.71E-02	1.49E-01	3.81E-01					OK	
12	U-235	TRG	PZ-113-SS TOT	pCi/l	1.94E-01	1.19E-01	7.49E-02					OK	
13	U-235	TRG	PZ-113-SS DIS	pCi/l	1.23E-01	8.87E-02	8.36E-02					OK	
14	U-235	TRG	PZ-104-SS TOT	pCi/l	1.11E-01	8.53E-02	6.79E-02					OK	
15	U-235	TRG	PZ-104-SS DIS	pCi/l	1.62E-02	4.50E-02	9.72E-02					OK	
16	U-235	TRG	PZ-101-SS TOT	pCi/l	8.72E-02	2.43E-01	5.23E-01					OK	
17	U-235	TRG	PZ-101-SS DIS	pCi/l	0.00E+00	8.91E-02	1.93E-01					OK	
18	U-235	TRG	PZ-104-SD TOT	pCi/l	0.00E+00	2.10E-01	4.55E-01					OK	
19	U-235	TRG	PZ-104-SD DIS	pCi/l	-1.23E-02	1.44E-01	3.02E-01					OK	



Run
1

Analysis Code
UUISO

Eberline Services Work Order
13-07100

Client
Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	U-235	LCS	07/16/13 00:00	1.00E+00	62.26	0.00	0.00			
02	U-235	MBL	07/16/13 00:00	1.00E+00	111.71	0.00	0.00			
03	U-235	DUP	07/10/13 14:00	1.00E+00	85.49	0.00	0.00			
04	U-235	DO	07/10/13 14:00	1.00E+00	63.97	0.00	0.00			
05	U-235	TRG	07/10/13 14:00	1.00E+00	81.38	0.00	0.00			
06	U-235	TRG	07/10/13 14:30	1.00E+00	104.25	0.00	0.00			
07	U-235	TRG	07/10/13 14:30	1.00E+00	112.41	0.00	0.00			
08	U-235	TRG	07/10/13 15:30	1.00E+00	114.96	0.00	0.00			
09	U-235	TRG	07/10/13 15:30	1.00E+00	104.54	0.00	0.00			
10	U-235	TRG	07/10/13 00:00	1.00E+00	23.25	0.00	0.00			
11	U-235	TRG	07/10/13 00:00	1.00E+00	22.93	0.00	0.00			
12	U-235	TRG	07/11/13 08:50	1.00E+00	96.01	0.00	0.00			
13	U-235	TRG	07/11/13 08:50	1.00E+00	111.70	0.00	0.00			
14	U-235	TRG	07/11/13 09:37	1.00E+00	109.12	0.00	0.00			
15	U-235	TRG	07/11/13 09:37	1.00E+00	109.27	0.00	0.00			
16	U-235	TRG	07/11/13 09:40	1.00E+00	20.23	0.00	0.00			
17	U-235	TRG	07/11/13 09:40	1.00E+00	55.83	0.00	0.00			
18	U-235	TRG	07/11/13 10:29	1.00E+00	22.60	0.00	0.00			
19	U-235	TRG	07/11/13 10:29	1.00E+00	26.27	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07100	Analysis Code	UUISO	Run	1



Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-UIISO-1



Run

1

Analysis Code

UIISO

Eberline Services Work Order

13-07100

Client

Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	07/30/13 13:04		A_Spec	Alpha_024	170.02	3.13 E+01	4.00 E-03	17.1
02	U-235	MBL	07/30/13 13:04		A_Spec	Alpha_025	170	2.00 E+00	0.00 E+00	17.4
03	U-235	DUP	07/30/13 13:04		A_Spec	Alpha_027	170.02	3.30 E+00	1.00 E-02	17.3
04	U-235	DO	07/30/13 13:04		A_Spec	Alpha_029	170	5.49 E+00	3.00 E-03	19.5
05	U-235	TRG	07/30/13 13:04		A_Spec	Alpha_031	170	6.32 E+00	4.00 E-03	14.2
06	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_033	170	1.00 E+01	0.00 E+00	18.5
07	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_034	170	8.00 E+00	0.00 E+00	18.6
08	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_035	170	1.00 E+01	0.00 E+00	18.3
09	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_036	170	7.00 E+00	0.00 E+00	19.1
10	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_038	170	8.30 E-01	1.00 E-03	17.2
11	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_039	170	-5.10 E-01	3.00 E-03	19.7
12	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_040	170	1.08 E+01	1.00 E-03	19
13	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_041	170	8.32 E+00	4.00 E-03	19.8
14	U-235	TRG	07/30/13 13:05		A_Spec	Alpha_042	170	6.83 E+00	1.00 E-03	18.5
15	U-235	TRG	07/30/13 16:13		A_Spec	Alpha_033	170	1.00 E+00	0.00 E+00	18.5
16	U-235	TRG	07/30/13 16:13		A_Spec	Alpha_034	170	1.00 E+00	0.00 E+00	18.6
17	U-235	TRG	07/30/13 16:13		A_Spec	Alpha_035	170	1.00 E+00	0.00 E+00	18.3
18	U-235	TRG	07/30/13 16:13		A_Spec	Alpha_036	170	1.00 E+00	0.00 E+00	19.1
19	U-235	TRG	07/30/13 16:17		A_Spec	Alpha_038	170	-1.70 E-01	1.00 E-03	17.2

Handwritten mark: 215

24-31

704

33-42

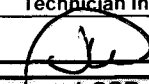
704

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Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/16/13 00:00	1.0000	0.6130	11.6758		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.6075	11.5711		0.00		
03	DUP	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.6102	11.6225		0.00		
04	DO	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.6048	11.5196		0.00		
05	TRG	PZ-113-AS DIS	07/10/13 14:00	1.0000	0.6019	11.4644		0.00		
06	TRG	PZ-109-SS TOT	07/10/13 14:30	1.0000	0.6008	11.4434		0.00		
07	TRG	PZ-109-SS DIS	07/10/13 14:30	1.0000	0.6046	11.5158		0.00		
08	TRG	PZ-205-SS TOT	07/10/13 15:30	1.0000	0.6043	11.5101		0.00		
09	TRG	PZ-205-SS DIS	07/10/13 15:30	1.0000	0.5988	11.4053		0.00		
10	TRG	DUP 02 TOT	07/10/13 00:00	1.0000	0.5937	11.3082		0.00		
11	TRG	DUP 02 DIS	07/10/13 00:00	1.0000	0.6032	11.4892		0.00		
12	TRG	PZ-113-SS TOT	07/11/13 08:50	1.0000	0.6025	11.4758		0.00		
13	TRG	PZ-113-SS DIS	07/11/13 08:50	1.0000	0.5960	11.3520		0.00		
14	TRG	PZ-104-SS TOT	07/11/13 09:37	1.0000	0.6029	11.4834		0.00		
15	TRG	PZ-104-SS DIS	07/11/13 09:37	1.0000	0.6040	11.5044		0.00		
16	TRG	PZ-101-SS TOT	07/11/13 09:40	1.0000	0.6040	11.5044		0.00		
17	TRG	PZ-101-SS DIS	07/11/13 09:40	1.0000	0.6044	11.5120		0.00		
18	TRG	PZ-104-SD TOT	07/11/13 10:29	1.0000	0.6034	11.4930		0.00		
19	TRG	PZ-104-SD DIS	07/11/13 10:29	1.0000	0.6010	11.4472		0.00		

1010

Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code				Date	Technician				Technician Initials		Witness Initials	
13-07100					1	UIISO				7/25/2013 5:36	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	7/25/2013	0.500	0.5200				8.25	0.297	0.00	0.000	0.00	0.000	0.00	0.000		
U-238	U-8a	34.350	7/25/2013	0.500	0.5200				8.05	0.290	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	19.047	7/25/2013	0.6130	0.6300															
02	U-232	U-10a	19.047	7/25/2013	0.6075	0.6300															
03	U-232	U-10a	19.047	7/25/2013	0.6102	0.6300															
04	U-232	U-10a	19.047	7/25/2013	0.6048	0.6300															
05	U-232	U-10a	19.047	7/25/2013	0.6019	0.6300															
06	U-232	U-10a	19.047	7/25/2013	0.6008	0.6300															
07	U-232	U-10a	19.047	7/25/2013	0.6046	0.6300															
08	U-232	U-10a	19.047	7/25/2013	0.6043	0.6300															
09	U-232	U-10a	19.047	7/25/2013	0.5988	0.6300															
10	U-232	U-10a	19.047	7/25/2013	0.5937	0.6300															
11	U-232	U-10a	19.047	7/25/2013	0.6032	0.6300															
12	U-232	U-10a	19.047	7/25/2013	0.6025	0.6300															
13	U-232	U-10a	19.047	7/25/2013	0.5960	0.6300															
14	U-232	U-10a	19.047	7/25/2013	0.6029	0.6300															
15	U-232	U-10a	19.047	7/25/2013	0.6040	0.6300															
16	U-232	U-10a	19.047	7/25/2013	0.6040	0.6300															
17	U-232	U-10a	19.047	7/25/2013	0.6044	0.6300															
18	U-232	U-10a	19.047	7/25/2013	0.6034	0.6300															
19	U-232	U-10a	19.047	7/25/2013	0.6010	0.6300															

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07100	1	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	PZ-113-AS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-113-AS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-109-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-109-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 02 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 02 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-104-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-104-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-101-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-104-SD TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-104-SD DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: _____

J Wolfe Date: 7/25/13

C 7/17/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/30/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:04:18 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.613 mL
 Effective Efficiency: 0.1065 +/- 0.0078
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.6226 +/- 0.0469

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.895243 +/- 0.087788
 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	210.13	13.59	1.87	0.00E+000	5.0
U-234	4.725	309.81	11.16	1.19	0.00E+000	36.4
U-235	4.375	31.32	35.46	0.68	0.00E+000	5.4
U-238	4.151	297.64	11.39	1.36	0.00E+000	10.5

T = Tracer Peak used for Effective Efficiency

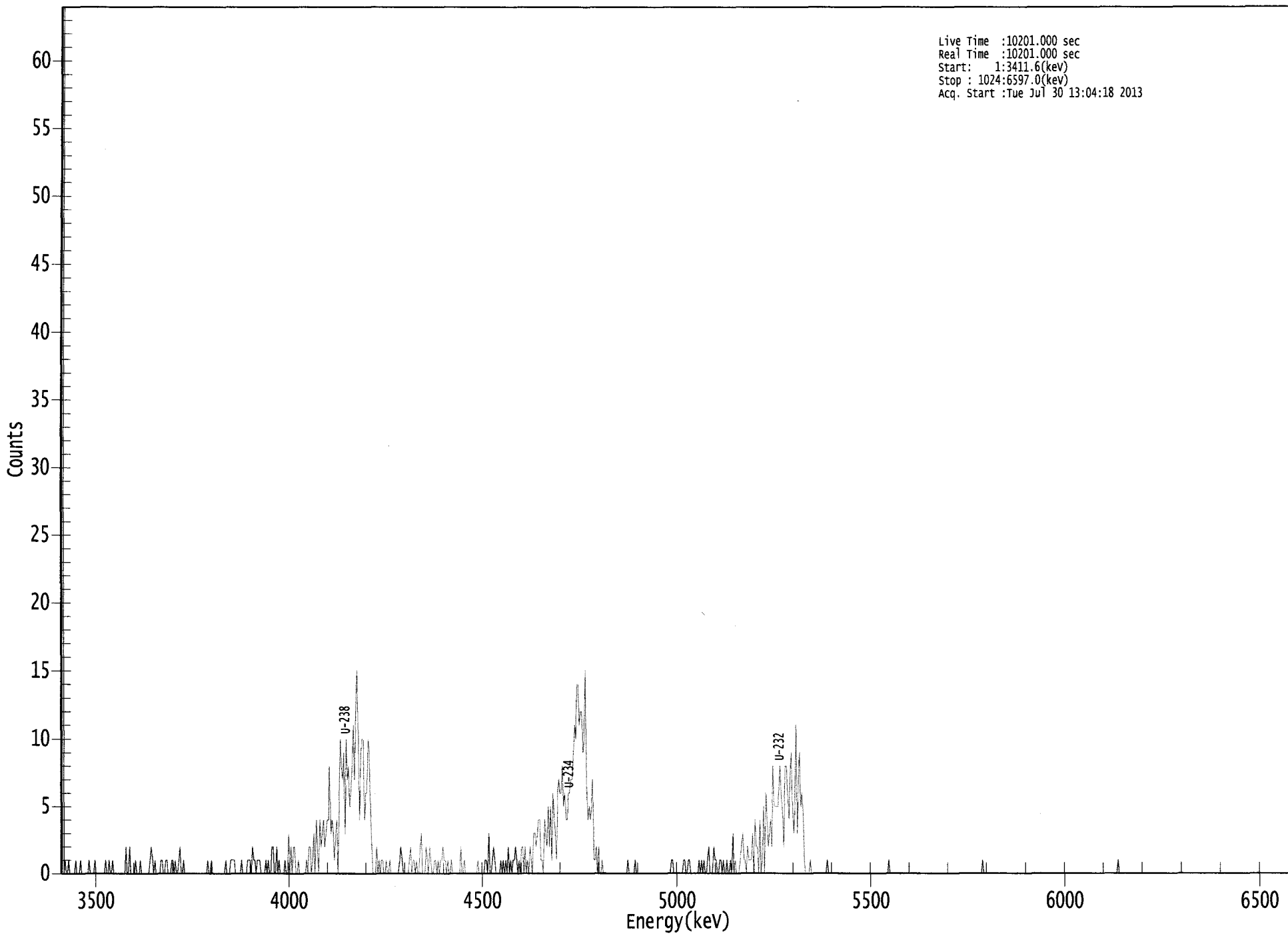
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.24E+000 +/- 7.50E-001	1.89E-001 +/- 2.70E-002
U-234	0.990	4761.50*	7.72E+000 +/- 1.40E+000	1.64E-001 +/- 2.35E-002
U-235	0.999	4385.50*	9.63E-001 +/- 3.68E-001	1.73E-001 +/- 2.48E-002
U-238	0.992	4184.40*	7.39E+000 +/- 1.35E+000	1.70E-001 +/- 2.44E-002

*AG
7/31/13*

0000064505.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Tue Jul 30 13:04:18 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 01

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	1	0	0	1	0
9:	0	0	0	0	1	0	0	0
17:	1	0	0	0	0	0	0	1
25:	0	0	0	0	1	0	0	0
33:	0	0	0	0	0	1	0	0
41:	1	0	0	1	0	0	0	0
49:	0	0	0	0	0	0	2	0
57:	0	2	0	0	0	0	1	0
65:	0	0	1	0	0	0	0	0
73:	0	0	1	2	1	0	1	0
81:	0	0	0	1	1	0	0	1
89:	1	0	0	0	1	1	0	1
97:	0	0	1	2	0	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	1	0	0	1	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	0	0	0	1	1	1
145:	1	0	0	0	0	0	1	0
153:	0	0	0	1	1	1	0	2
161:	1	1	0	1	1	1	0	0
169:	0	0	1	0	1	0	0	2
177:	2	0	0	2	0	1	0	0
185:	0	0	1	0	0	3	0	2
193:	0	2	2	0	0	1	0	0
201:	0	0	0	0	1	0	2	2
209:	0	1	3	0	4	2	0	4
217:	2	3	4	2	3	4	4	8
225:	3	4	3	1	3	4	0	5
233:	10	8	7	9	3	10	7	8
241:	5	6	8	11	7	11	15	11
249:	4	9	10	10	4	6	6	10
257:	9	4	2	0	0	0	2	0
265:	1	0	1	1	0	0	1	0
273:	0	1	0	0	0	0	0	0
281:	0	1	2	1	0	0	0	0
289:	0	1	2	0	1	1	0	1
297:	0	0	2	3	0	0	0	2
305:	1	0	2	1	0	0	1	1
313:	0	1	0	1	1	2	1	1
321:	0	1	0	0	1	0	0	0
329:	0	0	0	0	2	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	1	0	0	0	0	0
353:	1	1	0	3	0	0	1	2
361:	1	0	0	0	0	1	0	1

369: 0 1 0 2 0 1 0 1

Sample Title: 01

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

801: 0 0 0 0 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	1	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	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



CF17

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/30/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:04:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.608 mL
 Effective Efficiency: 0.1939 +/- 0.0109
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 1.1171 +/- 0.0663

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.286	379.15	10.08	0.85	0.00E+000	15.0
U-234	4.750	11.32	60.27	0.68	0.00E+000	3.1
U-235	4.394	2.00	169.74	0.00	0.00E+000	3.1
U-238	4.151	6.83	76.08	0.17	0.00E+000	9.4

T = Tracer Peak used for Effective Efficiency

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

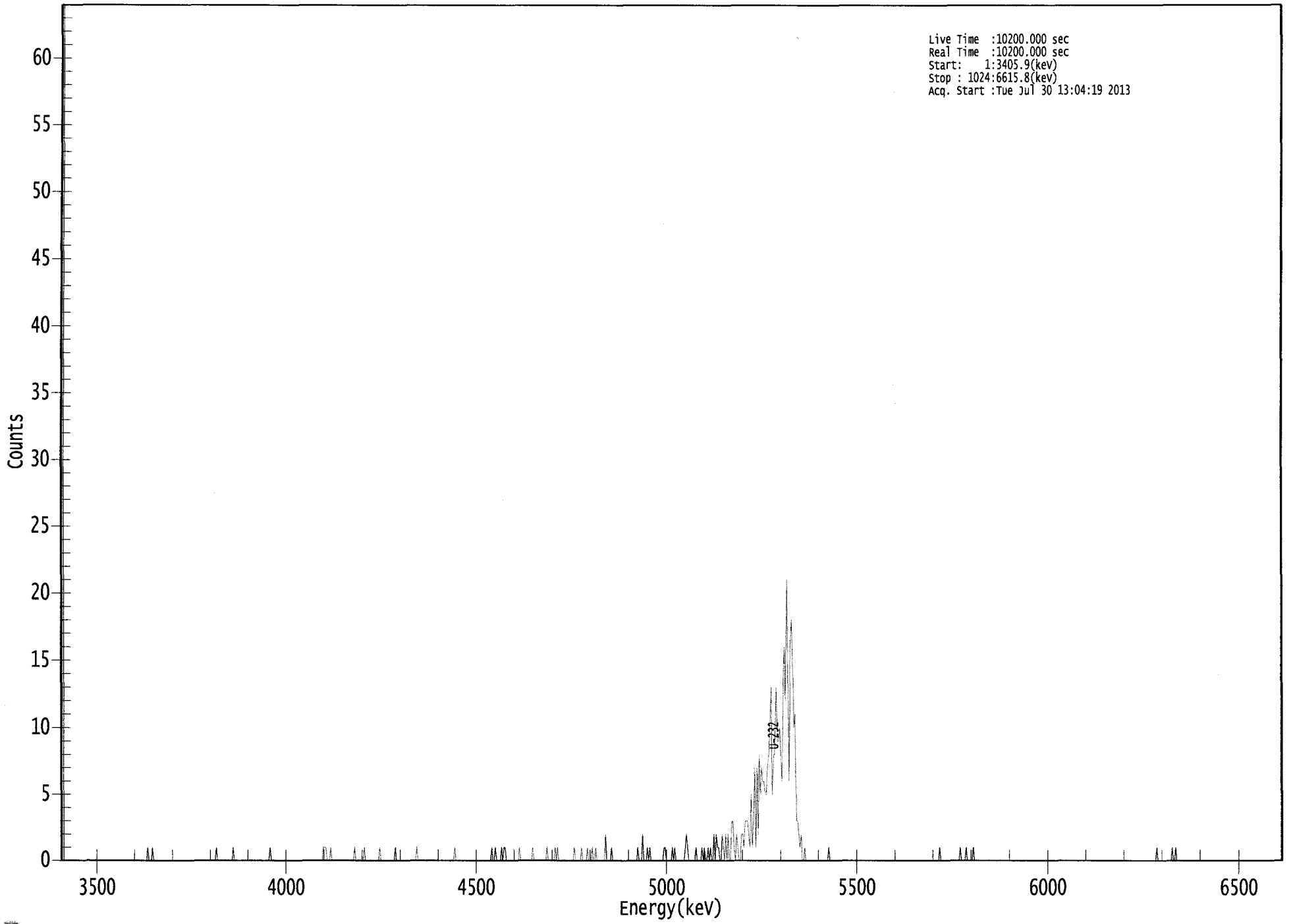
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.19E+000 +/- 5.73E-001	8.20E-002 +/- 9.05E-003
U-234	0.999	4761.50*	1.55E-001 +/- 9.50E-002	7.72E-002 +/- 8.53E-003
U-235	0.999	4385.50*	3.38E-002 +/- 5.75E-002	1.01E-001 +/- 1.12E-002
U-238	0.992	4184.40*	9.31E-002 +/- 7.16E-002	5.69E-002 +/- 6.28E-003

AG
 7/31/13

US EPA ARCHIVE DOCUMENT

000064506.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Tue Jul 30 13:04:19 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 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	1	0	0	0	1	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	1	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	1	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	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:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	1	1	1
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	1
249:	0	0	0	0	0	0	0	1
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	1	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	1	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	1	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	1	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	1	0	0	1	0	0

369: 0 0 1 0 1 1 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	1	0	0	0
401:	0	0	0	0	0	0	0	0
409:	1	0	0	0	0	0	0	1
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	1
433:	0	0	0	0	0	1	0	0
441:	0	0	1	0	0	0	1	0
449:	0	1	0	0	0	0	0	0
457:	0	2	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	1	0	0	0
489:	2	0	0	0	1	0	1	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	1	0	0	0	0
513:	0	1	0	1	0	0	0	0
521:	0	0	0	0	1	2	1	0
529:	0	0	0	0	0	1	0	0
537:	0	0	1	0	1	0	0	1
545:	0	1	0	0	2	0	2	1
553:	1	0	0	2	1	0	2	0
561:	2	0	0	3	3	1	0	2
569:	1	0	0	2	2	1	3	3
577:	3	2	1	5	1	3	7	1
585:	7	2	8	5	7	6	6	5
593:	5	7	8	10	13	5	8	8
601:	13	9	9	10	8	6	13	16
609:	12	21	14	6	16	18	15	10
617:	11	3	3	2	1	2	0	0
625:	1	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	1	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	1	0	0	0	0	1
761:	0	0	0	0	0	1	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 02

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



*C
7/17*

Sample Description: PZ-113-AS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:04:20 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.610 mL
 Effective Efficiency: 0.1477 +/- 0.0093
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM
 Chem. Recovery Factor: 0.8549 +/- 0.0564

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.261	290.13	11.55	1.87	0.00E+000	26.2
U-234	4.727	35.30	33.91	1.70	0.00E+000	4.8
U-235	4.405	3.30	136.60	1.70	0.00E+000	9.5
U-238	4.146	21.15	43.61	0.85	0.00E+000	3.2

T = Tracer Peak used for Effective Efficiency

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

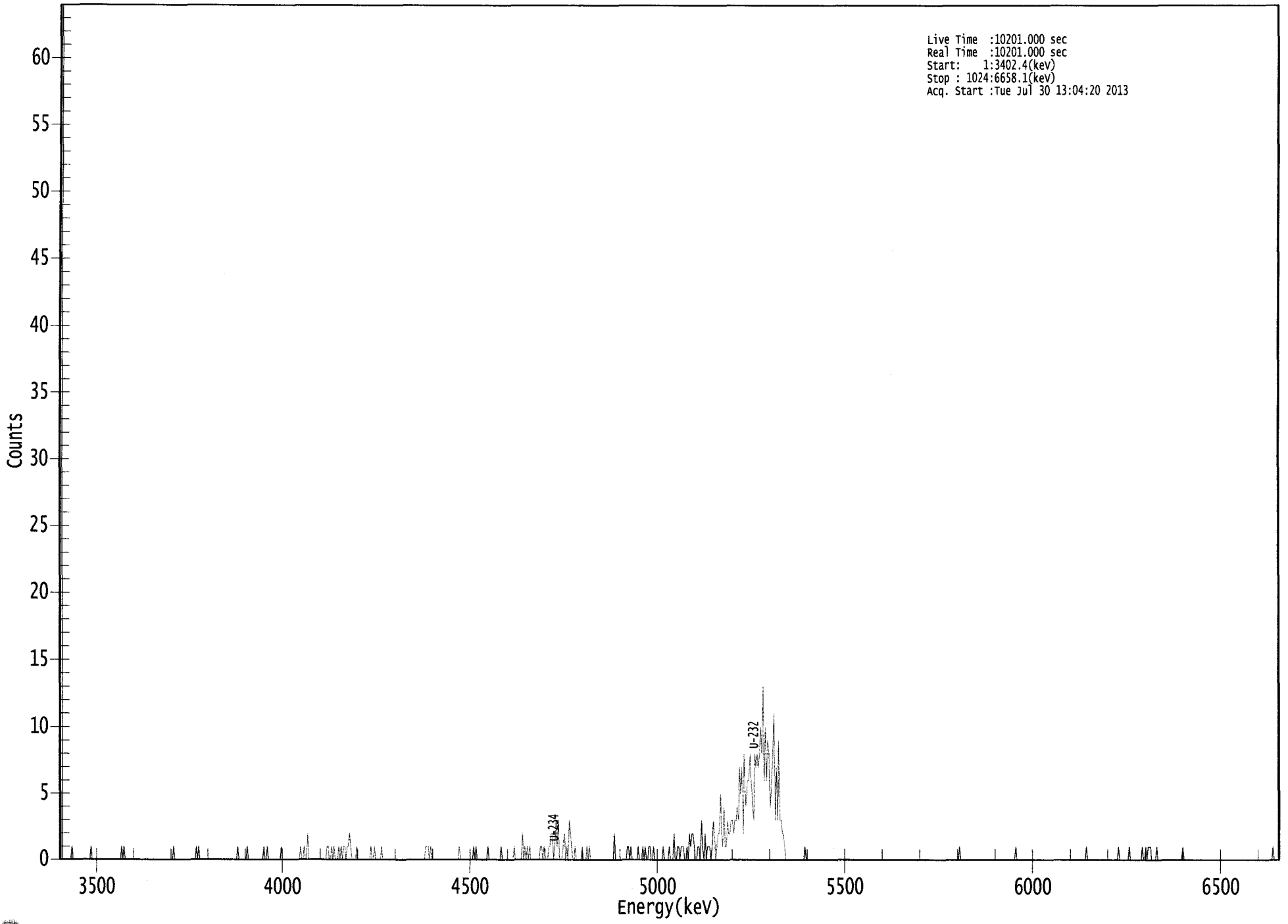
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.988	5302.50*	5.22E+000 +/- 6.47E-001	1.36E-001 +/- 1.69E-002
U-234	0.992	4761.50*	6.35E-001 +/- 2.29E-001	1.32E-001 +/- 1.64E-002
U-235	0.997	4385.50*	7.32E-002 +/- 1.00E-001	1.63E-001 +/- 2.02E-002
U-238	0.990	4184.40*	3.79E-001 +/- 1.72E-001	1.07E-001 +/- 1.33E-002

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7/31/13*

US EPA ARCHIVE DOCUMENT

0000064504.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3402.4(kev)
Stop : 1024:6658.1(kev)
Acq. Start :Tue Jul 30 13:04:20 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 03

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 1 0 0 0 0

Sample Title: 03

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

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



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7/17/13

Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:04:21 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.1245 +/- 0.0085
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 0.6397 +/- 0.0454

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.292	242.30	12.64	1.70	0.00E+000	5.0
U-234	4.740	32.15	35.10	0.85	0.00E+000	3.1
U-235	4.384	5.49	88.08	0.51	0.00E+000	3.1
U-238	4.159	29.00	37.02	0.00	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

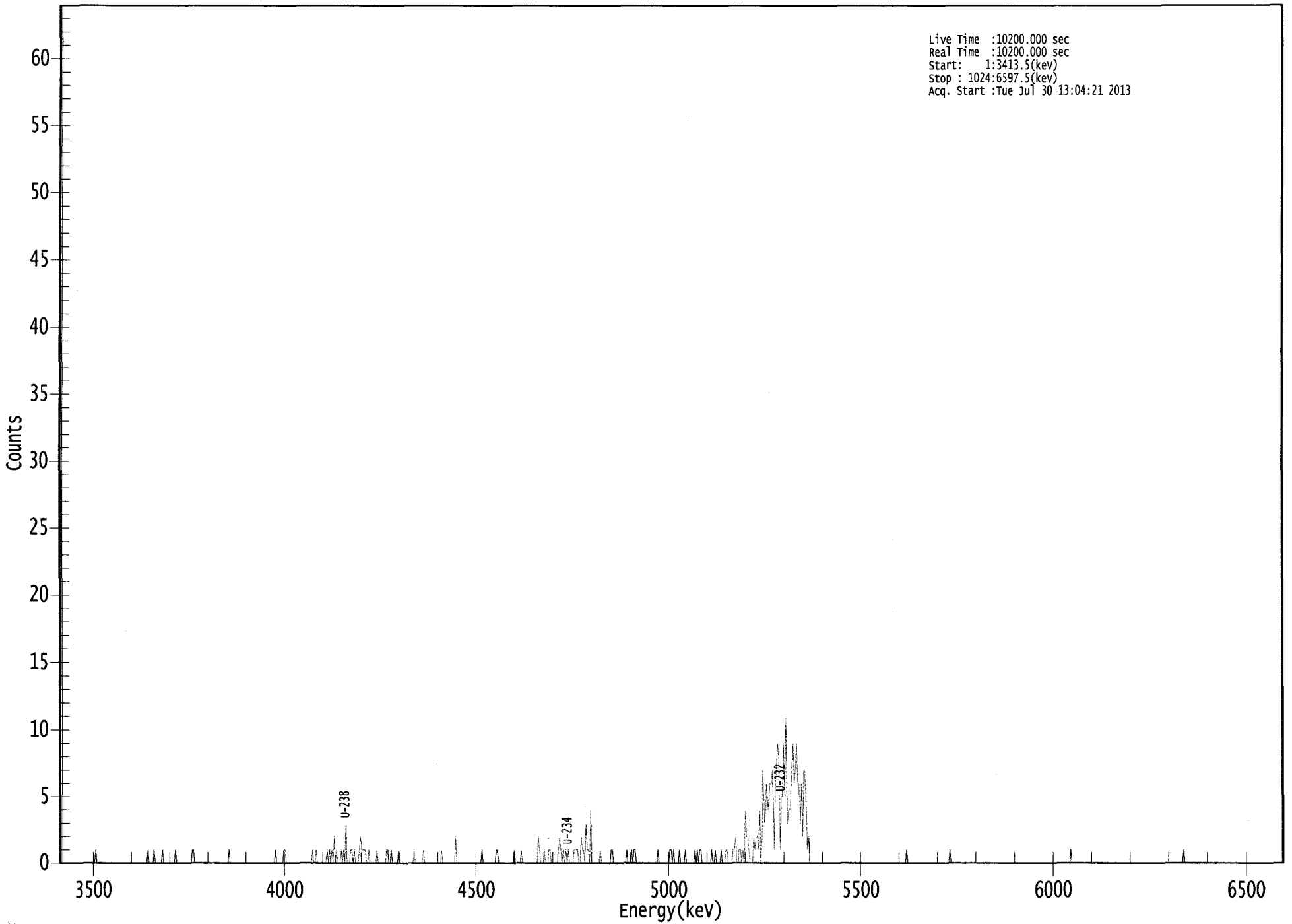
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.17E+000 +/- 6.94E-001	1.57E-001 +/- 2.10E-002
U-234	0.997	4761.50*	6.86E-001 +/- 2.58E-001	1.28E-001 +/- 1.71E-002
U-235	1.000	4385.50*	1.44E-001 +/- 1.29E-001	1.38E-001 +/- 1.85E-002
U-238	0.996	4184.40*	6.16E-001 +/- 2.43E-001	1.27E-001 +/- 1.71E-002

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US EPA ARCHIVE DOCUMENT

0000064503.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start :Tue Jul 30 13:04:21 2013



ROI Type: 1

ROI Type: 3

0123

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 04

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	2	1	0	0	0	1	0
409:	0	0	1	1	0	0	0	0
417:	0	0	1	2	1	0	1	0
425:	1	0	1	0	0	0	0	1
433:	1	1	1	0	0	2	1	1
441:	0	3	1	1	0	4	0	0
449:	0	0	0	0	0	1	0	0
457:	0	0	0	0	0	0	1	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	1	0	0	0	1
481:	0	1	1	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	0	0	0	0	0	1
513:	1	0	1	0	0	0	0	1
521:	0	0	0	0	1	0	0	0
529:	0	0	0	0	1	0	1	0
537:	1	1	0	0	0	0	0	0
545:	0	0	1	0	0	1	0	0
553:	0	0	1	0	0	0	1	1
561:	0	0	0	0	1	1	2	0
569:	0	1	1	0	1	0	4	2
577:	2	1	0	0	0	2	1	2
585:	2	1	4	0	2	7	3	4
593:	6	4	5	6	6	7	1	5
601:	7	9	8	1	5	5	9	5
609:	11	3	4	4	5	7	9	6
617:	7	9	6	6	3	6	2	7
625:	7	4	1	2	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	1	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	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	1	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	1	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



7/10

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:04:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.602 mL
 Effective Efficiency: 0.1154 +/- 0.0082
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM
 Chem. Recovery Factor: 0.8138 +/- 0.0609

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.263	223.66	13.12	0.34	0.00E+000	6.6
U-234	4.703	24.13	41.67	1.87	0.00E+000	3.1
U-235	4.386	6.32	82.73	0.68	0.00E+000	3.1
U-238	4.116	9.60	75.23	3.40	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

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

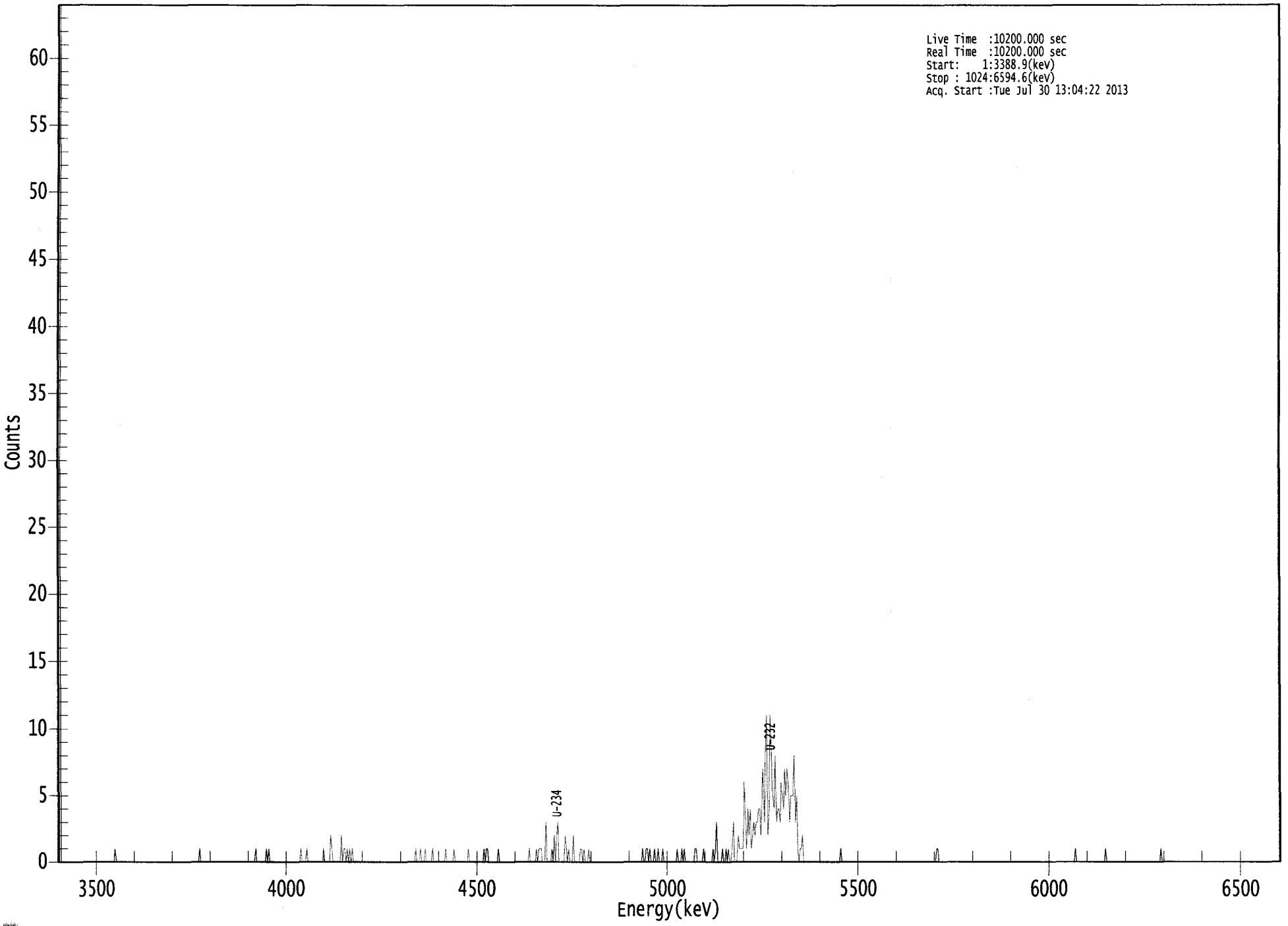
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.989	5302.50*	5.15E+000 +/- 7.14E-001	1.10E-001 +/- 1.53E-002
U-234	0.976	4761.50*	5.55E-001 +/- 2.44E-001	1.74E-001 +/- 2.42E-002
U-235	1.000	4385.50*	1.79E-001 +/- 1.50E-001	1.60E-001 +/- 2.22E-002
U-238	0.967	4184.40*	2.20E-001 +/- 1.68E-001	2.12E-001 +/- 2.94E-002

AG
 7/31/13

US EPA ARCHIVE DOCUMENT

0000064507.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3388.9(kev)
Stop : 1024:6594.6(kev)
Acq. Start :Tue Jul 30 13:04:22 2013



ROI Type: 1

ROI Type: 3

0128

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 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	1	0	0	0	0
401:	0	1	0	1	1	1	0	0
409:	0	3	0	0	0	0	1	0
417:	2	0	2	3	0	0	0	0
425:	0	2	1	0	1	0	0	0
433:	2	0	0	0	0	0	1	1
441:	0	1	0	0	0	1	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	1	0	0	1	1	0
497:	1	0	0	0	1	0	0	1
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	1	0	1	0	0
529:	0	0	0	0	0	0	1	1
537:	0	0	0	0	0	1	0	0
545:	0	0	0	0	0	1	0	1
553:	3	0	0	0	0	1	0	0
561:	1	0	1	0	0	1	3	0
569:	0	0	2	1	1	1	1	6
577:	3	1	4	2	4	1	2	3
585:	2	3	3	4	4	2	5	7
593:	3	8	11	2	4	11	8	5
601:	4	8	3	4	4	3	6	5
609:	4	7	5	7	6	3	5	5
617:	5	8	3	5	1	0	1	1
625:	2	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:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	1	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

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



*C
7/12*

Sample Description: PZ-109-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:37 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1927 +/- 0.0109
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Chem. Recovery Factor: 1.0425 +/- 0.0619

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.274	372.66	10.16	0.34	0.00E+000	17.9
U-234	4.724	98.83	19.74	0.17	0.00E+000	4.0
U-235	4.396	10.00	65.01	0.00	0.00E+000	3.0
U-238	4.154	39.00	31.78	0.00	0.00E+000	6.0

T = Tracer Peak used for Effective Efficiency

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

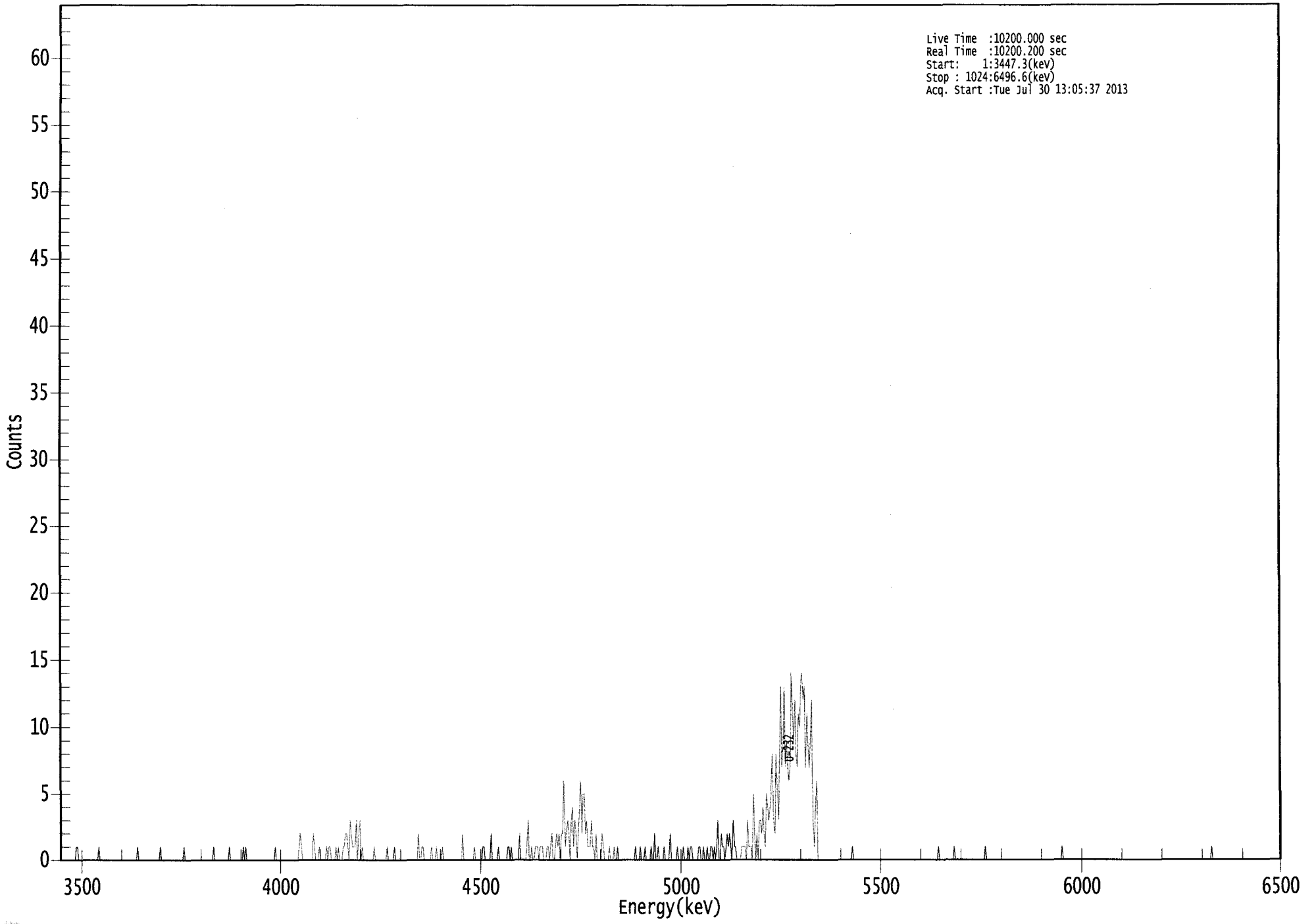
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.71E-001	6.59E-002 +/- 7.33E-003
U-234	0.990	4761.50*	1.36E+000 +/- 3.08E-001	5.75E-002 +/- 6.39E-003
U-235	0.999	4385.50*	1.70E-001 +/- 1.12E-001	1.02E-001 +/- 1.13E-002
U-238	0.994	4184.40*	5.35E-001 +/- 1.80E-001	8.23E-002 +/- 9.14E-003

*AG
7/31/13*

US EPA ARCHIVE DOCUMENT

0000064509.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :Tue Jul 30 13:05:37 2013



ROI Type: 1

ROI Type: 3

0000064509

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	1	1	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	1	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	1	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	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	1	0	0	0	0	0	0
137:	0	0	0	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	1	0	1	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	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	1	2	1	0	0	0	0
209:	0	0	0	0	0	2	1	0
217:	0	0	1	0	0	0	0	0
225:	1	0	1	1	0	0	0	0
233:	1	0	1	0	0	0	1	1
241:	2	2	1	0	3	2	1	1
249:	1	3	0	2	3	0	1	0
257:	0	0	0	0	0	0	0	0
265:	1	0	0	0	0	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	2	0	0
305:	1	1	0	0	0	0	0	0
313:	1	0	0	0	1	0	0	0
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	2	0	0	0	0	0
345:	0	0	0	0	1	0	0	0
353:	0	0	0	1	1	0	0	0
361:	0	0	2	0	0	0	0	0

369: 1 0 0 0 0 0 0 0

Sample Title: 06

Channel	1	2	3	4	5	6	7	8	9
377:	1	1	0	1	0	0	0	0	0
385:	0	0	2	0	0	0	0	0	0
393:	1	3	0	0	1	0	0	0	1
401:	1	1	0	1	1	1	0	0	0
409:	0	1	1	0	1	2	0	0	0
417:	1	2	1	2	0	2	2	6	0
425:	1	2	3	2	0	3	4	1	0
433:	3	2	0	2	4	6	2	5	0
441:	5	2	3	1	1	1	3	1	0
449:	1	0	2	0	0	0	0	2	0
457:	1	0	0	0	0	1	0	0	0
465:	0	1	0	0	1	0	0	0	0
473:	0	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	1	0
489:	0	0	0	1	0	0	0	0	0
497:	1	0	0	2	0	0	1	0	0
505:	0	0	0	1	0	0	0	0	0
513:	2	0	0	0	0	0	1	0	0
521:	0	0	0	1	0	0	0	1	0
529:	0	1	1	0	0	0	0	0	0
537:	1	1	0	0	1	0	0	1	0
545:	0	0	1	1	0	1	0	1	0
553:	3	0	0	2	1	1	0	1	0
561:	2	1	2	1	0	3	1	1	0
569:	0	0	0	0	1	1	1	1	0
577:	0	3	1	1	1	0	5	2	0
585:	0	2	0	3	3	2	4	2	0
593:	1	5	4	3	4	5	8	3	0
601:	2	8	6	3	7	13	7	9	0
609:	13	7	9	7	6	7	14	11	0
617:	9	12	8	7	11	10	13	14	0
625:	12	13	7	11	9	7	9	12	0
633:	3	1	4	6	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	1	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	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	1	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:	1	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: 06

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



Fin

Sample Description: PZ-109-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:39 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.2086 +/- 0.0114
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 1.1241 +/- 0.0646

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.281	406.00	9.74	0.00	0.00E+000	56.2
U-234	4.719	109.83	18.72	0.17	0.00E+000	4.1
U-235	4.391	8.00	73.50	0.00	0.00E+000	3.0
U-238	4.143	48.00	28.58	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

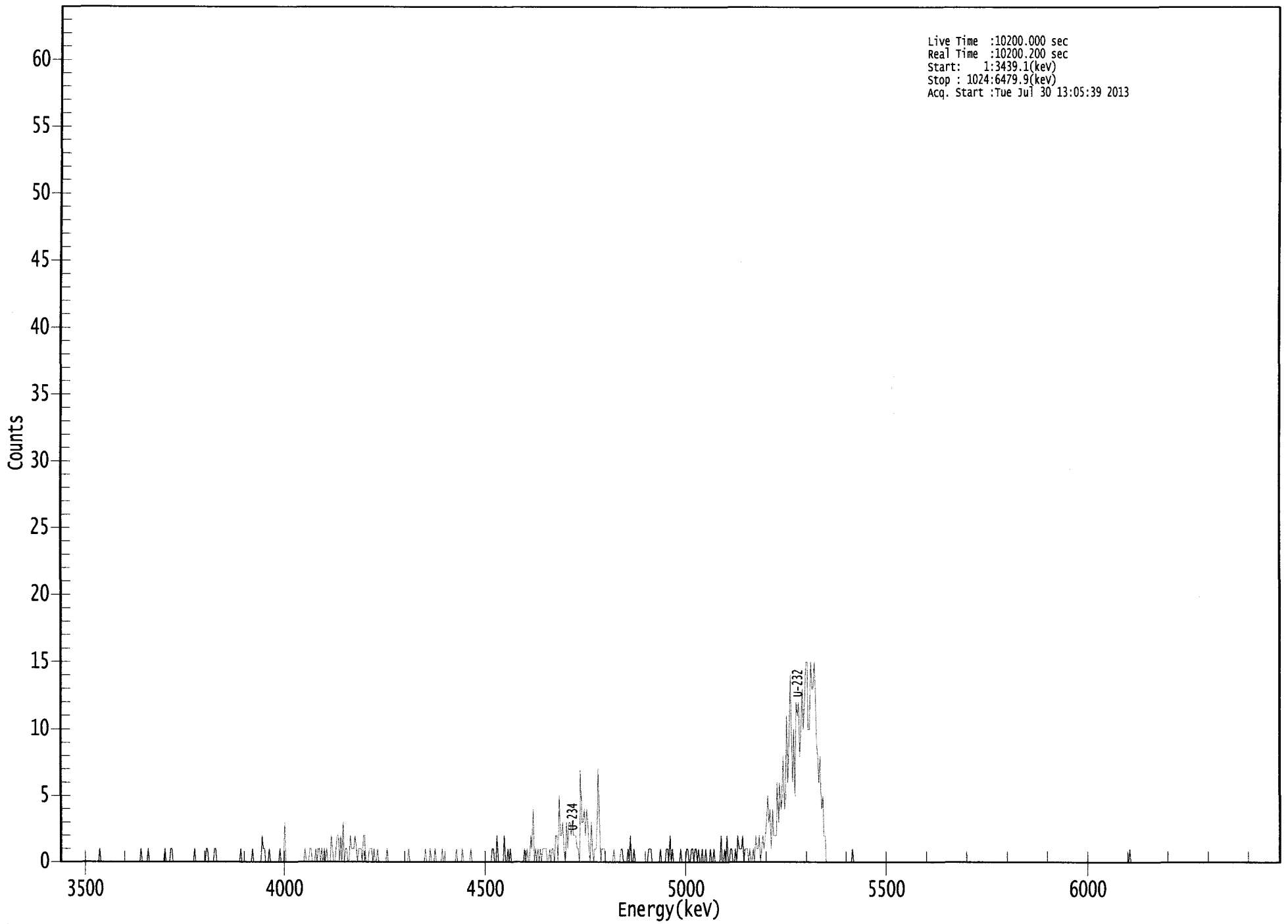
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.17E+000 +/- 5.55E-001	7.64E-002 +/- 8.20E-003
U-234	0.987	4761.50*	1.40E+000 +/- 3.02E-001	5.31E-002 +/- 5.70E-003
U-235	1.000	4385.50*	1.26E-001 +/- 9.33E-002	9.41E-002 +/- 1.01E-002
U-238	0.988	4184.40*	6.08E-001 +/- 1.86E-001	7.60E-002 +/- 8.16E-003

AG
7/31/13

US EPA ARCHIVE DOCUMENT

0000064510.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Tue Jul 30 13:05:39 2013



ROI Type: 1

ROI Type: 3

0138

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

369: 0 0 0 0 0 2 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	1	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	1	0
393:	1	0	0	2	1	4	0	1
401:	0	1	0	1	0	1	1	1
409:	1	0	0	1	0	1	1	0
417:	2	2	0	5	2	2	3	1
425:	0	3	1	3	3	2	3	2
433:	2	2	1	1	0	7	3	3
441:	4	2	4	3	1	0	3	1
449:	0	1	1	3	7	3	0	1
457:	1	1	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	1
473:	1	0	0	0	0	1	0	2
481:	0	0	1	0	0	0	0	0
489:	0	0	0	0	0	0	1	1
497:	1	0	0	0	0	0	0	0
505:	1	0	0	0	0	1	1	0
513:	2	0	1	0	0	0	0	0
521:	0	1	0	0	0	0	1	1
529:	0	0	1	1	0	1	1	0
537:	1	0	0	1	0	0	1	0
545:	0	0	1	0	0	1	0	0
553:	0	0	0	2	0	0	1	0
561:	2	0	0	1	1	0	0	1
569:	0	2	1	1	1	2	0	1
577:	1	1	0	1	0	0	1	0
585:	2	1	1	2	0	1	2	1
593:	2	3	5	3	4	1	4	2
601:	2	2	6	3	6	4	5	8
609:	4	5	11	6	9	14	10	6
617:	10	5	12	11	12	8	10	13
625:	10	12	15	15	10	10	15	13
633:	13	15	13	9	8	6	8	4
641:	5	2	2	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	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: 07

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



*C
F/P*

Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:33 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.2099 +/- 0.0115
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.1496 +/- 0.0659

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 5.310	408.32	9.71	0.68	0.00E+000	20.1
U-234	4.764	42.49	30.28	0.51	0.00E+000	4.0
U-235	4.435	10.00	65.01	0.00	0.00E+000	2.9
U-238	4.187	35.66	33.00	0.34	0.00E+000	5.4

T = Tracer Peak used for Effective Efficiency

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

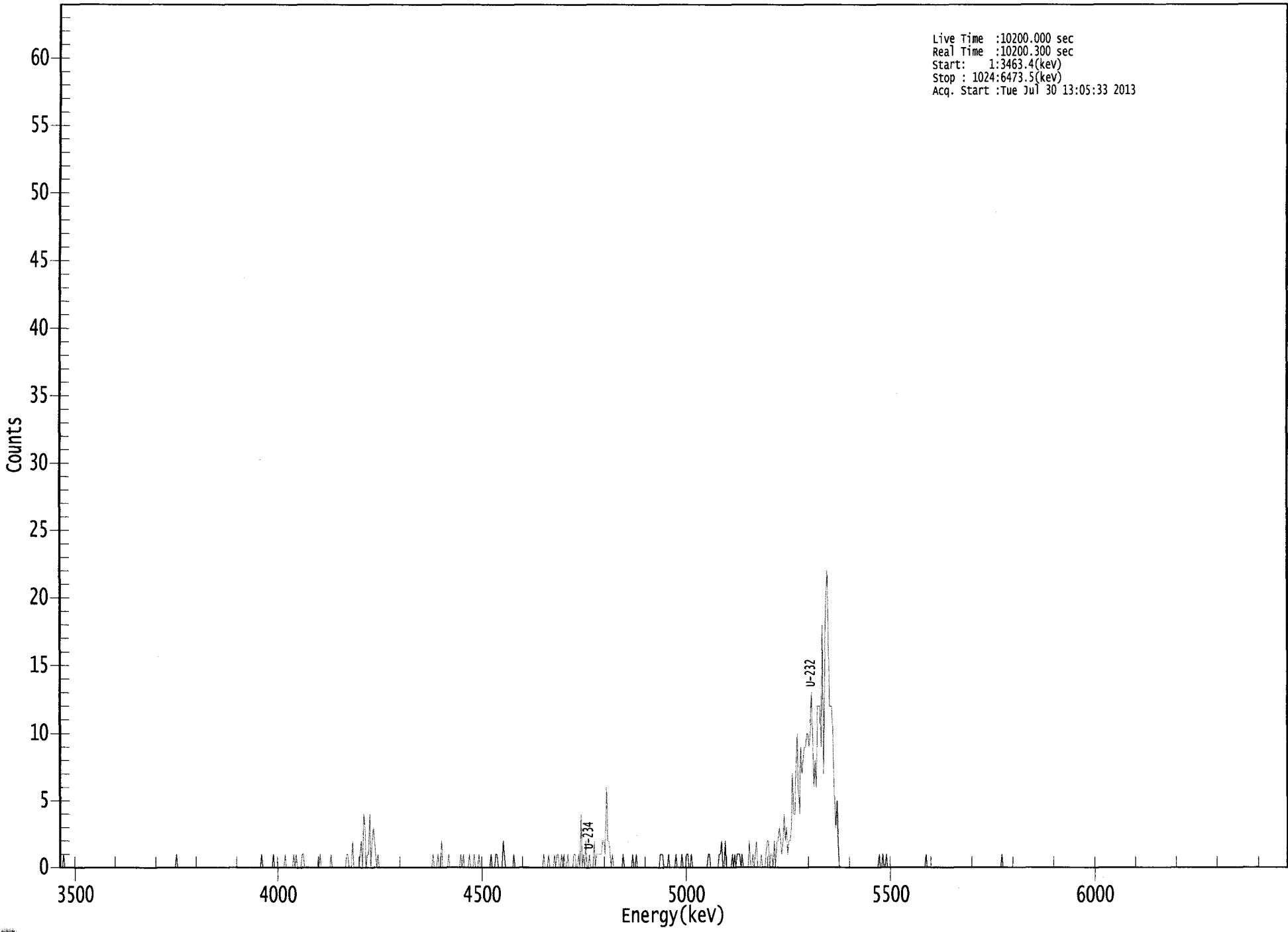
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.17E+000 +/- 5.53E-001	7.14E-002 +/- 7.64E-003
U-234	1.000	4761.50*	5.37E-001 +/- 1.73E-001	6.64E-002 +/- 7.11E-003
U-235	0.983	4385.50*	1.56E-001 +/- 1.03E-001	9.36E-002 +/- 1.00E-002
U-238	1.000	4184.40*	4.49E-001 +/- 1.56E-001	6.02E-002 +/- 6.45E-003

*AG
7/31/13*

US EPA ARCHIVE DOCUMENT

0000064511.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Tue Jul 30 13:05:33 2013



ROI Type: 1

ROI Type: 3

02719

 ***** 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	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	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	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	1	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	1	0	1	0
201:	0	0	0	1	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	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	1	0	0	0	2	0	0
249:	0	0	0	1	2	0	4	3
257:	0	1	1	4	0	2	3	2
265:	1	0	1	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	1	0	0	2
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	1
337:	0	1	0	0	0	0	1	0
345:	0	0	1	0	0	0	1	0
353:	0	0	0	0	0	0	0	0
361:	1	0	0	0	1	1	0	0

369: 0 0 2 1 0 0 0 0

Sample Title: 08

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	1	0	0	0
409:	1	0	0	0	0	1	0	1
417:	1	0	0	1	0	1	0	0
425:	1	0	0	0	0	1	1	0
433:	0	1	0	4	0	1	0	2
441:	0	0	1	0	0	0	2	0
449:	1	1	1	1	1	2	2	1
457:	6	2	2	1	0	1	0	0
465:	0	0	0	0	0	0	1	0
473:	0	0	0	0	0	0	1	0
481:	0	1	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	1	1	1
505:	0	0	0	0	1	0	0	0
513:	0	0	1	0	0	0	0	1
521:	0	0	0	1	1	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	1	1	0
545:	0	0	0	0	0	0	1	1
553:	2	0	0	2	0	0	0	0
561:	0	1	0	1	0	1	1	1
569:	0	1	0	0	0	0	0	2
577:	0	0	1	0	1	2	0	0
585:	0	1	0	0	0	1	2	2
593:	0	1	1	0	2	0	2	2
601:	3	2	1	2	4	2	3	1
609:	2	2	3	7	4	4	7	10
617:	6	4	9	7	8	9	9	10
625:	10	9	10	13	10	6	8	6
633:	12	12	12	9	18	7	15	20
641:	22	18	12	12	12	9	5	3
649:	5	2	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	1	0	0	1	0
689:	0	1	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	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	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: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	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-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:34 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.1996 +/- 0.0112
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 1.0454 +/- 0.0612

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	384.83	9.99	0.17	0.00E+000	7.9
U-234	4.728	35.66	33.00	0.34	0.00E+000	6.6
U-235	4.363	7.00	79.20	0.00	0.00E+000	3.0
U-238	4.138	31.66	35.05	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

