

US EPA ARCHIVE DOCUMENT

**ENGINEERING MANAGEMENT SUPPORT, INC.**

**West Lake OU-1**

**STANDARD LEVEL IV  
REPORT OF ANALYSIS**

**WORK ORDER #13-07146-OR**

**August 20, 2013**

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

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**Eberline Services – Oak Ridge Laboratory  
LABORATORY DATA SUPPORT CHECKLIST  
MP-001-3**

Eberline Services Work Order # 13-07146

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/23/13	KC	Sample Log-In
		8-12-13	JG	Data Compilation
		8-14/13	MH	First Technical Data Review
		8/10/13	NSA	Second Technical Data Review
		8/15/13	A	Data Entry/Electronic Deliverable
		8/19/13	G	Case Narrative
		8/19/13	KBS	Electronic Deliverable Proof
		8/19/13	NSA	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		8/19/13	NSA	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by:

Laboratory Manager

8/20/13

Date

Copy No. \_\_\_\_\_

Radiochemistry Services

US EPA ARCHIVE DOCUMENT

**SECTION I**  
**CHAIN OF CUSTODY**  
**&**  
**pH CHECK SHEET**

# Chain of Custody Record

No 1604

13-07146

REC'D JUL 22 2013

Eberline Services  
601 Scarboro Road  
Oak Ridge, TN 37830  
(865) 481-0683 Phone • (865) 483-4621 Fax



Project Name: <u>West Lake 0-1</u>		Project Number:		Analysis Requested D55 U-235 U-233 U-234 D55 RA-206 RA-208 Tot Ther 232 230 208 Tot RA-206 235 237 Tot Ther 232 230 228										Page <u>1</u> of <u>3</u>				
Send Report To: <u>Paul Rostice</u>		Sampler (Print Name):												① Samples re-presented w/ AUC <sub>3</sub>				
Address: <u>7220 W. Johnson Ave</u>		Sampler (Print Name):												Purchase Order #:				
Suite <u>406</u>		Shipment Method: <u>Carrier</u>																
<u>Lakewood, Co 80035</u>		Airbill Number:																
Phone:		Laboratory Receiving:																
Fax:												Comments, Special Instructions, etc.		Lab Sample ID (to be completed by lab)				
Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers														
PZ-105-SS 4.5	7/12/13	0942	Aqueous	3*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	① * 3rd container is TOTAL EYT 07/23/13
PZ-114-AS 6.7	7/12/13	1056	↑	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
I-66 8.9	7/15/13	1044	↑	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW-102 10.11	↑	1110		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW-103 12.13		1144		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-303-AS 14.15		1220		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
I-11 16.17		1312		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
S-10 18.19		1405		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
FB@ D-12 20		1430		1						✓	✓	✓	✓	✓	✓	✓	✓	
D-12	↓	1527		3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
DJP 05	7/15/13	N/A		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-208-SS	7/16/13	0925		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-301-AI	↑	1205		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-301-AS		1234		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
MW-104		1325		2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-204A-SS	↓	1356	↓	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
PZ-302-AI	7/16/13	1510	Aqueous	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	①
Relinquished by: (Signature)		Received by: (Signature)		Date:	Time:	Sample Custodian Remarks (Completed By Laboratory):												
		First Capital Courier		7/22/13	0800													
Relinquished by: (Signature)		Received by: (Signature)		Date:	Time:	QA/QC Level		Turnaround		Sample Receipt								
		K Bannister		7/22/13	1715	Level I <input type="checkbox"/>		Routine <input type="checkbox"/>		Total # Containers Received?								
Relinquished by: (Signature)		Received by: (Signature)		Date:	Time:	Level II <input type="checkbox"/>		24 Hour <input type="checkbox"/>		COC Seals Present?								
						Level III <input type="checkbox"/>		1 Week <input type="checkbox"/>		COC Seals Intact?								
						Other <input type="checkbox"/>		Other _____		Received Containers Intact?								
										Temperature?								



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Oak Ridge Laboratory

# Internal Chain of Custody

Work Order #

**13-07146**

Lab Deadline

**8/13/2013**

Analysis

**UUISO - Level 4**

Sample Matrix

**Water**

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p><b>Fxns 04, 06, 08, 10, 12, 14, 16, 18 &amp; 20 are TOTAL</b></p> <p><b>Fxns 05, 07, 09, 11, 13, 15, 17 &amp; 19 are DISSOLVED</b></p> <p><b>MUST USE FXN 04 FOR DUP</b></p>	04	48	V1.4
	05	48	V1.4
	06	46	V1.4
	07	46	V1.4
	08	42	V1.4
	09	42	V1.4
	10	41	V1.4
	11	41	V1.4
	12	44	V1.4
	13	44	V1.4
	14	42	V1.4
	15	42	V1.4
	16	39	V1.4
	17	39	V1.4
	18	44	V1.4
	19	44	V1.4
	20	40	V1.4

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

US EPA ARCHIVE DOCUMENT



# Internal Chain of Custody

Work Order #	<b>13-07146</b>
Lab Deadline	<b>8/13/2013</b>
Analysis	<b>ThISO - Level 4</b>
Sample Matrix	<b>Water</b>

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p><b>Fxns 04, 06, 08, 10, 12, 14, 16, 18 &amp; 20 are TOTAL</b></p> <p><b>Fxns 05, 07, 09, 11, 13, 15, 17 &amp; 19 are DISSOLVED</b></p> <p><b>MUST USE FXN 04 FOR DUP</b></p>	04	48	V1.4
	05	48	V1.4
	06	46	V1.4
	07	46	V1.4
	08	42	V1.4
	09	42	V1.4
	10	41	V1.4
	11	41	V1.4
	12	44	V1.4
	13	44	V1.4
	14	42	V1.4
	15	42	V1.4
	16	39	V1.4
	17	39	V1.4
	18	44	V1.4
	19	44	V1.4
	20	40	V1.4

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	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Judge	4/13 7/30/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Judge	8/1/13 100
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	1000 RM	8/1/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	6930 RM	8/6/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	OS 76	8/6/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	CB	7/17/06
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 #	<b>13-07146</b>
Lab Deadline	<b>8/13/2013</b>
Analysis	<b>Ra226 - Level 4</b>
Sample Matrix	<b>Water</b>

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p><b>Fxns 04, 06, 08, 10, 12, 14, 16, 18 &amp; 20 are TOTAL</b></p> <p><b>Fxns 05, 07, 09, 11, 13, 15, 17 &amp; 19 are DISSOLVED</b></p>	04	48	V1.4
	05	48	V1.4
	06	46	V1.4
	07	46	V1.4
	08	42	V1.4
	09	42	V1.4
	10	41	V1.4
	11	41	V1.4
	12	44	V1.4
	13	44	V1.4
<p><b>MUST USE FXN 04 FOR DUP</b></p>	14	42	V1.4
	15	42	V1.4
	16	39	V1.4
	17	39	V1.4
	18	44	V1.4
	19	44	V1.4
	20	40	V1.4

US EPA ARCHIVE DOCUMENT

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	Jude #10013051	7/30/13 #10013051
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/31/13 1652
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/31/13 2010
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 1553
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	8/1/13 1554
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		8/1/13 2015
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 #	<b>13-07146</b>
Lab Deadline	<b>8/13/2013</b>
Analysis	<b>Ra228 - Level 4</b>
Sample Matrix	<b>Water</b>

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p><b>Fxns 04, 06, 08, 10, 12, 14, 16, 18 &amp; 20 are TOTAL</b></p> <p><b>Fxns 05, 07, 09, 11, 13, 15, 17 &amp; 19 are DISSOLVED</b></p>	04	48	V1.4
	05	48	V1.4
	06	46	V1.4
	07	46	V1.4
	08	42	V1.4
	09	42	V1.4
	10	41	V1.4
	11	41	V1.4
	12	44	V1.4
	13	44	V1.4
<p><b>MUST USE FXN 04 FOR DUP</b></p>	14	42	V1.4
	15	42	V1.4
	16	39	V1.4
	17	39	V1.4
	18	44	V1.4
	19	44	V1.4
	20	40	V1.4

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/13/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/31/13 1652
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	7/31/13 2010
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/1/13 1553
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	ICB	8/1/13 1554
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	OTM	8/1/13 1015
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	OTM	8/1/13 1106
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	8/12/13 1106
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	8/12/13 1716
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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SERVICES

**Sample Receiving Report**  
(Volumes, pH, & CPM)

Internal Work Order

**13-07146**

Received By

**KCOULSTON**

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	V1.4		
02	BLANK	0		WA	V1.4		
03	DUP	0		WA	V1.4		
04	PZ-105-SS TOT	3		WA	V1.4	12.00	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	45
			2	<2	<2	4.0000	48
			3	<2	<2	4.0000	43
05	PZ-105-SS DIS	3		WA	V1.4	0.00	48
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				45
			2				48
			3				43
06	PZ-114-AS TOT	2		WA	V1.4	8.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	46
			2	<2	<2	4.0000	39
07	PZ-114-AS DIS	2		WA	V1.4	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				46
			2				39
08	I-66 TOT	2		WA	V1.4	8.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	42
			2	<2	<2	4.0000	38
09	I-66 DIS	2		WA	V1.4	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
			2				38
10	MW-102 TOT	2		WA	V1.4	8.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	40
			2	<2	<2	4.0000	41
11	MW-102 DIS	2		WA	V1.4	0.00	41
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
			2				41
12	MW-103 TOT	2		WA	V1.4	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	44
			2	<2	<2	4.0000	35
13	MW-103 DIS	2		WA	V1.4	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				44
			2				35
14	PZ-303-AS TOT	2		WA	V1.4	8.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	42
			2	<2	<2	4.0000	41
15	PZ-303-AS DIS	2		WA	V1.4	0.00	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				42
			2				41
16	I-11 TOT	2		WA	V1.4	8.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	36
			2	<2	<2	4.0000	39
17	I-11 DIS	2		WA	V1.4	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
			2				39
18	S-10 TOT	2		WA	V1.4	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	39
			2	<2	<2	4.0000	44
19	S-10 DIS	2		WA	V1.4	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM

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10/20/2013

Received by: *Kristen Coulston*

Date: 7/23/13



(Volumes, pH, & CPM)

Received By
KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
						3.6	39
							44
20	FR D-12 TOT	1		WA	V1.4	0.00	40
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2		40

KCB  
7/23/13

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Received by: Kristen Coulston Date: 7/23/13

**SECTION II**  
**SAMPLE ACKNOWLEDGEMENT**





**Eberline Services – Oak Ridge Laboratory**

**SAMPLE RECEIPT CHECKLIST**

MP-001-2

**13-07146**

WORK ORDER # \_\_\_\_\_

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS

NON-AQUEOUS

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

WERE SAMPLES:

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

WERE CHAIN OF CUSTODY SEALS:

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

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

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SIGNATURE: Kristen Carlsten DATE: 7/23/13

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**SECTION III  
CASE NARRATIVE**





EBS-OR-35981

August 20, 2013

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

CASE NARRATIVE  
Work Order # 13-07146-OR

SAMPLE RECEIPT

This work order contains nine water samples received 07/22/2013. Eight samples were analyzed as total and dissolved for Isotopic Uranium, Isotopic Thorium and Radium-226/228. One sample was analyzed as total 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-105-SS TOT	13-07146-04	MW-103 DIS	13-07146-13
PZ-105-SS DIS	13-07146-05	PZ-303-AS TOT	13-07146-14
PZ-114-AS TOT	13-07146-06	PZ-303-AS DIS	13-07146-15
PZ-114-AS DIS	13-07146-07	I-11 TOT	13-07146-16
I-66 TOT	13-07146-08	I-11 DIS	13-07146-17
I-66 DIS	13-07146-09	S-10 TOT	13-07146-18
MW-102 TOT	13-07146-10	S-10 DIS	13-07146-19
MW-102 DIS	13-07146-11	FB at D-12 TOT	13-07146-20
MW-103 TOT	13-07146-12		

ANALYTICAL METHODS

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

Laboratory qualifiers are as follows:

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

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

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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 acceptable for all samples. The Uranium-234, Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 and Uranium-238 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

### ISOTOPIC THORIUM

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

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

### RADIUM-226

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

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

ANALYTICAL RESULTS CONTINUED

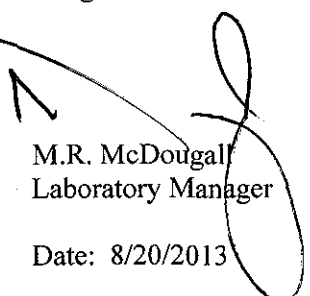
RADIUM-228

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

Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all samples. The Radium-228 method blank demonstrated acceptable results. Results for the Radium-228 duplicate demonstrated 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: 8/20/2013

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US EPA ARCHIVE DOCUMENT

**SECTION IV**  
**ANALYTICAL RESULTS SUMMARY**

US EPA ARCHIVE DOCUMENT

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
LCS13-07146-01	13-07146-01	08/05/2013 12:32:44	Radium-226	E903.0	10.40	1.17	2.49	0.17		pCi/l
LCS13-07146-01	13-07146-01	08/12/2013 11:15:19	Radium-228	E904.0	7.50	0.83	1.89	1.02		pCi/l
LCS13-07146-01	13-07146-01	08/06/2013 12:46:04	Thorium-228	HASL 300, 4.5.2	4.90	0.79	0.91	0.10		pCi/l
LCS13-07146-01	13-07146-01	08/06/2013 12:46:04	Thorium-230	HASL 300, 4.5.2	5.84	0.90	1.16	0.09		pCi/l
LCS13-07146-01	13-07146-01	08/06/2013 12:46:04	Thorium-232	HASL 300, 4.5.2	4.55	0.74	0.84	0.08		pCi/l
LCS13-07146-01	13-07146-01	08/07/2013 12:46:32	Uranium-234	HASL 300, 4.5.2	7.52	1.13	1.25	0.13		pCi/l
LCS13-07146-01	13-07146-01	08/07/2013 12:46:32	Uranium-235	HASL 300, 4.5.2	0.91	0.29	0.30	0.10		pCi/l
LCS13-07146-01	13-07146-01	08/07/2013 12:46:32	Uranium-238	HASL 300, 4.5.2	8.51	1.26	1.39	0.14		pCi/l
BLANK13-07146-02	13-07146-02	08/05/2013 12:32:39	Radium-226	E903.0	0.07	0.10	0.10	0.15	U	pCi/l
BLANK13-07146-02	13-07146-02	08/12/2013 11:15:19	Radium-228	E904.0	0.73	0.53	0.56	1.04	J	pCi/l
BLANK13-07146-02	13-07146-02	08/06/2013 12:46:05	Thorium-228	HASL 300, 4.5.2	-0.02	0.03	0.03	0.11	U	pCi/l
BLANK13-07146-02	13-07146-02	08/06/2013 12:46:05	Thorium-230	HASL 300, 4.5.2	0.58	0.21	0.22	0.10		pCi/l
BLANK13-07146-02	13-07146-02	08/06/2013 12:46:05	Thorium-232	HASL 300, 4.5.2	0.03	0.05	0.05	0.09	U	pCi/l
BLANK13-07146-02	13-07146-02	08/07/2013 12:46:57	Uranium-234	HASL 300, 4.5.2	0.08	0.06	0.06	0.07	J	pCi/l
BLANK13-07146-02	13-07146-02	08/07/2013 12:46:57	Uranium-235	HASL 300, 4.5.2	0.08	0.07	0.07	0.09	J	pCi/l
BLANK13-07146-02	13-07146-02	08/07/2013 12:46:57	Uranium-238	HASL 300, 4.5.2	0.03	0.04	0.04	0.06	U	pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/05/2013 12:32:41	Radium-226	E903.0	1.77	0.49	0.61	0.16		pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/12/2013 11:15:20	Radium-228	E904.0	1.61	0.72	0.81	1.35	J	pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/06/2013 12:46:06	Thorium-228	HASL 300, 4.5.2	0.06	0.11	0.11	0.20	U	pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/06/2013 12:46:06	Thorium-230	HASL 300, 4.5.2	0.56	0.29	0.30	0.16		pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/06/2013 12:46:06	Thorium-232	HASL 300, 4.5.2	0.11	0.12	0.12	0.16	U	pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/07/2013 12:46:58	Uranium-234	HASL 300, 4.5.2	3.12	0.53	0.57	0.06		pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/07/2013 12:46:58	Uranium-235	HASL 300, 4.5.2	0.51	0.19	0.19	0.07		pCi/l
PZ-105-SS TOT_07_12_2013 DUP	13-07146-03	08/07/2013 12:46:58	Uranium-238	HASL 300, 4.5.2	1.63	0.34	0.36	0.06		pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/05/2013 12:49:50	Radium-226	E903.0	1.54	0.46	0.56	0.24		pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/12/2013 11:15:20	Radium-228	E904.0	0.92	0.66	0.70	1.32	J	pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/06/2013 12:46:07	Thorium-228	HASL 300, 4.5.2	-0.03	0.04	0.04	0.14	U	pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/06/2013 12:46:07	Thorium-230	HASL 300, 4.5.2	0.45	0.18	0.19	0.11		pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/06/2013 12:46:07	Thorium-232	HASL 300, 4.5.2	0.06	0.07	0.07	0.09	U	pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/07/2013 12:47:00	Uranium-234	HASL 300, 4.5.2	2.81	0.52	0.56	0.06		pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/07/2013 12:47:00	Uranium-235	HASL 300, 4.5.2	0.25	0.14	0.14	0.11	J	pCi/l
PZ-105-SS TOT_07_12_2013	13-07146-04	08/07/2013 12:47:00	Uranium-238	HASL 300, 4.5.2	1.54	0.35	0.37	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-105-SS DIS_07_12_2013	13-07146-05	08/05/2013 12:49:51	Radium-226	E903.0	1.48	0.44	0.54	0.16		pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/12/2013 11:15:24	Radium-228	E904.0	1.89	0.69	0.81	1.28	J	pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/06/2013 12:46:08	Thorium-228	HASL 300, 4.5.2	0.06	0.08	0.08	0.12	U	pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/06/2013 12:46:08	Thorium-230	HASL 300, 4.5.2	0.45	0.18	0.19	0.07		pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/06/2013 12:46:08	Thorium-232	HASL 300, 4.5.2	0.12	0.09	0.09	0.08	J	pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/07/2013 12:47:01	Uranium-234	HASL 300, 4.5.2	2.78	0.50	0.54	0.08		pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/07/2013 12:47:01	Uranium-235	HASL 300, 4.5.2	0.55	0.21	0.21	0.11		pCi/l
PZ-105-SS DIS_07_12_2013	13-07146-05	08/07/2013 12:47:01	Uranium-238	HASL 300, 4.5.2	1.78	0.37	0.40	0.10		pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/05/2013 12:49:52	Radium-226	E903.0	0.54	0.31	0.33	0.29	J	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/12/2013 11:15:25	Radium-228	E904.0	1.34	0.77	0.83	1.50	J	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/06/2013 12:46:09	Thorium-228	HASL 300, 4.5.2	0.00	0.04	0.04	0.13	U	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/06/2013 12:46:09	Thorium-230	HASL 300, 4.5.2	0.35	0.18	0.18	0.12		pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/06/2013 12:46:09	Thorium-232	HASL 300, 4.5.2	0.04	0.07	0.07	0.12	U	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/07/2013 12:47:03	Uranium-234	HASL 300, 4.5.2	0.30	0.21	0.21	0.17	J	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/07/2013 12:47:03	Uranium-235	HASL 300, 4.5.2	0.01	0.09	0.09	0.24	U	pCi/l
PZ-114-AS TOT_07_12_2013	13-07146-06	08/07/2013 12:47:03	Uranium-238	HASL 300, 4.5.2	0.14	0.15	0.16	0.21	U	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/05/2013 12:49:53	Radium-226	E903.0	0.19	0.20	0.20	0.28	U	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/12/2013 11:15:25	Radium-228	E904.0	1.09	0.69	0.73	1.34	J	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/06/2013 12:46:33	Thorium-228	HASL 300, 4.5.2	0.08	0.13	0.13	0.23	U	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/06/2013 12:46:33	Thorium-230	HASL 300, 4.5.2	0.52	0.31	0.32	0.20		pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/06/2013 12:46:33	Thorium-232	HASL 300, 4.5.2	0.00	0.11	0.11	0.23	U	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/07/2013 12:47:05	Uranium-234	HASL 300, 4.5.2	0.29	0.16	0.16	0.13	J	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/07/2013 12:47:05	Uranium-235	HASL 300, 4.5.2	0.14	0.12	0.12	0.13	J	pCi/l
PZ-114-AS DIS_07_12_2013	13-07146-07	08/07/2013 12:47:05	Uranium-238	HASL 300, 4.5.2	0.16	0.11	0.12	0.08	J	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/05/2013 12:49:54	Radium-226	E903.0	0.33	0.26	0.27	0.31	J	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/12/2013 11:15:26	Radium-228	E904.0	1.59	0.69	0.77	1.27	J	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/06/2013 12:46:35	Thorium-228	HASL 300, 4.5.2	0.24	0.18	0.18	0.16	J	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/06/2013 12:46:35	Thorium-230	HASL 300, 4.5.2	0.75	0.34	0.35	0.16		pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/06/2013 12:46:35	Thorium-232	HASL 300, 4.5.2	0.03	0.08	0.08	0.17	U	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/07/2013 12:47:06	Uranium-234	HASL 300, 4.5.2	0.72	0.22	0.23	0.08		pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/07/2013 12:47:06	Uranium-235	HASL 300, 4.5.2	0.17	0.12	0.12	0.11	J	pCi/l
I-66 TOT_07_15_2013	13-07146-08	08/07/2013 12:47:06	Uranium-238	HASL 300, 4.5.2	0.59	0.20	0.20	0.09		pCi/l

Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
I-66 DIS_07_15_2013	13-07146-09	08/05/2013 12:49:55	Radium-226	E903.0	0.33	0.24	0.25	0.23	J	pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/12/2013 11:15:18	Radium-228	E904.0	0.85	0.72	0.75	1.45	J	pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/06/2013 12:46:30	Thorium-228	HASL 300, 4.5.2	0.06	0.09	0.09	0.16	U	pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/06/2013 12:46:30	Thorium-230	HASL 300, 4.5.2	0.26	0.16	0.16	0.09		pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/06/2013 12:46:30	Thorium-232	HASL 300, 4.5.2	0.06	0.08	0.08	0.09	U	pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/08/2013 08:19:34	Uranium-234	HASL 300, 4.5.2	1.10	0.42	0.43	0.19		pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/08/2013 08:19:34	Uranium-235	HASL 300, 4.5.2	0.20	0.19	0.19	0.17	J	pCi/l
I-66 DIS_07_15_2013	13-07146-09	08/08/2013 08:19:34	Uranium-238	HASL 300, 4.5.2	0.40	0.25	0.25	0.22	J	pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/05/2013 12:49:56	Radium-226	E903.0	1.09	0.42	0.48	0.30		pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/12/2013 11:15:18	Radium-228	E904.0	1.80	0.92	1.01	1.78	J	pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/06/2013 12:46:31	Thorium-228	HASL 300, 4.5.2	0.09	0.12	0.12	0.18	U	pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/06/2013 12:46:31	Thorium-230	HASL 300, 4.5.2	0.29	0.18	0.19	0.14	J	pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/06/2013 12:46:31	Thorium-232	HASL 300, 4.5.2	0.12	0.13	0.13	0.17	U	pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/07/2013 12:47:09	Uranium-234	HASL 300, 4.5.2	5.58	0.90	0.99	0.09		pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/07/2013 12:47:09	Uranium-235	HASL 300, 4.5.2	1.05	0.32	0.32	0.09		pCi/l
MW-102 TOT_07_15_2013	13-07146-10	08/07/2013 12:47:09	Uranium-238	HASL 300, 4.5.2	4.63	0.78	0.85	0.11		pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/05/2013 12:49:57	Radium-226	E903.0	0.33	0.21	0.23	0.17	J	pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/12/2013 11:15:19	Radium-228	E904.0	1.57	0.76	0.84	1.45	J	pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/06/2013 12:46:42	Thorium-228	HASL 300, 4.5.2	0.10	0.13	0.13	0.19	U	pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/06/2013 12:46:42	Thorium-230	HASL 300, 4.5.2	0.25	0.19	0.20	0.20	J	pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/06/2013 12:46:42	Thorium-232	HASL 300, 4.5.2	0.15	0.14	0.14	0.13	J	pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/07/2013 12:47:11	Uranium-234	HASL 300, 4.5.2	5.63	0.87	0.96	0.08		pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/07/2013 12:47:11	Uranium-235	HASL 300, 4.5.2	0.95	0.28	0.29	0.08		pCi/l
MW-102 DIS_07_15_2013	13-07146-11	08/07/2013 12:47:11	Uranium-238	HASL 300, 4.5.2	4.33	0.71	0.77	0.07		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/05/2013 12:49:58	Radium-226	E903.0	0.70	0.37	0.40	0.35	J	pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/12/2013 11:15:19	Radium-228	E904.0	1.73	0.74	0.83	1.38	J	pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/06/2013 12:46:44	Thorium-228	HASL 300, 4.5.2	1.18	0.38	0.40	0.11		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/06/2013 12:46:44	Thorium-230	HASL 300, 4.5.2	1.80	0.50	0.55	0.09		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/06/2013 12:46:44	Thorium-232	HASL 300, 4.5.2	0.91	0.31	0.32	0.08		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/07/2013 12:47:13	Uranium-234	HASL 300, 4.5.2	3.00	0.56	0.60	0.07		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/07/2013 12:47:13	Uranium-235	HASL 300, 4.5.2	0.67	0.24	0.25	0.12		pCi/l
MW-103 TOT_07_15_2013	13-07146-12	08/07/2013 12:47:13	Uranium-238	HASL 300, 4.5.2	2.79	0.53	0.57	0.07		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>
MW-103 DIS_07_15_2013	13-07146-13	08/05/2013 12:50:11	Radium-226	E903.0	0.21	0.22	0.22	0.27	U	pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/12/2013 11:16:34	Radium-228	E904.0	1.24	0.78	0.83	1.54	J	pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/06/2013 12:46:38	Thorium-228	HASL 300, 4.5.2	0.06	0.07	0.07	0.08	U	pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/06/2013 12:46:38	Thorium-230	HASL 300, 4.5.2	0.37	0.19	0.19	0.14		pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/06/2013 12:46:38	Thorium-232	HASL 300, 4.5.2	0.03	0.08	0.08	0.17	U	pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/07/2013 12:47:15	Uranium-234	HASL 300, 4.5.2	2.48	0.51	0.54	0.09		pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/07/2013 12:47:15	Uranium-235	HASL 300, 4.5.2	0.39	0.19	0.19	0.11		pCi/l
MW-103 DIS_07_15_2013	13-07146-13	08/07/2013 12:47:15	Uranium-238	HASL 300, 4.5.2	2.27	0.48	0.51	0.09		pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/05/2013 12:50:13	Radium-226	E903.0	1.01	0.45	0.50	0.21		pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/12/2013 11:16:34	Radium-228	E904.0	1.54	0.72	0.80	1.36	J	pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/06/2013 12:46:40	Thorium-228	HASL 300, 4.5.2	0.07	0.09	0.09	0.13	U	pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/06/2013 12:46:40	Thorium-230	HASL 300, 4.5.2	0.66	0.25	0.26	0.09		pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/06/2013 12:46:40	Thorium-232	HASL 300, 4.5.2	0.13	0.11	0.11	0.11	J	pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/07/2013 12:47:17	Uranium-234	HASL 300, 4.5.2	0.84	0.34	0.35	0.18		pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/07/2013 12:47:17	Uranium-235	HASL 300, 4.5.2	0.37	0.25	0.25	0.22	J	pCi/l
PZ-303-AS TOT_07_15_2013	13-07146-14	08/07/2013 12:47:17	Uranium-238	HASL 300, 4.5.2	0.53	0.26	0.27	0.12		pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/05/2013 16:10:32	Radium-226	E903.0	0.54	0.32	0.34	0.27	J	pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/12/2013 11:16:35	Radium-228	E904.0	1.61	0.84	0.91	1.62	J	pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/06/2013 16:33:54	Thorium-228	HASL 300, 4.5.2	0.01	0.06	0.06	0.15	U	pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/06/2013 16:33:54	Thorium-230	HASL 300, 4.5.2	0.35	0.17	0.17	0.09		pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/06/2013 16:33:54	Thorium-232	HASL 300, 4.5.2	0.01	0.03	0.03	0.08	U	pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/07/2013 16:03:33	Uranium-234	HASL 300, 4.5.2	1.05	0.36	0.36	0.13		pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/07/2013 16:03:33	Uranium-235	HASL 300, 4.5.2	0.37	0.22	0.22	0.13		pCi/l
PZ-303-AS DIS_07_15_2013	13-07146-15	08/07/2013 16:03:33	Uranium-238	HASL 300, 4.5.2	1.02	0.35	0.36	0.13		pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/05/2013 16:10:33	Radium-226	E903.0	1.44	0.44	0.54	0.25		pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/12/2013 11:16:35	Radium-228	E904.0	1.82	0.77	0.87	1.45	J	pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/06/2013 16:33:55	Thorium-228	HASL 300, 4.5.2	0.20	0.15	0.15	0.17	J	pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/06/2013 16:33:55	Thorium-230	HASL 300, 4.5.2	0.76	0.28	0.30	0.13		pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/06/2013 16:33:55	Thorium-232	HASL 300, 4.5.2	0.04	0.07	0.07	0.11	U	pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/07/2013 16:03:34	Uranium-234	HASL 300, 4.5.2	1.19	0.31	0.32	0.11		pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/07/2013 16:03:34	Uranium-235	HASL 300, 4.5.2	0.19	0.13	0.13	0.11	J	pCi/l
I-11 TOT_07_15_2013	13-07146-16	08/07/2013 16:03:34	Uranium-238	HASL 300, 4.5.2	0.63	0.22	0.22	0.11		pCi/l



EBERLINE ANALYTICAL CORPORATION

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

0023



<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Analysis Date/Time</u>	<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Error</u>	<u>CSU</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
I-11 DIS_07_15_2013	13-07146-17	08/05/2013 16:10:27	Radium-226	E903.0	1.43	0.47	0.56	0.30		pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/12/2013 11:16:38	Radium-228	E904.0	2.91	0.86	1.08	1.52		pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/06/2013 16:33:50	Thorium-228	HASL 300, 4.5.2	0.20	0.19	0.19	0.26	J	pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/06/2013 16:33:50	Thorium-230	HASL 300, 4.5.2	0.69	0.31	0.32	0.18		pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/06/2013 16:33:50	Thorium-232	HASL 300, 4.5.2	0.01	0.05	0.05	0.14	U	pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/07/2013 16:03:28	Uranium-234	HASL 300, 4.5.2	1.26	0.33	0.34	0.13		pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/07/2013 16:03:28	Uranium-235	HASL 300, 4.5.2	0.20	0.13	0.13	0.11	J	pCi/l
I-11 DIS_07_15_2013	13-07146-17	08/07/2013 16:03:28	Uranium-238	HASL 300, 4.5.2	0.81	0.25	0.26	0.10		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/05/2013 16:10:28	Radium-226	E903.0	0.43	0.23	0.25	0.14		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/12/2013 11:16:38	Radium-228	E904.0	2.55	0.78	0.97	1.38		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/06/2013 16:33:51	Thorium-228	HASL 300, 4.5.2	0.05	0.06	0.06	0.08	U	pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/06/2013 16:33:51	Thorium-230	HASL 300, 4.5.2	0.41	0.16	0.17	0.08		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/06/2013 16:33:51	Thorium-232	HASL 300, 4.5.2	0.18	0.10	0.10	0.07		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/07/2013 16:03:30	Uranium-234	HASL 300, 4.5.2	0.62	0.24	0.24	0.09		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/07/2013 16:03:30	Uranium-235	HASL 300, 4.5.2	0.38	0.20	0.20	0.11		pCi/l
S-10 TOT_07_15_2013	13-07146-18	08/07/2013 16:03:30	Uranium-238	HASL 300, 4.5.2	0.37	0.18	0.18	0.10		pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/05/2013 16:10:30	Radium-226	E903.0	0.14	0.14	0.15	0.18	U	pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/12/2013 11:16:39	Radium-228	E904.0	1.39	0.70	0.77	1.34	J	pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/06/2013 16:33:52	Thorium-228	HASL 300, 4.5.2	0.08	0.08	0.08	0.11	U	pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/06/2013 16:33:52	Thorium-230	HASL 300, 4.5.2	0.58	0.23	0.24	0.09		pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/06/2013 16:33:52	Thorium-232	HASL 300, 4.5.2	0.05	0.07	0.07	0.11	U	pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/07/2013 16:03:31	Uranium-234	HASL 300, 4.5.2	0.38	0.20	0.20	0.11		pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/07/2013 16:03:31	Uranium-235	HASL 300, 4.5.2	0.26	0.19	0.19	0.18	J	pCi/l
S-10 DIS_07_15_2013	13-07146-19	08/07/2013 16:03:31	Uranium-238	HASL 300, 4.5.2	0.25	0.16	0.16	0.11	J	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/05/2013 16:10:31	Radium-226	E903.0	0.02	0.07	0.07	0.17	U	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/12/2013 11:16:39	Radium-228	E904.0	1.20	0.68	0.73	1.32	J	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/06/2013 16:33:53	Thorium-228	HASL 300, 4.5.2	-0.08	0.05	0.05	0.19	U	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/06/2013 16:33:53	Thorium-230	HASL 300, 4.5.2	0.46	0.21	0.21	0.12		pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/06/2013 16:33:53	Thorium-232	HASL 300, 4.5.2	0.12	0.10	0.10	0.09	J	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/07/2013 16:03:32	Uranium-234	HASL 300, 4.5.2	0.32	0.13	0.14	0.06		pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/07/2013 16:03:32	Uranium-235	HASL 300, 4.5.2	0.04	0.06	0.06	0.09	U	pCi/l
FB at D-12 TOT_07_15_2013	13-07146-20	08/07/2013 16:03:32	Uranium-238	HASL 300, 4.5.2	0.04	0.05	0.05	0.08	U	pCi/l

**SECTION V**  
**ANALYTICAL STANDARDS**

U-8

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

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Customer: TMA EBERLINE  
P.O.No.: OR2778  
Reference Date: January 1 1995 12:00 PST.  
Contained Radioactivity: (Total U) 8.016  $\mu$ 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 H<sub>2</sub>O  
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  $\mu$ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

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

### NIST Traceability

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

### Leak Test(s)

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

### Notes

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

  
ERIC ALLAS  
QUALITY CONTROL

29 DECEMBER 1994  
Date Signed



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

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 SOLUTIONS**  
**PRIMARY DILUTION RECERTIFICATION**  
MP 009

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

Principal Radionuclide <u>234, 235, 238 U</u>	Half Life, Years <u>4.468E+09</u>	Half Life, Days <u>1.632E+12</u>
--	--------------------------------------	-------------------------------------

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

Ampoule /Solution Gross	<u>97.6400</u>	Weight, Grams
Empty Ampoule	<u>32.5020</u>	Weight, Grams
Solution Net	<u>65.1380</u>	Weight, Grams
Total Activity in Ampoule	<u>8.0160</u>	$\mu\text{Ci}$

Chemical Composition of Standard Solution  
Uranyl nitrate in dilute HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 1M HNO<sub>3</sub>

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 8.0160  $\mu\text{Ci}$  Which Equals 1.780E+07 dpm at the date listed above

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

Expiration Date: September 6, 2013

Verified & Approved By [Signature]

Date: 9/26/2012 0:00

QC Approval [Signature]

Date: 9/26/12



QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # **MP-009**  
**IPL 479-50**

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

Principal Radionuclide

Half Life, Years

Half Life, Days

**234, 235, 238 U**

**4.468E+09**

**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 HNO<sub>3</sub>**

Dilution Instructions:

Dilution Solvent Used

**1M HNO<sub>3</sub>**

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: **4.0000** ml

Total Activity: **7.1182E+04** dpm

Final Volume: **1000.00** ml

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

NOTES:

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

Isotopic Distribution as:

U-238 Atom % = 48.239 U-238 = 71.182 dpm/ml X 0.48249 = 34.345 dpm/ml

U-235 Atom % = 2.25 U-235 = 71.182 dpm/ml X 0.0225 = 1.602 dpm/ml

U-234 Atom % = 49.501 U-238 = 71.182 dpm/ml X 0.49501 = 35.236 dpm/ml

All values +/- 3.6%

Isotopic ratios from manufacturer's data sheet

Expiration Date: **September 6, 2013**

Verified & Approved By

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

QC Approval

Date: **9/26/12**

US EPA ARCHIVE DOCUMENT

# RECORD COPY

## Tracer Solution for Environmental Analysis & Disequilibrium Studies

### Product Description & Measurement Certificate

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

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

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

*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

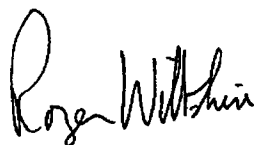
*Isotopic Purity* The isotopic composition, expressed as atom per cent at the reference date .  
  
Not measured

*Chemical Composition* Calculated weight of U-232, 4.42E-08 grams, as 2M HNO<sub>3</sub> 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.



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

Principal Radionuclide <sup>232</sup>U Half Life, Years 7.200E+01 Half Life, Days 2.630E+04

Radionuclide <sup>232</sup>U Reference Date 3/1/2000 0:00  
Certified Activity 9.760E-01  $\mu\text{Ci}$   
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  $\mu\text{Ci}$

Chemical Composition of Standard Solution  
<sup>232</sup>U(NO<sub>3</sub>)<sub>6</sub> in 2M HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 2M HNO<sub>3</sub>

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.9760  $\mu\text{Ci}$  Which Equals 2.167E+06 dpm at the date listed above

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

Expiration Date: December 7, 2013

Verified & Approved By [Signature]

Date: 12/13/2012 0:00

QC Approval [Signature]

Date: 12/13/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM  
MP-009

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

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

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

Principal Radionuclide <sup>232</sup>U Half Life, Years 7.200E+01 Half Life, Days 2.630E+04

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

Chemical Composition of Standard Solution  
<sup>232</sup>U(NO<sub>3</sub>)<sub>6</sub> in 2M HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 2M HNO<sub>3</sub>

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml  
Total Activity: 2.1670E+04 dpm  
Final Volume: 1000.00 ml  
Final Activity Concentration: 2.1670E+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: December 7, 2013

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

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

US EPA ARCHIVE DOCUMENT



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 <sup>4</sup> 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 <sub>3</sub> ) <sub>4</sub> in 0.1N HNO <sub>3</sub>	
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)



**ISOTOPE PRODUCTS LABORATORIES**  
1800 No. Keystone Street.,  
Burbank, California 91504  
(818) 843 - 7000

*[Signature]*  
**QUALITY CONTROL**



QUALITY CONTROL PROGRAM  
MP-009

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

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

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

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

Principal Radionuclide

Half Life, Years

Half Life, Days

<sup>230</sup>Th

**7.540E+04**

**2.754E+07**

Radionuclide of Interest **<sup>230</sup>Thorium**  
Parent Solution Conc. **2.30E+03** dpm/ml

Reference Date **11/17/1991 0:00**

Chemical Composition of Standard Solution

**<sup>230</sup>Th(NO<sub>3</sub>)<sub>4</sub> in 0.1N HNO<sub>3</sub>**

Dilution Instructions:

Dilution Solvent Used

**0.1N HNO<sub>3</sub>**

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**

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 SOLUTIONS PRIMARY DILUTION RECERTIFICATION MP 009

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

Principal Radionuclide <sup>230</sup>Th Half Life, Years 7.540E+04 Half Life, Days 2.754E+07

Radionuclide <sup>230</sup>Thorium Reference Date 11/1/1991 0:00  
Certified Activity 1.036E+00  $\mu\text{Ci}$   
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  $\mu\text{Ci}$

Chemical Composition of Standard Solution  
<sup>230</sup>Th(NO<sub>3</sub>)<sub>4</sub> in 0.1N HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 0.1N HNO<sub>3</sub>

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360  $\mu\text{Ci}$  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

US EPA ARCHIVE DOCUMENT

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	TMA EBERLINE
Half Life:	$(1.405 \pm 0.006) \times 10^{10}$ years	P.O.No.:	VH1632
Catalog No.:	7232	Reference Date:	November 1 1993 12:00 PST.
Source No.:	435-104-2	Contained Radioactivity:	(Th-232) 0.0933 $\mu$ 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<sub>3</sub>)<sub>4</sub> 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  $\mu$ Ci/g.

### Method of Calibration

Activity calculations are based upon known specific activity and mass.

### Uncertainty of Measurement

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

### NIST Traceability

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

### Leak Test(s)

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

### Notes

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



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

*Arma U. Khan*  
 \_\_\_\_\_  
 QUALITY CONTROL

*Nov. 8, 1993*  
 \_\_\_\_\_  
 Date Signed

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM  
MP-009

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

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

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

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

Radionuclide <sup>232</sup> & <sup>228</sup>Th Reference Date 11/11/1993 0:00  
Certified Activity 9.330E-02  $\mu\text{Ci}$   
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  $\mu\text{Ci}$

Chemical Composition of Standard Solution  
Th(NO<sub>3</sub>)<sub>4</sub> in H<sub>2</sub>O

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.0933  $\mu\text{Ci}$  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  Date: 10/9/2012 0:00  
QC Approval  Date: 11/12/12

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM  
MP-009

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

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

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

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

Chemical Composition of Standard Solution  
Th(NO<sub>3</sub>)<sub>4</sub> in 1% HNO<sub>3</sub>

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


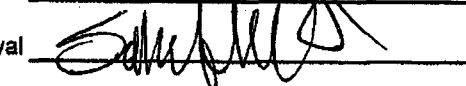
SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution:	500.0000 ml	Final Activity Concentration:	1.0355E+02 dpm/ml
Total Activity:	1.0355E+06 dpm		
Final Volume:	1000.00 ml		

NOTES:

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

Expiration Date: 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

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Valencia, California 91355

Tel 661•309•1010

Fax 661•257•8303

Th-18

## CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

<b>Radionuclide:</b>	Th-229	<b>Customer:</b>	EBERLINE SERVICES		
<b>Half-life:</b>	7340 ± 160 years	<b>P.O. No.:</b>	00009633		
<b>Catalog No.:</b>	7229	<b>Reference Date:</b>	15-Jan-02	12:00	PST
<b>Source No.:</b>	867-54	<b>Contained Radioactivity:</b>	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 <sub>3</sub> ) <sub>4</sub> in 0.1M HNO <sub>3</sub>
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.