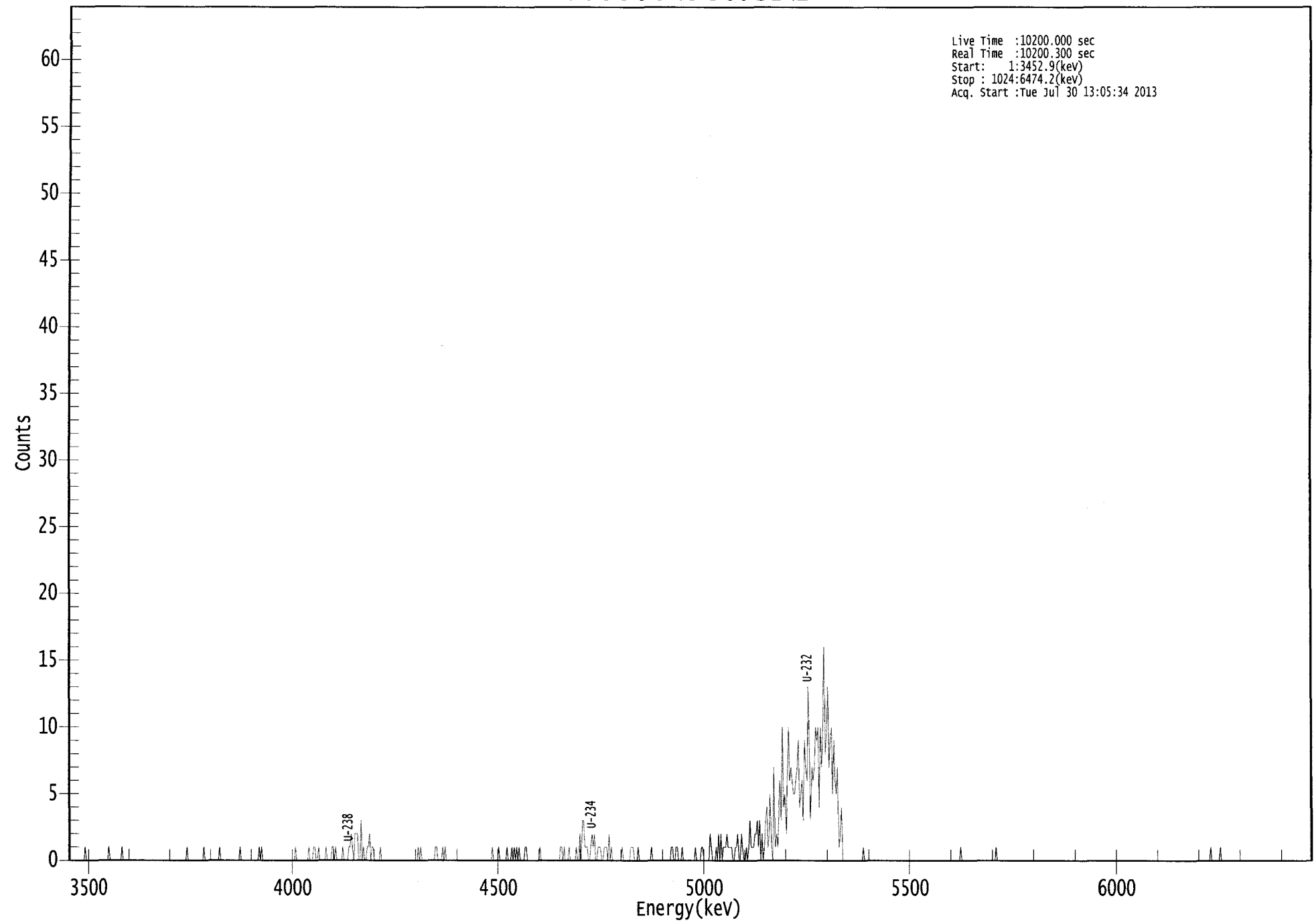
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.984	5302.50*	5.12E+000 +/- 5.61E-001	5.55E-002 +/- 6.09E-003
U-234	0.992	4761.50*	4.74E-001 +/- 1.65E-001	6.36E-002 +/- 6.97E-003
U-235	0.996	4385.50*	1.15E-001 +/- 9.18E-002	9.84E-002 +/- 1.08E-002
U-238	0.985	4184.40*	4.19E-001 +/- 1.54E-001	6.33E-002 +/- 6.94E-003

AG
 7/31/13

US EPA ARCHIVE DOCUMENT

0000064560.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start : 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Tue Jul 30 13:05:34 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	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:	0	0	0	0	0	0	0	0
33:	0	1	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	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	1	0	0	0	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	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	1	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	1	0	0	0
193:	0	0	0	0	0	0	0	1
201:	0	0	0	1	1	0	0	1
209:	0	0	0	0	0	1	0	0
217:	0	0	1	1	0	1	0	0
225:	0	0	0	1	0	0	0	0
233:	1	1	2	1	0	2	2	2
241:	0	0	3	0	1	0	0	1
249:	1	2	0	1	1	0	0	0
257:	0	0	1	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	1	0	1	0	0	0	0
297:	0	0	0	0	0	0	0	1
305:	1	0	0	0	0	1	0	1
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1	0
353:	0	0	0	1	0	0	0	0
361:	0	0	1	0	0	0	1	0

369: 1 0 1 0 1 0 0 0

Sample Title: 09

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

801: 0 0 0 0 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	1	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



Apex-Alpha™

CAZ

Sample Description: DUP 02 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:36 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.594 mL
 Effective Efficiency: 0.0400 +/- 0.0047
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 0.2325 +/- 0.0275

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.284	76.49	22.50	0.51	0.00E+000	11.4
U-234	4.703	4.66	94.59	0.34	0.00E+000	3.0
U-235	4.453	0.83	239.53	0.17	0.00E+000	3.0
U-238	4.149	0.83	239.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

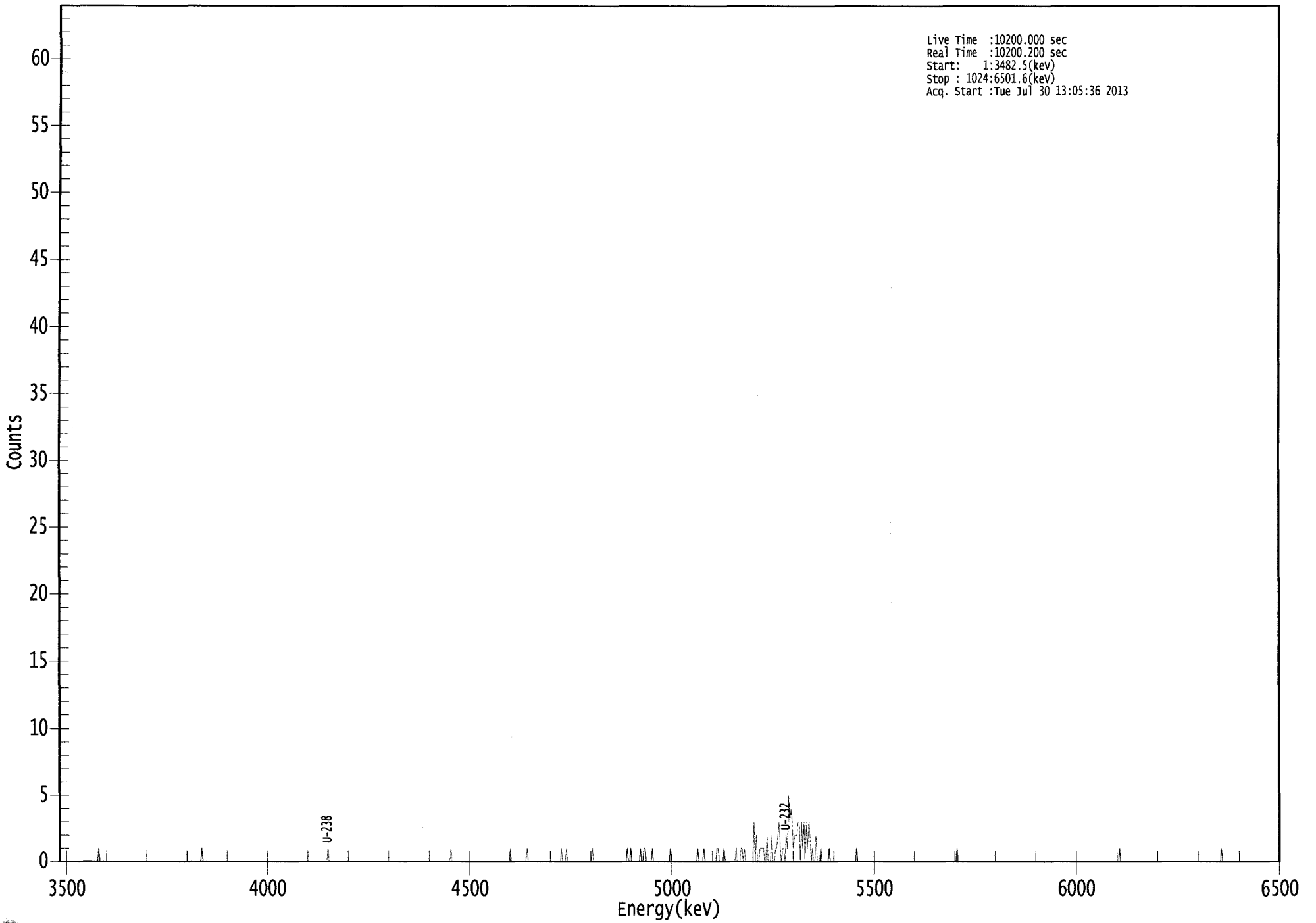
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.08E+000 +/- 1.16E+000	3.48E-001 +/- 7.99E-002
U-234	0.976	4761.50*	3.09E-001 +/- 3.01E-001	3.17E-001 +/- 7.28E-002
U-235	0.968	4385.50*	6.79E-002 +/- 1.63E-001	3.42E-001 +/- 7.84E-002
U-238	0.991	4184.40*	5.48E-002 +/- 1.32E-001	2.76E-001 +/- 6.33E-002

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US EPA ARCHIVE DOCUMENT

0000064508.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Tue Jul 30 13:05:36 2013



ROI Type: 1

ROI Type: 3

0153

 ***** 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
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	1	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:	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	1	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	1	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 10

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

801: 0 0 0 0 0 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	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	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

Apex-Alpha™

c
F12

Sample Description: DUP 02 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:44 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.0451 +/- 0.0049
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.2293 +/- 0.0255

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 5.288	87.49	21.03	0.51	0.00E+000	7.2
U-234	4.703	5.66	85.23	0.34	0.00E+000	3.0
U-235	4.397	-0.51	400.63	0.51	0.00E+000	0.0
U-238	4.124	5.66	85.23	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

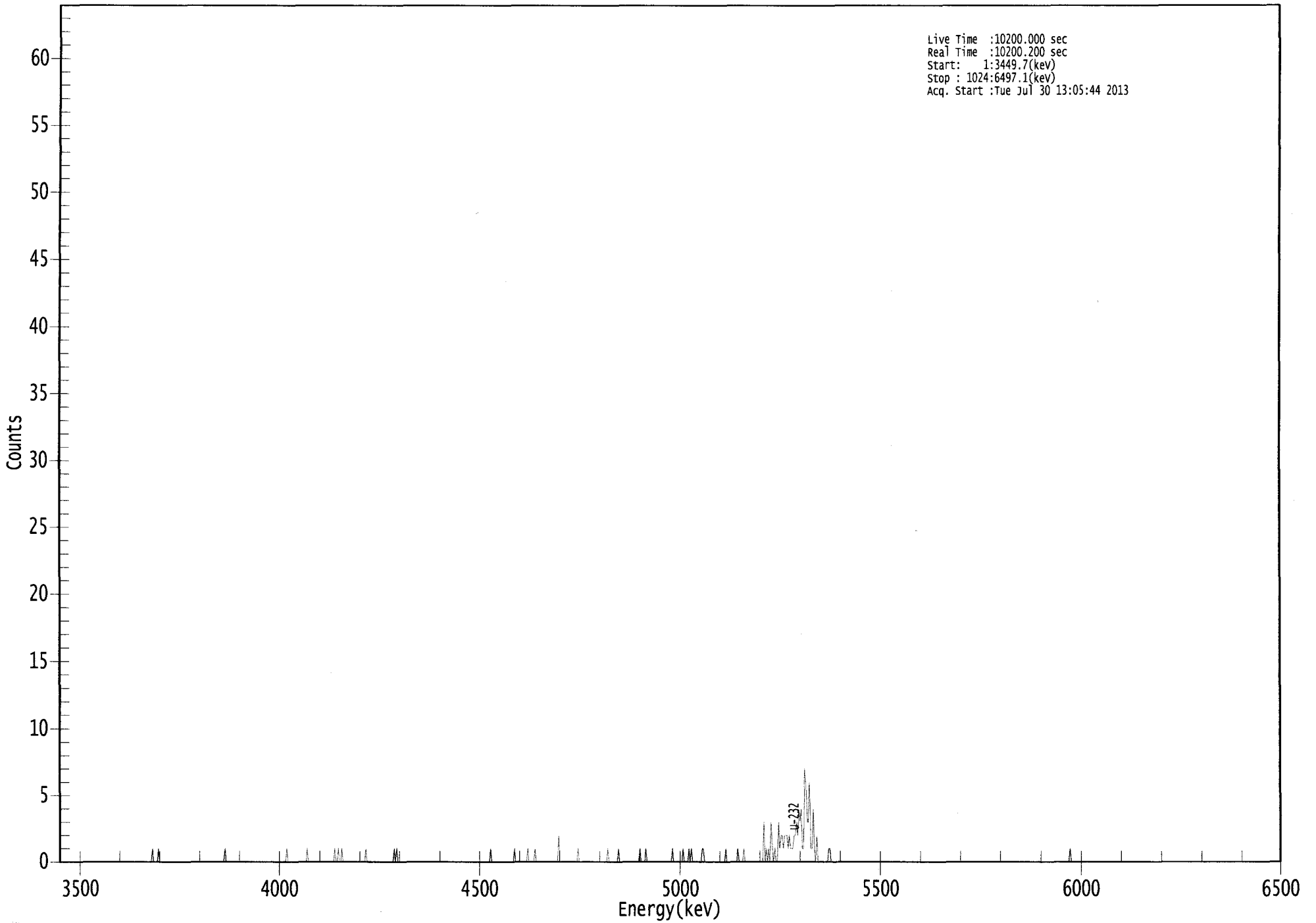
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.16E+000 +/- 1.11E+000	3.09E-001 +/- 6.65E-002
U-234	0.976	4761.50*	3.34E-001 +/- 2.93E-001	2.82E-001 +/- 6.06E-002
U-235	0.999	4385.50*	-3.71E-002 +/- 1.49E-001	3.81E-001 +/- 8.20E-002
U-238	0.974	4184.40*	3.32E-001 +/- 2.92E-001	2.81E-001 +/- 6.03E-002

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US EPA ARCHIVE DOCUMENT

0000064513.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Tue Jul 30 13:05:44 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	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0
81:	0	0	0	1	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	1	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	1
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	1	0	0	1	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	1	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	1	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	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	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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



C
7/31/13

Sample Description: PZ-113-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.1824 +/- 0.0106
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 0.9601 +/- 0.0581

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232 T	5.278	353.83	10.42	0.17	0.00E+000	31.2
U-234	4.728	118.00	18.12	0.00	0.00E+000	5.3
U-235	4.394	10.83	60.10	0.17	0.00E+000	3.0
U-238	4.159	68.00	23.94	0.00	0.00E+000	8.5

T = Tracer Peak used for Effective Efficiency

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

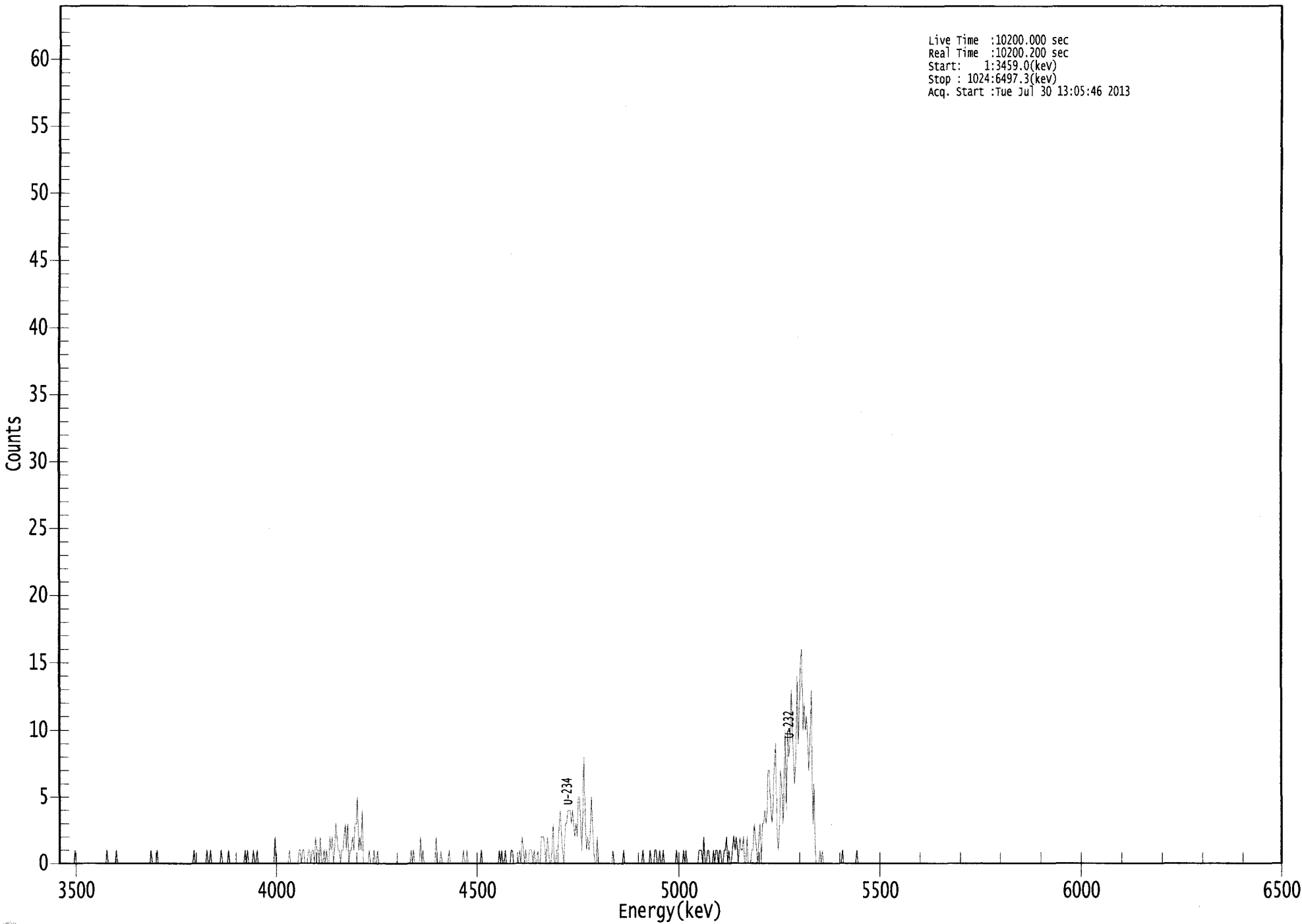
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.15E+000 +/- 5.85E-001	6.08E-002 +/- 6.90E-003
U-234	0.992	4761.50*	1.72E+000 +/- 3.67E-001	8.73E-002 +/- 9.91E-003
U-235	0.999	4385.50*	1.94E-001 +/- 1.19E-001	7.49E-002 +/- 8.51E-003
U-238	0.995	4184.40*	9.85E-001 +/- 2.61E-001	8.69E-002 +/- 9.87E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064515.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Tue Jul 30 13:05:46 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	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:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	0
49:	1	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	1	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	1	0	0	0	0	0	0
121:	0	0	0	0	1	0	0	1
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	1	0
161:	0	0	0	1	0	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	2	0	0
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	1	1	0	1	1	0	0
209:	0	1	1	0	1	1	0	2
217:	1	1	0	2	0	0	1	0
225:	1	0	0	2	1	2	0	1
233:	3	2	1	1	0	1	1	2
241:	3	1	3	0	1	1	2	1
249:	3	3	5	1	2	1	4	0
257:	0	0	0	0	1	0	0	0
265:	1	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	1
297:	0	1	0	0	0	0	0	2
305:	0	1	0	0	0	0	0	0
313:	0	0	0	0	2	0	0	0
321:	1	0	0	0	0	0	0	1
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	1	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 1 0 1 0 0 1 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

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



e
7/30

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 13
 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: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:40 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.596 mL
 Effective Efficiency: 0.2210 +/- 0.0119
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Chem. Recovery Factor: 1.1170 +/- 0.0631

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.265	424.00	9.53	0.00	0.00E+000	5.6
U-234	4.723	124.15	17.66	0.85	0.00E+000	4.5
U-235	4.405	8.32	71.13	0.68	0.00E+000	3.0
U-238	4.134	69.26	24.28	3.74	0.00E+000	5.0

T = Tracer Peak used for Effective Efficiency

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

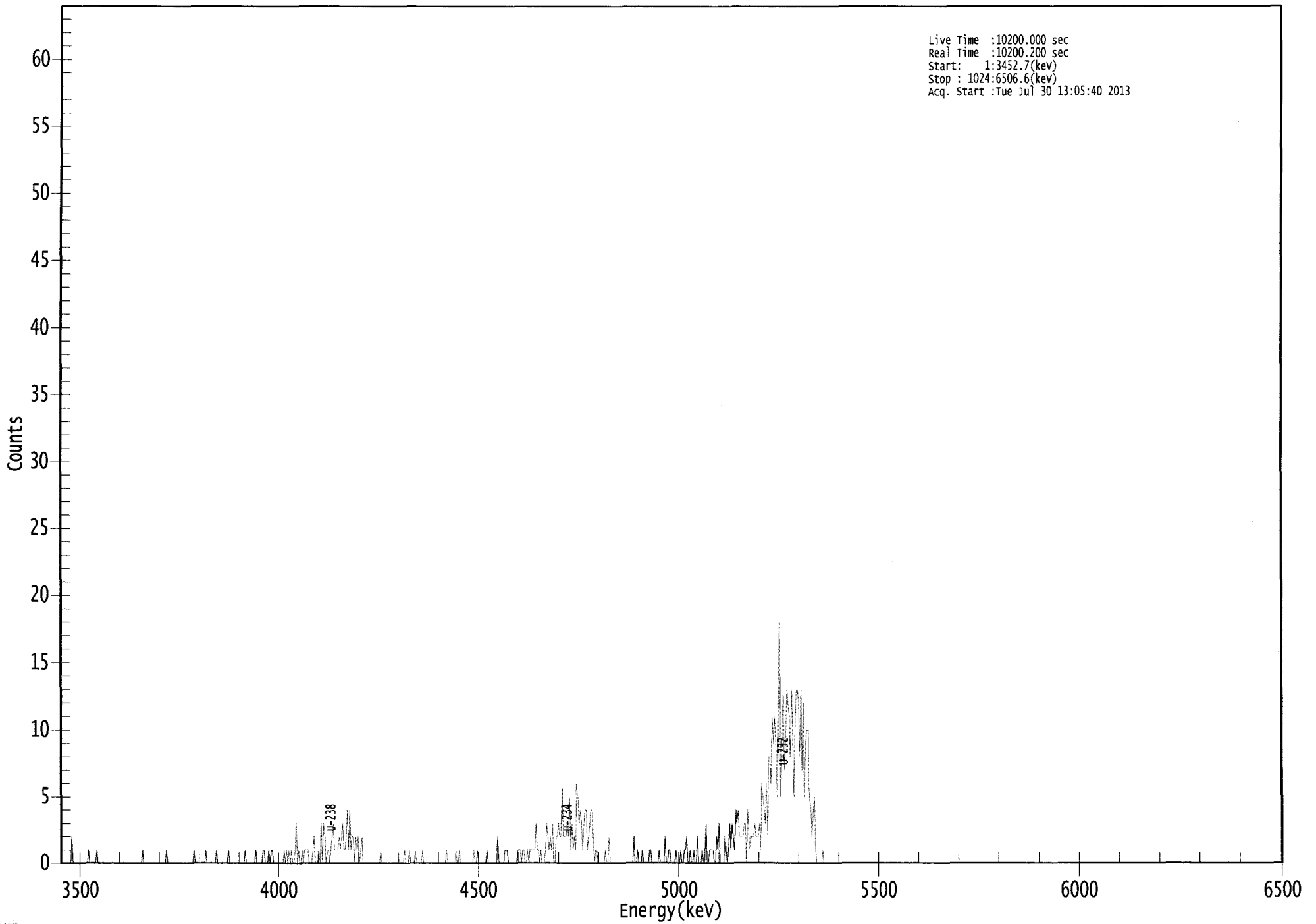
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.10E+000 +/- 5.37E-001	7.21E-002 +/- 7.60E-003
U-234	0.990	4761.50*	1.49E+000 +/- 3.07E-001	7.19E-002 +/- 7.58E-003
U-235	0.997	4385.50*	1.23E-001 +/- 8.87E-002	8.36E-002 +/- 8.81E-003
U-238	0.982	4184.40*	8.29E-001 +/- 2.19E-001	1.15E-001 +/- 1.21E-002

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US EPA ARCHIVE DOCUMENT

0000064514.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Tue Jul 30 13:05:40 2013



ROI Type: 1

ROI Type: 3

0168

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

369: 0 0 0 0 0 1 1 1

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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



*C
7/12*

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 14
 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: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 1:05:42 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.2015 +/- 0.0112
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 1.0912 +/- 0.0636

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.272	390.98	9.93	1.02	0.00E+000	9.2
U-234	4.742	39.66	31.28	0.34	0.00E+000	8.2
U-235	4.397	6.83	76.08	0.17	0.00E+000	3.0
U-238	4.150	16.98	49.21	1.02	0.00E+000	4.5

T = Tracer Peak used for Effective Efficiency

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

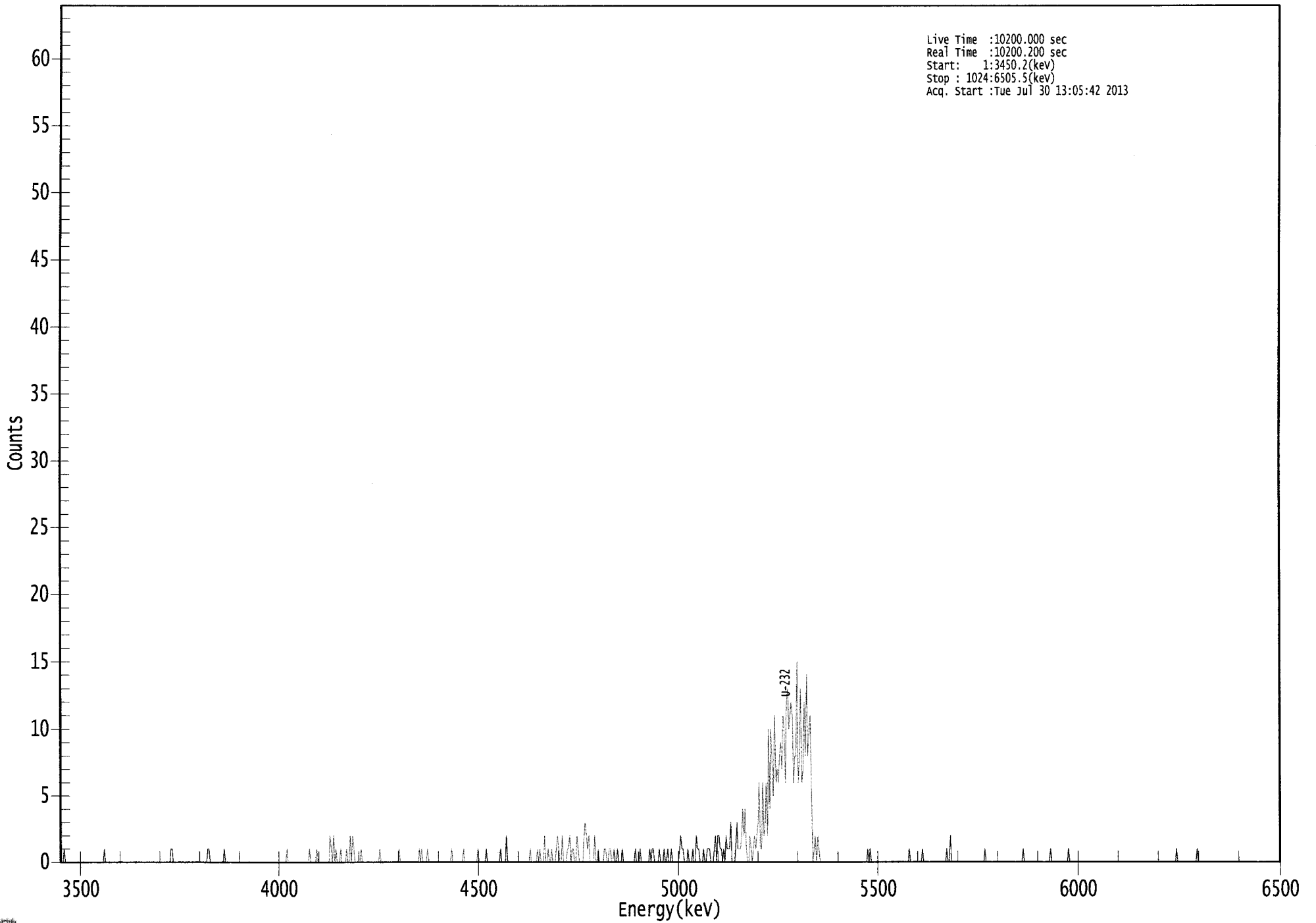
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.16E+000 +/- 5.62E-001	8.31E-002 +/- 9.06E-003
U-234	0.997	4761.50*	5.23E-001 +/- 1.73E-001	6.30E-002 +/- 6.87E-003
U-235	0.999	4385.50*	1.11E-001 +/- 8.53E-002	6.79E-002 +/- 7.40E-003
U-238	0.992	4184.40*	2.23E-001 +/- 1.12E-001	8.27E-002 +/- 9.02E-003

*AG
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US EPA ARCHIVE DOCUMENT

0000064516.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Tue Jul 30 13:05:42 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: 14

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

369: 0 0 1 0 0 0 0 2

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0

Sample Title: 14

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



Handwritten initials

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 4:13:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.2019 +/- 0.0112
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM
 Chem. Recovery Factor: 1.0927 +/- 0.0636

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232 T	5.308	392.66	9.90	0.34	0.00E+000	25.5
U-234	4.740	23.83	40.32	0.17	0.00E+000	6.0
U-235	4.365	1.00	277.19	0.00	0.00E+000	3.0
U-238	4.142	9.00	68.87	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

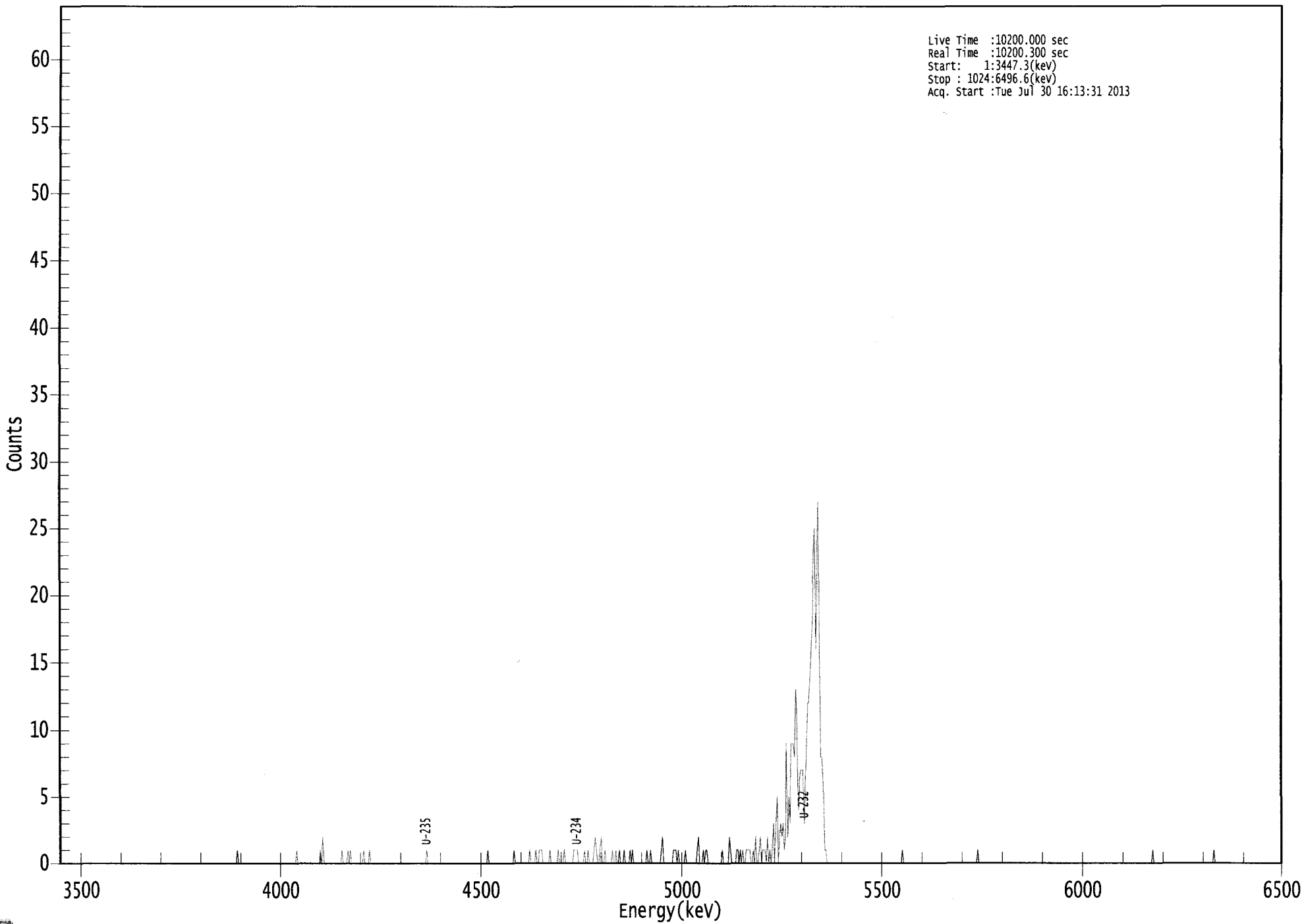
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.17E+000 +/- 5.62E-001	6.29E-002 +/- 6.84E-003
U-234	0.997	4761.50*	3.13E-001 +/- 1.31E-001	5.49E-002 +/- 5.97E-003
U-235	0.997	4385.50*	1.62E-002 +/- 4.50E-002	9.72E-002 +/- 1.06E-002
U-238	0.987	4184.40*	1.18E-001 +/- 8.21E-002	7.85E-002 +/- 8.54E-003

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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3447.3(kev)
Stop : 1024:6496.6(kev)
Acq. Start :Tue Jul 30 16:13:31 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	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	1	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	1
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	1	0	2	0
225:	0	0	0	0	0	0	0
233:	0	0	0	0	0	1	0
241:	0	0	1	0	1	0	0
249:	0	0	0	0	0	0	1
257:	0	0	0	0	1	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	1	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	0	0	0	0	1
401:	0	0	1	1	1	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	1	0	0	0	0	1
425:	0	0	0	0	0	0	0	1
433:	1	1	1	0	0	0	0	0
441:	1	0	0	1	0	0	0	0
449:	1	2	1	0	0	1	2	0
457:	0	1	0	0	0	0	0	1
465:	0	0	1	0	0	1	0	0
473:	0	1	0	0	0	0	1	0
481:	1	0	0	0	0	0	0	0
489:	0	0	0	0	1	0	0	1
497:	0	0	0	0	0	0	0	0
505:	1	2	0	0	0	0	0	0
513:	0	0	1	1	1	0	1	0
521:	0	0	0	0	1	0	0	0
529:	0	0	0	0	0	0	1	2
537:	0	0	0	1	0	1	1	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	0	0	0	0
561:	0	2	1	0	0	0	0	1
569:	1	0	1	0	1	0	0	1
577:	1	1	1	0	0	1	0	2
585:	0	0	1	2	0	1	1	1
593:	0	2	0	1	0	1	3	0
601:	3	5	0	2	3	2	3	1
609:	2	9	2	5	3	9	9	9
617:	8	13	11	4	6	7	7	7
625:	3	6	8	12	12	14	16	18
633:	23	25	16	22	27	16	8	8
641:	6	1	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	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	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 15

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



*C
Fry*

Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 4:13:33 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.0375 +/- 0.0045
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 0.2023 +/- 0.0245

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.290	73.00	23.10	0.00	0.00E+000	4.0
U-234	4.730	7.83	70.93	0.17	0.00E+000	5.9
U-235	4.346	1.00	277.19	0.00	0.00E+000	3.0
U-238	4.179	4.00	109.57	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

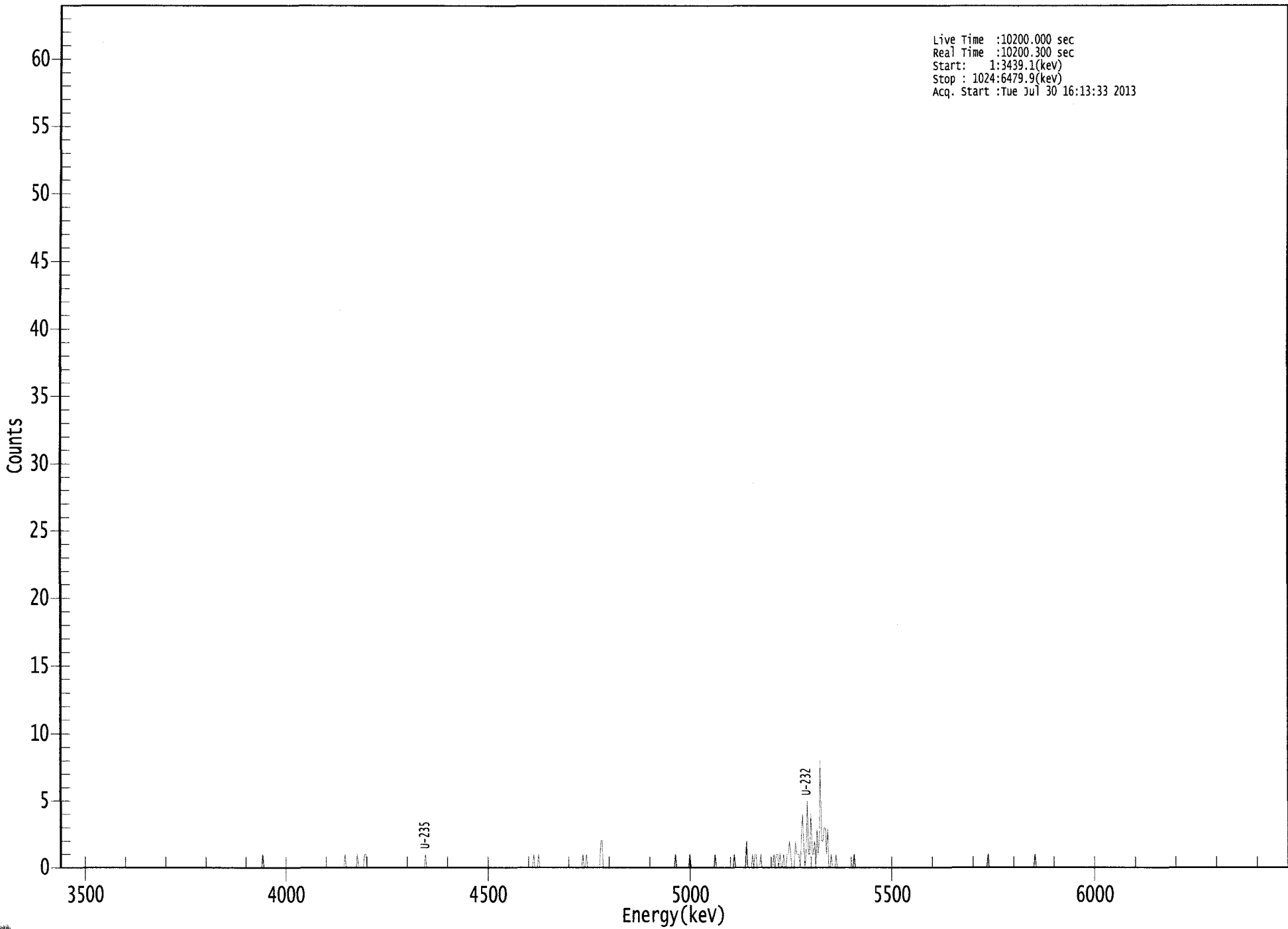
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.17E+000 +/- 1.22E+000	4.24E-001 +/- 9.98E-002
U-234	0.993	4761.50*	5.54E-001 +/- 4.14E-001	2.95E-001 +/- 6.95E-002
U-235	0.989	4385.50*	8.72E-002 +/- 2.43E-001	5.23E-001 +/- 1.23E-001
U-238	1.000	4184.40*	2.82E-001 +/- 3.16E-001	4.22E-001 +/- 9.94E-002

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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Tue Jul 30 16:13:33 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: 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:	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	1	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:	1	0	0	0	0	0	1	1
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	1	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	1
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	1	0	0	1
441:	0	0	0	0	0	0	0	0
449:	0	0	0	2	2	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	0	1	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	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	0	0	0	0	0
569:	0	0	0	0	2	0	0	0
577:	0	1	0	1	1	0	0	0
585:	1	0	0	0	0	0	0	0
593:	0	0	0	1	0	1	1	0
601:	1	0	0	1	0	0	1	1
609:	2	1	0	0	0	2	1	1
617:	1	0	2	4	2	0	1	5
625:	1	1	4	1	1	2	0	3
633:	1	2	8	2	2	3	3	1
641:	3	0	0	1	0	0	0	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	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	1	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	1	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	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



Signature

Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 4:13:28 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.1019 +/- 0.0076
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.5583 +/- 0.0429

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	5.312	198.32	13.95	0.68	0.00E+000	7.8
U-234	4.753	20.49	43.93	0.51	0.00E+000	4.4
U-235	4.399	0.00	1960.0	0.00	0.00E+000	0.0
U-238	4.190	18.66	45.85	0.34	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

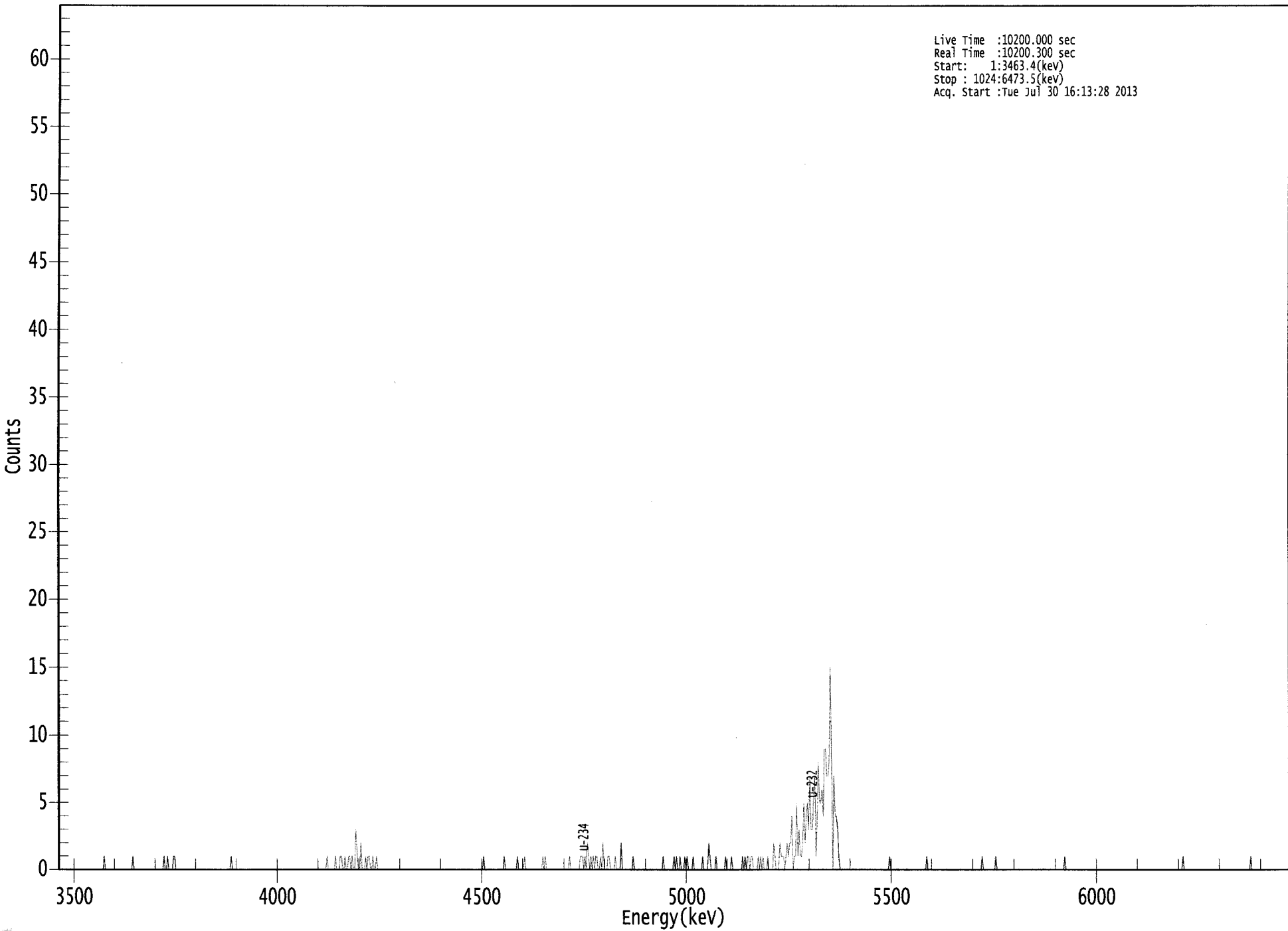
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.17E+000 +/- 7.58E-001	1.47E-001 +/- 2.15E-002
U-234	0.999	4761.50*	5.34E-001 +/- 2.47E-001	1.37E-001 +/- 2.00E-002
U-235	0.999	4385.50*	0.00E+000 +/- 8.91E-002	1.93E-001 +/- 2.82E-002
U-238	1.000	4184.40*	4.84E-001 +/- 2.33E-001	1.24E-001 +/- 1.82E-002

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 7/31/13

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3463.4(kev)
Stop : 1024:6473.5(kev)
Acq. Start :Tue Jul 30 16:13:28 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	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	1	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	1	0	0	0	0
97:	1	1	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	1	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	1	0	0	0	0	0	0	1
233:	0	0	0	1	1	0	0	1
241:	0	0	1	1	0	1	0	0
249:	3	1	0	0	2	0	0	0
257:	1	0	1	1	0	0	1	0
265:	0	1	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	1	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 1 0 0 0 0

Sample Title: 17

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

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

Apex-Alpha™

*C
Fog*

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 4:13:30 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.0432 +/- 0.0048
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.2260 +/- 0.0256

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	83.83	21.43	0.17	0.00E+000	3.7
U-234	4.699	1.66	169.38	0.34	0.00E+000	3.0
U-235	4.398	0.00	1960.0	0.00	0.00E+000	0.0
U-238	4.110	3.66	107.87	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

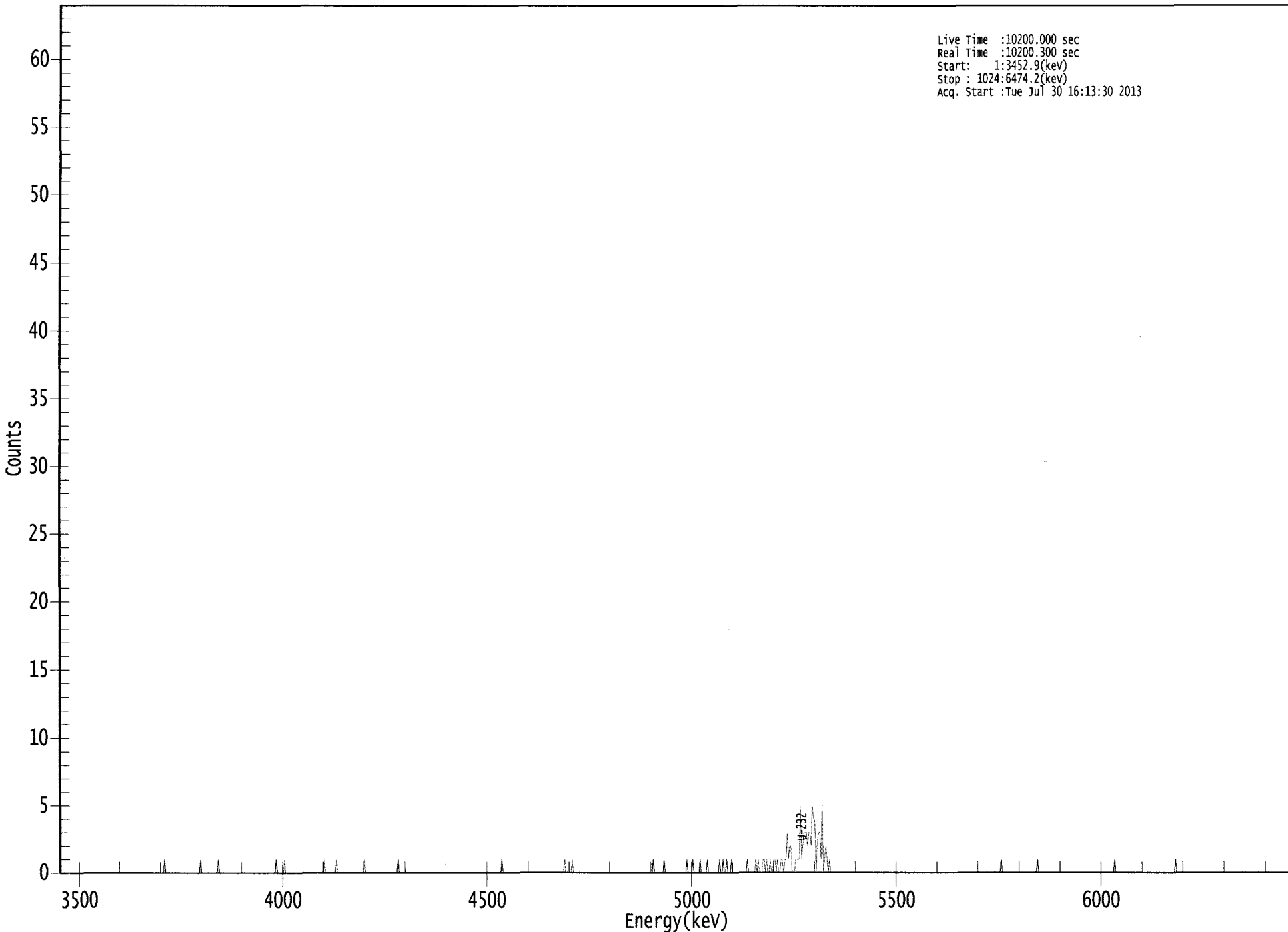
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.16E+000 +/- 1.13E+000	2.57E-001 +/- 5.63E-002
U-234	0.973	4761.50*	1.02E-001 +/- 1.74E-001	2.94E-001 +/- 6.44E-002
U-235	0.999	4385.50*	0.00E+000 +/- 2.10E-001	4.55E-001 +/- 9.97E-002
U-238	0.961	4184.40*	2.24E-001 +/- 2.47E-001	2.93E-001 +/- 6.41E-002

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7/31/13*

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Tue Jul 30 16:13:30 2013



ROI Type: 1

ROI Type: 3

0000064520

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	1
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	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	1	0	0	0
225:	0	0	0	0	0	0	1	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	1	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:	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	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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

801: 0 0 0 0 0 0 0 0

Sample Title: 18

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



*C
FMA*

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000645
 Batch Identification: 1307100A-UU
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: U iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:30:37 AM
 Acquisition Date/Time: 7/30/2013 4:17:20 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.0452 +/- 0.0050
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 0.2627 +/- 0.0292

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 5.271	87.49	21.03	0.51	0.00E+000	4.0
U-234	4.709	3.66	107.87	0.34	0.00E+000	3.0
U-235	4.397	-0.17	1169.4	0.17	0.00E+000	0.0
U-238	4.098	2.83	120.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

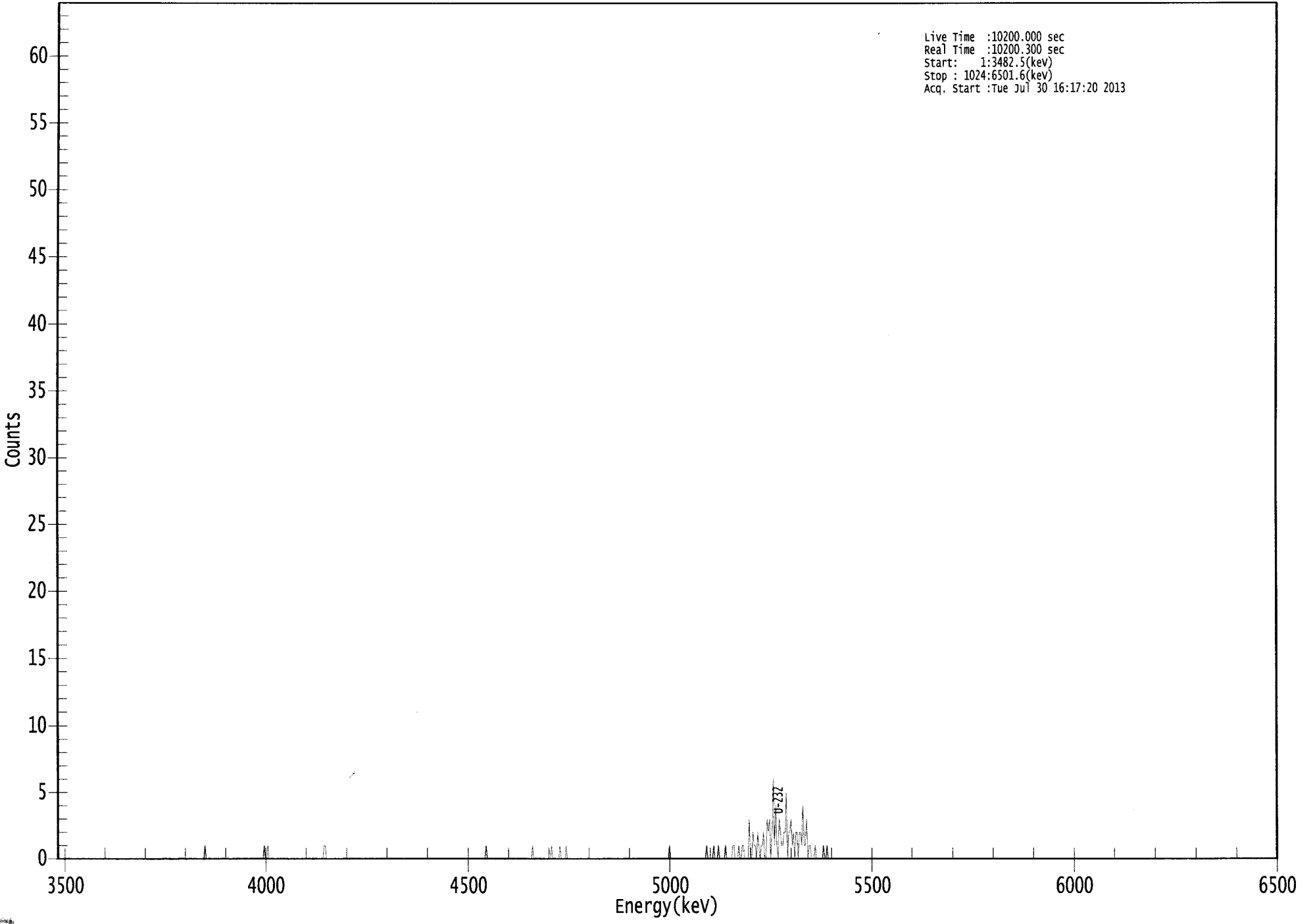
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.14E+000 +/- 1.11E+000	3.08E-001 +/- 6.63E-002
U-234	0.981	4761.50*	2.15E-001 +/- 2.36E-001	2.81E-001 +/- 6.04E-002
U-235	0.999	4385.50*	-1.23E-002 +/- 1.44E-001	3.02E-001 +/- 6.50E-002
U-238	0.949	4184.40*	1.65E-001 +/- 2.03E-001	2.44E-001 +/- 5.25E-002

*AG
7/31/13*

US EPA ARCHIVE DOCUMENT

000064521.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Tue Jul 30 16:17:20 2013



ROI Type: 1

ROI Type: 3

0198

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	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	1	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	1	0
177:	0	1	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	1	1	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:	1	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 19

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

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 7/30/2013
Time : 5:42:50 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	7/30/2013 5:28:21 AM
Alpha 004	21f	ALL	Passed	7/30/2013 5:28:22 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	7/30/2013 5:28:22 AM
Alpha 011	21f	ALL	Passed	7/30/2013 5:28:23 AM
Alpha 012	21f	ALL	Passed	7/30/2013 5:28:24 AM
Alpha 013	21f	ALL	Passed	7/30/2013 5:28:25 AM
Alpha 014	21f	ALL	Passed	7/30/2013 5:28:26 AM
Alpha 015	21f	Peak Energy	Action	7/30/2013 5:28:27 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	7/30/2013 5:28:27 AM
Alpha 019	AIM730	ALL	Passed	7/30/2013 5:28:28 AM
Alpha 020	AIM730	ALL	Passed	7/30/2013 5:28:29 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	7/30/2013 5:28:30 AM
Alpha 023	AIM730	ALL	Passed	7/30/2013 5:28:31 AM
Alpha 024	AIM730	ALL	Passed	7/30/2013 5:28:31 AM
Alpha 025	AIM730	ALL	Passed	7/30/2013 5:28:32 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	7/30/2013 5:28:33 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	7/30/2013 5:28:34 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	7/30/2013 5:28:34 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:35 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:37 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:38 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:39 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	7/30/2013 5:28:41 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:42 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:44 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:45 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:47 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	7/30/2013 5:28:48 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:50 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:52 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	7/30/2013 5:28:53 AM

APPROVED BY: _____ ✓

APPROVAL DATE: _____ 7/30/13

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

Nuclide Library Title: Uranium

Nuclide Library Description: U-232,-234,-235,-238

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert. (Abs.+)
U-232	2.174E+009	5302.500*	0.000	99.8000	0.0000
U-234	7.731E+012	4761.500*	0.000	99.8000	0.0000
U-235	2.221E+016	4385.500*	0.000	80.9000	0.0000
U-238	1.410E+017	4184.400*	0.000	100.2300	0.0000

* = key line

TOTALS: 4 Nuclides 4 Energy Lines

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

Work Order	13-07100	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	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Lab Deadline	8/6/2013	04	DO	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-113-AS DIS	44	07/10/13 14:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-109-SS TOT	42	07/10/13 14:30	1.0000E+00
Report Level	4	07	TRG	PZ-109-SS DIS	42	07/10/13 14:30	1.0000E+00
Activity Units	pCi	08	TRG	PZ-205-SS TOT	44	07/10/13 15:30	1.0000E+00
Aliquot Units	I	09	TRG	PZ-205-SS DIS	44	07/10/13 15:30	1.0000E+00
Matrix	WA	10	TRG	DUP 02 TOT	41	07/10/13 00:00	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	DUP 02 DIS	41	07/10/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-113-SS TOT	45	07/11/13 08:50	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	PZ-113-SS DIS	45	07/11/13 08:50	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	PZ-104-SS TOT	37	07/11/13 09:37	1.0000E+00
Tracer Act (dpm/g)	22.466	15	TRG	PZ-104-SS DIS	37	07/11/13 09:37	1.0000E+00
Carrier		16	TRG	PZ-101-SS TOT	40	07/11/13 09:40	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-101-SS DIS	40	07/11/13 09:40	1.0000E+00
		18	TRG	PZ-104-SD TOT	42	07/11/13 10:29	1.0000E+00
		19	TRG	PZ-104-SD DIS	42	07/11/13 10:29	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.

9206

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	0.4790	10.8		0.00								
02	MBL	0.2357	5.3		0.00								
03	DUP	0.2350	5.3		0.00								
04	DO	0.2352	5.3		0.00								
05	TRG	0.2347	5.3		0.00								
06	TRG	0.2344	5.3		0.00								
07	TRG	0.2332	5.2		0.00								
08	TRG	0.2339	5.3		0.00								
09	TRG	0.2352	5.3		0.00								
10	TRG	0.2339	5.3		0.00								
11	TRG	0.2350	5.3		0.00								
12	TRG	0.2334	5.2		0.00								
13	TRG	0.2340	5.3		0.00								
14	TRG	0.2341	5.3		0.00								
15	TRG	0.2326	5.2		0.00								
16	TRG	0.2323	5.2		0.00								
17	TRG	0.2332	5.2		0.00								
18	TRG	0.2328	5.2		0.00								
19	TRG	0.2326	5.2		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.

0207

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Rough Prep Date</i>	<i>Rough Prep By</i>	<i>Prep Date</i>	<i>Prep By</i>	<i>Sep t0 Date/Time</i>	<i>Sep t0 By</i>	<i>Sep t1 Date/Time</i>	<i>Sep t1 By</i>
01	LCS			07/24/13 12:11	JWOLFE				
02	MBL			07/24/13 12:11	JWOLFE				
03	DUP			07/24/13 12:11	JWOLFE				
04	DO			07/24/13 12:11	JWOLFE				
05	TRG			07/24/13 12:11	JWOLFE				
06	TRG			07/24/13 12:11	JWOLFE				
07	TRG			07/24/13 12:11	JWOLFE				
08	TRG			07/24/13 12:11	JWOLFE				
09	TRG			07/24/13 12:11	JWOLFE				
10	TRG			07/24/13 12:11	JWOLFE				
11	TRG			07/24/13 12:11	JWOLFE				
12	TRG			07/24/13 12:11	JWOLFE				
13	TRG			07/24/13 12:11	JWOLFE				
14	TRG			07/24/13 12:11	JWOLFE				
15	TRG			07/24/13 12:11	JWOLFE				
16	TRG			07/24/13 12:11	JWOLFE				
17	TRG			07/24/13 12:11	JWOLFE				
18	TRG			07/24/13 12:11	JWOLFE				
19	TRG			07/24/13 12:11	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.

0200

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-THISO-1

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-228	LCS	LCS	pCi/l	5.36E+00	1.14E+00	1.82E-01	4.86E+00	110.21	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	1.34E-02	4.10E-02	9.70E-02					OK	OK
03	TH-228	DUP	PZ-113-AS TOT	pCi/l	7.06E-02	6.12E-02	5.97E-02				NA	OK	
04	TH-228	DO	PZ-113-AS TOT	pCi/l	6.24E-02	6.77E-02	9.01E-02					OK	
05	TH-228	TRG	PZ-113-AS DIS	pCi/l	9.18E-02	7.57E-02	9.43E-02					OK	
06	TH-228	TRG	PZ-109-SS TOT	pCi/l	5.83E-02	8.27E-02	1.39E-01					OK	
07	TH-228	TRG	PZ-109-SS DIS	pCi/l	4.99E-02	7.17E-02	1.20E-01					OK	
08	TH-228	TRG	PZ-205-SS TOT	pCi/l	3.42E-02	6.06E-02	1.09E-01					OK	
09	TH-228	TRG	PZ-205-SS DIS	pCi/l	7.31E-03	3.05E-02	7.83E-02					OK	
10	TH-228	TRG	DUP 02 TOT	pCi/l	1.86E-01	1.14E-01	1.19E-01					OK	
11	TH-228	TRG	DUP 02 DIS	pCi/l	6.75E-02	8.09E-02	1.29E-01					OK	
12	TH-228	TRG	PZ-113-SS TOT	pCi/l	2.02E-01	1.12E-01	6.10E-02					OK	
13	TH-228	TRG	PZ-113-SS DIS	pCi/l	4.54E-02	6.93E-02	1.19E-01					OK	
14	TH-228	TRG	PZ-104-SS TOT	pCi/l	4.72E-02	5.71E-02	8.02E-02					OK	
15	TH-228	TRG	PZ-104-SS DIS	pCi/l	2.30E-02	7.46E-02	1.54E-01					OK	
16	TH-228	TRG	PZ-101-SS TOT	pCi/l	-8.66E-03	6.93E-02	1.87E-01					OK	
17	TH-228	TRG	PZ-101-SS DIS	pCi/l	8.47E-02	7.79E-02	9.60E-02					OK	
18	TH-228	TRG	PZ-104-SD TOT	pCi/l	-4.06E-02	7.46E-02	2.23E-01					OK	
19	TH-228	TRG	PZ-104-SD DIS	pCi/l	2.95E-02	5.23E-02	9.39E-02					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	50.24	0.00	0.00			
02	TH-228	MBL	07/16/13 00:00	1.00E+00	73.05	0.00	0.00			
03	TH-228	DUP	07/10/13 14:00	1.00E+00	118.86	0.00	0.00			
04	TH-228	DO	07/10/13 14:00	1.00E+00	106.92	0.00	0.00			
05	TH-228	TRG	07/10/13 14:00	1.00E+00	131.28	0.00	0.00			
06	TH-228	TRG	07/10/13 14:30	1.00E+00	97.75	0.00	0.00			
07	TH-228	TRG	07/10/13 14:30	1.00E+00	103.76	0.00	0.00			
08	TH-228	TRG	07/10/13 15:30	1.00E+00	76.32	0.00	0.00			
09	TH-228	TRG	07/10/13 15:30	1.00E+00	91.03	0.00	0.00			
10	TH-228	TRG	07/10/13 00:00	1.00E+00	108.21	0.00	0.00			
11	TH-228	TRG	07/10/13 00:00	1.00E+00	117.40	0.00	0.00			
12	TH-228	TRG	07/11/13 08:50	1.00E+00	125.04	0.00	0.00			
13	TH-228	TRG	07/11/13 08:50	1.00E+00	109.91	0.00	0.00			
14	TH-228	TRG	07/11/13 09:37	1.00E+00	114.36	0.00	0.00			
15	TH-228	TRG	07/11/13 09:37	1.00E+00	93.12	0.00	0.00			
16	TH-228	TRG	07/11/13 09:40	1.00E+00	77.38	0.00	0.00			
17	TH-228	TRG	07/11/13 09:40	1.00E+00	108.33	0.00	0.00			
18	TH-228	TRG	07/11/13 10:29	1.00E+00	67.72	0.00	0.00			
19	TH-228	TRG	07/11/13 10:29	1.00E+00	104.32	0.00	0.00			

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

0710

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	07/29/13 09:59		A_Spec	Alpha_045	170	1.94 E+02	7.00 E-03	19.1
02	TH-228	MBL	07/29/13 09:59		A_Spec	Alpha_046	170	6.60 E-01	2.00 E-03	17.9
03	TH-228	DUP	07/29/13 09:59		A_Spec	Alpha_047	170	5.66 E+00	2.00 E-03	18.2
04	TH-228	DO	07/29/13 09:59		A_Spec	Alpha_048	170	4.15 E+00	5.00 E-03	16.8
05	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_003	170	7.79 E+00	1.30 E-02	17.5
06	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_004	170	4.09 E+00	2.30 E-02	19.4
07	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_010	170	3.77 E+00	1.90 E-02	19.7
08	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_011	170	1.98 E+00	6.00 E-03	20.5
09	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_012	170	4.90 E-01	3.00 E-03	19.9
10	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_013	170	1.39 E+01	1.80 E-02	18.7
11	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_014	170	5.41 E+00	2.70 E-02	18.5
12	TH-228	TRG	07/29/13 12:39		A_Spec	Alpha_015	170	1.38 E+01	1.00 E-03	14.8
13	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_018	170	3.28 E+00	1.60 E-02	17.8
14	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_019	170.02	3.32 E+00	4.00 E-03	16.6
15	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_020	170	1.28 E+00	1.60 E-02	16.1
16	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_022	170	-3.80 E-01	1.40 E-02	15.3
17	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_023	170	5.81 E+00	7.00 E-03	17.1
18	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_024	170	-1.74 E+00	2.20 E-02	17.1
19	TH-228	TRG	07/29/13 12:40		A_Spec	Alpha_025	170	1.98 E+00	6.00 E-03	17.4

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07100	Analysis Code	THISO	Run	1

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	4.75E+00	1.04E+00	1.32E-01	5.51E+00	86.27	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.15E-01	1.00E-01	9.71E-02					OK	OK
03	TH-230	DUP	PZ-113-AS TOT	pCi/l	2.33E-01	1.13E-01	7.35E-02				NA	OK	
04	TH-230	DO	PZ-113-AS TOT	pCi/l	2.07E-01	1.17E-01	8.86E-02					OK	
05	TH-230	TRG	PZ-113-AS DIS	pCi/l	9.83E-02	7.00E-02	6.08E-02					OK	
06	TH-230	TRG	PZ-109-SS TOT	pCi/l	5.30E-02	6.98E-02	1.12E-01					OK	
07	TH-230	TRG	PZ-109-SS DIS	pCi/l	1.28E-01	8.77E-02	8.57E-02					OK	
08	TH-230	TRG	PZ-205-SS TOT	pCi/l	4.22E-02	5.89E-02	8.90E-02					OK	
09	TH-230	TRG	PZ-205-SS DIS	pCi/l	1.42E-01	9.41E-02	7.01E-02					OK	
10	TH-230	TRG	DUP 02 TOT	pCi/l	1.20E-01	8.41E-02	7.86E-02					OK	
11	TH-230	TRG	DUP 02 DIS	pCi/l	8.76E-02	6.98E-02	7.33E-02					OK	
12	TH-230	TRG	PZ-113-SS TOT	pCi/l	3.18E-01	1.45E-01	8.60E-02					OK	
13	TH-230	TRG	PZ-113-SS DIS	pCi/l	1.15E-01	8.25E-02	7.13E-02					OK	
14	TH-230	TRG	PZ-104-SS TOT	pCi/l	1.10E-01	7.97E-02	5.84E-02					OK	
15	TH-230	TRG	PZ-104-SS DIS	pCi/l	5.01E-02	6.10E-02	7.38E-02					OK	
16	TH-230	TRG	PZ-101-SS TOT	pCi/l	2.43E-01	1.54E-01	9.35E-02					OK	
17	TH-230	TRG	PZ-101-SS DIS	pCi/l	1.88E-01	1.10E-01	8.58E-02					OK	
18	TH-230	TRG	PZ-104-SD TOT	pCi/l	8.73E-02	1.04E-01	1.51E-01					OK	
19	TH-230	TRG	PZ-104-SD DIS	pCi/l	1.19E-01	8.91E-02	8.78E-02					OK	

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07100	Analysis Code	THISO	Run	1

02120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	50.24	0.00	0.00			
02	TH-230	MBL	07/16/13 00:00	1.00E+00	73.05	0.00	0.00			
03	TH-230	DUP	07/10/13 14:00	1.00E+00	118.86	0.00	0.00			
04	TH-230	DO	07/10/13 14:00	1.00E+00	106.92	0.00	0.00			
05	TH-230	TRG	07/10/13 14:00	1.00E+00	131.28	0.00	0.00			
06	TH-230	TRG	07/10/13 14:30	1.00E+00	97.75	0.00	0.00			
07	TH-230	TRG	07/10/13 14:30	1.00E+00	103.76	0.00	0.00			
08	TH-230	TRG	07/10/13 15:30	1.00E+00	76.32	0.00	0.00			
09	TH-230	TRG	07/10/13 15:30	1.00E+00	91.03	0.00	0.00			
10	TH-230	TRG	07/10/13 00:00	1.00E+00	108.21	0.00	0.00			
11	TH-230	TRG	07/10/13 00:00	1.00E+00	117.40	0.00	0.00			
12	TH-230	TRG	07/11/13 08:50	1.00E+00	125.04	0.00	0.00			
13	TH-230	TRG	07/11/13 08:50	1.00E+00	109.91	0.00	0.00			
14	TH-230	TRG	07/11/13 09:37	1.00E+00	114.36	0.00	0.00			
15	TH-230	TRG	07/11/13 09:37	1.00E+00	93.12	0.00	0.00			
16	TH-230	TRG	07/11/13 09:40	1.00E+00	77.38	0.00	0.00			
17	TH-230	TRG	07/11/13 09:40	1.00E+00	108.33	0.00	0.00			
18	TH-230	TRG	07/11/13 10:29	1.00E+00	67.72	0.00	0.00			
19	TH-230	TRG	07/11/13 10:29	1.00E+00	104.32	0.00	0.00			

Client	Engineering Management Support, Inc.	13-07100	THISO	Run	1

5128

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-THISO-1

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07100
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	TH-230	LCS	07/29/13 09:59		A_Spec	Alpha_045	170	1.72 E+02	2.00 E-03	19.1
02	TH-230	MBL	07/29/13 09:59		A_Spec	Alpha_046	170	5.66 E+00	2.00 E-03	17.9
03	TH-230	DUP	07/29/13 09:59		A_Spec	Alpha_047	170	1.90 E+01	0.00 E+00	18.2
04	TH-230	DO	07/29/13 09:59		A_Spec	Alpha_048	170	1.40 E+01	0.00 E+00	16.8
05	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_003	170	8.49 E+00	3.00 E-03	17.5
06	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_004	170	3.79 E+00	1.30 E-02	19.4
07	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_010	170	9.81 E+00	7.00 E-03	19.7
08	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_011	170	2.49 E+00	3.00 E-03	20.5
09	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_012	170	9.66 E+00	2.00 E-03	19.9
10	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_013	170	9.15 E+00	5.00 E-03	18.7
11	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_014	170	7.15 E+00	5.00 E-03	18.5
12	TH-230	TRG	07/29/13 12:39		A_Spec	Alpha_015	170	2.21 E+01	5.00 E-03	14.8
13	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_018	170	8.49 E+00	3.00 E-03	17.8
14	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_019	170.02	7.83 E+00	1.00 E-03	16.6
15	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_020	170	2.83 E+00	1.00 E-03	16.1
16	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_022	170	1.08 E+01	1.00 E-03	15.3
17	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_023	170	1.31 E+01	5.00 E-03	17.1
18	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_024	170	3.81 E+00	7.00 E-03	17.1
19	TH-230	TRG	07/29/13 12:40		A_Spec	Alpha_025	170	8.15 E+00	5.00 E-03	17.4

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	6.05E+00	1.26E+00	1.66E-01	4.86E+00	124.45	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	2.03E-02	5.63E-02	1.22E-01					OK	OK
03	TH-232	DUP	PZ-113-AS TOT	pCi/l	2.03E-02	3.45E-02	5.85E-02				NA	OK	
04	TH-232	DO	PZ-113-AS TOT	pCi/l	1.18E-01	8.89E-02	8.85E-02					OK	
05	TH-232	TRG	PZ-113-AS DIS	pCi/l	3.64E-02	4.64E-02	6.92E-02					OK	
06	TH-232	TRG	PZ-109-SS TOT	pCi/l	3.72E-02	4.83E-02	6.68E-02					OK	
07	TH-232	TRG	PZ-109-SS DIS	pCi/l	2.38E-02	3.64E-02	5.42E-02					OK	
08	TH-232	TRG	PZ-205-SS TOT	pCi/l	-2.88E-03	3.37E-02	7.06E-02					OK	
09	TH-232	TRG	PZ-205-SS DIS	pCi/l	5.60E-02	5.83E-02	6.11E-02					OK	
10	TH-232	TRG	DUP 02 TOT	pCi/l	1.95E-02	3.72E-02	6.87E-02					OK	
11	TH-232	TRG	DUP 02 DIS	pCi/l	3.91E-03	2.53E-02	6.90E-02					OK	
12	TH-232	TRG	PZ-113-SS TOT	pCi/l	1.70E-01	1.01E-01	5.99E-02					OK	
13	TH-232	TRG	PZ-113-SS DIS	pCi/l	2.89E-02	5.55E-02	1.03E-01					OK	
14	TH-232	TRG	PZ-104-SS TOT	pCi/l	2.56E-02	3.92E-02	5.83E-02					OK	
15	TH-232	TRG	PZ-104-SS DIS	pCi/l	4.40E-02	6.13E-02	9.26E-02					OK	
16	TH-232	TRG	PZ-101-SS TOT	pCi/l	5.19E-02	7.81E-02	1.26E-01					OK	
17	TH-232	TRG	PZ-101-SS DIS	pCi/l	3.80E-02	4.94E-02	6.84E-02					OK	
18	TH-232	TRG	PZ-104-SD TOT	pCi/l	-3.89E-02	5.15E-02	1.68E-01					OK	
19	TH-232	TRG	PZ-104-SD DIS	pCi/l	8.28E-02	7.19E-02	7.00E-02					OK	

Client	Engineering Management Support, Inc.	13-07100	THISO	Run	1

5120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	50.24	0.00	0.00			
02	TH-232	MBL	07/16/13 00:00	1.00E+00	73.05	0.00	0.00			
03	TH-232	DUP	07/10/13 14:00	1.00E+00	118.86	0.00	0.00			
04	TH-232	DO	07/10/13 14:00	1.00E+00	106.92	0.00	0.00			
05	TH-232	TRG	07/10/13 14:00	1.00E+00	131.28	0.00	0.00			
06	TH-232	TRG	07/10/13 14:30	1.00E+00	97.75	0.00	0.00			
07	TH-232	TRG	07/10/13 14:30	1.00E+00	103.76	0.00	0.00			
08	TH-232	TRG	07/10/13 15:30	1.00E+00	76.32	0.00	0.00			
09	TH-232	TRG	07/10/13 15:30	1.00E+00	91.03	0.00	0.00			
10	TH-232	TRG	07/10/13 00:00	1.00E+00	108.21	0.00	0.00			
11	TH-232	TRG	07/10/13 00:00	1.00E+00	117.40	0.00	0.00			
12	TH-232	TRG	07/11/13 08:50	1.00E+00	125.04	0.00	0.00			
13	TH-232	TRG	07/11/13 08:50	1.00E+00	109.91	0.00	0.00			
14	TH-232	TRG	07/11/13 09:37	1.00E+00	114.36	0.00	0.00			
15	TH-232	TRG	07/11/13 09:37	1.00E+00	93.12	0.00	0.00			
16	TH-232	TRG	07/11/13 09:40	1.00E+00	77.38	0.00	0.00			
17	TH-232	TRG	07/11/13 09:40	1.00E+00	108.33	0.00	0.00			
18	TH-232	TRG	07/11/13 10:29	1.00E+00	67.72	0.00	0.00			
19	TH-232	TRG	07/11/13 10:29	1.00E+00	104.32	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07100	Analysis Code	THISO	Run	1

9120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-THISO-1

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07100
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	TH-232	LCS	07/29/13 09:59		A_Spec	Alpha_045	170	2.19 E+02	0.00 E+00	19.1
02	TH-232	MBL	07/29/13 09:59		A_Spec	Alpha_046	170	1.00 E+00	0.00 E+00	17.9
03	TH-232	DUP	07/29/13 09:59		A_Spec	Alpha_047	170	1.66 E+00	2.00 E-03	18.2
04	TH-232	DO	07/29/13 09:59		A_Spec	Alpha_048	170	8.00 E+00	0.00 E+00	16.8
05	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_003	170	3.15 E+00	5.00 E-03	17.5
06	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_004	170	2.66 E+00	2.00 E-03	19.4
07	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_010	170	1.83 E+00	1.00 E-03	19.7
08	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_011	170	-1.70 E-01	1.00 E-03	20.5
09	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_012	170	3.83 E+00	1.00 E-03	19.9
10	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_013	170	1.49 E+00	3.00 E-03	18.7
11	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_014	170	3.20 E-01	4.00 E-03	18.5
12	TH-232	TRG	07/29/13 12:39		A_Spec	Alpha_015	170	1.18 E+01	1.00 E-03	14.8
13	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_018	170	2.13 E+00	1.10 E-02	17.8
14	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_019	170.02	1.83 E+00	1.00 E-03	16.6
15	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_020	170	2.49 E+00	3.00 E-03	16.1
16	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_022	170	2.32 E+00	4.00 E-03	15.3
17	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_023	170	2.66 E+00	2.00 E-03	17.1
18	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_024	170	-1.70 E+00	1.00 E-02	17.1
19	TH-232	TRG	07/29/13 12:40		A_Spec	Alpha_025	170	5.66 E+00	2.00 E-03	17.4

2120

2152

3-60

5-5

15-11

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01 <i>45</i>	LCS	LCS	07/16/13 00:00	1.0000	0.4790	10.7612		0.00		
02	MBL	BLANK	07/16/13 00:00	1.0000	0.2357	5.2952		0.00		
03	DUP	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.2350	5.2795		0.00		
04 <i>48</i>	DO	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.2352	5.2840		0.00		
05	TRG	PZ-113-AS DIS	07/10/13 14:00	1.0000	0.2347	5.2728		0.00		
06	TRG	PZ-109-SS TOT	07/10/13 14:30	1.0000	0.2344	5.2660		0.00		
07	TRG	PZ-109-SS DIS	07/10/13 14:30	1.0000	0.2332	5.2391		0.00		
08	TRG	PZ-205-SS TOT	07/10/13 15:30	1.0000	0.2339	5.2548		0.00		
09	TRG	PZ-205-SS DIS	07/10/13 15:30	1.0000	0.2352	5.2840		0.00		
10	TRG	DUP 02 TOT	07/10/13 00:00	1.0000	0.2339	5.2548		0.00		
11	TRG	DUP 02 DIS	07/10/13 00:00	1.0000	0.2350	5.2795		0.00		
12	TRG	PZ-113-SS TOT	07/11/13 08:50	1.0000	0.2334	5.2436		0.00		
13	TRG	PZ-113-SS DIS	07/11/13 08:50	1.0000	0.2340	5.2570		0.00		
14	TRG	PZ-104-SS TOT	07/11/13 09:37	1.0000	0.2341	5.2593		0.00		
15	TRG	PZ-104-SS DIS	07/11/13 09:37	1.0000	0.2326	5.2256		0.00		
16	TRG	PZ-101-SS TOT	07/11/13 09:40	1.0000	0.2323	5.2189		0.00		
17	TRG	PZ-101-SS DIS	07/11/13 09:40	1.0000	0.2332	5.2391		0.00		
18	TRG	PZ-104-SD TOT	07/11/13 10:29	1.0000	0.2328	5.2301		0.00		
19	TRG	PZ-104-SD DIS	07/11/13 10:29	1.0000	0.2326	5.2256		0.00		

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07100		1	ThISO		7/24/2013 12:10	JWOLFE		JW			

LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD	
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate
Th-228	Th-8b	103.560	7/24/2013	0.100	0.1042				4.86	0.175	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	7/24/2013	0.500	0.5196				5.51	0.149	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	7/24/2013	0.100	0.1042				4.86	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	7/24/2013	0.4790	0.2200															
02	Th-229	Th-18a	22.466	7/24/2013	0.2357	0.2200															
03	Th-229	Th-18a	22.466	7/24/2013	0.2350	0.2200															
04	Th-229	Th-18a	22.466	7/24/2013	0.2352	0.2200															
05	Th-229	Th-18a	22.466	7/24/2013	0.2347	0.2200															
06	Th-229	Th-18a	22.466	7/24/2013	0.2344	0.2200															
07	Th-229	Th-18a	22.466	7/24/2013	0.2332	0.2200															
08	Th-229	Th-18a	22.466	7/24/2013	0.2339	0.2200															
09	Th-229	Th-18a	22.466	7/24/2013	0.2352	0.2200															
10	Th-229	Th-18a	22.466	7/24/2013	0.2339	0.2200															
11	Th-229	Th-18a	22.466	7/24/2013	0.2350	0.2200															
12	Th-229	Th-18a	22.466	7/24/2013	0.2334	0.2200															
13	Th-229	Th-18a	22.466	7/24/2013	0.2340	0.2200															
14	Th-229	Th-18a	22.466	7/24/2013	0.2341	0.2200															
15	Th-229	Th-18a	22.466	7/24/2013	0.2326	0.2200															
16	Th-229	Th-18a	22.466	7/24/2013	0.2323	0.2200															
17	Th-229	Th-18a	22.466	7/24/2013	0.2332	0.2200															
18	Th-229	Th-18a	22.466	7/24/2013	0.2328	0.2200															
19	Th-229	Th-18a	22.466	7/24/2013	0.2326	0.2200															

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07100	1	ThISO	liters	8/6/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-113-AS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-113-AS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-109-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-109-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 02 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 02 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-104-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-104-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-101-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-104-SD TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-104-SD DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7/24/13

105
7/29/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/29/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 9:59:49 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.479 mL
 Effective Efficiency: 0.0959 +/- 0.0078
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Chem. Recovery Factor: 0.5024 +/- 0.0420

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 1.244451 +/- 0.137261
 Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.779	4.15	107.12	0.85	0.00E+000	3.0
TH-228	5.382	193.81	14.13	1.19	0.00E+000	20.2
TH-229 T	4.891	175.49	14.82	0.51	0.00E+000	3.8
TH-230	4.645	171.66	14.98	0.34	0.00E+000	6.2
TH-232	3.977	219.00	13.27	0.00	0.00E+000	7.3

T = Tracer Peak used for Effective Efficiency

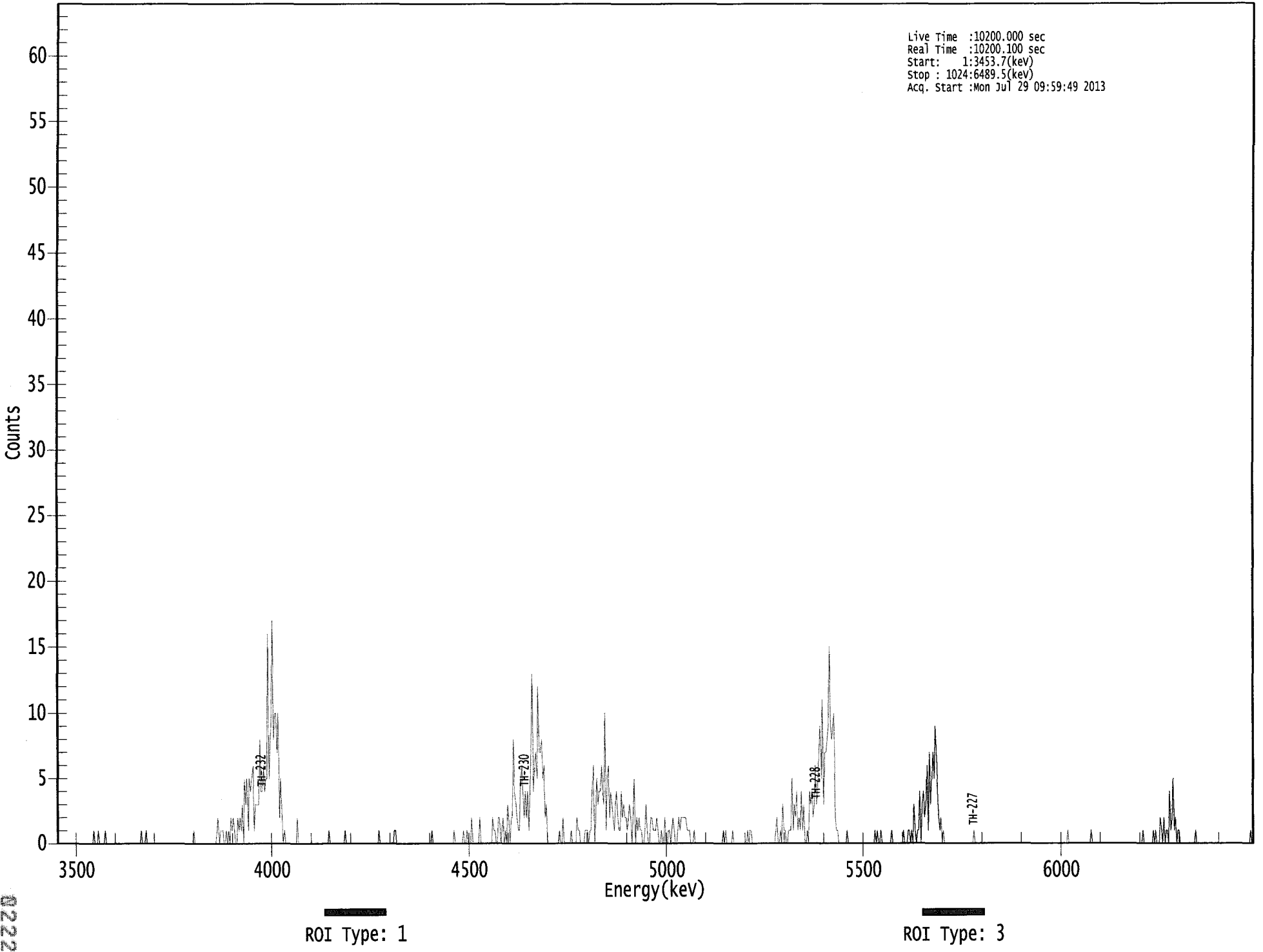
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.974	5850.00*	1.18E-001 +/- 1.27E-001	1.70E-001 +/- 2.72E-002
TH-228	0.998	5400.00*	5.36E+000 +/- 1.14E+000	1.82E-001 +/- 2.92E-002
TH-229	0.998	4872.00*	4.87E+000 +/- 7.80E-001	1.46E-001 +/- 2.33E-002
TH-230	0.996	4672.00*	4.75E+000 +/- 1.04E+000	1.32E-001 +/- 2.12E-002
TH-232	0.998	3997.00*	6.05E+000 +/- 1.26E+000	1.66E-001 +/- 2.65E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :Mon Jul 29 09:59:49 2013



0222

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	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	1	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:	1	0	0	0	1	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	2	0	1	1	1	0
145:	0	1	0	1	0	2	1	2
153:	1	0	0	2	1	2	1	3
161:	0	5	3	5	1	5	4	5
169:	6	1	3	3	3	3	8	4
177:	4	6	4	5	5	16	5	8
185:	9	17	8	10	10	7	10	2
193:	5	2	0	1	0	0	0	0
201:	0	0	0	0	0	0	2	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	1	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	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	1	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	1	0	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	1	0	0	1
353:	0	0	0	2	0	0	0	0
361:	0	0	2	0	0	0	0	0

369: 0 0 0 0 0 2 1 1

Sample Title: 01

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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:	1	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	1	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	0	0	0	0
937:	0	1	0	1	0	0	0	2
945:	1	0	2	0	1	1	0	4
953:	1	2	5	1	2	0	1	1
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	1	0	0	0

103
7/29/13

Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/29/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 9:59:50 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.236 mL
 Effective Efficiency: 0.1307 +/- 0.0127
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.7305 +/- 0.0723

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	5.815	4.00	109.57	0.00	0.00E+000	3.0
TH-228	5.417	0.66	305.43	0.34	0.00E+000	3.0
TH-229 T	4.876	117.66	18.10	0.34	0.00E+000	3.0
TH-230	4.568	5.66	85.23	0.34	0.00E+000	3.0
TH-232	4.070	1.00	277.19	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

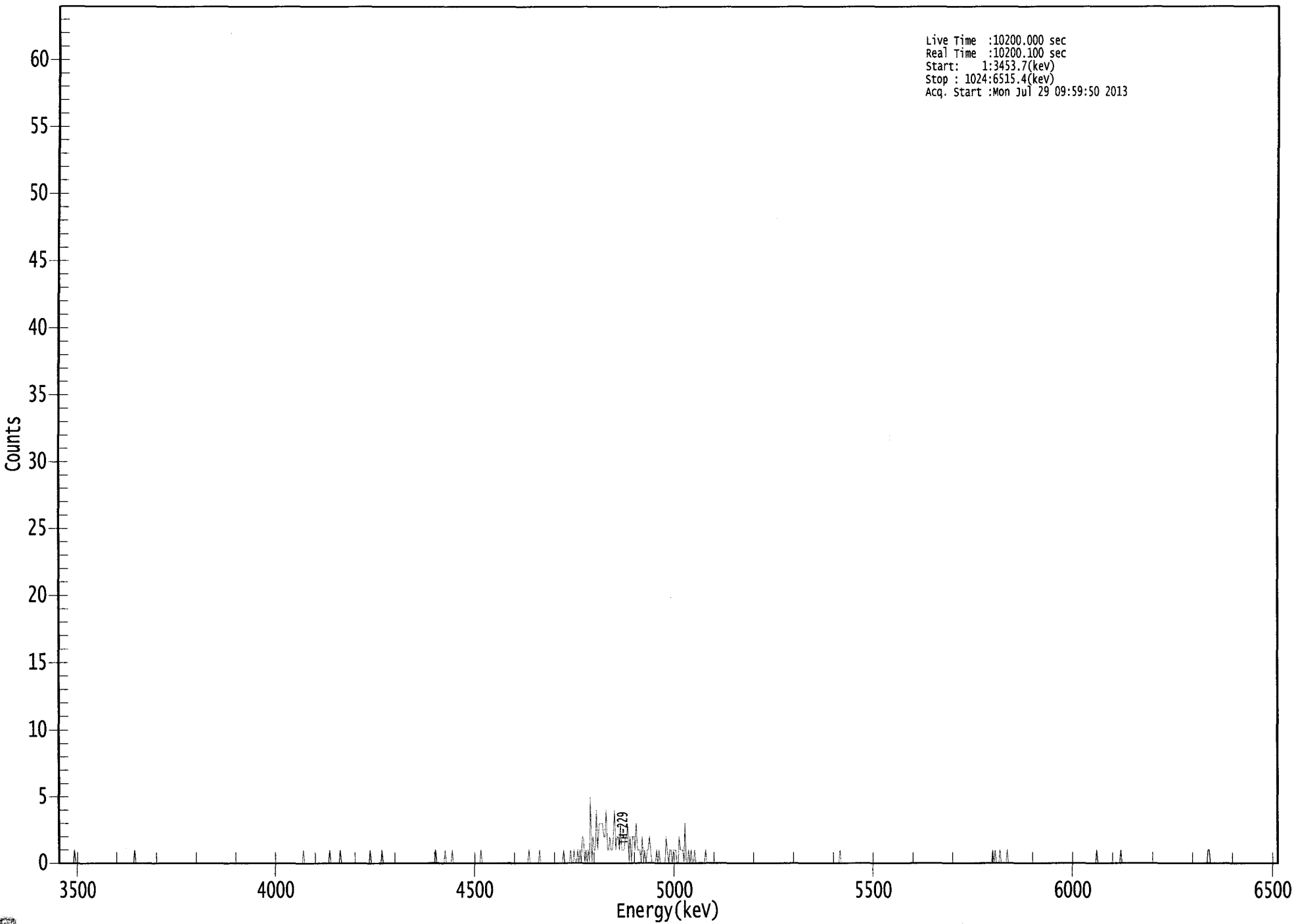
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	8.32E-002 +/- 9.25E-002	1.25E-001 +/- 2.38E-002
TH-228	0.998	5400.00*	1.34E-002 +/- 4.10E-002	9.70E-002 +/- 1.85E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 4.58E-001	9.74E-002 +/- 1.86E-002
TH-230	0.945	4672.00*	1.15E-001 +/- 1.00E-001	9.71E-002 +/- 1.85E-002
TH-232	0.972	3997.00*	2.03E-002 +/- 5.63E-002	1.22E-001 +/- 2.32E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(keV)
Stop : 1024:6515.4(keV)
Acq. Start :Mon Jul 29 09:59:50 2013



ROI Type: 1

ROI Type: 3

0227

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	1	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	1	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	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	1	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	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	1	0
265:	0	0	0	0	0	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	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	1	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	1	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	0	0	0	0	0	0	0
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	1	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	1	0
433:	0	1	0	0	1	0	1	0
441:	2	2	0	1	0	1	0	5
449:	0	2	1	1	4	1	3	3
457:	3	3	2	2	4	1	1	2
465:	1	1	2	4	1	2	2	1
473:	3	1	1	1	2	2	3	0
481:	2	0	2	2	1	3	1	1
489:	1	0	2	0	1	0	1	1
497:	2	1	0	0	0	0	1	0
505:	1	0	0	0	0	0	2	1
513:	0	1	1	0	1	1	1	0
521:	0	2	1	1	1	0	3	0
529:	0	1	0	1	0	0	1	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	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:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	1	0	1	0	0	0	1	0
793:	0	0	0	0	1	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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

WJ
7/29/13

Apex-Alpha™

Sample Description: PZ-113-AS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 9:59:46 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.2165 +/- 0.0169
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 1.1886 +/- 0.0953

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.817	0.32	646.93	0.68	0.00E+000	2.9
TH-228	5.359	5.66	85.23	0.34	0.00E+000	2.9
TH-229 T	4.864	194.32	14.09	0.68	0.00E+000	4.5
TH-230	4.616	19.00	46.13	0.00	0.00E+000	2.9
TH-232	3.942	1.66	169.38	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

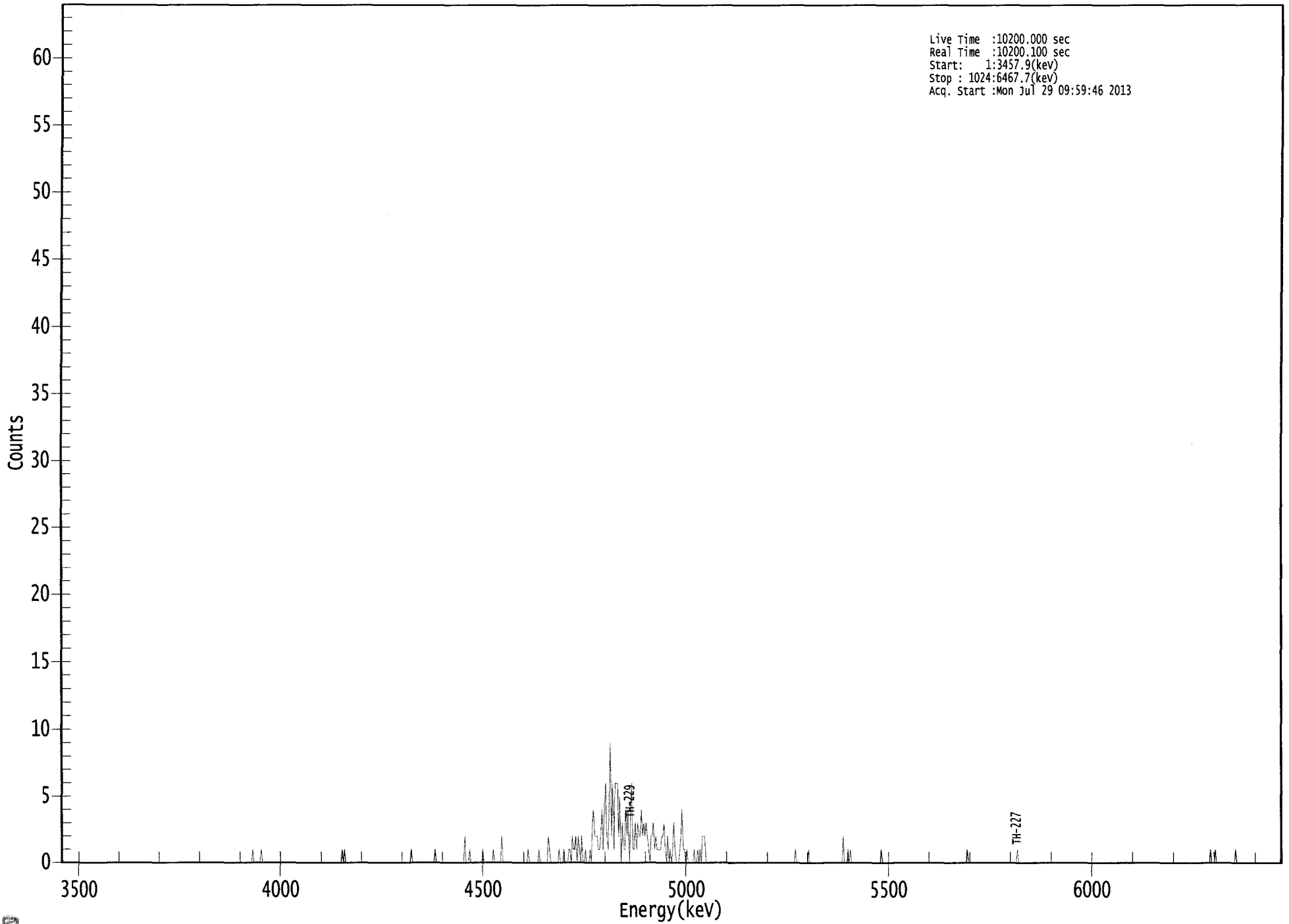
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.994	5850.00*	4.02E-003 +/- 2.60E-002	7.09E-002 +/- 1.09E-002
TH-228	0.991	5400.00*	7.06E-002 +/- 6.12E-002	5.97E-002 +/- 9.15E-003
TH-229	1.000	4872.00*	2.39E+000 +/- 3.67E-001	6.94E-002 +/- 1.06E-002
TH-230	0.984	4672.00*	2.33E-001 +/- 1.13E-001	7.35E-002 +/- 1.13E-002
TH-232	0.984	3997.00*	2.03E-002 +/- 3.45E-002	5.85E-002 +/- 8.98E-003

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064366.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Mon Jul 29 09:59:46 2013



ROI Type: 1

ROI Type: 3

0232

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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 2 0 0 0 0 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	1	0	0	0	0	0	0
409:	0	2	1	0	0	0	0	0
417:	0	0	1	0	0	0	1	0
425:	0	0	1	1	0	2	1	1
433:	2	0	2	1	0	2	0	0
441:	1	0	0	0	1	0	3	4
449:	2	2	2	1	1	2	4	1
457:	4	6	2	1	4	9	2	6
465:	1	6	6	6	2	5	0	3
473:	1	1	4	2	4	0	3	6
481:	1	1	3	1	3	2	2	4
489:	2	3	2	3	2	1	0	2
497:	2	3	1	2	1	1	1	1
505:	2	2	3	1	0	2	0	1
513:	0	1	3	1	0	0	0	1
521:	2	4	1	1	0	1	0	0
529:	0	0	0	1	0	0	1	0
537:	1	0	2	2	2	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:	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:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	2	0	0	0	1	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:	1	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 1 0 0 0 0 0

Sample Title: 03

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

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7/29/13

Apex-Alpha™

Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 9:59:47 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.1796 +/- 0.0152
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 1.0692 +/- 0.0926

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.867	4.00	109.57	0.00	0.00E+000	3.0
TH-228	5.346	4.15	107.12	0.85	0.00E+000	3.0
TH-229 T	4.862	161.32	15.47	0.68	0.00E+000	4.3
TH-230	4.617	14.00	54.22	0.00	0.00E+000	3.0
TH-232	3.967	8.00	73.50	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

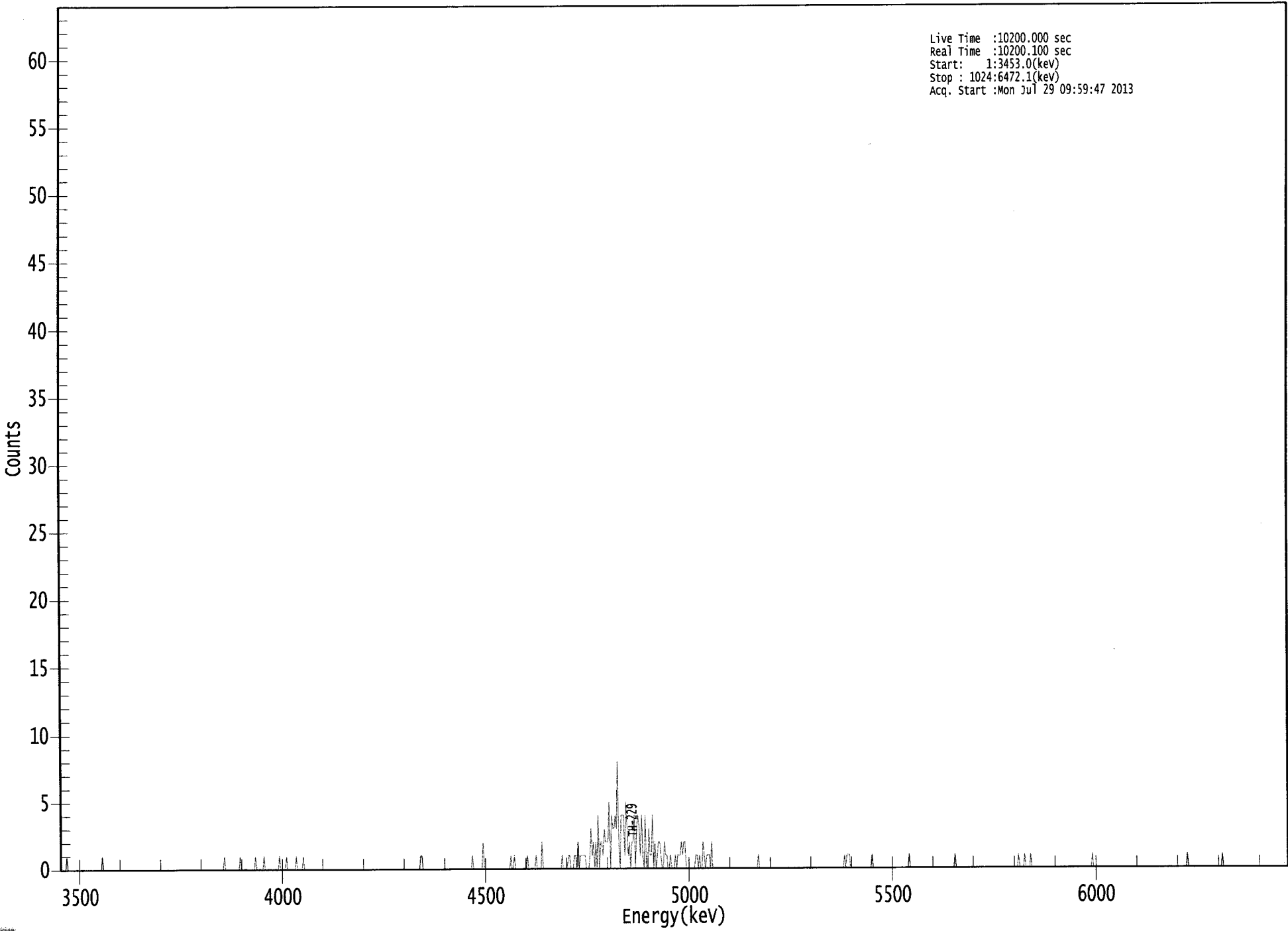
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	6.06E-002 +/- 6.72E-002	9.09E-002 +/- 1.51E-002
TH-228	0.985	5400.00*	6.24E-002 +/- 6.77E-002	9.01E-002 +/- 1.50E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 3.97E-001	8.36E-002 +/- 1.39E-002
TH-230	0.984	4672.00*	2.07E-001 +/- 1.17E-001	8.86E-002 +/- 1.47E-002
TH-232	0.995	3997.00*	1.18E-001 +/- 8.89E-002	8.85E-002 +/- 1.47E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064367.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :Mon Jul 29 09:59:47 2013



ROI Type: 1

ROI Type: 3

0237

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	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	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	1	0	0	0	0	0	0
145:	0	0	0	0	0	0	1	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	1	0	0	0	0	0
177:	0	0	0	0	0	0	0	1
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	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	1	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:	1	0	0	0	0	0	0	0
353:	0	2	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: 04

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

801: 0 0 0 0 1 0 0 0

Sample Title: 04

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

KYS
7/29/13

Apex-Alpha™

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:48 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.2293 +/- 0.0175
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.3128 +/- 0.1033

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.823	3.28	151.91	2.72	0.00E+000	3.0
TH-228	5.362	7.79	81.05	2.21	0.00E+000	3.0
TH-229 T	4.885	205.49	13.69	0.51	0.00E+000	6.4
TH-230	4.634	8.49	69.59	0.51	0.00E+000	3.0
TH-232	4.004	3.15	126.67	0.85	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

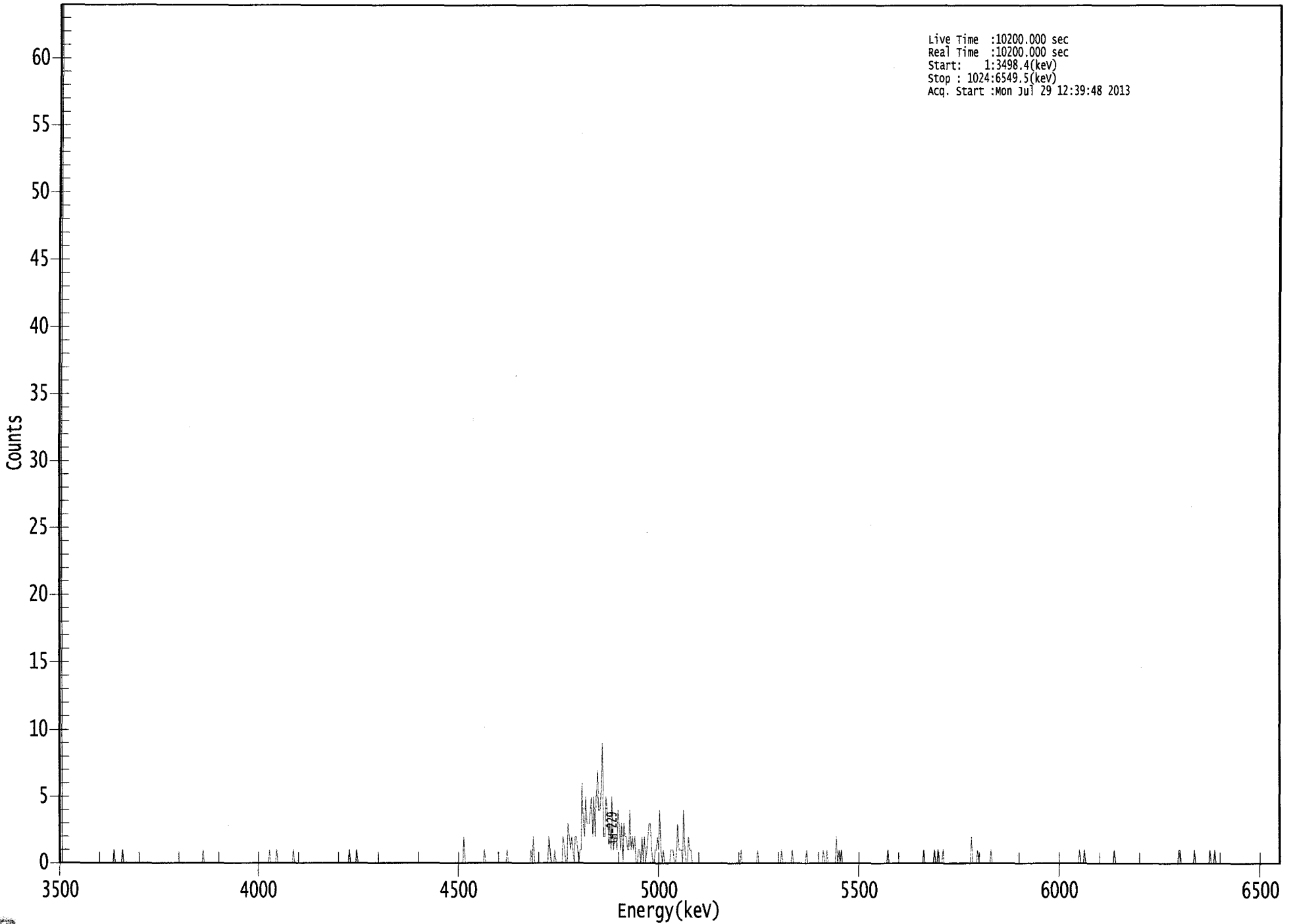
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.996	5850.00*	3.89E-002 +/- 5.95E-002	1.02E-001 +/- 1.53E-002
TH-228	0.993	5400.00*	9.18E-002 +/- 7.57E-002	9.43E-002 +/- 1.41E-002
TH-229	0.999	4872.00*	2.39E+000 +/- 3.58E-001	6.09E-002 +/- 9.13E-003
TH-230	0.992	4672.00*	9.83E-002 +/- 7.00E-002	6.08E-002 +/- 9.10E-003
TH-232	1.000	3997.00*	3.64E-002 +/- 4.64E-002	6.92E-002 +/- 1.04E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064374.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Mon Jul 29 12:39:48 2013



ROI Type: 1

ROI Type: 3

0272

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	1	0
49:	0	0	0	0	0	1	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	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	1	0	0	0	0	0	1
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	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	2	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	1	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 05

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

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

KJS
7/29/13

Apex-Alpha™

Sample Description: PZ-109-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:49 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1897 +/- 0.0158
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.9775 +/- 0.0834

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	5.771	3.47	129.54	1.53	0.00E+000	2.9
TH-228	5.398	4.09	141.06	3.91	0.00E+000	2.9
TH-229 T	4.876	169.79	15.16	2.21	0.00E+000	3.9
TH-230	4.574	3.79	130.58	2.21	0.00E+000	2.9
TH-232	3.937	2.66	128.85	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

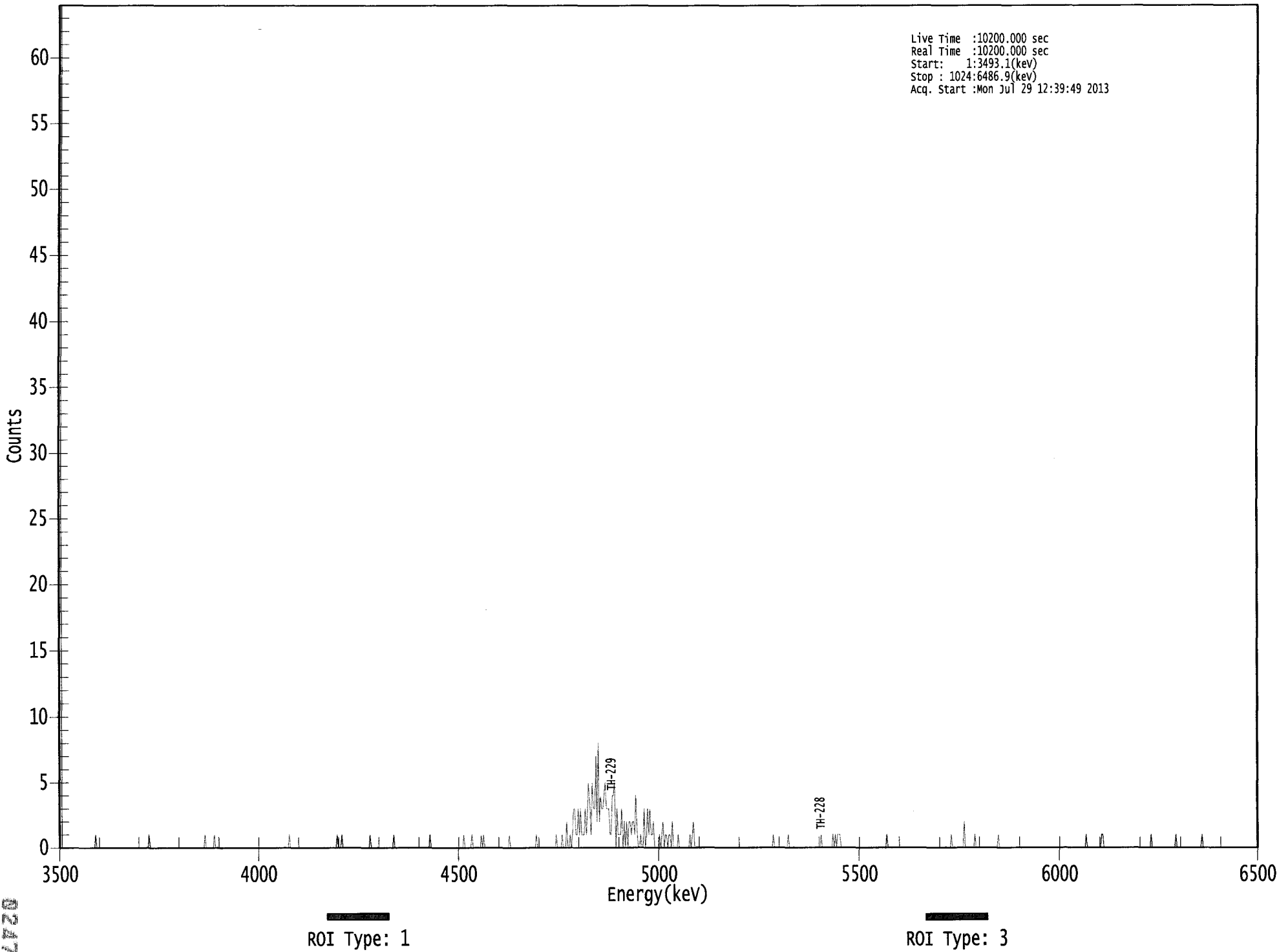
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.968	5850.00*	4.98E-002 +/- 6.50E-002	1.02E-001 +/- 1.67E-002
TH-228	1.000	5400.00*	5.83E-002 +/- 8.27E-002	1.39E-001 +/- 2.27E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.89E-001	1.12E-001 +/- 1.83E-002
TH-230	0.951	4672.00*	5.30E-002 +/- 6.98E-002	1.12E-001 +/- 1.83E-002
TH-232	0.981	3997.00*	3.72E-002 +/- 4.83E-002	6.68E-002 +/- 1.09E-002

AG
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US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Mon Jul 29 12:39:49 2013



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

Sample Title: 06

Elapsed Live time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 06

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:	1	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	1	0	0	0	0	1	0
433:	0	0	2	0	0	1	0	1
441:	3	3	1	1	3	1	3	1
449:	1	1	3	1	3	5	3	1
457:	5	3	3	7	2	8	2	4
465:	3	3	4	5	3	3	3	1
473:	1	4	4	5	0	3	1	1
481:	1	3	0	2	0	2	0	2
489:	2	1	2	2	1	4	1	0
497:	0	1	0	0	3	0	1	3
505:	1	3	1	1	2	0	0	0
513:	0	1	0	1	2	0	1	1
521:	0	1	1	0	2	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	1	0	1	2	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	1	0	0	0	0	0
617:	0	0	0	0	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	0	0	0	0	0
649:	0	0	0	1	0	0	0	0
657:	0	0	0	0	0	1	0	1
665:	0	1	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	0	0	0	0	0	0
705:	0	0	0	1	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	1	0	0	0	0	0
769:	0	0	0	0	0	2	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

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

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7/29/13

Apex-Alpha™

Sample Description: PZ-109-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:42 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.2041 +/- 0.0165
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 1.0376 +/- 0.0860

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	5.762	1.45	284.62	2.55	0.00E+000	2.9
TH-228	5.385	3.77	142.84	3.23	0.00E+000	2.9
TH-229 T	4.886	181.79	14.64	2.21	0.00E+000	4.3
TH-230	4.636	9.81	66.87	1.19	0.00E+000	2.9
TH-232	3.965	1.83	152.56	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