*As 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



**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 <sup>228</sup>Th Half Life, Years 7.340E+03 Half Life, Days 2.681E+06

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

Ampoule /Solution Gross 8.7752 Weight, Grams  
Empty Ampoule 3.7591 Weight, Grams  
Solution Net 5.0161 Weight, Grams  
Total Activity in Ampoule 1.0130  $\mu\text{Ci}$

**Chemical Composition of Standard Solution**  
<sup>228</sup>Th(NO<sub>3</sub>)<sub>4</sub> in 0.1M HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 0.1 M HNO<sub>3</sub>

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0130  $\mu\text{Ci}$  Which Equals 2.249E+06 dpm at the date listed above

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

Expiration Date: October 9, 2013

Verified & Approved By 

Date: 11/9/2012 0:00

QC Approval 

Date: 11/12/12

US EPA ARCHIVE DOCUMENT





QUALITY CONTROL PROGRAM  
MP-009

Rev.7: 9/29/99  
Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # MP-009 Date 11/9/2012 0:00  
IPL 867-54 Solution # Th-18a

Principal Radionuclide <sup>228</sup>Th Half Life, Years 7.340E+03 Half Life, Days 2.681E+06

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

Chemical Composition of Standard Solution  
TH(NO<sub>3</sub>)<sub>4</sub> in 0.1M HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 0.1M HNO<sub>3</sub>

SECONDARY VOLUMETRIC DILUTION

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

NOTES:

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

Expiration Date: October 9, 2013

Verified & Approved By [Signature]

Date: 11/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



Ba-6  
(f 6a)

# National Institute of Standards & Technology Certificate

## Standard Reference Material 4251C Barium-133 Radioactivity Standard

ORIGINAL

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

### Radiological Hazard

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

### Chemical Hazard

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

### Storage and Handling

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

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

### Preparation

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

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

Gaithersburg, Maryland 20899  
October 1994

Thomas E. Gills, Chief  
Standard Reference Materials Program

US EPA ARCHIVE DOCUMENT



# QUALITY CONTROL PROGRAM

QCP-009

Rev.8; 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

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

Principal Radionuclide <sup>133</sup>Barium Half Life, Years 1.048E+01 Half Life, Days 3.828E+03

Radionuclide <sup>133</sup>Barium Reference Date 9/1/1993 0:00  
Certified Activity           $\mu\text{Ci}$   
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  $\mu\text{Ci}$

### Chemical Composition of Standard Solution

<sup>133</sup>BaCl<sub>2</sub> in 1M HCl

Dilution Instructions: Dilution Solvent Used 1M HCl

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 66.5577  $\mu\text{Ci}$  Which Equals 1.478E+08 dpm at the date listed above

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

Expiration Date: June 16, 2014

Verified & Approved By [Signature]

Date: 7/1/13

QC Approval [Signature]

Date: 7/2/13

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM

QCP-009

Rev.8; 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

Solution Reference # **QCP-009-1-A**  
**NIST SRM4251C**

Date **6/18/13**  
Solution # **Ba-6a**

Principal Radionuclide

Half Life, Years

Half Life, Days

**<sup>133</sup>Ba**

**1.048E+01**

**3.828E+03**

Radionuclide of Interest

**<sup>133</sup>Ba**

Reference Date

**9/1/1993 0:00**

Parent Solution Conc. **1.48E+05** dpm/ml

Chemical Composition of Standard Solution

**<sup>133</sup>BaCl<sub>2</sub> 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 Volume: **1000.00** ml

Final Activity Concentration: **3.6950E+03** 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: **June 18, 2014**

Verified & Approved By

Date: **7/1/13**

QC Approval

Date: **7/2/13**

US EPA ARCHIVE DOCUMENT

# CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

*Ra-226*  
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(NO3)2 in 1 N HNO3
c. Carrier content:	None added
d. Density:	1.0318 g/ml @ 20°C.

Radioimpurities: None detected (other than daughters)

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

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

### Method of Calibration

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

### Uncertainty of Measurement

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

### NIST Traceability

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

### Leak Test(s)

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

### Notes

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



*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 <sup>226</sup>Radium Half Life, Years 1.600E+03 Half Life, Days 5.844E+05

Radionuclide <sup>226</sup>Radium Reference Date 2/1/1994 0:00  
Certified Activity 1.001E+00  $\mu\text{Ci}$   
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  $\mu\text{Ci}$

Chemical Composition of Standard Solution  
<sup>226</sup>Ra(NO<sub>3</sub>)<sub>2</sub> in 1M HNO<sub>3</sub>

Dilution Instructions: Dilution Solvent Used 1M HNO<sub>3</sub>

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0010  $\mu\text{Ci}$  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  
IPL-453-26

Date 11/9/2012 0:00  
Solution # Ra-5b

Principal Radionuclide

Half Life, Years

Half Life, Days

<sup>226</sup>Radium

1.600E+03

5.844E+05

Radionuclide of Interest <sup>226</sup>Radium

Reference Date 2/1/1994 0:00

Parent Solution Conc. 2.22E+03 dpm/ml

Chemical Composition of Standard Solution

<sup>226</sup>Ra(NO<sub>3</sub>)<sub>2</sub> in 1M HNO<sub>3</sub>

Dilution Instructions:

Dilution Solvent Used

1M HNO<sub>3</sub>

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml

Total Activity: 4.4440E+04 dpm

Final Volume: 1000.00 ml

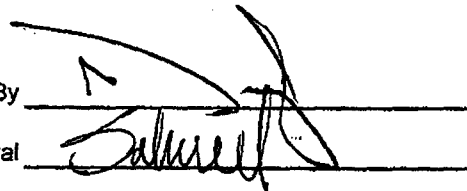
Final Activity Concentration: 4.4440E+01 dpm/ml

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



Date: 11/9/2012 0:00

QC Approval

Date: 11/12/12

US EPA ARCHIVE DOCUMENT



ANALYTICS

RA-11

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

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

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

\*99% Confidence Level

Impurities:  $\gamma$ -impurities (other than decay products) <0.1%

5.07198 grams 0.1M HCl solution with 50  $\mu$ g/g Ba carrier.

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

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

Q A APPROVED: PCW 11/7/01

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





# QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03

Title: Radioactive Reference Standards Solutions & Records

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

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

Principal Radionuclide <sup>228</sup>Ra Half Life, Years 5.750E+00 Half Life, Days 2.100E+03

Radionuclide <sup>228</sup>Ra Reference Date 11/7/2001 0:00  
Certified Activity 6.986E-02  $\mu\text{Ci}$   
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  $\mu\text{Ci}$

Chemical Composition of Standard Solution  
<sup>228</sup>Ra(NO<sub>3</sub>)<sub>2</sub> 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  $\mu\text{Ci}$  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
<b>13-07146</b>	<b>UUISO</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

**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	0.95	92.41%	16.69%	100.00%	3.60%	8.13E+00	2.93E-01	7.52E+00	1.25E+00	U-8a	3.52E+01	3.60E+00	5.12E-01
U-238	0.81	107.34%	16.39%	100.00%	3.60%	7.93E+00	2.85E-01	8.51E+00	1.39E+00	U-8a	3.44E+01	3.60E+00	5.12E-01

**Matrix Spike**

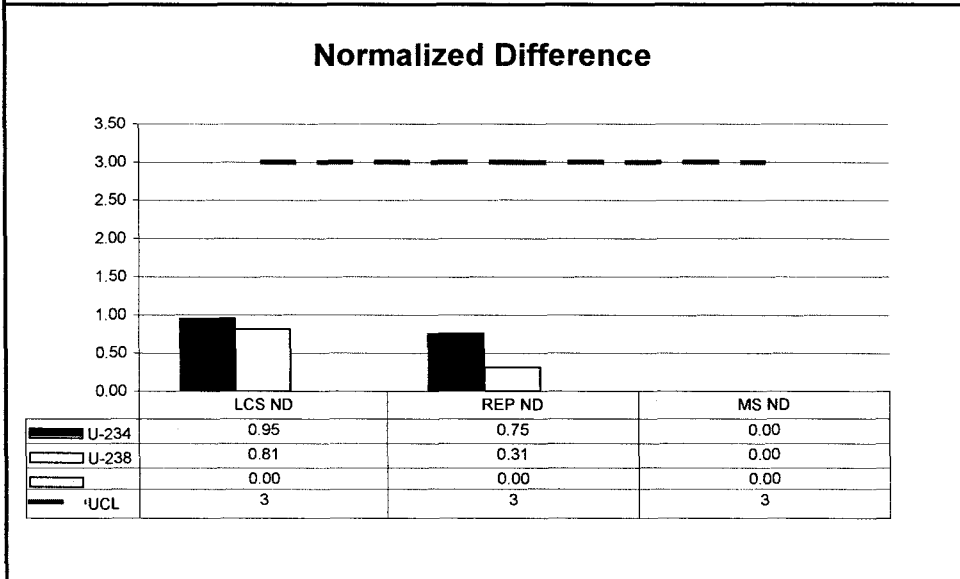
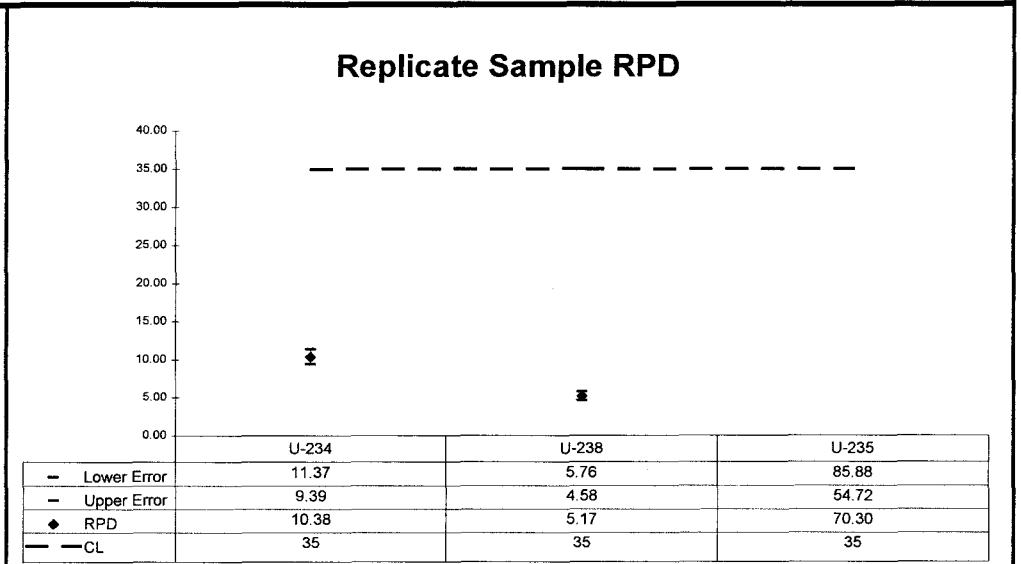
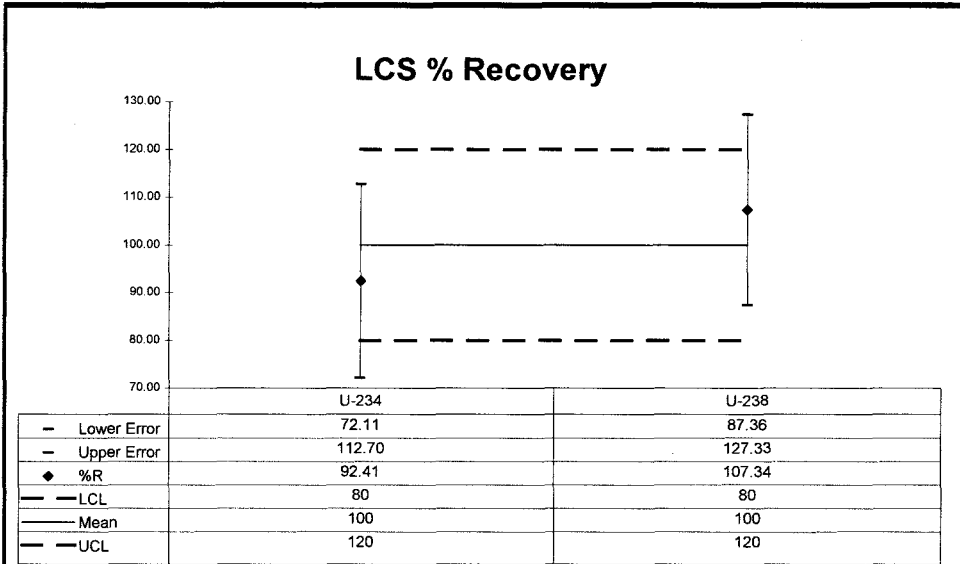
Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)

**Replicate Sample**

**QC Summary**

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.75	10.38	2.81E+00	5.60E-01	3.12E+00	5.74E-01	0.92	OK	OK			NA	OK
U-238	0.31	5.17	1.54E+00	3.68E-01	1.63E+00	3.60E-01	1.07	OK	OK			NA	OK
U-235	2.17	70.30	2.47E-01	1.43E-01	5.14E-01	1.94E-01		OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>UUISO</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>



## No Matrix Spike



WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>ThISO</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

**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	0.08	99.25%	18.62%	100.00%	3.60%	4.94E+00	1.78E-01	4.90E+00	9.12E-01	Th-8b	1.04E+02	3.60E+00	1.06E-01
TH-230	0.61	106.61%	19.83%	100.00%	2.70%	5.47E+00	1.48E-01	5.84E+00	1.16E+00	Th-1b	2.35E+01	2.70E+00	5.17E-01
TH-232	0.88	92.29%	18.54%	100.00%	3.60%	4.94E+00	1.78E-01	4.55E+00	8.44E-01	Th-8b	1.04E+02	3.60E+00	1.06E-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)

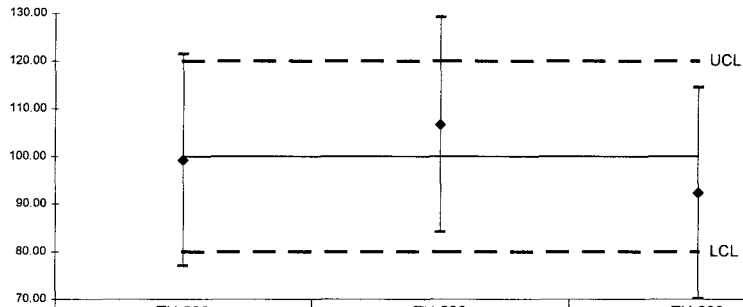
**Replicate Sample**

**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	1.62	719.53	-3.48E-02	3.87E-02	6.17E-02	1.10E-01	0.99	OK	OK			NA	OK
TH-230	0.62	22.28	4.50E-01	1.92E-01	5.62E-01	2.99E-01	1.07	OK	OK			NA	OK
TH-232	0.59	50.54	6.32E-02	6.87E-02	1.06E-01	1.23E-01	0.92	OK	OK			NA	OK

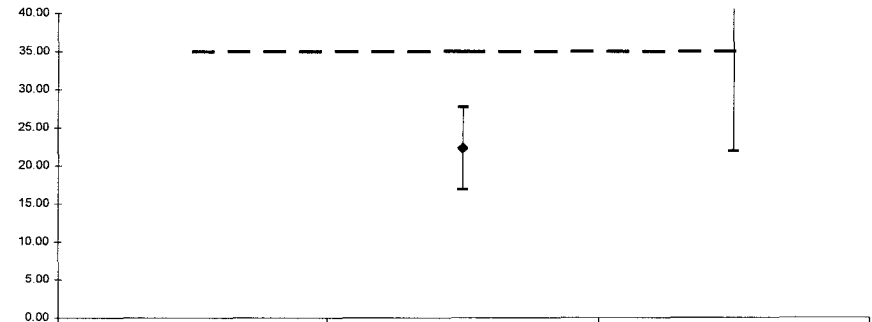
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>ThISO</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

### LCS % Recovery



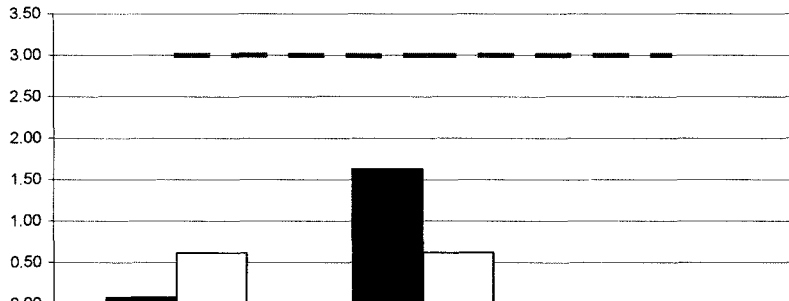
	TH-228	TH-230	TH-232
Lower Error	77.02	84.09	70.15
Upper Error	121.47	129.14	114.43
%R	99.25	106.61	92.29
LCL	80	80	80
Mean	100	100	100
UCL	120	120	120

### Replicate Sample RPD



	TH-228	TH-230	TH-232
Lower Error	2711.44	27.68	79.21
Upper Error	-1272.38	16.87	21.88
RPD	719.53	22.28	50.54
CL	35	35	35

### Normalized Difference



	LCS ND	REP ND	MS ND
TH-228	0.08	1.62	0.00
TH-230	0.61	0.62	0.00
UCL	3	3	3

### No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>Ra226</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

**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	0.11	101.32%	23.94%	100.00%	4.60%	1.03E+01	4.72E-01	1.04E+01	2.49E+00	Ra-5b	4.41E+01	4.60E+00	5.17E-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)

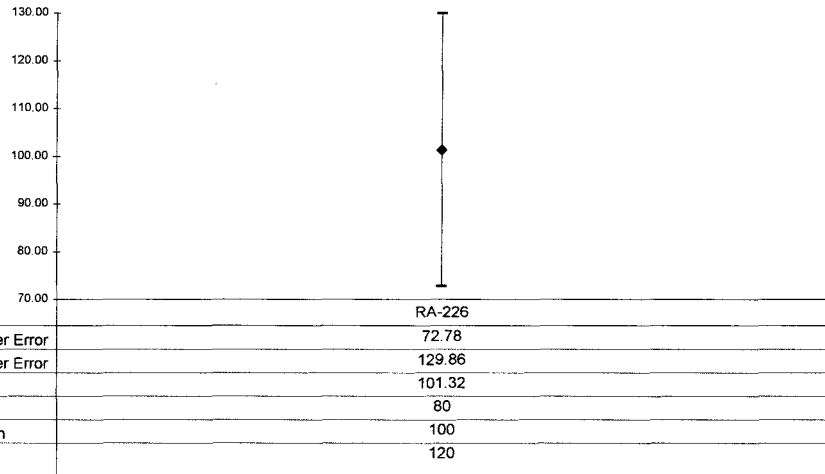
**Replicate Sample**

**QC Summary**

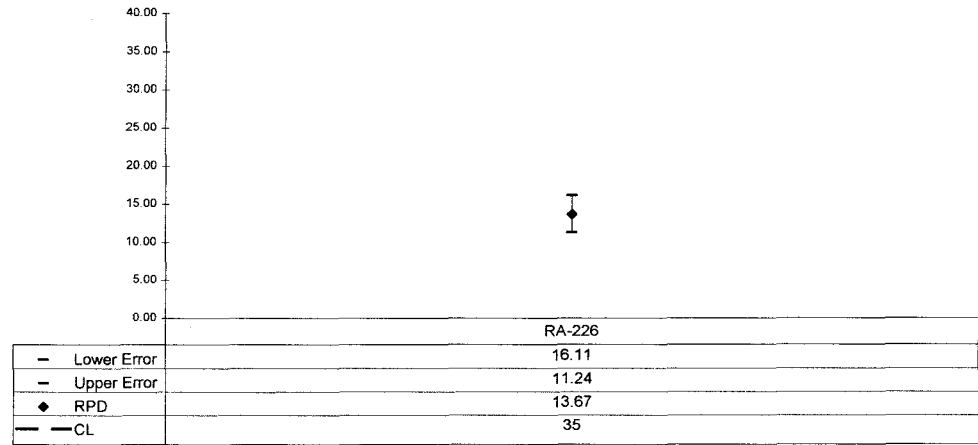
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.53	13.67	1.54E+00	5.63E-01	1.77E+00	6.14E-01	1.01	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>Ra226</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

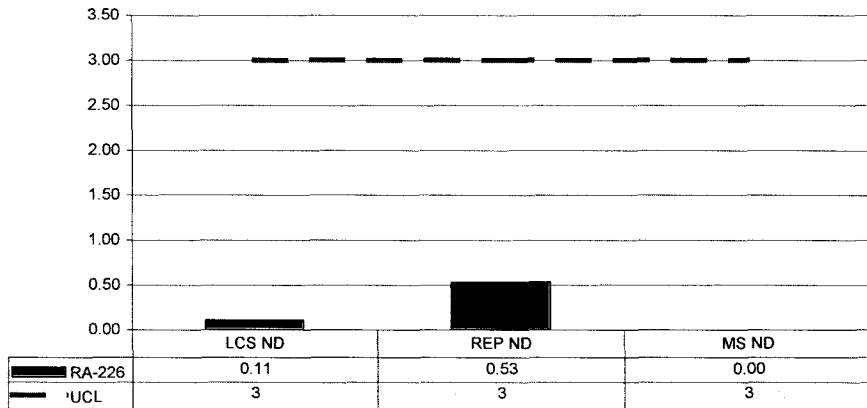
### LCS % Recovery



### Replicate Sample RPD



### Normalized Difference



### No Matrix Spike



WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>Ra228</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

**Laboratory Control Sample**

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	1.25	86.04%	25.21%	100.00%	5.10%	8.71E+00	4.44E-01	7.50E+00	1.89E+00	Ra-11	3.77E+01	5.10E+00	5.13E-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)

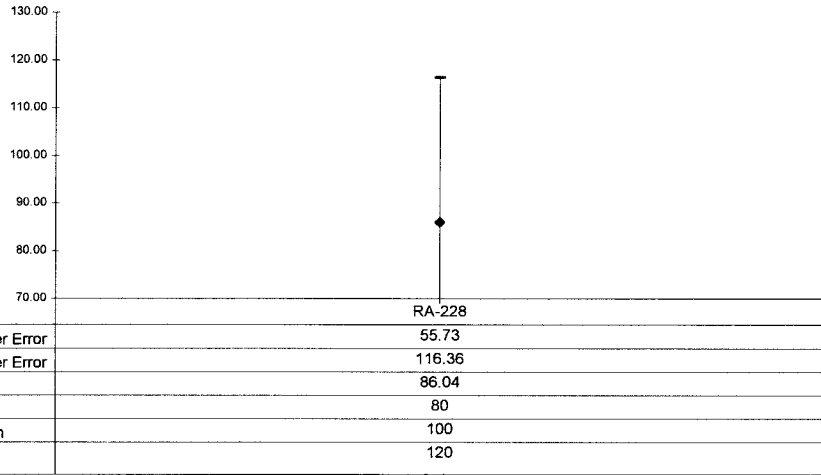
**Replicate Sample**

**QC Summary**

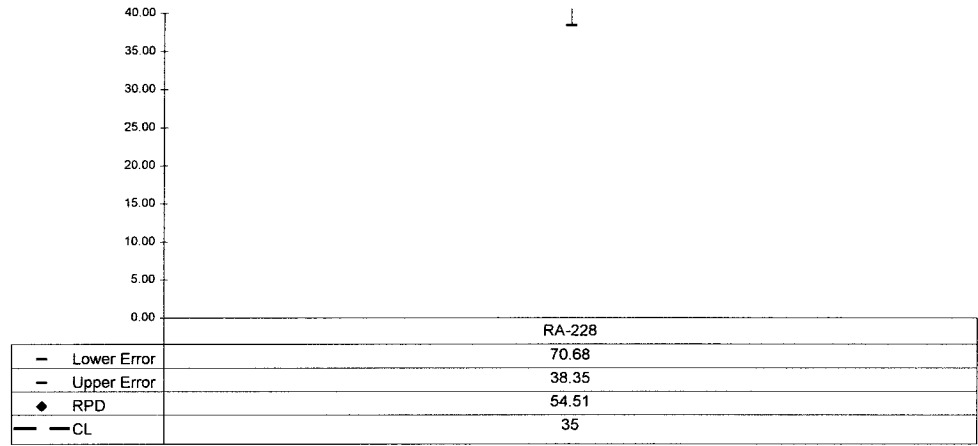
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	1.27	54.51	9.22E-01	6.96E-01	1.61E+00	8.07E-01	0.86	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
<b>13-07146</b>	<b>Ra228</b>	<b>1</b>	<b>pCi</b>	<b>I</b>	<b>Engineering Management Support, Inc.</b>

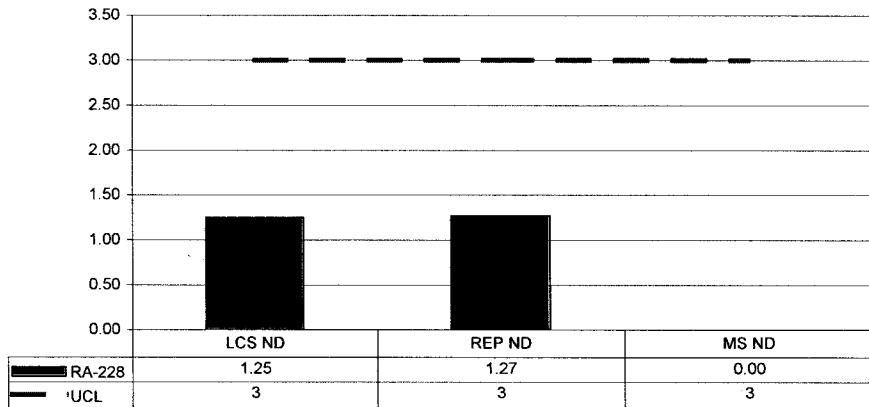
### LCS % Recovery



### Replicate Sample RPD



### Normalized Difference




### No Matrix Spike

057

**SECTION VII**  
**LABORATORY TECHNICIAN'S NOTES**


**ISO U NOTES**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	UISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIQOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN

*J Wolfe*  
*7/31/13*


**US EPA ARCHIVE DOCUMENT**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/06/13 17:22	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100 ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.
3	08/06/13 17:26	CHEM	JDEMELAS	NOTE: Columns for Fractions 6, 7, 10-12, and 16-19 all turned grayish-green after addition of load solutions. After addition of rinse solutions the same columns turned dark brown. Columns 16-19 were slow to drain through the resin. Per MRM, saved load/rinse liquids in clean, labeled sample bottles pending analytical results.

*John Demelas*  
8/6/13

US EPA ARCHIVE DOCUMENT

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/06/13 17:22	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.
3	08/06/13 17:26	CHEM	JDEMELAS	NOTE: Columns for Fractions 6, 7, 10-12, and 16-19 all turned grayish-green after addition of load solutions. After addition of rinse solutions the same columns turned dark brown. Columns 16-19 were slow to drain through the resin. Per MRM, saved load/rinse liquids in clean, labeled sample bottles pending analytical results.
4	08/07/13 05:29	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.

*Handwritten signature and date:*  
 [Signature]  
 8/7/13



Reagents Used in an Analysis

Internal Work Order

**13-07146**

Analysis Code

Run

**UUISO**

**1**

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/31/2013
014164P	Anion Exchange Resin	Reagent Grade	JDEMELAS	8/6/2013
014205S	HCl - HF	6.5N - 0.04N	JDEMELAS	8/6/2013
014229S	HCl - NH4I	8N - 0.1M	JDEMELAS	8/6/2013
014142D01	Hydrochloric Acid	0.5N	JDEMELAS	8/6/2013
014199S	Hydrochloric Acid	6.5N	JDEMELAS	8/6/2013
014213S	Hydrochloric Acid	8N	JDEMELAS	8/6/2013
014225S	Hydrochloric Acid	8N	JDEMELAS	8/6/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	8/6/2013
014042S	Carbon substrate	Solution	RMARTZ	8/7/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/7/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	8/7/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/7/2013
014220P	Titanous Chloride	Reagent Grade	RMARTZ	8/7/2013

US EPA ARCHIVE DOCUMENT



# Alpha #2

Date	Sample #	Client	Lab #	CT Time	Analysis	Test
8/6/13	Daily Pula	UAB	0928	1u	u	u
8/6/13	1707171A(4,6)	UWON	0936	2hr	Amz	u
8/6/13	1308006A(1-4)	UWON	0977	2hr	u/z	u
8/6/13	1307170A(1-7)	United	0978	2hr	u/z	u
8/6/13	1307171A(3-4,6)	UWON	1245	2hr	SDmins	Np
8/6/13	1307146A(1-6)	EMS	1246	2hr	SD-	Th
8/6/13	1307172A(3-4)	UWON	1634	2hr	SD-	Reb
8/6/13	1307147A(1-7)	EMS	1635	2hr	SD-	Reb
8/7/13	Daily Pula	UAB	0972	1u	u	u
8/7/13	1708016A(5)	United	0914	2hr	u/z	u
8/7/13	1707110B(1-7,10)	Englun	0915	2hr	u/z	u
8/7/13	1307185A(1-4)	Westren Adv.	0916	2hr	Pu	u
8/7/13	1307185A(1-4)	Westren	1244	2hr	SDmins	u
8/7/13	1307172A(1-4)	UWON	1244	2hr	SD-	Np
8/7/13	1307146A(1)	EMS	1246	2hr	SD-	u

# Alpha #3

Date	Sample #	Client	Location	CT	Time	Analysis	Test
8/5/13	1307128A(1-1)	UWOR	0948	2hr	7LN7	C	
8/5/13	1307128A(1-6)	UWOR	1231	2hr50m	Th	ICB	
8/5/13	1307129A(1-7)	MDNR	1231	2hr50m	Th	ICB	
8/5/13	1307146A(1-3)	EMS	1232	2hr50m	Rab	ICB	
<del>8/5/13</del>	<del>1307128A(1-6)</del>	<del>EMS</del>		<del>2hr50m</del>	<del>Rab</del>	<del>ICB</del>	
8/5/13	1307146A(13-14)	Ems	1250	2hr50m	Rab	ICB	
8/5/13	1307142A(12-15)	Accutest	1612	2hr50m	Rab	ICB	
8/5/13	1307171A(1-4,16)	UWOR	1613	2hr50m	Rab	ICB	
8/6/13	Daily Paise	UW	0928	1hr	---	---	
8/6/13	1307179A(1-11)	TBE	0950	2hr	Rab	C	
8/6/13	1307170A(4)	Unitech	0978	2hr	Unitech	---	
8/6/13	1307178A(1-5)	Unitech	0941	2hr	Paise	C	
8/6/13	1707179A(1-5)	Mirion Tech	0942	5hr	Unitech	C	
8/6/13	1707170A(1-2)	Unitech	0942	2hr	Paise	C	
8/6/13	1307146A(7-14)	EMS	1246	2hr50m	Th	ICB	
8/6/13	1307147A(8-19)	EMS	1636	2hr50min	Rab	ICB	
8/7/13	Daily Paise	UW	0972	1hr	---	---	
8/7/13	1307172A(1-4)	UWOR	0916	2hr	Am241	C	
8/7/13	1307172A(1-4)	UWOR	0917	2hr	Am241	C	
8/7/13	1307181A(1-4)	Westmonte	0918	2hr	Am241	C	
8/7/13	1307146A(2-14)	EMS	1247	2hr50m	UU	ICB	


# Alpha #1

Date	Sample #	Client	Lead Time (7 Fin)	Analysis Tech		
8/7/12	1708006A(1-4)	UCOR	0917	2hr	Pitzo	c
8/7/12	1308016A(1-4)	Unitech	0914	2hr	Unitech	c
8/7/13	1308006A(1-4)	UCOR	1243	2hr 50 mins	Np	KB
8/7/13	1307138A(1-4)	Unitech	1243	2hr 50 mins	UU	KB
8/7/13	1307146A(15-20)	EMS	1603	2hr 50 min	UU	KB
8/7/13	1307110B(1-2)	EMS	1607	2hr 50 min	UU	KB

# Alpha #3

Date	Account #	Client	Location	CT Skin Analysis	Therapist	Notes
8/5/13	1307123A (6)	UWOR	0948	2hr	TLN7	C
8/5/13	1307129A (6)	UWOR	1231	2hrs	Th	KB
8/5/13	1307129A (1-7)	MDNR	1231	2hrs	Th	KB
8/5/13	1307144A (1-3)	EMS	1232	2hrs	Rak	KB
<del>8/5/13</del>	<del>1307128A (1-5)</del>	<del>EMS</del>		<del>2hrs</del>	<del>Rak</del>	<del>KB</del>
8/5/13	1307146A (13-14)	EMS	1250	2hrs	Rak	KB
8/5/13	1307142A (12-15)	Accutest	1612	2hrs	Rak	KB
8/5/13	1307171A (1-4, 6)	UWOR	1613	2hrs	Rak	KB
8/6/17	Daily Pulg	UW	0928	1hr	---	---
8/6/17	1307179A (1-1)	TBE	0950	2hrs	Rak	C
8/6/17	1307170A (4)	Unitech	0978	2hr	Unitec	---
8/6/17	1307178A (1-5)	Unitech	0941	2hr	Pulgo	C
8/6/17	1307179A (1-5)	Mirion Tak	0942	5hr	Unitec	C
8/6/17	1307170A (1-2)	Unitech	0942	2hr	Pulgo	C
8/6/13	1307146A (7-14)	EMS	1246	2hrs	Th	KB
8/6/13	1307147A (8-19)	EMS	1636	2hrs	Rak	KB
8/7/17	Daily Pulg	UW	0972	1hr	---	---
8/7/17	1307172A (1-4)	UWOR	0916	2hr	Am241	C
8/7/17	1307172A (1-4)	UWOR	0917	2hr	Am241	C
8/7/17	1307181A (1-4)	Wastmnd	0918	2hr	Am241	C
8/7/13	1307146A (2-14)	EMS	1247	2hrs	UW	KB
8/7/13	1307149A (9-15)	EMS	1606	2hrs	Rak	KB
<del>8/8/17</del>	<del>Daily Pulg</del>	<del>UW</del>	<del>0978</del>	<del>1hr</del>	<del>---</del>	<del>---</del>
8/8/17	1307146A (9)	Engstrom	0920	2hrs	Unitec	C


**ISO TH NOTES**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN


*J Wolfe*  
 7/31/13

US EPA ARCHIVE DOCUMENT

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/05/13 19:15	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.

  
 8/5/13

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	07/31/13 09:49	PREP	JWOLFE	ALIQUTED AND ADDED SPIKES AND TRACERS- ADDED HNO3 TO FRACTIONS 10 AND 11, 14-19 TO PRESERVE SAMPLES- DRIED SAMPLES DOWN
2	08/05/13 19:15	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.
3	08/06/13 06:05	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.

  
 R  
 8/6/13





Reagents Used in an Analysis

Internal Work Order

**13-07146**

Analysis Code

Run

**ThISO**

**1**

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/31/2013
014164P	Anion Exchange Resin	Reagent Grade	JDEMELAS	8/5/2013
014213S	Hydrochloric Acid	8N	JDEMELAS	8/5/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	8/5/2013
014197S	Nitric Acid	8N	JDEMELAS	8/5/2013
014216S	Nitric Acid	8N	JDEMELAS	8/5/2013
014109P	Nitric Acid	Reagent Grade	JDEMELAS	8/5/2013
014042S	Carbon substrate	Solution	RMARTZ	8/6/2013
014040S	Cerrium Carrier	0.1mg/ml	RMARTZ	8/6/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/6/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/6/2013

US EPA ARCHIVE DOCUMENT

Alpha #2

Date	Sample #	Clients	Tacti	CTTime	Group	Total
8/6/13	Daily Pulse	WAS	0728	1w	mm	-
8/6/13	1307171A(4-6)	UWON	0936	2hrs	Answer	-
8/6/13	1308006A(1-4)	UWON	0977	2hrs	UWON	-
8/6/13	1307170A(1-7)	United	0978	2hr	UWON	-
8/6/13	1307171A(3-4,6)	UWON	1245	Chromosome	Np	WAS
8/6/13	1307146A(1-6)	EMS	1246	2hrs	Th	WAS

# Alpha #3


Date	Sample #	Client	Incl. Pin	CT Pin	Lead #	File
8/1/13	1207128A(4)	UWOR	0948	2LW	7LNY	C
8/5/13	1307129A(6)	UWOR	1231	2hr50i	Th	KB
8/5/13	1307129A(1-7)	MDNR	1231	2hr50i	Th	KB
8/5/13	1307144A(1-3)	EMS	1232	2hr50i	Rab	KB
<del>8/5/13</del>	<del>1307128A(1-5)</del>	<del>EMS</del>		<del>2hr50i</del>	<del>Rab</del>	<del>KB</del>
8/5/13	1307146A(13-14)	EMS	1250	2hr50i	Rab	KB
8/5/13	1307142A(12-15)	Accutest	1612	2hr50i	Rab	KB
8/5/13	1307171A(1-4,6)	UWOR	1613	2hr50i	Rab	KB
8/6/13	Daily Pulse	UW	0928	UW	UW	-
8/6/13	1307179A(1-1)	TBE	0550	2hr50i	Rab	C
8/6/13	1307170A(4)	Unitech	0978	2LW	Unitech	-
8/6/13	1307178A(1-5)	Unitech	0941	2LW	Pulse	C
8/6/13	1707179A(1-5)	Mirion Tech	0942	5hr70i	Unitech	C
8/6/13	1707170A(1-2)	Unitech	0942	2LW	Pulse	C
8/6/13	1307144A(7-14)	EMS	1246	2hr50i	Th	KB

# Alpha #1

Date	Sample #	Client	Incident #	CT Pin	Analysis Tech	Result
7/31/13	1307110A(1-8)	EMS	1829	2hrs 50mins	Th	KB
8/1/13	Daily Pulse	LAB	0728	1a	nm	—
8/1/13	1707140A(1-4)	UCOR	0745	2hr	RAB	—
8/1/13	1307098BU(3)	Engma	0915	2hr	UWZ	—
8/1/13	1307111A(1-2)	Engma	0916	2hr	UWZ	—
8/1/13	1307111A(7-14)	EMS	1217	2hrs 50i	Th	KB
8/1/13	Daily Pulse	LAB	0713	1a	nm	—
8/2/13	SECCAL	LAB	0807	2hr 7m	UWZ	—
8/2/13	1707098B(12-17)	Engma	1640	2hr	UWZ	—
8/2/13	1707116A(1-4)	UCOR	1040	2hr	THAT	—
8/2/13	1307116A(6)	UCOR	1335	2hrs 50mins	PUNT	KB
8/2/13	1307140A(3)	UCOR	1336	2hrs 50i	Am241	KB
8/2/13	1307116A(14,6)	UCOR	1336	2hr 50i	Th	KB
8/2/13	System Bkgd	Lab	1638	16:40 hrs	—	KB
8/3/13	Daily Pulse	Lab	0925	10mins	NA	KB
8/3/13	1307140A(1-4)	UCOR	0944	2hr 50i	Np	KB
8/3/13	1307130A(1-4)	Unitech	0947	2hr 50i	Np	KB
8/15/13	Daily Pulse	LAB	0722	1a	nm	—
8/15/13	1707128A(1-7)	Test Am	0916	2hr	UWZ	—
8/15/13	1707128A(1)	Mish Papi	0916	2hr	UWZ	—
8/15/13	1307109A(1-4)	UCOR	1230	2hrs 50mins	Th	KB
8/15/13	1307128A(1-4)	UCOR	1231	2hr 50i	Th	KB
8/15/13	1307146A(15-20)	EMS	1610	2hrs 50i	Rab	KB
8/15/13	1307142A(1-2)	Accutest	1611	2hr 50i	Rab	KB
8/16/13	Daily Pulse	LAB	0728	1a	nm	—
8/16/13	1707171A(1-4)	UCOR	0976	2hr	Am241	—
8/16/13	1307171A(1-7)	UCOR	0976	2hr	Am241	—
8/16/13	1307130A(3-4)	Unitech	1244	2 hrs 50i	PU	KB
8/16/13	1307130A(1-4)	Unitech	1245	2hr 50i	Th	KB
8/16/13	1307171A(1-2)	UCOR	1245	2hr 50mins	Np	KB
8/16/13	1307146A(15-20)	EMS	1633	2hr 50i	Th	KB
8/16/13	1307172A(1-2)	UCOR	1634	2hr 50i	Rab	KB

US EPA ARCHIVE DOCUMENT


**RA-226 NOTES**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/30/13 10:32	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 14 AND 15 DOWN AND DIGESTED DUE TO HIGH SOLID CONTENT- PH'D ALL SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

*J Wolfe*  
*7/30/13*

US EPA ARCHIVE DOCUMENT

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	07/30/13 10:32	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 14 AND 15 DOWN AND DIGESTED DUE TO HIGH SOLID CONTENT- PH'D ALL SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	07/31/13 20:11	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	08/01/13 15:48	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*  
 8/1/13



Reagents Used in an Analysis

Internal Work Order

**13-07146**

Analysis Code

Run

**Ra226**

**1**

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/30/2013
013930D02	Ammonium Sulfate	200 mg/ml	JWOLFE	7/30/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/30/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/30/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/30/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	7/30/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	7/30/2013
014192S	EDTA	0.25M	LWALKER	7/31/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	8/1/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	8/1/2013

US EPA ARCHIVE DOCUMENT



# Alpha #3

Date	Sample #	Client	Location	CT Skin	Analysis	Lab
8/17	No 77884444	UOR	0948	ZL	TLN7	C
8/5/13	1307129A (6)	UOR	1231	2hr50i	Th	ICB
8/5/13	1307129A (1-7)	MDNR	1231	2hr50i	Th	ICB
8/5/13	1307146A (1-3)	EMS	1232	2hr50i	Rap	ICB