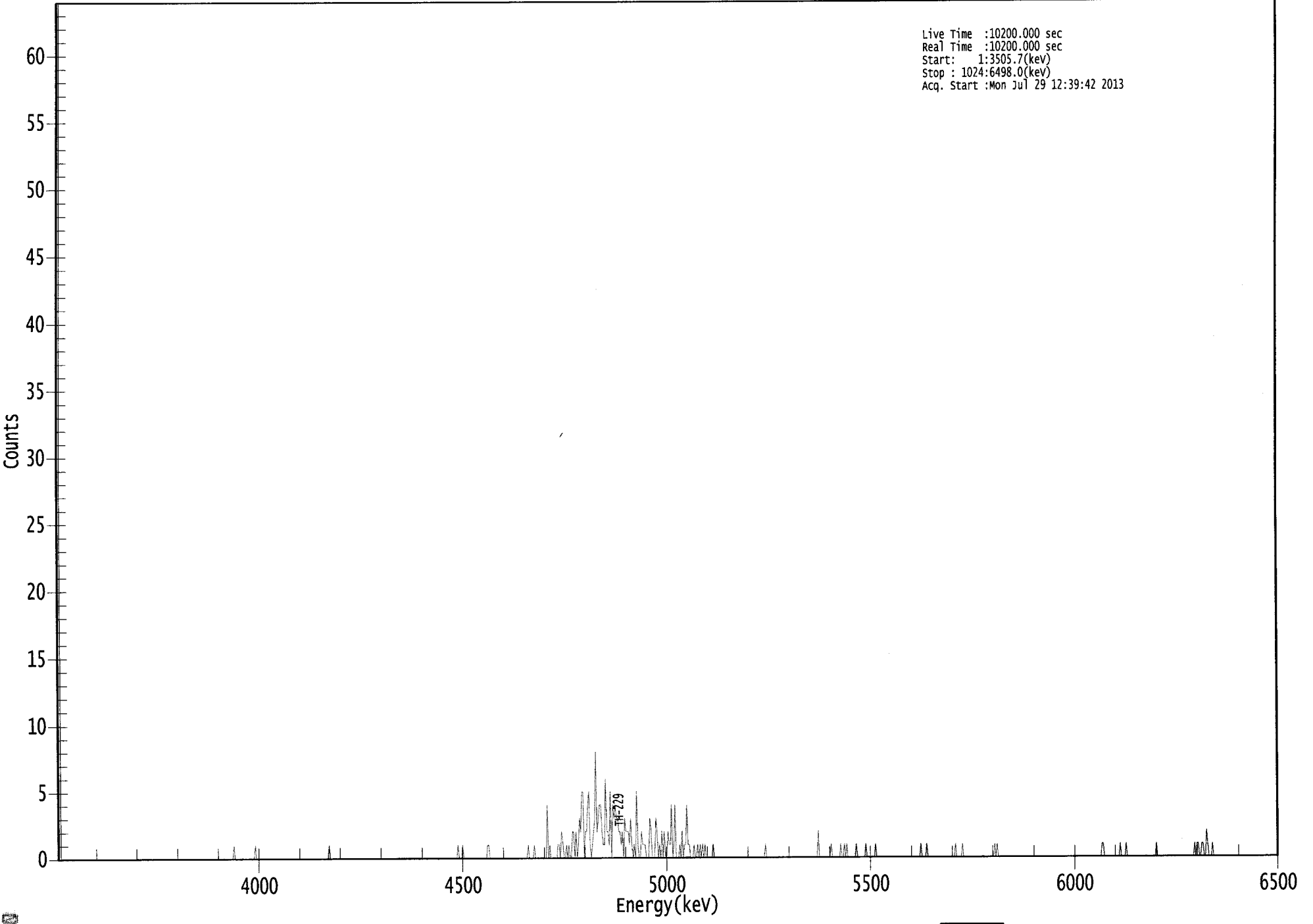
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.961	5850.00*	1.93E-002 +/- 5.51E-002	1.12E-001 +/- 1.77E-002
TH-228	0.999	5400.00*	4.99E-002 +/- 7.17E-002	1.20E-001 +/- 1.91E-002
TH-229	0.999	4872.00*	2.37E+000 +/- 3.76E-001	1.04E-001 +/- 1.65E-002
TH-230	0.993	4672.00*	1.28E-001 +/- 8.77E-002	8.57E-002 +/- 1.36E-002
TH-232	0.995	3997.00*	2.38E-002 +/- 3.64E-002	5.42E-002 +/- 8.59E-003

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064369.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Mon Jul 29 12:39:42 2013



ROI Type: 1

ROI Type: 3

0252

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	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	1	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	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:	1	0	0	0	1	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	1	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	1	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	1	0	0	0	0
897:	1	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	1	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	1	0	1	1	0	0	1
961:	1	0	0	2	1	0	0	0
969:	1	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000644
 Batch Identification: 1307100A-TH
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:43 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1565 +/- 0.0141
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
 Chem. Recovery Factor: 0.7632 +/- 0.0700

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	5.827	2.49	138.29	0.51	0.00E+000	2.6
TH-228	5.395	1.98	176.34	1.02	0.00E+000	2.6
TH-229 T	4.887	139.83	16.59	0.17	0.00E+000	4.2
TH-230	4.628	2.49	138.29	0.51	0.00E+000	2.6
TH-232	3.954	-0.17	1169.5	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

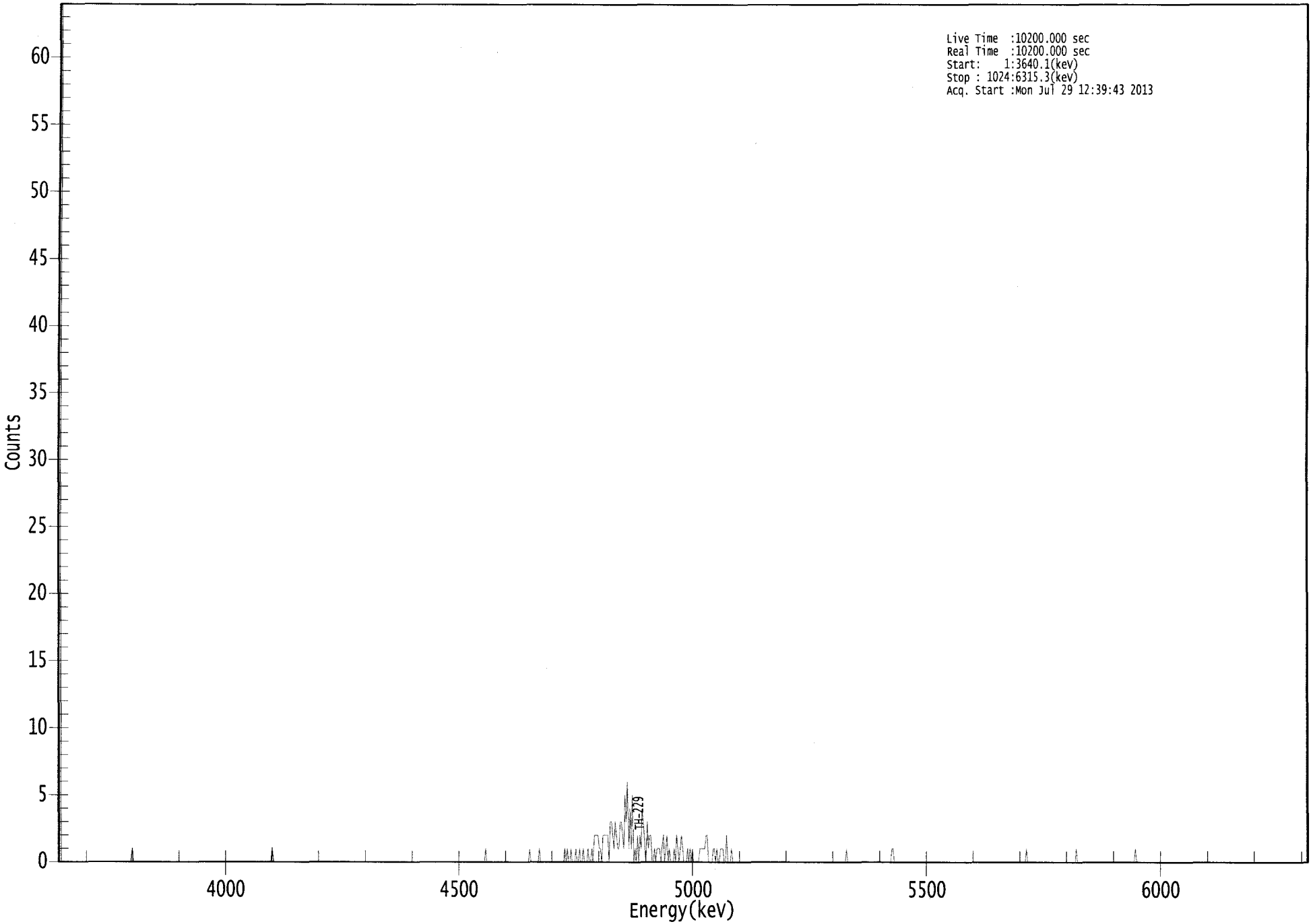
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	4.33E-002 +/- 6.04E-002	9.13E-002 +/- 1.61E-002
TH-228	1.000	5400.00*	3.42E-002 +/- 6.06E-002	1.09E-001 +/- 1.92E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 4.20E-001	7.10E-002 +/- 1.25E-002
TH-230	0.990	4672.00*	4.22E-002 +/- 5.89E-002	8.90E-002 +/- 1.57E-002
TH-232	0.990	3997.00*	-2.88E-003 +/- 3.37E-002	7.06E-002 +/- 1.25E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064444.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start : 1:3640.1(keV)
Stop : 1024:6315.3(keV)
Acq. Start :Mon Jul 29 12:39:43 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	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	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:	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 0

Sample Title: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	0
393:	0	0	0	1	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	1	0	0	1	0	0
425:	0	1	0	0	1	0	0	1
433:	0	0	0	1	0	0	1	0
441:	2	2	2	2	1	1	0	2
449:	2	2	2	2	0	3	3	2
457:	1	3	2	1	1	3	3	2
465:	1	5	3	6	1	4	1	5
473:	0	1	0	2	0	2	1	4
481:	3	1	0	3	1	2	2	0
489:	0	1	0	1	1	1	0	1
497:	2	0	1	2	0	1	0	0
505:	0	1	0	2	1	0	1	2
513:	1	0	0	0	1	0	1	0
521:	1	0	0	0	0	0	1	1
529:	1	1	1	2	2	0	0	0
537:	0	1	1	0	1	0	0	1
545:	1	1	0	0	2	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	1	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	1	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	1	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 08

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	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	1	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	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

103
7/29/13

Apex-Alpha™

Sample Description: PZ-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 09
 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: 7/10/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:44 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.1811 +/- 0.0153
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Chem. Recovery Factor: 0.9103 +/- 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	5.753	0.32	646.93	0.68	0.00E+000	3.0
TH-228	5.409	0.49	416.98	0.51	0.00E+000	3.0
TH-229 T	4.869	162.66	15.39	0.34	0.00E+000	5.9
TH-230	4.628	9.66	64.35	0.34	0.00E+000	3.0
TH-232	3.923	3.83	102.72	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

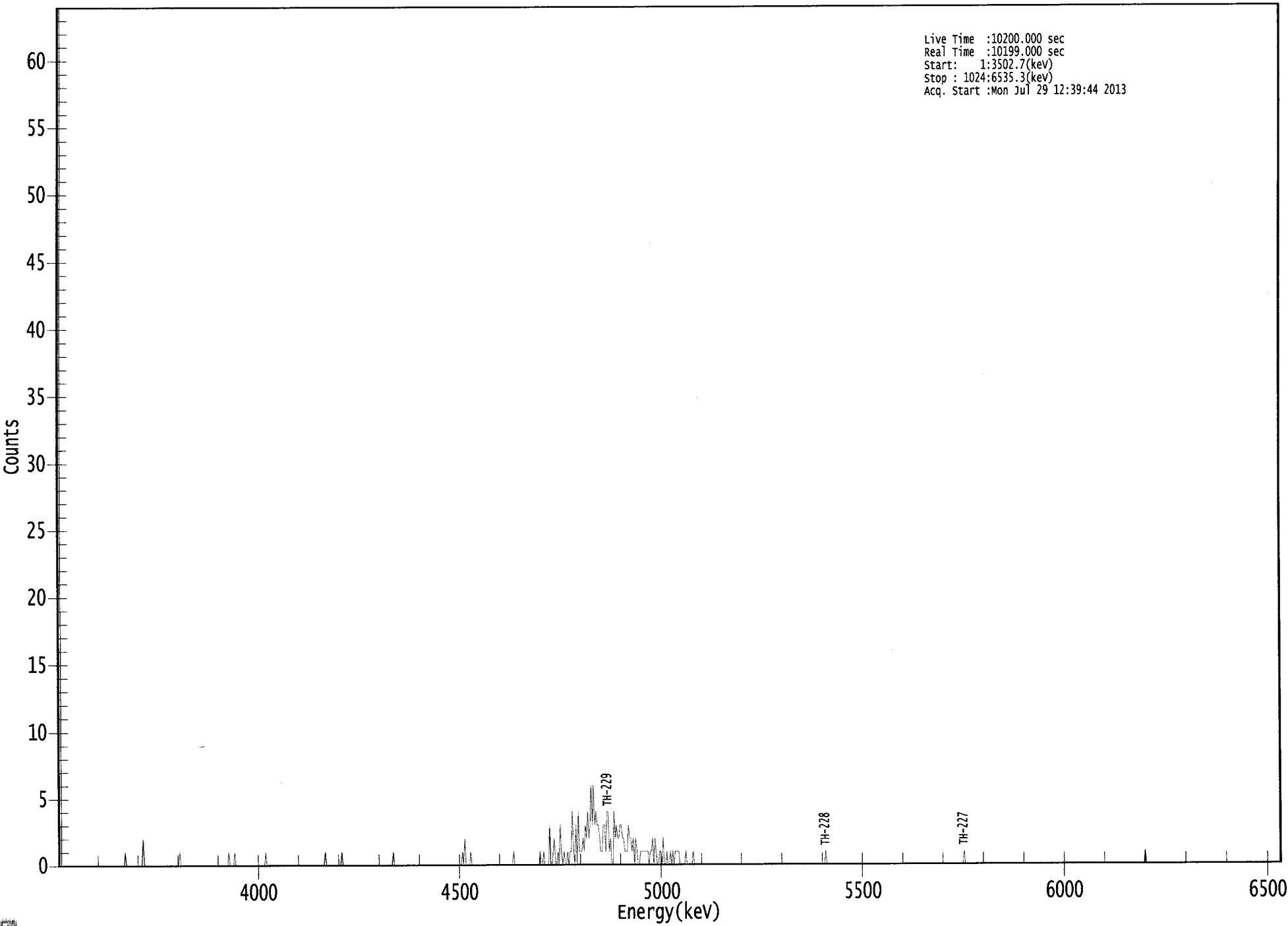
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.952	5850.00*	4.81E-003 +/- 3.11E-002	8.48E-002 +/- 1.40E-002
TH-228	1.000	5400.00*	7.31E-003 +/- 3.05E-002	7.83E-002 +/- 1.30E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 3.96E-001	7.03E-002 +/- 1.16E-002
TH-230	0.990	4672.00*	1.42E-001 +/- 9.41E-002	7.01E-002 +/- 1.16E-002
TH-232	0.972	3997.00*	5.60E-002 +/- 5.83E-002	6.11E-002 +/- 1.01E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064371.CNF

Live Time :10200.000 sec
Real Time :10199.000 sec
Start: 1:3502.7(kev)
Stop : 1024:6535.3(kev)
Acq. Start :Mon Jul 29 12:39:44 2013



ROI Type: 1

ROI Type: 3

2952

 ***** 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: 10199

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10199	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	2
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	1
145:	0	0	0	0	1	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	1	0	0	0	0	0	0	0
233:	0	0	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:	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	1	0	2	0	0
345:	0	0	1	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	1	0	0	1
409:	0	0	0	0	3	0	0	1
417:	2	0	0	1	0	3	1	0
425:	1	0	0	1	0	1	1	4
433:	1	0	3	0	4	1	1	1
441:	2	1	3	2	4	2	3	6
449:	3	6	3	4	3	3	2	1
457:	1	3	3	1	4	4	1	2
465:	0	0	4	2	3	2	2	3
473:	3	2	2	1	1	1	3	2
481:	2	1	2	0	2	1	0	0
489:	1	1	1	1	1	1	1	0
497:	1	1	2	0	2	1	0	0
505:	1	1	0	2	0	0	1	0
513:	0	1	0	1	0	1	1	1
521:	1	0	0	0	0	0	1	0
529:	0	0	0	0	1	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	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	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	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	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	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

MS
7/29/13

Apex-Alpha™

Sample Description: DUP 02 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 10
 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 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:45 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.2022 +/- 0.0163
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 1.0821 +/- 0.0896

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.829	3.62	137.02	2.38	0.00E+000	2.8
TH-228	5.381	13.94	58.85	3.06	0.00E+000	2.8
TH-229 T	4.881	180.66	14.60	0.34	0.00E+000	17.2
TH-230	4.641	9.15	68.23	0.85	0.00E+000	2.8
TH-232	3.926	1.49	190.02	0.51	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

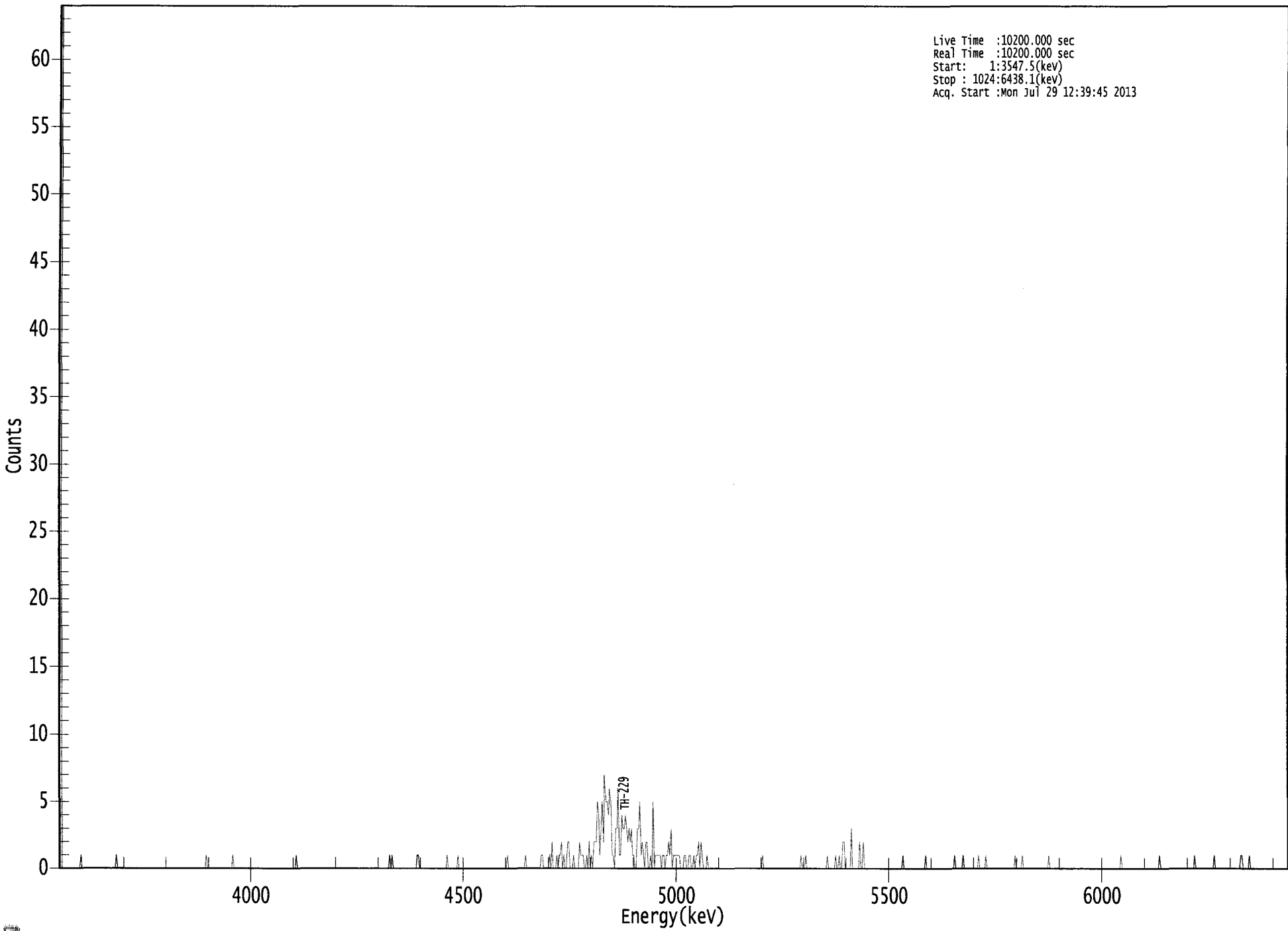
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	4.87E-002 +/- 6.72E-002	1.10E-001 +/- 1.74E-002
TH-228	0.998	5400.00*	1.86E-001 +/- 1.14E-001	1.19E-001 +/- 1.89E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.76E-001	6.29E-002 +/- 9.95E-003
TH-230	0.995	4672.00*	1.20E-001 +/- 8.41E-002	7.86E-002 +/- 1.24E-002
TH-232	0.974	3997.00*	1.95E-002 +/- 3.72E-002	6.87E-002 +/- 1.09E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064373.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Mon Jul 29 12:39:45 2013



ROI Type: 1

ROI Type: 3

0267

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

369: 0 0 0 0 0 0 1 0

Sample Title: 10

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

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

CS
7/29/13

Apex-Alpha™

Sample Description: DUP 02 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 11
 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 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:39:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.2167 +/- 0.0170
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Chem. Recovery Factor: 1.1740 +/- 0.0946

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	5.843	4.79	111.13	2.21	0.00E+000	2.9
TH-228	5.384	5.41	118.95	4.59	0.00E+000	2.9
TH-229 T	4.866	194.47	14.12	1.53	0.00E+000	12.0
TH-230	4.619	7.15	78.23	0.85	0.00E+000	2.9
TH-232	4.034	0.32	646.91	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

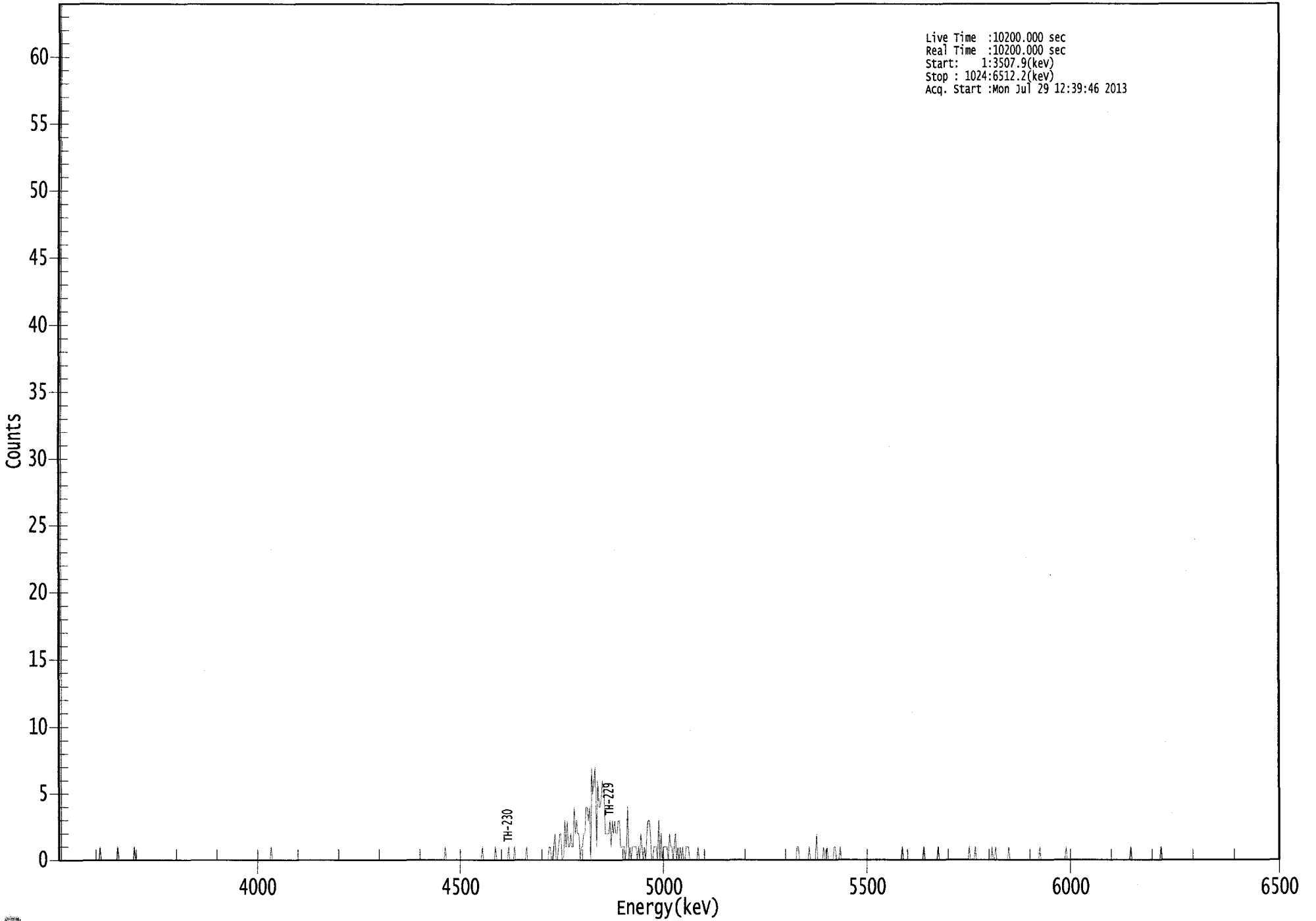
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	6.02E-002 +/- 6.75E-002	1.00E-001 +/- 1.54E-002
TH-228	0.999	5400.00*	6.75E-002 +/- 8.09E-002	1.29E-001 +/- 1.98E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 3.67E-001	8.73E-002 +/- 1.34E-002
TH-230	0.985	4672.00*	8.76E-002 +/- 6.98E-002	7.33E-002 +/- 1.13E-002
TH-232	0.993	3997.00*	3.91E-003 +/- 2.53E-002	6.90E-002 +/- 1.06E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064372.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3507.9(kev)
Stop : 1024:6512.2(kev)
Acq. Start :Mon Jul 29 12:39:46 2013



ROI Type: 1

ROI Type: 3

0272

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	1	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	1	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	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:	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	1	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	0	1	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	1	1	0	0
417:	1	2	0	0	1	2	2	0
425:	0	3	1	3	1	1	2	1
433:	1	4	2	3	2	2	0	1
441:	1	2	2	4	4	3	4	0
449:	7	5	6	7	1	6	4	4
457:	5	6	5	2	2	2	2	3
465:	1	3	2	3	2	2	3	3
473:	1	1	1	1	0	1	4	0
481:	1	0	1	1	1	1	0	1
489:	0	2	1	0	1	0	2	3
497:	3	2	0	0	1	1	1	0
505:	3	0	2	0	1	1	1	1
513:	0	2	1	1	0	1	2	0
521:	1	0	1	0	1	0	0	1
529:	1	1	0	0	0	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	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	1	1	0	0
625:	0	0	0	0	0	0	1	0
633:	0	0	0	0	2	0	0	0
641:	0	0	1	0	0	1	0	0
649:	0	0	0	1	1	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	1	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	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	1	0	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	1
785:	0	0	1	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: 11

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

KCS
7/29/13

Apex-Alpha™

Sample Description: PZ-113-SS TOT
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
Batch Identification: 1307100A-TH
Sample Identification: 12
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: 7/11/2013 7:35:44 AM
Acquisition Date/Time: 7/29/2013 12:39:47 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
Tracer Quantity: 0.233 mL
Effective Efficiency: 0.1847 +/- 0.0155
Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
Chem. Recovery Factor: 1.2504 +/- 0.1074

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	5.802	4.83	91.00	0.17	0.00E+000	3.0
TH-228	5.374	13.83	53.08	0.17	0.00E+000	3.0
TH-229 T	4.869	164.66	15.29	0.34	0.00E+000	4.0
TH-230	4.616	22.15	42.57	0.85	0.00E+000	3.0
TH-232	3.963	11.83	57.46	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

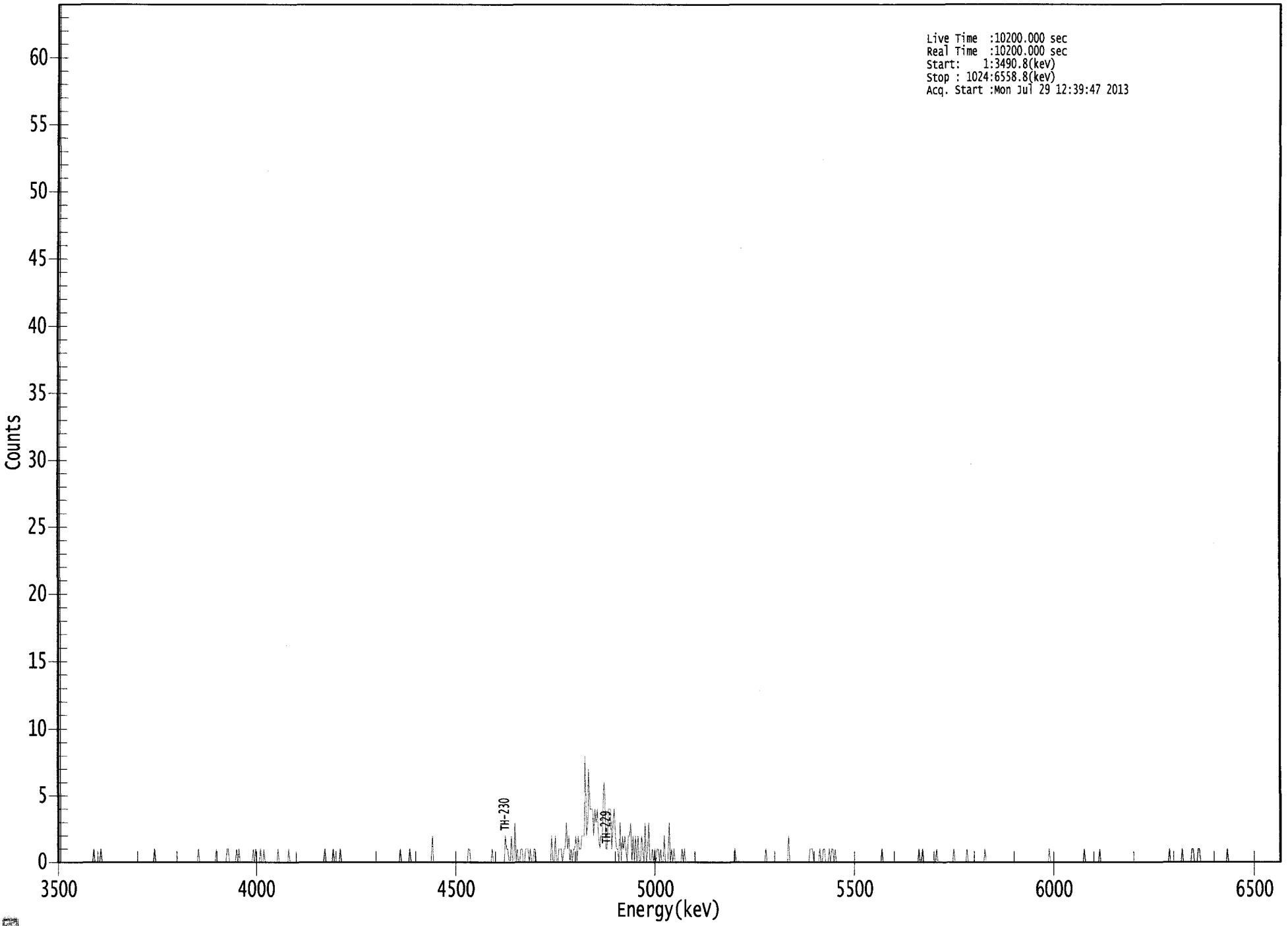
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.988	5850.00*	7.12E-002 +/- 6.58E-002	6.15E-002 +/- 1.01E-002
TH-228	0.997	5400.00*	2.02E-001 +/- 1.12E-001	6.10E-002 +/- 1.00E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 3.91E-001	6.89E-002 +/- 1.13E-002
TH-230	0.984	4672.00*	3.18E-001 +/- 1.45E-001	8.60E-002 +/- 1.42E-002
TH-232	0.994	3997.00*	1.70E-001 +/- 1.01E-001	5.99E-002 +/- 9.85E-003

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064376.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :Mon Jul 29 12:39:47 2013



ROI Type: 1

ROI Type: 3

0277

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	1	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	1	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	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	1	0	0
137:	0	0	0	0	0	0	1	1
145:	0	0	0	0	0	0	1	0
153:	1	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	1	0
169:	0	0	1	0	0	1	0	0
177:	0	0	0	0	0	0	0	0
185:	0	1	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:	1	0	0	0	0	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	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	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	2	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	1	1	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	1	0	0	0

369: 0 0 0 0 0 0 0 0 2

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	1	1	0	0	2	0	0	3
385:	0	1	0	0	1	1	0	0
393:	1	1	1	0	1	0	0	1
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	2	0
417:	0	2	0	0	1	1	1	0
425:	1	1	3	1	2	0	1	0
433:	1	1	2	0	2	1	1	2
441:	2	2	8	2	3	7	4	4
449:	4	2	4	3	4	2	1	2
457:	2	5	6	1	1	4	4	4
465:	1	3	4	2	1	1	0	3
473:	0	2	1	2	1	0	2	2
481:	3	0	2	0	2	0	2	0
489:	0	2	1	0	3	0	1	3
497:	0	0	1	0	1	0	1	1
505:	0	1	0	0	2	0	0	0
513:	3	0	1	0	1	0	0	0
521:	0	0	0	1	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	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:	0	1	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	2	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	1	1
633:	1	0	0	0	0	0	1	0
641:	0	1	1	0	0	0	1	0
649:	1	1	0	1	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	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	1	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	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	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: 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	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	1	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	1	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	0	0	0
937:	0	0	0	0	0	1	0	0
945:	0	0	0	0	0	1	1	0
953:	0	0	1	1	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	1	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Apex-Alpha™

DYS
7/29/13

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:07 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1952 +/- 0.0160
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 1.0991 +/- 0.0926

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.782	2.96	153.11	2.04	0.00E+000	3.1
TH-228	5.390	3.28	151.91	2.72	0.00E+000	3.1
TH-229 T	4.869	174.47	14.91	1.53	0.00E+000	9.8
TH-230	4.679	8.49	69.59	0.51	0.00E+000	3.1
TH-232	3.934	2.13	191.21	1.87	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

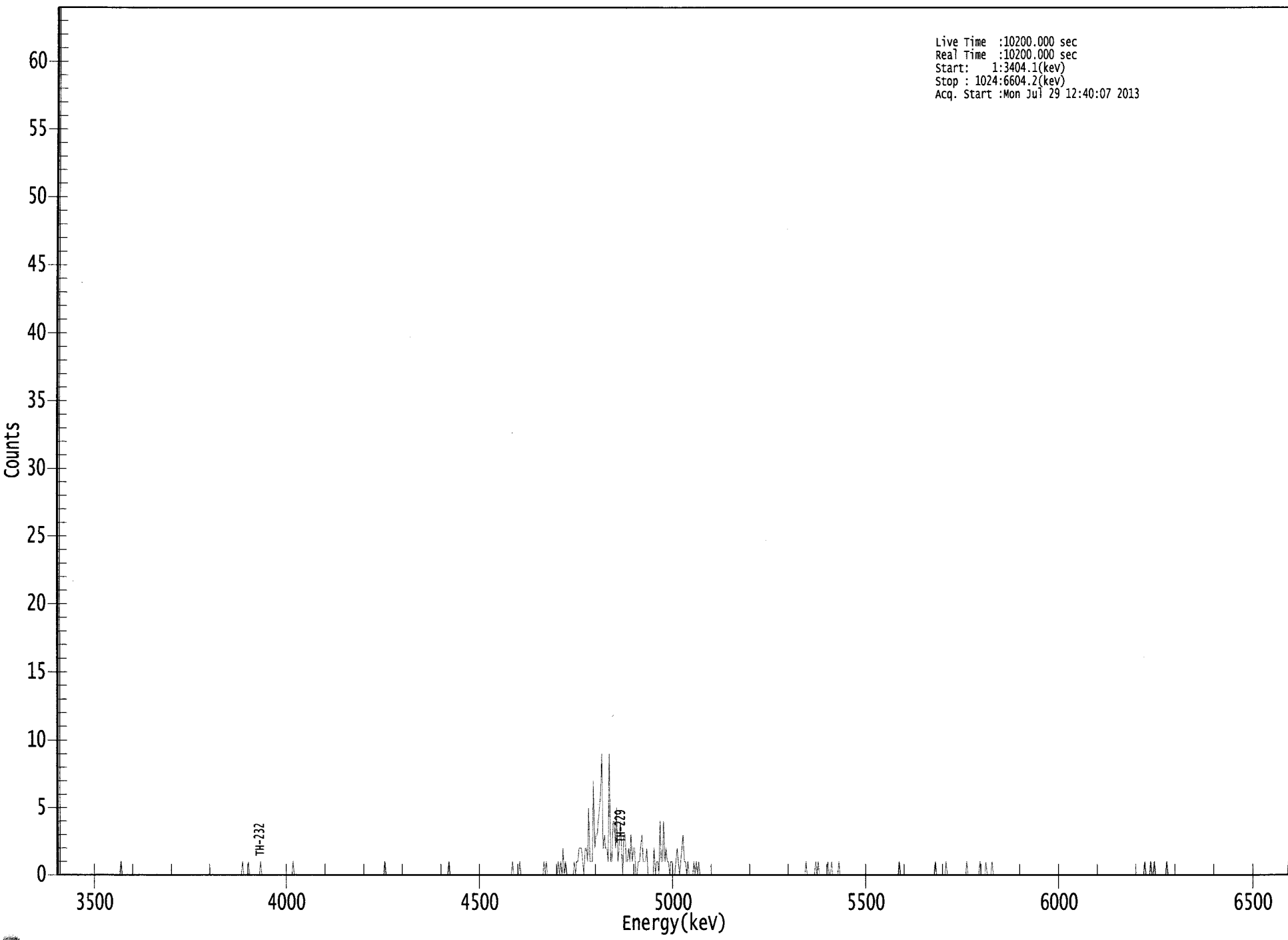
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.976	5850.00*	4.13E-002 +/- 6.35E-002	1.09E-001 +/- 1.75E-002
TH-228	1.000	5400.00*	4.54E-002 +/- 6.93E-002	1.19E-001 +/- 1.91E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 3.83E-001	9.69E-002 +/- 1.56E-002
TH-230	1.000	4672.00*	1.15E-001 +/- 8.25E-002	7.13E-002 +/- 1.15E-002
TH-232	0.980	3997.00*	2.89E-002 +/- 5.55E-002	1.03E-001 +/- 1.66E-002

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US EPA ARCHIVE DOCUMENT

000064378.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start :Mon Jul 29 12:40:07 2013



ROI Type: 1

ROI Type: 3

0282

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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	1	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	1	0	0	0	1
161:	0	0	0	0	0	0	0
169:	0	1	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	1	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	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 13

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

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



Apex-Alpha™

103
7/29/13

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:08 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1897 +/- 0.0157
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
 Chem. Recovery Factor: 1.1436 +/- 0.0969

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	5.701	0.49	417.03	0.51	0.00E+000	3.3
TH-228	5.364	3.32	119.77	0.68	0.00E+000	6.7
TH-229 T	4.861	169.66	15.07	0.34	0.00E+000	4.9
TH-230	4.612	7.83	70.93	0.17	0.00E+000	3.3
TH-232	3.901	1.83	152.56	0.17	0.00E+000	3.3

T = Tracer Peak used for Effective Efficiency

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

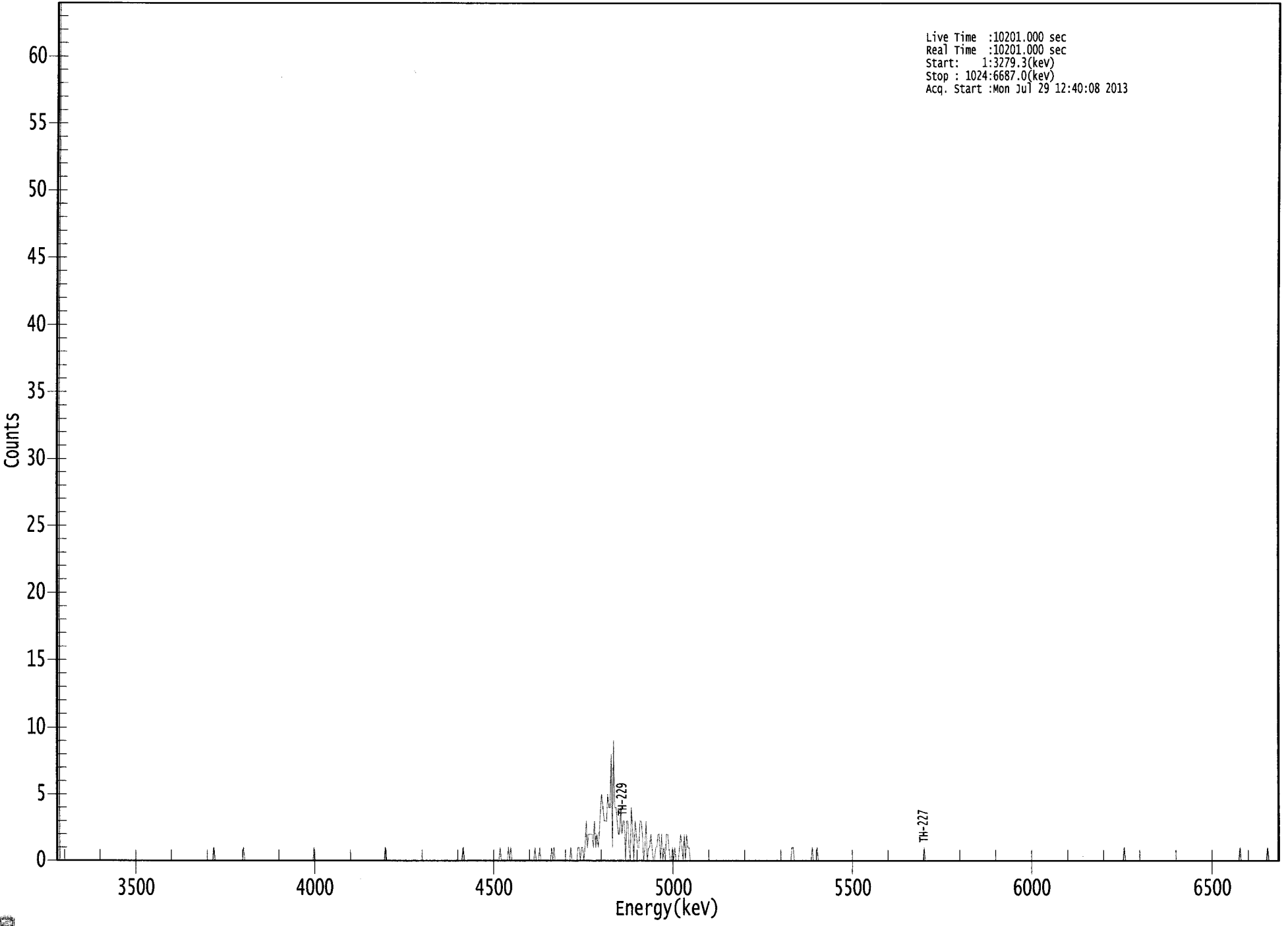
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.891	5850.00*	7.03E-003 +/- 2.93E-002	7.53E-002 +/- 1.22E-002
TH-228	0.993	5400.00*	4.72E-002 +/- 5.71E-002	8.02E-002 +/- 1.30E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 3.87E-001	6.71E-002 +/- 1.09E-002
TH-230	0.981	4672.00*	1.10E-001 +/- 7.97E-002	5.84E-002 +/- 9.48E-003
TH-232	0.953	3997.00*	2.56E-002 +/- 3.92E-002	5.83E-002 +/- 9.47E-003

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064377.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3279.3(kev)
Stop : 1024:6687.0(kev)
Acq. Start :Mon Jul 29 12:40:08 2013



ROI Type: 1

ROI Type: 3

0207

 ***** 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
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	1	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	1	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	1	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	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: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	0	0	0	1	0	0
409:	0	0	0	0	0	0	0	1
417:	0	1	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	1
433:	0	0	0	0	0	1	1	0
441:	1	1	0	1	3	1	2	2
449:	2	2	1	3	1	2	1	2
457:	4	5	4	3	3	3	5	4
465:	4	8	1	9	4	4	3	2
473:	2	4	2	3	3	0	3	3
481:	1	0	4	2	0	3	2	1
489:	1	3	3	2	0	1	3	0
497:	1	1	2	1	0	0	1	1
505:	2	2	0	2	0	1	0	2
513:	2	1	0	0	1	0	1	0
521:	0	0	1	2	1	0	2	0
529:	2	1	1	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	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	1	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	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	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	1	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	1	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	1	0	0
1017:	0	0	0	0	0	0	0	0

KVB
7/29/13

Apex-Alpha™

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:09 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1501 +/- 0.0138
 Counting Efficiency: 0.1612 +/- 0.0029 on 7/20/2013 6:29:23 PM
 Chem. Recovery Factor: 0.9312 +/- 0.0875

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.833	3.32	119.77	0.68	0.00E+000	3.3
TH-228	5.388	1.28	323.47	2.72	0.00E+000	3.3
TH-229 T	4.897	133.32	17.03	0.68	0.00E+000	6.9
TH-230	4.662	2.83	120.53	0.17	0.00E+000	3.3
TH-232	4.012	2.49	138.29	0.51	0.00E+000	3.3

T = Tracer Peak used for Effective Efficiency

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

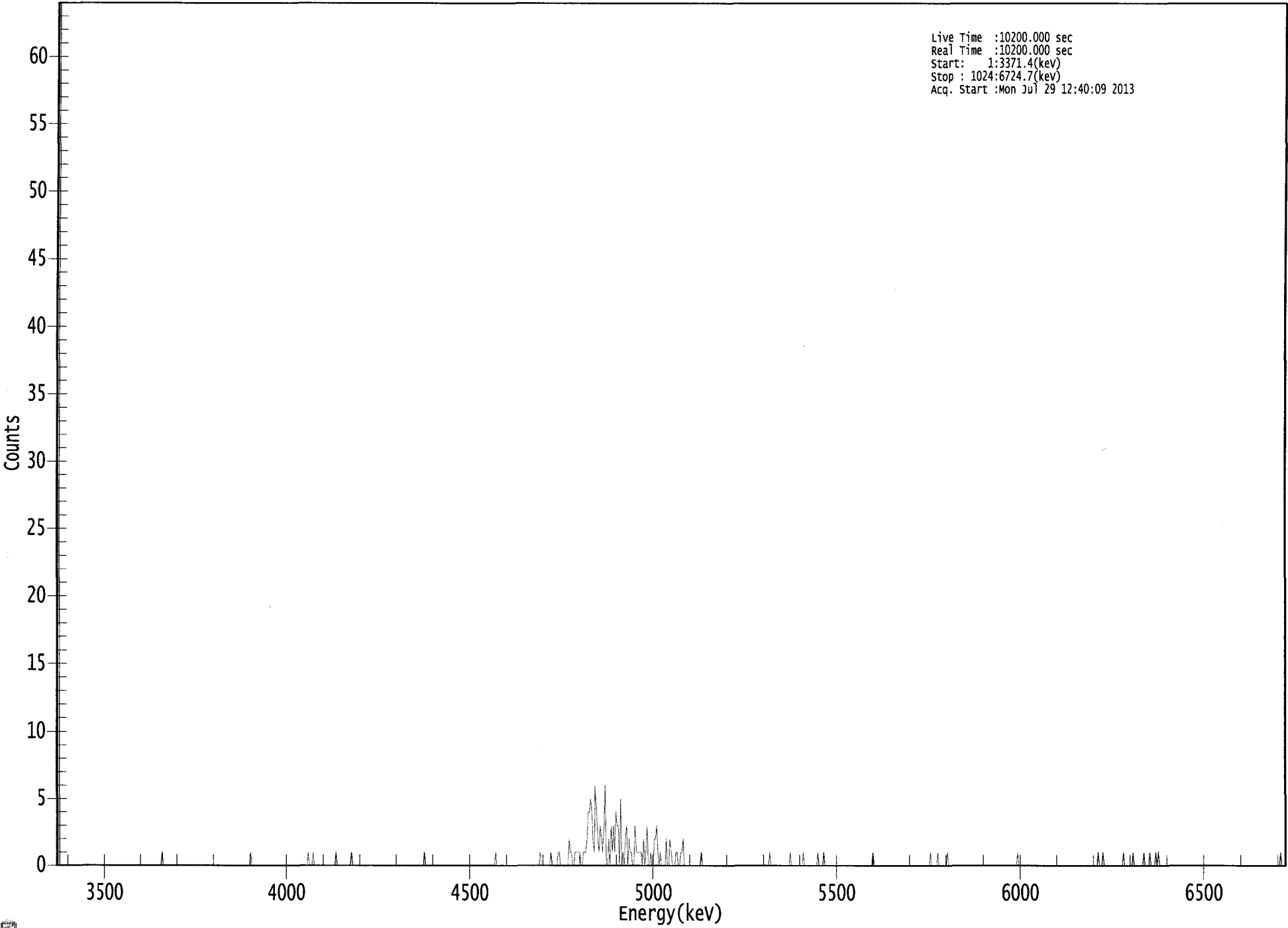
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	6.02E-002 +/- 7.29E-002	1.02E-001 +/- 1.85E-002
TH-228	0.999	5400.00*	2.30E-002 +/- 7.46E-002	1.54E-001 +/- 2.79E-002
TH-229	0.997	4872.00*	2.37E+000 +/- 4.28E-001	1.00E-001 +/- 1.81E-002
TH-230	0.999	4672.00*	5.01E-002 +/- 6.10E-002	7.38E-002 +/- 1.33E-002
TH-232	0.999	3997.00*	4.40E-002 +/- 6.13E-002	9.26E-002 +/- 1.67E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064379.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3371.4(kev)
Stop : 1024:6724.7(kev)
Acq. Start :Mon Jul 29 12:40:09 2013



ROI Type: 1

ROI Type: 3

0292

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

Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	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	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	1	0	0	0	1	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	0	0	0	0
241:	0	0	0	0	0	0	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	1	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	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	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

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

801: 1 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	1	0	0	0	1
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	1	0	0	0	0	0	0	0
897:	1	0	0	0	0	0	0	0
905:	0	1	0	0	0	0	1	0
913:	0	0	0	1	0	1	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	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	1	0	0	0	0	0



Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000644
 Batch Identification: 1307100A-TH
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:10 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.232 mL
 Effective Efficiency: 0.1185 +/- 0.0122
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Chem. Recovery Factor: 0.7738 +/- 0.0813

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	5.853	1.15	249.59	0.85	0.00E+000	3.1
TH-228	5.389	-0.38	799.82	2.38	0.00E+000	3.1
TH-229 T	4.828	105.13	19.31	1.87	0.00E+000	3.9
TH-230	4.550	10.83	60.10	0.17	0.00E+000	3.1
TH-232	3.937	2.32	149.12	0.68	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

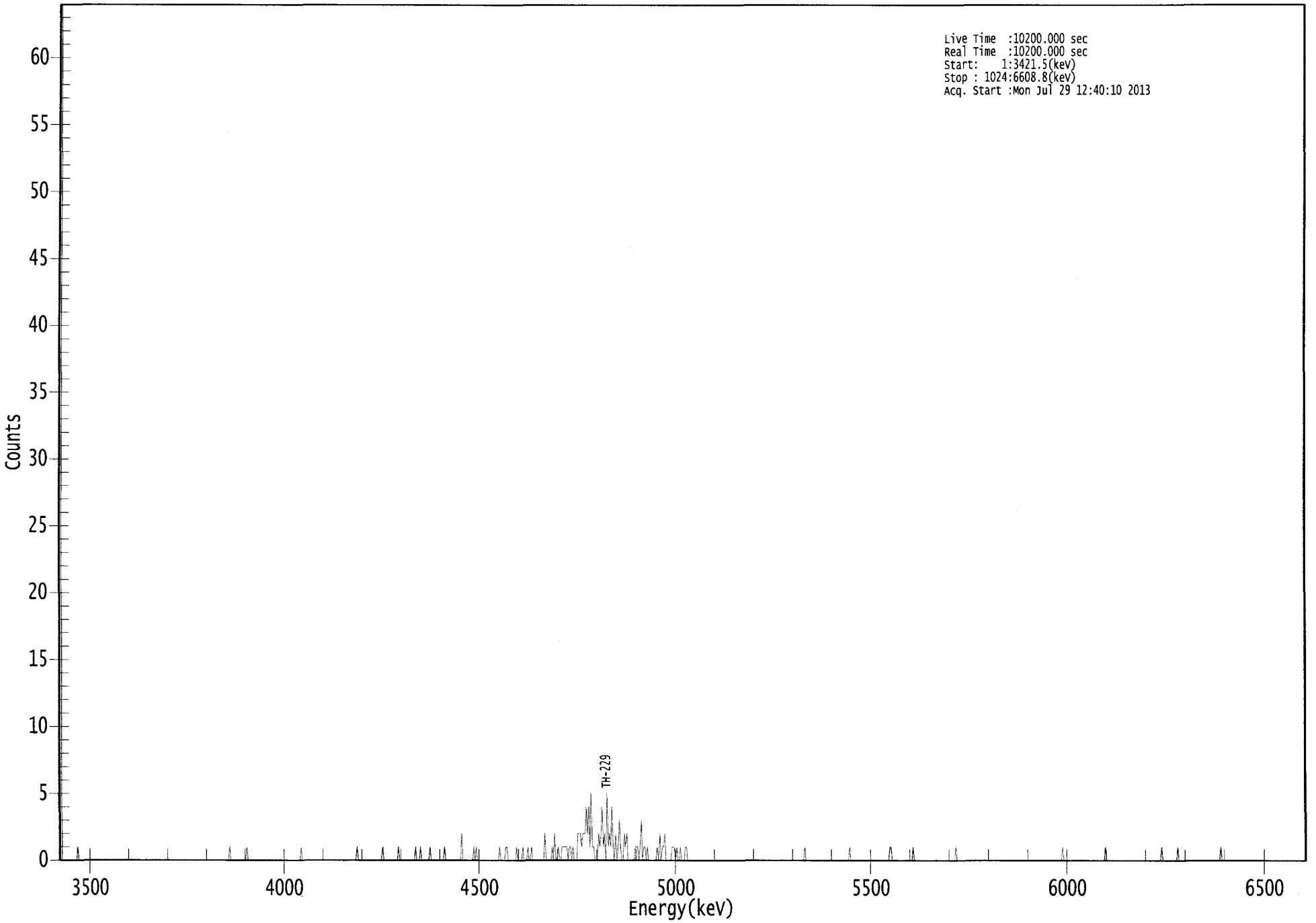
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	2.64E-002 +/- 6.61E-002	1.38E-001 +/- 2.78E-002
TH-228	0.999	5400.00*	-8.66E-003 +/- 6.93E-002	1.87E-001 +/- 3.78E-002
TH-229	0.990	4872.00*	2.36E+000 +/- 4.78E-001	1.70E-001 +/- 3.44E-002
TH-230	0.925	4672.00*	2.43E-001 +/- 1.54E-001	9.35E-002 +/- 1.89E-002
TH-232	0.981	3997.00*	5.19E-002 +/- 7.81E-002	1.26E-001 +/- 2.55E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064445.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(kev)
Stop : 1024:6608.8(kev)
Acq. Start :Mon Jul 29 12:40:10 2013



ROI Type: 1

0297

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	1
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	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	1	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	1	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	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	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	1	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	1	0
297:	0	0	1	0	0	0	0	0
305:	0	0	1	0	0	0	0	0
313:	0	0	0	0	0	0	1	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	2	0	0	0
337:	0	0	0	0	0	0	1	0
345:	1	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	1	0	0	0	0

369: 1 1 0 0 0 0 0 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	1	0	0	0	0	0	0	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	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	1	0	0	0	0	0	0
913:	0	0	0	0	0	0	1	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	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	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
7/29/13

Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:11 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1852 +/- 0.0156
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
 Chem. Recovery Factor: 1.0833 +/- 0.0930

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.842	8.64	72.56	1.36	0.00E+000	3.1
TH-228	5.329	5.81	90.53	1.19	0.00E+000	6.2
TH-229 T	4.896	164.98	15.31	1.02	0.00E+000	10.5
TH-230	4.578	13.15	56.06	0.85	0.00E+000	3.1
TH-232	3.915	2.66	128.85	0.34	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

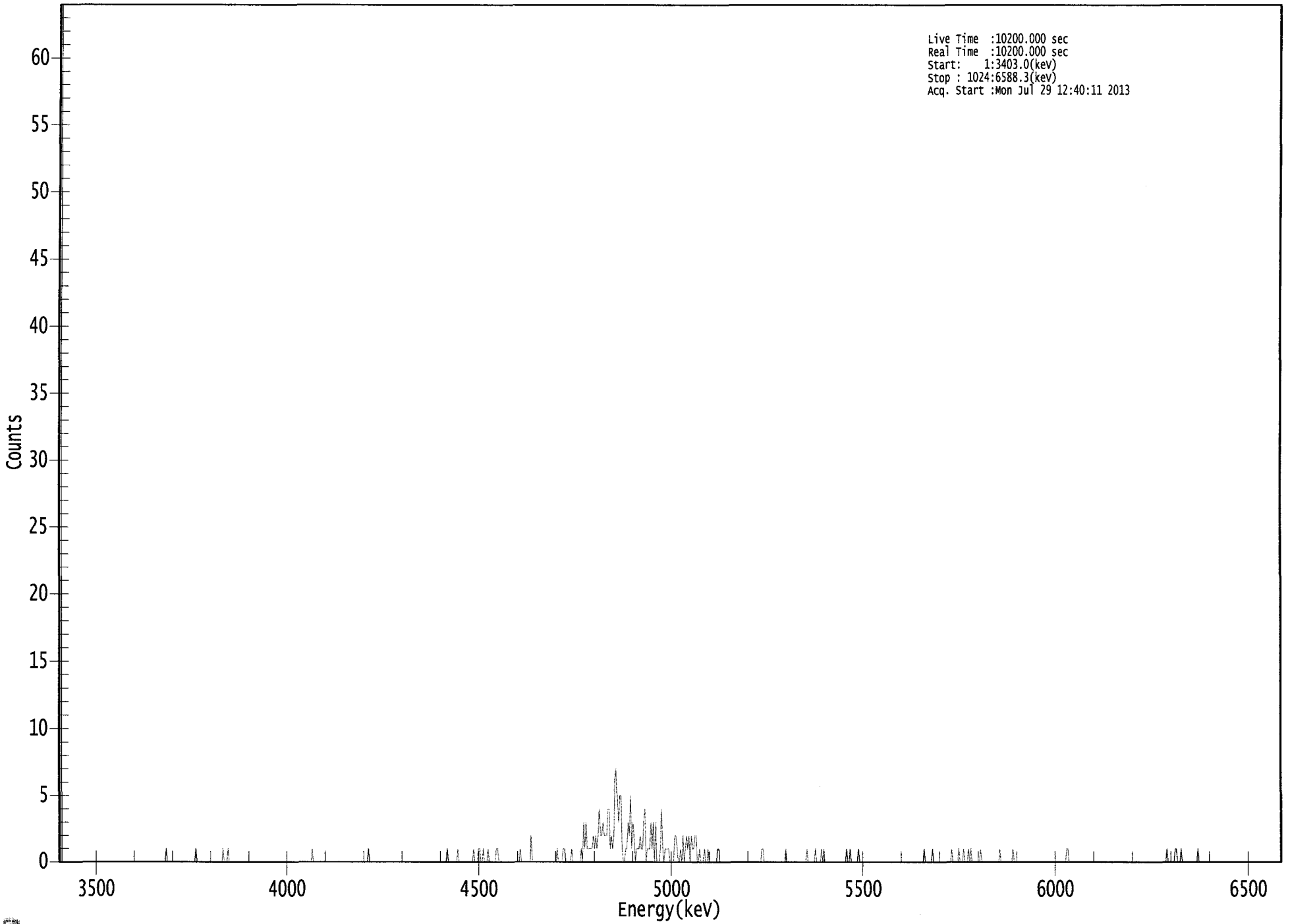
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	1.27E-001 +/- 9.45E-002	1.01E-001 +/- 1.66E-002
TH-228	0.974	5400.00*	8.47E-002 +/- 7.79E-002	9.60E-002 +/- 1.58E-002
TH-229	0.997	4872.00*	2.37E+000 +/- 3.91E-001	9.06E-002 +/- 1.49E-002
TH-230	0.955	4672.00*	1.88E-001 +/- 1.10E-001	8.58E-002 +/- 1.41E-002
TH-232	0.965	3997.00*	3.80E-002 +/- 4.94E-002	6.84E-002 +/- 1.13E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064381.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3403.0(kev)
Stop : 1024:6588.3(kev)
Acq. Start :Mon Jul 29 12:40:11 2013