US EPA ARCHIVE DOCUMENT

Alpha #2

Date	Sample #	Client	Location	CT Time	Analysis	Stat
7/28	Daily Pulse	LAB		0770	low	run
7/29/13	1307120A(4-7)	ERT		0933	2hrs	unit
7/29/13	1307158A(1-4)	Udon		0933	2hrs	unit
7/29/13	1307180A(1,2)	Udon		0934	2hrs	Pulse
7/29/13	1307100A(13-19)	Eng. Manag. Serv.		1240	2hrs	Th
7/29/13	Daily Pulse	LAB		0724	low	run
7/29/13	1307158A(1-4,7)	Udon		0959	2hrs	Pulse
7/29/13	1307158A(1-4)	Udon		0959	2hrs	Pulse
7/29/13	1307158A(1-4)	Udon		1000	2hrs	Th
7/29/13	1307128A(1-4,6)	Udon		1307	2hrs	HP27
7/29/13	1307100A(1-5)	Eng Man		1304	2hrs	unit
7/29	Daily Pulse	LAB		0722	low	run
7/29/13	1307128A(4,6)	Udon		0914	2hrs	unit
7/29/13	1307167A(1-4)	Udon		0914	2hrs	unit
7/29/13	1307168A(1-4)	Udon		0914	2hrs	unit
7/31/13	1307099A(2-11)	EMS		1215	2hrs	Rak
7/31/13	1307100A(10-19)	EMS		1515	2hrs	Rak
7/31/13	1307111A(1-6)	EMS		1516	2hrs	Rak
7/31/13	1307110A(9-18)	EMS		1829	2hrs	Th
8/1/13	Daily Pulse	LAB		0725	low	run
8/1/13	1307111A(3-12)	Eng Man		0916	2hrs	unit
8/1/13	Daily Pulse	LAB		0717	low	run
8/1/13	1707140A(1-4)	Udon		0903	2hrs	unit
8/1/13	1707140A(1-4)	Udon		0909	2hrs	unit
8/1/13	1707170A(1-2)	United		0909	2hrs	unit
8/2/13	SECCAL	LAB		1206	2hrs	run
8/2/13	System Bkscd	Lab		1438	4.40 hrs	NA
8/3/13	Daily Pulse	Lab		0925	10 mins	NA
8/5/13	Daily Pulse	LAB		0722	low	run
8/5/13	1707128A(4-4,6)	Udon		0947	2hrs	Pulse
8/5/13	1707128A(1-4,6)	Udon		0948	2hrs	Pulse
8/5/13	1707109A(1-4)	Udon		0848	2hrs	Th
8/5/13	1307146A(4-14)	EMS		1245	2hrs	Rak

US EPA ARCHIVE DOCUMENT

# Alpha #3


Date	Sample #	Client	Location	CT Skin	Analysis	Other
8/17	1207128A(1-14)	UOR	0948	2Lm	7LN7	C
8/5/13	1307128A (6)	UOR	1231	2hr50m	Th	KB
8/5/13	1307129A (1-7)	MDNR	1231	2hr50m	Th	KB
8/5/13	1307146A (1-3)	EMS	1232	2hr50m	Rap	KB
<del>8/5/13</del>	<del>1307128A (1-5) 8/5/13</del>	<del>EMS</del>		<del>2hr50m</del>	<del>Rap</del>	<del>KB</del>
8/5/13	1307146A (13-14)	EMS	1250	2hr50m	Rap	KB

# Alpha #1

47

Date	Sample #	Client	Facility	CT Time	Analysis	Test
7/3/13	1307110A(1-8)	EMS	1829	2hrs 50mins	Th	KB
8/1/13	Daily Pulse	LAB	0728	1hr	nm	—
8/1/13	1707140A(1-4)	UWOR	0745	2hr	RAB	—
8/1/13	1307098B(1-3)	Engman	0915	2hr	UWZ	—
8/1/13	1307111A(1-2)	Engman	0916	2hr	UWZ	—
8/1/13	1307111A(7-14)	EMS	1217	2hrs 50i	Th	KB
8/2/13	Daily Pulse	LAB	0713	1hr	nm	—
8/2/13	SECCAL	LAB	0807	2hr 20	UWZ	—
8/2/13	1707098B(12-17)	Engman	1040	2hr	UWZ	—
8/2/13	1707116A(1-4)	UWOR	1040	2hr	THAT	—
8/2/13	1307116A(6)	UWOR	1335	2hrs 50mins	PUNT	KB
8/2/13	1307140A(3)	UWOR	1336	2hrs 50i	Am241	KB
8/2/13	1307116A(1-4,6)	UWOR	1336	2hr 50i	Th	KB
8/2/13	System Bkgd	Lab	1638	16:40 hrs	—	KB
8/3/13	Daily Pulse	Lab	0925	10mins	NA	KB
8/3/13	1307140A(1-4)	UWOR	0944	2hrs 50i	Np	KB
8/3/13	1307130A(1-4)	Whitech	0947	2hrs 50i	Np	KB
8/5/13	Daily Pulse	LAB	0722	1hr	nm	—
8/5/13	1707128A(1-7)	Test Am	0916	2hr	UWZ	—
8/5/13	1707128A(1)	Mish/Rep.	0916	2hr	UWZ	—
8/5/13	1307109A(1-4)	UWOR	1230	2hrs 50mins	Th	KB
8/5/13	1307128A(1-4)	UWOR	1231	2hrs 50i	Th	KB
8/5/13	1307146A(15-20)	EMS	1610	2hrs 50i	Rak	KB
8/5/13	1307142A(1-2)	Accutest	1611	2hrs 50i	Rak	KB


**RA-228 NOTES**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/30/13 10:32	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 14 AND 15 DOWN AND DIGESTED DUE TO HIGH SOLID CONTENT- PH'D ALL SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

*J Wolfe*  
*7/30/13*


**US EPA ARCHIVE DOCUMENT**

 <b>EBERLINE</b> <small>SERVICES</small> <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	Ra228
		Run Number	1


#	Date	Dept	User	Notes
1	07/30/13 10:32	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 14 AND 15 DOWN AND DIGESTED DUE TO HIGH SOLID CONTENT- PH'D ALL SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/06/13 12:30	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/08/13 18:06	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

*L Walker*  
8/8/13

US EPA ARCHIVE DOCUMENT

 <b>EBERLINE</b> SERVICES <b>Work Order Analysis Notes</b>	<b>Oak Ridge Laboratory</b> 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07146
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	07/30/13 10:32	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 14 AND 15 DOWN AND DIGESTED DUE TO HIGH SOLID CONTENT- PH'D ALL SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/06/13 12:30	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/08/13 18:06	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/12/13 09:40	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 )

8-12-13  






Reagents Used in an Analysis

Internal Work Order

**13-07146**

Analysis Code

Run

**Ra228**

**1**

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	7/30/2013
013930D02	Ammonium Sulfate	200 mg/ml	JWOLFE	7/30/2013
014007D01	Barium Carrier	1 mg/ml	JWOLFE	7/30/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	7/30/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	7/30/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	7/30/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	7/30/2013
011504D32	Ammonium Sulfide	2%	LWALKER	8/8/2013
014008D03	Lead Carrier	1.5 mg/ml	LWALKER	8/8/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	8/8/2013
013065D06	Sodium Hydroxide	10M	LWALKER	8/8/2013
014060S	Yttrium Carrier	9 mg/ml	LWALKER	8/8/2013
013763D02	Ammonium Oxalate	5%	TSMITH	8/12/2013
013910D07	Nitric Acid	1N	TSMITH	8/12/2013
013910D08	Nitric Acid	6N	TSMITH	8/12/2013
013065D06	Sodium Hydroxide	10M	TSMITH	8/12/2013
014207S	Sodium Hydroxide	18M	TSMITH	8/12/2013

Date	Sample #	Client	Location	City	Amount	Unit
8/8/13	1307186Pb(1-4)	Udon	0818110	2L	Pb210	C
8/8/13	1307122SS4(2-9)	Test Ana.	1006	2L	Snodly	C
8/8/13	1307186Pb(1-4)	Udon	1217	2hrs	Pb210	KB
8/9/13	EF70E	Urs	0702	30m	LAB	C
8/9/13	Buadac	Urs	0774	1hr	Urs	C
8/9/13	1307186NA(1-4)	Udon	0750	2L	RA8	C
8/9/13	1308004NA(1-7)	Udon	0750	2L	RA8	C
8/9/13	1708005NA(1-4)	Udon	0750	2L	RA8	C
8/9/13	1707129NA(1-7)	Miss Rep	0958	2L	RA8	C
8/9/13	1707186NP(1-4)	Udon	1005	10m	VP27	C
8/9/13	1308005Pb(1-4)	Udon	1026	2L	Pb210	C
8/10/13	Weekly Blog	Lab	1138	12hr	OB	AG
8/12/13	EF70E	Urs	0518	30m	LAB	C
8/12/13	Buadac	Urs	0751	1hr	Urs	C
8/12/13	1707142NA(1-7)	Acatest	0747	2L	RA8	C
8/12/13	1307146NA(1-7)	Engma	1116	2L	RA8	C

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Sample #	CT Time	Analysis	Fee
8/7/13	1307172CL(1-3,5)	Ucon	1518	30mins	CL36	KB
8/7/13	1307186CL(1-3,5)	Ucon	1519	30mins	CL36	KB
8/7/13	1308004CL(1-3,6)	Ucon	1555	30mins	CL36	KB
8/7/13	1308005CL(1-3,5)	Ucon	1556	30mins	CL36	KB
8/8/13	B/LC/OC	UAS	0117	hr	L13	C
8/8/13	G/F/OC	UAS	0616	hr	L13	C
8/8/13	1707111RA(10-19)	EngMan	0786	2L	RT8	C
8/8/13	1707111RA(1)	EngMan	1013	30min	RT8	C
8/8/13	1707125S(11-18+13)	TestAm.	1017	2L	S/Soly	C
8/8/13	1707111S(11)	TestAm.	1048	hr	S/Soly	C
8/8/13	1308036AB(1-4)	Thermochem	1242	2hrs	αB	KB
8/9/13	B/LC/OC	UAS	0102	hr	L13	C
8/9/13	G/F/OC	UAS	0606	30	UAS	C
8/9/13	1708071S(1-6)	Ucon	0781	2L	S/RTOT	C
8/9/13	1707141RA(1)	Adcontest	1002	30min	RT8	C
8/9/13	1707141RA(2-5)	Adcontest	1002	2L	RT8	C
8/9/13	1707105AD(1)	Hudson	0940	30min	L13	C
8/9/13	1707105AD(2-4)	Hudson	0940	2L	L13	C
8/9/13	1708004Pb(1)	Ucon	1028	30min	Ph210	C
8/9/13	1708004Pb(2-5)	Ucon	1106	4hr	Ph210	C
8/10/13	Weekly Bldg	Lab	1137	12 hr	αB	AG
8/12/13	B/LC/OC	UAS	0115	hr	L13	C
8/12/13	G/F/OC	UAS	0625	30	UAS	C
8/12/13	1707142RA(12-15)	Adcontest	0747	2L	RT8	C
8/12/13	1707128S(1-4,6,8)	Ucon	0848	2L	S/Soly	C
8/12/13	1707146RA(17-20)	EngMan	1117	2L	RT8	C

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

Work Order	<b>13-07146</b>
Analysis Code	<b>UIISO</b>
Run	<b>1</b>
Date Received	<b>7/22/2013</b>
Lab Deadline	<b>8/13/2013</b>
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	<b>4</b>
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)	19.044
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/23/13 00:00	1.0000E+00
02	MBL	BLANK		07/23/13 00:00	1.0000E+00
03	DUP	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
04	DO	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
05	TRG	PZ-105-SS DIS	48	07/12/13 09:42	1.0000E+00
06	TRG	PZ-114-AS TOT	46	07/12/13 10:56	1.0000E+00
07	TRG	PZ-114-AS DIS	46	07/12/13 10:56	1.0000E+00
08	TRG	I-66 TOT	42	07/15/13 10:44	1.0000E+00
09	TRG	I-66 DIS	42	07/15/13 10:44	1.0000E+00
10	TRG	MW-102 TOT	41	07/15/13 11:10	1.0000E+00
11	TRG	MW-102 DIS	41	07/15/13 11:10	1.0000E+00
12	TRG	MW-103 TOT	44	07/15/13 11:44	1.0000E+00
13	TRG	MW-103 DIS	44	07/15/13 11:44	1.0000E+00
14	TRG	PZ-303-AS TOT	42	07/15/13 12:20	1.0000E+00
15	TRG	PZ-303-AS DIS	42	07/15/13 12:20	1.0000E+00
16	TRG	I-11 TOT	39	07/15/13 13:12	1.0000E+00
17	TRG	I-11 DIS	39	07/15/13 13:12	1.0000E+00
18	TRG	S-10 TOT	44	07/15/13 14:05	1.0000E+00
19	TRG	S-10 DIS	44	07/15/13 14:05	1.0000E+00
20	TRG	FB at D-12 TOT	40	07/15/13 14:30	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	0.6121	11.7		0.00								
02	MBL	0.6083	11.6		0.00								
03	DUP	0.6054	11.5		0.00								
04	DO	0.6025	11.5		0.00								
05	TRG	0.6016	11.5		0.00								
06	TRG	0.6029	11.5		0.00								
07	TRG	0.6023	11.5		0.00								
08	TRG	0.6019	11.5		0.00								
09	TRG	0.6032	11.5		0.00								
10	TRG	0.5996	11.4		0.00								
11	TRG	0.6005	11.4		0.00								
12	TRG	0.6009	11.4		0.00								
13	TRG	0.6010	11.4		0.00								
14	TRG	0.6013	11.5		0.00								
15	TRG	0.6018	11.5		0.00								
16	TRG	0.6005	11.4		0.00								
17	TRG	0.6020	11.5		0.00								
18	TRG	0.6012	11.4		0.00								
19	TRG	0.6034	11.5		0.00								
20	TRG	0.6017	11.5		0.00								

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

<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			07/31/13 09:44	JWOLFE				
02	MBL			07/31/13 09:44	JWOLFE				
03	DUP			07/31/13 09:44	JWOLFE				
04	DO			07/31/13 09:44	JWOLFE				
05	TRG			07/31/13 09:44	JWOLFE				
06	TRG			07/31/13 09:44	JWOLFE				
07	TRG			07/31/13 09:44	JWOLFE				
08	TRG			07/31/13 09:44	JWOLFE				
09	TRG			07/31/13 09:44	JWOLFE				
10	TRG			07/31/13 09:44	JWOLFE				
11	TRG			07/31/13 09:44	JWOLFE				
12	TRG			07/31/13 09:44	JWOLFE				
13	TRG			07/31/13 09:44	JWOLFE				
14	TRG			07/31/13 09:44	JWOLFE				
15	TRG			07/31/13 09:44	JWOLFE				
16	TRG			07/31/13 09:44	JWOLFE				
17	TRG			07/31/13 09:44	JWOLFE				
18	TRG			07/31/13 09:44	JWOLFE				
19	TRG			07/31/13 09:44	JWOLFE				
20	TRG			07/31/13 09:44	JWOLFE				

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

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-UUISO-1**

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	7.52E+00	1.13E+00	1.26E-01	8.13E+00	92.41	OK		OK	
02	U-234	MBL	BLANK	pCi/l	7.69E-02	6.42E-02	6.87E-02					OK	OK
03	U-234	DUP	PZ-105-SS TOT	pCi/l	3.12E+00	5.29E-01	5.64E-02				NA	OK	
04	U-234	DO	PZ-105-SS TOT	pCi/l	2.81E+00	5.23E-01	6.42E-02					OK	
05	U-234	TRG	PZ-105-SS DIS	pCi/l	2.78E+00	5.04E-01	8.12E-02					OK	
06	U-234	TRG	PZ-114-AS TOT	pCi/l	3.04E-01	2.13E-01	1.68E-01					OK	
07	U-234	TRG	PZ-114-AS DIS	pCi/l	2.86E-01	1.60E-01	1.29E-01					OK	
08	U-234	TRG	I-66 TOT	pCi/l	7.23E-01	2.21E-01	7.83E-02					OK	
09	U-234	TRG	I-66 DIS	pCi/l	1.10E+00	4.24E-01	1.92E-01					OK	
10	U-234	TRG	MW-102 TOT	pCi/l	5.58E+00	9.04E-01	9.45E-02					OK	
11	U-234	TRG	MW-102 DIS	pCi/l	5.63E+00	8.67E-01	7.94E-02					OK	
12	U-234	TRG	MW-103 TOT	pCi/l	3.00E+00	5.58E-01	6.70E-02					OK	
13	U-234	TRG	MW-103 DIS	pCi/l	2.48E+00	5.15E-01	8.54E-02					OK	
14	U-234	TRG	PZ-303-AS TOT	pCi/l	8.41E-01	3.43E-01	1.80E-01					OK	
15	U-234	TRG	PZ-303-AS DIS	pCi/l	1.05E+00	3.56E-01	1.33E-01					OK	
16	U-234	TRG	I-11 TOT	pCi/l	1.19E+00	3.08E-01	1.06E-01					OK	
17	U-234	TRG	I-11 DIS	pCi/l	1.26E+00	3.27E-01	1.27E-01					OK	
18	U-234	TRG	S-10 TOT	pCi/l	6.24E-01	2.39E-01	8.73E-02					OK	
19	U-234	TRG	S-10 DIS	pCi/l	3.78E-01	2.01E-01	1.06E-01					OK	
20	U-234	TRG	FB at D-12 TOT	pCi/l	3.18E-01	1.34E-01	6.42E-02					OK	

Client	Engineering Management Support, Inc.	13-07146	UUISO	1
Eberline Services Work Order				Run



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	112.85	0.00	0.00			
02	U-234	MBL	07/23/13 00:00	1.00E+00	118.01	0.00	0.00			
03	U-234	DUP	07/12/13 09:42	1.00E+00	105.88	0.00	0.00			
04	U-234	DO	07/12/13 09:42	1.00E+00	94.57	0.00	0.00			
05	U-234	TRG	07/12/13 09:42	1.00E+00	96.59	0.00	0.00			
06	U-234	TRG	07/12/13 10:56	1.00E+00	43.95	0.00	0.00			
07	U-234	TRG	07/12/13 10:56	1.00E+00	66.16	0.00	0.00			
08	U-234	TRG	07/15/13 10:44	1.00E+00	93.69	0.00	0.00			
09	U-234	TRG	07/15/13 10:44	1.00E+00	42.36	0.00	0.00			
10	U-234	TRG	07/15/13 11:10	1.00E+00	85.84	0.00	0.00			
11	U-234	TRG	07/15/13 11:10	1.00E+00	91.95	0.00	0.00			
12	U-234	TRG	07/15/13 11:44	1.00E+00	92.47	0.00	0.00			
13	U-234	TRG	07/15/13 11:44	1.00E+00	81.59	0.00	0.00			
14	U-234	TRG	07/15/13 12:20	1.00E+00	52.65	0.00	0.00			
15	U-234	TRG	07/15/13 12:20	1.00E+00	60.11	0.00	0.00			
16	U-234	TRG	07/15/13 13:12	1.00E+00	85.01	0.00	0.00			
17	U-234	TRG	07/15/13 13:12	1.00E+00	80.36	0.00	0.00			
18	U-234	TRG	07/15/13 14:05	1.00E+00	61.90	0.00	0.00			
19	U-234	TRG	07/15/13 14:05	1.00E+00	52.41	0.00	0.00			
20	U-234	TRG	07/15/13 14:30	1.00E+00	105.80	0.00	0.00			

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-UIISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	08/07/13 12:46		A_Spec	Alpha_031	170	4.53 E+02	1.10 E-02	14.2
02	U-234	MBL	08/07/13 12:46		A_Spec	Alpha_033	170	6.32 E+00	4.00 E-03	18.5
03	U-234	DUP	08/07/13 12:46		A_Spec	Alpha_034	170	2.31 E+02	1.00 E-03	18.6
04	U-234	DO	08/07/13 12:47		A_Spec	Alpha_035	170	1.83 E+02	1.00 E-03	18.3
05	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_036	170	1.93 E+02	4.00 E-03	19.1
06	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_038	170	8.66 E+00	2.00 E-03	17.2
07	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_039	170	1.40 E+01	6.00 E-03	19.7
08	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_040	170	4.85 E+01	3.00 E-03	19
09	U-234	TRG	08/08/13 08:19		A_Spec	Alpha_042	170	3.23 E+01	4.00 E-03	18.5
10	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_042	170	3.33 E+02	4.00 E-03	18.5
11	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_045	170	3.72 E+02	3.00 E-03	19.1
12	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_046	170	1.87 E+02	1.00 E-03	17.9
13	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_047	170	1.39 E+02	2.00 E-03	18.2
14	U-234	TRG	08/07/13 12:47		A_Spec	Alpha_048	170	2.80 E+01	0.00 E+00	16.8
15	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_003	170.02	4.15 E+01	3.00 E-03	17.5
16	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_004	170.02	7.38 E+01	7.00 E-03	19.4
17	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_010	170.02	7.51 E+01	1.10 E-02	19.7
18	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_011	170.02	2.98 E+01	1.00 E-03	20.5
19	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_012	170.02	1.48 E+01	1.00 E-03	19.9
20	U-234	TRG	08/07/13 16:03		A_Spec	Alpha_013	170.02	2.37 E+01	2.00 E-03	18.7

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-UUISO-1**

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-238	LCS	LCS	pCi/l	8.51E+00	1.26E+00	1.42E-01	7.93E+00	107.34	OK		OK	
02	U-238	MBL	BLANK	pCi/l	3.22E-02	4.17E-02	5.80E-02					OK	OK
03	U-238	DUP	PZ-105-SS TOT	pCi/l	1.63E+00	3.41E-01	5.62E-02				NA	OK	
04	U-238	DO	PZ-105-SS TOT	pCi/l	1.54E+00	3.51E-01	6.39E-02					OK	
05	U-238	TRG	PZ-105-SS DIS	pCi/l	1.78E+00	3.75E-01	1.02E-01					OK	
06	U-238	TRG	PZ-114-AS TOT	pCi/l	1.40E-01	1.55E-01	2.10E-01					OK	
07	U-238	TRG	PZ-114-AS DIS	pCi/l	1.59E-01	1.15E-01	8.49E-02					OK	
08	U-238	TRG	I-66 TOT	pCi/l	5.94E-01	1.98E-01	8.90E-02					OK	
09	U-238	TRG	I-66 DIS	pCi/l	3.99E-01	2.50E-01	2.23E-01					OK	
10	U-238	TRG	MW-102 TOT	pCi/l	4.63E+00	7.83E-01	1.10E-01					OK	
11	U-238	TRG	MW-102 DIS	pCi/l	4.33E+00	7.08E-01	7.20E-02					OK	
12	U-238	TRG	MW-103 TOT	pCi/l	2.79E+00	5.31E-01	6.67E-02					OK	
13	U-238	TRG	MW-103 DIS	pCi/l	2.27E+00	4.85E-01	8.50E-02					OK	
14	U-238	TRG	PZ-303-AS TOT	pCi/l	5.33E-01	2.62E-01	1.25E-01					OK	
15	U-238	TRG	PZ-303-AS DIS	pCi/l	1.02E+00	3.49E-01	1.32E-01					OK	
16	U-238	TRG	I-11 TOT	pCi/l	6.33E-01	2.15E-01	1.14E-01					OK	
17	U-238	TRG	I-11 DIS	pCi/l	8.05E-01	2.50E-01	1.00E-01					OK	
18	U-238	TRG	S-10 TOT	pCi/l	3.68E-01	1.80E-01	9.96E-02					OK	
19	U-238	TRG	S-10 DIS	pCi/l	2.49E-01	1.61E-01	1.06E-01					OK	
20	U-238	TRG	FB at D-12 TOT	pCi/l	4.44E-02	5.34E-02	7.54E-02					OK	

Run	1
	UUISO
Analysis Code	UUISO
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

8600

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	112.85	0.00	0.00			
02	U-238	MBL	07/23/13 00:00	1.00E+00	118.01	0.00	0.00			
03	U-238	DUP	07/12/13 09:42	1.00E+00	105.88	0.00	0.00			
04	U-238	DO	07/12/13 09:42	1.00E+00	94.57	0.00	0.00			
05	U-238	TRG	07/12/13 09:42	1.00E+00	96.59	0.00	0.00			
06	U-238	TRG	07/12/13 10:56	1.00E+00	43.95	0.00	0.00			
07	U-238	TRG	07/12/13 10:56	1.00E+00	66.16	0.00	0.00			
08	U-238	TRG	07/15/13 10:44	1.00E+00	93.69	0.00	0.00			
09	U-238	TRG	07/15/13 10:44	1.00E+00	42.36	0.00	0.00			
10	U-238	TRG	07/15/13 11:10	1.00E+00	85.84	0.00	0.00			
11	U-238	TRG	07/15/13 11:10	1.00E+00	91.95	0.00	0.00			
12	U-238	TRG	07/15/13 11:44	1.00E+00	92.47	0.00	0.00			
13	U-238	TRG	07/15/13 11:44	1.00E+00	81.59	0.00	0.00			
14	U-238	TRG	07/15/13 12:20	1.00E+00	52.65	0.00	0.00			
15	U-238	TRG	07/15/13 12:20	1.00E+00	60.11	0.00	0.00			
16	U-238	TRG	07/15/13 13:12	1.00E+00	85.01	0.00	0.00			
17	U-238	TRG	07/15/13 13:12	1.00E+00	80.36	0.00	0.00			
18	U-238	TRG	07/15/13 14:05	1.00E+00	61.90	0.00	0.00			
19	U-238	TRG	07/15/13 14:05	1.00E+00	52.41	0.00	0.00			
20	U-238	TRG	07/15/13 14:30	1.00E+00	105.80	0.00	0.00			

Run	1
	UUISO
Analysis Code	UUISO
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

6600

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-UISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	08/07/13 12:46		A_Spec	Alpha_031	170	5.15 E+02	1.60 E-02	14.2
02	U-238	MBL	08/07/13 12:46		A_Spec	Alpha_033	170	2.66 E+00	2.00 E-03	18.5
03	U-238	DUP	08/07/13 12:46		A_Spec	Alpha_034	170	1.21 E+02	1.00 E-03	18.6
04	U-238	DO	08/07/13 12:47		A_Spec	Alpha_035	170	1.01 E+02	1.00 E-03	18.3
05	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_036	170	1.24 E+02	9.00 E-03	19.1
06	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_038	170	4.00 E+00	0.00 E+00	17.2
07	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_039	170	7.83 E+00	1.00 E-03	19.7
08	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_040	170	4.00 E+01	0.00 E+00	19
09	U-238	TRG	08/08/13 08:19		A_Spec	Alpha_042	170	1.18 E+01	7.00 E-03	18.5
10	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_042	170	2.78 E+02	7.00 E-03	18.5
11	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_045	170	2.88 E+02	2.00 E-03	19.1
12	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_046	170	1.75 E+02	1.00 E-03	17.9
13	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_047	170	1.28 E+02	2.00 E-03	18.2
14	U-238	TRG	08/07/13 12:47		A_Spec	Alpha_048	170	1.78 E+01	1.00 E-03	16.8
15	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_003	170.02	4.05 E+01	3.00 E-03	17.5
16	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_004	170.02	3.95 E+01	9.00 E-03	19.4
17	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_010	170.02	4.81 E+01	5.00 E-03	19.7
18	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_011	170.02	1.77 E+01	2.00 E-03	20.5
19	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_012	170.02	9.83 E+00	1.00 E-03	19.9
20	U-238	TRG	08/07/13 16:03		A_Spec	Alpha_013	170.02	3.32 E+00	4.00 E-03	18.7

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

0010

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	9.14E-01	2.90E-01	9.78E-02					OK	
02	U-235	MBL	BLANK	pCi/l	7.51E-02	7.25E-02	9.00E-02					OK	OK
03	U-235	DUP	PZ-105-SS TOT	pCi/l	5.14E-01	1.91E-01	6.96E-02				NA	OK	
04	U-235	DO	PZ-105-SS TOT	pCi/l	2.47E-01	1.42E-01	1.14E-01					OK	
05	U-235	TRG	PZ-105-SS DIS	pCi/l	5.53E-01	2.07E-01	1.06E-01					OK	
06	U-235	TRG	PZ-114-AS TOT	pCi/l	1.39E-02	8.96E-02	2.44E-01					OK	
07	U-235	TRG	PZ-114-AS DIS	pCi/l	1.38E-01	1.23E-01	1.32E-01					OK	
08	U-235	TRG	I-66 TOT	pCi/l	1.66E-01	1.16E-01	1.10E-01					OK	
09	U-235	TRG	I-66 DIS	pCi/l	2.02E-01	1.87E-01	1.75E-01					OK	
10	U-235	TRG	MW-102 TOT	pCi/l	1.05E+00	3.16E-01	8.63E-02					OK	
11	U-235	TRG	MW-102 DIS	pCi/l	9.48E-01	2.83E-01	7.79E-02					OK	
12	U-235	TRG	MW-103 TOT	pCi/l	6.73E-01	2.43E-01	1.19E-01					OK	
13	U-235	TRG	MW-103 DIS	pCi/l	3.89E-01	1.90E-01	1.05E-01					OK	
14	U-235	TRG	PZ-303-AS TOT	pCi/l	3.70E-01	2.48E-01	2.22E-01					OK	
15	U-235	TRG	PZ-303-AS DIS	pCi/l	3.69E-01	2.19E-01	1.30E-01					OK	
16	U-235	TRG	I-11 TOT	pCi/l	1.85E-01	1.26E-01	1.12E-01					OK	
17	U-235	TRG	I-11 DIS	pCi/l	1.97E-01	1.31E-01	1.09E-01					OK	
18	U-235	TRG	S-10 TOT	pCi/l	3.83E-01	2.03E-01	1.08E-01					OK	
19	U-235	TRG	S-10 DIS	pCi/l	2.61E-01	1.90E-01	1.77E-01					OK	
20	U-235	TRG	FB at D-12 TOT	pCi/l	3.84E-02	5.75E-02	9.34E-02					OK	

Run	1
	UUISO
Analysis Code	UUISO
	13-07146
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	112.85	0.00	0.00			
02	U-235	MBL	07/23/13 00:00	1.00E+00	118.01	0.00	0.00			
03	U-235	DUP	07/12/13 09:42	1.00E+00	105.88	0.00	0.00			
04	U-235	DO	07/12/13 09:42	1.00E+00	94.57	0.00	0.00			
05	U-235	TRG	07/12/13 09:42	1.00E+00	96.59	0.00	0.00			
06	U-235	TRG	07/12/13 10:56	1.00E+00	43.95	0.00	0.00			
07	U-235	TRG	07/12/13 10:56	1.00E+00	66.16	0.00	0.00			
08	U-235	TRG	07/15/13 10:44	1.00E+00	93.69	0.00	0.00			
09	U-235	TRG	07/15/13 10:44	1.00E+00	42.36	0.00	0.00			
10	U-235	TRG	07/15/13 11:10	1.00E+00	85.84	0.00	0.00			
11	U-235	TRG	07/15/13 11:10	1.00E+00	91.95	0.00	0.00			
12	U-235	TRG	07/15/13 11:44	1.00E+00	92.47	0.00	0.00			
13	U-235	TRG	07/15/13 11:44	1.00E+00	81.59	0.00	0.00			
14	U-235	TRG	07/15/13 12:20	1.00E+00	52.65	0.00	0.00			
15	U-235	TRG	07/15/13 12:20	1.00E+00	60.11	0.00	0.00			
16	U-235	TRG	07/15/13 13:12	1.00E+00	85.01	0.00	0.00			
17	U-235	TRG	07/15/13 13:12	1.00E+00	80.36	0.00	0.00			
18	U-235	TRG	07/15/13 14:05	1.00E+00	61.90	0.00	0.00			
19	U-235	TRG	07/15/13 14:05	1.00E+00	52.41	0.00	0.00			
20	U-235	TRG	07/15/13 14:30	1.00E+00	105.80	0.00	0.00			

Run	1	Analysis Code	UUISO	Eberline Services Work Order	13-07146	Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-UUISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-235	LCS	08/07/13 12:46		A_Spec	Alpha_031	170	4.47 E+01	2.00 E-03	14.2
02	U-235	MBL	08/07/13 12:46		A_Spec	Alpha_033	170	5.00 E+00	0.00 E+00	18.5
03	U-235	DUP	08/07/13 12:46		A_Spec	Alpha_034	170	3.08 E+01	1.00 E-03	18.6
04	U-235	DO	08/07/13 12:47		A_Spec	Alpha_035	170	1.30 E+01	0.00 E+00	18.3
05	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_036	170	3.11 E+01	5.00 E-03	19.1
06	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_038	170	3.20 E-01	4.00 E-03	17.2
07	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_039	170	5.49 E+00	3.00 E-03	19.7
08	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_040	170	9.00 E+00	0.00 E+00	19
09	U-235	TRG	08/08/13 08:19		A_Spec	Alpha_042	170	4.83 E+00	1.00 E-03	18.5
10	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_042	170	5.08 E+01	1.00 E-03	18.5
11	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_045	170	5.08 E+01	1.00 E-03	19.1
12	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_046	170	3.40 E+01	0.00 E+00	17.9
13	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_047	170	1.77 E+01	2.00 E-03	18.2
14	U-235	TRG	08/07/13 12:47		A_Spec	Alpha_048	170	1.00 E+01	0.00 E+00	16.8
15	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_003	170.02	1.18 E+01	1.00 E-03	17.5
16	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_004	170.02	9.32 E+00	4.00 E-03	19.4
17	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_010	170.02	9.49 E+00	3.00 E-03	19.7
18	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_011	170.02	1.48 E+01	1.00 E-03	20.5
19	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_012	170.02	8.32 E+00	4.00 E-03	19.9
20	U-235	TRG	08/07/13 16:03		A_Spec	Alpha_013	170.02	2.32 E+00	4.00 E-03	18.7

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

0810



*21*

*52-47 #3*

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/23/13 00:00	1.0000	0.6121	11.6568		0.00		
02	MBL	BLANK	07/23/13 00:00	1.0000	0.6083	11.5845		0.00		
03	DUP	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.6054	11.5292		0.00		
04	DO	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.6025	11.4740		0.00		
05	TRG	PZ-105-SS DIS	07/12/13 09:42	1.0000	0.6016	11.4569		0.00		
06	TRG	PZ-114-AS TOT	07/12/13 10:56	1.0000	0.6029	11.4816		0.00		
07	TRG	PZ-114-AS DIS	07/12/13 10:56	1.0000	0.6023	11.4702		0.00		
08	TRG	I-66 TOT	07/15/13 10:44	1.0000	0.6019	11.4626		0.00		
09	TRG	I-66 DIS	07/15/13 10:44	1.0000	0.6032	11.4873		0.00		
10	TRG	MW-102 TOT	07/15/13 11:10	1.0000	0.5996	11.4188		0.00		
11	TRG	MW-102 DIS	07/15/13 11:10	1.0000	0.6005	11.4359		0.00		
12	TRG	MW-103 TOT	07/15/13 11:44	1.0000	0.6009	11.4435		0.00		
13	TRG	MW-103 DIS	07/15/13 11:44	1.0000	0.6010	11.4454		0.00		
14	TRG	PZ-303-AS TOT	07/15/13 12:20	1.0000	0.6013	11.4512		0.00		
15	TRG	PZ-303-AS DIS	07/15/13 12:20	1.0000	0.6018	11.4607		0.00		
16	TRG	I-11 TOT	07/15/13 13:12	1.0000	0.6005	11.4359		0.00		
17	TRG	I-11 DIS	07/15/13 13:12	1.0000	0.6020	11.4645		0.00		
18	TRG	S-10 TOT	07/15/13 14:05	1.0000	0.6012	11.4493		0.00		
19	TRG	S-10 DIS	07/15/13 14:05	1.0000	0.6034	11.4911		0.00		
20	TRG	FB at D-12 TOT	07/15/13 14:30	1.0000	0.6017	11.4588		0.00		

*42 Account*

*3-13*

0104

### Spike and Tracer Worksheet

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07146		1	UIISO		7/31/2013 9:43	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	7/31/2013	0.500	0.5124				8.13	0.293	0.00	0.000	0.00	0.000	0.00	0.000
U-238	U-8a	34.350	7/31/2013	0.500	0.5124				7.93	0.285	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	U-232	U-10a	19.044	7/31/2013	0.6121	0.6300	<pre> 0.6121 g 0.6083 g -0.6034 g -0.6070 g -0.6016 g -0.6009 g -0.6027 g -0.6019 g -0.6032 g -0.5996 g -0.6000 g -0.6009 g -0.6010 g -0.6013 g -0.6018 g -0.6005 g -0.6000 g -0.6012 g -0.6004 g -0.6017 g           </pre>					0.5124 g				
02	U-232	U-10a	19.044	7/31/2013	0.6083	0.6300										
03	U-232	U-10a	19.044	7/31/2013	0.6054	0.6300										
04	U-232	U-10a	19.044	7/31/2013	0.6025	0.6300										
05	U-232	U-10a	19.044	7/31/2013	0.6016	0.6300										
06	U-232	U-10a	19.044	7/31/2013	0.6029	0.6300										
07	U-232	U-10a	19.044	7/31/2013	0.6023	0.6300										
08	U-232	U-10a	19.044	7/31/2013	0.6019	0.6300										
09	U-232	U-10a	19.044	7/31/2013	0.6032	0.6300										
10	U-232	U-10a	19.044	7/31/2013	0.5996	0.6300										
11	U-232	U-10a	19.044	7/31/2013	0.6005	0.6300										
12	U-232	U-10a	19.044	7/31/2013	0.6009	0.6300										
13	U-232	U-10a	19.044	7/31/2013	0.6010	0.6300										
14	U-232	U-10a	19.044	7/31/2013	0.6013	0.6300										
15	U-232	U-10a	19.044	7/31/2013	0.6018	0.6300										
16	U-232	U-10a	19.044	7/31/2013	0.6005	0.6300										
17	U-232	U-10a	19.044	7/31/2013	0.6020	0.6300										
18	U-232	U-10a	19.044	7/31/2013	0.6012	0.6300										
19	U-232	U-10a	19.044	7/31/2013	0.6034	0.6300										
20	U-232	U-10a	19.044	7/31/2013	0.6017	0.6300										

01001

# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-07146</b>	<b>1</b>	<b>UUISO</b>	<b>liters</b>	<b>8/13/2013</b>	<b>JWOLFE</b>

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-105-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-105-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-105-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	I-66 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-66 DIS	TRG					1.0000E+00	1.0000E+00				
10	MW-102 TOT	TRG					1.0000E+00	1.0000E+00				
11	MW-102 DIS	TRG					1.0000E+00	1.0000E+00				
12	MW-103 TOT	TRG					1.0000E+00	1.0000E+00				
13	MW-103 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-303-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-303-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	I-11 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-11 DIS	TRG					1.0000E+00	1.0000E+00				
18	S-10 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-10 DIS	TRG					1.0000E+00	1.0000E+00				
20	FB at D-12 TOT	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7/31/13

0106



C  
8/8/13

Sample Description: SPIKE  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 01  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_031  
 Chamber Serial Number:  
 Detector Serial Number: 31  
 Env. Background: System Bkgd 64050  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 8/7/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:46:32 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232\_UU-10A  
 Tracer Quantity: 0.612 mL  
 Effective Efficiency: 0.1601 +/- 0.0097  
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM  
 Chem. Recovery Factor: 1.1285 +/- 0.0740

Control Certificate Name: NatU\_U-8A  
 Chem. Recov. of Control: U-238 1.046381 +/- 0.084761  
 Peak Match Tolerance: 0.150 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.272	315.32	11.05	0.68	0.00E+000	7.0
U-234	4.728	453.13	9.23	1.87	0.00E+000	8.3
U-235	4.414	44.66	29.46	0.34	0.00E+000	3.1
U-238	4.143	515.28	8.66	2.72	0.00E+000	24.4

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
 -----

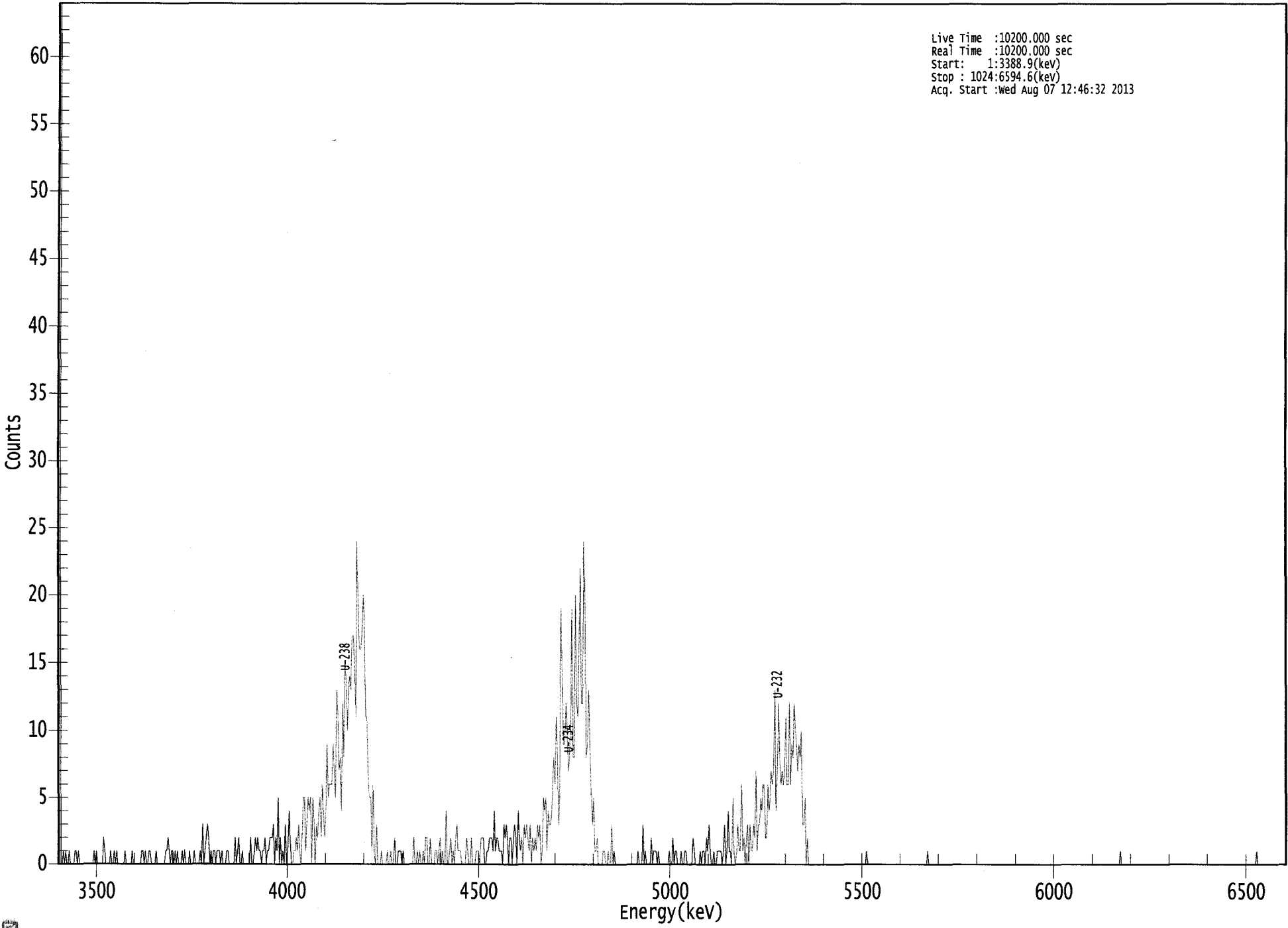
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.23E+000 +/- 6.24E-001	9.36E-002 +/- 1.12E-002
U-234	0.992	4761.50*	7.52E+000 +/- 1.13E+000	1.26E-001 +/- 1.50E-002
U-235	0.994	4385.50*	9.14E-001 +/- 2.90E-001	9.78E-002 +/- 1.17E-002
U-238	0.988	4184.40*	8.51E+000 +/- 1.26E+000	1.42E-001 +/- 1.69E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065427.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3388.9(kev)  
Stop : 1024:6594.6(kev)  
Acq. Start :Wed Aug 07 12:46:32 2013



ROI Type: 1

ROI Type: 3

01610

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	1	0	1	0
9:	0	1	0	0	0	0	1	1
17:	0	1	0	0	0	0	0	0
25:	0	0	0	0	0	0	1	0
33:	1	0	0	0	0	0	2	1
41:	0	0	0	0	1	0	0	1
49:	0	1	0	0	0	0	0	0
57:	1	0	0	0	0	0	1	0
65:	0	0	0	0	0	0	1	1
73:	0	1	0	0	1	1	0	0
81:	0	0	1	0	0	0	0	0
89:	0	0	1	1	2	1	0	1
97:	1	0	1	0	1	0	0	0
105:	1	0	1	0	0	0	1	0
113:	0	0	1	0	0	0	0	1
121:	0	3	0	1	2	3	2	0
129:	1	0	1	1	0	1	1	1
137:	0	1	0	0	0	1	1	0
145:	0	0	0	0	2	0	1	2
153:	0	0	1	0	0	0	0	0
161:	0	2	0	0	1	2	1	2
169:	1	1	0	1	1	2	0	1
177:	1	2	2	2	3	0	2	1
185:	5	0	2	0	1	0	3	0
193:	1	4	2	0	0	1	1	2
201:	1	3	1	0	2	5	5	1
209:	3	5	4	5	0	5	3	0
217:	3	2	4	5	2	6	3	2
225:	5	9	5	6	6	6	9	7
233:	5	13	11	7	8	4	12	8
241:	15	14	10	13	14	13	17	17
249:	15	11	24	18	16	16	17	20
257:	18	11	11	7	5	5	1	6
265:	1	0	3	0	0	0	1	0
273:	0	0	0	1	0	0	1	0
281:	0	2	0	0	1	1	1	0
289:	1	0	0	0	0	0	0	0
297:	0	2	0	0	1	0	1	0
305:	0	1	0	2	2	0	0	2
313:	0	0	0	1	1	0	1	2
321:	0	1	0	0	4	0	0	1
329:	2	0	1	0	2	3	1	1
337:	1	0	0	0	0	2	1	0
345:	0	2	0	0	0	1	1	1
353:	0	2	2	2	0	0	1	1
361:	2	2	2	1	4	1	2	2

369: 1 1 1 0 3 2 3 2

Sample Title: 01

Channel	1	2	3	4	5	6	7	8
377:	0	2	2	0	2	3	2	0
385:	4	2	1	2	0	3	2	3
393:	2	1	3	0	2	1	2	1
401:	3	2	3	0	1	5	4	5
409:	1	4	3	3	4	6	8	6
417:	11	8	3	6	19	15	9	9
425:	12	10	7	8	11	19	8	8
433:	20	12	11	16	22	12	12	24
441:	19	8	9	13	9	6	3	5
449:	1	1	2	0	0	0	0	1
457:	1	0	0	1	0	0	3	0
465:	1	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:	3	0	1	0	0	0	0	2
497:	0	1	1	1	0	1	0	0
505:	0	0	0	0	0	0	1	0
513:	0	2	0	1	1	0	0	0
521:	1	0	0	1	1	0	0	0
529:	0	0	2	1	0	0	0	0
537:	1	0	1	1	0	2	1	3
545:	1	0	0	1	0	0	1	1
553:	1	1	0	1	3	0	1	4
561:	1	1	0	5	1	0	1	3
569:	1	1	6	1	2	0	2	3
577:	0	3	1	1	3	2	7	1
585:	3	3	5	4	6	6	2	2
593:	6	4	5	7	6	7	13	4
601:	7	12	8	6	7	6	7	11
609:	6	6	12	6	9	8	12	10
617:	9	7	9	8	10	3	3	5
625:	0	2	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	1	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	1	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 01

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





C  
8/8/13

Sample Description: BLANK  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 02  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso  
 Detector Name: Alpha\_033  
 Chamber Serial Number: 04026479A  
 Detector Serial Number: 91132  
 Env. Background: System Bkgd 64051  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 8/7/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:46:57 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: 0.2181 +/- 0.0117  
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM  
 Chem. Recovery Factor: 1.1801 +/- 0.0666

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.276	427.00	9.50	0.00	0.00E+000	19.8
U-234	4.729	6.32	82.73	0.68	0.00E+000	3.0
U-235	4.405	5.00	96.02	0.00	0.00E+000	3.0
U-238	4.141	2.66	128.85	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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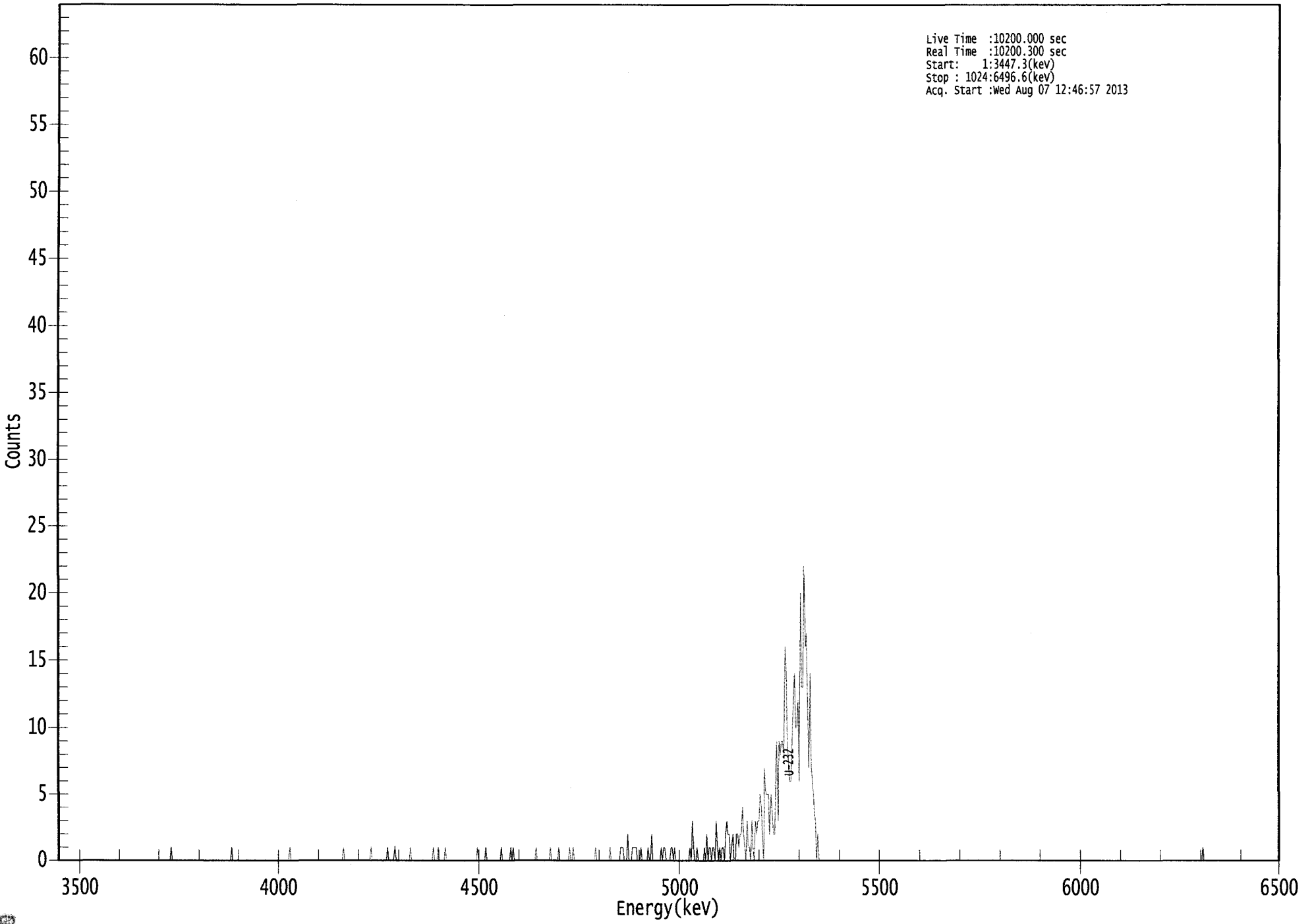
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
U-232	0.995	5302.50*	5.20E+000 +/- 5.46E-001	7.30E-002 +/- 7.67E-003
U-234	0.992	4761.50*	7.69E-002 +/- 6.42E-002	6.87E-002 +/- 7.22E-003
U-235	0.997	4385.50*	7.51E-002 +/- 7.25E-002	9.00E-002 +/- 9.47E-003
U-238	0.987	4184.40*	3.22E-002 +/- 4.17E-002	5.80E-002 +/- 6.09E-003

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065432.CNF

Live Time :10200.000 sec  
Real Time :10200.300 sec  
Start: 1:3447.3(keV)  
Stop : 1024:6496.6(keV)  
Acq. Start :Wed Aug 07 12:46:57 2013



ROI Type: 1

ROI Type: 3

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

Sample Title:    02

Elapsed Live time:        10200

Elapsed Real Time:        10200

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

369: 0 0 0 0 1 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	1	0	1	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	0	0	0
409:	0	0	0	0	0	1	0	0
417:	0	0	0	0	1	0	0	0
425:	0	0	0	0	0	1	0	0
433:	1	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	1	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	1	1	1	0	0	0	2	0
481:	0	0	1	1	1	1	0	0
489:	0	1	0	0	0	0	0	1
497:	0	0	2	0	0	0	0	0
505:	0	0	1	0	1	1	0	0
513:	0	0	1	1	0	1	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	1	0	3	1	0	0
537:	1	0	0	0	0	0	1	0
545:	2	0	1	1	0	1	1	0
553:	3	1	0	1	0	1	1	0
561:	2	3	2	2	0	1	2	0
569:	0	2	2	1	2	2	4	2
577:	1	0	3	1	1	0	3	1
585:	0	3	2	3	3	5	4	2
593:	0	7	5	5	5	2	5	4
601:	2	2	6	9	3	9	8	9
609:	9	8	16	14	9	7	6	6
617:	9	12	14	10	10	12	6	20
625:	13	13	22	16	17	11	7	14
633:	7	6	4	3	0	2	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	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 0

Sample Title: 02

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



2  
8/8/13

Sample Description: PZ-105-SS TOT-DUP  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 03  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_034  
 Chamber Serial Number: 04026479B  
 Detector Serial Number: 91136  
 Env. Background: System Bkgd 64052  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:46:58 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: 0.1965 +/- 0.0110  
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM  
 Chem. Recovery Factor: 1.0588 +/- 0.0622

Peak Match Tolerance: 0.150 MeV

-----  
 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.276	382.83	10.02	0.17	0.00E+000	7.4
U-234	4.726	230.83	12.91	0.17	0.00E+000	10.7
U-235	4.393	30.83	35.41	0.17	0.00E+000	5.9
U-238	4.152	120.83	17.85	0.17	0.00E+000	6.7

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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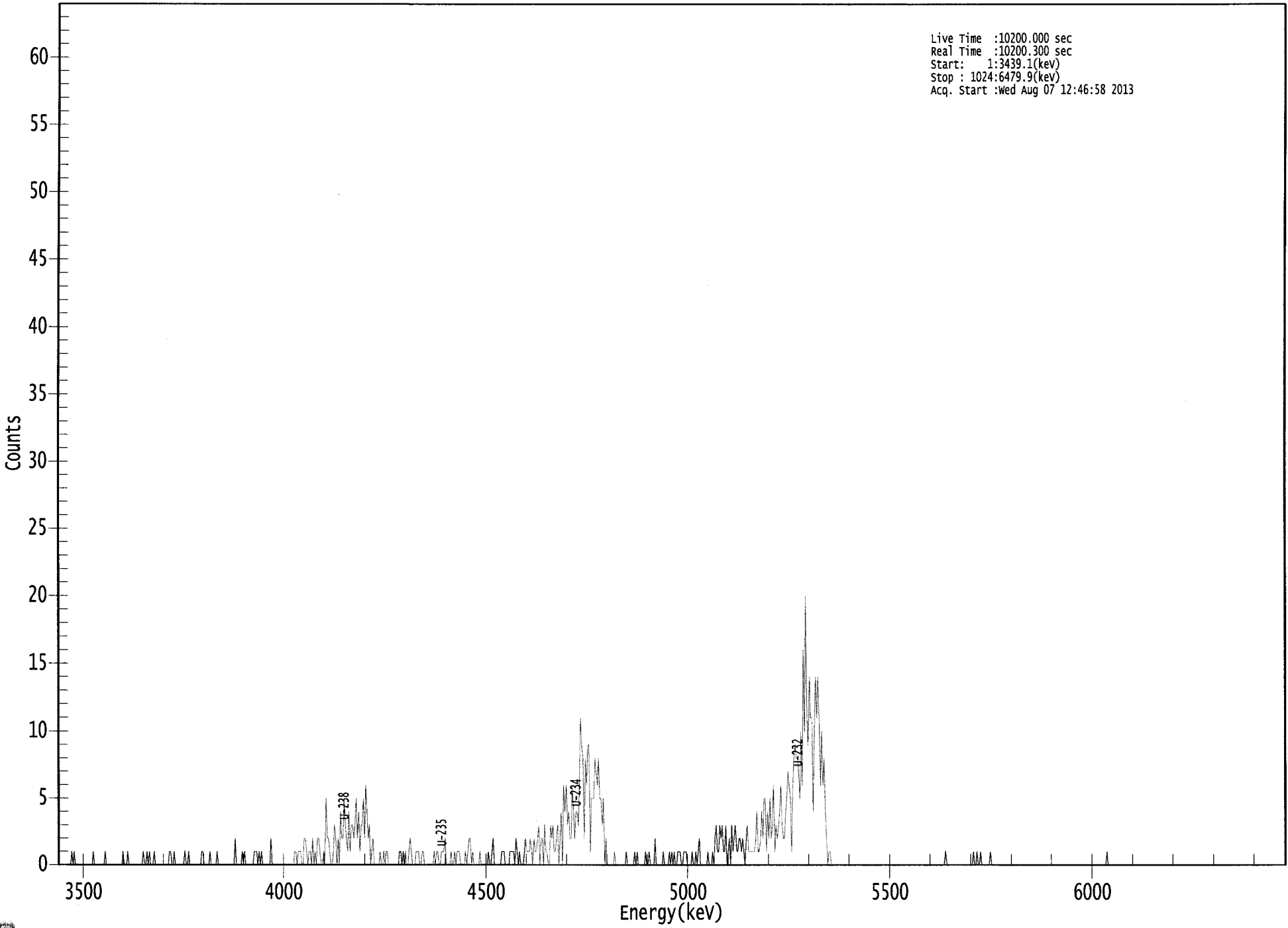
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
U-232	0.995	5302.50*	5.18E+000 +/- 5.69E-001	5.64E-002 +/- 6.20E-003
U-234	0.991	4761.50*	3.12E+000 +/- 5.29E-001	5.64E-002 +/- 6.20E-003
U-235	1.000	4385.50*	5.14E-001 +/- 1.91E-001	6.96E-002 +/- 7.64E-003
U-238	0.993	4184.40*	1.63E+000 +/- 3.41E-001	5.62E-002 +/- 6.17E-003

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

000065431.CNF

Live Time :10200.000 sec  
Real Time :10200.300 sec  
Start: 1:3439.1(keV)  
Stop : 1024:6479.9(keV)  
Acq. Start :Wed Aug 07 12:46:58 2013



ROI Type: 1

ROI Type: 3

916

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



369: 0 0 1 1 1 0 0 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	1	1	1	1	0	2	1
385:	0	1	0	0	0	1	2	1
393:	1	1	2	1	0	2	1	1
401:	2	3	0	2	2	0	3	1
409:	1	0	0	3	2	3	1	1
417:	2	3	0	2	4	0	6	4
425:	6	3	4	2	2	6	4	2
433:	4	4	3	6	11	9	8	2
441:	8	6	9	9	1	5	5	5
449:	8	7	6	8	5	5	3	5
457:	0	2	0	0	0	0	0	0
465:	1	0	0	0	0	0	0	0
473:	0	0	1	0	0	0	0	0
481:	0	1	0	1	0	0	0	0
489:	0	0	1	0	0	1	0	0
497:	0	0	2	0	0	0	0	0
505:	0	1	0	0	0	0	1	0
513:	1	0	1	0	0	1	1	1
521:	0	0	1	1	1	0	0	0
529:	0	1	0	0	1	0	1	2
537:	0	0	0	0	0	0	1	0
545:	0	0	1	0	2	3	1	1
553:	3	2	3	1	1	3	0	1
561:	2	0	3	1	2	3	1	1
569:	2	2	1	2	1	0	2	3
577:	1	1	1	1	1	1	2	4
585:	1	1	2	4	2	5	5	1
593:	4	2	5	2	3	6	1	3
601:	2	3	4	6	3	2	2	4
609:	5	7	6	5	1	6	8	9
617:	8	8	7	5	10	6	16	10
625:	20	11	9	14	11	11	4	10
633:	14	11	14	11	6	10	6	8
641:	4	2	0	1	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	0	0	0	1	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	1	0	0	1	0
769:	0	1	0	0	0	0	0	0
777:	0	1	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

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	1	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	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  
8/8/13

Sample Description: PZ-105-SS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 04  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_035  
 Chamber Serial Number: 04026477A  
 Detector Serial Number: 58771  
 Env. Background: System Bkgd 64053  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:00 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: 0.1727 +/- 0.0103  
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM  
 Chem. Recovery Factor: 0.9457 +/- 0.0586

Peak Match Tolerance: 0.150 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.299	334.81	10.73	1.19	0.00E+000	10.0
U-234	4.758	182.83	14.50	0.17	0.00E+000	10.8
U-235	4.434	13.00	56.41	0.00	0.00E+000	2.9
U-238	4.173	100.83	19.54	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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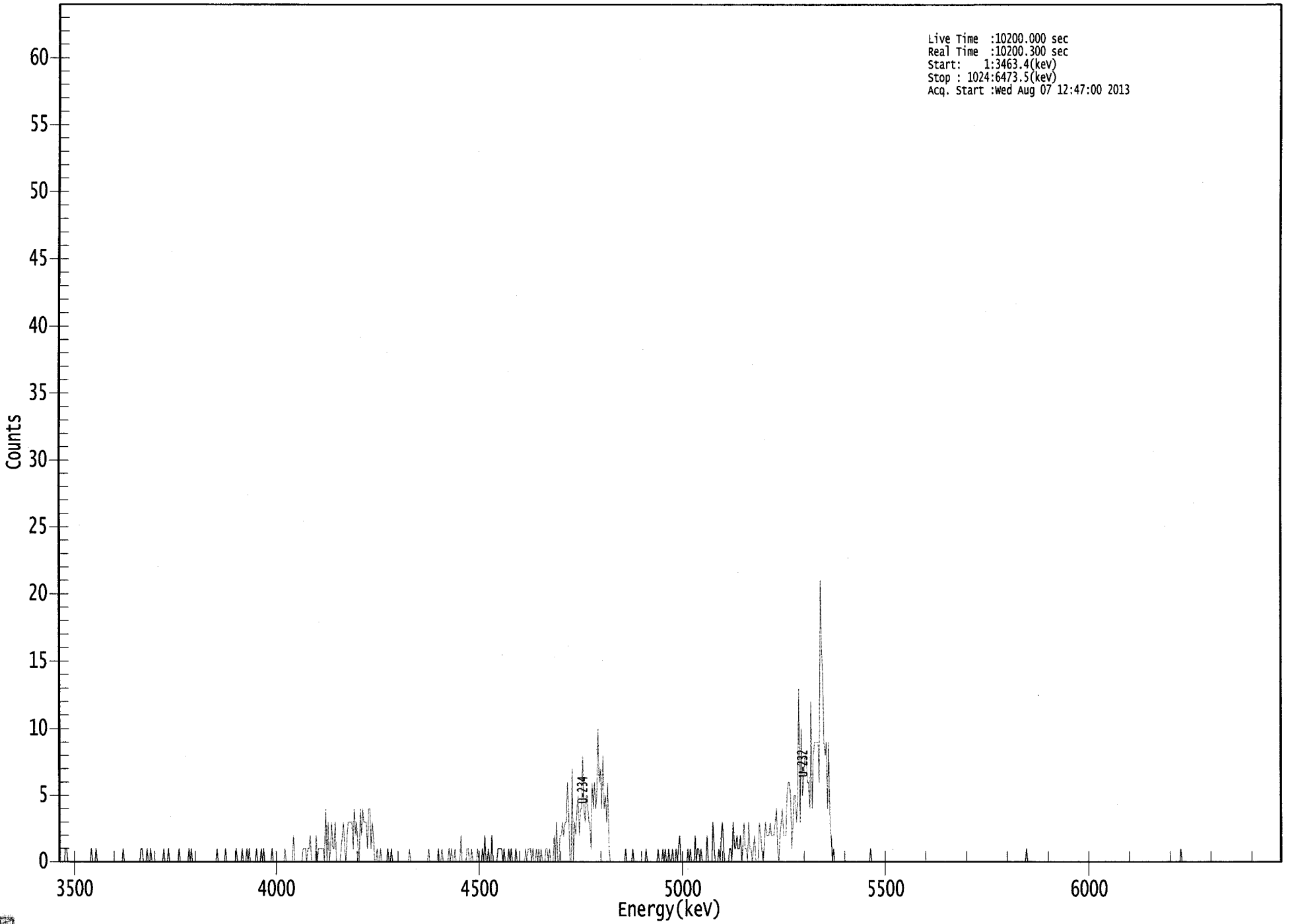
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
U-232	1.000	5302.50*	5.15E+000 +/- 6.00E-001	1.01E-001 +/- 1.18E-002
U-234	1.000	4761.50*	2.81E+000 +/- 5.23E-001	6.42E-002 +/- 7.47E-003
U-235	0.984	4385.50*	2.47E-001 +/- 1.42E-001	1.14E-001 +/- 1.32E-002
U-238	0.999	4184.40*	1.54E+000 +/- 3.51E-001	6.39E-002 +/- 7.44E-003

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065438.CNF

Live Time :10200.000 sec  
Real Time :10200.300 sec  
Start: 1:3463.4(kev)  
Stop : 1024:6473.5(kev)  
Acq. Start :Wed Aug 07 12:47:00 2013



ROI Type: 1

ROI Type: 3

0123

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

369: 1 1 1 1 0 1 0 0

Sample Title: 04

Channel	1	2	3	4	5	6	7	8
377:	0	1	0	1	0	0	0	1
385:	0	0	0	0	0	0	0	1
393:	0	1	1	1	0	1	0	0
401:	1	0	1	0	1	0	0	0
409:	1	1	0	1	0	0	0	2
417:	0	3	0	0	2	2	3	2
425:	3	3	6	4	0	0	7	0
433:	3	2	4	5	2	4	4	8
441:	4	3	5	5	3	3	1	6
449:	4	6	4	5	10	6	7	4
457:	8	4	5	3	6	1	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	1	0	0	0	0
481:	0	1	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	1	0	0	1
513:	0	0	1	0	0	1	0	1
521:	2	0	0	0	0	0	0	1
529:	0	1	0	0	0	2	0	1
537:	1	0	1	0	0	0	0	2
545:	0	0	0	0	3	1	0	0
553:	0	1	0	2	3	1	0	0
561:	0	0	1	1	0	3	1	1
569:	2	1	1	2	0	1	3	1
577:	1	0	3	1	1	0	1	2
585:	0	0	0	3	2	1	0	1
593:	3	2	2	2	3	2	2	2
601:	3	4	1	0	2	3	4	2
609:	2	2	5	6	6	5	1	3
617:	5	5	3	5	13	3	10	5
625:	6	8	8	6	6	4	12	4
633:	8	9	9	9	9	6	21	16
641:	14	9	8	9	4	9	3	2
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:	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:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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



8/8/13

Sample Description: PZ-105-SS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 05  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_036  
 Chamber Serial Number: 04026477B  
 Detector Serial Number: 84167  
 Env. Background: System Bkgd 64054  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:01 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: 0.1845 +/- 0.0107  
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM  
 Chem. Recovery Factor: 0.9659 +/- 0.0583

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	357.15	10.39	0.85	0.00E+000	20.1
U-234	4.727	193.32	14.13	0.68	0.00E+000	8.4
U-235	4.406	31.15	35.67	0.85	0.00E+000	4.4
U-238	4.142	124.47	17.69	1.53	0.00E+000	17.6

T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.82E-001	8.62E-002 +/- 9.76E-003
U-234	0.991	4761.50*	2.78E+000 +/- 5.04E-001	8.12E-002 +/- 9.19E-003
U-235	0.997	4385.50*	5.53E-001 +/- 2.07E-001	1.06E-001 +/- 1.20E-002
U-238	0.987	4184.40*	1.78E+000 +/- 3.75E-001	1.02E-001 +/- 1.15E-002

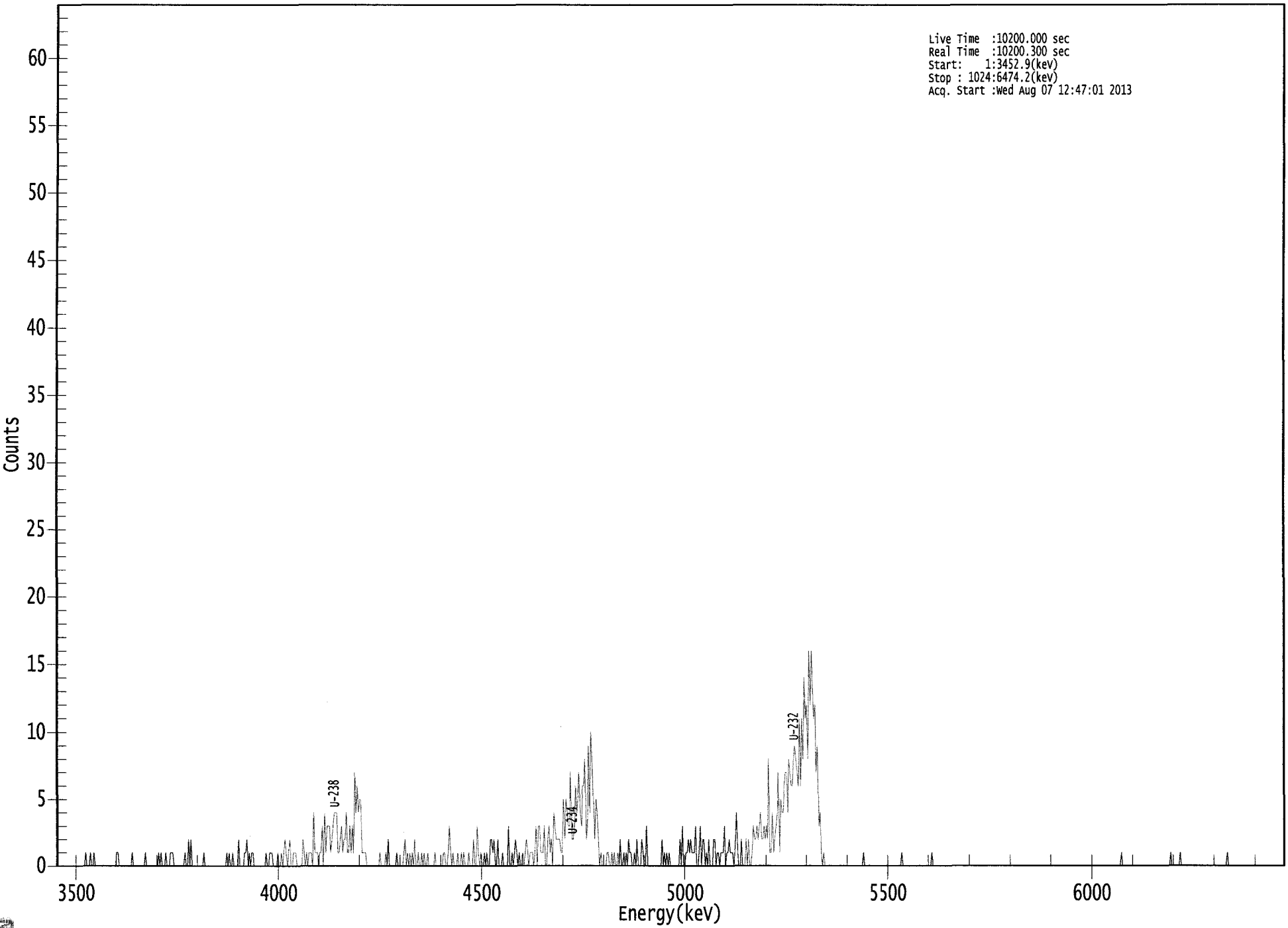
AG  
 8/8/13

US EPA ARCHIVE DOCUMENT



0000065437.CNF

Live Time :10200.000 sec  
Real Time :10200.300 sec  
Start: 1:3452.9(kev)  
Stop : 1024:6474.2(kev)  
Acq. Start :Wed Aug 07 12:47:01 2013



ROI Type: 1

ROI Type: 3

0128

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

369: 2 0 0 0 1 0 0 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

Sample Title: 05

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	1
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:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	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



2  
8/8/13

Sample Description: PZ-114-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 06  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_038  
 Chamber Serial Number: 04026478B  
 Detector Serial Number: 91134  
 Env. Background: System Bkgd 64055  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:03 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: 0.0757 +/- 0.0065  
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM  
 Chem. Recovery Factor: 0.4395 +/- 0.0386

Peak Match Tolerance: 0.150 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.272	146.81	16.25	1.19	0.00E+000	6.3
U-234	4.718	8.66	68.12	0.34	0.00E+000	3.0
U-235	4.418	0.32	646.93	0.68	0.00E+000	3.0
U-238	4.132	4.00	109.57	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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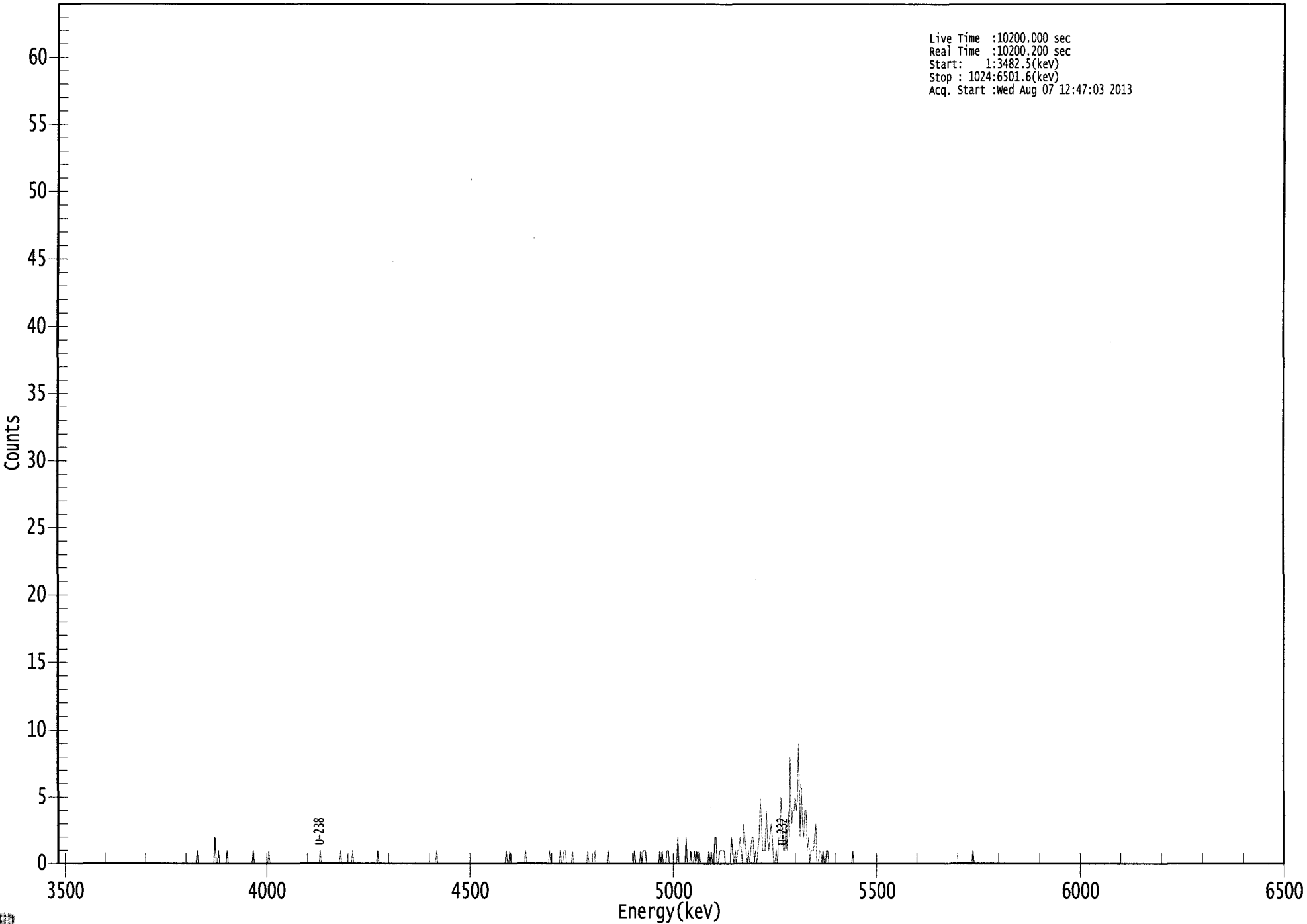
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.16E+000 +/- 8.70E-001	2.31E-001 +/- 3.90E-002
U-234	0.987	4761.50*	3.04E-001 +/- 2.13E-001	1.68E-001 +/- 2.83E-002
U-235	0.993	4385.50*	1.39E-002 +/- 8.96E-002	2.44E-001 +/- 4.12E-002
U-238	0.981	4184.40*	1.40E-001 +/- 1.55E-001	2.10E-001 +/- 3.53E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065430.CNF

Live Time :10200.000 sec  
Real Time :10200.200 sec  
Start: 1:3482.5(kev)  
Stop : 1024:6501.6(kev)  
Acq. Start :wed Aug 07 12:47:03 2013



ROI Type: 1

ROI Type: 3

10  
10  
10

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 1

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	0	0	0	0	1	0	0	1
425:	1	0	0	0	0	0	1	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	1	0	0	0	0	0	0
457:	0	0	0	0	1	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	0	0	0	1
489:	0	1	1	1	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	0	1	0	0	0	1	1	0
513:	0	0	0	0	0	0	2	0
521:	0	0	0	0	0	2	0	0
529:	0	1	0	0	1	0	1	0
537:	1	0	0	0	0	0	0	0
545:	1	0	1	0	0	2	2	0
553:	0	1	1	1	1	1	0	0
561:	0	0	0	2	1	0	1	0
569:	1	1	2	1	0	3	2	1
577:	0	1	0	1	2	2	0	1
585:	0	1	2	5	3	1	1	1
593:	4	2	1	2	3	2	0	0
601:	1	0	2	2	5	3	1	1
609:	3	1	4	2	8	3	4	4
617:	5	4	5	9	2	6	3	2
625:	4	4	1	2	0	1	1	1
633:	2	3	0	0	1	1	0	1
641:	0	0	1	1	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	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	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: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	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  
8/8/13

Sample Description: PZ-114-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 07  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_039  
 Chamber Serial Number: 06027396A  
 Detector Serial Number: 83109  
 Env. Background: System Bkgd 64056  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:05 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: 0.1300 +/- 0.0087  
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM  
 Chem. Recovery Factor: 0.6616 +/- 0.0459

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	252.00	12.37	0.00	0.00E+000	8.5
U-234	4.767	13.98	54.61	1.02	0.00E+000	3.0
U-235	4.443	5.49	88.08	0.51	0.00E+000	6.0
U-238	4.150	7.83	70.93	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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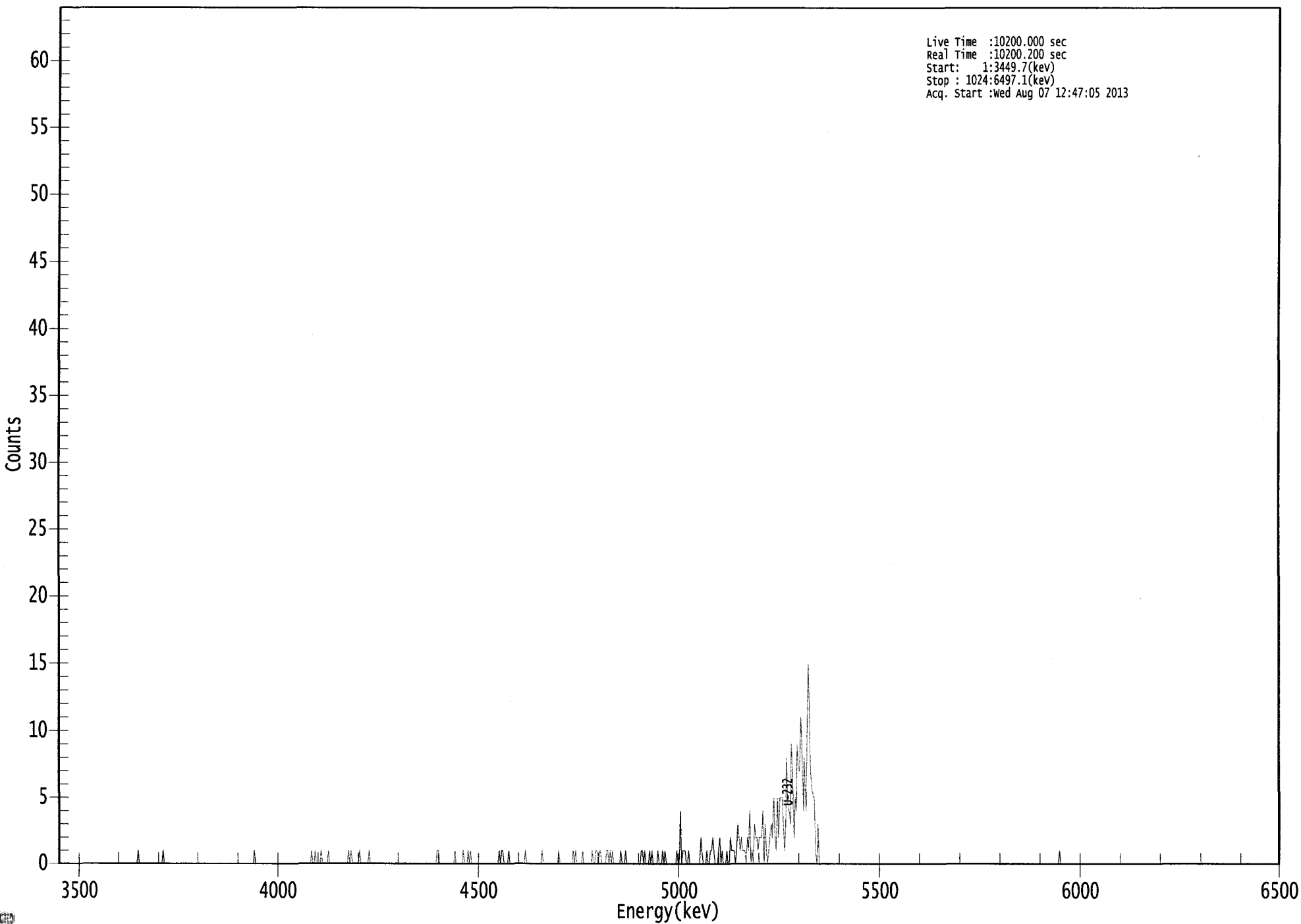
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.15E+000 +/- 6.78E-001	1.23E-001 +/- 1.61E-002
U-234	1.000	4761.50*	2.86E-001 +/- 1.60E-001	1.29E-001 +/- 1.69E-002
U-235	0.977	4385.50*	1.38E-001 +/- 1.23E-001	1.32E-001 +/- 1.74E-002
U-238	0.992	4184.40*	1.59E-001 +/- 1.15E-001	8.49E-002 +/- 1.12E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065433.CNF

Live Time :10200.000 sec  
Real Time :10200.200 sec  
Start: 1:3449.7(kev)  
Stop : 1024:6497.1(kev)  
Acq. Start :Wed Aug 07 12:47:05 2013



ROI Type: 1

ROI Type: 3

0138

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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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	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	1	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	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	0	0	0	1	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	1	0	0	0	0	1	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	1	0
249:	0	0	0	0	0	1	0	0
257:	0	0	0	0	0	1	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	1	1
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	1	0	0	0
345:	1	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 1 0 1 1 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	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  
8/8/13