ROI Type: 1

ROI Type: 3

0302

 ***** 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	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	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	1	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	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	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:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0
353:	1	1	0	0	1	0	0	0
361:	1	0	0	0	0	0	0	1

369: 1 0 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0

Sample Title: 17

Channel	1	2	3	4	5	6	7	8
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	1	1	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	1
929:	0	0	0	0	0	0	1	1
937:	0	0	0	1	0	0	0	0
945:	0	0	0	0	0	0	0	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	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
7/29/13

Apex-Alpha™

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:12 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1158 +/- 0.0120
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Chem. Recovery Factor: 0.6772 +/- 0.0715

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	5.769	2.98	134.36	1.02	0.00E+000	3.1
TH-228	5.372	-1.74	182.88	3.74	0.00E+000	3.1
TH-229 T	4.874	102.98	19.43	1.02	0.00E+000	4.7
TH-230	4.597	3.81	117.34	1.19	0.00E+000	3.1
TH-232	3.947	-1.70	130.90	1.70	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

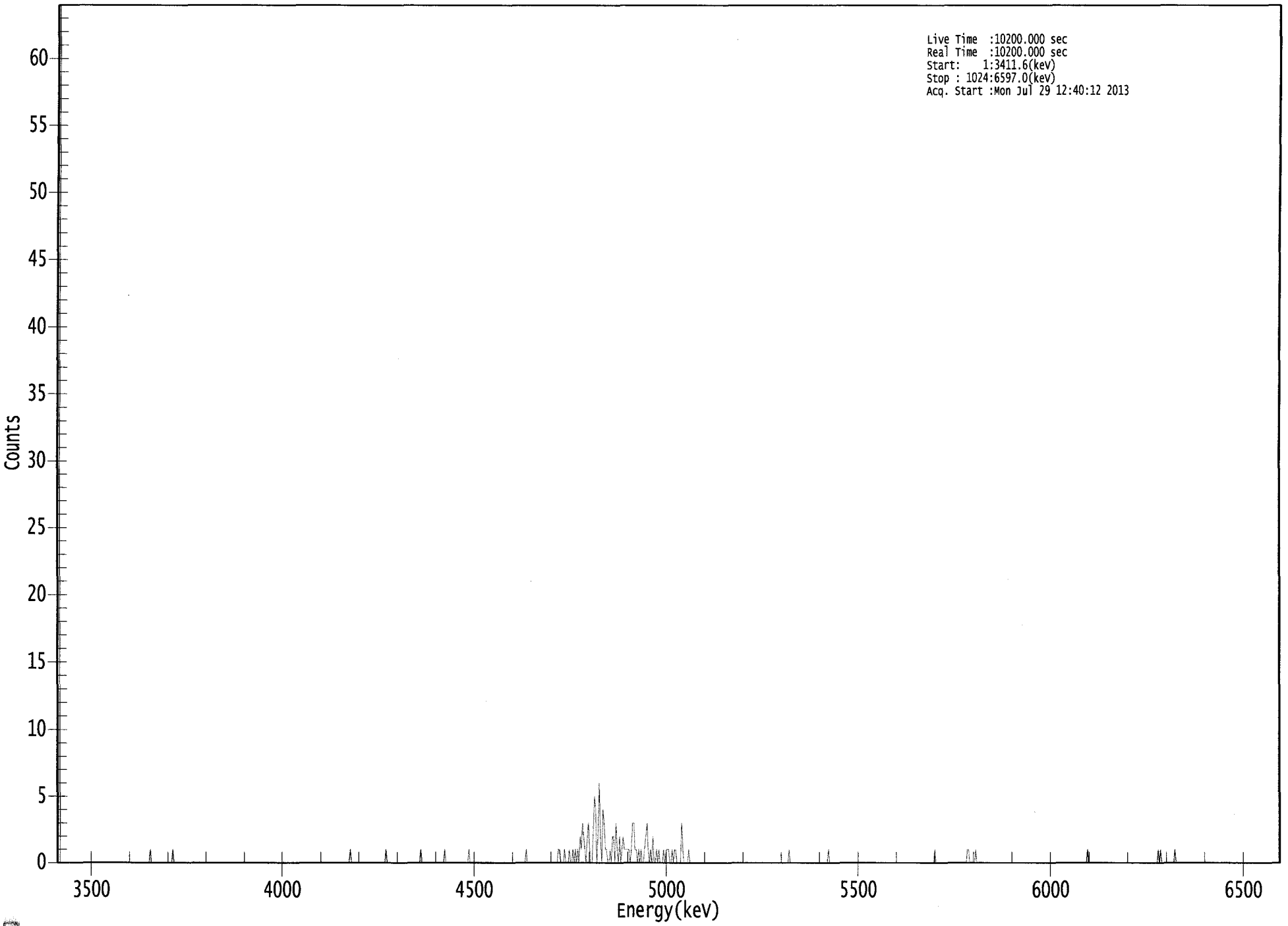
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.967	5850.00*	7.00E-002 +/- 9.52E-002	1.48E-001 +/- 3.01E-002
TH-228	0.996	5400.00*	-4.06E-002 +/- 7.46E-002	2.23E-001 +/- 4.55E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.82E-001	1.45E-001 +/- 2.95E-002
TH-230	0.971	4672.00*	8.73E-002 +/- 1.04E-001	1.51E-001 +/- 3.07E-002
TH-232	0.987	3997.00*	-3.89E-002 +/- 5.15E-002	1.68E-001 +/- 3.42E-002

AG
 7/30/13

US EPA ARCHIVE DOCUMENT

0000064383.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Mon Jul 29 12:40:12 2013



ROI Type: 1

ROI Type: 3

0307

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	1	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	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	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	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	1	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 18

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

801: 0 0 0 0 0 0 0 0

Sample Title: 18

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

103
7/29/13

Apex-Alpha™

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000643
 Batch Identification: 1307100A-TH
 Sample Identification: 19
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/11/2013 7:35:44 AM
 Acquisition Date/Time: 7/29/2013 12:40:13 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.233 mL
 Effective Efficiency: 0.1810 +/- 0.0153
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM
 Chem. Recovery Factor: 1.0432 +/- 0.0905

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.880	1.64	214.83	1.36	0.00E+000	3.1
TH-228	5.411	1.98	176.34	1.02	0.00E+000	3.1
TH-229 T	4.895	160.83	15.46	0.17	0.00E+000	3.4
TH-230	4.634	8.15	72.72	0.85	0.00E+000	3.1
TH-232	3.965	5.66	85.23	0.34	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

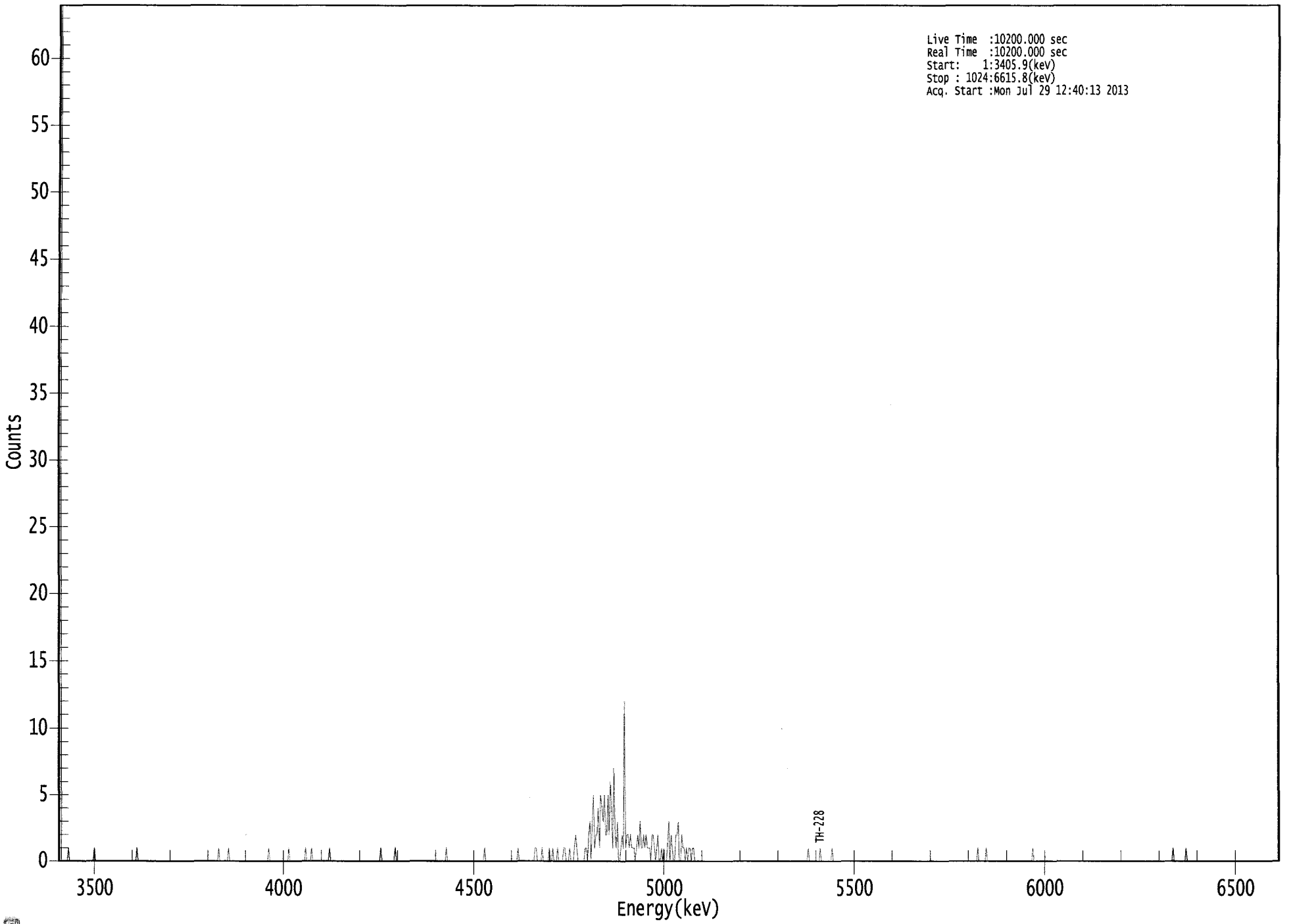
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.995	5850.00*	2.47E-002 +/- 5.31E-002	1.03E-001 +/- 1.71E-002
TH-228	0.999	5400.00*	2.95E-002 +/- 5.23E-002	9.39E-002 +/- 1.56E-002
TH-229	0.997	4872.00*	2.37E+000 +/- 3.93E-001	6.14E-002 +/- 1.02E-002
TH-230	0.993	4672.00*	1.19E-001 +/- 8.91E-002	8.78E-002 +/- 1.46E-002
TH-232	0.995	3997.00*	8.28E-002 +/- 7.19E-002	7.00E-002 +/- 1.16E-002

AG
7/30/13

US EPA ARCHIVE DOCUMENT

0000064382.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3405.9(kev)
Stop : 1024:6615.8(kev)
Acq. Start :Mon Jul 29 12:40:13 2013



ROI Type: 1

ROI Type: 3

Th-228

0312

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	1	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	1	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	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	1
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	1	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:	1	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	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	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	1	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 19

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

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	1	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	1	0
937:	0	0	0	0	0	0	0	0
945:	0	1	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	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 : 7/29/2013
Time : 6:13:32 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	7/29/2013 5:30:57 AM
Alpha 004	21f	ALL	Passed	7/29/2013 5:30:58 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	7/29/2013 5:30:59 AM
Alpha 011	21f	ALL	Passed	7/29/2013 5:31:00 AM
Alpha 012	21f	ALL	Passed	7/29/2013 5:31:01 AM
Alpha 013	21f	ALL	Passed	7/29/2013 5:31:01 AM
Alpha 014	21f	ALL	Passed	7/29/2013 5:31:02 AM
Alpha 015	21f	ALL	Passed	7/29/2013 5:31:03 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	7/29/2013 5:31:04 AM
Alpha 019	AIM730	ALL	Passed	7/29/2013 5:31:05 AM
Alpha 020	AIM730	ALL	Passed	7/29/2013 5:31:05 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	7/29/2013 5:31:06 AM
Alpha 023	AIM730	ALL	Passed	7/29/2013 5:31:07 AM
Alpha 024	AIM730	ALL	Passed	7/29/2013 5:31:08 AM
Alpha 025	AIM730	ALL	Passed	7/29/2013 5:31:09 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	7/29/2013 5:31:09 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	7/29/2013 5:31:10 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	7/29/2013 5:31:11 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:12 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:13 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:15 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:16 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	7/25/2013 5:16:46 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:17 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:19 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:20 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:22 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:23 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	7/29/2013 5:31:25 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:26 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:28 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	7/29/2013 5:31:29 AM

APPROVED BY: _____ *C*APPROVAL DATE: _____ *7/29/13*

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

Nuclide Library Title: Thorium

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

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

* = key line

TOTALS: 5 Nuclides 5 Energy Lines

SECTION X
ANALYTICAL DATA (RADIUM-226)

Work Order	13-07100	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	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Lab Deadline	8/6/2013	04	DO	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-113-AS DIS	44	07/10/13 14:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-109-SS TOT	42	07/10/13 14:30	1.0000E+00
Report Level	4	07	TRG	PZ-109-SS DIS	42	07/10/13 14:30	1.0000E+00
Activity Units	pCi	08	TRG	PZ-205-SS TOT	44	07/10/13 15:30	1.0000E+00
Aliquot Units	I	09	TRG	PZ-205-SS DIS	44	07/10/13 15:30	1.0000E+00
Matrix	WA	10	TRG	DUP 02 TOT	41	07/10/13 00:00	1.0000E+00
Method	E903.0	11	TRG	DUP 02 DIS	41	07/10/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-113-SS TOT	45	07/11/13 08:50	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	PZ-113-SS DIS	45	07/11/13 08:50	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-104-SS TOT	37	07/11/13 09:37	1.0000E+00
Tracer Act (dpm/g)	992.736	15	TRG	PZ-104-SS DIS	37	07/11/13 09:37	1.0000E+00
Carrier		16	TRG	PZ-101-SS TOT	40	07/11/13 09:40	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-101-SS DIS	40	07/11/13 09:40	1.0000E+00
		18	TRG	PZ-104-SD TOT	42	07/11/13 10:29	1.0000E+00
		19	TRG	PZ-104-SD DIS	42	07/11/13 10:29	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.

0320

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	0.9221	915.4	421.1	102.12		0.0224	0.0288	0.0064		102.12	2.31	1.00
02	MBL	0.9101	903.5	403.3	99.10		0.0227	0.0286	0.0059		99.10	2.12	1.00
03	DUP	0.9133	906.7	358.8	87.85		0.0226	0.0297	0.0071		87.85	2.53	1.00
04	DO	0.9097	903.1	410.5	100.91		0.0227	0.0299	0.0072		100.91	2.55	1.00
05	TRG	0.9093	902.7	391.4	96.26		0.0226	0.0303	0.0077		96.26	2.69	1.00
06	TRG	0.9091	902.5	387.2	95.25		0.0232	0.0295	0.0063		95.25	2.27	1.00
07	TRG	0.9092	902.6	370.7	91.18		0.0227	0.0292	0.0065		91.18	2.34	1.00
08	TRG	0.9105	903.9	404.0	99.22		0.0226	0.0288	0.0062		99.22	2.23	1.00
09	TRG	0.9055	898.9	362.8	89.60		0.0225	0.0284	0.0059		89.60	2.12	1.00
10	TRG	0.9062	899.6	377.0	93.03		0.0226	0.0320	0.0094		93.03	3.12	1.00
11	TRG	0.9063	899.7	355.5	87.72		0.0222	0.0319	0.0097		87.72	3.20	1.00
12	TRG	0.9066	900.0	394.1	97.21		0.0229	0.0291	0.0062		97.21	2.23	1.00
13	TRG	0.9085	901.9	425.3	104.69		0.0229	0.0292	0.0063		104.69	2.27	1.00
14	TRG	0.9080	901.4	410.5	101.10		0.0228	0.0287	0.0059		101.10	2.12	1.00
15	TRG	0.9041	897.5	357.7	88.48		0.0223	0.0286	0.0063		88.48	2.27	1.00
16	TRG	0.9058	899.2	407.1	100.51		0.0224	0.0295	0.0071		100.51	2.53	1.00
17	TRG	0.9058	899.2	373.9	92.31		0.0224	0.0295	0.0071		92.31	2.53	1.00
18	TRG	0.9083	901.7	333.3	82.06		0.0226	0.0289	0.0063		82.06	2.27	1.00
19	TRG	0.9076	901.0	374.8	92.35		0.0228	0.0358	0.0130		92.35	4.65	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			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
02	MBL			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
03	DUP			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
04	DO			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
05	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
06	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
07	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
08	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
09	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
10	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
11	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
12	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
13	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
14	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
15	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
16	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
17	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
18	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	LWALKER		
19	TRG			07/24/13 12:07	JWOLFE	07/29/13 17:45	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.

0322

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-Ra226-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	9.83E+00	1.15E+00	1.93E-01	1.03E+01	95.11	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-3.41E-02	6.16E-02	1.89E-01					OK	OK
03	RA-226	DUP	PZ-113-AS TOT	pCi/l	6.61E-01	3.36E-01	2.60E-01				OK	OK	
04	RA-226	DO	PZ-113-AS TOT	pCi/l	6.54E-01	3.04E-01	1.86E-01					OK	
05	RA-226	TRG	PZ-113-AS DIS	pCi/l	4.34E-01	2.70E-01	2.17E-01					OK	
06	RA-226	TRG	PZ-109-SS TOT	pCi/l	1.46E+00	4.48E-01	2.08E-01					OK	
07	RA-226	TRG	PZ-109-SS DIS	pCi/l	2.15E+00	5.88E-01	2.43E-01					OK	
08	RA-226	TRG	PZ-205-SS TOT	pCi/l	1.06E+00	3.81E-01	2.15E-01					OK	
09	RA-226	TRG	PZ-205-SS DIS	pCi/l	9.30E-01	3.63E-01	2.94E-01					OK	
10	RA-226	TRG	DUP 02 TOT	pCi/l	2.78E+00	7.18E-01	3.79E-01					OK	
11	RA-226	TRG	DUP 02 DIS	pCi/l	3.45E+00	8.04E-01	2.82E-01					OK	
12	RA-226	TRG	PZ-113-SS TOT	pCi/l	2.12E+00	5.07E-01	1.72E-01					OK	
13	RA-226	TRG	PZ-113-SS DIS	pCi/l	1.99E+00	5.07E-01	2.12E-01					OK	
14	RA-226	TRG	PZ-104-SS TOT	pCi/l	1.99E+00	4.95E-01	2.16E-01					OK	
15	RA-226	TRG	PZ-104-SS DIS	pCi/l	1.76E+00	5.68E-01	2.75E-01					OK	
16	RA-226	TRG	PZ-101-SS TOT	pCi/l	2.37E+01	2.04E+00	2.38E-01					OK	
17	RA-226	TRG	PZ-101-SS DIS	pCi/l	2.79E+01	2.37E+00	2.09E-01					OK	
18	RA-226	TRG	PZ-104-SD TOT	pCi/l	4.08E+00	8.58E-01	2.17E-01					OK	
19	RA-226	TRG	PZ-104-SD DIS	pCi/l	7.39E+00	1.50E+00	5.14E-01					OK	

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

0200

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	100.00	0.00	102.12		7/29/2013 17:45	
02	RA-226	MBL	07/16/13 00:00	1.00E+00	99.10	0.00	99.10		7/29/2013 17:45	
03	RA-226	DUP	07/10/13 14:00	1.00E+00	87.85	0.00	87.85		7/29/2013 17:45	
04	RA-226	DO	07/10/13 14:00	1.00E+00	100.00	0.00	100.91		7/29/2013 17:45	
05	RA-226	TRG	07/10/13 14:00	1.00E+00	96.26	0.00	96.26		7/29/2013 17:45	
06	RA-226	TRG	07/10/13 14:30	1.00E+00	95.25	0.00	95.25		7/29/2013 17:45	
07	RA-226	TRG	07/10/13 14:30	1.00E+00	91.18	0.00	91.18		7/29/2013 17:45	
08	RA-226	TRG	07/10/13 15:30	1.00E+00	99.22	0.00	99.22		7/29/2013 17:45	
09	RA-226	TRG	07/10/13 15:30	1.00E+00	89.60	0.00	89.60		7/29/2013 17:45	
10	RA-226	TRG	07/10/13 00:00	1.00E+00	93.03	0.00	93.03		7/29/2013 17:45	
11	RA-226	TRG	07/10/13 00:00	1.00E+00	87.72	0.00	87.72		7/29/2013 17:45	
12	RA-226	TRG	07/11/13 08:50	1.00E+00	97.21	0.00	97.21		7/29/2013 17:45	
13	RA-226	TRG	07/11/13 08:50	1.00E+00	100.00	0.00	104.69		7/29/2013 17:45	
14	RA-226	TRG	07/11/13 09:37	1.00E+00	100.00	0.00	101.10		7/29/2013 17:45	
15	RA-226	TRG	07/11/13 09:37	1.00E+00	88.48	0.00	88.48		7/29/2013 17:45	
16	RA-226	TRG	07/11/13 09:40	1.00E+00	100.00	0.00	100.51		7/29/2013 17:45	
17	RA-226	TRG	07/11/13 09:40	1.00E+00	92.31	0.00	92.31		7/29/2013 17:45	
18	RA-226	TRG	07/11/13 10:29	1.00E+00	82.06	0.00	82.06		7/29/2013 17:45	
19	RA-226	TRG	07/11/13 10:29	1.00E+00	92.35	0.00	92.35		7/29/2013 17:45	

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

726

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-Ra226-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	07/31/13 12:16		A_Spec	Alpha_040	170	3.05 E+02	0.00 E+00	19
02	RA-226	MBL	07/31/13 12:16		A_Spec	Alpha_041	170	-1.19 E+00	7.00 E-03	19.8
03	RA-226	DUP	07/31/13 12:16		A_Spec	Alpha_042	170	1.60 E+01	6.00 E-03	18.5
04	RA-226	DO	07/31/13 12:16		A_Spec	Alpha_045	170	1.85 E+01	3.00 E-03	19.1
05	RA-226	TRG	07/31/13 12:16		A_Spec	Alpha_046	170	1.05 E+01	3.00 E-03	17.9
06	RA-226	TRG	07/31/13 12:16		A_Spec	Alpha_047	170	4.20 E+01	0.00 E+00	18.2
07	RA-226	TRG	07/31/13 12:16		A_Spec	Alpha_048	170	5.30 E+01	0.00 E+00	16.8
08	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_003	170.02	3.10 E+01	6.00 E-03	17.5
09	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_004	170	2.88 E+01	1.90 E-02	19.4
10	RA-226	TRG	07/31/13 15:14		A_Spec	Alpha_010	170.02	6.14 E+01	1.50 E-02	19.7
11	RA-226	TRG	07/31/13 15:14		A_Spec	Alpha_011	170.02	7.31 E+01	5.00 E-03	20.5
12	RA-226	TRG	07/31/13 15:14		A_Spec	Alpha_012	170	6.93 E+01	4.00 E-03	19.9
13	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_013	170	6.18 E+01	7.00 E-03	18.7
14	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_014	170.02	6.55 E+01	9.00 E-03	18.5
15	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_015	170.02	3.81 E+01	5.00 E-03	14.8
16	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_018	170.02	6.27 E+02	6.00 E-03	17.8
17	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_019	170.02	6.38 E+02	2.00 E-03	16.6
18	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_020	170.02	8.97 E+01	2.00 E-03	16.1
19	RA-226	TRG	07/31/13 15:15		A_Spec	Alpha_022	170.02	9.86 E+01	8.00 E-03	15.3

	Run	1
	Analysis Code	Ra226
Eberline Services Work Order	13-07100	
Client	Engineering Management Support, Inc.	

5200

2.5

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	0.9221	915.4019	421.1000	102.12	2.31	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9101	903.4890	403.3000	99.10	2.12	1.00
03	DUP	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.9133	906.6658	358.8000	87.85	2.53	1.00
04	DO	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.9097	903.0919	410.5000	100.91	2.55	1.00
05	TRG	PZ-113-AS DIS	07/10/13 14:00	1.0000	0.9093	902.6948	391.4000	96.26	2.69	1.00
06	TRG	PZ-109-SS TOT	07/10/13 14:30	1.0000	0.9091	902.4963	387.2000	95.25	2.27	1.00
07	TRG	PZ-109-SS DIS	07/10/13 14:30	1.0000	0.9092	902.5956	370.7000	91.18	2.34	1.00
08	TRG	PZ-205-SS TOT	07/10/13 15:30	1.0000	0.9105	903.8861	404.0000	99.22	2.23	1.00
09	TRG	PZ-205-SS DIS	07/10/13 15:30	1.0000	0.9055	898.9224	362.8000	89.60	2.12	1.00
10	TRG	DUP 02 TOT	07/10/13 00:00	1.0000	0.9062	899.6174	377.0000	93.03	3.12	1.00
11	TRG	DUP 02 DIS	07/10/13 00:00	1.0000	0.9063	899.7166	355.5000	87.72	3.20	1.00
12	TRG	PZ-113-SS TOT	07/11/13 08:50	1.0000	0.9066	900.0145	394.1000	97.21	2.23	1.00
13	TRG	PZ-113-SS DIS	07/11/13 08:50	1.0000	0.9085	901.9007	425.3000	104.69	2.27	1.00
14	TRG	PZ-104-SS TOT	07/11/13 09:37	1.0000	0.9080	901.4043	410.5000	101.10	2.12	1.00
15	TRG	PZ-104-SS DIS	07/11/13 09:37	1.0000	0.9041	897.5326	357.7000	88.48	2.27	1.00
16	TRG	PZ-101-SS TOT	07/11/13 09:40	1.0000	0.9058	899.2203	407.1000	100.51	2.53	1.00
17	TRG	PZ-101-SS DIS	07/11/13 09:40	1.0000	0.9058	899.2203	373.9000	92.31	2.53	1.00
18	TRG	PZ-104-SD TOT	07/11/13 10:29	1.0000	0.9083	901.7021	333.3000	82.06	2.27	1.00
19	TRG	PZ-104-SD DIS	07/11/13 10:29	1.0000	0.9076	901.0072	374.8000	92.35	4.65	1.00

40-48

15

0-2

0326

Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code			Date	Technician				Technician Initials		Witness Initials	
13-07100					1	Ra226			7/24/2013 12:03	JWOLFE				<i>JW</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	
Ra-226	Ra-5b	44.067	7/24/2013	0.500	0.5204				10.33	0.475	0.00	0.000	0.00	0.000	0.00	0.000	

Tracers							Balance Printer Tapes														
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS									
01	Ba-133	Ba-6a	992.736	7/24/2013	0.9221	1.0200															
02	Ba-133	Ba-6a	992.736	7/24/2013	0.9101	1.0200															
03	Ba-133	Ba-6a	992.736	7/24/2013	0.9133	1.0200															
04	Ba-133	Ba-6a	992.736	7/24/2013	0.9097	1.0200															
05	Ba-133	Ba-6a	992.736	7/24/2013	0.9093	1.0200															
06	Ba-133	Ba-6a	992.736	7/24/2013	0.9091	1.0200															
07	Ba-133	Ba-6a	992.736	7/24/2013	0.9092	1.0200															
08	Ba-133	Ba-6a	992.736	7/24/2013	0.9105	1.0200															
09	Ba-133	Ba-6a	992.736	7/24/2013	0.9055	1.0200															
10	Ba-133	Ba-6a	992.736	7/24/2013	0.9062	1.0200															
11	Ba-133	Ba-6a	992.736	7/24/2013	0.9063	1.0200															
12	Ba-133	Ba-6a	992.736	7/24/2013	0.9066	1.0200															
13	Ba-133	Ba-6a	992.736	7/24/2013	0.9085	1.0200															
14	Ba-133	Ba-6a	992.736	7/24/2013	0.9080	1.0200															
15	Ba-133	Ba-6a	992.736	7/24/2013	0.9041	1.0200															
16	Ba-133	Ba-6a	992.736	7/24/2013	0.9058	1.0200															
17	Ba-133	Ba-6a	992.736	7/24/2013	0.9058	1.0200															
18	Ba-133	Ba-6a	992.736	7/24/2013	0.9083	1.0200															
19	Ba-133	Ba-6a	992.736	7/24/2013	0.9076	1.0200															

0327

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07100	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	PZ-113-AS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-113-AS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-109-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-109-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 02 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 02 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-104-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-104-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-101-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-104-SD TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-104-SD DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: _____

J Wolfe

Date: _____

7 24 13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07100	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		0.0224	0.0288	0.0064	
02	BLANK	MBL		0.0227	0.0286	0.0059	
03	DUP	DUP		0.0226	0.0297	0.0071	
04	PZ-113-AS TOT	DO		0.0227	0.0299	0.0072	
05	PZ-113-AS DIS	TRG		0.0226	0.0303	0.0077	
06	PZ-109-SS TOT	TRG		0.0232	0.0295	0.0063	
07	PZ-109-SS DIS	TRG		0.0227	0.0292	0.0065	
08	PZ-205-SS TOT	TRG		0.0226	0.0288	0.0062	
09	PZ-205-SS DIS	TRG		0.0225	0.0284	0.0059	
10	DUP 02 TOT	TRG		0.0226	0.0320	0.0094	
11	DUP 02 DIS	TRG		0.0222	0.0319	0.0097	
12	PZ-113-SS TOT	TRG		0.0229	0.0291	0.0062	
13	PZ-113-SS DIS	TRG		0.0229	0.0292	0.0063	
14	PZ-104-SS TOT	TRG		0.0228	0.0287	0.0059	
15	PZ-104-SS DIS	TRG		0.0223	0.0286	0.0063	
16	PZ-101-SS TOT	TRG		0.0224	0.0295	0.0071	
17	PZ-101-SS DIS	TRG		0.0224	0.0295	0.0071	
18	PZ-104-SD TOT	TRG		0.0226	0.0289	0.0063	
19	PZ-104-SD DIS	TRG		0.0228	0.0358	0.0130	

Technician: *J. Walker*

Date: 7, 29, 13

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Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.310E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:34 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1900 +/- 0.0033

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.411741 +/- 0.027591
 Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	481.00	8.95	0.00	0.00E+000	7.8
RA-226	4.705	305.00	11.24	0.00	0.00E+000	4.2

 NUCLIDE ANALYSIS RESULTS

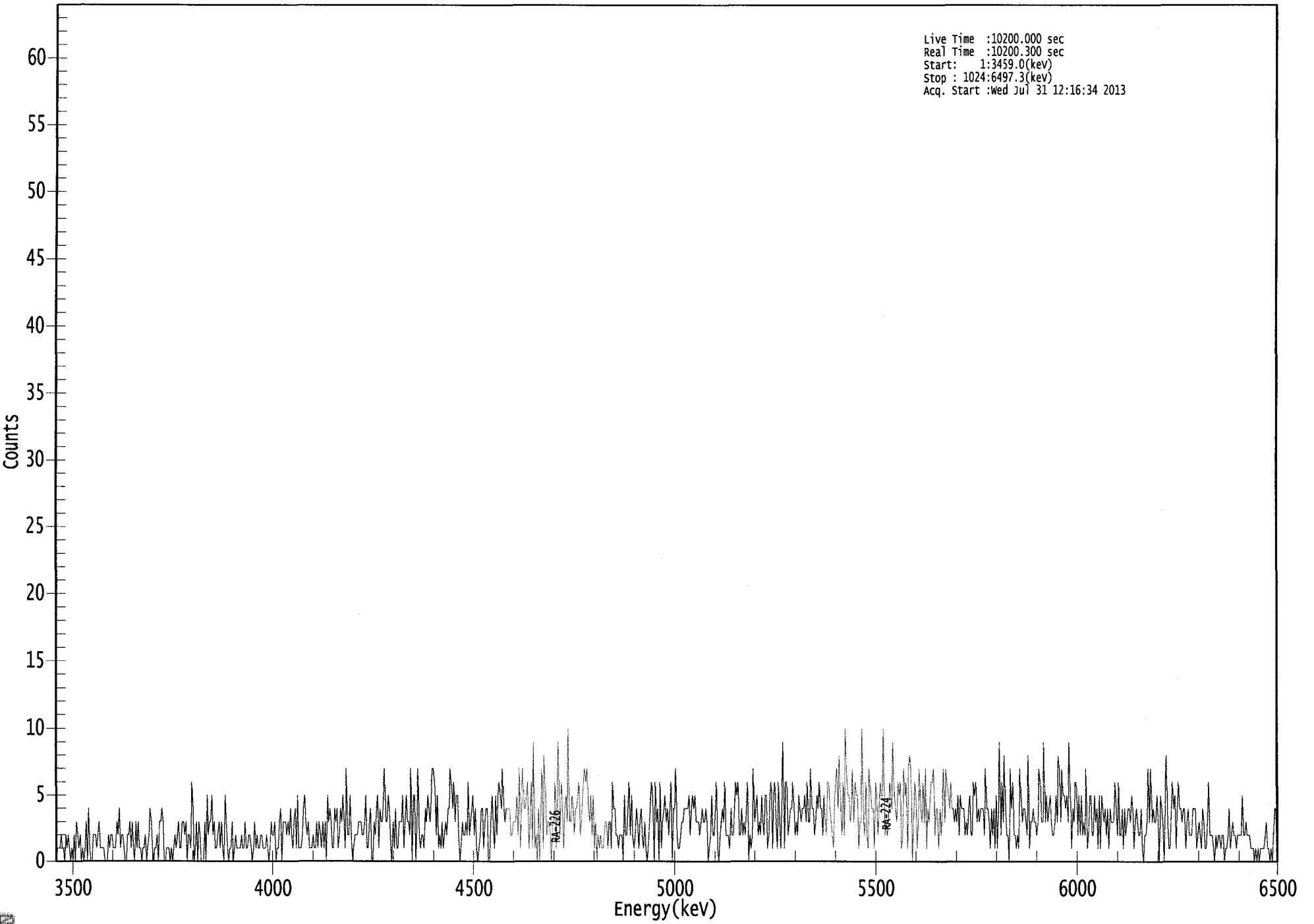
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	1.63E+001 +/- 1.56E+000	2.03E-001 +/- 6.91E-003
RA-226	0.992	4785.00*	9.83E+000 +/- 1.15E+000	1.93E-001 +/- 6.57E-003

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US EPA ARCHIVE DOCUMENT

0000064690.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :wed Jul 31 12:16:34 2013



0331
1550

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

369: 1 5 2 5 6 5 4 7

Sample Title: 01

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

801: 7 4 6 2 2 1 2 1

Sample Title: 01

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



KB
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Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/31/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9910 +/- 0.0000
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM
 Effective Efficiency: 0.1961 +/- 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	5.462	0.32	646.93	0.68	0.00E+000	3.0
RA-226	4.602	-1.19	180.60	1.19	0.00E+000	0.0

 NUCLIDE ANALYSIS RESULTS

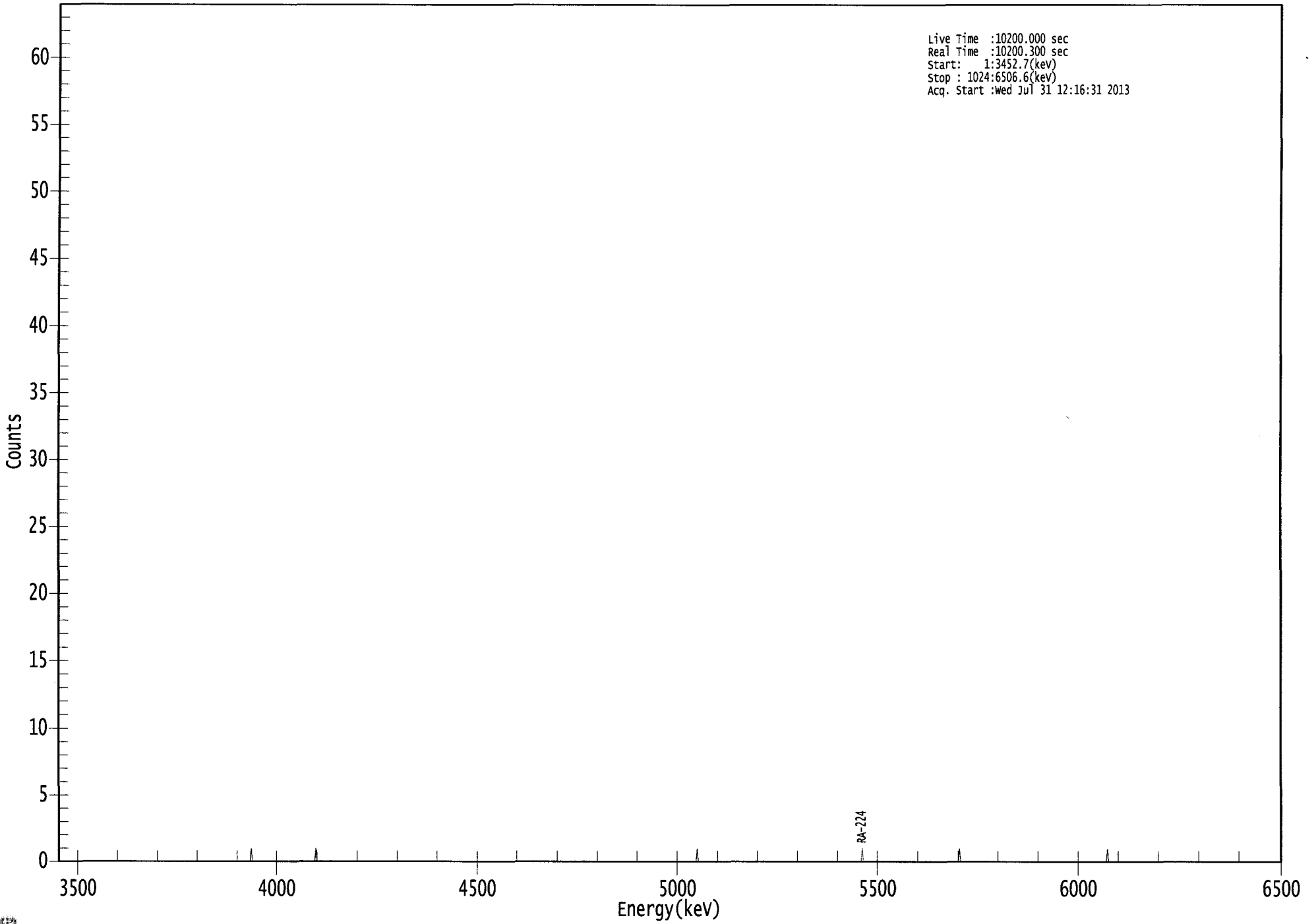
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.937	5685.50*	9.64E-003 +/- 6.24E-002	1.70E-001 +/- 5.75E-003
RA-226	0.957	4785.00*	-3.41E-002 +/- 6.16E-002	1.89E-001 +/- 6.39E-003

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US EPA ARCHIVE DOCUMENT

0000064629.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3452.7(kev)
Stop : 1024:6506.6(kev)
Acq. Start :Wed Jul 31 12:16:31 2013



0236
ROI Type: 1

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

Sample Title: 02

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

801: 0 0 0 0 0 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	1	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	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: PZ-113-AS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.530E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:32 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8785 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Effective Efficiency: 0.1622 +/- 0.0028

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.534	9.81	66.87	1.19	0.00E+000	3.0
RA-226	4.589	15.98	50.83	1.02	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

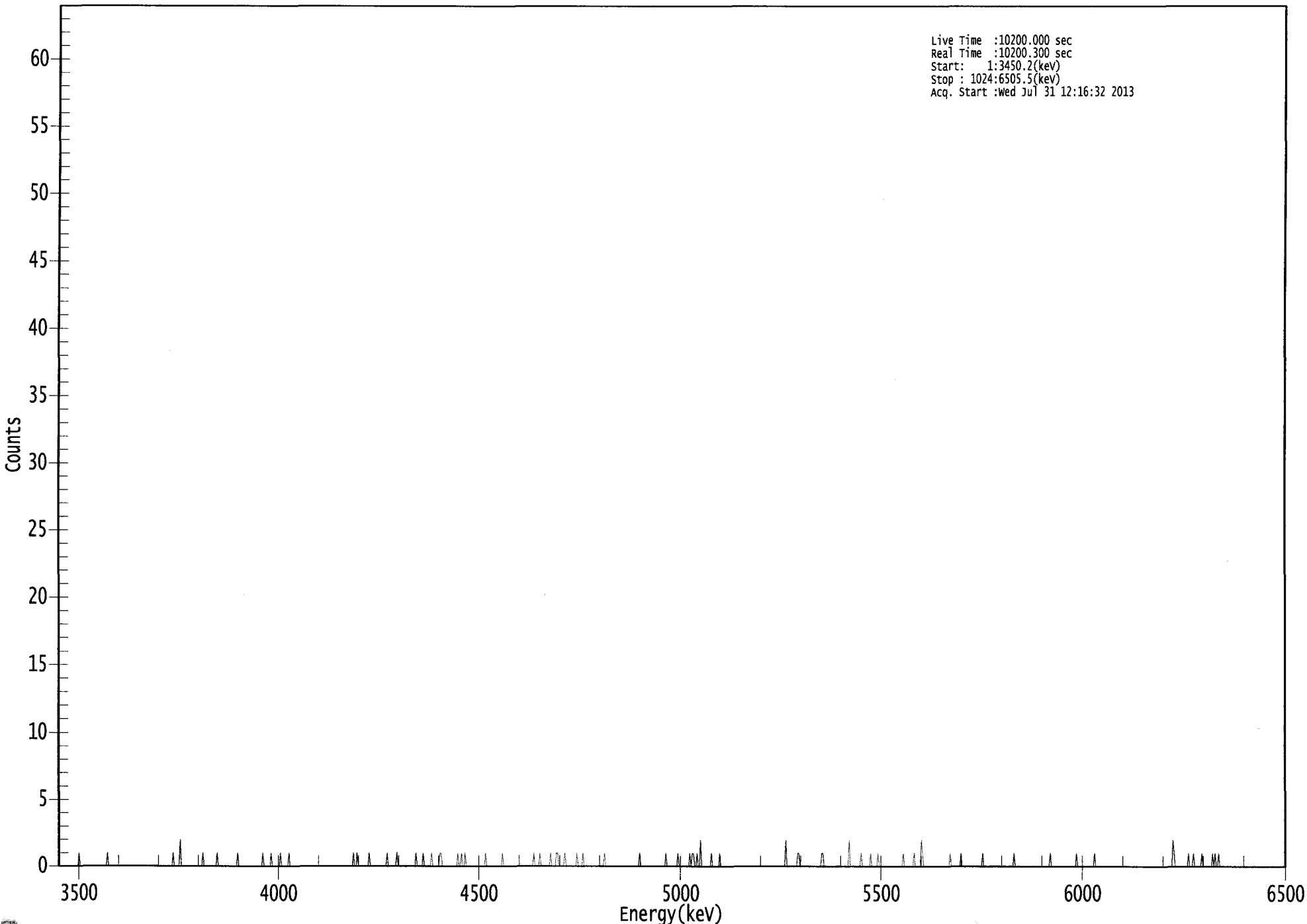
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	4.29E-001 +/- 2.87E-001	2.88E-001 +/- 9.85E-003
RA-226	0.951	4785.00*	6.61E-001 +/- 3.36E-001	2.60E-001 +/- 8.88E-003

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US EPA ARCHIVE DOCUMENT

0000064630.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Wed Jul 31 12:16:32 2013



0341

ROI Type: 1

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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 0 0 0 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	1	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	1	1	0	0	0	0	0	1
425:	0	0	0	0	0	0	0	0
433:	0	1	0	0	0	0	1	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	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	1	0	0	0	0
513:	0	0	0	0	0	1	0	0
521:	0	0	0	0	0	0	0	1
529:	0	1	1	0	0	1	0	0
537:	2	0	0	0	0	0	0	0
545:	0	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	2
609:	0	0	0	0	0	0	0	0
617:	0	1	1	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	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	2	0	0	0
665:	0	0	0	0	0	0	1	0
673:	0	0	0	0	0	0	1	0
681:	0	0	0	0	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	1	0	0	0	0	0	0
713:	0	0	1	0	0	0	0	0
721:	2	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:	1	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	1	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	1	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 03

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



148
7/31/13

Sample Description: PZ-113-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:26 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Effective Efficiency: 0.1909 +/- 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	5.539	6.49	80.40	0.51	0.00E+000	3.0
RA-226	4.637	18.49	46.31	0.51	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

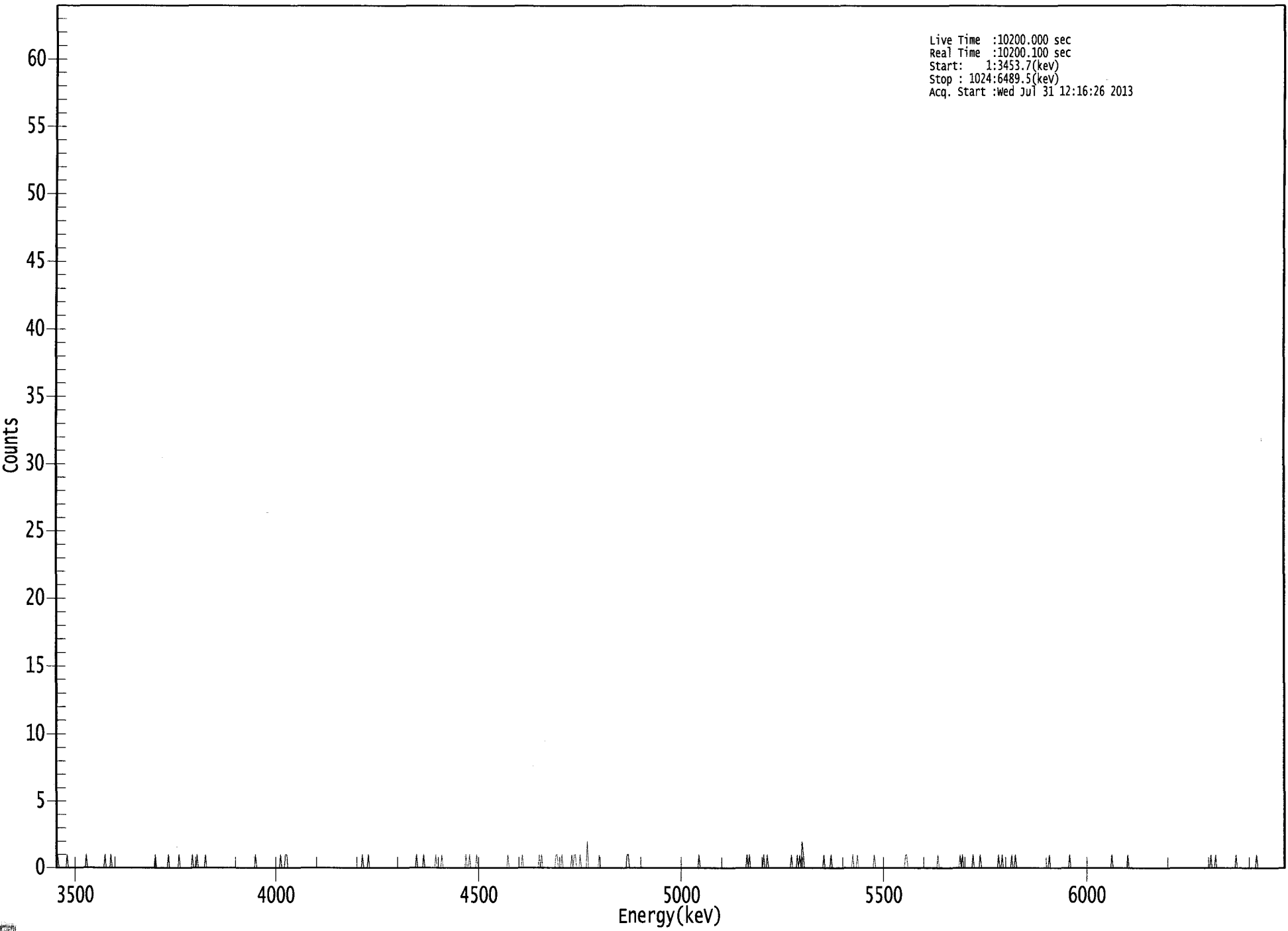
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.972	5685.50*	2.43E-001 +/- 1.96E-001	1.97E-001 +/- 6.72E-003
RA-226	0.972	4785.00*	6.54E-001 +/- 3.04E-001	1.86E-001 +/- 6.33E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064632.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :wed Jul 31 12:16:26 2013



ROI Type: 1

0250

369: 0 0 0 0 0 0 0 0 0

Sample Title: 04

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

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	1	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	1	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	1
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	1	0	0	0	1	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	1
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



ICB
7/31/13

Sample Description: PZ-113-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.690E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:29 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9626 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 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	5.528	8.83	66.70	0.17	0.00E+000	3.0
RA-226	4.573	10.49	62.21	0.51	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

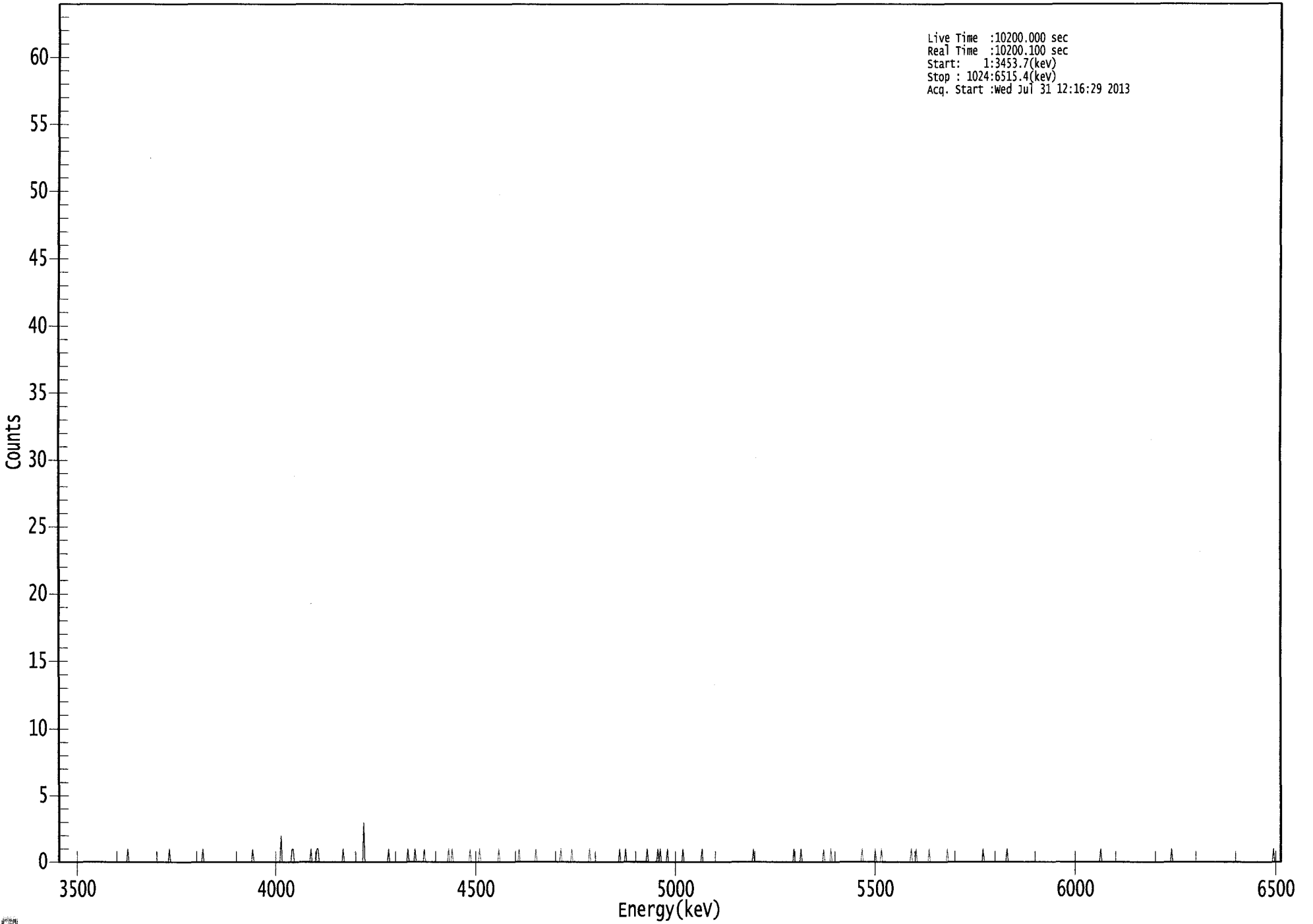
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	3.87E-001 +/- 2.58E-001	1.83E-001 +/- 6.31E-003
RA-226	0.943	4785.00*	4.34E-001 +/- 2.70E-001	2.17E-001 +/- 7.47E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064628.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Wed Jul 31 12:16:29 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:	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	1	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	1	0	0
97:	0	0	0	0	0	0	0	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	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	2	0	0	0	0
193:	0	0	0	0	1	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	1	0	0	0
217:	0	1	1	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:	3	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	0	0	0	0	1	0	0
297:	0	0	0	1	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	1
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	1	0	0	0	0	0	0
353:	0	1	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 1 0 0 0 0 0 0

Sample Title: 05

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



ICB
7/31/13

Sample Description: PZ-109-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:23 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9525 +/- 0.0000
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Effective Efficiency: 0.1735 +/- 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	5.474	9.66	64.35	0.34	0.00E+000	2.9
RA-226	4.592	42.00	30.60	0.00	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

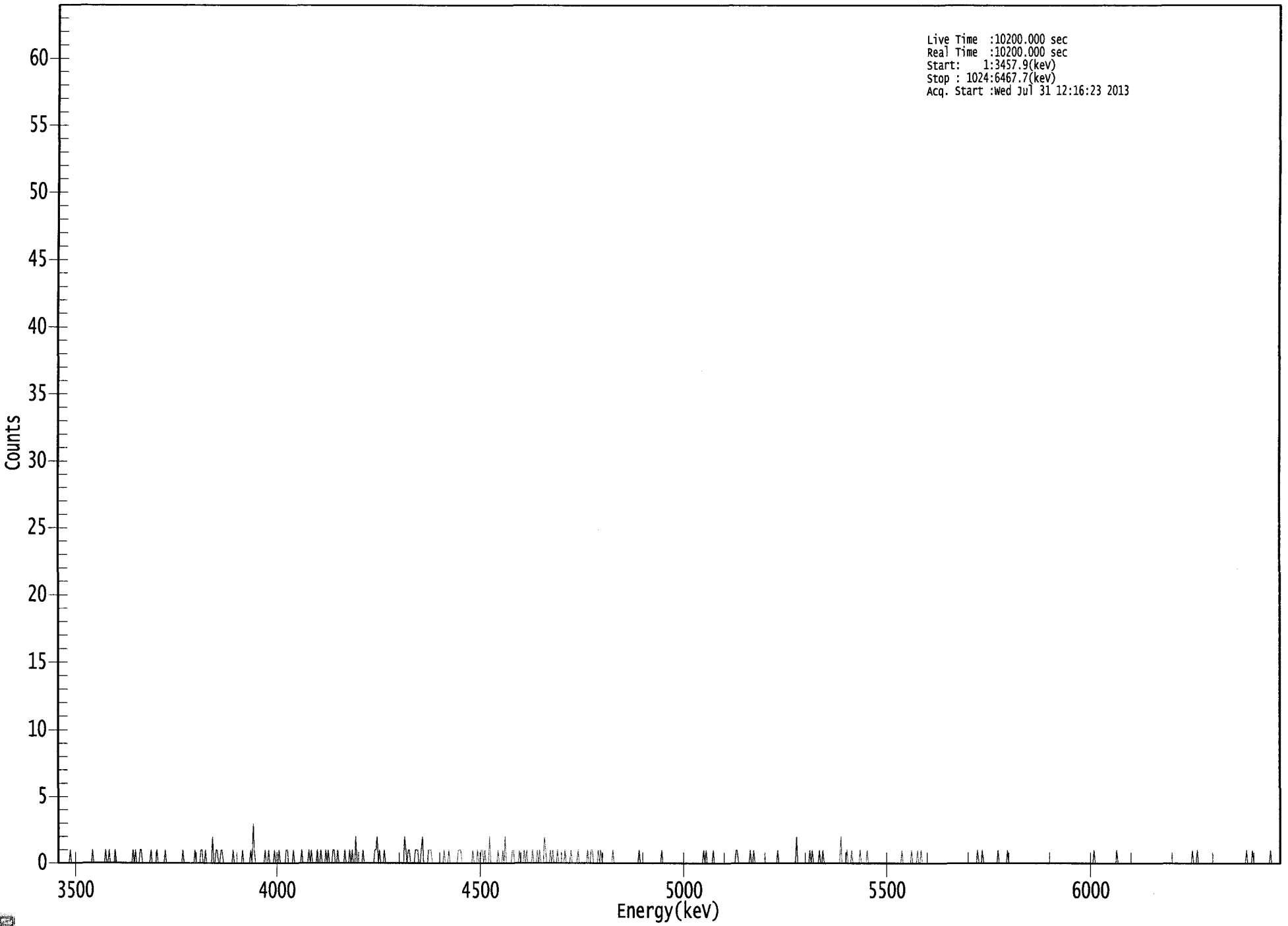
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.943	5685.50*	3.55E-001 +/- 2.28E-001	1.75E-001 +/- 6.04E-003
RA-226	0.953	4785.00*	1.46E+000 +/- 4.48E-001	2.08E-001 +/- 7.13E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064639.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Wed Jul 31 12:16:23 2013



0350
9550

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

369: 0 1 0 0 0 1 0 2

Sample Title: 06

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	1	1	0
385:	0	0	0	1	0	0	0	1
393:	0	1	0	0	0	0	1	0
401:	0	0	1	0	1	0	0	0
409:	2	1	0	0	0	1	0	1
417:	0	0	0	1	0	0	0	0
425:	0	1	0	0	0	0	1	0
433:	0	0	0	0	1	0	0	0
441:	0	0	0	0	1	0	0	1
449:	1	0	0	0	0	1	0	1
457:	0	0	0	0	0	0	0	0
465:	0	1	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	1
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	1	0	1
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:	1	1	0	0	0	0	0	0
577:	0	0	0	0	1	0	0	1
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	1	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	2	0	0	0	0
625:	0	0	0	0	0	0	1	0
633:	1	0	0	0	0	0	1	0
641:	0	1	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	2	0	0	0	0	1	0	0
665:	0	1	0	0	0	0	0	0
673:	1	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	1	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	1	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	1	0	0	0	1	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	1	0	0	0	0
793:	0	0	0	1	0	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	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	1	0	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	1	0	0	0	0	1
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	1	0
1017:	0	0	0	0	0	0	0	0

108
7/31/13

Apex-Alpha™

Sample Description: PZ-109-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.340E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 12:16:24 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9118 +/- 0.0000
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Effective Efficiency: 0.1532 +/- 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	5.474	7.98	74.39	1.02	0.00E+000	4.4
RA-226	4.596	53.00	27.18	0.00	0.00E+000	4.4