Sample Description: I-66 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 08  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_040  
 Chamber Serial Number: 06027396B  
 Detector Serial Number: 91135  
 Env. Background: System Bkgd 64057  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:06 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: 0.1780 +/- 0.0104  
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM  
 Chem. Recovery Factor: 0.9369 +/- 0.0572

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.269	344.83	10.56	0.17	0.00E+000	15.2
U-234	4.729	48.49	28.32	0.51	0.00E+000	3.3
U-235	4.376	9.00	68.87	0.00	0.00E+000	3.0
U-238	4.147	40.00	31.38	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

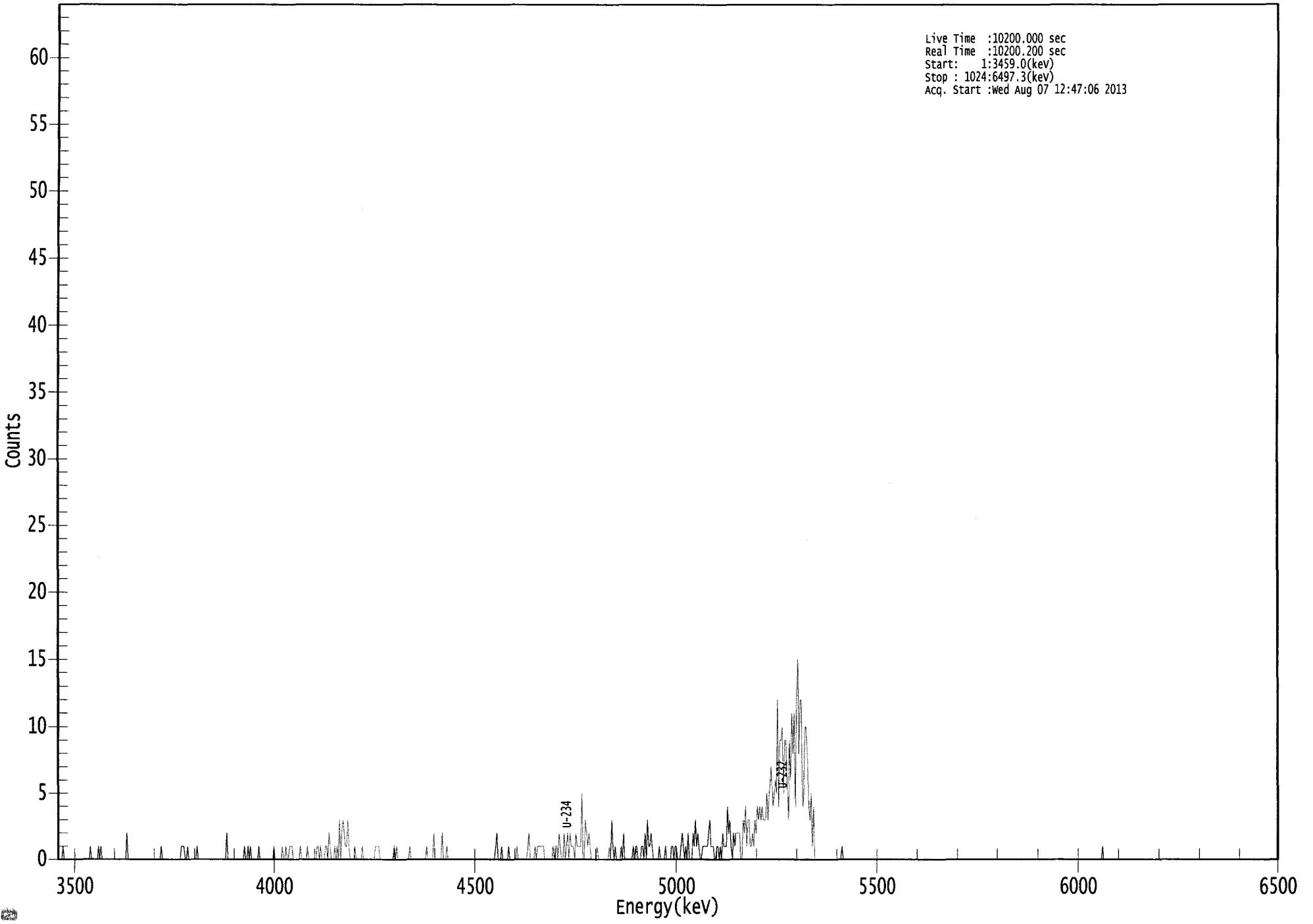
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.15E+000 +/- 5.91E-001	6.23E-002 +/- 7.15E-003
U-234	0.992	4761.50*	7.23E-001 +/- 2.21E-001	7.83E-002 +/- 8.99E-003
U-235	0.999	4385.50*	1.66E-001 +/- 1.16E-001	1.10E-001 +/- 1.27E-002
U-238	0.990	4184.40*	5.94E-001 +/- 1.98E-001	8.90E-002 +/- 1.02E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065434.CNF

Live Time :10200.000 sec  
Real Time :10200.200 sec  
Start: 1:3459.0(kev)  
Stop : 1024:6497.3(kev)  
Acq. Start :Wed Aug 07 12:47:06 2013



ROI Type: 1

ROI Type: 3

0143



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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 2 0 0 0 1 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	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

8/8/13

Sample Description: I-66 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000655  
 Batch Identification: 1307146A-UU  
 Sample Identification: 09  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 64059  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:16:41 AM  
 Acquisition Date/Time: 8/8/2013 8:19:34 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232\_UU-10A  
 Tracer Quantity: 0.603 mL  
 Effective Efficiency: 0.0782 +/- 0.0066  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Chem. Recovery Factor: 0.4236 +/- 0.0366

Peak Match Tolerance: 0.150 MeV

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 -----  
 PEAK AREA REPORT  
 -----  
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Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.274	151.81	15.98	1.19	0.00E+000	6.0
U-234		4.722	32.32	34.90	0.68	0.00E+000	3.0
U-235		4.440	4.83	91.00	0.17	0.00E+000	3.0
U-238		4.164	11.81	60.30	1.19	0.00E+000	6.0

T = Tracer Peak used for Effective Efficiency

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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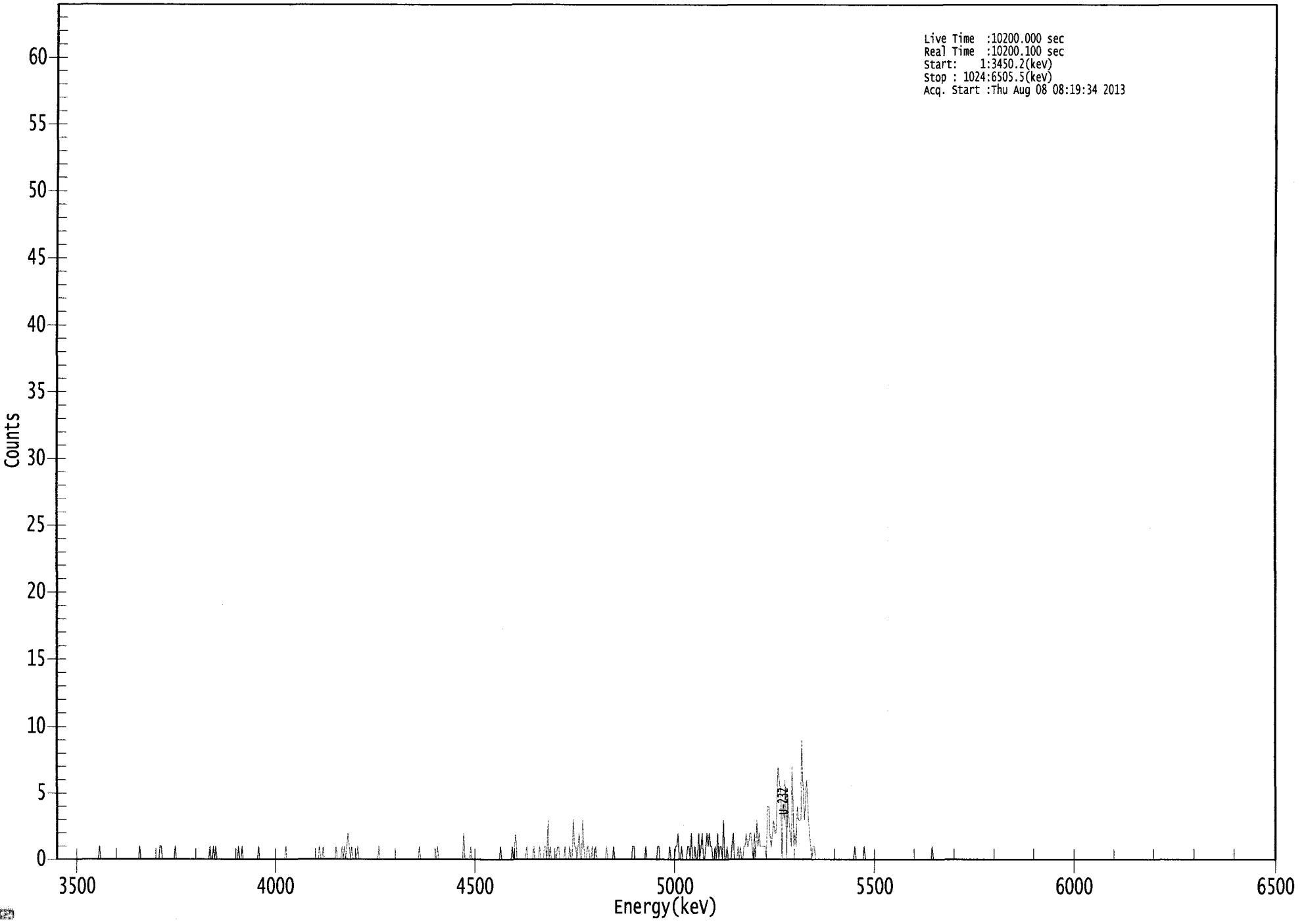
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
U-232	0.994	5302.50*	5.16E+000 +/- 8.56E-001	2.24E-001 +/- 3.72E-002
U-234	0.989	4761.50*	1.10E+000 +/- 4.24E-001	1.92E-001 +/- 3.18E-002
U-235	0.979	4385.50*	2.02E-001 +/- 1.87E-001	1.75E-001 +/- 2.90E-002
U-238	0.997	4184.40*	3.99E-001 +/- 2.50E-001	2.23E-001 +/- 3.70E-002

AG  
 8/8/13

US EPA ARCHIVE DOCUMENT

0000065500.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Thu Aug 08 08:19:34 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: 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	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	1	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	1	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	1
89:	1	0	0	0	0	0	0	0
97:	0	0	0	0	1	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	1	0	0	1	0	1	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	1	0	0	1	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	1	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	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	1	0	0
225:	1	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	1	0	1	0	1	2	1	0
249:	1	0	0	0	0	1	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	1
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	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	0	0	0	0
337:	0	0	0	0	0	0	2	0
345:	0	0	0	0	1	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 1 0 0

Sample Title: 09

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

801: 0 0 0 0 0 0 0 0

Sample Title: 09

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	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  
8/8/13

Sample Description: MW-102 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 10  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 64059  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:09 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232\_UU-10A  
 Tracer Quantity: 0.600 mL  
 Effective Efficiency: 0.1585 +/- 0.0098  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Chem. Recovery Factor: 0.8584 +/- 0.0551

Peak Match Tolerance: 0.150 MeV

-----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.270	305.81	11.23	1.19	0.00E+000	31.9
U-234	4.724	333.32	10.75	0.68	0.00E+000	15.1
U-235	4.402	50.83	27.55	0.17	0.00E+000	3.5
U-238	4.145	277.81	11.79	1.19	0.00E+000	13.9

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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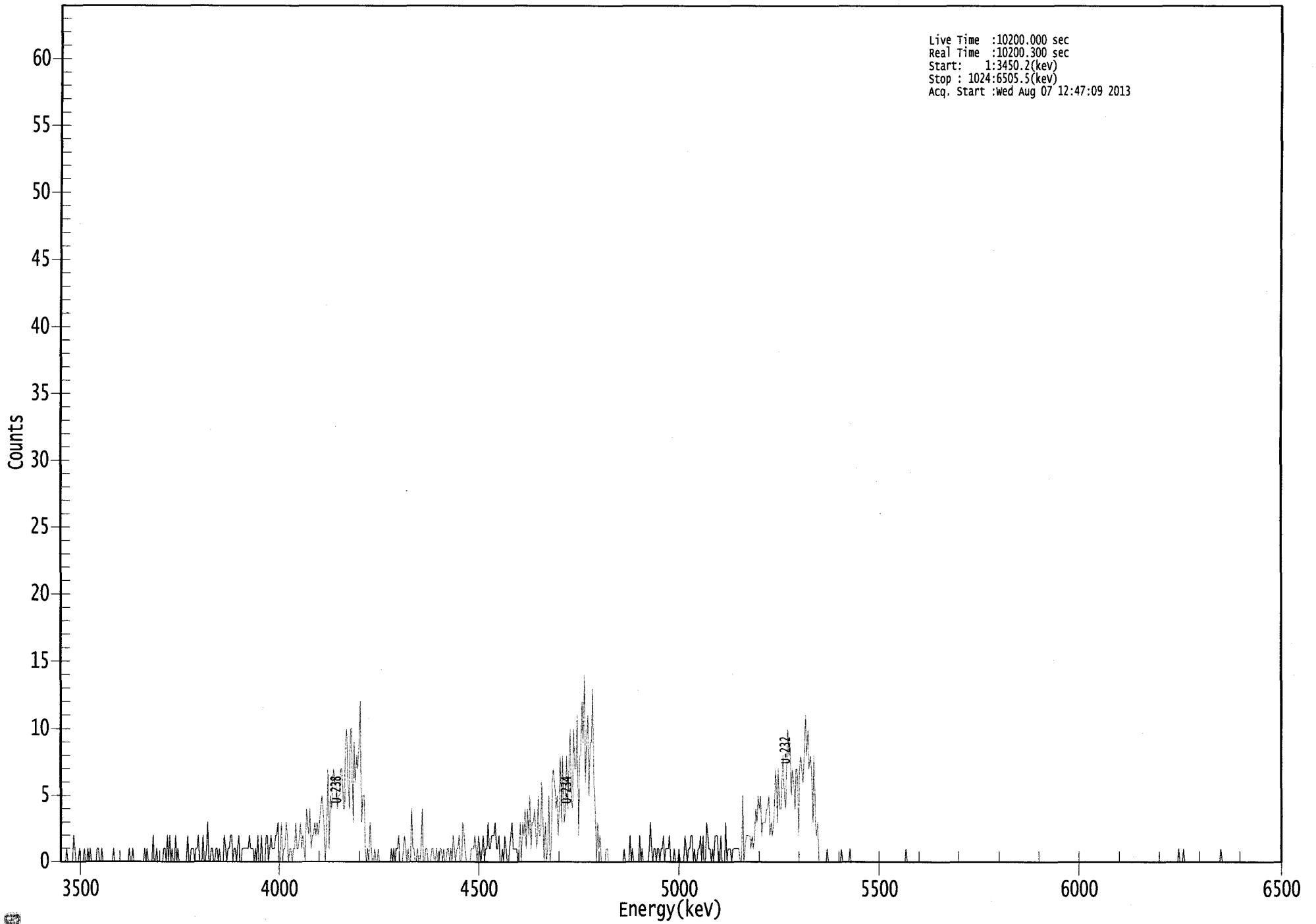
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.13E+000 +/- 6.21E-001	1.10E-001 +/- 1.34E-002
U-234	0.990	4761.50*	5.58E+000 +/- 9.04E-001	9.45E-002 +/- 1.14E-002
U-235	0.998	4385.50*	1.05E+000 +/- 3.16E-001	8.63E-002 +/- 1.04E-002
U-238	0.989	4184.40*	4.63E+000 +/- 7.83E-001	1.10E-001 +/- 1.33E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065436.CNF

Live Time :10200.000 sec  
Real Time :10200.300 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Wed Aug 07 12:47:09 2013



ROI Type: 1

ROI Type: 3

0103

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

369: 2 0 0 1 0 2 1 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

Sample Title: 10

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



c  
8/8/13

Sample Description: MW-102 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 11  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_045  
 Chamber Serial Number: 04026482A  
 Detector Serial Number: 91131  
 Env. Background: System Bkgd 64060  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:11 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232\_UU-10A  
 Tracer Quantity: 0.600 mL  
 Effective Efficiency: 0.1756 +/- 0.0104  
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM  
 Chem. Recovery Factor: 0.9195 +/- 0.0566

Peak Match Tolerance: 0.150 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	339.32	10.65	0.68	0.00E+000	11.1
U-234	4.728	372.49	10.16	0.51	0.00E+000	24.2
U-235	4.414	50.83	27.55	0.17	0.00E+000	8.9
U-238	4.146	287.66	11.56	0.34	0.00E+000	33.7

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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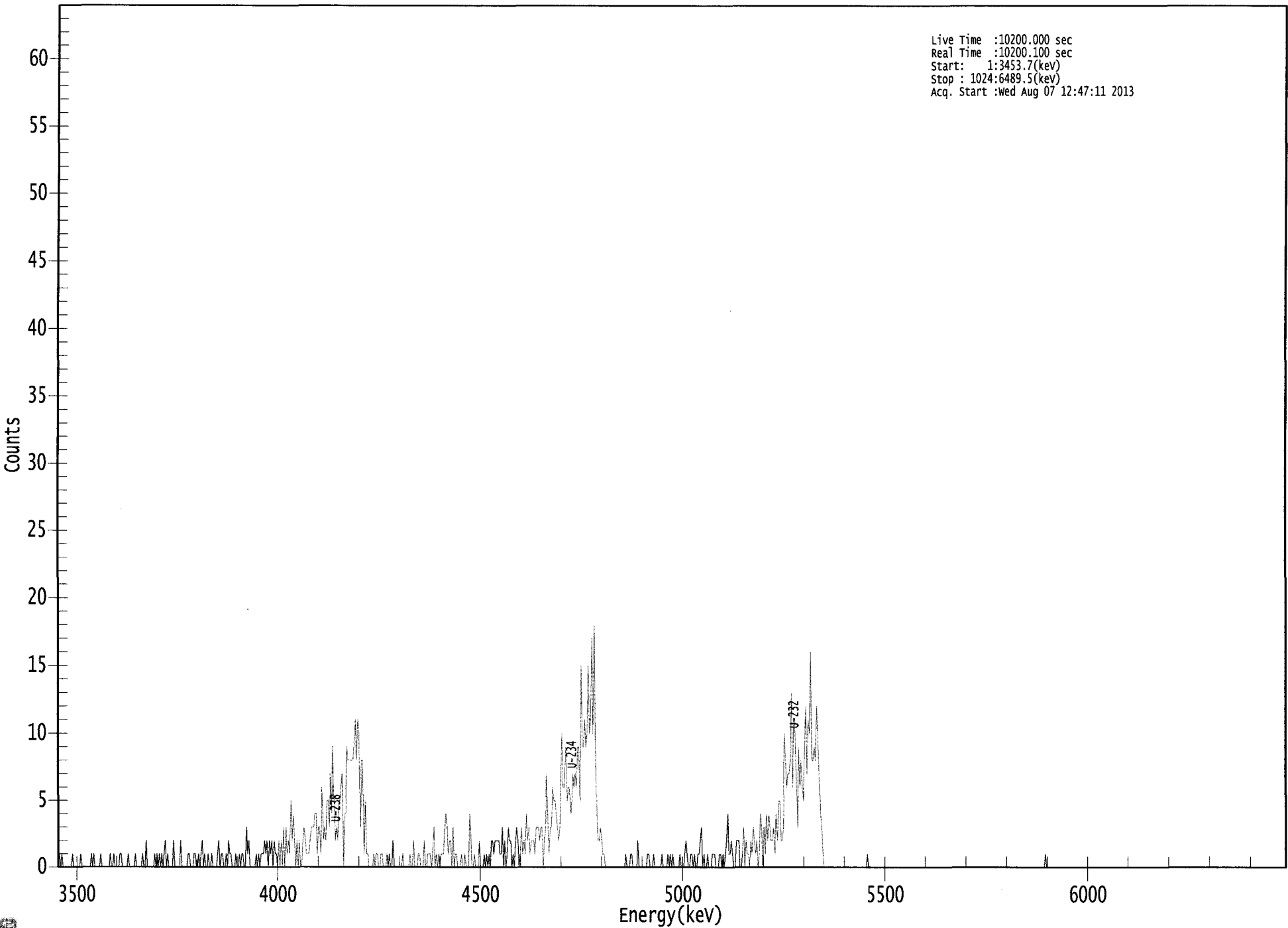
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.13E+000 +/- 5.94E-001	8.54E-002 +/- 9.87E-003
U-234	0.992	4761.50*	5.63E+000 +/- 8.67E-001	7.94E-002 +/- 9.18E-003
U-235	0.994	4385.50*	9.48E-001 +/- 2.83E-001	7.79E-002 +/- 9.01E-003
U-238	0.990	4184.40*	4.33E+000 +/- 7.08E-001	7.20E-002 +/- 8.33E-003

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065429.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3453.7(kev)  
Stop : 1024:6489.5(kev)  
Acq. Start :wed Aug 07 12:47:11 2013



ROI Type: 1

ROI Type: 3

0158

\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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



369: 2 1 1 3 0 2 0 1

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	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



# Apex-Alpha™

Sample Description: MW-103 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 12  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_046  
 Chamber Serial Number: 04026482B  
 Detector Serial Number: 58762  
 Env. Background: System Bkgd 64061  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:13 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: 0.1655 +/- 0.0100  
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM  
 Chem. Recovery Factor: 0.9247 +/- 0.0583

Peak Match Tolerance: 0.150 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.269	320.00	10.97	0.00	0.00E+000	10.9
U-234	4.725	186.83	14.35	0.17	0.00E+000	6.4
U-235	4.418	34.00	34.10	0.00	0.00E+000	3.7
U-238	4.149	174.83	14.83	0.17	0.00E+000	17.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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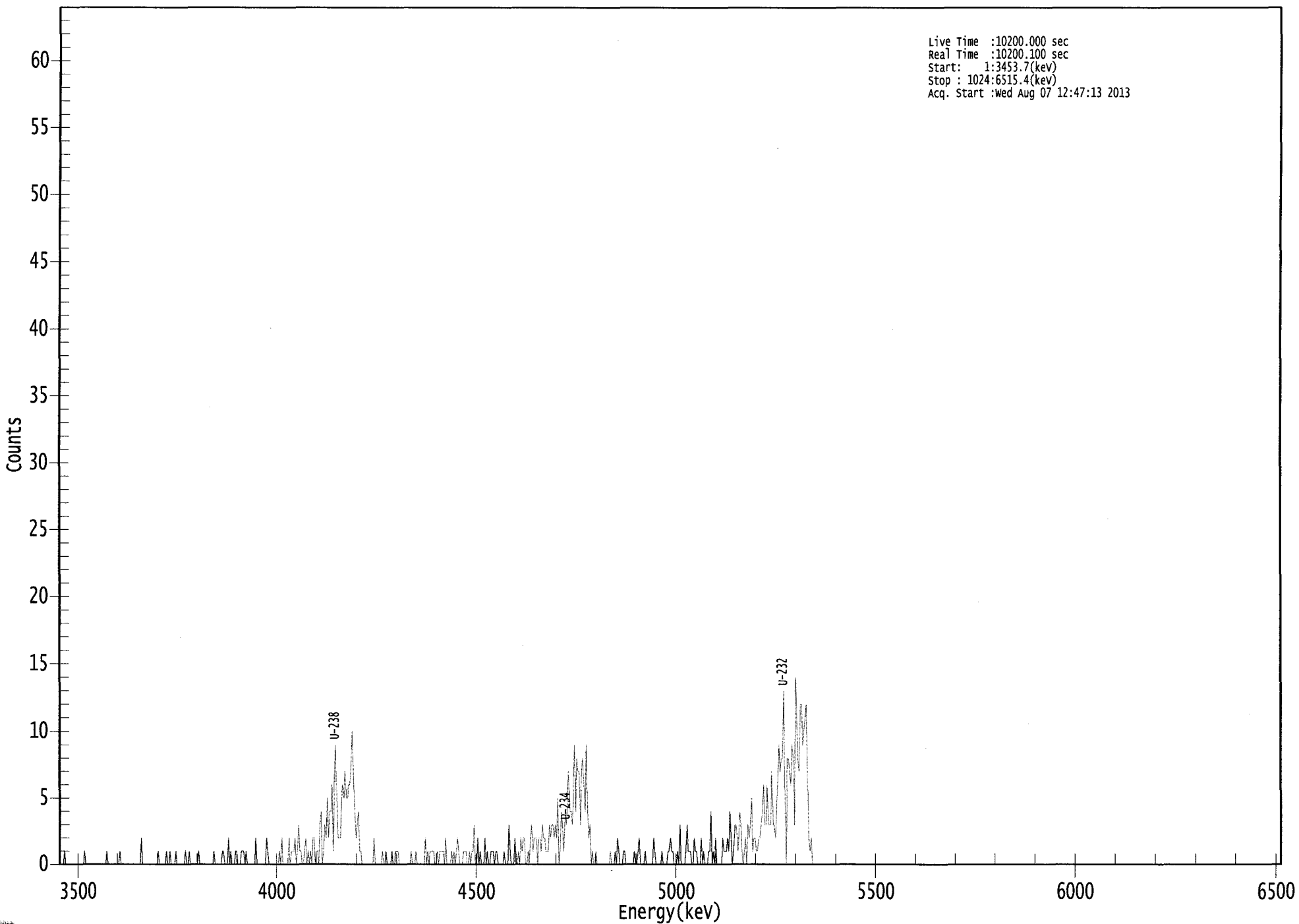
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.992	5302.50*	5.14E+000 +/- 6.10E-001	9.63E-002 +/- 1.14E-002
U-234	0.991	4761.50*	3.00E+000 +/- 5.58E-001	6.70E-002 +/- 7.95E-003
U-235	0.992	4385.50*	6.73E-001 +/- 2.43E-001	1.19E-001 +/- 1.41E-002
U-238	0.991	4184.40*	2.79E+000 +/- 5.31E-001	6.67E-002 +/- 7.91E-003

AG  
8/8/13

c  
8/8/13

0000065428.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3453.7(kev)  
Stop : 1024:6515.4(kev)  
Acq. Start :Wed Aug 07 12:47:13 2013



ROI Type: 1

ROI Type: 3

0153

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

369: 0 0 0 0 0 1 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

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



c  
8/8/13

Sample Description: MW-103 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 13  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_047  
 Chamber Serial Number: 02030596A  
 Detector Serial Number: 91086  
 Env. Background: System Bkgd 64062  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:15 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: 0.1486 +/- 0.0094  
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM  
 Chem. Recovery Factor: 0.8159 +/- 0.0536

Peak Match Tolerance: 0.150 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.262	287.49	11.57	0.51	0.00E+000	7.4
U-234	4.723	138.66	16.67	0.34	0.00E+000	3.5
U-235	4.398	17.66	47.16	0.34	0.00E+000	2.9
U-238	4.129	127.66	17.37	0.34	0.00E+000	4.3

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.988	5302.50*	5.14E+000 +/- 6.38E-001	9.38E-002 +/- 1.16E-002
U-234	0.990	4761.50*	2.48E+000 +/- 5.15E-001	8.54E-002 +/- 1.06E-002
U-235	0.999	4385.50*	3.89E-001 +/- 1.90E-001	1.05E-001 +/- 1.31E-002
U-238	0.979	4184.40*	2.27E+000 +/- 4.85E-001	8.50E-002 +/- 1.06E-002

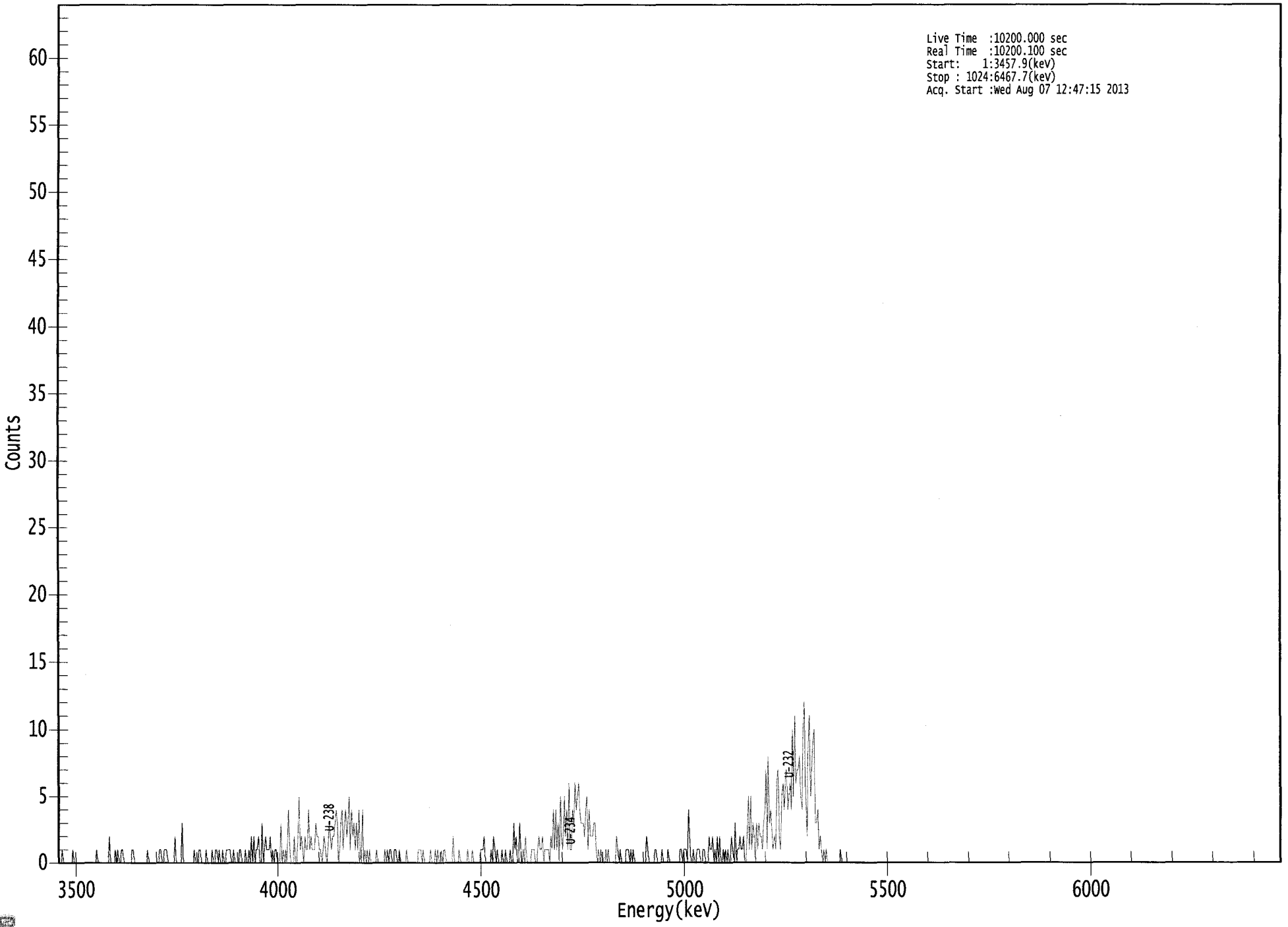
AG  
8/8/13

US EPA ARCHIVE DOCUMENT



0000065439.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3457.9(kev)  
Stop : 1024:6467.7(kev)  
Acq. Start :Wed Aug 07 12:47:15 2013



ROI Type: 1

ROI Type: 3

0168

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 1 0 0 1

Sample Title: 13

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



2  
8/8/13

Sample Description: PZ-303-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 14  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_048  
 Chamber Serial Number: 02030596B  
 Detector Serial Number: 83111  
 Env. Background: System Bkgd 64063  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 12:47:17 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: 0.0884 +/- 0.0071  
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM  
 Chem. Recovery Factor: 0.5265 +/- 0.0432

Peak Match Tolerance: 0.150 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.265	171.15	15.03	0.85	0.00E+000	4.9
U-234	4.698	28.00	37.70	0.00	0.00E+000	3.0
U-235	4.389	10.00	65.01	0.00	0.00E+000	3.0
U-238	4.145	17.83	46.68	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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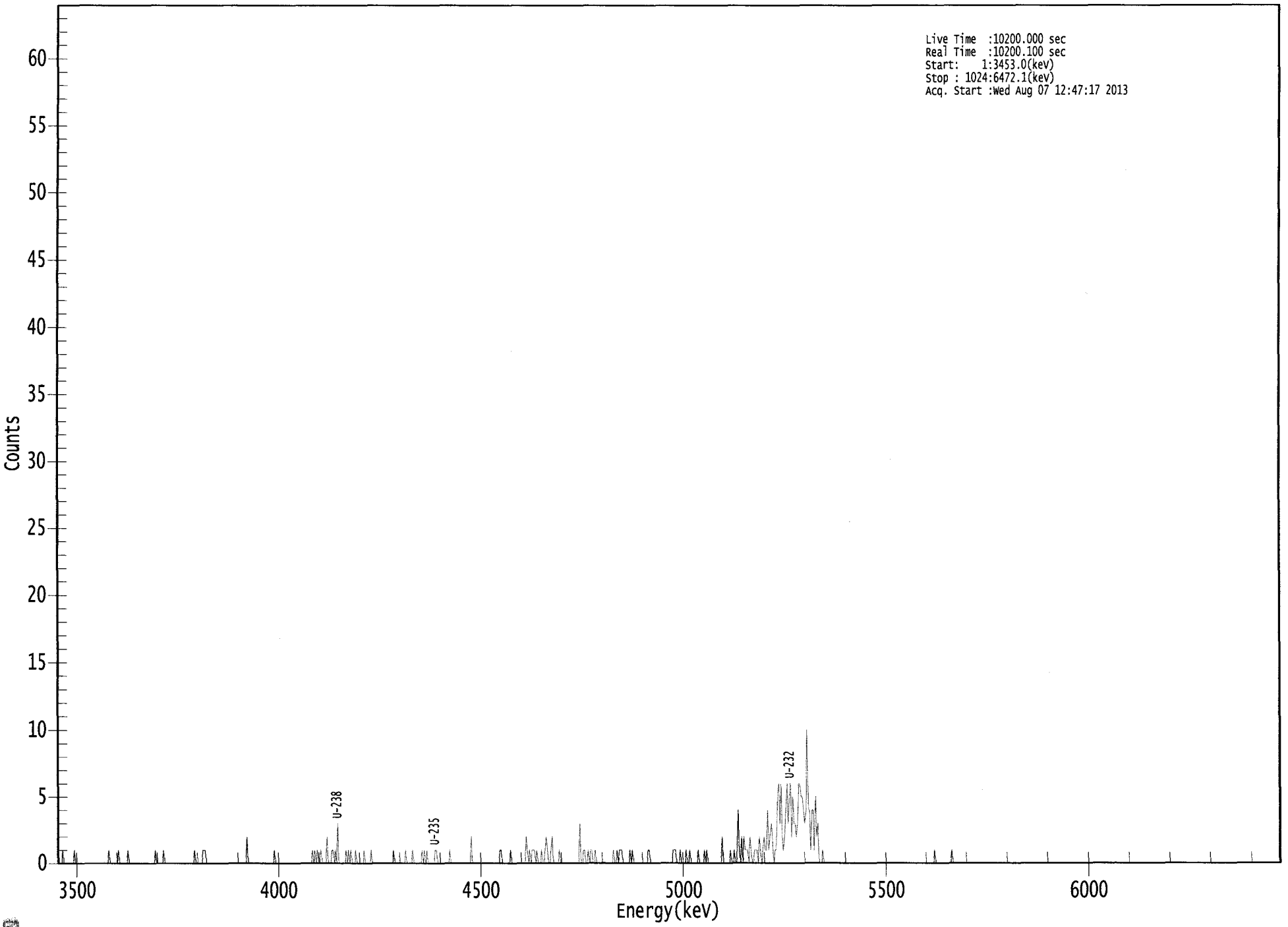
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.990	5302.50*	5.14E+000 +/- 8.07E-001	1.80E-001 +/- 2.82E-002
U-234	0.971	4761.50*	8.41E-001 +/- 3.43E-001	1.80E-001 +/- 2.82E-002
U-235	1.000	4385.50*	3.70E-001 +/- 2.48E-001	2.22E-001 +/- 3.48E-002
U-238	0.989	4184.40*	5.33E-001 +/- 2.62E-001	1.25E-001 +/- 1.96E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065440.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3453.0(kev)  
Stop : 1024:6472.1(kev)  
Acq. Start :wed Aug 07 12:47:17 2013



ROI Type: 1

ROI Type: 3

222

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 1 0 0 0

Sample Title: 14

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



801: 0 0 0 0 0 0 0 0

Sample Title: 14

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



8/8/13

Sample Description: PZ-303-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 15  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_003  
 Chamber Serial Number:  
 Detector Serial Number: 3  
 Env. Background: System Bkgd 64034  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:33 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: 0.1050 +/- 0.0078  
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM  
 Chem. Recovery Factor: 0.6011 +/- 0.0458

Peak Match Tolerance: 0.150 MeV

-----  
 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.248	203.32	13.77	0.68	0.00E+000	14.9
U-234	4.726	41.49	30.65	0.51	0.00E+000	3.7
U-235	4.399	11.83	57.46	0.17	0.00E+000	3.0
U-238	4.113	40.49	31.03	0.51	0.00E+000	3.5

T = Tracer Peak used for Effective Efficiency

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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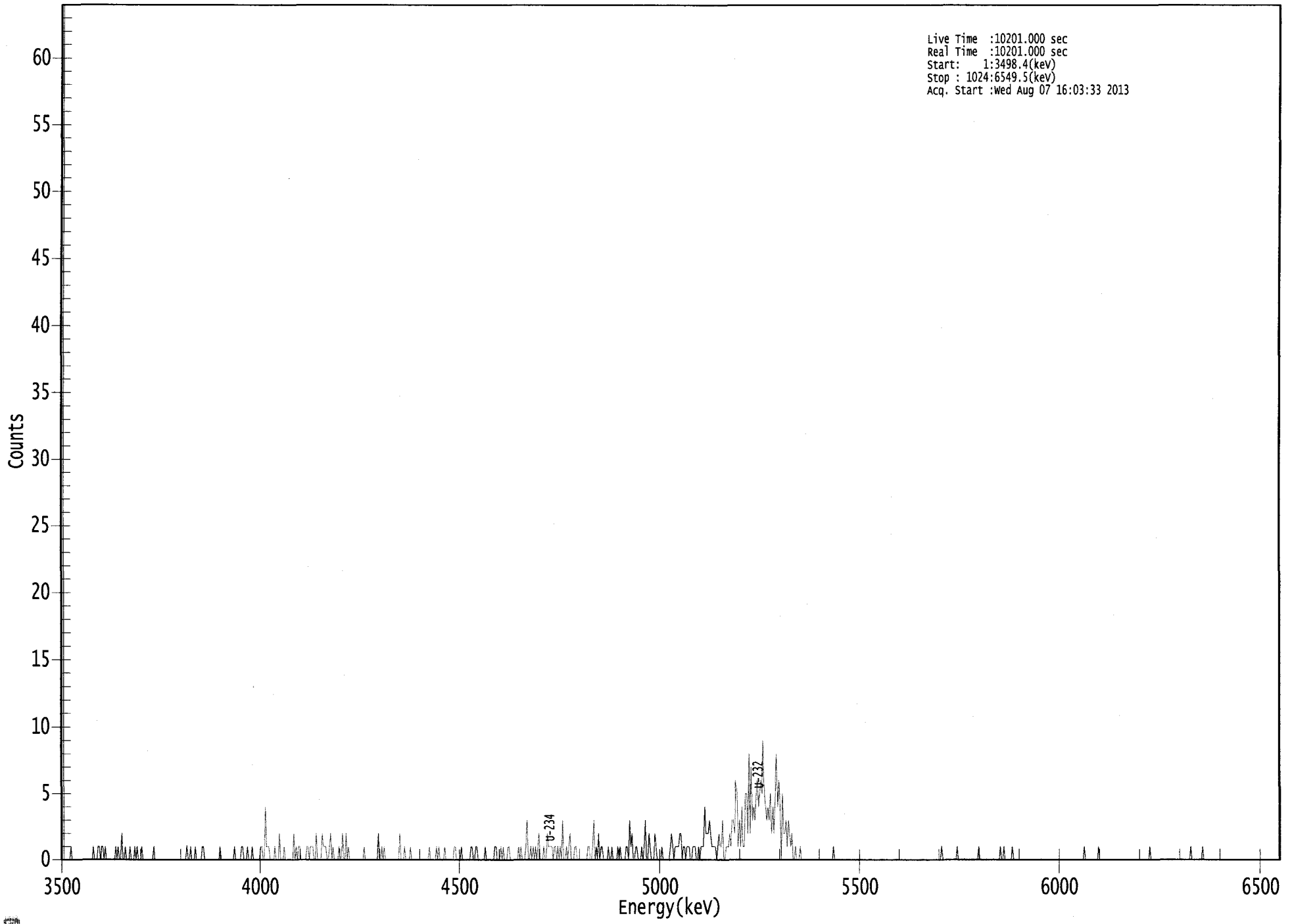
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.979	5302.50*	5.15E+000 +/- 7.46E-001	1.43E-001 +/- 2.07E-002
U-234	0.991	4761.50*	1.05E+000 +/- 3.56E-001	1.33E-001 +/- 1.92E-002
U-235	0.999	4385.50*	3.69E-001 +/- 2.19E-001	1.30E-001 +/- 1.89E-002
U-238	0.965	4184.40*	1.02E+000 +/- 3.49E-001	1.32E-001 +/- 1.92E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065443.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3498.4(kev)  
Stop : 1024:6549.5(kev)  
Acq. Start :wed Aug 07 16:03:33 2013



ROI Type: 1

ROI Type: 3

0178

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

369: 0 0 1 0 1 0 0 0

Sample Title: 15

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

801: 0 0 0 0 0 0 0 0

Sample Title: 15

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



C  
8/8/13

Sample Description: I-11 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 16  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_004  
 Chamber Serial Number:  
 Detector Serial Number: 4  
 Env. Background: System Bkgd 64035  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:34 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232\_UU-10A  
 Tracer Quantity: 0.600 mL  
 Effective Efficiency: 0.1649 +/- 0.0100  
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM  
 Chem. Recovery Factor: 0.8501 +/- 0.0539

Peak Match Tolerance: 0.150 MeV

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 -----  
 PEAK AREA REPORT  
 -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.271	318.81	11.00	1.19	0.00E+000	8.9
U-234	4.718	73.81	23.03	1.19	0.00E+000	4.4
U-235	4.424	9.32	66.89	0.68	0.00E+000	2.9
U-238	4.136	39.47	31.90	1.53	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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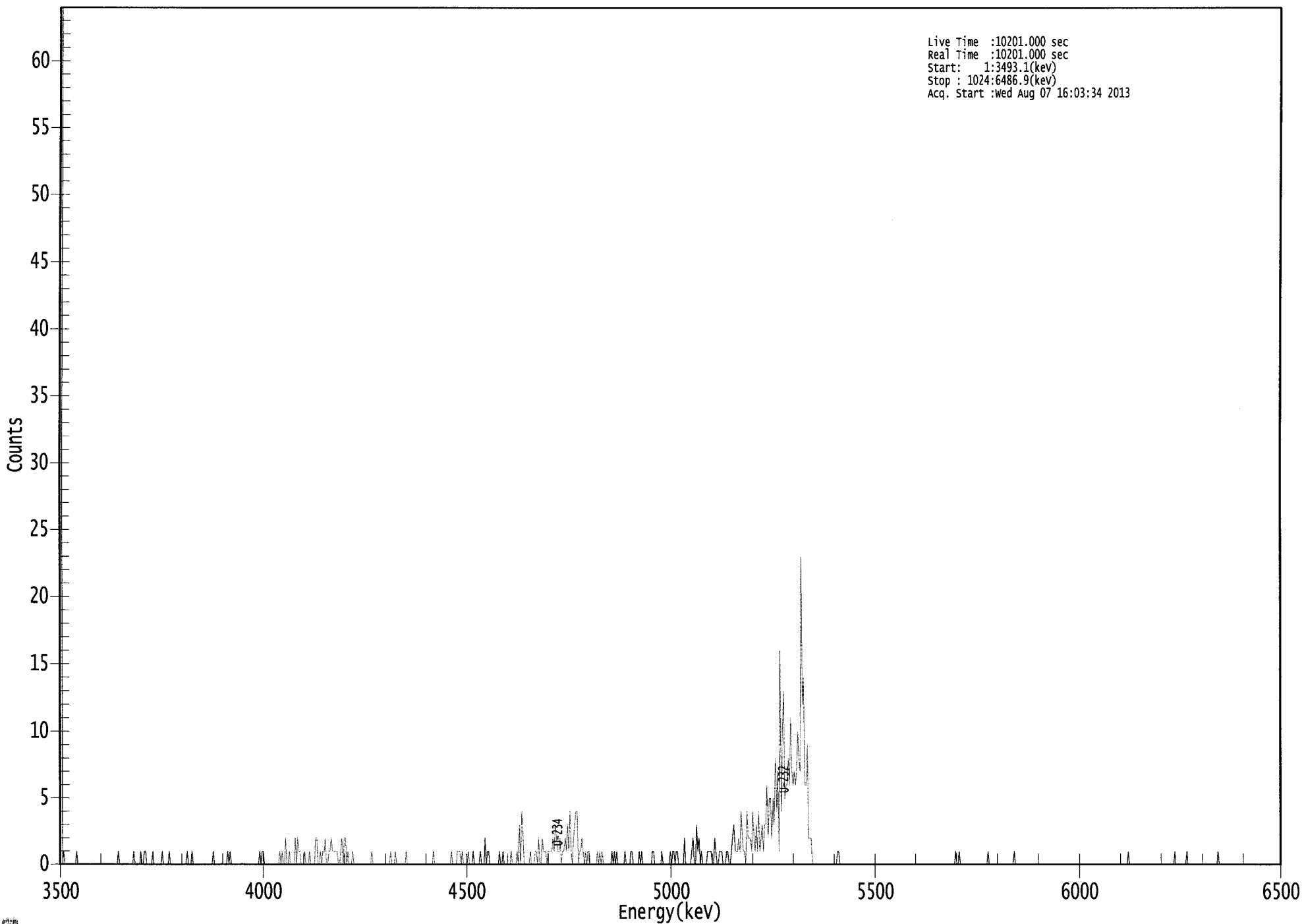
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.13E+000 +/- 6.10E-001	1.06E-001 +/- 1.26E-002
U-234	0.987	4761.50*	1.19E+000 +/- 3.08E-001	1.06E-001 +/- 1.26E-002
U-235	0.990	4385.50*	1.85E-001 +/- 1.26E-001	1.12E-001 +/- 1.33E-002
U-238	0.984	4184.40*	6.33E-001 +/- 2.15E-001	1.14E-001 +/- 1.35E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065444.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3493.1(kev)  
Stop : 1024:6486.9(kev)  
Acq. Start :Wed Aug 07 16:03:34 2013



ROI Type: 1

ROI Type: 3



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

369: 0 1 0 0 1 0 0 0

Sample Title: 16

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

Sample Title: 16

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



c  
8/8/13

Sample Description: I-11 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 17  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_010  
 Chamber Serial Number:  
 Detector Serial Number: 10  
 Env. Background: System Bkgd 64036  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:28 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: 0.1581 +/- 0.0098  
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM  
 Chem. Recovery Factor: 0.8036 +/- 0.0518

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	306.30	11.24	1.70	0.00E+000	9.5
U-234	4.731	75.13	22.94	1.87	0.00E+000	4.9
U-235	4.393	9.49	65.59	0.51	0.00E+000	2.9
U-238	4.144	48.15	28.54	0.85	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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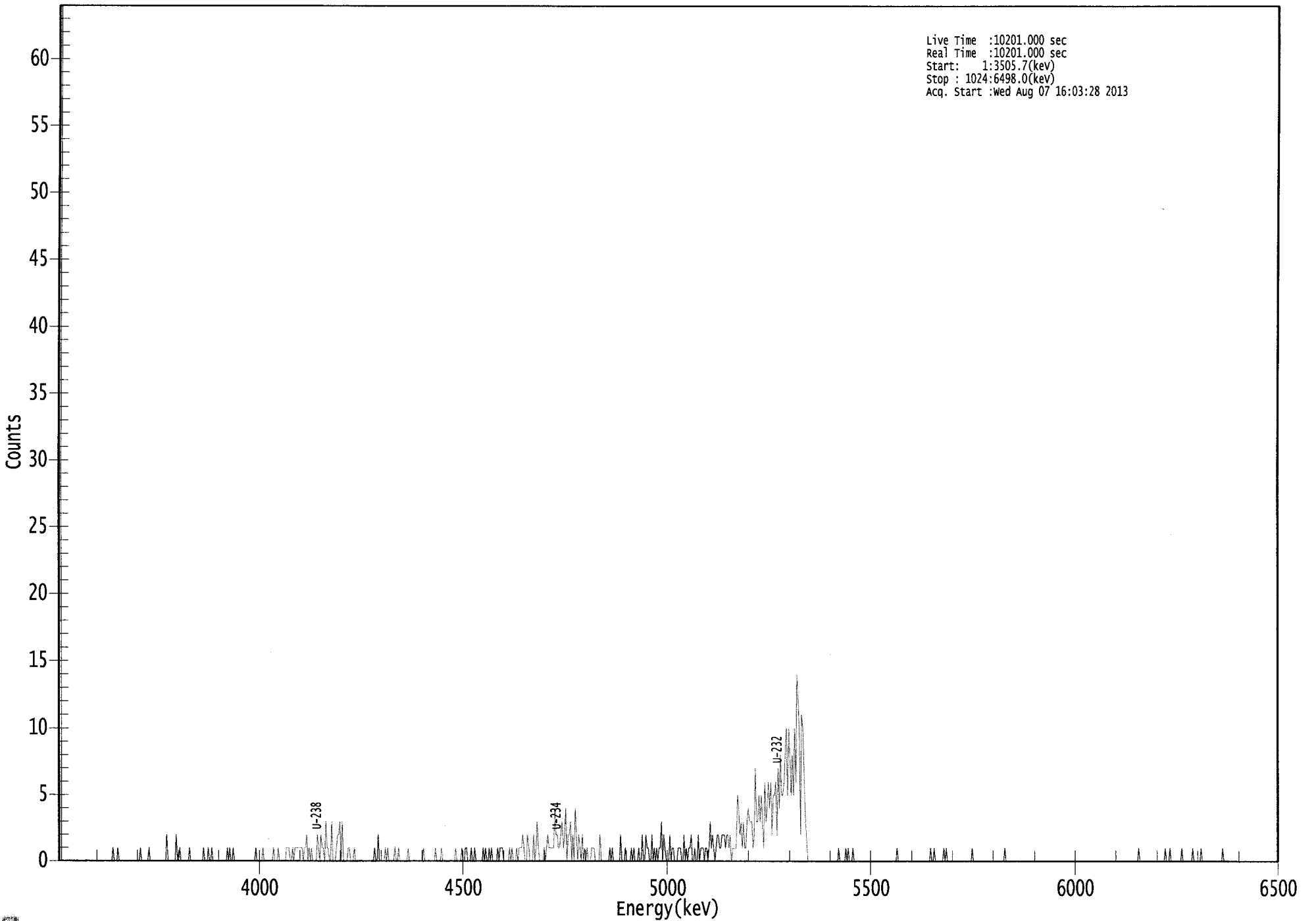
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
U-232	0.994	5302.50*	5.15E+000 +/- 6.23E-001	1.23E-001 +/- 1.49E-002
U-234	0.994	4761.50*	1.26E+000 +/- 3.27E-001	1.27E-001 +/- 1.54E-002
U-235	1.000	4385.50*	1.97E-001 +/- 1.31E-001	1.09E-001 +/- 1.32E-002
U-238	0.988	4184.40*	8.05E-001 +/- 2.50E-001	1.00E-001 +/- 1.21E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065442.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3505.7(kev)  
Stop : 1024:6498.0(kev)  
Acq. Start :wed Aug 07 16:03:28 2013



ROI Type: 1

ROI Type: 3

0188

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

369: 0 1 0 1 1 1 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 17

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	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	1	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	1	0	0	0	1	0	0	0
937:	0	0	0	0	0	0	1	0
945:	0	0	0	0	0	0	0	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	0	0	0
977:	1	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0





c  
8/8u

Sample Description: S-10 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 18  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_011  
 Chamber Serial Number:  
 Detector Serial Number: 11  
 Env. Background: System Bkgd 64037  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:30 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: 0.1269 +/- 0.0086  
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM  
 Chem. Recovery Factor: 0.6190 +/- 0.0433

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.257	245.66	12.52	0.34	0.00E+000	4.1
U-234	4.710	29.83	36.01	0.17	0.00E+000	5.2
U-235	4.391	14.83	51.24	0.17	0.00E+000	2.6
U-238	4.117	17.66	47.16	0.34	0.00E+000	3.9

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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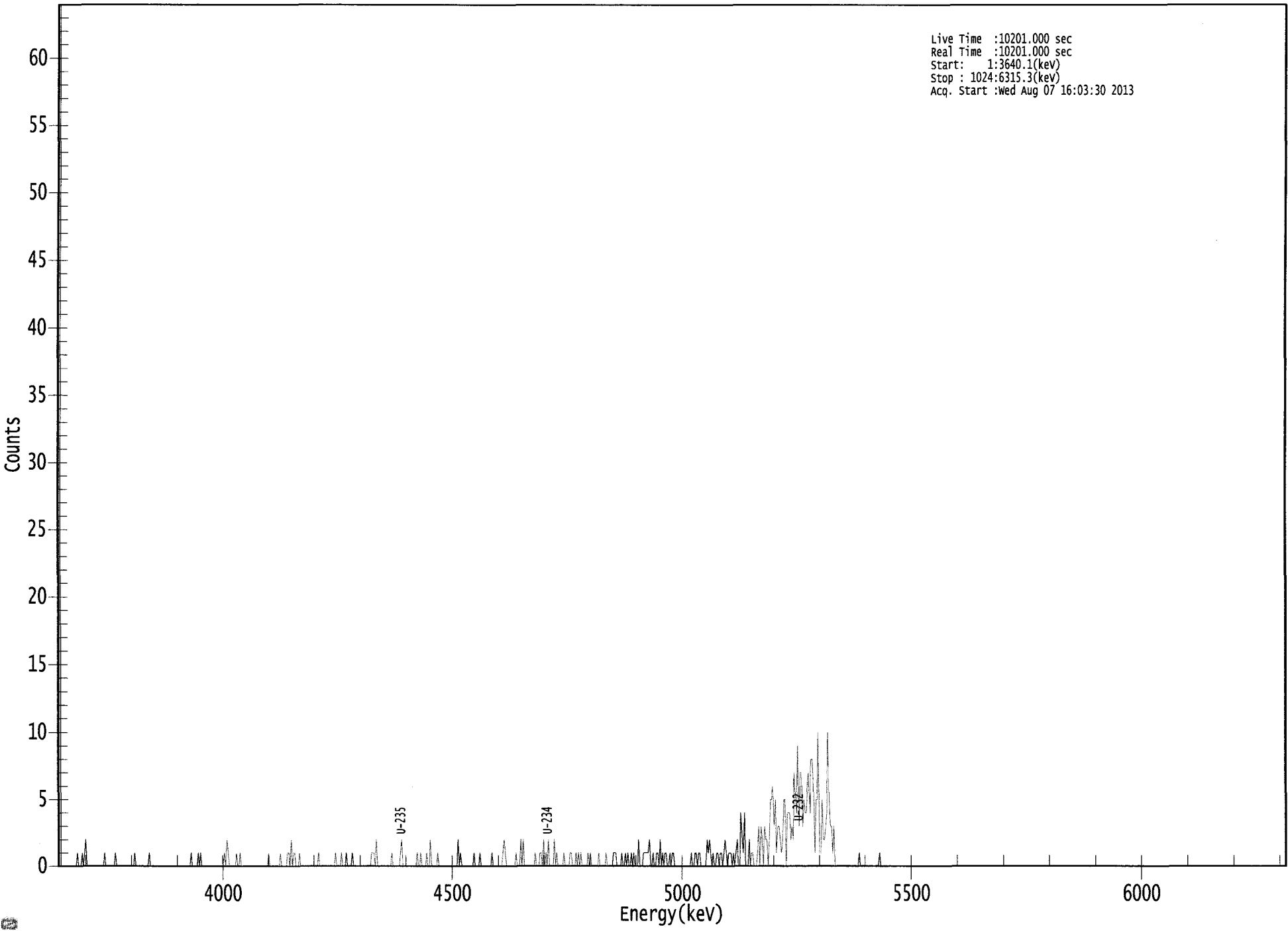
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.986	5302.50*	5.14E+000 +/- 6.84E-001	1.00E-001 +/- 1.33E-002
U-234	0.981	4761.50*	6.24E-001 +/- 2.39E-001	8.73E-002 +/- 1.16E-002
U-235	1.000	4385.50*	3.83E-001 +/- 2.03E-001	1.08E-001 +/- 1.43E-002
U-238	0.969	4184.40*	3.68E-001 +/- 1.80E-001	9.96E-002 +/- 1.32E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065445.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3640.1(kev)  
Stop : 1024:6315.3(kev)  
Acq. Start :Wed Aug 07 16:03:30 2013



ROI Type: 1

ROI Type: 3

0103

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 \*\*\*\*\* 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	0	0	0
17:	1	0	0	0	1	0	1	2
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	1
41:	0	0	0	0	0	0	0	0
49:	1	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	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	1
113:	0	0	0	0	0	1	0	1
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	1	0	2	1	0
145:	0	0	0	0	0	1	0	0
153:	1	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	1	0	0	0	0	0
193:	1	1	0	2	0	1	1	0
201:	0	0	1	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	0	0	1	0	0
241:	0	1	0	0	0	0	1	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	1	1
265:	1	0	2	0	0	0	0	0
273:	0	0	0	0	0	0	0	1
281:	0	0	0	0	0	0	1	2
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	1	0	0	1
305:	0	0	0	0	1	0	0	2
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	2	0
337:	1	0	0	0	0	0	0	0
345:	0	0	0	1	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	1	0	0	0	0	0

369: 0 0 0 1 2 1 0 0

Sample Title: 18

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

801: 0 0 0 0 0 0 0 0

Sample Title: 18

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



# Apex-Alpha™

c  
8/8/13

Sample Description: S-10 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 19  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_012  
 Chamber Serial Number:  
 Detector Serial Number: 12  
 Env. Background: System Bkgd 64038  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:31 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: 0.1043 +/- 0.0077  
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM  
 Chem. Recovery Factor: 0.5241 +/- 0.0399

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.273	202.49	13.79	0.51	0.00E+000	5.4
U-234	4.755	14.83	51.24	0.17	0.00E+000	3.0
U-235	4.411	8.32	71.13	0.68	0.00E+000	3.0
U-238	4.120	9.83	63.14	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

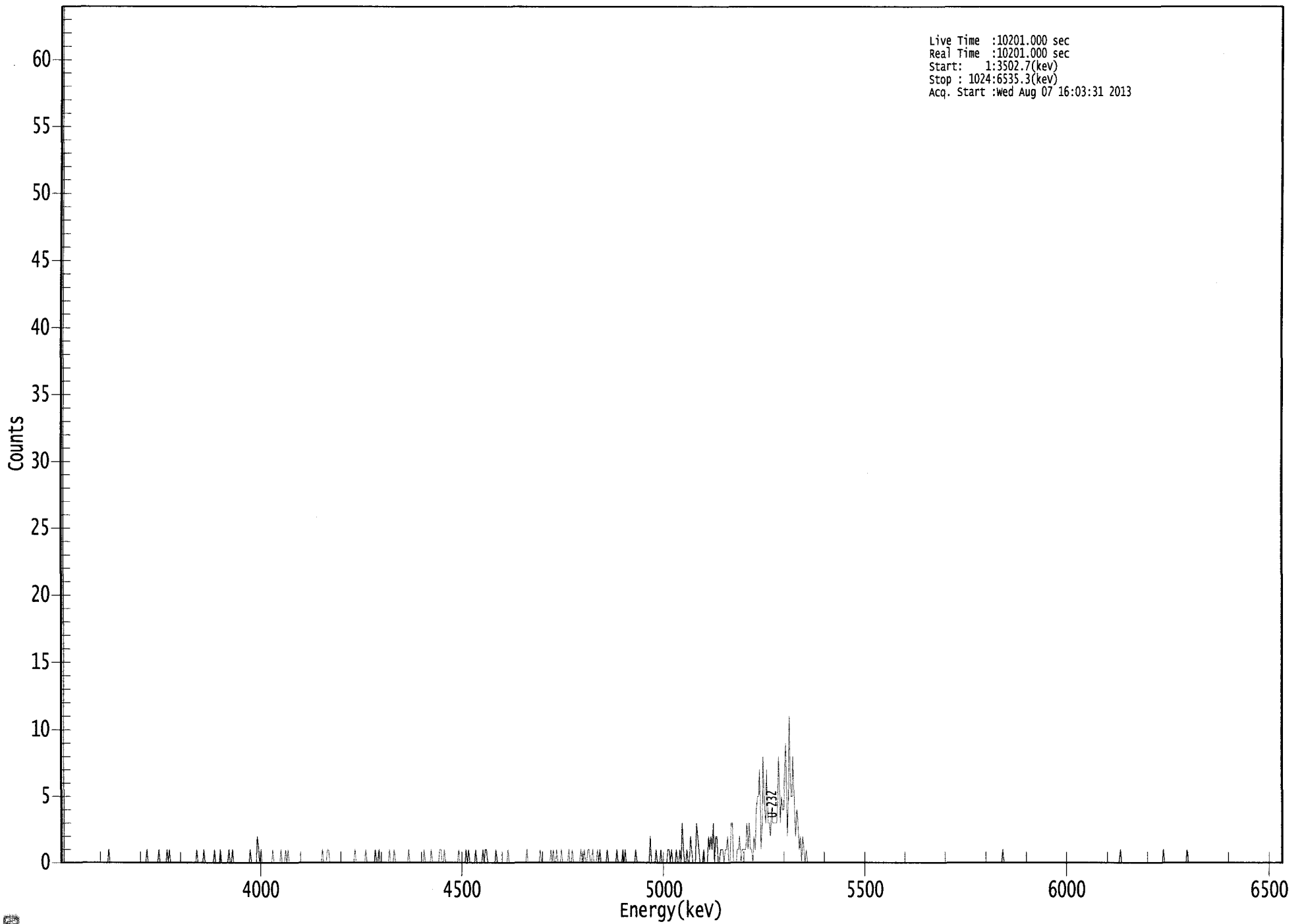
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.16E+000 +/- 7.49E-001	1.34E-001 +/- 1.94E-002
U-234	1.000	4761.50*	3.78E-001 +/- 2.01E-001	1.06E-001 +/- 1.54E-002
U-235	0.995	4385.50*	2.61E-001 +/- 1.90E-001	1.77E-001 +/- 2.57E-002
U-238	0.971	4184.40*	2.49E-001 +/- 1.61E-001	1.06E-001 +/- 1.54E-002

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065447.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3502.7(kev)  
Stop : 1024:6535.3(kev)  
Acq. Start :wed Aug 07 16:03:31 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: 19

Elapsed Live time: 10201

Elapsed Real Time: 10201

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



369: 0 0 0 0 0 0 0 0 1

Sample Title: 19

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

Sample Description: FB AT D-12 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000654  
 Batch Identification: 1307146A-UU  
 Sample Identification: 20  
 Sample Geometry: Shelf 2  
 Procedure Description: U iso

Detector Name: Alpha\_013  
 Chamber Serial Number:  
 Detector Serial Number: 13  
 Env. Background: System Bkgd 64039  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 8:22:29 AM  
 Acquisition Date/Time: 8/7/2013 4:03:32 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: 0.1977 +/- 0.0111  
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM  
 Chem. Recovery Factor: 1.0580 +/- 0.0626

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.275	382.96	10.05	2.04	0.00E+000	21.1
U-234	4.727	23.66	40.63	0.34	0.00E+000	2.8
U-235	4.392	2.32	149.13	0.68	0.00E+000	2.8
U-238	4.218	3.32	119.77	0.68	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

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

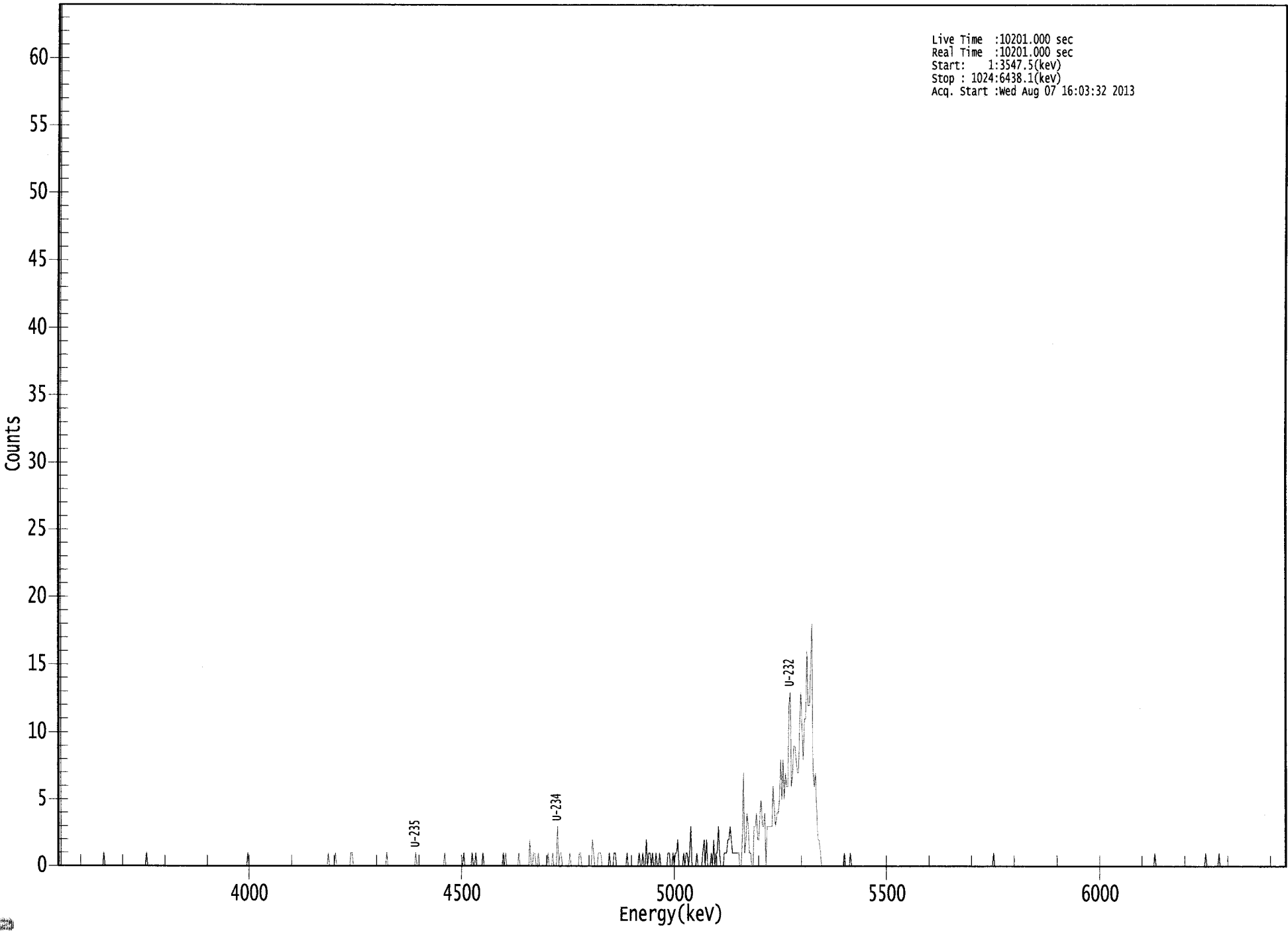
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.14E+000 +/- 5.67E-001	1.05E-001 +/- 1.15E-002
U-234	0.992	4761.50*	3.18E-001 +/- 1.34E-001	6.42E-002 +/- 7.07E-003
U-235	1.000	4385.50*	3.84E-002 +/- 5.75E-002	9.34E-002 +/- 1.03E-002
U-238	0.992	4184.40*	4.44E-002 +/- 5.34E-002	7.54E-002 +/- 8.30E-003

AG  
8/8/13

US EPA ARCHIVE DOCUMENT

0000065446.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3547.5(kev)  
Stop : 1024:6438.1(kev)  
Acq. Start :Wed Aug 07 16:03:32 2013



ROI Type: 1

ROI Type: 3

0200

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

Sample Title:    20

Elapsed Live time:        10201

Elapsed Real Time:        10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	1	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	1	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	1
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	1	0	0	0	0	0
233:	1	0	0	0	0	0	0	0
241:	0	0	0	0	0	1	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	1	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	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	1	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	1	0	0	1	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 1 0 1 0

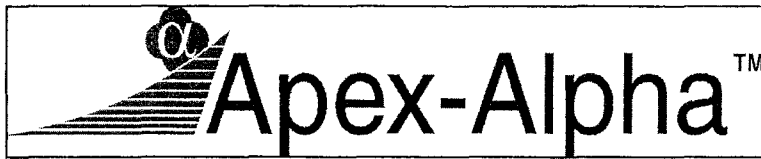
Sample Title: 20

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

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



QA SUMMARY REPORT  
Review Of QA Results - Pulser Check

Date : 8/7/2013  
Time : 6:51:42 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/7/2013 5:32:16 AM
Alpha 004	21f	ALL	Passed	8/7/2013 5:32:17 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/7/2013 5:32:18 AM
Alpha 011	21f	ALL	Passed	8/7/2013 5:32:18 AM
Alpha 012	21f	ALL	Passed	8/7/2013 5:32:19 AM
Alpha 013	21f	ALL	Passed	8/7/2013 5:32:20 AM
Alpha 014	21f	ALL	Passed	8/7/2013 5:32:21 AM
Alpha 015	21f	Peak Energy	Action	8/7/2013 5:32:22 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/7/2013 5:32:23 AM
Alpha 019	AIM730	ALL	Passed	8/7/2013 5:32:24 AM
Alpha 020	AIM730	ALL	Passed	8/2/2013 5:14:08 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/7/2013 5:32:24 AM
Alpha 023	AIM730	ALL	Passed	8/7/2013 5:32:25 AM
Alpha 024	AIM730	ALL	Passed	8/7/2013 5:32:26 AM
Alpha 025	AIM730	ALL	Passed	8/7/2013 5:32:27 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/7/2013 5:32:28 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/7/2013 5:32:28 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/7/2013 5:32:29 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:30 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:32 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:33 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:35 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/7/2013 5:32:37 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:38 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:41 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:43 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:45 AM

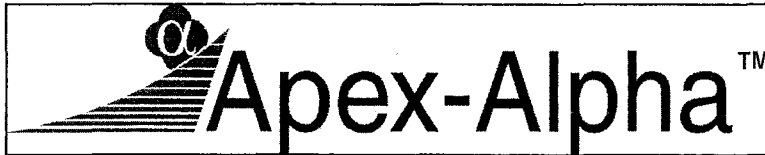


CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:48 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:50 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:53 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/7/2013 5:32:55 AM

APPROVED BY: \_\_\_\_\_ *✓*

APPROVAL DATE: \_\_\_\_\_ *8/7/13*

US EPA ARCHIVE DOCUMENT



## QA SUMMARY REPORT

### Review Of QA Results - Pulser Check

Date : 8/8/2013

Time : 7:55:58 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/8/2013 5:38:35 AM
Alpha 004	21f	ALL	Passed	8/8/2013 5:38:36 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/8/2013 5:38:37 AM
Alpha 011	21f	ALL	Passed	8/8/2013 5:38:38 AM
Alpha 012	21f	ALL	Passed	8/8/2013 5:38:39 AM
Alpha 013	21f	ALL	Passed	8/8/2013 5:38:40 AM
Alpha 014	21f	ALL	Passed	8/8/2013 5:38:40 AM
Alpha 015	21f	Peak Energy	Action	8/8/2013 5:38:41 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/8/2013 5:38:42 AM
Alpha 019	AIM730	ALL	Passed	8/8/2013 5:38:43 AM
Alpha 020	AIM730	ALL	Passed	8/2/2013 5:14:08 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/8/2013 5:38:44 AM
Alpha 023	AIM730	ALL	Passed	8/8/2013 5:38:45 AM
Alpha 024	AIM730	ALL	Passed	8/8/2013 5:38:45 AM
Alpha 025	AIM730	ALL	Passed	8/8/2013 5:38:46 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/8/2013 5:38:47 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/8/2013 5:38:48 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/8/2013 5:38:49 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:52 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:54 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/8/2013 5:38:55 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:57 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:38:58 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:00 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:02 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:03 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:05 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:06 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/8/2013 5:39:08 AM

APPROVED BY: \_\_\_\_\_ 

APPROVAL DATE: \_\_\_\_\_ 

US EPA ARCHIVE DOCUMENT

\*\*\*\*\*  
\*\*\*\*\* 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	<b>13-07146</b>
Analysis Code	<b>ThISO</b>
Run	<b>1</b>
Date Received	<b>7/22/2013</b>
Lab Deadline	<b>8/13/2013</b>
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	<b>4</b>
Activity Units	pCi
Aliquot Units	I
Matrix	WA
Method	HASL 300, 4.5.2
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Th-229
Radiometric Sol#	Th-18a
Tracer Act (dpm/g)	22.466
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/23/13 00:00	1.0000E+00
02	MBL	BLANK		07/23/13 00:00	1.0000E+00
03	DUP	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
04	DO	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
05	TRG	PZ-105-SS DIS	48	07/12/13 09:42	1.0000E+00
06	TRG	PZ-114-AS TOT	46	07/12/13 10:56	1.0000E+00
07	TRG	PZ-114-AS DIS	46	07/12/13 10:56	1.0000E+00
08	TRG	I-66 TOT	42	07/15/13 10:44	1.0000E+00
09	TRG	I-66 DIS	42	07/15/13 10:44	1.0000E+00
10	TRG	MW-102 TOT	41	07/15/13 11:10	1.0000E+00
11	TRG	MW-102 DIS	41	07/15/13 11:10	1.0000E+00
12	TRG	MW-103 TOT	44	07/15/13 11:44	1.0000E+00
13	TRG	MW-103 DIS	44	07/15/13 11:44	1.0000E+00
14	TRG	PZ-303-AS TOT	42	07/15/13 12:20	1.0000E+00
15	TRG	PZ-303-AS DIS	42	07/15/13 12:20	1.0000E+00
16	TRG	I-11 TOT	39	07/15/13 13:12	1.0000E+00
17	TRG	I-11 DIS	39	07/15/13 13:12	1.0000E+00
18	TRG	S-10 TOT	44	07/15/13 14:05	1.0000E+00
19	TRG	S-10 DIS	44	07/15/13 14:05	1.0000E+00
20	TRG	FB at D-12 TOT	40	07/15/13 14:30	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	0.4793	10.8		0.00								
02	MBL	0.2393	5.4		0.00								
03	DUP	0.2349	5.3		0.00								
04	DO	0.2367	5.3		0.00								
05	TRG	0.2363	5.3		0.00								
06	TRG	0.2374	5.3		0.00								
07	TRG	0.2365	5.3		0.00								
08	TRG	0.2358	5.3		0.00								
09	TRG	0.2348	5.3		0.00								
10	TRG	0.2342	5.3		0.00								
11	TRG	0.2342	5.3		0.00								
12	TRG	0.2345	5.3		0.00								
13	TRG	0.2350	5.3		0.00								
14	TRG	0.2351	5.3		0.00								
15	TRG	0.2349	5.3		0.00								
16	TRG	0.2355	5.3		0.00								
17	TRG	0.2347	5.3		0.00								
18	TRG	0.2340	5.3		0.00								
19	TRG	0.2346	5.3		0.00								
20	TRG	0.2356	5.3		0.00								

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

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Rough Prep Date</i>	<i>Rough Prep By</i>	<i>Prep Date</i>	<i>Prep By</i>	<i>Sep t0 Date/Time</i>	<i>Sep t0 By</i>	<i>Sep t1 Date/Time</i>	<i>Sep t1 By</i>
01	LCS			07/31/13 09:42	JWOLFE				
02	MBL			07/31/13 09:42	JWOLFE				
03	DUP			07/31/13 09:42	JWOLFE				
04	DO			07/31/13 09:42	JWOLFE				
05	TRG			07/31/13 09:42	JWOLFE				
06	TRG			07/31/13 09:42	JWOLFE				
07	TRG			07/31/13 09:42	JWOLFE				
08	TRG			07/31/13 09:42	JWOLFE				
09	TRG			07/31/13 09:42	JWOLFE				
10	TRG			07/31/13 09:42	JWOLFE				
11	TRG			07/31/13 09:42	JWOLFE				
12	TRG			07/31/13 09:42	JWOLFE				
13	TRG			07/31/13 09:42	JWOLFE				
14	TRG			07/31/13 09:42	JWOLFE				
15	TRG			07/31/13 09:42	JWOLFE				
16	TRG			07/31/13 09:42	JWOLFE				
17	TRG			07/31/13 09:42	JWOLFE				
18	TRG			07/31/13 09:42	JWOLFE				
19	TRG			07/31/13 09:42	JWOLFE				
20	TRG			07/31/13 09:42	JWOLFE				

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



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-THISO-1**

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-228	LCS	LCS	pCi/l	4.90E+00	7.87E-01	1.03E-01	4.94E+00	99.25	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	-2.30E-02	3.33E-02	1.07E-01					OK	OK
03	TH-228	DUP	PZ-105-SS TOT	pCi/l	6.17E-02	1.10E-01	1.96E-01				NA	OK	
04	TH-228	DO	PZ-105-SS TOT	pCi/l	-3.48E-02	3.86E-02	1.42E-01					OK	
05	TH-228	TRG	PZ-105-SS DIS	pCi/l	6.27E-02	7.56E-02	1.15E-01					OK	
06	TH-228	TRG	PZ-114-AS TOT	pCi/l	-3.75E-03	4.24E-02	1.30E-01					OK	
07	TH-228	TRG	PZ-114-AS DIS	pCi/l	7.84E-02	1.35E-01	2.35E-01					OK	
08	TH-228	TRG	I-66 TOT	pCi/l	2.42E-01	1.80E-01	1.64E-01					OK	
09	TH-228	TRG	I-66 DIS	pCi/l	6.01E-02	9.25E-02	1.56E-01					OK	
10	TH-228	TRG	MW-102 TOT	pCi/l	9.49E-02	1.19E-01	1.79E-01					OK	
11	TH-228	TRG	MW-102 DIS	pCi/l	9.55E-02	1.27E-01	1.91E-01					OK	
12	TH-228	TRG	MW-103 TOT	pCi/l	1.18E+00	3.79E-01	1.14E-01					OK	
13	TH-228	TRG	MW-103 DIS	pCi/l	5.72E-02	6.98E-02	8.44E-02					OK	
14	TH-228	TRG	PZ-303-AS TOT	pCi/l	6.88E-02	8.57E-02	1.30E-01					OK	
15	TH-228	TRG	PZ-303-AS DIS	pCi/l	7.84E-03	6.33E-02	1.46E-01					OK	
16	TH-228	TRG	I-11 TOT	pCi/l	2.02E-01	1.46E-01	1.68E-01					OK	
17	TH-228	TRG	I-11 DIS	pCi/l	2.03E-01	1.88E-01	2.58E-01					OK	
18	TH-228	TRG	S-10 TOT	pCi/l	5.41E-02	5.86E-02	7.81E-02					OK	
19	TH-228	TRG	S-10 DIS	pCi/l	7.53E-02	8.18E-02	1.09E-01					OK	
20	TH-228	TRG	FB at D-12 TOT	pCi/l	-7.76E-02	5.05E-02	1.88E-01					OK	

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	110.89	0.00	0.00			
02	TH-228	MBL	07/23/13 00:00	1.00E+00	102.99	0.00	0.00			
03	TH-228	DUP	07/12/13 09:42	1.00E+00	50.30	0.00	0.00			
04	TH-228	DO	07/12/13 09:42	1.00E+00	100.74	0.00	0.00			
05	TH-228	TRG	07/12/13 09:42	1.00E+00	91.99	0.00	0.00			
06	TH-228	TRG	07/12/13 10:56	1.00E+00	97.19	0.00	0.00			
07	TH-228	TRG	07/12/13 10:56	1.00E+00	37.54	0.00	0.00			
08	TH-228	TRG	07/15/13 10:44	1.00E+00	50.27	0.00	0.00			
09	TH-228	TRG	07/15/13 10:44	1.00E+00	65.25	0.00	0.00			
10	TH-228	TRG	07/15/13 11:10	1.00E+00	54.43	0.00	0.00			
11	TH-228	TRG	07/15/13 11:10	1.00E+00	43.33	0.00	0.00			
12	TH-228	TRG	07/15/13 11:44	1.00E+00	70.32	0.00	0.00			
13	TH-228	TRG	07/15/13 11:44	1.00E+00	67.76	0.00	0.00			
14	TH-228	TRG	07/15/13 12:20	1.00E+00	77.62	0.00	0.00			
15	TH-228	TRG	07/15/13 12:20	1.00E+00	89.15	0.00	0.00			
16	TH-228	TRG	07/15/13 13:12	1.00E+00	71.14	0.00	0.00			
17	TH-228	TRG	07/15/13 13:12	1.00E+00	50.36	0.00	0.00			
18	TH-228	TRG	07/15/13 14:05	1.00E+00	101.38	0.00	0.00			
19	TH-228	TRG	07/15/13 14:05	1.00E+00	75.08	0.00	0.00			
20	TH-228	TRG	07/15/13 14:30	1.00E+00	76.30	0.00	0.00			

Run	1	Analysis Code	ThISO	Eberline Services Work Order	13-07146	Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-THISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	08/06/13 12:46		A_Spec	Alpha_023	170.02	3.50 E+02	1.00 E-02	17.1
02	TH-228	MBL	08/06/13 12:46		A_Spec	Alpha_024	170	-1.53 E+00	9.00 E-03	17.1
03	TH-228	DUP	08/06/13 12:46		A_Spec	Alpha_025	170	1.98 E+00	6.00 E-03	17.4
04	TH-228	DO	08/06/13 12:46		A_Spec	Alpha_027	170	-2.23 E+00	1.90 E-02	17.3
05	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_029	170	4.13 E+00	1.10 E-02	19.5
06	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_031	170	-1.90 E-01	7.00 E-03	14.2
07	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_033	170	2.00 E+00	0.00 E+00	18.5
08	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_034	170	8.32 E+00	4.00 E-03	18.6
09	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_035	170	2.64 E+00	8.00 E-03	18.3
10	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_036	170	3.64 E+00	8.00 E-03	19.1
11	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_039	170	3.00 E+00	0.00 E+00	19.7
12	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_040	170	5.83 E+01	4.00 E-03	19
13	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_041	170	2.83 E+00	1.00 E-03	19.8
14	TH-228	TRG	08/06/13 12:46		A_Spec	Alpha_042	170	3.64 E+00	8.00 E-03	18.5
15	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_003	170	4.50 E-01	1.50 E-02	17.5
16	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_004	170.02	1.03 E+01	1.60 E-02	19.4
17	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_010	170	7.43 E+00	2.10 E-02	19.7
18	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_011	170.02	4.15 E+00	5.00 E-03	20.5
19	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_012	170.02	4.15 E+00	5.00 E-03	19.9
20	TH-228	TRG	08/06/13 16:33		A_Spec	Alpha_013	170.02	-4.08 E+00	2.40 E-02	18.7

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-07146	
Client	Engineering Management Support, Inc.	