 NUCLIDE ANALYSIS RESULTS

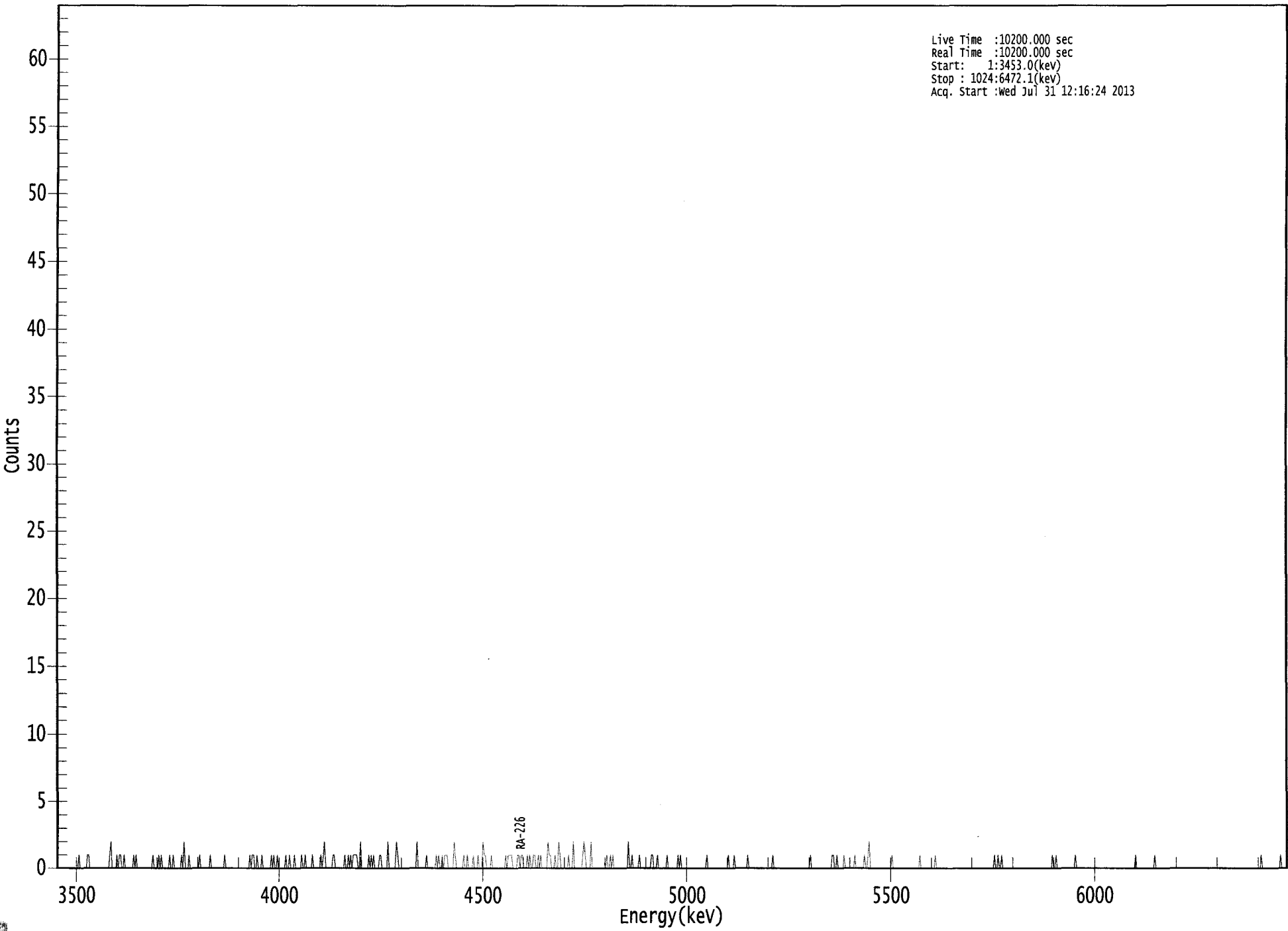
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.943	5685.50*	3.42E-001 +/- 2.55E-001	2.70E-001 +/- 9.37E-003
RA-226	0.954	4785.00*	2.15E+000 +/- 5.88E-001	2.43E-001 +/- 8.41E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064638.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :wed Jul 31 12:16:24 2013



ROI Type: 1

1000

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

369: 0 0 0 0 0 0 1 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

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

100
7/13/13



Sample Description: PZ-205-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:04 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9922 +/- 0.0000
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Effective Efficiency: 0.1733 +/- 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	5.522	11.96	62.07	2.04	0.00E+000	3.0
RA-226	4.602	30.98	35.89	1.02	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

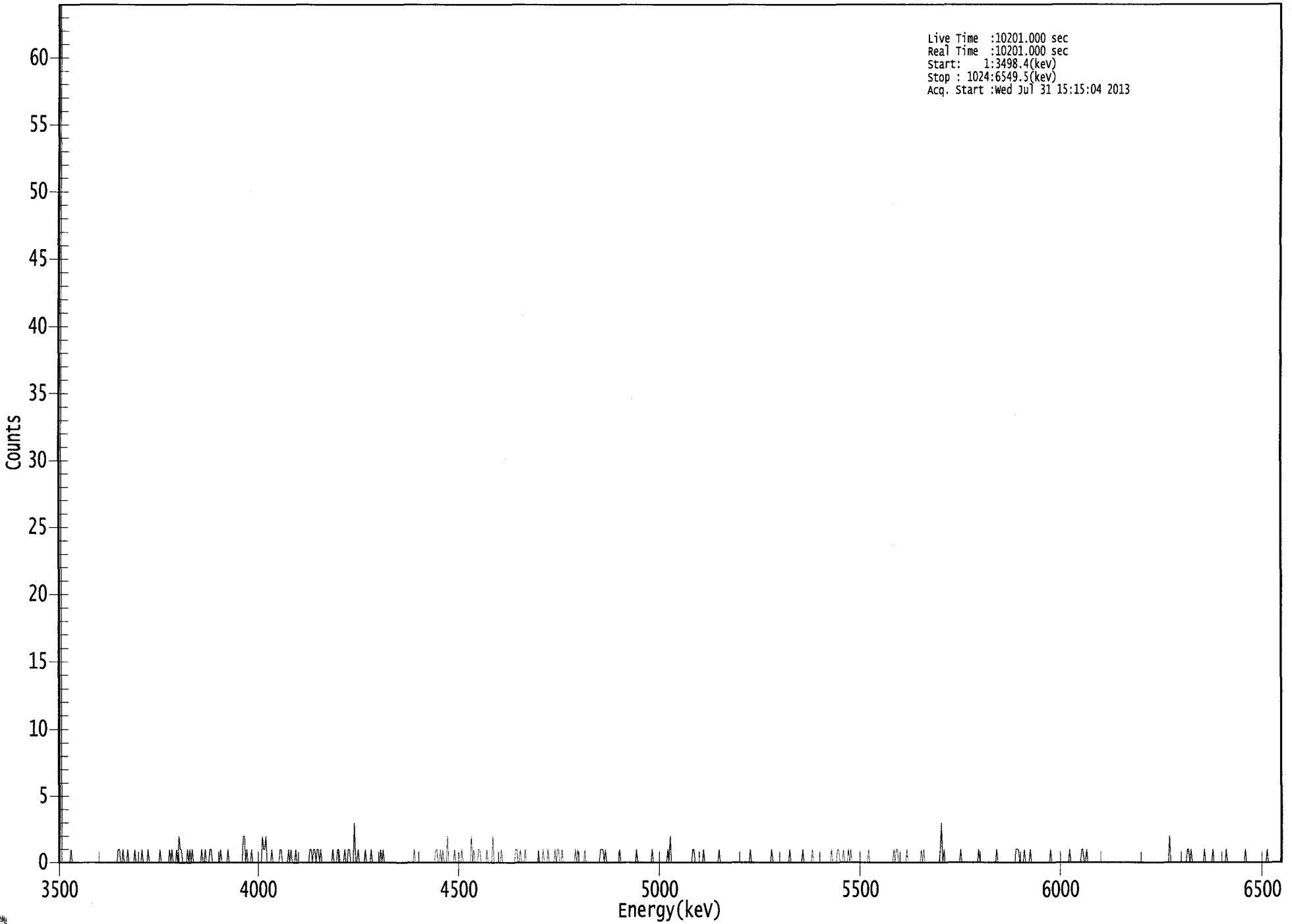
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.966	5685.50*	4.32E-001 +/- 2.69E-001	2.81E-001 +/- 1.03E-002
RA-226	0.957	4785.00*	1.06E+000 +/- 3.81E-001	2.15E-001 +/- 7.87E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064663.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Wed Jul 31 15:15:04 2013



ROI Type: 1

0000

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

Sample Title: 08

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 1 0 0 0 0

Sample Title: 08

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

801: 0 1 1 1 0 0 0 0

Sample Title: 08

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	1	0	0	0	0	1	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	1	0
849:	0	0	0	0	0	0	0	0
857:	1	1	0	0	1	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	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	2	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	1	1	0	1	0	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	0	0	0	0	1	0	0
969:	0	0	0	0	0	0	0	0
977:	1	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	1	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:	0	0	0	0	0	0	1	0

105
7/13/13



Sample Description: PZ-205-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:05 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8960 +/- 0.0000
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Effective Efficiency: 0.1738 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.563	9.43	76.67	3.57	0.00E+000	2.9
RA-226	4.591	28.77	38.87	3.23	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

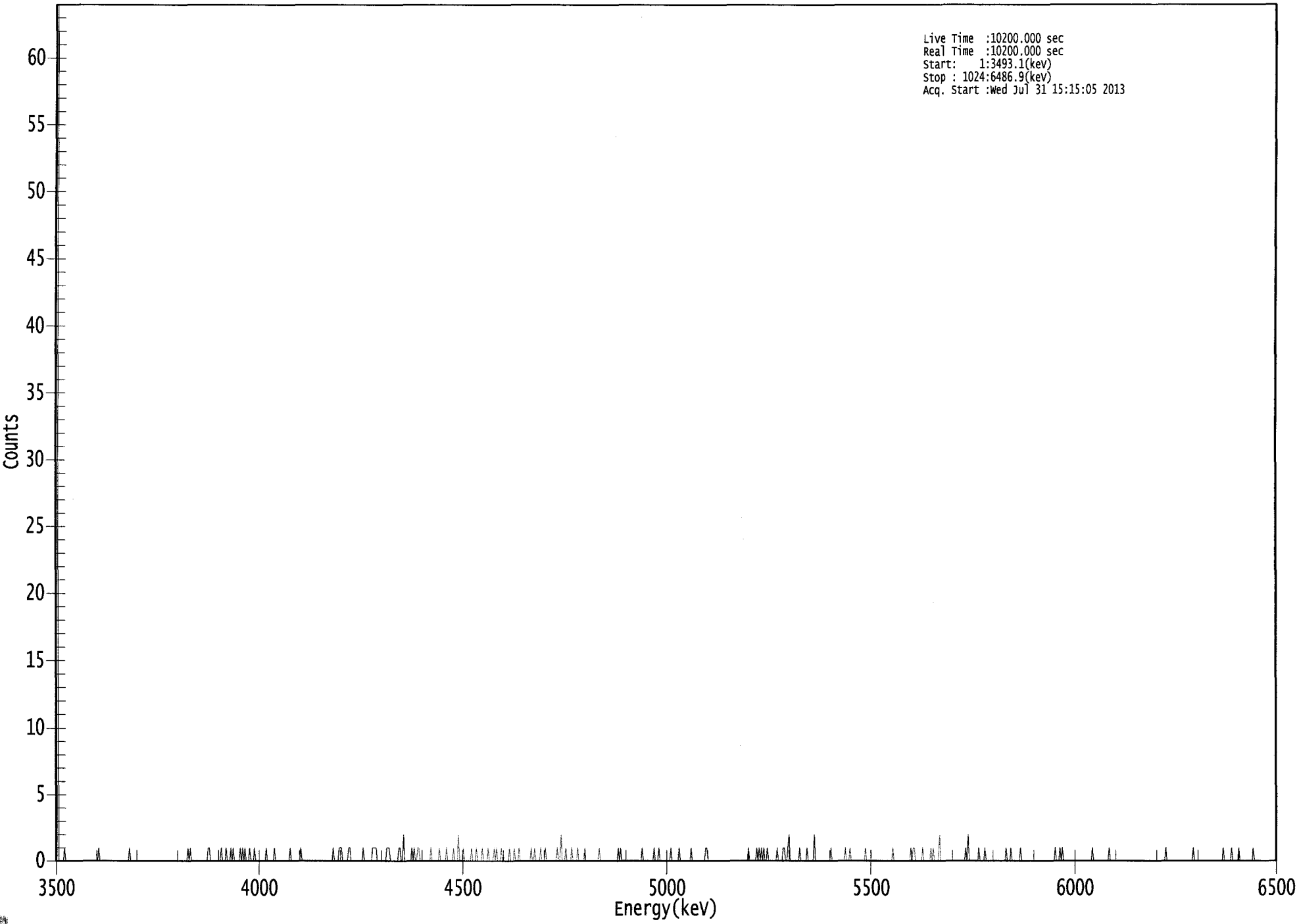
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.981	5685.50*	3.23E-001 +/- 2.48E-001	3.23E-001 +/- 1.16E-002
RA-226	0.952	4785.00*	9.30E-001 +/- 3.63E-001	2.94E-001 +/- 1.06E-002

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064664.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :wed Jul 31 15:15:05 2013



ROI Type: 1

0371

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 1 0 0 0 1 0

Sample Title: 09

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

801: 0 1 0 0 0 0 0 0

Sample Title: 09

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

KCS
7/13/13

Apex-Alpha™

Sample Description: DUP 02 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 3.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/10/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:14:57 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9303 +/- 0.0000
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Effective Efficiency: 0.1830 +/- 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	5.525	15.24	58.67	4.76	0.00E+000	4.4
RA-226	4.577	61.45	25.60	2.55	0.00E+000	3.7

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

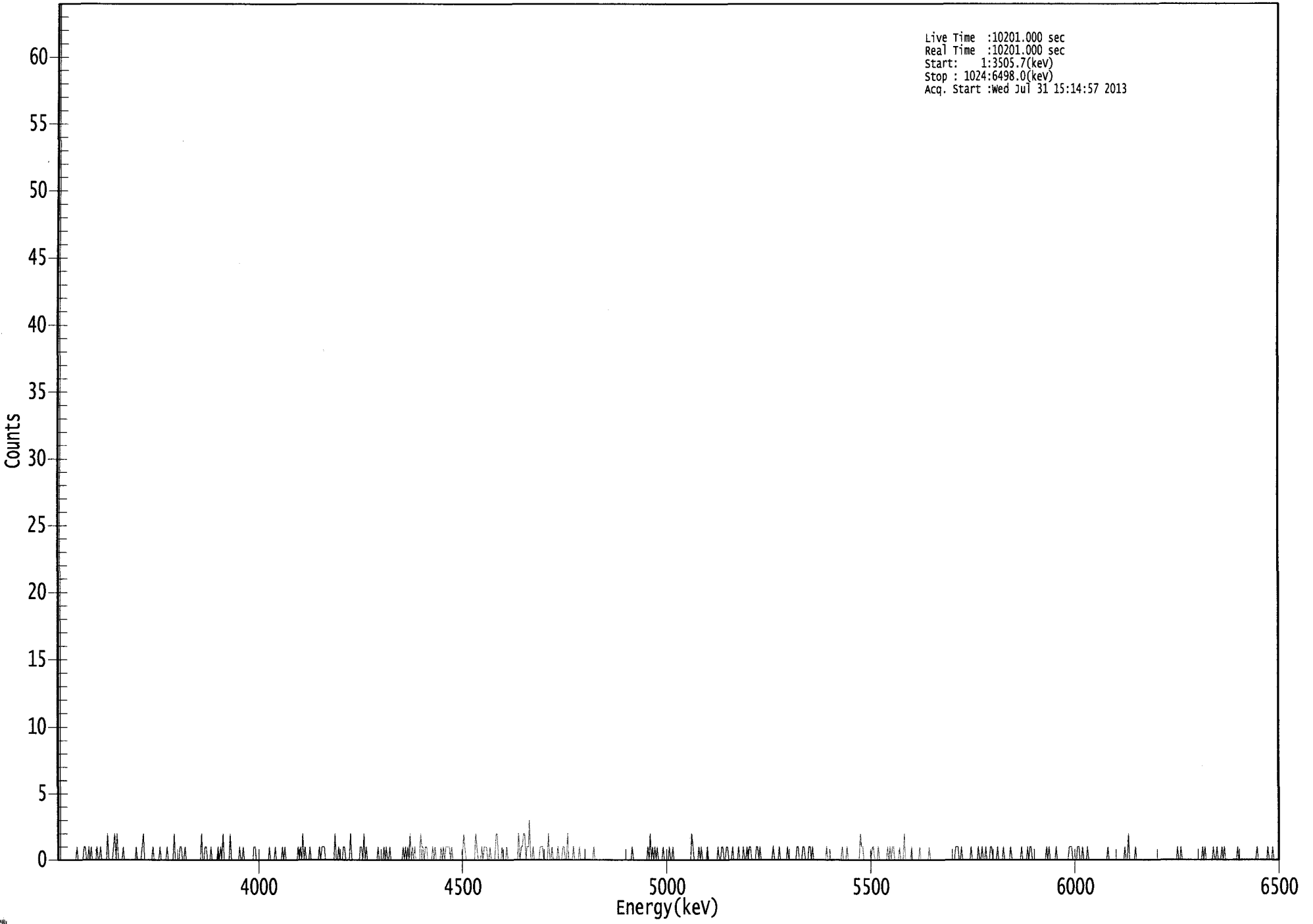
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	7.29E-001 +/- 4.28E-001	5.01E-001 +/- 1.79E-002
RA-226	0.945	4785.00*	2.78E+000 +/- 7.18E-001	3.79E-001 +/- 1.35E-002

AG
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US EPA ARCHIVE DOCUMENT

0000064658.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Wed Jul 31 15:14:57 2013



ROI Type: 1

9758

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

Sample Title: 10

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 2 2 0 0 0 1 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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

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Apex-Alpha™

Sample Description: DUP 02 DIS
Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
Batch Identification: 1307100A-RA
Sample Identification: 11
Sample Geometry: Shelf 2
Procedure Description: Ra

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
Generic Mult. Factor: 3.200E+000 Generic Div. Factor: 1.000E+000
Sample Date/Time: 7/10/2013 11:12:10 AM
Acquisition Date/Time: 7/31/2013 3:14:58 PM
Acquisition Live Time: 170.0 minutes
Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8772 +/- 0.0000
Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
Effective Efficiency: 0.1799 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.535	28.15	37.59	0.85	0.00E+000	2.6
RA-226	4.598	73.15	23.07	0.85	0.00E+000	3.3

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	1.40E+000 +/- 5.30E-001	2.99E-001 +/- 1.01E-002
RA-226	0.955	4785.00*	3.45E+000 +/- 8.04E-001	2.82E-001 +/- 9.54E-003

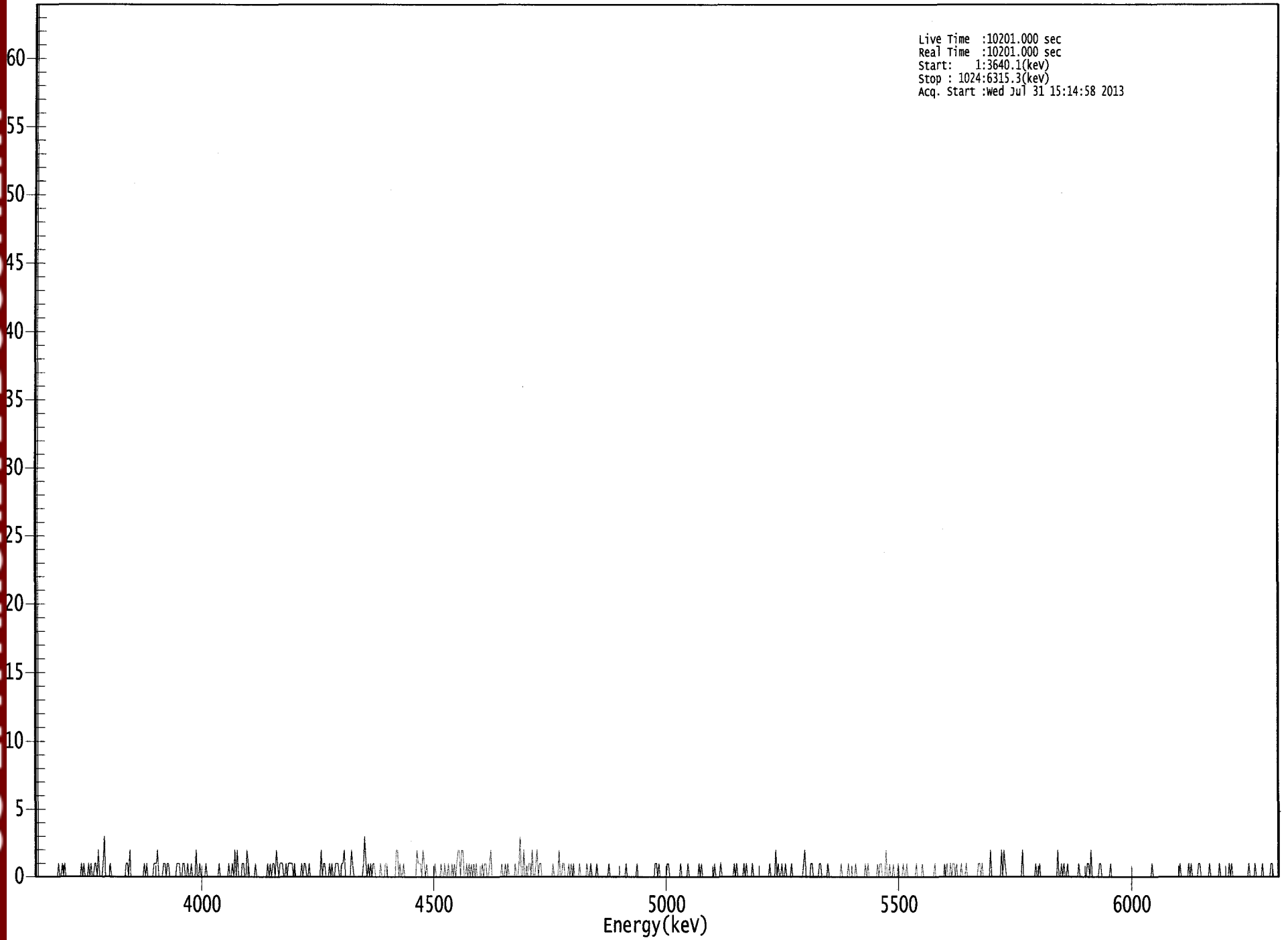
AG
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US EPA ARCHIVE DOCUMENT

0000064659.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3640.1(kev)
Stop : 1024:6315.3(kev)
Acq. Start :Wed Jul 31 15:14:58 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: 11

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 1 0 1 1 0 0 1

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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

KD
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Apex-Alpha™

Sample Description: PZ-113-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:14:59 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9721 +/- 0.0000
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Effective Efficiency: 0.1934 +/- 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	5.507	16.15	50.25	0.85	0.00E+000	3.0
RA-226	4.590	69.32	23.68	0.68	0.00E+000	3.5

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

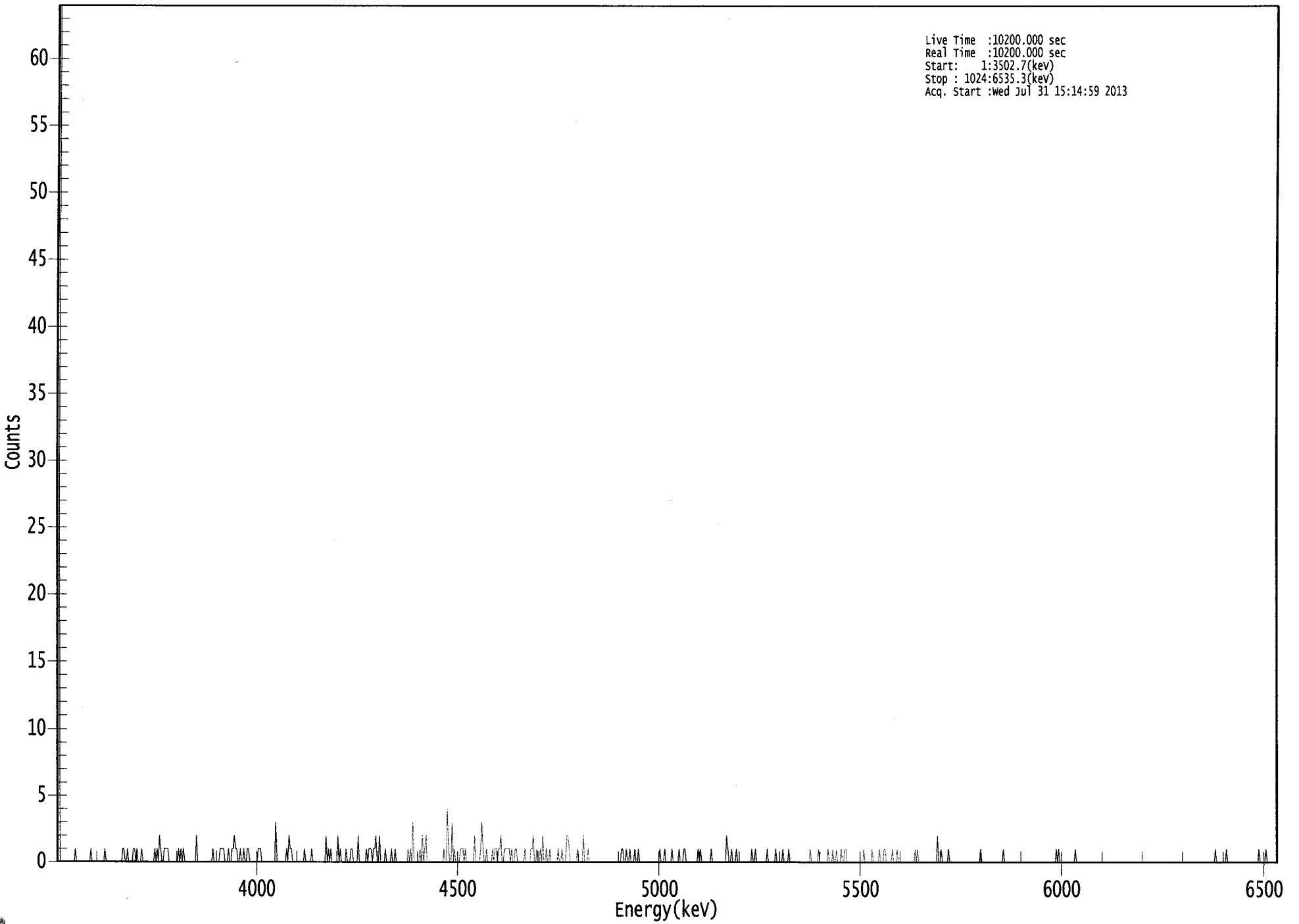
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.959	5685.50*	5.22E-001 +/- 2.63E-001	1.94E-001 +/- 6.59E-003
RA-226	0.952	4785.00*	2.12E+000 +/- 5.07E-001	1.72E-001 +/- 5.85E-003

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US EPA ARCHIVE DOCUMENT

0000064660.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3502.7(kev)
Stop : 1024:6535.3(kev)
Acq. Start :wed Jul 31 15:14:59 2013



ROI Type: 1

0000064660

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 1 0 1 1 2 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

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

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7/31/13

Apex-Alpha™

Sample Description: PZ-113-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:00 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Effective Efficiency: 0.1869 +/- 0.0035

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.539	16.96	50.83	2.04	0.00E+000	2.8
RA-226	4.585	61.81	25.21	1.19	0.00E+000	4.2

 NUCLIDE ANALYSIS RESULTS

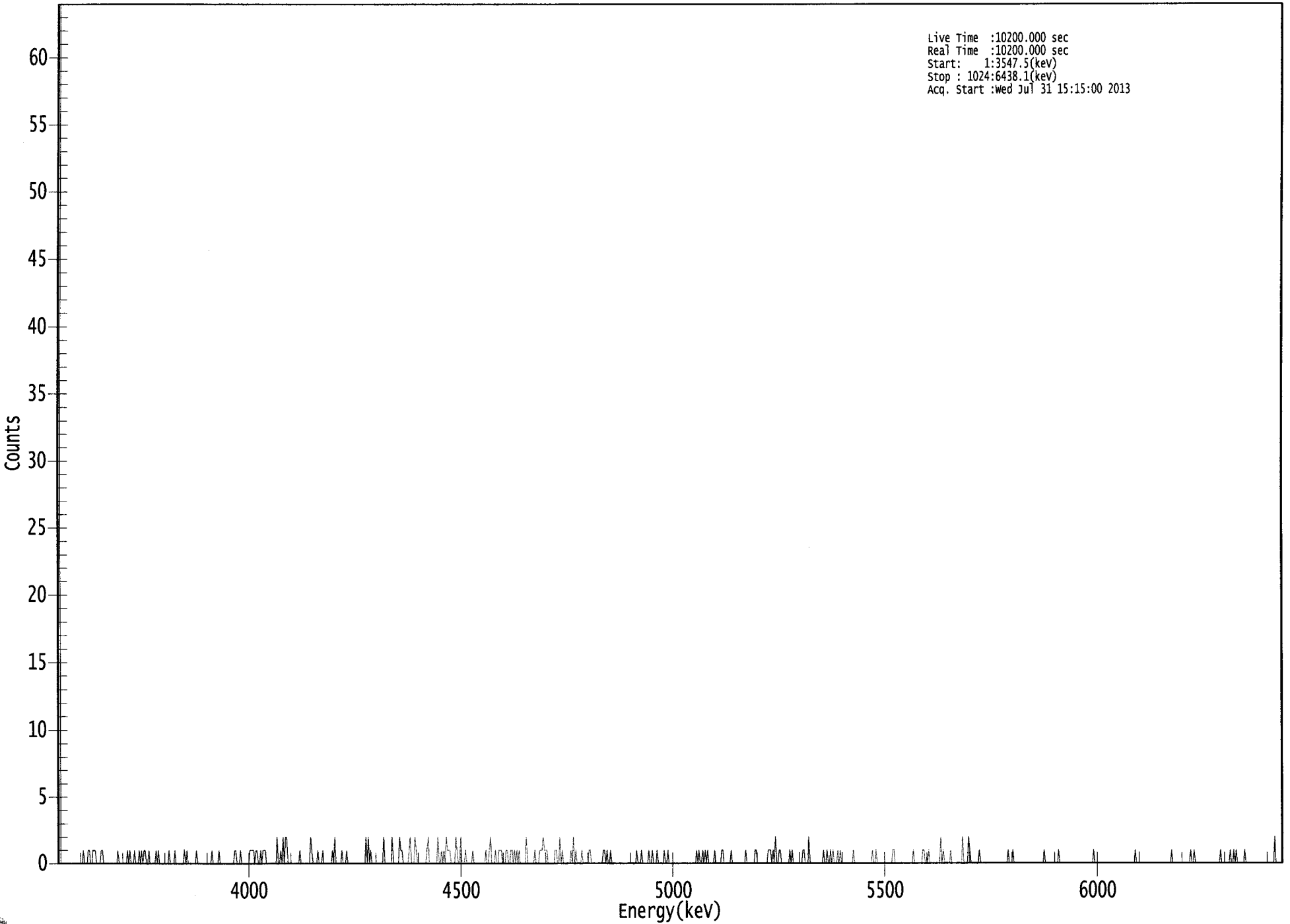
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.972	5685.50*	5.78E-001 +/- 2.94E-001	2.65E-001 +/- 9.63E-003
RA-226	0.949	4785.00*	1.99E+000 +/- 5.07E-001	2.12E-001 +/- 7.68E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064661.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Wed Jul 31 15:15:00 2013



ROI Type: 1

0000064661

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

369: 0 1 1 1 0 0 0 1

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
377:	1	0	0	1	1	0	1	0
385:	1	0	1	0	0	0	0	0
393:	2	0	0	0	0	0	0	1
401:	0	0	0	1	1	1	2	1
409:	1	1	0	0	0	0	0	0
417:	1	1	0	0	2	0	1	0
425:	0	0	0	0	0	1	0	2
433:	0	1	0	0	0	0	1	0
441:	0	0	0	0	1	1	0	0
449:	0	0	0	0	0	0	0	0
457:	1	1	0	1	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	1	0	0	0
489:	1	0	0	0	0	0	1	0
497:	0	1	0	0	0	1	0	0
505:	0	0	0	1	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:	1	0	0	1	0	1	0	1
545:	0	0	0	0	0	1	0	0
553:	0	0	0	1	1	0	0	0
561:	0	0	0	1	0	0	0	0
569:	0	0	0	0	0	0	0	1
577:	0	0	0	0	0	0	0	1
585:	1	0	0	0	0	0	0	0
593:	0	0	1	1	1	0	1	0
601:	2	0	0	1	1	0	0	0
609:	0	0	0	0	1	0	1	0
617:	0	0	0	0	0	0	0	1
625:	1	0	0	0	2	0	0	0
633:	0	0	0	0	0	0	0	0
641:	1	0	0	1	0	0	1	0
649:	1	0	0	0	1	0	1	0
657:	0	0	0	0	0	0	0	0
665:	0	1	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	1	0	0	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	1	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	1	1	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	2	0	1	0	0	0
745:	0	0	1	0	0	0	0	0
753:	0	0	0	0	2	0	0	0
761:	0	2	1	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	1	0	0	0	1	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:	1	0	0	0	0	0	0	0
833:	0	0	0	0	1	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	1	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	1	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	0	1	0	0	1	0
985:	1	0	0	0	0	0	0	1
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	2	0	0	0	0	0	0	0



CS
7/31/13

Sample Description: PZ-104-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Ra

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
 Generic Mult. Factor: 2.120E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:02 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM
 Effective Efficiency: 0.1846 +/- 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	5.477	14.77	57.15	3.23	0.00E+000	2.9
RA-226	4.615	65.47	24.55	1.53	0.00E+000	3.7

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

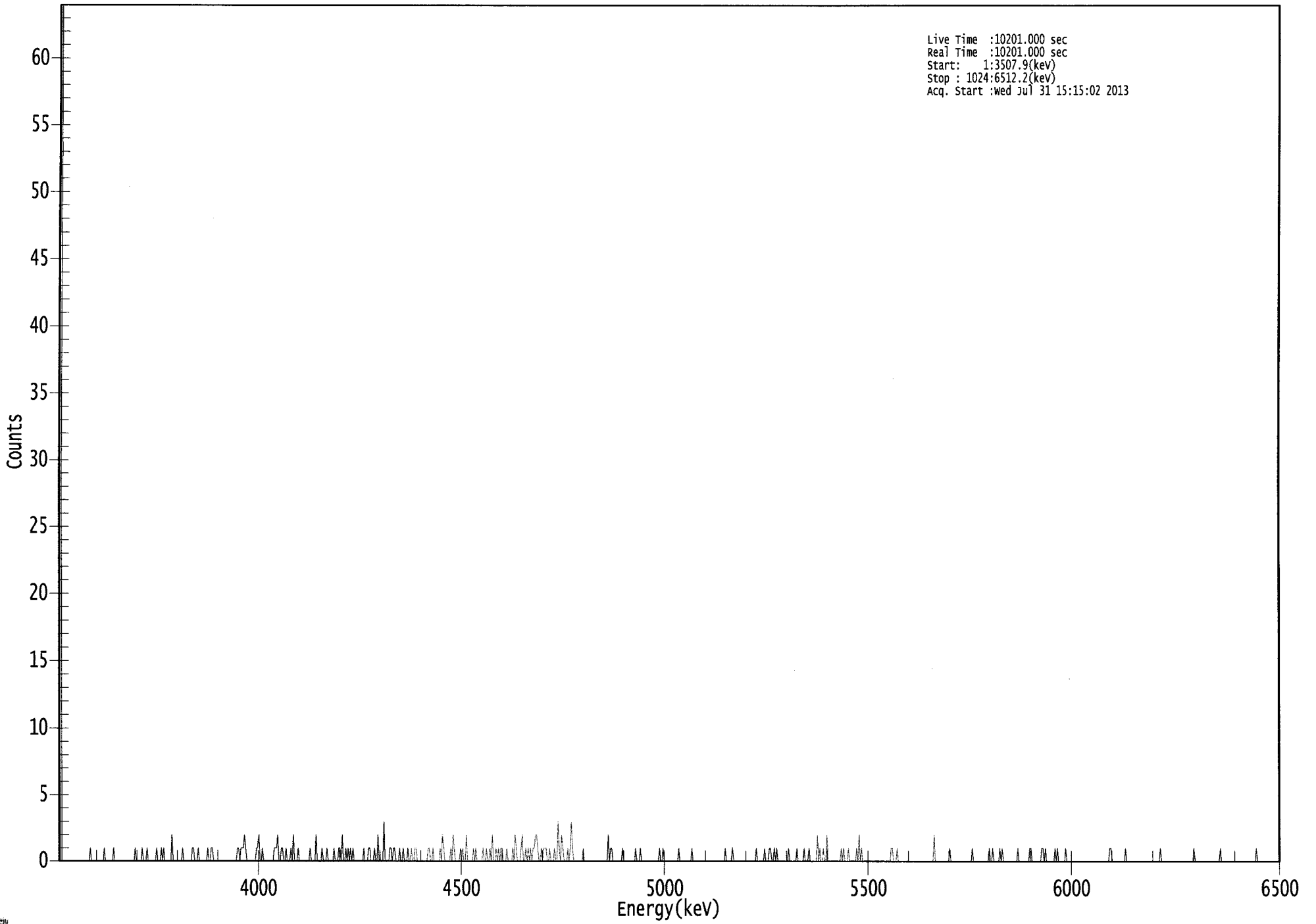
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.945	5685.50*	4.76E-001 +/- 2.72E-001	2.93E-001 +/- 1.07E-002
RA-226	0.963	4785.00*	1.99E+000 +/- 4.95E-001	2.16E-001 +/- 7.86E-003

AG
8/1/13

US EPA ARCHIVE DOCUMENT

0000064662.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3507.9(keV)
Stop : 1024:6512.2(keV)
Acq. Start :Wed Jul 31 15:15:02 2013



ROI Type: 1

0395
9650

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

369: 0 1 0 1 1 0 0 0

Sample Title: 14

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

801: 0 0 0 0 1 0 0 0

Sample Title: 14

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

ICP
7/13/13

Apex-Alpha™

Sample Description: PZ-104-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 15
 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: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:03 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8848 +/- 0.0000
 Counting Efficiency: 0.1477 +/- 0.0027 on 7/20/2013 6:27:27 PM
 Effective Efficiency: 0.1307 +/- 0.0024

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.549	8.83	66.70	0.17	0.00E+000	3.0
RA-226	4.579	38.15	32.14	0.85	0.00E+000	4.5

 NUCLIDE ANALYSIS RESULTS

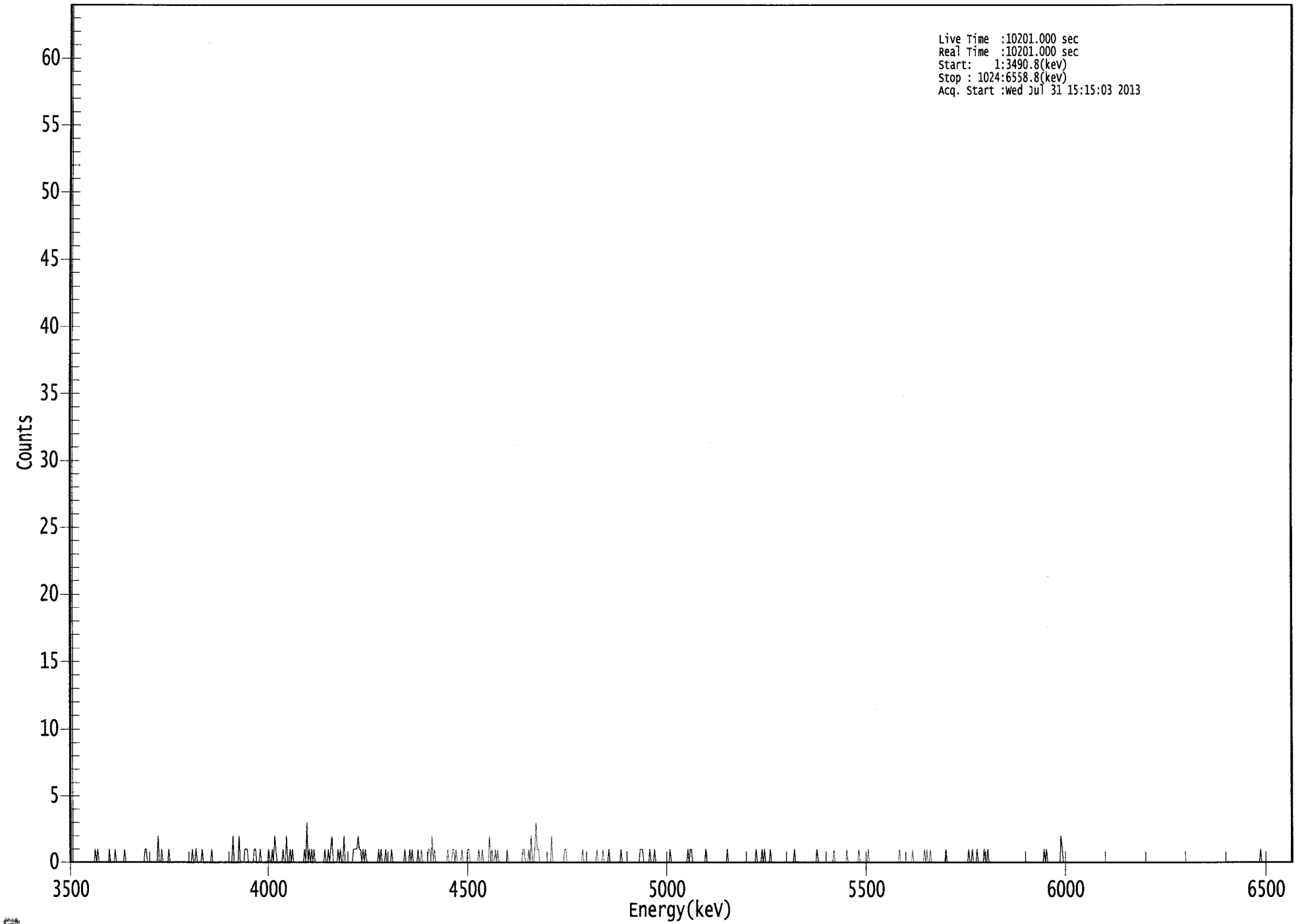
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.976	5685.50*	4.30E-001 +/- 2.87E-001	2.03E-001 +/- 7.19E-003
RA-226	0.946	4785.00*	1.76E+000 +/- 5.68E-001	2.75E-001 +/- 9.73E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064665.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3490.8(kev)
Stop : 1024:6558.8(kev)
Acq. Start :wed Jul 31 15:15:03 2013



ROI Type: 1

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

Sample Title: 15

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 15

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

801: 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	1	0	1	0	0	0	0	0
825:	0	0	0	0	0	0	2	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:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	1	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

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Apex-Alpha™

Sample Description: PZ-101-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 16
 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: 2.530E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:31 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	5.505	141.41	16.79	4.59	0.00E+000	6.3
RA-226	4.582	626.98	7.84	1.02	0.00E+000	5.7

 NUCLIDE ANALYSIS RESULTS

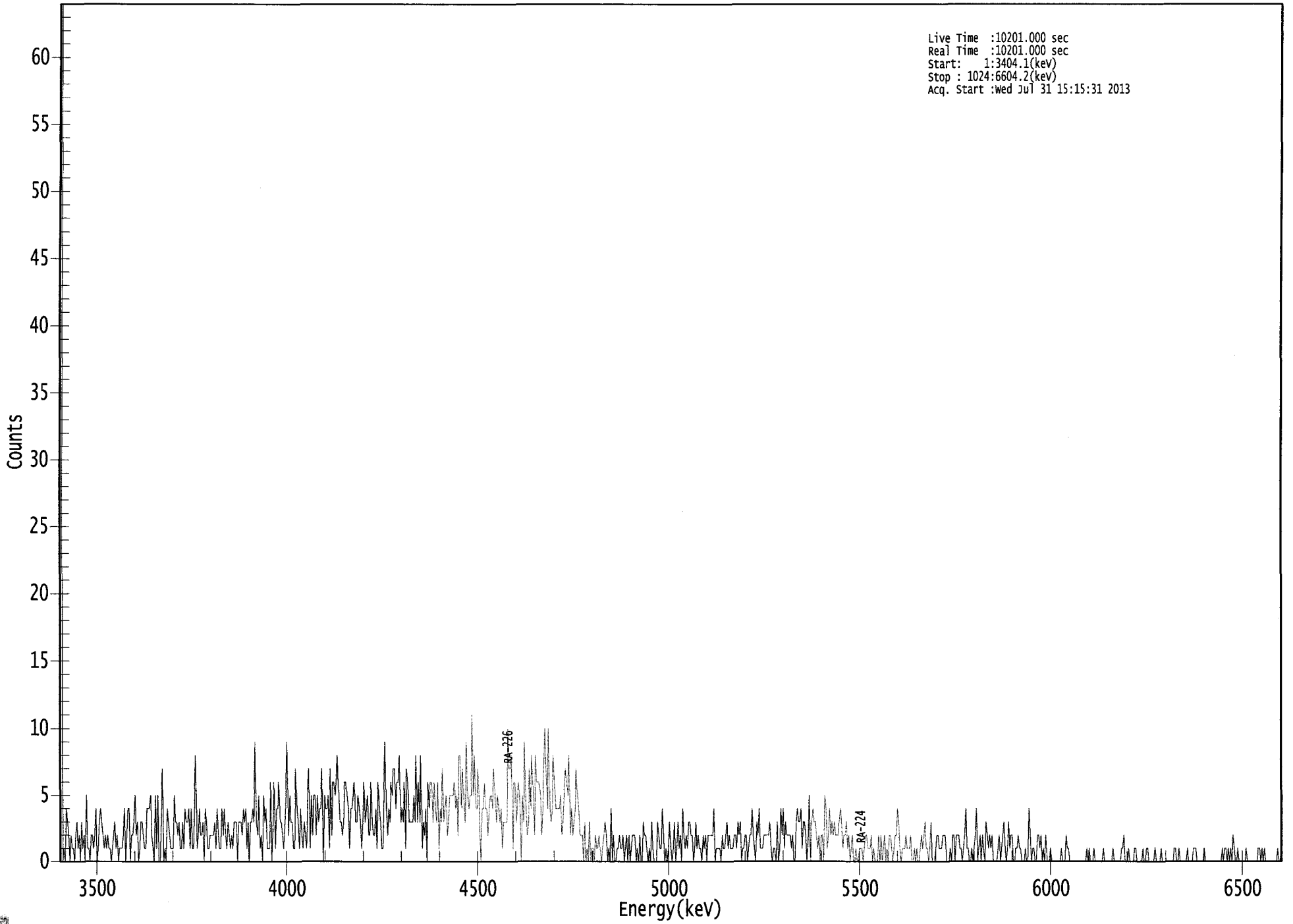
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	5.65E+000 +/- 9.71E-001	4.13E-001 +/- 1.51E-002
RA-226	0.948	4785.00*	2.37E+001 +/- 2.04E+000	2.38E-001 +/- 8.66E-003

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US EPA ARCHIVE DOCUMENT

0000064668.CNF

Live Time : 10201.000 sec
Real Time : 10201.000 sec
Start : 1:3404.1(kev)
Stop : 1024:6604.2(kev)
Acq. Start : wed Jul 31 15:15:31 2013



ROI Type: 1

9979

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

Sample Title: 16

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 4 3 4 1 3 3 3 3

Sample Title: 16

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

801: 0 1 1 2 1 1 0 0

Sample Title: 16

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



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Sample Description: PZ-101-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 17
 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: 2.530E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:32 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9231 +/- 0.0000
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
 Effective Efficiency: 0.1532 +/- 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	5.510	157.13	15.74	1.87	0.00E+000	6.9
RA-226	4.586	637.66	7.76	0.34	0.00E+000	5.8

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

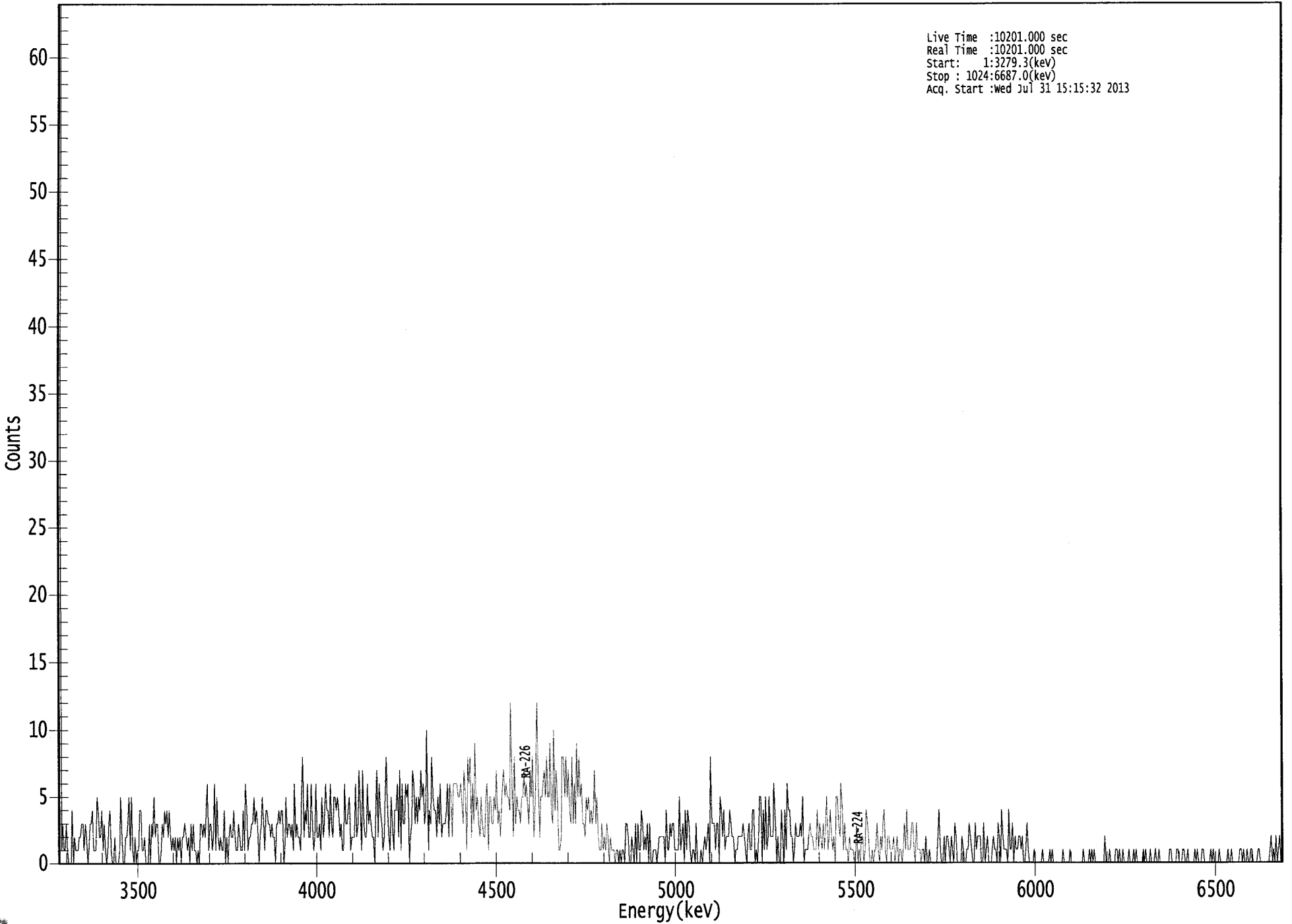
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.961	5685.50*	7.28E+000 +/- 1.17E+000	3.51E-001 +/- 1.22E-002
RA-226	0.950	4785.00*	2.79E+001 +/- 2.37E+000	2.09E-001 +/- 7.26E-003

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US EPA ARCHIVE DOCUMENT

0000064669.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3279.3(kev)
Stop : 1024:6687.0(kev)
Acq. Start :wed Jul 31 15:15:32 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: 10201

Elapsed Real Time: 10201

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

369: 3 4 2 4 6 7 5 6

Sample Title: 17

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

801: 2 1 1 2 2 1 2 0

Sample Title: 17

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

100
7/21/13

Apex-Alpha™

Sample Description: PZ-104-SD TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 18
 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: 2.270E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:33 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8206 +/- 0.0000
 Counting Efficiency: 0.1612 +/- 0.0029 on 7/20/2013 6:29:23 PM
 Effective Efficiency: 0.1323 +/- 0.0024

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.498	21.62	44.79	2.38	0.00E+000	3.3
RA-226	4.603	89.66	20.75	0.34	0.00E+000	4.9

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

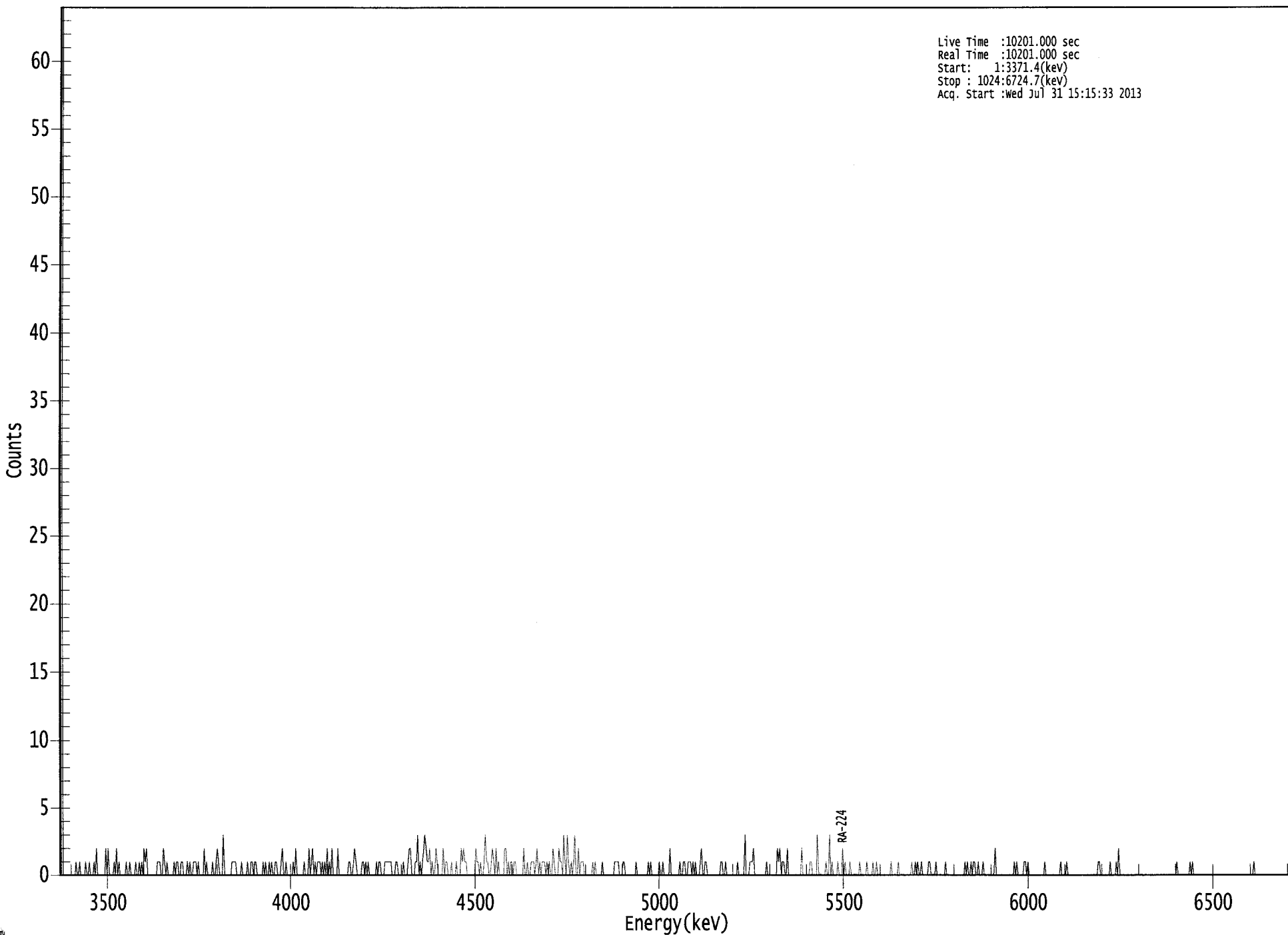
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.955	5685.50*	1.04E+000 +/- 4.68E-001	3.95E-001 +/- 1.38E-002
RA-226	0.958	4785.00*	4.08E+000 +/- 8.58E-001	2.17E-001 +/- 7.58E-003

AG
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US EPA ARCHIVE DOCUMENT

0000064667.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3371.4(kev)
Stop : 1024:6724.7(kev)
Acq. Start :wed Jul 31 15:15:33 2013



ROI Type: 1

0179

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

Sample Title: 18

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 2 2 0 1 0 1 1

Sample Title: 18

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

801: 1 0 1 0 0 0 0 0

Sample Title: 18

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



KCB
7/13/13

Sample Description: PZ-104-SD DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000646
 Batch Identification: 1307100A-RA
 Sample Identification: 19
 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: 4.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/11/2013 11:12:10 AM
 Acquisition Date/Time: 7/31/2013 3:15:34 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9235 +/- 0.0000
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1414 +/- 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	5.508	26.96	39.38	2.04	0.00E+000	3.1
RA-226	4.575	98.64	19.89	1.36	0.00E+000	6.2

 NUCLIDE ANALYSIS RESULTS

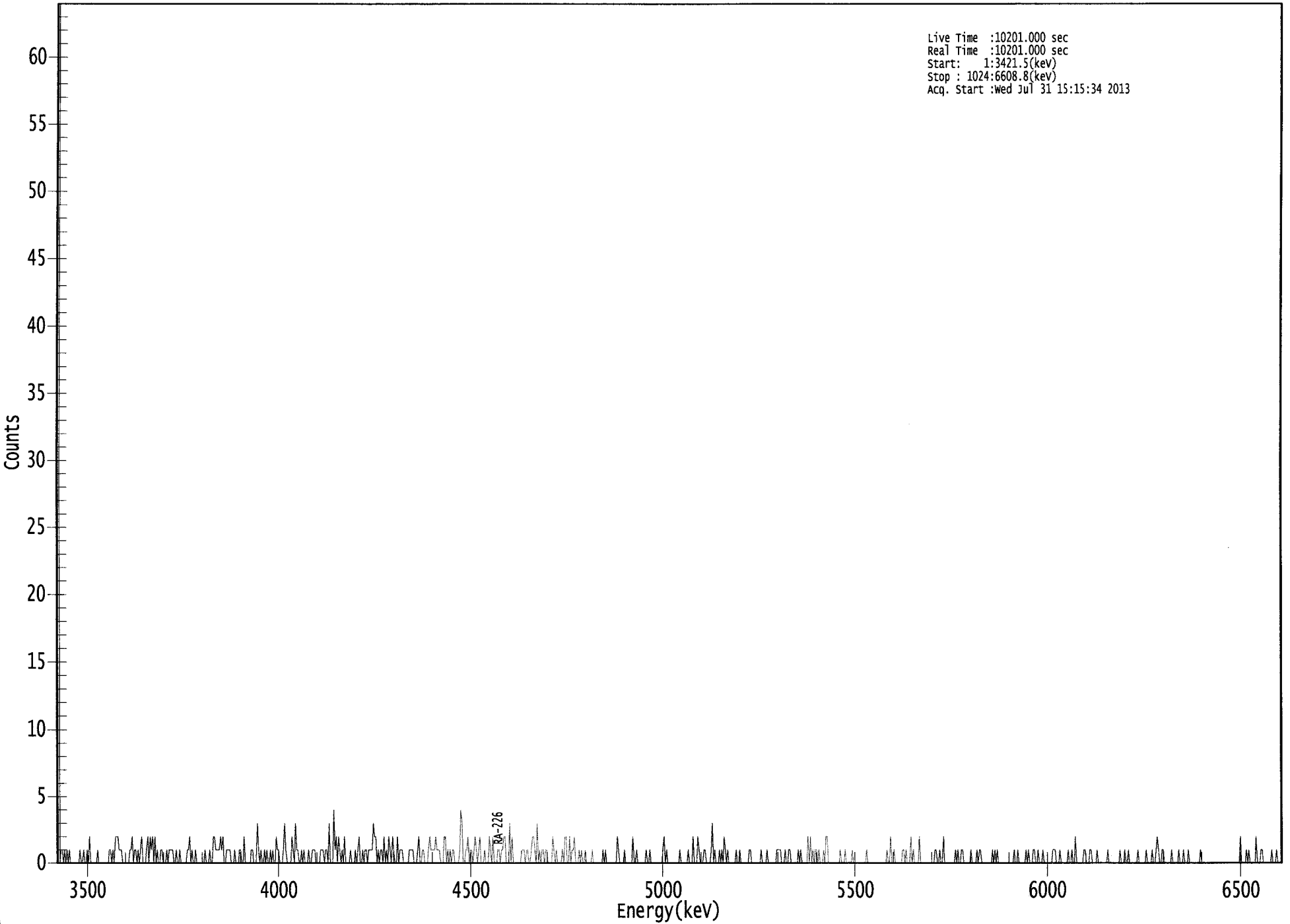
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.960	5685.50*	2.14E+000 +/- 8.46E-001	6.18E-001 +/- 2.31E-002
RA-226	0.944	4785.00*	7.39E+000 +/- 1.50E+000	5.14E-001 +/- 1.92E-002

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US EPA ARCHIVE DOCUMENT

0000064666.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3421.5(keV)
Stop : 1024:6608.8(keV)
Acq. Start :Wed Jul 31 15:15:34 2013



ROI Type: 1

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

Sample Title: 19

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 1 1 0 1 1 2 2

Sample Title: 19

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

801: 1 0 0 1 0 0 0 0

Sample Title: 19

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



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	13-07100	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	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Lab Deadline	8/6/2013	04	DO	PZ-113-AS TOT	44	07/10/13 14:00	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-113-AS DIS	44	07/10/13 14:00	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-109-SS TOT	42	07/10/13 14:30	1.0000E+00
Report Level	4	07	TRG	PZ-109-SS DIS	42	07/10/13 14:30	1.0000E+00
Activity Units	pCi	08	TRG	PZ-205-SS TOT	44	07/10/13 15:30	1.0000E+00
Aliquot Units	I	09	TRG	PZ-205-SS DIS	44	07/10/13 15:30	1.0000E+00
Matrix	WA	10	TRG	DUP 02 TOT	41	07/10/13 00:00	1.0000E+00
Method	E904.0	11	TRG	DUP 02 DIS	41	07/10/13 00:00	1.0000E+00
Instrument Type	Alpha/Beta GPC	12	TRG	PZ-113-SS TOT	45	07/11/13 08:50	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	PZ-113-SS DIS	45	07/11/13 08:50	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-104-SS TOT	37	07/11/13 09:37	1.0000E+00
Tracer Act (dpm/g)	992.736	15	TRG	PZ-104-SS DIS	37	07/11/13 09:37	1.0000E+00
Carrier	Yttrium	16	TRG	PZ-101-SS TOT	40	07/11/13 09:40	1.0000E+00
Carrier Conc (mg/ml)	34	17	TRG	PZ-101-SS DIS	40	07/11/13 09:40	1.0000E+00
		18	TRG	PZ-104-SD TOT	42	07/11/13 10:29	1.0000E+00
		19	TRG	PZ-104-SD DIS	42	07/11/13 10:29	1.0000E+00

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

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Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9221	915.4	421.1	102.12	2.000	0.0968	0.1536	0.0568	83.53	85.30	1.00	1.00
02	MBL	0.9101	903.5	403.3	99.10	2.000	0.0963	0.1525	0.0562	82.65	81.90	1.00	1.00
03	DUP	0.9133	906.7	358.8	87.85	2.000	0.0967	0.1533	0.0566	83.24	73.12	1.00	1.00
04	DO	0.9097	903.1	410.5	100.91	2.000	0.0968	0.1538	0.0570	83.82	84.59	1.00	1.00
05	TRG	0.9093	902.7	391.4	96.26	2.000	0.0966	0.1538	0.0572	84.12	80.97	1.00	1.00
06	TRG	0.9091	902.5	387.2	95.25	2.000	0.0965	0.1535	0.0570	83.82	79.84	1.00	1.00
07	TRG	0.9092	902.6	370.7	91.18	2.000	0.0963	0.1495	0.0532	78.24	71.33	1.00	1.00
08	TRG	0.9105	903.9	404.0	99.22	2.000	0.0963	0.1510	0.0547	80.44	79.82	1.00	1.00
09	TRG	0.9055	898.9	362.8	89.60	2.000	0.0967	0.1519	0.0552	81.18	72.73	1.00	1.00
10	TRG	0.9062	899.6	377.0	93.03	2.000	0.0963	0.1523	0.0560	82.35	76.62	1.00	1.00
11	TRG	0.9063	899.7	355.5	87.72	2.000	0.0966	0.1498	0.0532	78.24	68.63	1.00	1.00
12	TRG	0.9066	900.0	394.1	97.21	2.000	0.0963	0.1512	0.0549	80.74	78.48	1.00	1.00
13	TRG	0.9085	901.9	425.3	104.69	2.000	0.0952	0.1508	0.0556	81.76	85.60	1.00	1.00
14	TRG	0.9080	901.4	410.5	101.10	2.000	0.0960	0.1513	0.0553	81.32	82.22	1.00	1.00
15	TRG	0.9041	897.5	357.7	88.48	2.000	0.0966	0.1512	0.0546	80.29	71.04	1.00	1.00
16	TRG	0.9058	899.2	407.1	100.51	2.000	0.0960	0.1507	0.0547	80.44	80.85	1.00	1.00
17	TRG	0.9058	899.2	373.9	92.31	2.000	0.0961	0.1508	0.0547	80.44	74.25	1.00	1.00
18	TRG	0.9083	901.7	333.3	82.06	2.000	0.0965	0.1521	0.0556	81.76	67.10	1.00	1.00
19	TRG	0.9076	901.0	374.8	92.35	2.000	0.0957	0.1530	0.0573	84.26	77.82	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.