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	5.84E+00	9.05E-01	8.82E-02	5.47E+00	106.61	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	5.82E-01	2.11E-01	1.03E-01					OK	OK
03	TH-230	DUP	PZ-105-SS TOT	pCi/l	5.62E-01	2.91E-01	1.60E-01				NA	OK	
04	TH-230	DO	PZ-105-SS TOT	pCi/l	4.50E-01	1.83E-01	1.08E-01					OK	
05	TH-230	TRG	PZ-105-SS DIS	pCi/l	4.55E-01	1.79E-01	7.09E-02					OK	
06	TH-230	TRG	PZ-114-AS TOT	pCi/l	3.50E-01	1.78E-01	1.15E-01					OK	
07	TH-230	TRG	PZ-114-AS DIS	pCi/l	5.16E-01	3.11E-01	2.01E-01					OK	
08	TH-230	TRG	I-66 TOT	pCi/l	7.49E-01	3.35E-01	1.61E-01					OK	
09	TH-230	TRG	I-66 DIS	pCi/l	2.64E-01	1.60E-01	9.30E-02					OK	
10	TH-230	TRG	MW-102 TOT	pCi/l	2.89E-01	1.85E-01	1.44E-01					OK	
11	TH-230	TRG	MW-102 DIS	pCi/l	2.49E-01	1.94E-01	1.96E-01					OK	
12	TH-230	TRG	MW-103 TOT	pCi/l	1.80E+00	5.05E-01	9.50E-02					OK	
13	TH-230	TRG	MW-103 DIS	pCi/l	3.66E-01	1.88E-01	1.41E-01					OK	
14	TH-230	TRG	PZ-303-AS TOT	pCi/l	6.61E-01	2.49E-01	8.86E-02					OK	
15	TH-230	TRG	PZ-303-AS DIS	pCi/l	3.49E-01	1.65E-01	8.95E-02					OK	
16	TH-230	TRG	I-11 TOT	pCi/l	7.62E-01	2.81E-01	1.32E-01					OK	
17	TH-230	TRG	I-11 DIS	pCi/l	6.87E-01	3.13E-01	1.84E-01					OK	
18	TH-230	TRG	S-10 TOT	pCi/l	4.08E-01	1.57E-01	7.65E-02					OK	
19	TH-230	TRG	S-10 DIS	pCi/l	5.77E-01	2.26E-01	9.33E-02					OK	
20	TH-230	TRG	FB at D-12 TOT	pCi/l	4.62E-01	2.05E-01	1.23E-01					OK	

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

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	110.89	0.00	0.00			
02	TH-230	MBL	07/23/13 00:00	1.00E+00	102.99	0.00	0.00			
03	TH-230	DUP	07/12/13 09:42	1.00E+00	50.30	0.00	0.00			
04	TH-230	DO	07/12/13 09:42	1.00E+00	100.74	0.00	0.00			
05	TH-230	TRG	07/12/13 09:42	1.00E+00	91.99	0.00	0.00			
06	TH-230	TRG	07/12/13 10:56	1.00E+00	97.19	0.00	0.00			
07	TH-230	TRG	07/12/13 10:56	1.00E+00	37.54	0.00	0.00			
08	TH-230	TRG	07/15/13 10:44	1.00E+00	50.27	0.00	0.00			
09	TH-230	TRG	07/15/13 10:44	1.00E+00	65.25	0.00	0.00			
10	TH-230	TRG	07/15/13 11:10	1.00E+00	54.43	0.00	0.00			
11	TH-230	TRG	07/15/13 11:10	1.00E+00	43.33	0.00	0.00			
12	TH-230	TRG	07/15/13 11:44	1.00E+00	70.32	0.00	0.00			
13	TH-230	TRG	07/15/13 11:44	1.00E+00	67.76	0.00	0.00			
14	TH-230	TRG	07/15/13 12:20	1.00E+00	77.62	0.00	0.00			
15	TH-230	TRG	07/15/13 12:20	1.00E+00	89.15	0.00	0.00			
16	TH-230	TRG	07/15/13 13:12	1.00E+00	71.14	0.00	0.00			
17	TH-230	TRG	07/15/13 13:12	1.00E+00	50.36	0.00	0.00			
18	TH-230	TRG	07/15/13 14:05	1.00E+00	101.38	0.00	0.00			
19	TH-230	TRG	07/15/13 14:05	1.00E+00	75.08	0.00	0.00			
20	TH-230	TRG	07/15/13 14:30	1.00E+00	76.30	0.00	0.00			

Run	1	Analysis Code	ThISO	Eberline Services Work Order	13-07146	Client	Engineering Management Support, Inc.

0220

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-THISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	08/06/13 12:46		A_Spec	Alpha_023	170.02	4.17 E+02	6.00 E-03	17.1
02	TH-230	MBL	08/06/13 12:46		A_Spec	Alpha_024	170	3.86 E+01	8.00 E-03	17.1
03	TH-230	DUP	08/06/13 12:46		A_Spec	Alpha_025	170	1.85 E+01	3.00 E-03	17.4
04	TH-230	DO	08/06/13 12:46		A_Spec	Alpha_027	170	2.95 E+01	9.00 E-03	17.3
05	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_029	170	3.07 E+01	2.00 E-03	19.5
06	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_031	170	1.81 E+01	5.00 E-03	14.2
07	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_033	170	1.35 E+01	3.00 E-03	18.5
08	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_034	170	2.63 E+01	4.00 E-03	18.6
09	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_035	170	1.18 E+01	1.00 E-03	18.3
10	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_036	170	1.13 E+01	4.00 E-03	19.1
11	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_039	170	7.98 E+00	6.00 E-03	19.7
12	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_040	170	9.07 E+01	2.00 E-03	19
13	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_041	170	1.85 E+01	9.00 E-03	19.8
14	TH-230	TRG	08/06/13 12:46		A_Spec	Alpha_042	170	3.57 E+01	2.00 E-03	18.5
15	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_003	170	2.05 E+01	3.00 E-03	17.5
16	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_004	170.02	3.96 E+01	8.00 E-03	19.4
17	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_010	170	2.56 E+01	8.00 E-03	19.7
18	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_011	170.02	3.20 E+01	0.00 E+00	20.5
19	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_012	170.02	3.25 E+01	3.00 E-03	19.9
20	TH-230	TRG	08/06/13 16:33		A_Spec	Alpha_013	170.02	2.48 E+01	7.00 E-03	18.7

Run	<b>1</b>
Analysis Code	<b>THISO</b>
Eberline Services Work Order	<b>13-07146</b>
Client	Engineering Management Support, Inc.

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Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-232	LCS	LCS	pCi/l	4.55E+00	7.43E-01	8.38E-02	4.94E+00	92.29	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	2.98E-02	5.28E-02	9.48E-02					OK	OK
03	TH-232	DUP	PZ-105-SS TOT	pCi/l	1.06E-01	1.23E-01	1.59E-01				NA	OK	
04	TH-232	DO	PZ-105-SS TOT	pCi/l	6.32E-02	6.85E-02	9.12E-02					OK	
05	TH-232	TRG	PZ-105-SS DIS	pCi/l	1.23E-01	9.00E-02	8.35E-02					OK	
06	TH-232	TRG	PZ-114-AS TOT	pCi/l	3.81E-02	6.75E-02	1.21E-01					OK	
07	TH-232	TRG	PZ-114-AS DIS	pCi/l	0.00E+00	1.06E-01	2.29E-01					OK	
08	TH-232	TRG	I-66 TOT	pCi/l	2.84E-02	7.90E-02	1.70E-01					OK	
09	TH-232	TRG	I-66 DIS	pCi/l	6.29E-02	7.69E-02	9.28E-02					OK	
10	TH-232	TRG	MW-102 TOT	pCi/l	1.23E-01	1.27E-01	1.68E-01					OK	
11	TH-232	TRG	MW-102 DIS	pCi/l	1.50E-01	1.41E-01	1.30E-01					OK	
12	TH-232	TRG	MW-103 TOT	pCi/l	9.09E-01	3.15E-01	8.28E-02					OK	
13	TH-232	TRG	MW-103 DIS	pCi/l	2.87E-02	8.17E-02	1.66E-01					OK	
14	TH-232	TRG	PZ-303-AS TOT	pCi/l	1.32E-01	1.06E-01	1.11E-01					OK	
15	TH-232	TRG	PZ-303-AS DIS	pCi/l	1.12E-02	3.44E-02	8.14E-02					OK	
16	TH-232	TRG	I-11 TOT	pCi/l	4.45E-02	6.69E-02	1.08E-01					OK	
17	TH-232	TRG	I-11 DIS	pCi/l	1.31E-02	5.47E-02	1.40E-01					OK	
18	TH-232	TRG	S-10 TOT	pCi/l	1.85E-01	1.01E-01	6.69E-02					OK	
19	TH-232	TRG	S-10 DIS	pCi/l	5.32E-02	7.02E-02	1.06E-01					OK	
20	TH-232	TRG	FB at D-12 TOT	pCi/l	1.24E-01	9.94E-02	8.88E-02					OK	

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

ZZZ

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	110.89	0.00	0.00			
02	TH-232	MBL	07/23/13 00:00	1.00E+00	102.99	0.00	0.00			
03	TH-232	DUP	07/12/13 09:42	1.00E+00	50.30	0.00	0.00			
04	TH-232	DO	07/12/13 09:42	1.00E+00	100.74	0.00	0.00			
05	TH-232	TRG	07/12/13 09:42	1.00E+00	91.99	0.00	0.00			
06	TH-232	TRG	07/12/13 10:56	1.00E+00	97.19	0.00	0.00			
07	TH-232	TRG	07/12/13 10:56	1.00E+00	37.54	0.00	0.00			
08	TH-232	TRG	07/15/13 10:44	1.00E+00	50.27	0.00	0.00			
09	TH-232	TRG	07/15/13 10:44	1.00E+00	65.25	0.00	0.00			
10	TH-232	TRG	07/15/13 11:10	1.00E+00	54.43	0.00	0.00			
11	TH-232	TRG	07/15/13 11:10	1.00E+00	43.33	0.00	0.00			
12	TH-232	TRG	07/15/13 11:44	1.00E+00	70.32	0.00	0.00			
13	TH-232	TRG	07/15/13 11:44	1.00E+00	67.76	0.00	0.00			
14	TH-232	TRG	07/15/13 12:20	1.00E+00	77.62	0.00	0.00			
15	TH-232	TRG	07/15/13 12:20	1.00E+00	89.15	0.00	0.00			
16	TH-232	TRG	07/15/13 13:12	1.00E+00	71.14	0.00	0.00			
17	TH-232	TRG	07/15/13 13:12	1.00E+00	50.36	0.00	0.00			
18	TH-232	TRG	07/15/13 14:05	1.00E+00	101.38	0.00	0.00			
19	TH-232	TRG	07/15/13 14:05	1.00E+00	75.08	0.00	0.00			
20	TH-232	TRG	07/15/13 14:30	1.00E+00	76.30	0.00	0.00			

Client	Engineering Management Support, Inc.	Eberline Services Work Order	13-07146	Analysis Code	THISO	Run	1



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-ThISO-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	08/06/13 12:46		A_Spec	Alpha_023	170.02	3.26 E+02	0.00 E+00	17.1
02	TH-232	MBL	08/06/13 12:46		A_Spec	Alpha_024	170	1.98 E+00	6.00 E-03	17.1
03	TH-232	DUP	08/06/13 12:46		A_Spec	Alpha_025	170	3.49 E+00	3.00 E-03	17.4
04	TH-232	DO	08/06/13 12:46		A_Spec	Alpha_027	170	4.15 E+00	5.00 E-03	17.3
05	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_029	170	8.32 E+00	4.00 E-03	19.5
06	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_031	170	1.98 E+00	6.00 E-03	14.2
07	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_033	170	1.00 E+00	0.00 E+00	18.5
08	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_034	170	1.00 E+00	0.00 E+00	18.6
09	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_035	170	2.83 E+00	1.00 E-03	18.3
10	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_036	170	4.81 E+00	7.00 E-03	19.1
11	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_039	170	4.83 E+00	1.00 E-03	19.7
12	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_040	170	4.58 E+01	1.00 E-03	19
13	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_041	170	1.45 E+00	1.50 E-02	19.8
14	TH-232	TRG	08/06/13 12:46		A_Spec	Alpha_042	170	7.15 E+00	5.00 E-03	18.5
15	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_003	170	6.60 E-01	2.00 E-03	17.5
16	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_004	170.02	2.32 E+00	4.00 E-03	19.4
17	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_010	170	4.90 E-01	3.00 E-03	19.7
18	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_011	170.02	1.45 E+01	3.00 E-03	20.5
19	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_012	170.02	3.00 E+00	0.00 E+00	19.9
20	TH-232	TRG	08/06/13 16:33		A_Spec	Alpha_013	170.02	6.66 E+00	2.00 E-03	18.7

	Run	1
	Analysis Code	ThISO
Eberline Services Work Order	13-07146	
Client	Engineering Management Support, Inc.	

0224

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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	07/23/13 00:00	1.0000	0.4793	10.7680		0.00		
02	MBL	BLANK	07/23/13 00:00	1.0000	0.2393	5.3761		0.00		
03	DUP	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.2349	5.2773		0.00		
04	DO	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.2367	5.3177		0.00		
05	TRG	PZ-105-SS DIS	07/12/13 09:42	1.0000	0.2363	5.3087		0.00		
06	TRG	PZ-114-AS TOT	07/12/13 10:56	1.0000	0.2374	5.3334		0.00		
07	TRG	PZ-114-AS DIS	07/12/13 10:56	1.0000	0.2365	5.3132		0.00		
08	TRG	I-66 TOT	07/15/13 10:44	1.0000	0.2358	5.2975		0.00		
09	TRG	I-66 DIS	07/15/13 10:44	1.0000	0.2348	5.2750		0.00		
10	TRG	MW-102 TOT	07/15/13 11:10	1.0000	0.2342	5.2615		0.00		
11	TRG	MW-102 DIS	07/15/13 11:10	1.0000	0.2342	5.2615		0.00		
12	TRG	MW-103 TOT	07/15/13 11:44	1.0000	0.2345	5.2683		0.00		
13	TRG	MW-103 DIS	07/15/13 11:44	1.0000	0.2350	5.2795		0.00		
14	TRG	PZ-303-AS TOT	07/15/13 12:20	1.0000	0.2351	5.2818		0.00		
15	TRG	PZ-303-AS DIS	07/15/13 12:20	1.0000	0.2349	5.2773		0.00		
16	TRG	I-11 TOT	07/15/13 13:12	1.0000	0.2355	5.2907		0.00		
17	TRG	I-11 DIS	07/15/13 13:12	1.0000	0.2347	5.2728		0.00		
18	TRG	S-10 TOT	07/15/13 14:05	1.0000	0.2340	5.2570		0.00		
19	TRG	S-10 DIS	07/15/13 14:05	1.0000	0.2346	5.2705		0.00		
20	TRG	FB at D-12 TOT	07/15/13 14:30	1.0000	0.2356	5.2930		0.00		

02-31  
 04-42  
 0225

Internal Work Order					Run	Analysis Code				Date		Technician		Technician Initials		Witness Initials	
13-07146					1	ThISO				7/31/2013 9:40		JWOLFE		[Signature]			
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	7/31/2013	0.100	0.1058				4.94	0.178	0.00	0.000	0.00	0.000	0.00	0.000	
Th-230	Th-1b	23.525	7/31/2013	0.500	0.5166				5.47	0.148	0.00	0.000	0.00	0.000	0.00	0.000	
Th-232	Th-8b	103.560	7/31/2013	0.100	0.1058				4.94	0.178	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	7/31/2013	0.4793	0.2200										
02	Th-229	Th-18a	22.466	7/31/2013	0.2393	0.2200										
03	Th-229	Th-18a	22.466	7/31/2013	0.2349	0.2200										
04	Th-229	Th-18a	22.466	7/31/2013	0.2367	0.2200										
05	Th-229	Th-18a	22.466	7/31/2013	0.2363	0.2200										
06	Th-229	Th-18a	22.466	7/31/2013	0.2374	0.2200										
07	Th-229	Th-18a	22.466	7/31/2013	0.2365	0.2200										
08	Th-229	Th-18a	22.466	7/31/2013	0.2358	0.2200										
09	Th-229	Th-18a	22.466	7/31/2013	0.2348	0.2200										
10	Th-229	Th-18a	22.466	7/31/2013	0.2342	0.2200										
11	Th-229	Th-18a	22.466	7/31/2013	0.2342	0.2200										
12	Th-229	Th-18a	22.466	7/31/2013	0.2345	0.2200										
13	Th-229	Th-18a	22.466	7/31/2013	0.2350	0.2200										
14	Th-229	Th-18a	22.466	7/31/2013	0.2351	0.2200										
15	Th-229	Th-18a	22.466	7/31/2013	0.2349	0.2200										
16	Th-229	Th-18a	22.466	7/31/2013	0.2355	0.2200										
17	Th-229	Th-18a	22.466	7/31/2013	0.2347	0.2200										
18	Th-229	Th-18a	22.466	7/31/2013	0.2340	0.2200										
19	Th-229	Th-18a	22.466	7/31/2013	0.2346	0.2200										
20	Th-229	Th-18a	22.466	7/31/2013	0.2356	0.2200										

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# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-07146</b>	<b>1</b>	<b>ThISO</b>	<b>liters</b>	<b>8/13/2013</b>	<b>JWOLFE</b>

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-105-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-105-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-105-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	I-66 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-66 DIS	TRG					1.0000E+00	1.0000E+00				
10	MW-102 TOT	TRG					1.0000E+00	1.0000E+00				
11	MW-102 DIS	TRG					1.0000E+00	1.0000E+00				
12	MW-103 TOT	TRG					1.0000E+00	1.0000E+00				
13	MW-103 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-303-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-303-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	I-11 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-11 DIS	TRG					1.0000E+00	1.0000E+00				
18	S-10 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-10 DIS	TRG					1.0000E+00	1.0000E+00				
20	FB at D-12 TOT	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 7.31.13

0227

C  
8/7/13

Sample Description: SPIKE  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000652  
 Batch Identification: 1307146A-TH  
 Sample Identification: 01  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_023  
 Chamber Serial Number:  
 Detector Serial Number: 23  
 Env. Background: System Bkgd 64045  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 8/6/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:04 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.479 mL  
 Effective Efficiency: 0.1896 +/- 0.0118  
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM  
 Chem. Recovery Factor: 1.1089 +/- 0.0715

Control Certificate Name: NatTh\_Th-8  
 Chem. Recov. of Control: TH-232 0.922868 +/- 0.081645  
 Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.777	19.81	45.56	1.19	0.00E+000	9.3
TH-228	5.345	350.30	10.50	1.70	0.00E+000	12.1
TH-229 T	4.880	347.15	10.53	0.85	0.00E+000	4.3
TH-230	4.615	416.98	9.61	1.02	0.00E+000	34.8
TH-232	3.959	326.00	10.87	0.00	0.00E+000	5.3

T = Tracer Peak used for Effective Efficiency

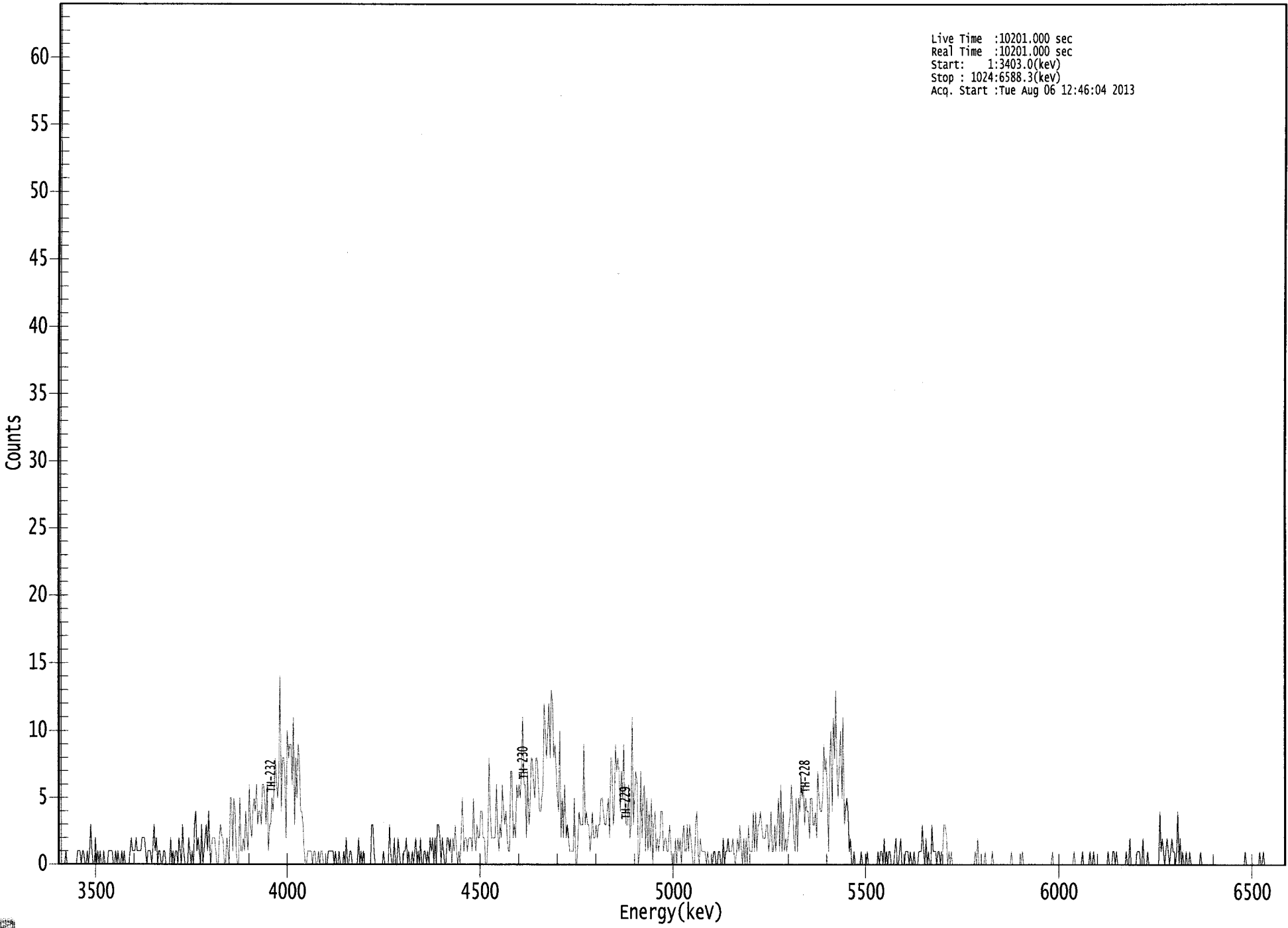
-----  
 NUCLIDE ANALYSIS RESULTS  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.972	5850.00*	2.84E-001 +/- 1.34E-001	9.44E-002 +/- 1.15E-002
TH-228	0.984	5400.00*	4.90E+000 +/- 7.87E-001	1.03E-001 +/- 1.25E-002
TH-229	1.000	4872.00*	4.87E+000 +/- 5.93E-001	8.41E-002 +/- 1.02E-002
TH-230	0.983	4672.00*	5.84E+000 +/- 9.05E-001	8.82E-002 +/- 1.07E-002
TH-232	0.993	3997.00*	4.55E+000 +/- 7.43E-001	8.38E-002 +/- 1.02E-002

AG  
8/7/13

000065297.CNF

Live Time : 10201.000 sec  
Real Time : 10201.000 sec  
Start : 1:3403.0(kev)  
Stop : 1024:6588.3(kev)  
Acq. Start : Tue Aug 06 12:46:04 2013



ROI Type: 1

ROI Type: 3

6226

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 01

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 1 3 2 6 4 3 4 2

Sample Title: 01

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



801: 0 0 0 0 1 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	1	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	1	0
857:	0	0	0	0	1	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	1	0	0	0	1
881:	1	0	1	0	0	0	0	0
889:	0	0	1	0	0	2	0	0
897:	0	0	0	1	1	1	0	0
905:	2	0	0	0	1	0	0	0
913:	0	0	0	0	0	0	4	1
921:	2	1	0	1	2	1	0	1
929:	2	1	1	0	1	4	0	2
937:	0	1	0	0	1	0	0	1
945:	0	0	0	0	0	0	0	0
953:	1	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	1	0	0	1	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C  
8/7/13

Sample Description: BLANK  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000652  
 Batch Identification: 1307146A-TH  
 Sample Identification: 02  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_024  
 Chamber Serial Number:  
 Detector Serial Number: 24  
 Env. Background: System Bkgd 64046  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 8/6/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:05 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.239 mL  
 Effective Efficiency: 0.1761 +/- 0.0150  
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM  
 Chem. Recovery Factor: 1.0299 +/- 0.0896

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.854	1.64	214.83	1.36	0.00E+000	6.2
TH-228	5.299	-1.53	143.80	1.53	0.00E+000	0.0
TH-229 T	4.858	160.98	15.51	1.02	0.00E+000	5.0
TH-230	4.622	38.64	32.17	1.36	0.00E+000	3.9
TH-232	4.036	1.98	176.34	1.02	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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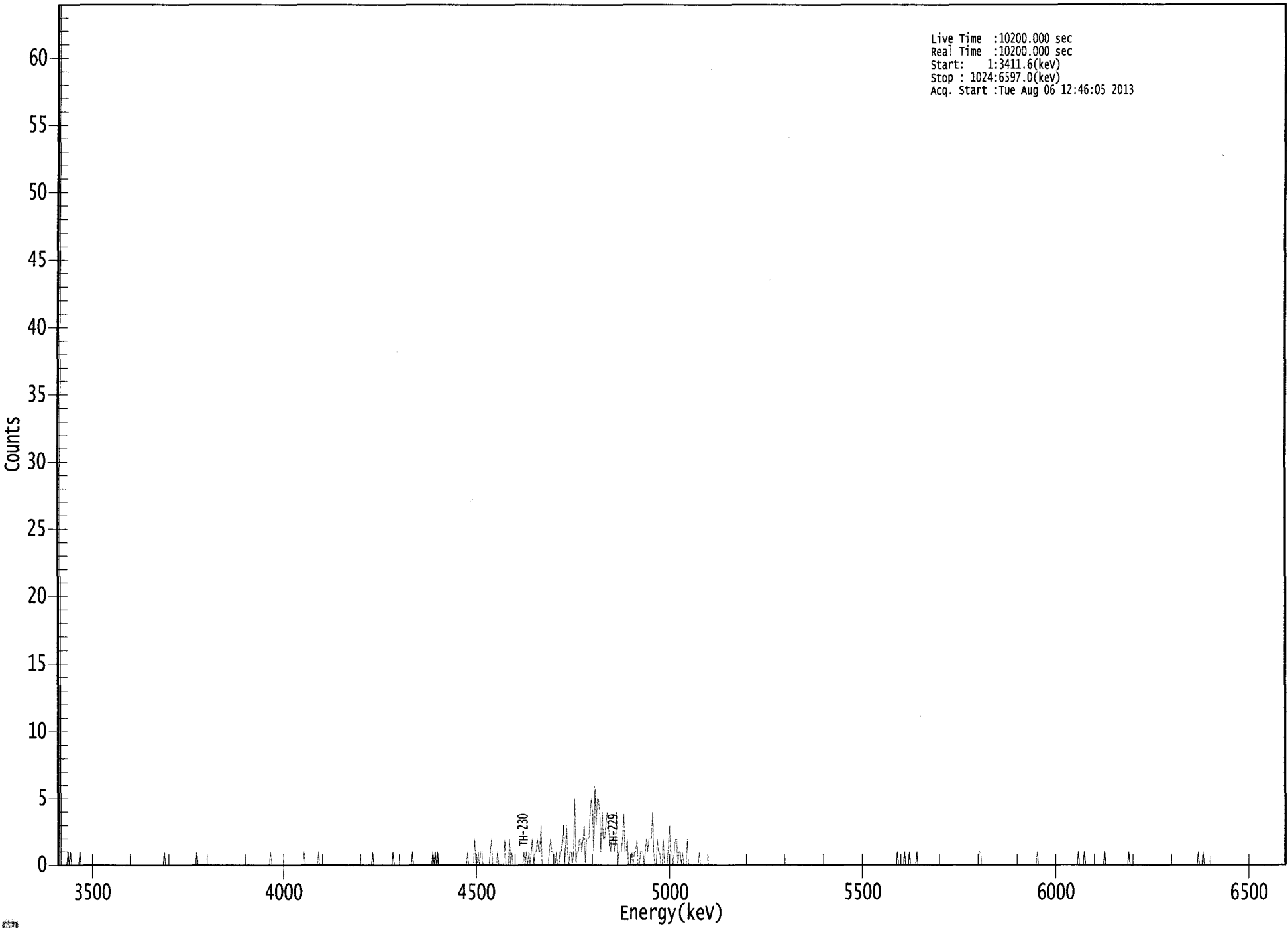
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
TH-227	1.000	5850.00*	2.53E-002 +/- 5.45E-002	1.06E-001 +/- 1.76E-002
TH-228	0.948	5400.00*	-2.30E-002 +/- 3.33E-002	1.07E-001 +/- 1.78E-002
TH-229	0.999	4872.00*	2.43E+000 +/- 4.05E-001	9.52E-002 +/- 1.59E-002
TH-230	0.987	4672.00*	5.82E-001 +/- 2.11E-001	1.03E-001 +/- 1.72E-002
TH-232	0.992	3997.00*	2.98E-002 +/- 5.28E-002	9.48E-002 +/- 1.58E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065298.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3411.6(kev)  
Stop : 1024:6597.0(kev)  
Acq. Start :Tue Aug 06 12:46:05 2013



ROI Type: 1

ROI Type: 3

0234

\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title:    02

Elapsed Live time:        10200

Elapsed Real Time:        10200

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

369: 0 0 0 0 0 2 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	2	0	1	0	0	0	0
385:	0	0	0	0	0	1	0	1
393:	0	1	0	1	2	0	1	1
401:	2	1	1	3	0	0	0	0
409:	0	0	1	2	1	1	0	0
417:	1	0	0	1	1	2	3	0
425:	3	1	0	1	1	0	1	5
433:	0	1	1	2	2	1	2	3
441:	0	2	2	2	4	5	4	1
449:	6	3	5	5	4	1	4	2
457:	2	3	4	3	2	1	2	2
465:	1	2	4	0	1	1	1	2
473:	4	1	1	2	0	0	0	1
481:	0	1	1	2	0	0	1	1
489:	1	0	1	2	1	2	2	2
497:	4	1	0	0	2	1	1	0
505:	0	2	0	0	0	1	3	1
513:	1	0	1	2	2	0	1	1
521:	0	1	0	0	0	2	0	0
529:	0	0	0	0	0	0	0	1
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	1	0	0	0
705:	0	0	1	0	0	0	1	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	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: 02

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	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	1	0	0	0	0	1
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	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	1	0
953:	0	0	1	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

*01/7/13*

Sample Description: PZ-105-SS TOT-DUP  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000652  
 Batch Identification: 1307146A-TH  
 Sample Identification: 03  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_025  
 Chamber Serial Number:  
 Detector Serial Number: 25  
 Env. Background: System Bkgd 64047  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:06 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: 0.0873 +/- 0.0103  
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM  
 Chem. Recovery Factor: 0.5030 +/- 0.0600

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.828	-0.53	415.13	1.53	0.00E+000	3.1
TH-228	5.403	1.98	176.34	1.02	0.00E+000	3.1
TH-229	T 4.888	78.32	22.26	0.68	0.00E+000	11.0
TH-230	4.621	18.49	46.31	0.51	0.00E+000	3.1
TH-232	3.997	3.49	113.53	0.51	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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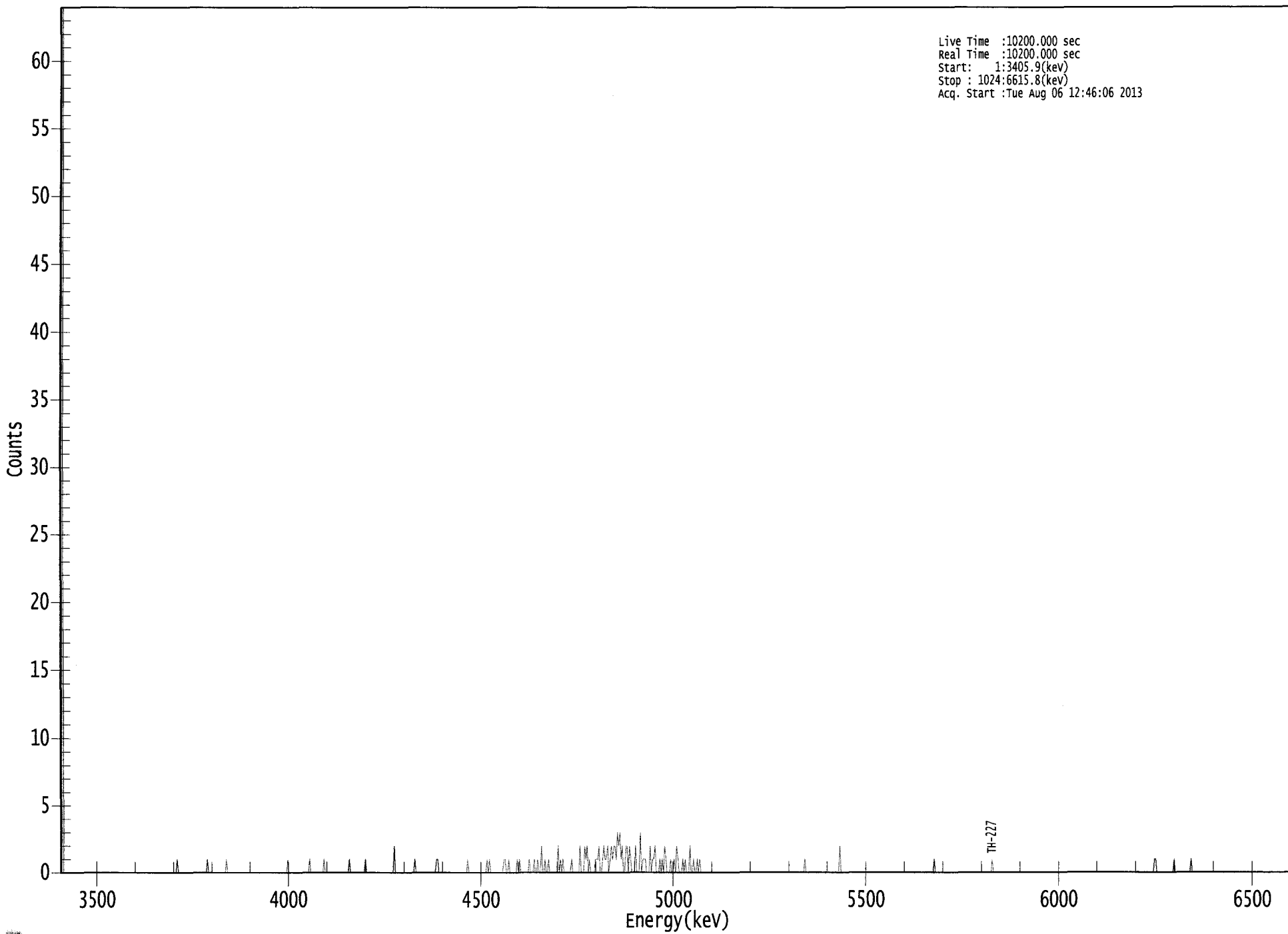
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	-1.65E-002 +/- 6.87E-002	2.22E-001 +/- 5.12E-002
TH-228	1.000	5400.00*	6.17E-002 +/- 1.10E-001	1.96E-001 +/- 4.53E-002
TH-229	0.999	4872.00*	2.39E+000 +/- 5.51E-001	1.72E-001 +/- 3.97E-002
TH-230	0.987	4672.00*	5.62E-001 +/- 2.91E-001	1.60E-001 +/- 3.68E-002
TH-232	1.000	3997.00*	1.06E-001 +/- 1.23E-001	1.59E-001 +/- 3.67E-002

*AG*  
*8/7/13*

US EPA ARCHIVE DOCUMENT

0000065299.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3405.9(kev)  
Stop : 1024:6615.8(kev)  
Acq. Start :Tue Aug 06 12:46:06 2013



ROI Type: 1

ROI Type: 3

0239



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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	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	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	1	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	1	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	1	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	0	0	0	0	0
217:	0	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	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	2	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:	1	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	1	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	1	0	0	0
361:	0	0	0	0	0	0	0	0

369: 1 1 0 0 1 0 0 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	1	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	1	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	1	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	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  
8/7/13

Sample Description: PZ-105-SS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 04  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_027  
 Chamber Serial Number:  
 Detector Serial Number: 27  
 Env. Background: System Bkgd 64048  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:07 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.237 mL  
 Effective Efficiency: 0.1740 +/- 0.0149  
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM  
 Chem. Recovery Factor: 1.0074 +/- 0.0884

Peak Match Tolerance: 0.175 MeV

-----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.872	-2.21	104.02	2.21	0.00E+000	0.0
TH-228	5.426	-2.23	109.39	3.23	0.00E+000	3.2
TH-229 T	4.859	157.32	15.67	0.68	0.00E+000	8.8
TH-230	4.599	29.47	37.19	1.53	0.00E+000	3.2
TH-232	3.946	4.15	107.12	0.85	0.00E+000	3.2

T = Tracer Peak used for Effective Efficiency

-----  
 NUCLIDE ANALYSIS RESULTS  
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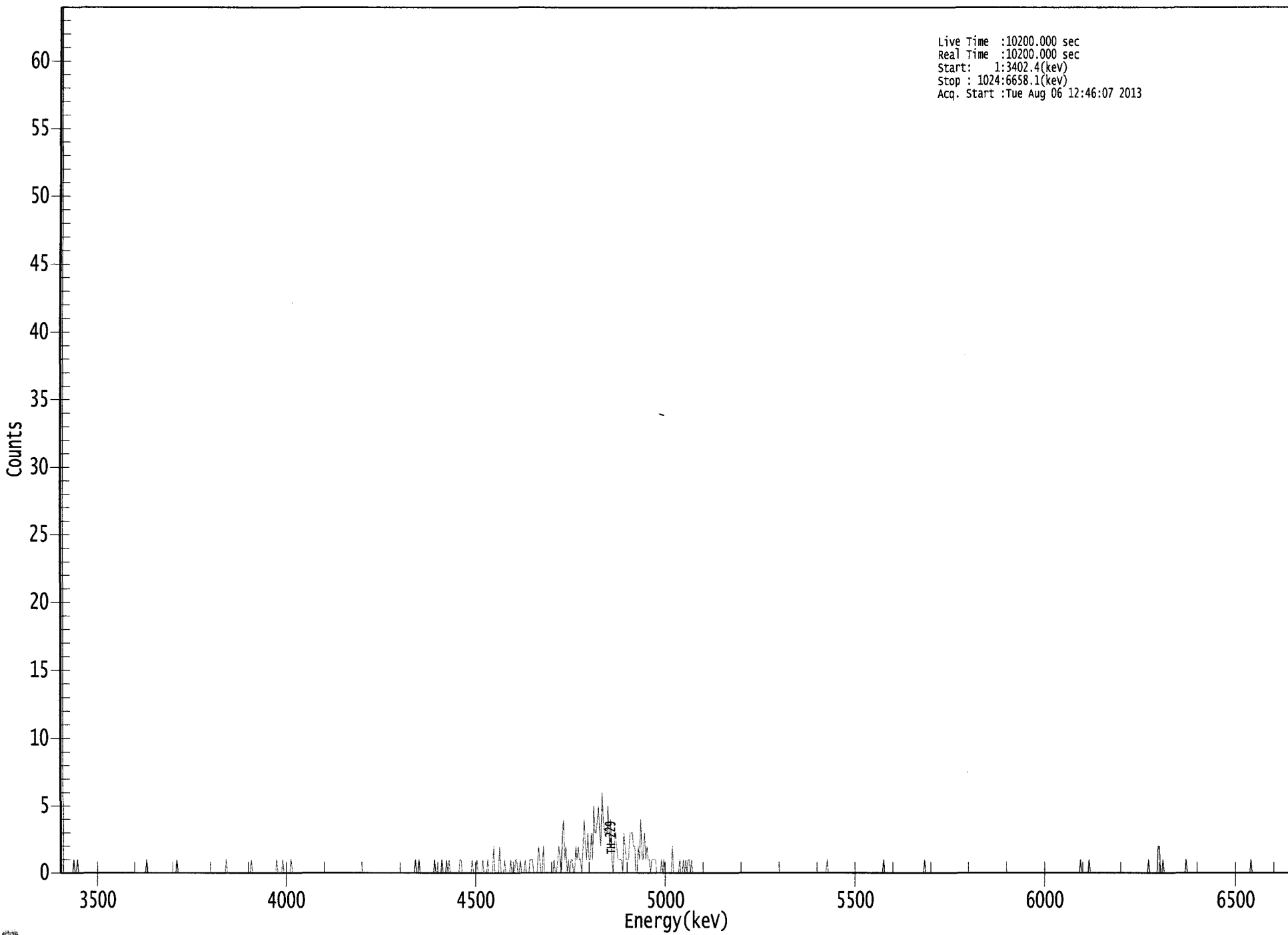
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-3.46E-002 +/- 3.64E-002	1.25E-001 +/- 2.10E-002
TH-228	0.996	5400.00*	-3.48E-002 +/- 3.86E-002	1.42E-001 +/- 2.39E-002
TH-229	0.999	4872.00*	2.41E+000 +/- 4.04E-001	8.63E-002 +/- 1.45E-002
TH-230	0.972	4672.00*	4.50E-001 +/- 1.83E-001	1.08E-001 +/- 1.82E-002
TH-232	0.986	3997.00*	6.32E-002 +/- 6.85E-002	9.12E-002 +/- 1.53E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065300.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3402.4(kev)  
Stop : 1024:6658.1(kev)  
Acq. Start :Tue Aug 06 12:46:07 2013



ROI Type: 1

ROI Type: 3

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

369: 0 1 0 0 0 0 1 0

Sample Title: 04

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	1	0	0	1	0
385:	0	0	1	0	0	0	1	1
393:	1	0	0	0	0	2	1	0
401:	0	2	0	0	0	0	0	0
409:	0	0	1	0	0	1	2	1
417:	0	3	4	1	2	0	1	0
425:	1	1	0	0	2	1	2	1
433:	1	0	2	4	2	1	3	1
441:	1	3	1	5	3	3	4	5
449:	3	2	6	4	3	3	3	5
457:	2	4	1	0	2	3	2	1
465:	1	1	1	0	3	2	1	1
473:	1	3	3	3	2	2	0	0
481:	2	1	4	1	1	3	1	2
489:	1	1	0	1	1	1	1	0
497:	0	0	0	1	0	1	0	0
505:	0	0	0	0	2	0	0	0
513:	0	0	1	0	0	1	0	1
521:	0	1	1	0	1	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	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	1	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	1	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	1	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	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: 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	1	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	1	0
905:	0	0	0	0	0	0	2	2
913:	0	0	1	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	1	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	1	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0