0430

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Rough Prep Date</i>	<i>Rough Prep By</i>	<i>Prep Date</i>	<i>Prep By</i>	<i>Sep t0 Date/Time</i>	<i>Sep t0 By</i>	<i>Sep t1 Date/Time</i>	<i>Sep t1 By</i>
01	LCS			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
02	MBL			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
03	DUP			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
04	DO			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
05	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
06	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
07	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
08	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
09	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
10	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
11	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
12	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
13	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
14	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
15	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
16	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
17	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
18	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH
19	TRG			07/24/13 12:09	JWOLFE	07/29/13 17:45	LWALKER	08/06/13 04:17	TSMITH

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

Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	9.43E+00	1.83E+00	1.76E+00	8.83E+00	106.73	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	1.99E-01	4.12E-01	8.64E-01					OK	OK
03	RA-228	DUP	PZ-113-AS TOT	pCi/l	6.81E-01	5.19E-01	1.02E+00				NA	OK	
04	RA-228	DO	PZ-113-AS TOT	pCi/l	5.27E-01	5.43E-01	1.10E+00					OK	
05	RA-228	TRG	PZ-113-AS DIS	pCi/l	1.39E+00	5.74E-01	1.06E+00					OK	
06	RA-228	TRG	PZ-109-SS TOT	pCi/l	1.34E+00	6.06E-01	1.14E+00					OK	
07	RA-228	TRG	PZ-109-SS DIS	pCi/l	1.88E+00	7.28E-01	1.34E+00					OK	
08	RA-228	TRG	PZ-205-SS TOT	pCi/l	1.21E+00	6.19E-01	1.18E+00					OK	
09	RA-228	TRG	PZ-205-SS DIS	pCi/l	7.68E-01	7.35E-01	1.49E+00					OK	
10	RA-228	TRG	DUP 02 TOT	pCi/l	7.16E+00	9.30E-01	1.30E+00					OK	
11	RA-228	TRG	DUP 02 DIS	pCi/l	7.98E+00	1.14E+00	1.76E+00					OK	
12	RA-228	TRG	PZ-113-SS TOT	pCi/l	1.31E+00	6.90E-01	1.33E+00					OK	
13	RA-228	TRG	PZ-113-SS DIS	pCi/l	1.79E+00	6.34E-01	1.16E+00					OK	
14	RA-228	TRG	PZ-104-SS TOT	pCi/l	1.23E+00	6.71E-01	1.30E+00					OK	
15	RA-228	TRG	PZ-104-SS DIS	pCi/l	1.15E+00	7.81E-01	1.54E+00					OK	
16	RA-228	TRG	PZ-101-SS TOT	pCi/l	3.48E+00	7.40E-01	1.21E+00					OK	
17	RA-228	TRG	PZ-101-SS DIS	pCi/l	2.74E+00	8.11E-01	1.45E+00					OK	
18	RA-228	TRG	PZ-104-SD TOT	pCi/l	-1.55E-01	1.06E+00	2.28E+00					INV	
19	RA-228	TRG	PZ-104-SD DIS	pCi/l	2.50E+00	8.84E-01	1.62E+00					OK	

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07100
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07100-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	102.12	83.53	85.30	1.00	7/29/2013 17:45	8/6/2013 4:17
02	RA-228	MBL	07/16/13 00:00	1.00E+00	99.10	82.65	81.90	1.00	7/29/2013 17:45	8/6/2013 4:17
03	RA-228	DUP	07/10/13 14:00	1.00E+00	87.85	83.24	73.12	1.00	7/29/2013 17:45	8/6/2013 4:17
04	RA-228	DO	07/10/13 14:00	1.00E+00	100.91	83.82	84.59	1.00	7/29/2013 17:45	8/6/2013 4:17
05	RA-228	TRG	07/10/13 14:00	1.00E+00	96.26	84.12	80.97	1.00	7/29/2013 17:45	8/6/2013 4:17
06	RA-228	TRG	07/10/13 14:30	1.00E+00	95.25	83.82	79.84	1.00	7/29/2013 17:45	8/6/2013 4:17
07	RA-228	TRG	07/10/13 14:30	1.00E+00	91.18	78.24	71.33	1.00	7/29/2013 17:45	8/6/2013 4:17
08	RA-228	TRG	07/10/13 15:30	1.00E+00	99.22	80.44	79.82	1.00	7/29/2013 17:45	8/6/2013 4:17
09	RA-228	TRG	07/10/13 15:30	1.00E+00	89.60	81.18	72.73	1.00	7/29/2013 17:45	8/6/2013 4:17
10	RA-228	TRG	07/10/13 00:00	1.00E+00	93.03	82.35	76.62	1.00	7/29/2013 17:45	8/6/2013 4:17
11	RA-228	TRG	07/10/13 00:00	1.00E+00	87.72	78.24	68.63	1.00	7/29/2013 17:45	8/6/2013 4:17
12	RA-228	TRG	07/11/13 08:50	1.00E+00	97.21	80.74	78.48	1.00	7/29/2013 17:45	8/6/2013 4:17
13	RA-228	TRG	07/11/13 08:50	1.00E+00	104.69	81.76	85.60	1.00	7/29/2013 17:45	8/6/2013 4:17
14	RA-228	TRG	07/11/13 09:37	1.00E+00	101.10	81.32	82.22	1.00	7/29/2013 17:45	8/6/2013 4:17
15	RA-228	TRG	07/11/13 09:37	1.00E+00	88.48	80.29	71.04	1.00	7/29/2013 17:45	8/6/2013 4:17
16	RA-228	TRG	07/11/13 09:40	1.00E+00	100.51	80.44	80.85	1.00	7/29/2013 17:45	8/6/2013 4:17
17	RA-228	TRG	07/11/13 09:40	1.00E+00	92.31	80.44	74.25	1.00	7/29/2013 17:45	8/6/2013 4:17
18	RA-228	TRG	07/11/13 10:29	1.00E+00	82.06	81.76	67.10	1.00	7/29/2013 17:45	8/6/2013 4:17
19	RA-228	TRG	07/11/13 10:29	1.00E+00	92.35	84.26	77.82	1.00	7/29/2013 17:45	8/6/2013 4:17

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07100
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	0.9221	915.4019	421.1000	102.12	1.00	1.00
02	MBL	BLANK	07/16/13 00:00	1.0000	0.9101	903.4890	403.3000	99.10	1.00	1.00
03	DUP	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.9133	906.6658	358.8000	87.85	1.00	1.00
04	DO	PZ-113-AS TOT	07/10/13 14:00	1.0000	0.9097	903.0919	410.5000	100.91	1.00	1.00
05	TRG	PZ-113-AS DIS	07/10/13 14:00	1.0000	0.9093	902.6948	391.4000	96.26	1.00	1.00
06	TRG	PZ-109-SS TOT	07/10/13 14:30	1.0000	0.9091	902.4963	387.2000	95.25	1.00	1.00
07	TRG	PZ-109-SS DIS	07/10/13 14:30	1.0000	0.9092	902.5956	370.7000	91.18	1.00	1.00
08	TRG	PZ-205-SS TOT	07/10/13 15:30	1.0000	0.9105	903.8861	404.0000	99.22	1.00	1.00
09	TRG	PZ-205-SS DIS	07/10/13 15:30	1.0000	0.9055	898.9224	362.8000	89.60	1.00	1.00
10	TRG	DUP 02 TOT	07/10/13 00:00	1.0000	0.9062	899.6174	377.0000	93.03	1.00	1.00
11	TRG	DUP 02 DIS	07/10/13 00:00	1.0000	0.9063	899.7166	355.5000	87.72	1.00	1.00
12	TRG	PZ-113-SS TOT	07/11/13 08:50	1.0000	0.9066	900.0145	394.1000	97.21	1.00	1.00
13	TRG	PZ-113-SS DIS	07/11/13 08:50	1.0000	0.9085	901.9007	425.3000	104.69	1.00	1.00
14	TRG	PZ-104-SS TOT	07/11/13 09:37	1.0000	0.9080	901.4043	410.5000	101.10	1.00	1.00
15	TRG	PZ-104-SS DIS	07/11/13 09:37	1.0000	0.9041	897.5326	357.7000	88.48	1.00	1.00
16	TRG	PZ-101-SS TOT	07/11/13 09:40	1.0000	0.9058	899.2203	407.1000	100.51	1.00	1.00
17	TRG	PZ-101-SS DIS	07/11/13 09:40	1.0000	0.9058	899.2203	373.9000	92.31	1.00	1.00
18	TRG	PZ-104-SD TOT	07/11/13 10:29	1.0000	0.9083	901.7021	333.3000	82.06	1.00	1.00
19	TRG	PZ-104-SD DIS	07/11/13 10:29	1.0000	0.9076	901.0072	374.8000	92.35	1.00	1.00

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Spike and Tracer Worksheet

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07100		1	Ra228		7/24/2013 12:08	JWOLFE		<i>JW</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
Ra-228	Ra-11	37.802	7/24/2013	0.530	0.5188				8.83	0.451	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes	
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer	
01	Ba-133	Ba-6a	992.736	7/24/2013	0.9221	1.0200	LCS	
02	Ba-133	Ba-6a	992.736	7/24/2013	0.9101	1.0200		
03	Ba-133	Ba-6a	992.736	7/24/2013	0.9133	1.0200		
04	Ba-133	Ba-6a	992.736	7/24/2013	0.9097	1.0200		
05	Ba-133	Ba-6a	992.736	7/24/2013	0.9093	1.0200		
06	Ba-133	Ba-6a	992.736	7/24/2013	0.9091	1.0200		
07	Ba-133	Ba-6a	992.736	7/24/2013	0.9092	1.0200		
08	Ba-133	Ba-6a	992.736	7/24/2013	0.9105	1.0200		
09	Ba-133	Ba-6a	992.736	7/24/2013	0.9055	1.0200		
10	Ba-133	Ba-6a	992.736	7/24/2013	0.9062	1.0200		
11	Ba-133	Ba-6a	992.736	7/24/2013	0.9063	1.0200		
12	Ba-133	Ba-6a	992.736	7/24/2013	0.9066	1.0200		
13	Ba-133	Ba-6a	992.736	7/24/2013	0.9085	1.0200		
14	Ba-133	Ba-6a	992.736	7/24/2013	0.9080	1.0200		
15	Ba-133	Ba-6a	992.736	7/24/2013	0.9041	1.0200		
16	Ba-133	Ba-6a	992.736	7/24/2013	0.9058	1.0200		
17	Ba-133	Ba-6a	992.736	7/24/2013	0.9058	1.0200		
18	Ba-133	Ba-6a	992.736	7/24/2013	0.9083	1.0200		
19	Ba-133	Ba-6a	992.736	7/24/2013	0.9076	1.0200		
							Matrix Spike	

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07100	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	PZ-113-AS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-113-AS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-113-AS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-109-SS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-109-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-205-SS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-205-SS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 02 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 02 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-113-SS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-113-SS DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-104-SS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-104-SS DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-101-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-101-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	PZ-104-SD TOT	TRG					1.0000E+00	1.0000E+00				
19	PZ-104-SD DIS	TRG					1.0000E+00	1.0000E+00				

Comments

Technician: Wolfe Date: 7/24/13

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Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07100	1	Ra228	Yttrium	34.0000	TSMITH

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data		Filter Data		Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	
01	LCS	LCS	2.0000	0.0968	0.1536	0.0568	83.53
02	BLANK	MBL	2.0000	0.0963	0.1525	0.0562	82.65
03	DUP	DUP	2.0000	0.0967	0.1533	0.0566	83.24
04	PZ-113-AS TOT	DO	2.0000	0.0968	0.1538	0.0570	83.82
05	PZ-113-AS DIS	TRG	2.0000	0.0966	0.1538	0.0572	84.12
06	PZ-109-SS TOT	TRG	2.0000	0.0965	0.1535	0.0570	83.82
07	PZ-109-SS DIS	TRG	2.0000	0.0963	0.1495	0.0532	78.24
08	PZ-205-SS TOT	TRG	2.0000	0.0963	0.1510	0.0547	80.44
09	PZ-205-SS DIS	TRG	2.0000	0.0967	0.1519	0.0552	81.18
10	DUP 02 TOT	TRG	2.0000	0.0963	0.1523	0.0560	82.35
11	DUP 02 DIS	TRG	2.0000	0.0966	0.1498	0.0532	78.24
12	PZ-113-SS TOT	TRG	2.0000	0.0963	0.1512	0.0549	80.74
13	PZ-113-SS DIS	TRG	2.0000	0.0952	0.1508	0.0556	81.76
14	PZ-104-SS TOT	TRG	2.0000	0.0960	0.1513	0.0553	81.32
15	PZ-104-SS DIS	TRG	2.0000	0.0966	0.1512	0.0546	80.29
16	PZ-101-SS TOT	TRG	2.0000	0.0960	0.1507	0.0547	80.44
17	PZ-101-SS DIS	TRG	2.0000	0.0961	0.1508	0.0547	80.44
18	PZ-104-SD TOT	TRG	2.0000	0.0965	0.1521	0.0556	81.76
19	PZ-104-SD DIS	TRG	2.0000	0.0957	0.1530	0.0573	84.26

Technician: *T. Smith* Date: 8/6/13

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c
8/6/13
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Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307100-10	11	545	120	1400	8/6/13 10:07
C2	1307100-11	14	610	120	1400	8/6/13 10:07
C3	1307100-12	17	229	120	1400	8/6/13 10:07
C4	1307100-13	12	257	120	1400	8/6/13 10:07
A1	1307100-02	6	86	120	1400	8/6/13 10:07
A2	1307100-03	8	116	120	1400	8/6/13 10:07
A3	1307100-04	16	167	120	1400	8/6/13 10:07
A4	1307100-05	10	190	120	1400	8/6/13 10:07
B1	1307100-06	12	202	120	1400	8/6/13 10:07
B2	1307100-07	16	228	120	1400	8/6/13 10:07
B3	1307100-08	17	202	120	1400	8/6/13 10:07
B4	1307100-09	16	221	120	1400	8/6/13 10:07

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Elling
(A)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307100-14	18	238	120	1400	8/6/13 10:10
C2	1307100-15	14	225	120	1400	8/6/13 10:10
C3	1307100-16	23	342	120	1400	8/6/13 10:10
C4	1307100-17	12	316	120	1400	8/6/13 10:10

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81610
KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
D2	1307100-18	7	218	120	1400	8/6/13 12:04
D4	1307100-19	12	268	120	1400	8/6/13 12:04

c
8/6/13
A

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
A3	1307100-01	7	201	30	1400	8/6/13 8:40

C
8/6/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/6/2013	6.67E-02	P	-2.14E+01	2.83E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/6/2013	6.67E-02	P	-1.81E+01	2.54E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/6/2013	5.00E-02	P	-1.76E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	8/6/2013	8.33E-02	P	-1.87E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/6/2013	2.00E-01	P	-9.70E-02	7.52E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/6/2013	3.33E-02	P	-7.81E-02	7.23E-02	2.23E-01
LB4110A - B3	Alpha	11/18/2007	8/6/2013	6.67E-02	P	-6.31E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/6/2013	1.33E-01	P	-1.40E-01	7.88E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	8/6/2013	1.67E-01	P	-1.49E-01	8.87E-02	3.27E-01
LB4110A - C2	Alpha	11/18/2007	8/6/2013	5.00E-02	P	-1.77E-01	8.67E-02	3.51E-01
LB4110A - C3	Alpha	11/18/2007	8/6/2013	3.33E-02	P	-1.72E-01	1.00E-01	3.73E-01
LE4110A - C4	Alpha	11/18/2007	8/6/2013	8.33E-02	P	-6.27E-02	6.84E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/6/2013	3.33E-02	P	-5.35E-02	8.34E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/6/2013	8.33E-02	P	-6.99E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/6/2013	1.67E-02	P	-4.85E-02	7.07E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/6/2013	1.00E-01	P	-5.71E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/6/2013	1.67E-02	P	-9.82E-02	1.01E-01	3.01E-01
LB4110R - A2	Alpha	11/24/2006	8/6/2013	5.00E-02	P	-8.91E-02	7.65E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/6/2013	1.17E-01	P	-7.34E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/6/2013	1.67E-02	P	-5.27E-02	7.09E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/6/2013	1.67E-01	P	-9.44E-02	6.16E-02	2.18E-01
LB4110R - B2	Alpha	11/24/2006	8/6/2013	0.00E+00	P	-6.94E-02	6.34E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/6/2013	3.33E-02	P	-6.48E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/6/2013	8.33E-02	P	-6.39E-02	7.02E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/6/2013	8.33E-02	P	-7.68E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/6/2013	3.33E-02	P	-7.56E-02	7.10E-02	2.18E-01
LB4110R - C3	Alpha	11/24/2006	8/6/2013	5.00E-02	P	-8.78E-02	8.44E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	8/6/2013	1.00E-01	P	-6.19E-02	8.13E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/6/2013	0.00E+00	P	-1.02E-01	7.04E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/6/2013	0.00E+00	P	-7.76E-02	6.98E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/6/2013	0.00E+00	P	-8.26E-02	6.96E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/6/2013	0.00E+00	P	-7.49E-02	7.43E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

c
8/6/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/6/2013	7.08E+00	P	-2.90E+02	7.63E+00	3.05E+02
LB4110A - A2	Beta	11/18/2007	8/6/2013	3.23E+00	P	-3.04E+01	2.59E+00	3.56E+01
LB4110A - A3	Beta	11/18/2007	8/6/2013	1.43E+00	P	-5.02E+01	2.63E+00	5.55E+01
LB4110A - A4	Beta	11/18/2007	8/6/2013	7.32E+00	P	-3.25E+01	3.20E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	8/6/2013	2.10E+00	P	-1.04E+01	3.23E+00	1.69E+01
LB4110A - B2	Beta	11/18/2007	8/6/2013	8.33E-01	P	-7.64E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/6/2013	1.38E+00	P	1.15E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/6/2013	1.20E+00	P	-7.63E+00	1.98E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/6/2013	1.38E+00	P	-5.39E+00	2.12E+00	9.63E+00
LB4110A - C2	Beta	11/18/2007	8/6/2013	1.40E+00	P	3.82E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/6/2013	1.17E+00	P	4.72E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/6/2013	1.42E+00	P	-1.76E+00	2.10E+00	5.96E+00
LB4110A - D1	Beta	11/18/2007	8/6/2013	1.97E+00	P	-2.31E+00	2.57E+00	7.44E+00
LB4110A - D2	Beta	11/18/2007	8/6/2013	1.87E+00	P	-6.43E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/6/2013	4.12E+00	P	1.28E+00	4.48E+00	7.67E+00
LB4110A - D4	Beta	11/18/2007	8/6/2013	1.28E+00	P	-4.25E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/6/2013	6.17E-01	P	-6.09E+01	3.67E+00	6.82E+01
LB4110R - A2	Beta	11/24/2006	8/6/2013	6.67E-01	P	-4.84E+01	2.01E+00	5.24E+01
LB4110R - A3	Beta	11/24/2006	8/6/2013	1.12E+00	P	-4.48E+01	2.73E+00	5.02E+01
LB4110R - A4	Beta	11/24/2006	8/6/2013	9.00E-01	P	-4.47E+01	1.99E+00	4.86E+01
LB4110R - B1	Beta	11/24/2006	8/6/2013	1.03E+00	P	-4.70E+01	2.02E+00	5.10E+01
LB4110R - B2	Beta	11/24/2006	8/6/2013	1.10E+00	P	-4.70E+01	2.05E+00	5.11E+01
LB4110R - B3	Beta	11/24/2006	8/6/2013	1.10E+00	P	-4.68E+01	2.65E+00	5.21E+01
LB4110R - B4	Beta	11/24/2006	8/6/2013	1.50E+00	P	-4.71E+01	1.92E+00	5.09E+01
LB4110R - C1	Beta	11/24/2006	8/6/2013	1.23E+00	P	-4.69E+01	2.97E+00	5.28E+01
LB4110R - C2	Beta	11/24/2006	8/6/2013	1.80E+00	P	-4.68E+01	2.71E+00	5.23E+01
LB4110R - C3	Beta	11/24/2006	8/6/2013	1.30E+00	P	-4.73E+01	2.52E+00	5.24E+01
LB4110R - C4	Beta	11/24/2006	8/6/2013	1.22E+00	P	-5.34E+01	2.95E+00	5.93E+01
LB4110R - D1	Beta	11/24/2006	8/6/2013	0.00E+00	P	-4.45E+01	5.57E+00	5.56E+01
LB4110R - D2	Beta	11/24/2006	8/6/2013	0.00E+00	P	-4.78E+01	1.88E+00	5.16E+01
LB4110R - D3	Beta	11/24/2006	8/6/2013	0.00E+00	P	-5.12E+01	5.54E+00	6.23E+01
LB4110R - D4	Beta	11/24/2006	8/6/2013	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

0442

C
B/6/11/13

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/6/2013	0.2418	P	-0.0133	0.2158	0.4449
LB4110A - A2	Alpha	11/18/2007	8/6/2013	0.2071	P	-0.0508	0.1740	0.3988
LB4110A - A3	Alpha	11/18/2007	8/6/2013	0.1996	P	-0.0742	0.1632	0.4006
LB4110A - A4	Alpha	11/18/2007	8/6/2013	0.2178	P	-0.0526	0.1819	0.4165
LB4110A - B1	Alpha	11/18/2007	8/6/2013	0.2093	P	0.1943	0.2243	0.2544
LB4110A - B2	Alpha	11/18/2007	8/6/2013	0.2154	P	0.1924	0.2213	0.2503
LB4110A - B3	Alpha	11/18/2007	8/6/2013	0.2375	P	0.1277	0.2323	0.3368
LB4110A - B4	Alpha	11/18/2007	8/6/2013	0.2292	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/6/2013	0.2198	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	8/6/2013	0.2240	P	0.1971	0.2252	0.2533
LB4110A - C3	Alpha	11/18/2007	8/6/2013	0.2578	P	0.2233	0.2494	0.2756
LB4110A - C4	Alpha	11/18/2007	8/6/2013	0.2261	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	8/6/2013	0.2219	P	0.2030	0.2329	0.2628
LB4110A - D2	Alpha	11/18/2007	8/6/2013	0.2520	P	0.2277	0.2581	0.2884
LB4110A - D3	Alpha	11/18/2007	8/6/2013	0.2495	P	0.2310	0.2634	0.2959
LB4110A - D4	Alpha	11/18/2007	8/6/2013	0.1845	P	0.1643	0.1993	0.2342
LB4110R - A1	Alpha	11/24/2006	8/6/2013	0.2258	P	0.2005	0.2387	0.2768
LB4110R - A2	Alpha	11/24/2006	8/6/2013	0.1987	P	0.1868	0.2202	0.2537
LB4110R - A3	Alpha	11/24/2006	8/6/2013	0.1978	W	0.1928	0.2244	0.2560
LB4110R - A4	Alpha	11/24/2006	8/6/2013	0.2352	P	0.2125	0.2454	0.2784
LB4110R - B1	Alpha	11/24/2006	8/6/2013	0.2221	P	0.1831	0.2257	0.2682
LB4110R - B2	Alpha	11/24/2006	8/6/2013	0.2089	P	0.1754	0.2170	0.2586
LB4110R - B3	Alpha	11/24/2006	8/6/2013	0.2393	P	0.2015	0.2438	0.2862
LB4110R - B4	Alpha	11/24/2006	8/6/2013	0.2219	P	0.1883	0.2313	0.2743
LB4110R - C1	Alpha	11/24/2006	8/6/2013	0.2112	P	0.1833	0.2150	0.2466
LB4110R - C2	Alpha	11/24/2006	8/6/2013	0.2198	P	0.1932	0.2245	0.2558
LB4110R - C3	Alpha	11/24/2006	8/6/2013	0.2311	P	0.2034	0.2394	0.2755
LB4110R - C4	Alpha	11/24/2006	8/6/2013	0.2081	P	0.1826	0.2222	0.2619
LB4110R - D1	Alpha	11/24/2006	8/6/2013	0.0000	F	0.0062	0.1999	0.3936
LB4110R - D2	Alpha	11/24/2006	8/6/2013	0.0000	F	0.0077	0.2273	0.4469
LB4110R - D3	Alpha	11/24/2006	8/6/2013	0.0000	F	0.0076	0.2233	0.4390
LB4110R - D4	Alpha	11/24/2006	8/6/2013	0.0000	F	0.0047	0.1799	0.3552
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

02
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GPC Detector Report
(ALL Efficiencies)

8/6/13

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/6/2013	0.5598	P	0.2105	0.5625	0.9145
LB4110A - A2	Beta	11/18/2007	8/6/2013	0.4981	P	0.1614	0.4647	0.7680
LB4110A - A3	Beta	11/18/2007	8/6/2013	0.4548	P	0.0894	0.4572	0.8250
LB4110A - A4	Beta	11/18/2007	8/6/2013	0.5182	P	0.1421	0.4891	0.8361
LB4110A - B1	Beta	11/18/2007	8/6/2013	0.5056	P	0.4635	0.5298	0.5962
LB4110A - B2	Beta	11/18/2007	8/6/2013	0.5189	P	0.4632	0.5268	0.5905
LB4110A - B3	Beta	11/18/2007	8/6/2013	0.5281	P	0.3165	0.5314	0.7463
LB4110A - B4	Beta	11/18/2007	8/6/2013	0.5266	P	0.4918	0.5539	0.6160
LB4110A - C1	Beta	11/18/2007	8/6/2013	0.5037	P	0.4510	0.5026	0.5542
LB4110A - C2	Beta	11/18/2007	8/6/2013	0.5108	P	0.4292	0.5010	0.5729
LB4110A - C3	Beta	11/18/2007	8/6/2013	0.6085	P	0.5290	0.5906	0.6523
LB4110A - C4	Beta	11/18/2007	8/6/2013	0.5275	P	0.4578	0.5248	0.5919
LB4110A - D1	Beta	11/18/2007	8/6/2013	0.5220	P	0.4785	0.5531	0.6276
LB4110A - D2	Beta	11/18/2007	8/6/2013	0.5443	P	0.4889	0.5873	0.6856
LB4110A - D3	Beta	11/18/2007	8/6/2013	0.6057	P	0.5374	0.6150	0.6926
LB4110A - D4	Beta	11/18/2007	8/6/2013	0.4342	P	0.3848	0.4720	0.5593
LB4110R - A1	Beta	11/24/2006	8/6/2013	0.5451	P	0.4754	0.5674	0.6594
LB4110R - A2	Beta	11/24/2006	8/6/2013	0.4849	P	0.4166	0.5087	0.6008
LB4110R - A3	Beta	11/24/2006	8/6/2013	0.5100	P	0.4506	0.5385	0.6264
LB4110R - A4	Beta	11/24/2006	8/6/2013	0.5836	P	0.5034	0.5915	0.6797
LB4110R - B1	Beta	11/24/2006	8/6/2013	0.5292	P	0.4462	0.5422	0.6382
LB4110R - B2	Beta	11/24/2006	8/6/2013	0.5021	P	0.4246	0.5196	0.6146
LB4110R - B3	Beta	11/24/2006	8/6/2013	0.6056	P	0.4937	0.5917	0.6896
LB4110R - B4	Beta	11/24/2006	8/6/2013	0.5211	P	0.4540	0.5490	0.6439
LB4110R - C1	Beta	11/24/2006	8/6/2013	0.4608	P	0.4161	0.5017	0.5872
LB4110R - C2	Beta	11/24/2006	8/6/2013	0.5105	P	0.4440	0.5284	0.6128
LB4110R - C3	Beta	11/24/2006	8/6/2013	0.5627	P	0.4754	0.5706	0.6658
LB4110R - C4	Beta	11/24/2006	8/6/2013	0.4989	P	0.4258	0.5250	0.6242
LB4110R - D1	Beta	11/24/2006	8/6/2013	0.0000	F	0.0140	0.4779	0.9419
LB4110R - D2	Beta	11/24/2006	8/6/2013	0.0000	F	0.0163	0.5371	1.0578
LB4110R - D3	Beta	11/24/2006	8/6/2013	0.0000	F	0.0158	0.5216	1.0274
LB4110R - D4	Beta	11/24/2006	8/6/2013	0.0000	F	0.0101	0.4294	0.8486
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

046

SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

C
7/17/13

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Configuration      : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710001_GE3_BAFIL_194056.CN
Analyses by       : PEAK V16.9  PEAKEFF V2.2
Client ID        : SPIKE
Deposition Date   :
Sample Date       : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 07:44:01
Sample ID        : 1307100-01 Sample Quantity : 1.00000E+00 filter
Sample type      : FILTER Sample Geometry : 0
Detector name    : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:06.30 0.7%
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	10	29.66	264	174	3.37	29.98	26	13	2.94E-01	19.7	5.53E+00
2	10	30.83	2029	82	1.37	31.15	26	13	2.25E+00	2.4	
3	10	34.99	532	69	1.63	35.31	26	13	5.91E-01	5.1	
4	0	52.02	71	98	2.84	52.34	49	7	7.89E-02	26.0	
5	1	61.79	248	84	1.51	62.11	57	13	2.76E-01	8.8	6.11E+00
6	1	65.54	91	77	1.52	65.86	57	13	1.02E-01	19.3	
7	2	80.96	879	69	1.56	81.28	77	15	9.76E-01	3.7	1.91E+00
8	2	84.93	30	49	1.70	85.25	77	15	3.31E-02	45.3	
9	0	93.55	17	107	1.63	93.87	91	8	1.84E-02	110.9	
10	3	111.64	273	59	1.93	111.95	107	17	3.03E-01	7.5	2.60E+00
11	3	115.96	69	45	1.93	116.27	107	17	7.67E-02	23.6	
12	0	159.94	28	68	1.26	160.25	158	6	3.08E-02	50.7	
13	0	222.18	24	50	1.43	222.49	218	8	2.68E-02	54.6	
14	0	240.04	31	63	1.68	240.35	235	9	3.42E-02	50.4	
15	0	277.05	52	23	1.17	277.36	274	7	5.73E-02	21.1	
16	1	295.86	14	10	1.80	296.16	292	19	1.51E-02	47.6	2.10E+00
17	1	302.73	157	12	1.80	303.04	292	19	1.75E-01	8.6	
18	1	306.76	35	14	1.81	307.06	292	19	3.85E-02	28.7	
19	2	333.67	69	12	1.79	333.98	329	14	7.66E-02	13.7	1.64E+00
20	2	337.91	31	9	2.02	338.21	329	14	3.49E-02	28.2	
21	0	356.02	503	44	1.67	356.32	352	9	5.59E-01	5.1	
22	1	383.53	107	39	1.87	383.83	381	10	1.19E-01	15.4	1.77E+01
23	1	386.83	201	65	1.82	387.13	381	10	2.24E-01	9.7	
24	0	391.42	50	18	1.42	391.72	390	6	5.54E-02	21.7	
25	0	416.89	98	16	5.41	417.20	409	16	1.09E-01	13.6	
26	0	436.87	96	8	1.77	437.17	433	8	1.07E-01	11.4	
27	0	467.79	23	13	1.17	468.09	465	7	2.56E-02	33.0	
28	0	510.84	23	5	2.35	511.13	507	9	2.50E-02	27.1	
29	0	583.59	11	3	6.24	583.88	579	10	1.27E-02	39.4	
30	0	707.67	6	3	2.76	707.96	705	6	6.30E-03	64.8	

Total number of lines in spectrum 30
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 5 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.211E+02	4.211E+02	0.733E+02	17.42	
NP-237	2.14E+06Y	1.00	4.056E+01	4.056E+01	3.690E+01	90.97	
Total Activity :			4.616E+02	4.617E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	7.403E+02	7.403E+02	1.388E+02	18.75	
Total Activity :			7.403E+02	7.403E+02			

Grand Total Activity : 1.202E+03 1.202E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.211E+02	4.211E+02	17.42	OK
	302.84	17.80	6.222E+00	4.259E+02	4.259E+02	26.78	OK
	356.01	60.00	5.860E+00	4.298E+02	4.298E+02	16.99	OK

Final Mean for 3 Valid Peaks = 4.211E+02+/- 7.333E+01 (17.42%)

NP-237	86.50	12.60*	1.749E+01	4.056E+01	4.056E+01	90.97	OK
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Final Mean for 1 Valid Peaks = 4.056E+01+/- 3.690E+01 (90.97%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.403E+02	7.403E+02	18.75	OK

Final Mean for 1 Valid Peaks = 7.403E+02+/- 1.388E+02 (18.75%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.211E+02	7.333E+01	2.157E+01	3.299E+00	19.522
TH-234	7.403E+02	1.388E+02	1.422E+02	7.637E+00	5.207
NP-237	4.056E+01	3.690E+01	6.150E+01	4.971E+00	0.660

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.141E+00	5.928E+00	1.003E+01	1.146E+00	0.214
CD-109	-1.405E+02	1.242E+02	1.734E+02	1.429E+01	-0.811
PA-231	1.815E+00	1.670E+00	3.219E+00	4.579E-02	0.564
PA-234	3.484E+00	1.523E+00	2.845E+00	4.047E-02	1.224
AM-241	3.295E+01	1.077E+01	2.012E+01	9.894E-01	1.637

*C
7712*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710002_GE3_BAFIL_194060.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : BLANK
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:07:14
 Sample ID : 1307100-02 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.61 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	27.81	33	60	1.43	28.13	27	14	3.68E-02	29.0	1.05E+01
2	4	30.81	1958	97	1.44	31.13	27	14	2.18E+00	2.4	
3	4	34.95	512	100	1.93	35.27	27	14	5.69E-01	6.9	
4	0	52.18	47	131	2.41	52.50	50	9	5.25E-02	46.5	
5	2	58.97	23	28	1.65	59.29	58	16	2.54E-02	37.3	5.04E+00
6	2	61.81	302	54	1.66	62.13	58	16	3.36E-01	7.0	
7	2	65.62	99	62	1.67	65.94	58	16	1.10E-01	18.2	
8	0	80.85	841	150	1.59	81.17	76	8	9.35E-01	4.3	
9	0	93.96	30	98	1.10	94.28	90	8	3.35E-02	60.4	
10	0	111.62	244	114	1.51	111.93	107	8	2.71E-01	10.0	
11	0	116.07	63	82	1.83	116.38	115	6	7.02E-02	26.2	
12	0	142.50	22	80	1.60	142.82	139	8	2.44E-02	73.6	
13	0	161.31	42	64	1.29	161.62	158	8	4.67E-02	36.4	
14	0	238.71	29	75	1.67	239.02	234	10	3.22E-02	58.9	
15	7	276.59	53	27	1.84	276.90	272	20	5.94E-02	20.7	1.92E+00
16	7	287.14	14	23	3.17	287.45	272	20	1.51E-02	80.4	
17	0	295.91	8	26	1.70	296.22	294	6	9.02E-03	104.7	
18	2	302.90	128	16	1.61	303.21	299	16	1.42E-01	9.9	1.76E+00
19	2	307.04	35	17	1.99	307.34	299	16	3.84E-02	32.2	
20	1	333.53	94	14	1.83	333.83	329	16	1.04E-01	11.7	3.95E+00
21	1	337.86	18	18	1.83	338.17	329	16	2.00E-02	43.9	
22	0	355.87	523	34	1.58	356.18	351	9	5.81E-01	4.8	
23	1	383.73	110	39	1.53	384.04	382	8	1.22E-01	12.9	2.87E+01
24	1	386.67	173	84	1.54	386.98	382	8	1.93E-01	9.7	
25	0	391.15	57	10	1.63	391.45	390	5	6.29E-02	16.7	
26	4	414.68	48	13	2.42	414.98	411	16	5.30E-02	19.7	1.77E+00
27	4	418.20	48	10	2.30	418.50	411	16	5.28E-02	23.2	
28	4	422.28	16	9	2.53	422.58	411	16	1.81E-02	54.2	
29	1	433.53	6	17	1.91	433.83	431	13	6.42E-03	122.5	5.18E+00
30	1	436.83	121	12	1.91	437.13	431	13	1.35E-01	9.5	
31	0	468.75	31	10	2.86	469.05	464	10	3.39E-02	26.4	
32	0	510.75	22	0	1.90	511.05	508	7	2.44E-02	21.3	
33	0	607.23	27	0	8.05	607.52	601	13	3.00E-02	19.2	

Summary of Nuclide Activity

Sample ID : 1307100-02

Acquisition date : 31-JUL-2013 08:07:14

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.033E+02	4.033E+02	0.725E+02	17.97	
Total Activity :			4.033E+02	4.033E+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	9.027E+02	9.027E+02	1.405E+02	15.57	
AM-241	432.20Y	1.00	6.621E+00	6.621E+00	4.955E+00	74.84	
Total Activity :			9.094E+02	9.094E+02			

Grand Total Activity : 1.313E+03 1.313E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.033E+02	4.033E+02	17.97	OK
	302.84	17.80	6.222E+00	3.473E+02	3.474E+02	28.52	OK
	356.01	60.00	5.860E+00	4.467E+02	4.467E+02	16.70	OK

Final Mean for 3 Valid Peaks = 4.033E+02 +/- 7.246E+01 (17.97%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	9.027E+02	9.027E+02	15.57	OK

Final Mean for 1 Valid Peaks = 9.027E+02 +/- 1.405E+02 (15.57%)

AM-241	59.54	35.90*	2.893E+01	6.621E+00	6.621E+00	74.84	OK
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Final Mean for 1 Valid Peaks = 6.621E+00 +/- 4.955E+00 (74.84%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.033E+02	7.246E+01	2.109E+01	3.226E+00	19.121
TH-234	9.027E+02	1.405E+02	1.135E+02	6.094E+00	7.956
AM-241	6.621E+00	4.955E+00	1.097E+01	5.393E-01	0.604

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.277E+00	6.431E+00	9.636E+00	1.101E+00	-0.340
CD-109	-1.459E+02	1.322E+02	1.860E+02	1.533E+01	-0.784
PA-231	6.364E+00	2.066E+00	4.255E+00	6.052E-02	1.496
PA-234	3.463E+00	1.524E+00	2.961E+00	4.212E-02	1.169
NP-237	5.975E+00	3.877E+01	5.589E+01	4.518E+00	0.107

From

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710003_GE3_BAFIL_194063.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-AS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:27:25
 Sample ID : 1307100-03 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.13 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.89	58	101	1.73	28.21	26	15	6.41E-02	38.3	1.00E+01
2	3	30.80	1967	72	1.44	31.12	26	15	2.19E+00	2.3	
3	3	34.85	482	74	1.75	35.17	26	15	5.36E-01	5.4	
4	3	52.13	39	87	1.80	52.45	50	20	4.36E-02	38.6	3.18E+00
5	3	61.75	268	76	1.82	62.07	50	20	2.97E-01	7.7	
6	3	65.98	118	76	1.83	66.30	50	20	1.31E-01	16.1	
7	1	80.82	749	66	1.54	81.14	76	14	8.32E-01	4.1	6.41E+00
8	1	83.68	14	45	1.41	84.00	76	14	1.61E-02	133.3	
9	0	102.47	31	77	2.77	102.78	99	8	3.43E-02	52.6	
10	1	111.59	232	47	1.59	111.91	107	15	2.57E-01	8.0	2.60E+00
11	1	115.72	65	49	1.60	116.04	107	15	7.19E-02	20.7	
12	0	160.59	24	79	1.53	160.90	157	7	2.68E-02	64.3	
13	0	277.05	46	43	1.71	277.36	272	9	5.14E-02	29.4	
14	1	302.77	143	26	1.50	303.08	299	12	1.59E-01	9.9	3.72E+00
15	1	307.53	30	27	1.81	307.84	299	12	3.36E-02	30.8	
16	2	333.63	88	8	1.74	333.93	328	15	9.78E-02	12.1	1.41E+00
17	2	337.69	20	9	2.02	337.99	328	15	2.23E-02	38.8	
18	0	355.99	496	65	1.67	356.29	352	8	5.51E-01	5.2	
19	0	377.15	15	22	3.03	377.45	372	8	1.67E-02	59.8	
20	1	383.59	116	16	1.87	383.90	381	9	1.29E-01	12.1	7.91E+00
21	1	386.72	209	23	1.59	387.02	381	9	2.32E-01	7.9	
22	0	391.17	54	9	1.93	391.47	390	5	5.97E-02	16.8	
23	7	415.05	53	6	3.05	415.35	410	14	5.86E-02	18.4	2.05E+00
24	7	418.54	22	7	2.52	418.84	410	14	2.48E-02	43.9	
25	0	436.76	111	4	1.55	437.06	432	9	1.23E-01	10.1	
26	0	467.30	22	6	2.05	467.60	463	8	2.44E-02	28.7	
27	0	510.72	13	4	1.88	511.02	506	9	1.43E-02	40.4	

Total number of lines in spectrum 27
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 4 14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.588E+02	3.588E+02	0.640E+02	17.82	
Total Activity :			3.588E+02	3.588E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	7.985E+02	7.985E+02	1.347E+02	16.87	
Total Activity :			7.985E+02	7.985E+02			

Grand Total Activity : 1.157E+03 1.157E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.588E+02	3.588E+02	17.82	OK
	302.84	17.80	6.222E+00	3.875E+02	3.875E+02	28.52	OK
	356.01	60.00	5.860E+00	4.238E+02	4.239E+02	17.13	OK

Final Mean for 3 Valid Peaks = 3.588E+02+/- 6.396E+01 (17.82%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.985E+02	7.985E+02	16.87	OK

Final Mean for 1 Valid Peaks = 7.985E+02+/- 1.347E+02 (16.87%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.588E+02	6.396E+01	1.840E+01	2.814E+00	19.498
TH-234	7.985E+02	1.347E+02	1.267E+02	6.808E+00	6.300

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.694E+00		6.096E+00	8.996E+00	1.028E+00	-0.411
CD-109	-1.026E+02		1.194E+02	1.727E+02	1.424E+01	-0.594
PA-231	2.044E+00		1.624E+00	3.176E+00	4.517E-02	0.644
PA-234	2.493E+00		1.423E+00	2.609E+00	3.711E-02	0.955
NP-237	-7.275E+00		2.944E+01	5.021E+01	4.059E+00	-0.145
AM-241	3.386E+01		9.647E+00	1.931E+01	9.494E-01	1.753

Handwritten mark: a checkmark and the number 27.

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710004_GE3_BAFIL_194066.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-AS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:00:59
 Sample ID : 1307100-04 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.85 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.72	2026	98	1.57	31.04	26	13	2.25E+00	2.3	1.12E+01
2	3	35.02	559	72	1.63	35.34	26	13	6.21E-01	5.0	
3	0	52.99	112	102	2.42	53.31	49	9	1.24E-01	18.9	
4	3	61.76	266	51	1.82	62.08	58	17	2.96E-01	7.3	3.94E+00
5	3	65.75	126	62	1.83	66.07	58	17	1.40E-01	14.8	
6	3	70.06	18	63	1.84	70.38	58	17	2.04E-02	75.2	
7	0	80.86	856	150	1.57	81.18	76	10	9.52E-01	4.3	
8	0	93.80	23	85	1.15	94.12	90	7	2.54E-02	70.7	
9	2	111.76	222	42	1.75	112.08	107	17	2.46E-01	8.3	2.25E+00
10	2	115.70	54	48	1.76	116.01	107	17	6.05E-02	28.1	
11	0	142.63	48	46	4.62	142.94	139	8	5.29E-02	28.7	
12	0	161.22	20	60	1.12	161.54	158	6	2.17E-02	67.1	
13	0	276.25	74	24	1.60	276.56	273	8	8.18E-02	16.6	
14	0	302.81	128	46	1.32	303.11	299	8	1.42E-01	12.7	
15	1	333.67	79	18	1.83	333.97	330	15	8.80E-02	13.1	3.68E+00
16	1	338.53	30	8	1.83	338.83	330	15	3.32E-02	28.3	
17	1	350.70	12	1	1.68	351.00	350	10	1.37E-02	12.8	9.72E+00
18	1	355.84	520	11	1.72	356.15	350	10	5.78E-01	4.4	
19	1	383.57	121	8	1.87	383.87	380	15	1.34E-01	11.4	5.63E+00
20	1	386.75	211	6	1.87	387.05	380	15	2.35E-01	8.5	
21	1	390.87	51	4	1.88	391.17	380	15	5.69E-02	21.9	
22	0	404.80	9	5	2.53	405.10	402	6	1.04E-02	48.9	
23	5	415.75	44	16	2.77	416.05	412	14	4.87E-02	24.2	3.64E+00
24	5	421.80	11	14	2.30	422.10	412	14	1.18E-02	69.3	
25	0	436.92	89	20	1.75	437.22	432	10	9.90E-02	14.1	
26	1	467.69	27	2	1.93	467.99	464	19	3.01E-02	22.8	1.23E+00
27	1	471.64	11	1	1.94	471.94	464	19	1.21E-02	47.2	
28	1	478.68	6	0	1.94	478.98	464	19	6.14E-03	60.7	
29	0	511.49	21	7	2.90	511.79	507	10	2.31E-02	32.8	
30	0	609.16	7	5	1.23	609.45	606	7	7.45E-03	68.6	

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.105E+02	4.105E+02	0.740E+02	18.03		
Total Activity :			4.105E+02	4.105E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	7.948E+02	7.948E+02	1.275E+02	16.05		
Total Activity :			7.948E+02	7.948E+02				

Grand Total Activity : 1.205E+03 1.205E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.105E+02	4.105E+02	18.03	OK
	302.84	17.80	6.222E+00	3.472E+02	3.472E+02	32.76	OK
	356.01	60.00	5.860E+00	4.444E+02	4.444E+02	16.26	OK

Final Mean for 3 Valid Peaks = 4.105E+02 +/- 7.403E+01 (18.03%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.948E+02	7.948E+02	16.05	OK

Final Mean for 1 Valid Peaks = 7.948E+02 +/- 1.275E+02 (16.05%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.105E+02	7.403E+01	1.713E+01	2.620E+00	23.960
TH-234	7.948E+02	1.275E+02	1.015E+02	5.451E+00	7.831

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.124E+00		6.436E+00	1.056E+01	1.206E+00	0.107
CD-109	-1.120E+02		1.406E+02	1.750E+02	1.443E+01	-0.640
PA-231	2.215E+00		1.536E+00	3.064E+00	4.357E-02	0.723
PA-234	3.782E+00		1.509E+00	2.856E+00	4.063E-02	1.324
NP-237	2.518E+00		3.656E+01	5.235E+01	4.232E+00	0.048
AM-241	3.425E+01		9.505E+00	1.798E+01	8.839E-01	1.905

7131

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710005_GE3_BAFIL_194071.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-AS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:20:45
 Sample ID : 1307100-05 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.51 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.80	1958	93	1.44	31.12	26	15	2.18E+00	2.4	2.34E+00
2	4	34.99	531	89	1.69	35.31	26	15	5.90E-01	5.2	
3	0	52.88	81	130	2.16	53.20	50	8	9.04E-02	27.1	
4	3	61.75	276	65	1.63	62.07	58	18	3.07E-01	7.5	6.01E-01
5	3	65.73	131	81	1.83	66.05	58	18	1.46E-01	15.2	
6	0	80.91	817	120	1.70	81.22	76	10	9.07E-01	4.3	
7	3	111.64	257	53	1.93	111.96	107	15	2.85E-01	7.6	1.95E+00
8	3	116.16	51	31	1.93	116.48	107	15	5.67E-02	26.5	
9	0	147.38	23	65	1.36	147.70	145	7	2.55E-02	61.9	
10	0	160.58	35	73	1.17	160.90	158	6	3.88E-02	42.5	
11	0	276.98	55	38	1.66	277.28	272	9	6.11E-02	24.3	
12	1	302.86	150	19	1.65	303.16	300	15	1.67E-01	9.3	4.35E+00
13	1	306.86	23	23	1.81	307.16	300	15	2.55E-02	46.7	
14	1	310.68	9	24	1.81	310.99	300	15	9.81E-03	85.5	
15	1	333.74	71	7	1.82	334.05	328	16	7.90E-02	12.9	1.93E+00
16	1	337.86	37	4	1.83	338.17	328	16	4.14E-02	20.4	
17	7	352.26	15	12	3.27	352.56	350	12	1.66E-02	60.7	6.09E+00
18	7	355.98	506	10	1.62	356.28	350	12	5.63E-01	4.5	
19	0	366.20	11	28	1.75	366.50	362	9	1.19E-02	93.0	
20	1	383.72	109	13	1.60	384.02	382	16	1.21E-01	12.2	2.50E+00
21	1	386.71	182	17	1.87	387.02	382	16	2.03E-01	9.6	
22	1	390.74	50	18	1.87	391.04	382	16	5.57E-02	22.3	
23	2	414.63	42	10	2.08	414.93	411	18	4.69E-02	18.8	2.42E+00
24	2	418.35	22	6	2.09	418.65	411	18	2.47E-02	33.1	
25	2	422.06	15	4	2.09	422.36	411	18	1.66E-02	46.6	
26	0	436.94	92	14	1.38	437.24	433	8	1.02E-01	12.6	
27	0	458.59	8	1	1.05	458.89	456	6	8.58E-03	43.4	
28	0	469.45	6	9	2.79	469.75	464	7	6.93E-03	88.3	
29	0	510.68	28	6	3.64	510.97	507	9	3.07E-02	25.4	

Summary of Nuclide Activity

Sample ID : 1307100-05

Acquisition date : 31-JUL-2013 09:20:45

Total number of lines in spectrum 29
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 4 13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.914E+02	3.914E+02	0.705E+02	18.00	
Total Activity :			3.914E+02	3.914E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	8.235E+02	8.235E+02	1.351E+02	16.40	
Total Activity :			8.235E+02	8.235E+02			

Grand Total Activity : 1.215E+03 1.215E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.914E+02	3.914E+02	18.00	OK
	302.84	17.80	6.222E+00	4.065E+02	4.065E+02	27.71	OK
	356.01	60.00	5.860E+00	4.324E+02	4.324E+02	16.36	OK

Final Mean for 3 Valid Peaks = 3.914E+02 +/- 7.047E+01 (18.00%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	8.235E+02	8.235E+02	16.40	OK

Final Mean for 1 Valid Peaks = 8.235E+02 +/- 1.351E+02 (16.40%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.914E+02	7.047E+01	1.526E+01	2.334E+00	25.646
TH-234	8.235E+02	1.351E+02	1.135E+02	6.094E+00	7.257

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.826E-01		4.676E+00	7.859E+00	8.978E-01	0.061
CD-109	-2.321E+01		1.054E+02	1.660E+02	1.369E+01	-0.140
PA-231	4.437E+00		2.038E+00	4.047E+00	5.756E-02	1.096
PA-234	4.749E+00		1.556E+00	3.008E+00	4.278E-02	1.579
NP-237	8.570E+00		2.747E+01	4.656E+01	3.764E+00	0.184
AM-241	3.253E+01		1.002E+01	1.831E+01	9.001E-01	1.777

Handwritten mark

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710006_GE3_BAFIL_194074.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-109-SS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:45:03
 Sample ID : 1307100-06 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.48 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.80	2027	97	1.43	31.12	27	13	2.25E+00	2.3	1.95E+00
2	3	35.02	489	72	1.55	35.34	27	13	5.43E-01	5.4	
3	0	52.86	34	110	2.99	53.18	49	7	3.74E-02	54.6	
4	1	58.82	23	82	1.50	59.14	57	17	2.61E-02	67.7	3.21E+00
5	1	61.72	246	81	1.51	62.04	57	17	2.73E-01	8.6	
6	1	65.66	88	81	1.52	65.98	57	17	9.78E-02	19.1	
7	0	80.92	808	165	1.66	81.24	76	10	8.98E-01	4.6	
8	0	92.37	47	108	3.57	92.69	88	9	5.26E-02	42.1	
9	0	111.31	246	93	1.64	111.63	107	8	2.73E-01	9.4	
10	0	161.13	27	60	2.26	161.45	158	7	2.96E-02	51.9	
11	0	262.29	9	23	2.62	262.59	260	5	9.55E-03	91.4	
12	0	276.90	39	45	2.26	277.21	272	9	4.33E-02	34.9	
13	1	302.78	160	14	1.47	303.09	298	12	1.78E-01	8.3	5.64E+00
14	1	306.83	37	18	1.81	307.14	298	12	4.12E-02	28.3	
15	0	333.78	56	29	1.76	334.09	331	6	6.23E-02	20.2	
16	0	337.79	29	17	1.26	338.09	337	5	3.26E-02	29.1	
17	0	355.85	522	27	1.67	356.16	351	9	5.80E-01	4.7	
18	1	383.82	121	8	1.68	384.13	382	14	1.34E-01	11.0	1.24E+00
19	1	386.80	180	11	1.87	387.11	382	14	2.00E-01	9.8	
20	1	390.87	41	12	1.88	391.17	382	14	4.58E-02	27.2	
21	1	414.53	47	19	1.89	414.83	411	13	5.21E-02	20.6	3.60E+00
22	1	417.87	37	17	1.90	418.17	411	13	4.08E-02	28.8	
23	0	436.70	113	10	1.51	437.00	432	10	1.26E-01	10.7	
24	0	445.78	8	2	1.59	446.08	444	5	8.33E-03	43.3	
25	0	468.22	17	10	2.31	468.52	464	8	1.84E-02	41.5	
26	0	511.80	5	8	1.20	512.10	508	6	5.13E-03	111.5	

Summary of Nuclide Activity

Sample ID : 1307100-06

Acquisition date : 31-JUL-2013 09:45:03

Total number of lines in spectrum 26
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 5 19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.872E+02	3.872E+02	0.708E+02	18.30	
Total Activity :			3.872E+02	3.872E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	7.340E+02	7.340E+02	1.362E+02	18.55	
AM-241	432.20Y	1.00	6.790E+00	6.790E+00	9.201E+00	135.50	
Total Activity :			7.408E+02	7.408E+02			

Grand Total Activity : 1.128E+03 1.128E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.872E+02	3.872E+02	18.30	OK
	302.84	17.80	6.222E+00	4.348E+02	4.349E+02	26.51	OK
	356.01	60.00	5.860E+00	4.458E+02	4.459E+02	16.60	OK

Final Mean for 3 Valid Peaks = 3.872E+02+/- 7.085E+01 (18.30%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.340E+02	7.340E+02	18.55	OK

Final Mean for 1 Valid Peaks = 7.340E+02+/- 1.362E+02 (18.55%)

AM-241	59.54	35.90*	2.893E+01	6.790E+00	6.790E+00	135.50	OK
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Final Mean for 1 Valid Peaks = 6.790E+00+/- 9.201E+00 (135.50%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.872E+02	7.085E+01	2.001E+01	3.060E+00	19.352
TH-234	7.340E+02	1.362E+02	1.276E+02	6.852E+00	5.754
AM-241	6.790E+00	9.201E+00	1.233E+01	6.064E-01	0.551

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.298E+00		5.796E+00	9.261E+00	1.058E+00	-0.464
CD-109	-3.383E+01		1.283E+02	1.744E+02	1.438E+01	-0.194
PA-231	2.622E+00		1.479E+00	3.030E+00	4.310E-02	0.865
PA-234	3.551E+00		1.509E+00	2.946E+00	4.189E-02	1.205
NP-237	-1.094E+01		3.885E+01	5.264E+01	4.255E+00	-0.208

7/31/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710007_GE2_BAFIL_194059.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-109-SS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:06:32
 Sample ID : 1307100-07 Sample Quantity : 1.000000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.89	1917	113	1.43	31.00	26	15	2.13E+00	2.4	5.62E+00
2	2	35.15	479	117	1.53	35.27	26	15	5.32E-01	5.8	
3	4	53.04	58	79	1.91	53.16	50	25	6.42E-02	27.8	3.10E+00
4	4	61.85	219	81	1.94	61.96	50	25	2.44E-01	9.6	
5	4	65.82	134	82	1.95	65.93	50	25	1.49E-01	14.4	
6	0	80.96	733	145	1.36	81.08	77	8	8.14E-01	4.7	
7	0	91.96	28	111	1.42	92.07	89	8	3.07E-02	69.0	
8	2	111.89	177	58	1.61	112.00	108	14	1.97E-01	9.8	1.31E+00
9	2	116.18	37	48	1.71	116.30	108	14	4.17E-02	34.8	
10	0	162.53	25	67	2.22	162.64	158	7	2.79E-02	57.4	
11	0	185.81	45	85	2.61	185.92	181	10	5.00E-02	41.1	
12	0	276.59	67	41	2.02	276.70	272	11	7.46E-02	22.2	
13	4	302.87	129	26	1.54	302.98	299	29	1.43E-01	10.4	2.53E+00
14	4	307.24	18	32	2.38	307.35	299	29	2.01E-02	64.7	
15	0	333.84	57	17	1.59	333.94	330	7	6.28E-02	18.1	
16	0	356.01	531	26	1.39	356.12	352	8	5.90E-01	4.6	
17	6	384.01	90	15	2.12	384.12	381	9	9.97E-02	15.7	7.29E+00
18	6	386.87	185	21	1.49	386.98	381	9	2.06E-01	8.5	
19	0	391.68	36	15	1.59	391.79	390	6	3.95E-02	26.2	
20	3	414.75	31	11	2.28	414.86	411	14	3.43E-02	27.4	1.45E+00
21	3	418.76	22	11	2.28	418.86	411	14	2.45E-02	41.6	
22	0	437.17	89	15	1.53	437.28	433	9	9.88E-02	13.3	
23	0	467.77	17	8	1.73	467.88	465	6	1.91E-02	35.0	
24	0	510.83	24	11	3.81	510.93	508	9	2.71E-02	31.8	

Total number of lines in spectrum 24
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 4 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.707E+02	3.707E+02	0.735E+02	19.83	
Total Activity :			3.707E+02	3.707E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	7.526E+02	7.526E+02	1.605E+02	21.33	
Total Activity :			7.526E+02	7.526E+02			

Grand Total Activity : 1.123E+03 1.123E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.707E+02	3.707E+02	19.83	OK
	302.84	17.80	7.560E+00	2.880E+02	2.880E+02	36.43	OK
	356.01	60.00	7.170E+00	3.706E+02	3.706E+02	17.77	OK

Final Mean for 3 Valid Peaks = 3.707E+02+/- 7.350E+01 (19.83%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.526E+02	7.526E+02	21.33	OK

Final Mean for 1 Valid Peaks = 7.526E+02+/- 1.605E+02 (21.33%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.707E+02	7.350E+01	2.082E+01	3.545E+00	17.805
TH-234	7.526E+02	1.605E+02	1.262E+02	1.043E+01	5.964

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.508E-01		5.597E+00	9.183E+00	1.410E+00	0.038
CD-109	-1.257E+02		1.487E+02	1.857E+02	2.132E+01	-0.677
PA-231	2.441E+01		3.851E+00	7.739E+00	1.474E-01	3.154
PA-234	4.342E+00		1.881E+00	3.466E+00	7.149E-02	1.253
NP-237	3.244E+00		3.954E+01	5.704E+01	6.440E+00	0.057
AM-241	2.786E+01		9.641E+00	1.931E+01	1.495E+00	1.443

C
7/11/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710008_GE2_BAFIL_194062.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-205-SS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 08:26:50
 Sample ID : 1307100-08 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.90	2031	104	1.40	31.02	26	14	2.26E+00	2.3	6.50E+00
2	2	35.13	505	108	1.53	35.25	26	14	5.62E-01	5.6	
3	0	52.55	51	79	1.85	52.66	50	6	5.69E-02	30.7	
4	4	61.77	224	74	1.53	61.89	58	15	2.48E-01	8.8	1.74E+00
5	4	66.08	122	70	1.83	66.20	58	15	1.36E-01	14.3	
6	0	81.03	798	114	1.37	81.14	77	8	8.87E-01	4.2	
7	2	111.88	208	41	1.45	112.00	108	14	2.31E-01	8.1	1.88E+00
8	2	116.18	37	43	1.71	116.30	108	14	4.10E-02	34.2	
9	0	154.90	26	64	1.51	155.01	150	8	2.90E-02	56.5	
10	0	161.46	29	67	1.25	161.58	158	8	3.23E-02	52.0	
11	3	185.39	30	47	2.00	185.50	182	24	3.29E-02	41.7	1.37E+00
12	3	191.72	15	44	2.01	191.83	182	24	1.71E-02	77.1	
13	3	197.75	21	41	2.02	197.86	182	24	2.38E-02	54.6	
14	0	231.73	28	46	3.06	231.84	227	8	3.13E-02	45.7	
15	1	239.05	23	21	1.72	239.16	236	11	2.54E-02	37.7	2.54E+00
16	1	242.89	10	15	1.56	243.00	236	11	1.12E-02	77.2	
17	0	277.39	33	30	1.63	277.50	273	7	3.62E-02	33.4	
18	3	302.85	171	13	1.43	302.96	299	18	1.90E-01	8.1	3.06E+00
19	3	306.92	36	13	1.99	307.03	299	18	4.00E-02	27.3	
20	3	313.35	11	11	2.17	313.46	299	18	1.21E-02	75.2	
21	0	334.00	63	41	1.67	334.11	330	9	7.00E-02	22.2	
22	0	356.00	509	34	1.34	356.11	352	8	5.65E-01	4.9	
23	0	376.78	15	12	2.80	376.88	373	7	1.67E-02	47.7	
24	5	383.80	99	5	1.95	383.90	380	15	1.10E-01	13.6	4.13E+00
25	5	386.81	172	9	1.54	386.92	380	15	1.92E-01	8.5	
26	5	390.89	32	19	2.73	391.00	380	15	3.53E-02	45.6	
27	3	414.33	35	11	2.23	414.43	410	18	3.92E-02	24.3	1.30E+00
28	3	418.35	26	11	2.28	418.46	410	18	2.88E-02	35.0	
29	3	422.80	13	11	2.29	422.90	410	18	1.47E-02	58.6	
30	0	437.09	95	15	1.48	437.19	432	10	1.06E-01	12.8	
31	1	464.84	5	0	1.92	464.94	463	11	5.99E-03	45.5	1.08E+00
32	1	468.07	18	1	1.93	468.18	463	11	1.98E-02	29.3	
33	0	482.62	9	2	3.42	482.73	480	6	1.04E-02	39.1	
34	0	511.60	12	10	1.40	511.70	509	8	1.28E-02	56.1	
35	0	811.40	5	2	1.07	811.49	809	6	5.79E-03	58.3	
36	0	848.05	7	0	1.66	848.14	845	6	7.78E-03	37.8	
37	0	853.91	7	0	2.50	854.00	852	5	7.78E-03	37.8	

Total number of lines in spectrum 37
 Number of unidentified lines 33
 Number of lines tentatively identified by NID 4 10.81%

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	4.039E+02	4.040E+02	0.785E+02	19.43		
Total Activity :			4.039E+02	4.040E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	7.669E+02	7.669E+02	1.520E+02	19.82		
Total Activity :			7.669E+02	7.669E+02				

Grand Total Activity : 1.171E+03 1.171E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	4.039E+02	4.040E+02	19.43	OK
	302.84	17.80	7.560E+00	3.817E+02	3.817E+02	33.97	OK
	356.01	60.00	7.170E+00	3.553E+02	3.553E+02	17.99	OK

Final Mean for 3 Valid Peaks = 4.040E+02 +/- 7.848E+01 (19.43%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.669E+02	7.669E+02	19.82	OK

Final Mean for 1 Valid Peaks = 7.669E+02 +/- 1.520E+02 (19.82%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.040E+02	7.848E+01	1.931E+01	3.288E+00	20.920
TH-234	7.669E+02	1.520E+02	1.424E+02	1.177E+01	5.386

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.943E-01		6.021E+00	9.543E+00	1.466E+00	-0.104
CD-109	4.016E+01		1.143E+02	1.925E+02	2.210E+01	0.209
PA-231	2.339E+01		3.778E+00	7.601E+00	1.448E-01	3.077
PA-234	2.205E+00		1.763E+00	3.109E+00	6.414E-02	0.709
NP-237	-1.643E+01		3.538E+01	5.438E+01	6.140E+00	-0.302
AM-241	2.092E+01		9.774E+00	1.900E+01	1.470E+00	1.101

*C
Fixing*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710009_GE2_BAFIL_194065.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-205-SS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:00:17
 Sample ID : 1307100-09 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.04	39	130	1.66	28.16	26	14	4.37E-02	61.5	1.61E+01
2	3	30.93	1948	93	1.43	31.04	26	14	2.16E+00	2.4	
3	3	35.05	494	97	1.68	35.17	26	14	5.49E-01	5.5	
4	0	53.21	83	81	2.51	53.33	50	8	9.22E-02	21.7	
5	5	61.68	268	54	1.77	61.80	58	15	2.98E-01	7.3	2.67E+00
6	5	65.94	103	62	2.15	66.05	58	15	1.14E-01	16.6	
7	0	81.03	717	130	1.31	81.15	77	8	7.97E-01	4.6	
8	0	93.11	26	70	1.10	93.22	89	6	2.93E-02	54.1	
9	1	111.75	167	44	1.55	111.87	107	14	1.85E-01	10.1	5.38E+00
10	1	116.03	53	32	1.56	116.14	107	14	5.90E-02	23.7	
11	0	185.77	37	83	1.80	185.88	182	9	4.13E-02	47.2	
12	0	277.46	27	45	1.64	277.57	273	10	3.00E-02	49.4	
13	3	302.86	158	11	1.54	302.97	299	15	1.75E-01	8.5	1.77E+00
14	3	307.43	33	6	2.16	307.54	299	15	3.70E-02	28.8	
15	3	310.77	12	3	2.17	310.88	299	15	1.38E-02	47.2	
16	3	330.59	11	6	1.99	330.70	329	8	1.18E-02	52.2	1.38E+00
17	3	333.85	57	17	1.80	333.96	329	8	6.28E-02	17.9	
18	0	356.03	471	46	1.34	356.14	352	8	5.23E-01	5.2	
19	1	384.06	137	11	1.86	384.17	380	15	1.52E-01	10.3	4.61E+00
20	1	386.82	159	10	1.86	386.92	380	15	1.77E-01	10.8	
21	1	391.06	47	9	1.86	391.17	380	15	5.23E-02	21.6	
22	1	414.72	28	9	1.88	414.83	412	9	3.08E-02	28.1	4.14E+00
23	1	417.72	30	13	1.89	417.83	412	9	3.33E-02	29.1	
24	0	437.04	85	12	1.37	437.15	433	8	9.45E-02	12.9	
25	0	468.00	14	18	2.24	468.11	463	9	1.53E-02	61.8	
26	0	504.04	7	0	1.66	504.14	501	6	7.78E-03	37.8	
27	0	511.67	27	3	3.49	511.78	507	10	3.05E-02	21.9	
28	0	604.51	4	5	0.87	604.61	600	7	4.57E-03	103.7	
29	0	610.22	16	2	1.99	610.32	606	10	1.77E-02	30.8	
30	0	969.41	8	0	1.33	969.50	966	7	8.89E-03	35.4	

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.628E+02	3.628E+02	0.718E+02	19.80	
Total Activity :			3.628E+02	3.628E+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	9.205E+02	9.205E+02	1.587E+02	17.24	
Total Activity :			9.205E+02	9.205E+02			

Grand Total Activity : 1.283E+03 1.283E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.628E+02	3.628E+02	19.80	OK
	302.84	17.80	7.560E+00	3.515E+02	3.515E+02	34.40	OK
	356.01	60.00	7.170E+00	3.288E+02	3.288E+02	18.42	OK

Final Mean for 3 Valid Peaks = 3.628E+02 +/- 7.183E+01 (19.80%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	9.205E+02	9.205E+02	17.24	OK

Final Mean for 1 Valid Peaks = 9.205E+02 +/- 1.587E+02 (17.24%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.628E+02	7.183E+01	2.023E+01	3.445E+00	17.934
TH-234	9.205E+02	1.587E+02	1.297E+02	1.072E+01	7.095

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.628E+00		5.507E+00	8.365E+00	1.285E+00	-0.314
CD-109	-5.017E+01		1.298E+02	1.749E+02	2.008E+01	-0.287
PA-231	2.807E+01		4.103E+00	8.209E+00	1.563E-01	3.419
PA-234	2.544E+00		1.631E+00	2.955E+00	6.094E-02	0.861
NP-237	-3.606E+01		4.134E+01	5.128E+01	5.790E+00	-0.703
AM-241	3.043E+01		1.045E+01	2.004E+01	1.551E+00	1.519

713112

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710010_GE2_BAFIL_194070.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 02 TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:19:55
 Sample ID : 1307100-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1916	107	1.32	31.02	26	14	2.13E+00	2.4	3.10E+00
2	3	35.10	449	127	1.52	35.21	26	14	4.99E-01	6.1	
3	0	54.23	42	102	2.42	54.35	48	8	4.72E-02	43.9	
4	1	59.02	22	54	1.45	59.13	57	14	2.49E-02	53.6	2.70E+00
5	1	61.90	145	63	1.46	62.02	57	14	1.61E-01	12.1	
6	1	65.75	83	73	1.47	65.87	57	14	9.22E-02	18.1	
7	0	80.98	745	112	1.37	81.09	77	8	8.28E-01	4.4	
8	0	92.08	21	88	1.90	92.20	89	7	2.28E-02	78.8	
9	0	111.87	174	103	1.23	111.98	108	7	1.93E-01	12.3	
10	0	116.57	41	57	1.97	116.69	115	6	4.59E-02	33.2	
11	0	143.77	33	72	3.09	143.88	141	8	3.69E-02	47.1	
12	1	161.04	32	49	1.62	161.15	157	17	3.58E-02	38.7	9.76E-01
13	1	170.94	13	43	1.64	171.05	157	17	1.44E-02	81.2	
14	0	186.67	37	61	1.36	186.78	184	7	4.09E-02	38.6	
15	0	276.79	51	38	1.68	276.90	274	8	5.66E-02	24.9	
16	0	303.40	155	47	1.72	303.51	299	10	1.72E-01	11.4	
17	0	334.33	70	58	1.73	334.44	330	10	7.73E-02	23.7	
18	0	356.09	493	36	1.36	356.20	352	8	5.48E-01	5.0	
19	1	383.78	118	9	1.86	383.89	380	15	1.31E-01	11.1	7.55E+00
20	1	386.91	184	9	1.86	387.02	380	15	2.04E-01	9.2	
21	1	390.91	42	9	1.86	391.02	380	15	4.64E-02	22.1	
22	1	414.72	11	18	1.88	414.83	412	10	1.22E-02	78.5	2.84E+00
23	1	418.02	20	26	1.89	418.13	412	10	2.26E-02	46.5	
24	0	437.07	92	8	1.54	437.17	433	7	1.02E-01	11.5	
25	0	469.67	29	10	5.82	469.78	465	13	3.18E-02	29.3	
26	0	510.91	22	13	1.83	511.02	507	10	2.45E-02	36.9	
27	0	582.57	9	0	1.16	582.67	579	8	1.00E-02	33.3	
28	0	609.90	20	0	3.03	610.00	606	10	2.22E-02	22.4	
29	0	749.11	6	2	2.37	749.21	746	6	6.11E-03	55.3	
30	0	911.13	9	0	2.38	911.22	907	8	1.00E-02	33.3	

Summary of Nuclide Activity

Sample ID : 1307100-10

Acquisition date : 31-JUL-2013 09:19:55

Total number of lines in spectrum 30
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 5 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.769E+02	3.770E+02	0.739E+02	19.59		
Total Activity :			3.769E+02	3.770E+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	4.983E+02	4.983E+02	1.288E+02	25.84		
AM-241	432.20Y	1.00	7.610E+00	7.610E+00	8.185E+00	107.55		
Total Activity :			5.059E+02	5.059E+02				

Grand Total Activity : 8.828E+02 8.828E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.769E+02	3.770E+02	19.59	OK
	302.84	17.80	7.560E+00	3.463E+02	3.463E+02	37.64	OK
	356.01	60.00	7.170E+00	3.440E+02	3.440E+02	18.12	OK

Final Mean for 3 Valid Peaks = 3.770E+02 +/- 7.385E+01 (19.59%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	4.983E+02	4.983E+02	25.84	OK

Final Mean for 1 Valid Peaks = 4.983E+02 +/- 1.288E+02 (25.84%)

AM-241	59.54	35.90*	2.461E+01	7.610E+00	7.610E+00	107.55	OK
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Final Mean for 1 Valid Peaks = 7.610E+00 +/- 8.185E+00 (107.55%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.770E+02	7.385E+01	1.867E+01	3.179E+00	20.193
TH-234	4.983E+02	1.288E+02	1.392E+02	1.150E+01	3.580
AM-241	7.610E+00	8.185E+00	1.376E+01	1.065E+00	0.553

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.869E+00	5.575E+00	8.659E+00	1.330E+00	-0.216
CD-109	2.316E+01	1.162E+02	1.728E+02	1.984E+01	0.134
PA-231	2.601E+01	3.986E+00	7.983E+00	1.520E-01	3.258
PA-234	2.680E+00	1.705E+00	3.073E+00	6.338E-02	0.872
NP-237	-1.406E+01	3.700E+01	4.996E+01	5.641E+00	-0.281

7/22

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710011_GE2_BAFIL_194073.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 02 DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:44:13
 Sample ID : 1307100-11 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.16	45	165	1.66	28.28	26	16	4.97E-02	54.4	1.21E+01
2	3	30.93	1662	112	1.40	31.04	26	16	1.85E+00	2.6	
3	3	35.05	472	105	1.68	35.17	26	16	5.25E-01	5.8	
4	0	52.93	66	101	1.47	53.04	49	9	7.33E-02	30.1	
5	10	60.97	81	73	2.91	61.08	58	16	9.03E-02	24.3	1.17E+01
6	10	66.10	112	67	2.39	66.22	58	16	1.24E-01	16.4	
7	10	70.28	23	64	2.38	70.40	58	16	2.53E-02	68.4	
8	1	80.95	703	53	1.50	81.06	76	11	7.81E-01	4.0	7.40E+00
9	1	84.01	25	49	1.50	84.13	76	11	2.75E-02	70.1	
10	0	93.19	25	60	1.21	93.30	90	6	2.81E-02	52.2	
11	3	111.84	155	43	1.63	111.95	107	15	1.72E-01	10.2	1.07E+00
12	3	116.32	38	36	1.88	116.43	107	15	4.26E-02	33.2	
13	0	160.12	34	65	1.58	160.23	157	7	3.72E-02	43.8	
14	0	185.63	29	73	1.38	185.75	182	7	3.20E-02	52.7	
15	0	276.54	50	34	1.89	276.65	272	9	5.60E-02	25.1	
16	0	303.02	128	28	1.30	303.13	299	7	1.42E-01	11.2	
17	2	333.55	49	21	1.99	333.65	330	12	5.48E-02	20.6	2.73E+00
18	2	338.24	20	17	2.00	338.35	330	12	2.17E-02	45.3	
19	0	356.04	472	32	1.31	356.14	352	8	5.25E-01	5.0	
20	1	383.72	90	24	1.86	383.83	380	10	1.00E-01	14.5	7.98E+00
21	1	386.82	106	44	1.58	386.93	380	10	1.18E-01	12.3	
22	4	414.91	16	25	2.35	415.02	411	14	1.79E-02	55.7	2.14E+00
23	4	418.10	15	21	2.51	418.20	411	14	1.71E-02	67.7	
24	0	436.96	73	13	1.44	437.06	432	10	8.16E-02	14.7	
25	0	467.77	10	15	1.66	467.87	465	7	1.12E-02	69.7	
26	0	511.11	21	9	3.15	511.21	506	9	2.35E-02	33.5	
27	0	534.12	6	2	2.86	534.22	531	6	6.11E-03	55.3	
28	0	584.10	6	2	2.59	584.21	581	7	6.74E-03	54.9	
29	0	744.66	4	3	1.39	744.76	741	6	4.60E-03	81.9	
30	0	911.18	11	0	2.32	911.27	907	8	1.22E-02	30.2	

Summary of Nuclide Activity

Sample ID : 1307100-11

Acquisition date : 31-JUL-2013 09:44:13

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.555E+02	3.555E+02	0.684E+02	19.24	
Total Activity :			3.555E+02	3.555E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
AM-241	432.20Y	1.00	2.763E+01	2.763E+01	1.365E+01	49.39	
Total Activity :			2.763E+01	2.763E+01			

Grand Total Activity : 3.831E+02 3.831E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.555E+02	3.555E+02	19.24	OK
	302.84	17.80	7.560E+00	2.856E+02	2.857E+02	37.34	OK
	356.01	60.00	7.170E+00	3.295E+02	3.296E+02	18.20	OK

Final Mean for 3 Valid Peaks = 3.555E+02+/- 6.841E+01 (19.24%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
AM-241	59.54	35.90*	2.461E+01	2.763E+01	2.763E+01	49.39	OK

Final Mean for 1 Valid Peaks = 2.763E+01+/- 1.365E+01 (49.39%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.555E+02	6.841E+01	1.915E+01	3.261E+00	18.562
AM-241	2.763E+01	1.365E+01	1.241E+01	9.601E-01	2.228

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-4.878E-01		5.007E+00	8.112E+00	1.246E+00	-0.060
CD-109	-8.270E+00		1.161E+02	1.656E+02	1.901E+01	-0.050
PA-231	2.801E+01		4.120E+00	8.233E+00	1.568E-01	3.402
PA-234	3.431E+00		1.820E+00	3.304E+00	6.815E-02	1.038
TH-234	4.443E+02		1.165E+02	2.248E+02	1.857E+01	1.977
NP-237	1.255E+01		3.271E+01	5.014E+01	5.661E+00	0.250

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710012_GE2_BAFIL_194077.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-SS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:13:23
 Sample ID : 1307100-12 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.13	29	155	1.66	28.25	26	15	3.27E-02	84.4	6.38E+00
2	3	30.93	1966	109	1.41	31.04	26	15	2.18E+00	2.4	
3	3	35.05	487	111	1.68	35.17	26	15	5.41E-01	5.7	
4	0	46.12	51	72	2.83	46.24	44	6	5.67E-02	29.8	
5	0	52.51	67	80	1.56	52.62	50	7	7.47E-02	25.2	
6	3	61.61	213	66	1.76	61.72	57	13	2.36E-01	9.1	1.84E+00
7	3	65.93	74	80	1.77	66.04	57	13	8.25E-02	21.9	
8	0	81.01	779	104	1.39	81.12	77	8	8.65E-01	4.2	
9	0	92.26	35	75	1.92	92.38	89	7	3.88E-02	44.5	
10	0	111.45	136	134	1.22	111.56	108	8	1.51E-01	17.0	
11	0	116.64	28	64	1.69	116.75	115	6	3.09E-02	49.9	
12	0	159.89	48	77	2.08	160.00	155	10	5.36E-02	37.0	
13	0	175.49	37	69	1.11	175.60	172	8	4.11E-02	42.4	
14	0	185.88	47	51	1.85	185.99	183	7	5.22E-02	29.1	
15	0	208.13	43	59	9.05	208.24	203	12	4.76E-02	39.2	
16	0	241.33	3	47	1.47	241.44	239	6	3.02E-03	417.2	
17	0	276.80	46	40	2.02	276.91	273	10	5.11E-02	29.6	
18	0	303.01	130	39	1.34	303.12	299	8	1.45E-01	12.0	
19	0	307.61	21	12	1.77	307.72	306	4	2.38E-02	31.3	
20	2	333.66	75	2	1.99	333.76	330	15	8.38E-02	13.2	2.33E+00
21	2	337.93	19	5	2.00	338.04	330	15	2.12E-02	33.7	
22	1	351.95	22	8	1.83	352.06	350	13	2.42E-02	23.7	1.51E+00
23	1	356.01	549	13	1.51	356.12	350	13	6.10E-01	4.4	
24	0	365.14	17	11	1.58	365.25	362	6	1.90E-02	39.7	
25	0	377.21	11	10	1.81	377.31	374	6	1.19E-02	56.7	
26	1	383.76	119	10	1.86	383.87	380	15	1.33E-01	11.4	8.41E+00
27	1	386.89	219	9	1.81	387.00	380	15	2.43E-01	8.0	
28	1	391.06	44	12	1.86	391.17	380	15	4.94E-02	22.3	
29	1	414.72	20	12	1.88	414.83	410	16	2.21E-02	36.1	7.29E-01
30	1	418.07	21	10	1.89	418.17	410	16	2.29E-02	37.5	
31	1	421.72	12	7	1.89	421.83	410	16	1.38E-02	53.2	
32	0	437.16	89	17	1.53	437.26	432	10	9.88E-02	13.8	
33	0	469.22	33	9	1.86	469.32	464	11	3.63E-02	26.0	
34	0	493.26	11	0	2.51	493.36	491	6	1.22E-02	30.2	
35	4	510.72	19	5	2.61	510.83	507	16	2.09E-02	32.3	7.55E-01
36	4	516.72	7	1	2.61	516.82	507	16	7.74E-03	65.8	
37	0	528.83	6	2	1.24	528.93	525	6	7.08E-03	50.2	
38	0	610.02	10	4	1.77	610.12	607	5	1.14E-02	42.2	
39	0	1179.77	7	0	1.66	1179.86	1177	6	7.78E-03	37.8	

Total number of lines in spectrum 39
 Number of unidentified lines 35
 Number of lines tentatively identified by NID 4 10.26%

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	3.941E+02	3.941E+02	0.766E+02	19.44		
Total Activity :			3.941E+02	3.941E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.295E+02	7.295E+02	1.481E+02	20.30		
Total Activity :			7.295E+02	7.295E+02				

Grand Total Activity : 1.124E+03 1.124E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.941E+02	3.941E+02	19.44	OK
	302.84	17.80	7.560E+00	2.910E+02	2.911E+02	38.34	OK
	356.01	60.00	7.170E+00	3.831E+02	3.831E+02	17.51	OK

Final Mean for 3 Valid Peaks = 3.941E+02+/- 7.661E+01 (19.44%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.295E+02	7.295E+02	20.30	OK

Final Mean for 1 Valid Peaks = 7.295E+02+/- 1.481E+02 (20.30%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.941E+02	7.661E+01	1.713E+01	2.917E+00	23.007
TH-234	7.295E+02	1.481E+02	1.339E+02	1.106E+01	5.449

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.283E+00		5.907E+00	9.308E+00	1.429E+00	-0.138
CD-109	6.133E+01		1.036E+02	1.655E+02	1.900E+01	0.371
PA-231	2.857E+01		3.972E+00	8.030E+00	1.529E-01	3.558
PA-234	4.079E+00		1.721E+00	3.225E+00	6.652E-02	1.265
NP-237	-1.771E+01		3.392E+01	4.462E+01	5.038E+00	-0.397
AM-241	2.978E+01		1.060E+01	2.017E+01	1.561E+00	1.476

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7172

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710013_GE5_BAFIL_194075.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-113-SS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 09:46:00
 Sample ID : 1307100-13 Sample Quantity : 1.000000E+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	20.96	113	22	1.00	206.47	194	22	1.26E-01	14.2	
2	0	30.94	2060	93	0.71	302.29	284	33	2.29E+00	2.6	
3	2	35.09	437	10	0.68	342.13	332	28	4.86E-01	5.5	1.66E+00
4	2	36.02	95	8	0.57	351.00	332	28	1.06E-01	19.1	
5	0	53.09	36	26	1.20	514.87	506	20	4.05E-02	37.5	
6	2	61.65	144	58	0.78	596.94	584	25	1.60E-01	15.3	3.43E+00
7	2	62.18	78	36	0.65	602.00	584	25	8.69E-02	20.5	
8	3	65.78	81	30	0.88	636.56	623	28	9.04E-02	20.3	1.25E+00
9	3	66.66	35	11	0.66	645.00	623	28	3.88E-02	29.0	
10	1	79.50	51	10	0.76	768.24	760	38	5.70E-02	19.5	1.30E+00
11	1	80.93	842	10	0.69	781.93	760	38	9.36E-01	3.5	
12	1	82.22	22	2	0.64	794.33	760	38	2.39E-02	19.7	
13	0	84.31	28	9	1.33	814.38	804	18	3.10E-02	28.6	
14	5	110.40	36	19	0.84	1064.73	1057	30	4.00E-02	26.4	1.07E+00
15	5	111.68	185	10	0.86	1077.04	1057	30	2.05E-01	8.7	
16	0	160.34	21	17	0.32	1543.97	1532	18	2.29E-02	42.9	
17	0	275.78	55	7	0.45	2651.73	2637	27	6.13E-02	16.7	
18	0	301.88	107	0	1.10	2902.11	2886	27	1.19E-01	9.7	
19	2	332.49	80	8	1.33	3195.89	3183	27	8.91E-02	11.4	3.82E+00
20	2	333.17	22	4	1.09	3202.37	3183	27	2.45E-02	33.6	
21	4	354.83	337	5	1.03	3410.26	3394	29	3.74E-01	6.0	1.11E+00
22	4	355.55	23	3	0.74	3417.11	3394	29	2.57E-02	69.8	
23	0	382.61	97	3	0.99	3676.78	3660	28	1.07E-01	10.7	
24	1	385.44	91	0	1.16	3704.00	3691	29	1.01E-01	13.3	4.95E+00
25	1	386.07	113	0	1.16	3710.00	3691	29	1.25E-01	10.4	

Summary of Nuclide Activity

Sample ID : 1307100-13

Acquisition date : 31-JUL-2013 09:46:00

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	4.253E+02	4.253E+02	0.716E+02	16.83		
Total Activity :			4.253E+02	4.253E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.066E+01	7.066E+01	2.908E+01	41.15		
Total Activity :			7.066E+01	7.066E+01				

Grand Total Activity : 4.959E+02 4.960E+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	4.253E+02	4.253E+02	16.83	OK
	302.84	17.80	2.575E+00	7.009E+02	7.010E+02	32.72	OK
	356.01	60.00	4.312E+00	2.684E+01	2.684E+01	140.33	OK

Final Mean for 3 Valid Peaks = 4.253E+02+/- 7.156E+01 (16.83%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr 2-Sigma		%Error	Status
				pCi/filter	pCi/filter		
TH-234	63.29	3.80*	8.750E+01	7.066E+01	7.066E+01	41.15	OK

Final Mean for 1 Valid Peaks = 7.066E+01+/- 2.908E+01 (41.15%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.253E+02	7.156E+01	1.221E+01	1.797E+00	34.843
TH-234	7.066E+01	2.908E+01	3.395E+01	4.368E-01	2.081

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.671E+00	1.499E+01	2.470E+01	8.373E+00	-0.351
CD-109	1.990E+01	9.565E+01	1.799E+02	1.731E+01	0.111
PA-231	2.478E-01	8.032E-01	1.570E+00	1.767E-02	0.158
PA-234	5.229E+00 +	1.497E+00	2.008E+00	2.260E-02	2.604
NP-237	-1.511E+01	2.849E+01	4.149E+01	3.660E+00	-0.364
AM-241	7.101E-01	1.363E+00	2.314E+00	2.604E-02	0.307

CFM

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710014_GE5_BAFIL_194079.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-SS TOT
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:14:53
 Sample ID : 1307100-14 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 00:15:01.11 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.27	95	20	0.43	209.47	202	17	1.05E-01	15.8	
2	0	30.95	1915	100	0.73	302.40	290	30	2.13E+00	2.8	
3	1	35.03	380	26	0.62	341.54	329	30	4.22E-01	6.4	1.06E+00
4	1	35.91	75	30	0.57	350.00	329	30	8.35E-02	26.6	
5	1	52.90	31	10	0.62	513.00	508	17	3.40E-02	25.7	1.93E+00
6	1	53.53	17	12	0.62	519.00	508	17	1.91E-02	54.4	
7	0	61.69	256	24	0.51	597.35	586	24	2.84E-01	7.6	
8	0	65.91	95	38	0.48	637.80	626	25	1.06E-01	17.9	
9	2	79.72	48	26	0.84	770.40	760	39	5.33E-02	34.8	1.24E+00
10	2	80.93	813	20	0.69	781.99	760	39	9.03E-01	3.7	
11	0	111.72	176	50	0.68	1077.41	1062	27	1.96E-01	12.0	
12	0	115.85	47	18	0.86	1117.09	1106	18	5.22E-02	23.2	
13	0	145.35	12	10	0.49	1400.15	1389	15	1.30E-02	58.6	
14	1	275.08	21	5	1.03	2645.00	2637	24	2.28E-02	37.1	2.75E+00
15	1	275.81	74	7	1.03	2652.00	2637	24	8.23E-02	12.0	
16	1	301.76	104	5	1.06	2901.00	2887	28	1.15E-01	10.9	1.52E+00
17	1	302.39	34	3	1.06	2907.00	2887	28	3.76E-02	28.8	
18	0	306.17	30	0	0.52	2943.30	2930	24	3.33E-02	18.3	
19	1	332.40	32	5	1.10	3195.00	3181	27	3.56E-02	28.8	9.06E-01
20	1	332.82	32	4	1.10	3199.00	3181	27	3.57E-02	26.7	
21	0	354.96	360	6	0.78	3411.47	3395	30	4.00E-01	5.4	
22	0	382.66	93	3	1.27	3677.23	3661	29	1.04E-01	10.9	
23	2	385.24	39	8	1.16	3702.00	3692	26	4.32E-02	28.6	1.89E+00
24	2	385.62	50	10	1.24	3705.66	3692	26	5.58E-02	24.6	
25	1	388.77	18	5	1.21	3735.88	3729	28	2.04E-02	25.6	1.05E+00
26	1	389.72	51	8	1.16	3745.00	3729	28	5.69E-02	16.8	

Summary of Nuclide Activity

Sample ID : 1307100-14

Acquisition date : 31-JUL-2013 10:14:53

Total number of lines in spectrum 26
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 5 19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.105E+02	4.105E+02	0.695E+02	16.94	
Total Activity :			4.105E+02	4.105E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.309E+02	2.309E+02	0.363E+02	15.74	
Total Activity :			2.309E+02	2.309E+02			

Grand Total Activity : 6.414E+02 6.414E+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	4.105E+02	4.105E+02	16.94	OK
	302.84	17.80	2.575E+00	2.214E+02	2.214E+02	63.29	OK
	356.01	60.00	4.312E+00	4.179E+02	4.179E+02	18.10	OK

Final Mean for 3 Valid Peaks = 4.105E+02+/- 6.953E+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	2.309E+02	2.309E+02	15.74	OK

Final Mean for 1 Valid Peaks = 2.309E+02+/- 3.635E+01 (15.74%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.105E+02	6.953E+01	1.548E+01	2.279E+00	26.525
TH-234	2.309E+02	3.635E+01	2.063E+01	2.655E-01	11.191

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.703E+01		1.564E+01	2.172E+01	7.364E+00	-0.784
CD-109	3.614E+01		9.379E+01	1.808E+02	1.740E+01	0.200
PA-231	-4.250E-01		8.209E-01	1.392E+00	1.567E-02	-0.305
PA-234	4.381E+00	+	1.395E+00	2.116E+00	2.381E-02	2.071
NP-237	1.156E+01		2.716E+01	5.208E+01	4.594E+00	0.222
AM-241	7.413E-01		1.419E+00	2.392E+00	2.693E-02	0.310

KB
7/31/13

VAX/VMS Peak Search Report Generated 31-JUL-2013 10:48:48.74

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710015_GE2_BAFIL_194080.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-104-SS DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:33:32
Sample ID : 1307100-15 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.90	1856	100	1.34	31.02	26	16	2.06E+00	2.4	2.33E+00
2	3	35.11	528	101	1.53	35.22	26	16	5.87E-01	5.3	
3	0	53.27	53	100	2.36	53.38	50	7	5.94E-02	33.9	
4	1	61.98	163	53	1.46	62.10	57	13	1.81E-01	10.7	4.20E+00
5	1	65.75	84	49	1.47	65.87	57	13	9.37E-02	17.0	
6	1	80.95	707	50	1.50	81.06	76	11	7.85E-01	4.1	8.81E+00
7	1	83.89	15	54	1.37	84.00	76	11	1.70E-02	111.9	
8	1	111.93	183	49	1.55	112.04	107	16	2.04E-01	9.3	1.15E+00
9	1	116.03	35	53	1.56	116.14	107	16	3.86E-02	35.3	
10	0	160.16	33	56	1.18	160.27	157	7	3.64E-02	42.1	
11	2	185.58	25	51	1.82	185.69	182	10	2.78E-02	48.6	5.40E-01
12	2	188.74	15	49	1.82	188.85	182	10	1.63E-02	83.1	
13	0	195.75	21	76	1.86	195.86	192	8	2.33E-02	75.1	
14	0	212.16	23	46	4.46	212.27	208	8	2.51E-02	56.2	
15	0	229.12	29	53	3.80	229.23	224	9	3.24E-02	49.5	
16	0	276.37	47	23	1.74	276.48	273	8	5.24E-02	22.7	
17	3	302.89	130	14	1.48	303.00	299	25	1.44E-01	9.5	1.31E+00
18	3	307.43	16	18	2.16	307.54	299	25	1.75E-02	60.0	
19	2	333.88	84	12	1.99	333.99	328	17	9.32E-02	13.1	1.49E+00
20	2	338.55	15	12	2.00	338.65	328	17	1.72E-02	48.0	
21	0	356.03	526	15	1.38	356.13	354	6	5.85E-01	4.5	
22	0	364.37	11	13	1.26	364.48	362	5	1.17E-02	59.2	
23	1	383.97	105	12	1.86	384.08	381	15	1.16E-01	13.1	3.92E+00
24	1	386.78	157	12	1.86	386.89	381	15	1.75E-01	10.6	
25	1	390.79	46	12	1.86	390.89	381	15	5.14E-02	21.8	
26	0	415.52	42	35	1.52	415.62	411	10	4.62E-02	30.9	
27	0	437.16	82	18	1.79	437.27	433	9	9.11E-02	14.5	
28	1	467.72	33	3	1.93	467.82	463	11	3.62E-02	18.8	2.36E+00
29	1	471.07	7	1	1.93	471.18	463	11	8.03E-03	81.3	
30	1	507.90	6	5	1.78	508.00	505	11	6.29E-03	75.5	4.39E+00
31	1	512.90	6	5	1.78	513.00	505	11	6.30E-03	106.2	
32	0	584.04	7	0	2.83	584.14	582	5	7.78E-03	37.8	

Summary of Nuclide Activity

Sample ID : 1307100-15

Acquisition date : 31-JUL-2013 10:33:32

Total number of lines in spectrum 32
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 4 12.50%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.577E+02	3.577E+02	0.692E+02	19.34		
Total Activity :			3.577E+02	3.577E+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	5.581E+02	5.581E+02	1.297E+02	23.24		
Total Activity :			5.581E+02	5.581E+02				

Grand Total Activity : 9.158E+02 9.159E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.577E+02	3.577E+02	19.34	OK
	302.84	17.80	7.560E+00	2.897E+02	2.897E+02	35.46	OK
	356.01	60.00	7.170E+00	3.673E+02	3.674E+02	17.62	OK

Final Mean for 3 Valid Peaks = 3.577E+02 +/- 6.918E+01 (19.34%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	5.581E+02	5.581E+02	23.24	OK

Final Mean for 1 Valid Peaks = 5.581E+02 +/- 1.297E+02 (23.24%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.577E+02	6.918E+01	1.883E+01	3.206E+00	18.996
TH-234	5.581E+02	1.297E+02	1.352E+02	1.117E+01	4.128

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.149E+00		5.597E+00	9.537E+00	1.465E+00	0.225
CD-109	4.001E+01		1.143E+02	1.924E+02	2.210E+01	0.208
PA-231	2.420E+01		3.850E+00	7.730E+00	1.472E-01	3.130
PA-234	3.092E+00		1.754E+00	3.181E+00	6.560E-02	0.972
NP-237	-2.795E+00		3.267E+01	5.264E+01	5.944E+00	-0.053
AM-241	2.227E+01		1.003E+01	1.877E+01	1.453E+00	1.187

V63
212/113

VAX/VMS Peak Search Report Generated 31-JUL-2013 11:05:51.44

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130710016_GE2_BAFIL_194083.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-101-SS TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:50:35
Sample ID : 1307100-16 Sample Quantity : 1.000000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE2 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.91	1957	109	1.41	31.02	27	16	2.17E+00	2.4	4.65E+00
2	2	35.13	431	115	1.53	35.25	27	16	4.79E-01	6.3	
3	1	52.89	37	64	1.44	53.00	50	24	4.13E-02	34.5	3.04E+00
4	1	61.81	185	57	1.46	61.93	50	24	2.06E-01	10.1	
5	1	65.75	69	52	1.47	65.87	50	24	7.69E-02	20.1	
6	1	70.02	28	50	1.47	70.13	50	24	3.08E-02	42.7	
7	0	81.08	804	143	1.44	81.20	76	10	8.94E-01	4.5	
8	0	93.12	41	81	1.85	93.24	89	8	4.57E-02	41.2	
9	1	111.79	175	46	1.55	111.90	107	21	1.95E-01	9.8	1.92E+00
10	1	115.75	30	35	1.56	115.86	107	21	3.31E-02	39.4	
11	1	118.75	21	31	1.56	118.86	107	21	2.31E-02	53.7	
12	0	144.30	22	74	1.91	144.41	142	7	2.48E-02	66.7	
13	0	186.01	28	97	1.26	186.12	183	8	3.07E-02	64.4	
14	3	276.36	39	19	2.13	276.47	272	21	4.38E-02	25.6	2.71E+00
15	3	285.31	10	16	2.14	285.42	272	21	1.16E-02	75.8	
16	0	302.88	149	40	1.36	302.98	300	7	1.65E-01	10.9	
17	1	333.78	68	20	1.74	333.89	330	16	7.52E-02	15.5	2.03E+00
18	1	338.03	29	14	1.82	338.13	330	16	3.18E-02	28.1	
19	1	351.89	11	10	1.66	352.00	351	10	1.28E-02	40.2	8.40E+00
20	1	355.97	484	16	1.52	356.07	351	10	5.38E-01	4.7	
21	1	383.95	107	12	1.86	384.05	380	15	1.18E-01	12.6	4.76E+00
22	1	386.83	175	6	1.86	386.93	380	15	1.95E-01	9.5	
23	1	391.04	43	1	1.86	391.14	380	15	4.73E-02	20.8	
24	0	415.81	48	28	1.71	415.92	411	10	5.35E-02	25.0	
25	1	432.91	7	4	1.90	433.02	431	10	8.11E-03	45.5	1.25E+00
26	1	436.93	121	3	1.62	437.03	431	10	1.34E-01	9.3	
27	1	467.87	29	8	1.93	467.97	464	14	3.25E-02	22.2	1.50E+00
28	1	473.07	8	4	1.93	473.18	464	14	8.87E-03	61.7	
29	4	510.31	14	0	2.37	510.41	506	13	1.51E-02	32.1	1.23E+00
30	4	514.57	9	0	2.61	514.68	506	13	1.01E-02	49.2	
31	0	591.00	6	1	2.81	591.11	589	5	6.75E-03	48.2	
32	0	600.54	7	2	1.55	600.64	598	6	8.09E-03	46.1	
33	0	609.28	7	5	1.36	609.38	607	6	7.87E-03	61.1	
34	0	661.04	11	5	2.25	661.14	656	10	1.22E-02	48.5	

Summary of Nuclide Activity

Sample ID : 1307100-16

Acquisition date : 31-JUL-2013 10:50:35

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.070E+02	4.071E+02	0.800E+02	19.66	
Total Activity :			4.070E+02	4.071E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	2.566E+03	2.566E+03	0.913E+03	35.59	
TH-234	4.47E+09Y	1.00	6.350E+02	6.350E+02	1.411E+02	22.22	
Total Activity :			3.201E+03	3.201E+03			

Grand Total Activity : 3.608E+03 3.608E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	4.070E+02	4.071E+02	19.66	OK
	302.84	17.80	7.560E+00	3.316E+02	3.316E+02	37.01	OK
	356.01	60.00	7.170E+00	3.382E+02	3.382E+02	17.85	OK

Final Mean for 3 Valid Peaks = 4.071E+02 +/- 8.002E+01 (19.66%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-231	9.28	42.00*	1.000E+02	-----	Line Out Of Range	----	Absent
	10.11	20.20	1.000E+02	-----	Line Out Of Range	----	Absent
	283.67	1.60	7.750E+00	2.537E+02	2.537E+02	153.95	OK
	302.67	2.30	7.562E+00	2.566E+03	2.566E+03	35.59	OK

Final Mean for 2 Valid Peaks = 2.566E+03 +/- 9.132E+02 (35.59%)

TH-234	63.29	3.80*	2.305E+01	6.350E+02	6.350E+02	22.22	OK
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Final Mean for 1 Valid Peaks = 6.350E+02 +/- 1.411E+02 (22.22%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.071E+02	8.002E+01	1.677E+01	2.855E+00	24.275
PA-231	2.566E+03	9.132E+02	8.240E+00	1.569E-01	311.359
TH-234	6.350E+02	1.411E+02	1.273E+02	1.052E+01	4.989

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.383E+00		4.842E+00	8.067E+00	1.239E+00	-0.295
CD-109	-1.188E+02		1.322E+02	1.619E+02	1.859E+01	-0.734
PA-234	2.551E+00		1.713E+00	3.226E+00	6.654E-02	0.791
NP-237	5.782E+00		3.434E+01	5.077E+01	5.732E+00	0.114
AM-241	3.097E+01		9.974E+00	1.999E+01	1.547E+00	1.549

*C
Figu*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710017_GE3_BAFIL_194078.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-101-SS DIS
 Deposition Date :
 Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:14:13
 Sample ID : 1307100-17 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.41 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.95	61	65	1.57	28.27	27	14	6.78E-02	20.8	5.46E+00
2	3	30.79	1882	71	1.44	31.11	27	14	2.09E+00	2.4	
3	3	35.00	460	63	1.75	35.32	27	14	5.11E-01	5.6	
4	0	52.82	68	116	1.86	53.14	49	9	7.56E-02	31.1	
5	2	61.74	243	65	1.66	62.06	58	12	2.70E-01	8.2	2.12E+00
6	2	65.85	107	70	1.67	66.17	58	12	1.19E-01	15.6	
7	0	80.92	780	133	1.64	81.24	76	10	8.67E-01	4.5	
8	4	111.80	240	50	1.74	112.11	108	12	2.66E-01	7.8	7.34E-01
9	4	115.64	66	43	2.13	115.96	108	12	7.32E-02	25.0	
10	0	161.44	20	67	1.73	161.76	158	6	2.20E-02	69.7	
11	0	276.93	55	52	2.24	277.24	271	11	6.07E-02	29.0	
12	1	302.76	139	24	1.55	303.06	299	13	1.54E-01	10.0	1.35E+00
13	1	306.74	19	30	1.81	307.04	299	13	2.08E-02	56.9	
14	3	316.19	15	4	1.74	316.49	315	7	1.63E-02	30.4	5.80E+00
15	3	318.36	10	8	2.20	318.66	315	7	1.13E-02	65.5	
16	0	333.94	46	38	1.24	334.25	331	6	5.15E-02	25.5	
17	0	338.09	26	10	1.90	338.39	337	5	2.93E-02	28.9	
18	1	351.69	19	8	1.84	352.00	350	11	2.13E-02	32.6	1.13E+00
19	1	355.86	507	19	1.51	356.17	350	11	5.63E-01	4.6	
20	1	376.57	18	6	1.86	376.88	371	28	1.98E-02	36.4	1.21E+00
21	1	383.82	119	6	1.87	384.13	371	28	1.33E-01	10.9	
22	1	386.86	207	5	1.63	387.16	371	28	2.30E-01	7.6	
23	1	390.87	41	6	1.88	391.17	371	28	4.57E-02	26.5	
24	4	413.90	28	9	2.52	414.20	411	12	3.16E-02	28.5	3.22E+00
25	4	417.75	14	26	2.52	418.05	411	12	1.58E-02	72.9	
26	0	436.78	91	10	1.63	437.08	432	10	1.01E-01	12.3	
27	0	469.36	15	27	2.40	469.66	464	9	1.63E-02	68.9	
28	0	511.01	17	3	1.33	511.31	508	7	1.89E-02	30.1	
29	0	608.83	16	0	1.75	609.12	605	9	1.78E-02	25.0	

Total number of lines in spectrum 29
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 4 13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.739E+02	3.739E+02	0.681E+02	18.21		
Total Activity :			3.739E+02	3.739E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	7.260E+02	7.260E+02	1.283E+02	17.68		
Total Activity :			7.260E+02	7.260E+02				

Grand Total Activity : 1.100E+03 1.100E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.739E+02	3.739E+02	18.21	OK
	302.84	17.80	6.222E+00	3.758E+02	3.759E+02	28.71	OK
	356.01	60.00	5.860E+00	4.328E+02	4.328E+02	16.46	OK

Final Mean for 3 Valid Peaks = 3.739E+02+/- 6.810E+01 (18.21%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.260E+02	7.260E+02	17.68	OK

Final Mean for 1 Valid Peaks = 7.260E+02+/- 1.283E+02 (17.68%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.739E+02	6.810E+01	1.778E+01	2.719E+00	21.031
TH-234	7.260E+02	1.283E+02	1.196E+02	6.422E+00	6.072

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.084E+00		6.031E+00	9.962E+00	1.138E+00	0.109
CD-109	-6.762E+00		1.110E+02	1.777E+02	1.465E+01	-0.038
PA-231	3.667E+00		1.702E+00	3.478E+00	4.947E-02	1.054
PA-234	3.249E+00		1.473E+00	2.867E+00	4.078E-02	1.133
NP-237	1.022E+01		2.984E+01	5.027E+01	4.064E+00	0.203
AM-241	2.750E+01		9.258E+00	1.776E+01	8.730E-01	1.549

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VAX/VMS Peak Search Report Generated 31-JUL-2013 10:49:45.81

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710018_GE3_BAFIL_194081.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-104-SD TOT
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:34:19
Sample ID : 1307100-18 Sample Quantity : 1.000000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.06 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	27.81	26	47	1.43	28.13	27	13	2.92E-02	34.9	1.07E+01
2	3	30.79	1789	86	1.43	31.11	27	13	1.99E+00	2.5	
3	3	34.85	437	95	1.75	35.17	27	13	4.85E-01	5.9	
4	0	52.06	51	89	1.72	52.38	49	7	5.66E-02	33.8	
5	1	61.75	214	96	1.51	62.07	58	13	2.38E-01	9.8	5.39E+00
6	1	65.54	84	92	1.52	65.86	58	13	9.29E-02	20.6	
7	2	80.92	695	58	1.50	81.24	76	21	7.73E-01	4.1	2.25E+00
8	2	92.69	27	70	1.72	93.01	76	21	2.95E-02	49.7	
9	0	111.38	154	108	1.45	111.70	108	7	1.71E-01	12.6	
10	0	161.36	43	60	1.70	161.67	159	7	4.72E-02	33.8	
11	0	275.90	58	43	1.76	276.20	272	9	6.45E-02	24.2	
12	3	302.74	129	15	1.51	303.05	299	16	1.43E-01	9.6	2.67E+00
13	3	307.24	27	9	2.19	307.54	299	16	2.94E-02	38.2	
14	3	311.54	13	3	2.19	311.85	299	16	1.40E-02	46.5	
15	1	333.57	73	17	1.83	333.88	329	14	8.15E-02	13.8	3.19E+00
16	1	337.85	15	22	1.83	338.15	329	14	1.63E-02	57.4	
17	0	355.86	451	42	1.50	356.16	351	10	5.01E-01	5.4	
18	1	383.53	78	27	1.87	383.83	381	9	8.71E-02	18.3	1.09E+00
19	1	386.61	149	46	1.54	386.91	381	9	1.66E-01	10.6	
20	1	414.53	27	11	1.89	414.83	411	17	3.05E-02	27.9	1.34E+00
21	1	417.87	26	10	1.90	418.17	411	17	2.88E-02	33.4	
22	1	420.87	10	9	1.90	421.17	411	17	1.09E-02	80.4	
23	0	436.76	73	17	1.31	437.06	434	7	8.12E-02	14.8	
24	0	468.27	15	9	1.33	468.57	465	6	1.67E-02	40.8	
25	0	510.97	13	10	1.31	511.27	507	8	1.44E-02	50.6	
26	0	585.09	4	3	1.42	585.38	581	6	4.60E-03	81.9	
27	0	703.76	7	2	2.99	704.04	701	6	8.27E-03	45.1	

Total number of lines in spectrum 27
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 4 14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.332E+02	3.333E+02	0.593E+02	17.79		
Total Activity :			3.332E+02	3.333E+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	6.396E+02	6.396E+02	1.324E+02	20.70		
Total Activity :			6.396E+02	6.396E+02				

Grand Total Activity : 9.729E+02 9.729E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.332E+02	3.333E+02	17.79	OK
	302.84	17.80	6.222E+00	3.501E+02	3.502E+02	28.18	OK
	356.01	60.00	5.860E+00	3.848E+02	3.848E+02	17.44	OK

Final Mean for 3 Valid Peaks = 3.333E+02 +/- 5.928E+01 (17.79%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.396E+02	6.396E+02	20.70	OK

Final Mean for 1 Valid Peaks = 6.396E+02 +/- 1.324E+02 (20.70%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.333E+02	5.928E+01	1.900E+01	2.906E+00	17.538
TH-234	6.396E+02	1.324E+02	1.259E+02	6.763E+00	5.080

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.687E-01		5.484E+00	9.419E+00	1.076E+00	-0.103
CD-109	-3.217E+01		1.052E+02	1.781E+02	1.468E+01	-0.181
PA-231	2.363E+00		1.440E+00	2.940E+00	4.182E-02	0.804
PA-234	2.862E+00		1.424E+00	2.762E+00	3.929E-02	1.036
NP-237	-6.387E+00		3.060E+01	5.227E+01	4.226E+00	-0.122
AM-241	3.033E+01		9.348E+00	1.865E+01	9.171E-01	1.626

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VAX/VMS Peak Search Report Generated 31-JUL-2013 11:07:15.69

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130710019_GE3_BAFIL_194084.CN
Analyses by : PEAK V16.9 PEAKEFF V2.2
Client ID : PZ-104-SD DIS
Deposition Date :
Sample Date : 31-JUL-2013 00:00:00 Acquisition date : 31-JUL-2013 10:51:55
Sample ID : 1307100-19 Sample Quantity : 1.00000E+00 filter
Sample type : FILTER Sample Geometry : 0
Detector name : GE3 Detector Geometry: BAFIL
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.26 0.6%
Start channel : 25 End channel : 4096
Sensitivity : 3.00000 Gaussian : 10.00000
Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	1931	82	1.48	31.11	27	15	2.15E+00	2.3	6.96E+00
2	3	35.02	486	80	1.75	35.34	27	15	5.41E-01	5.4	
3	0	52.25	43	85	1.30	52.57	50	6	4.74E-02	37.7	
4	3	61.65	283	72	1.54	61.96	58	13	3.15E-01	7.5	1.34E+00
5	3	65.81	120	79	1.76	66.13	58	13	1.33E-01	15.3	
6	2	80.95	782	68	1.53	81.27	76	12	8.69E-01	3.9	2.06E+00
7	2	84.45	20	56	1.70	84.77	76	12	2.26E-02	101.5	
8	0	92.89	19	44	1.46	93.21	91	5	2.15E-02	55.7	
9	0	111.41	169	139	1.40	111.72	108	8	1.87E-01	14.3	
10	0	277.34	30	36	1.82	277.65	273	8	3.33E-02	39.2	
11	1	302.78	147	19	1.51	303.08	297	14	1.63E-01	9.2	3.22E+00
12	1	306.86	27	18	1.81	307.16	297	14	2.96E-02	37.2	
13	0	324.33	11	24	1.54	324.64	320	10	1.27E-02	83.6	
14	1	333.70	81	9	1.70	334.01	329	14	9.01E-02	12.2	1.14E+00
15	1	337.86	28	4	1.83	338.17	329	14	3.16E-02	26.6	
16	0	355.83	490	24	1.54	356.13	351	9	5.44E-01	4.9	
17	0	366.38	8	22	2.13	366.68	362	7	8.44E-03	107.5	
18	3	383.66	150	10	1.97	383.96	381	9	1.67E-01	9.7	4.01E+00
19	3	386.70	179	17	1.58	387.01	381	9	1.99E-01	8.6	
20	0	391.17	43	15	2.05	391.47	390	6	4.75E-02	21.6	
21	4	414.95	55	7	2.52	415.26	411	15	6.08E-02	16.4	7.89E+00
22	4	418.87	21	4	1.90	419.17	411	15	2.29E-02	35.9	
23	0	436.79	131	6	1.44	437.09	433	7	1.45E-01	9.2	
24	0	468.70	8	14	1.27	469.00	465	6	9.32E-03	77.5	
25	0	510.93	28	6	1.95	511.22	505	12	3.15E-02	25.4	
26	0	608.46	12	0	3.38	608.75	605	8	1.33E-02	28.9	

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.748E+02	3.748E+02	0.661E+02	17.64	
Total Activity :			3.748E+02	3.748E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	8.456E+02	8.456E+02	1.383E+02	16.36	
Total Activity :			8.456E+02	8.456E+02			

Grand Total Activity : 1.220E+03 1.220E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.748E+02	3.748E+02	17.64	OK
	302.84	17.80	6.222E+00	3.979E+02	3.980E+02	27.66	OK
	356.01	60.00	5.860E+00	4.181E+02	4.181E+02	16.77	OK

Final Mean for 3 Valid Peaks = 3.748E+02 +/- 6.611E+01 (17.64%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	8.456E+02	8.456E+02	16.36	OK

Final Mean for 1 Valid Peaks = 8.456E+02 +/- 1.383E+02 (16.36%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.748E+02	6.611E+01	1.855E+01	2.838E+00	20.201
TH-234	8.456E+02	1.383E+02	1.276E+02	6.852E+00	6.628

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.398E+00		5.382E+00	8.732E+00	9.976E-01	-0.389
CD-109	2.888E+01		1.084E+02	1.622E+02	1.337E+01	0.178
PA-231	2.523E+00		1.444E+00	2.967E+00	4.219E-02	0.851
PA-234	3.051E+00		1.432E+00	2.790E+00	3.968E-02	1.094
NP-237	8.661E+00		3.498E+01	5.159E+01	4.170E+00	0.168
AM-241	3.336E+01		9.646E+00	1.928E+01	9.477E-01	1.731