C  
8/7/13

Sample Description: PZ-105-SS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 05  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_029  
 Chamber Serial Number:  
 Detector Serial Number: 29  
 Env. Background: System Bkgd 64049  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:08 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.236 mL  
 Effective Efficiency: 0.1789 +/- 0.0152  
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM  
 Chem. Recovery Factor: 0.9199 +/- 0.0797

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.741	1.81	193.78	1.19	0.00E+000	6.2
TH-228	5.408	4.13	119.29	1.87	0.00E+000	3.1
TH-229 T	4.881	161.49	15.45	0.51	0.00E+000	4.8
TH-230	4.616	30.66	35.63	0.34	0.00E+000	3.1
TH-232	3.985	8.32	71.13	0.68	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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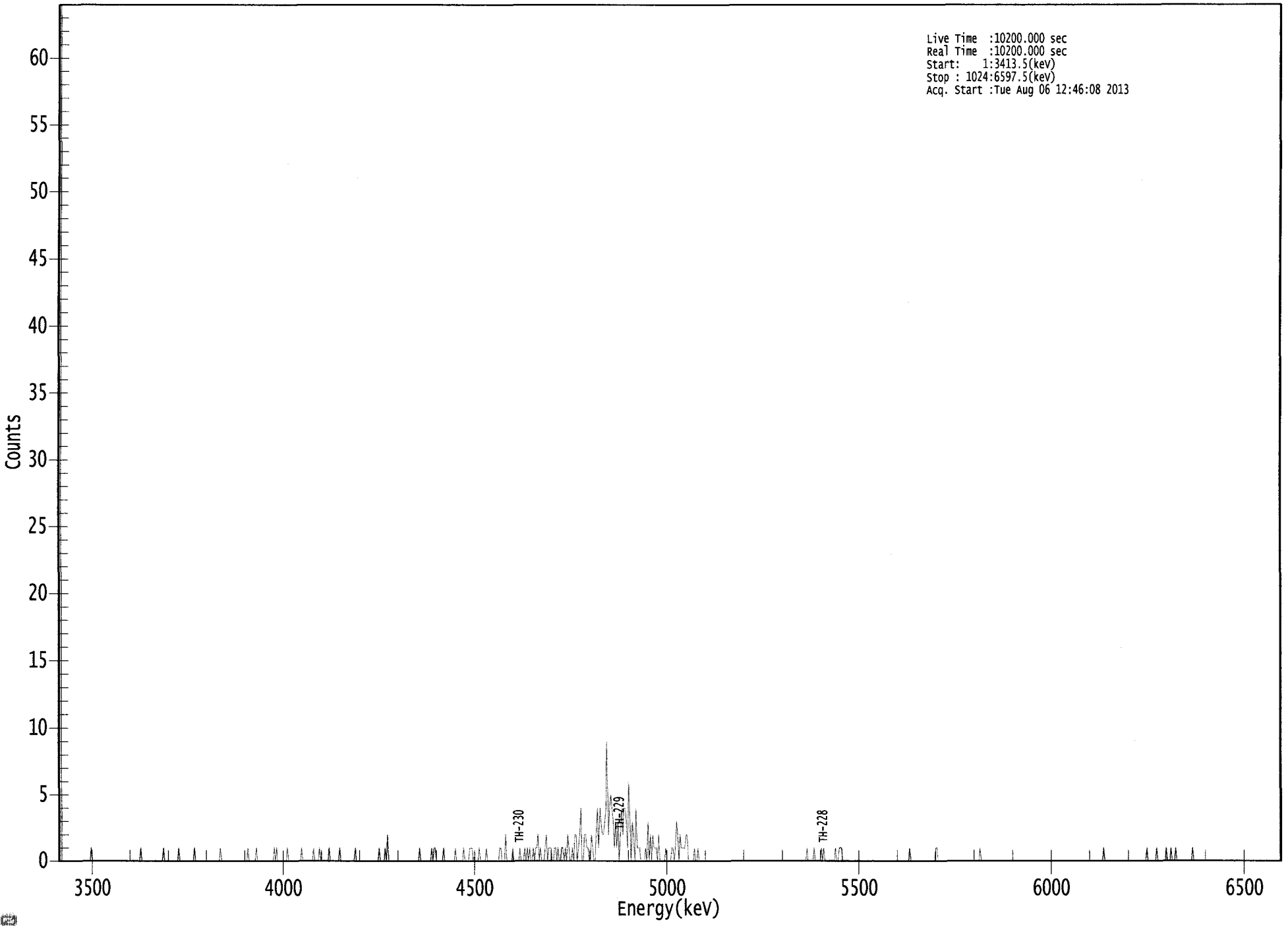
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.939	5850.00*	2.75E-002 +/- 5.36E-002	1.00E-001 +/- 1.66E-002
TH-228	1.000	5400.00*	6.27E-002 +/- 7.56E-002	1.15E-001 +/- 1.91E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 3.99E-001	7.81E-002 +/- 1.30E-002
TH-230	0.984	4672.00*	4.55E-001 +/- 1.79E-001	7.09E-002 +/- 1.18E-002
TH-232	0.999	3997.00*	1.23E-001 +/- 9.00E-002	8.35E-002 +/- 1.39E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065301.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3413.5(kev)  
Stop : 1024:6597.5(kev)  
Acq. Start :Tue Aug 06 12:46:08 2013



ROI Type: 1

ROI Type: 3

6728

\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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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	1	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	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:	1	0	0	0	0	0	0	0
97:	0	0	0	0	0	1	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	1	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	1	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	1
161:	0	0	0	0	0	0	1	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	1
185:	0	0	0	0	0	0	0	0
193:	1	0	0	0	0	0	0	0
201:	0	0	0	0	1	0	0	0
209:	0	0	0	0	0	0	1	0
217:	0	0	0	1	0	0	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	1	0	0
273:	0	0	1	0	2	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	1
305:	0	0	0	0	0	0	0	0
313:	0	1	0	1	1	0	0	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	0	0	0	0	1	0	0	0
345:	0	1	1	1	0	0	0	0
353:	0	1	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369: 0 0 1 1 0 0 0 2

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

Sample Title: 05

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	1	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	1
913:	0	0	0	0	0	0	0	1
921:	0	0	0	0	0	0	0	1
929:	0	0	0	1	0	0	0	1
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	1	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	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  
8/17/13

Sample Description: PZ-114-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 06  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_031  
 Chamber Serial Number:  
 Detector Serial Number: 31  
 Env. Background: System Bkgd 64050  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:09 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.237 mL  
 Effective Efficiency: 0.1378 +/- 0.0131  
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM  
 Chem. Recovery Factor: 0.9719 +/- 0.0954

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	5.871	3.15	126.67	0.85	0.00E+000	3.1
TH-228	5.372	-0.19	1131.1	1.19	0.00E+000	3.1
TH-229 T	4.875	124.98	17.62	1.02	0.00E+000	7.8
TH-230	4.618	18.15	47.25	0.85	0.00E+000	3.1
TH-232	3.960	1.98	176.34	1.02	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

-----  
 NUCLIDE ANALYSIS RESULTS  
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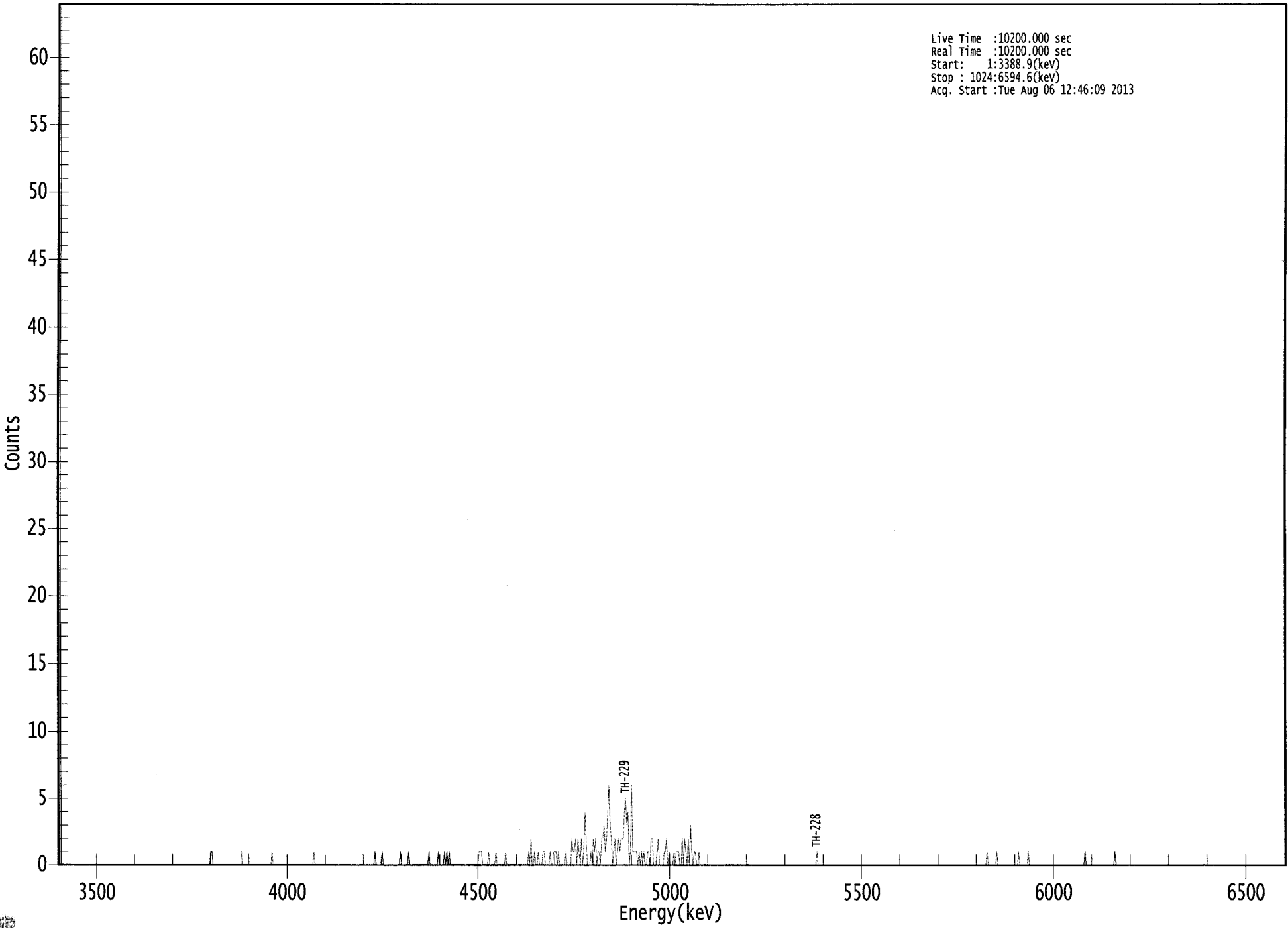
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	6.22E-002 +/- 7.97E-002	1.18E-001 +/- 2.20E-002
TH-228	0.996	5400.00*	-3.75E-003 +/- 4.24E-002	1.30E-001 +/- 2.42E-002
TH-229	1.000	4872.00*	2.41E+000 +/- 4.50E-001	1.22E-001 +/- 2.27E-002
TH-230	0.985	4672.00*	3.50E-001 +/- 1.78E-001	1.15E-001 +/- 2.15E-002
TH-232	0.993	3997.00*	3.81E-002 +/- 6.75E-002	1.21E-001 +/- 2.26E-002

AG  
8/17/13

US EPA ARCHIVE DOCUMENT

0000065302.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3388.9(kev)  
Stop : 1024:6594.6(kev)  
Acq. Start :Tue Aug 06 12:46:09 2013



ROI Type: 1

ROI Type: 3

0254

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

Sample Title:    06

Elapsed Live time:        10200  
 Elapsed Real Time:       10200

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



369: 0 0 0 0 0 0 1 0

Sample Title: 06

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

801: 0 1 0 0 0 0 0 0

Sample Title: 06

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:	1	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	1	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	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-114-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 07  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_033  
 Chamber Serial Number: 04026479A  
 Detector Serial Number: 91132  
 Env. Background: System Bkgd 64051  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/12/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:33 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.236 mL  
 Effective Efficiency: 0.0694 +/- 0.0091  
 Counting Efficiency: 0.1848 +/- 0.0032 on 7/20/2013 2:31:30 PM  
 Chem. Recovery Factor: 0.3754 +/- 0.0494

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	-1.02	208.15	1.02	0.00E+000	0.0
TH-228	5.406	2.00	169.74	0.00	0.00E+000	3.0
TH-229 T	4.885	62.66	24.84	0.34	0.00E+000	4.5
TH-230	4.616	13.49	54.53	0.51	0.00E+000	3.0
TH-232	3.948	0.00	1960.0	0.00	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

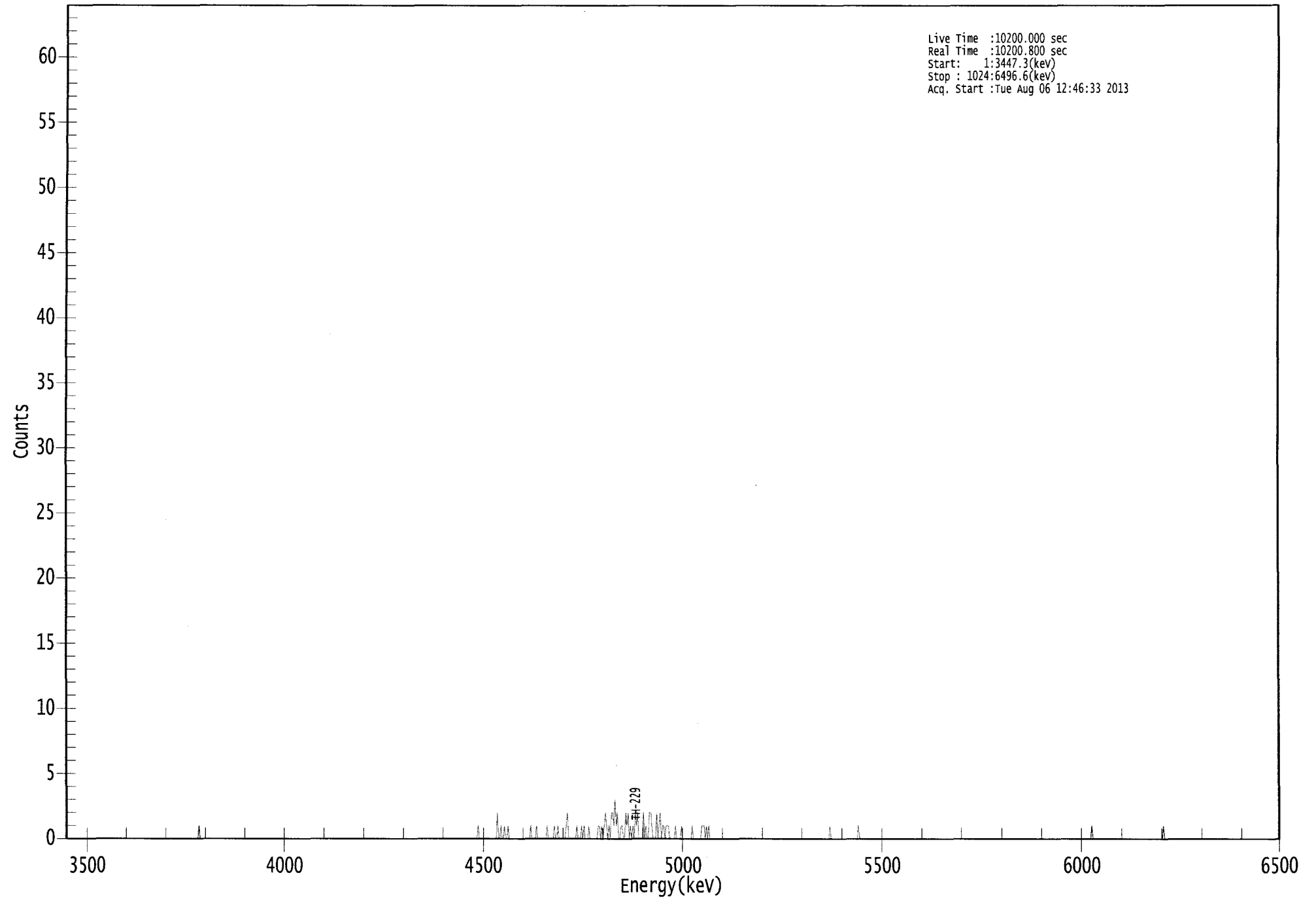
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	-4.00E-002 +/- 8.40E-002	2.47E-001 +/- 6.32E-002
TH-228	1.000	5400.00*	7.84E-002 +/- 1.35E-001	2.35E-001 +/- 6.01E-002
TH-229	0.999	4872.00*	2.40E+000 +/- 6.15E-001	1.83E-001 +/- 4.69E-002
TH-230	0.984	4672.00*	5.16E-001 +/- 3.11E-001	2.01E-001 +/- 5.13E-002
TH-232	0.988	3997.00*	0.00E+000 +/- 1.06E-001	2.29E-001 +/- 5.86E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

# 000065370.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start : 1:3447.3(kev)  
Stop : 1024:6496.6(kev)  
Acq. Start :Tue Aug 06 12:46:33 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:    07

Elapsed Live time:        10200

Elapsed Real Time:        10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	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	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	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	1	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	2	0	0

369: 1 0 0 1 0 0 1 0

Sample Title: 07

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	1	0	0	0	0	1	0
401:	0	0	0	0	0	0	0	1
409:	0	0	0	0	0	1	0	0
417:	1	0	0	0	0	0	0	1
425:	2	0	0	0	0	0	0	0
433:	1	0	0	0	1	0	1	0
441:	0	0	1	0	0	0	0	0
449:	0	0	1	1	0	1	0	1
457:	2	1	0	1	0	2	2	1
465:	3	1	2	0	0	1	1	0
473:	0	2	1	2	0	1	0	1
481:	0	2	1	2	0	0	0	0
489:	2	0	1	0	0	2	2	1
497:	0	0	0	2	0	1	2	0
505:	1	1	0	1	1	1	0	0
513:	0	0	0	1	0	0	0	0
521:	1	0	0	0	0	0	0	0
529:	0	1	0	0	0	0	0	0
537:	0	1	1	1	0	1	0	1
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	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	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	1	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	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:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



8/7/17

Sample Description: I-66 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 08  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_034  
 Chamber Serial Number: 04026479B  
 Detector Serial Number: 91136  
 Env. Background: System Bkgd 64052  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:35 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.236 mL  
 Effective Efficiency: 0.0933 +/- 0.0106  
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM  
 Chem. Recovery Factor: 0.5027 +/- 0.0580

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	5.809	2.83	120.53	0.17	0.00E+000	3.0
TH-228	5.377	8.32	71.13	0.68	0.00E+000	3.0
TH-229 T	4.859	84.00	21.51	0.00	0.00E+000	3.5
TH-230	4.614	26.32	38.78	0.68	0.00E+000	4.5
TH-232	4.001	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	0.991	5850.00*	8.26E-002 +/- 1.01E-001	1.22E-001 +/- 2.72E-002
TH-228	0.997	5400.00*	2.42E-001 +/- 1.80E-001	1.64E-001 +/- 3.66E-002
TH-229	0.999	4872.00*	2.40E+000 +/- 5.36E-001	1.71E-001 +/- 3.83E-002
TH-230	0.983	4672.00*	7.49E-001 +/- 3.35E-001	1.61E-001 +/- 3.59E-002
TH-232	1.000	3997.00*	2.84E-002 +/- 7.90E-002	1.70E-001 +/- 3.81E-002

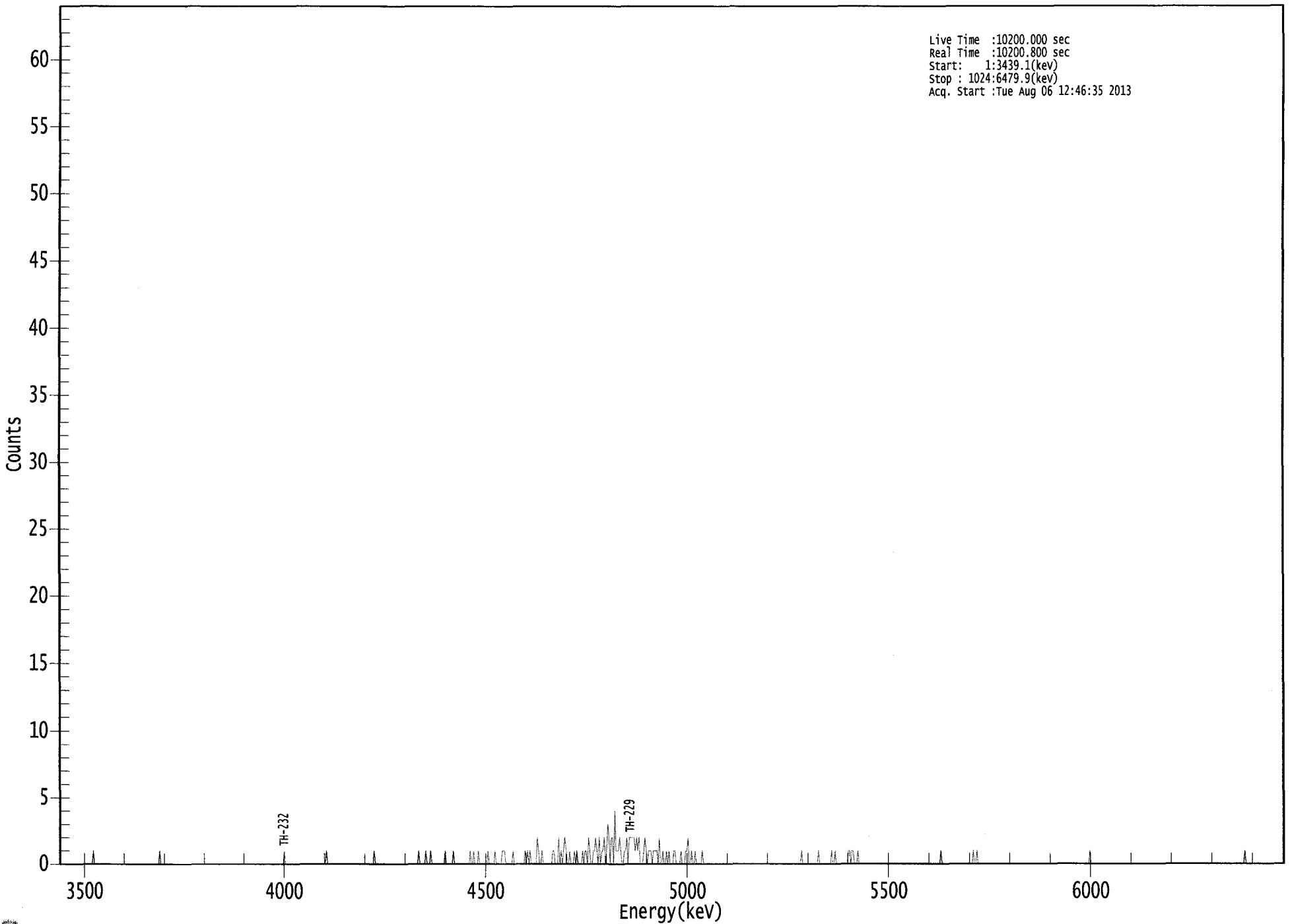
AG  
 8/7/13

US EPA ARCHIVE DOCUMENT



0000065307.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start: 1:3439.1(kev)  
Stop : 1024:6479.9(kev)  
Acq. Start :Tue Aug 06 12:46:35 2013



ROI Type: 1

ROI Type: 3

0259

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10201

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

369: 0 0 0 1 1 1 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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



C  
8/7m

Sample Description: I-66 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 09  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_035  
 Chamber Serial Number: 04026477A  
 Detector Serial Number: 58771  
 Env. Background: System Bkgd 64053  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:30 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: 0.1191 +/- 0.0121  
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM  
 Chem. Recovery Factor: 0.6525 +/- 0.0673

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.873	-1.19	180.60	1.19	0.00E+000	0.0
TH-228	5.369	2.64	152.72	1.36	0.00E+000	2.9
TH-229 T	4.893	106.83	18.98	0.17	0.00E+000	5.9
TH-230	4.622	11.83	57.46	0.17	0.00E+000	2.9
TH-232	4.046	2.83	120.53	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

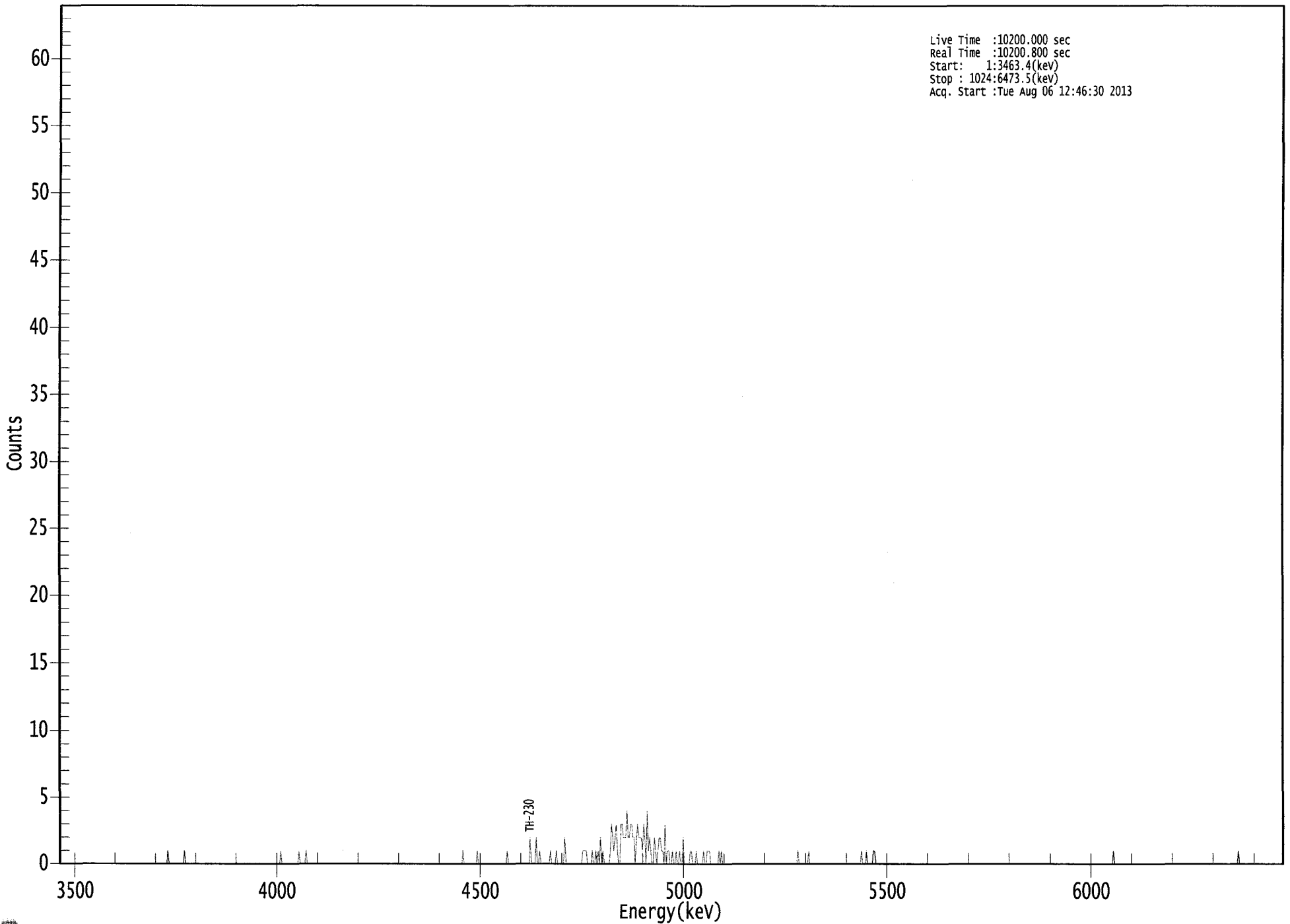
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-2.72E-002 +/- 4.94E-002	1.51E-001 +/- 3.00E-002
TH-228	0.995	5400.00*	6.01E-002 +/- 9.25E-002	1.56E-001 +/- 3.11E-002
TH-229	0.998	4872.00*	2.39E+000 +/- 4.76E-001	9.33E-002 +/- 1.86E-002
TH-230	0.987	4672.00*	2.64E-001 +/- 1.60E-001	9.30E-002 +/- 1.85E-002
TH-232	0.988	3997.00*	6.29E-002 +/- 7.69E-002	9.28E-002 +/- 1.85E-002

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8/7/13

US EPA ARCHIVE DOCUMENT

0000065306.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start: 1:3463.4(kev)  
Stop : 1024:6473.5(kev)  
Acq. Start :Tue Aug 06 12:46:30 2013



ROI Type: 1

ROI Type: 3

0269

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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0 1

Sample Title: 09

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



801: 0 0 0 0 0 0 0 0 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	1	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	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	1	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C  
8/7/13

Sample Description: MW-102 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 10  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_036  
 Chamber Serial Number: 04026477B  
 Detector Serial Number: 84167  
 Env. Background: System Bkgd 64054  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:31 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: 0.1040 +/- 0.0113  
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM  
 Chem. Recovery Factor: 0.5443 +/- 0.0600

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.783	0.83	239.53	0.17	0.00E+000	3.0
TH-228	5.335	3.64	123.16	1.36	0.00E+000	3.0
TH-229 T	4.866	92.98	20.46	1.02	0.00E+000	4.4
TH-230	4.622	11.32	60.27	0.68	0.00E+000	3.0
TH-232	3.947	4.81	101.48	1.19	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

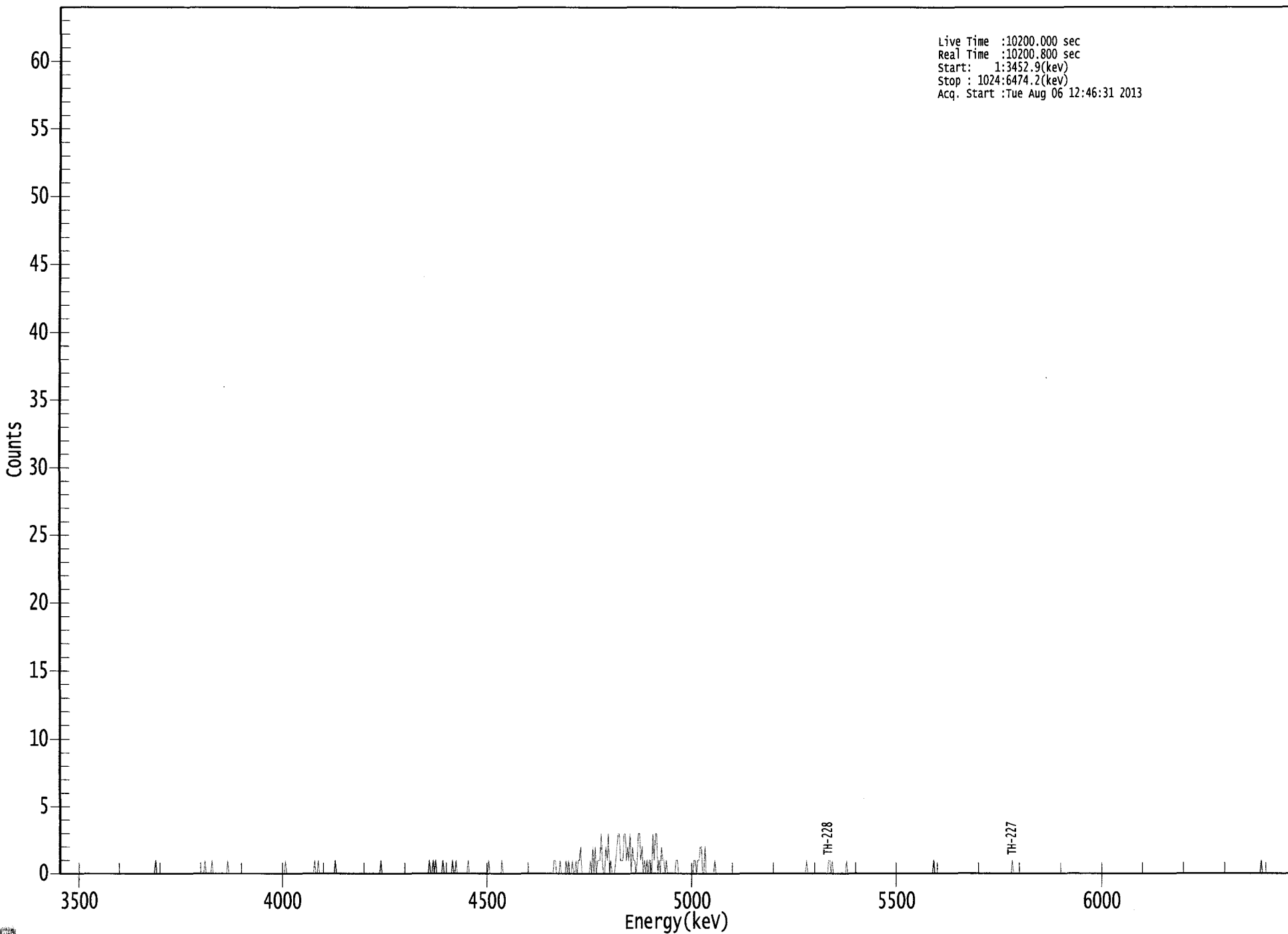
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.977	5850.00*	2.17E-002 +/- 5.23E-002	1.09E-001 +/- 2.33E-002
TH-228	0.978	5400.00*	9.49E-002 +/- 1.19E-001	1.79E-001 +/- 3.81E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 5.08E-001	1.61E-001 +/- 3.44E-002
TH-230	0.987	4672.00*	2.89E-001 +/- 1.85E-001	1.44E-001 +/- 3.07E-002
TH-232	0.987	3997.00*	1.23E-001 +/- 1.27E-001	1.68E-001 +/- 3.58E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065305.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start: 1:3452.9(kev)  
Stop : 1024:6474.2(kev)  
Acq. Start :Tue Aug 06 12:46:31 2013



ROI Type: 1

ROI Type: 3

429

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10201

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

Sample Title: 10

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	1	1	0	0	0	1
417:	0	0	0	0	1	0	1	0
425:	0	1	0	0	1	0	1	1
433:	2	0	0	0	0	0	0	0
441:	1	0	2	0	2	0	1	1
449:	1	3	1	0	0	2	1	3
457:	0	1	0	0	0	1	2	3
465:	3	1	1	1	3	3	1	2
473:	1	3	0	2	1	1	0	1
481:	3	3	1	2	0	1	0	1
489:	0	1	1	0	3	1	3	3
497:	0	1	0	2	1	1	0	1
505:	0	0	0	0	0	0	0	1
513:	1	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	1	1
529:	0	1	1	2	2	0	0	2
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	1	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	1	0
641:	1	0	0	0	0	0	0	0
649:	0	0	0	0	1	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	1	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 10

Channel	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0
961:	0	0	0	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	1	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  
8/7/13

Sample Description: MW-102 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 11  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_039  
 Chamber Serial Number: 06027396A  
 Detector Serial Number: 83109  
 Env. Background: System Bkgd 64056  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:42 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: 0.0851 +/- 0.0102  
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM  
 Chem. Recovery Factor: 0.4333 +/- 0.0523

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	5.872	-0.68	304.44	0.68	0.00E+000	0.0
TH-228	5.349	3.00	130.67	0.00	0.00E+000	3.0
TH-229	T 4.870	76.15	22.61	0.85	0.00E+000	5.0
TH-230	4.569	7.98	74.39	1.02	0.00E+000	3.0
TH-232	3.917	4.83	91.00	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

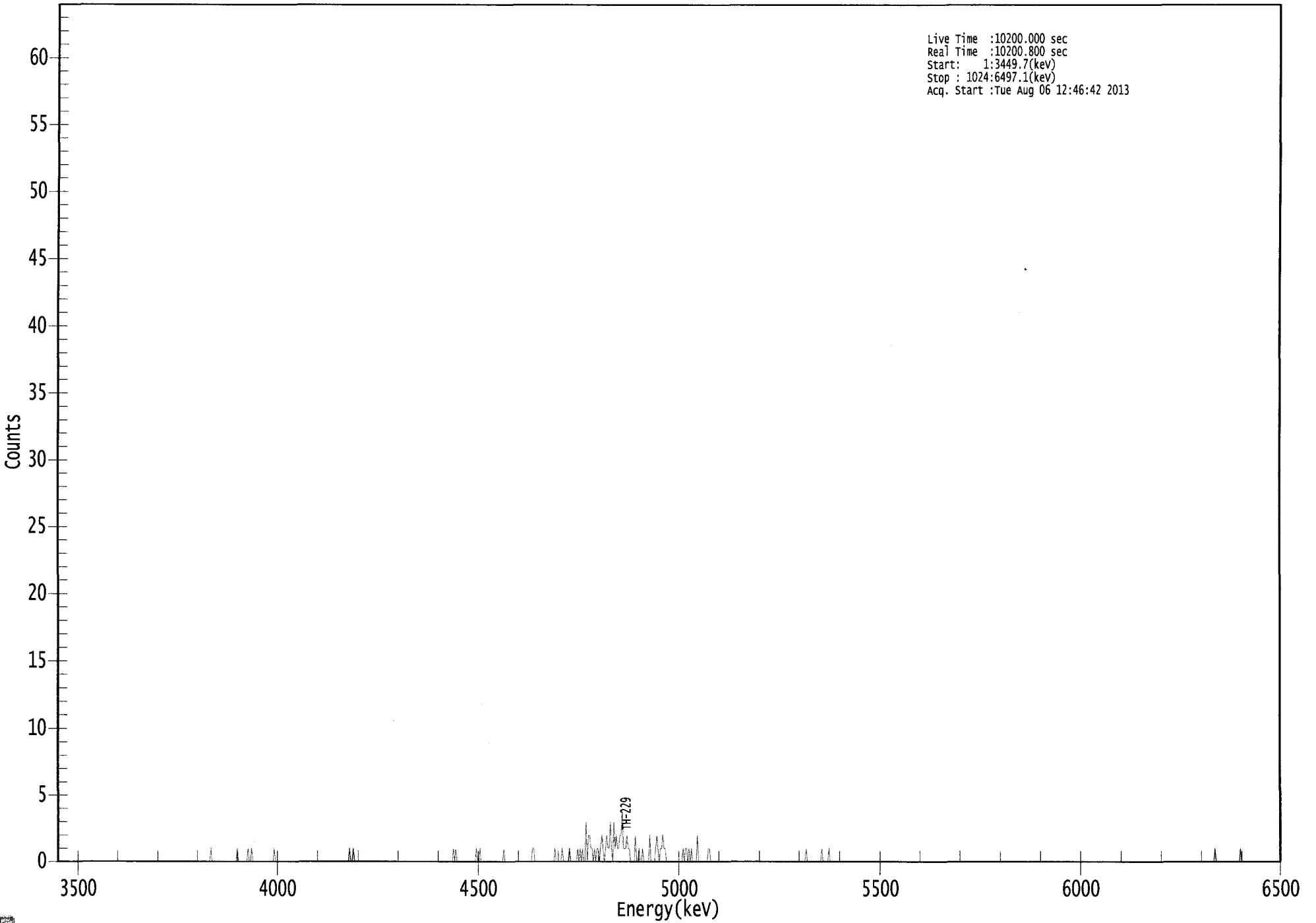
-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
 -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	-2.17E-002 +/- 6.64E-002	1.80E-001 +/- 4.22E-002
TH-228	0.987	5400.00*	9.55E-002 +/- 1.27E-001	1.91E-001 +/- 4.47E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 5.57E-001	1.87E-001 +/- 4.38E-002
TH-230	0.946	4672.00*	2.49E-001 +/- 1.94E-001	1.96E-001 +/- 4.60E-002
TH-232	0.967	3997.00*	1.50E-001 +/- 1.41E-001	1.30E-001 +/- 3.04E-002

AG  
8/7/13

0000065309.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start: 1:3449.7(kev)  
Stop : 1024:6497.1(kev)  
Acq. Start :Tue Aug 06 12:46:42 2013



ROI Type: 1

ROI Type: 3

0279



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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	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	1	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	0
161:	1	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	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	1	0	0
249:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	0	1	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	1	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: 11

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	1	1
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	0	0	0	1
425:	0	0	0	0	0	1	0	0
433:	0	0	0	0	1	0	1	0
441:	1	0	0	3	0	2	2	1
449:	1	0	1	0	1	1	0	1
457:	2	1	0	1	2	1	1	3
465:	1	0	3	1	2	1	1	2
473:	2	4	1	1	1	2	1	1
481:	0	0	0	0	2	0	0	1
489:	0	0	1	0	0	0	0	0
497:	2	0	0	0	0	1	2	1
505:	0	1	1	2	1	1	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	1	0	1	1
529:	0	1	0	1	0	0	0	0
537:	2	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	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	1	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	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:	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	0
849:	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0
969:	1	0	0	0	0	0	0
977:	0	0	0	0	0	0	0
985:	0	0	0	0	0	1	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  
8/7/13

Sample Description: MW-103 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 12  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_040  
 Chamber Serial Number: 06027396B  
 Detector Serial Number: 91135  
 Env. Background: System Bkgd 64057  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:44 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: 0.1336 +/- 0.0129  
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM  
 Chem. Recovery Factor: 0.7032 +/- 0.0691

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.795	5.66	85.23	0.34	0.00E+000	3.0
TH-228	5.355	58.32	25.84	0.68	0.00E+000	5.3
TH-229 T	4.868	119.66	17.95	0.34	0.00E+000	4.0
TH-230	4.599	90.66	20.63	0.34	0.00E+000	4.8
TH-232	3.941	45.83	29.01	0.17	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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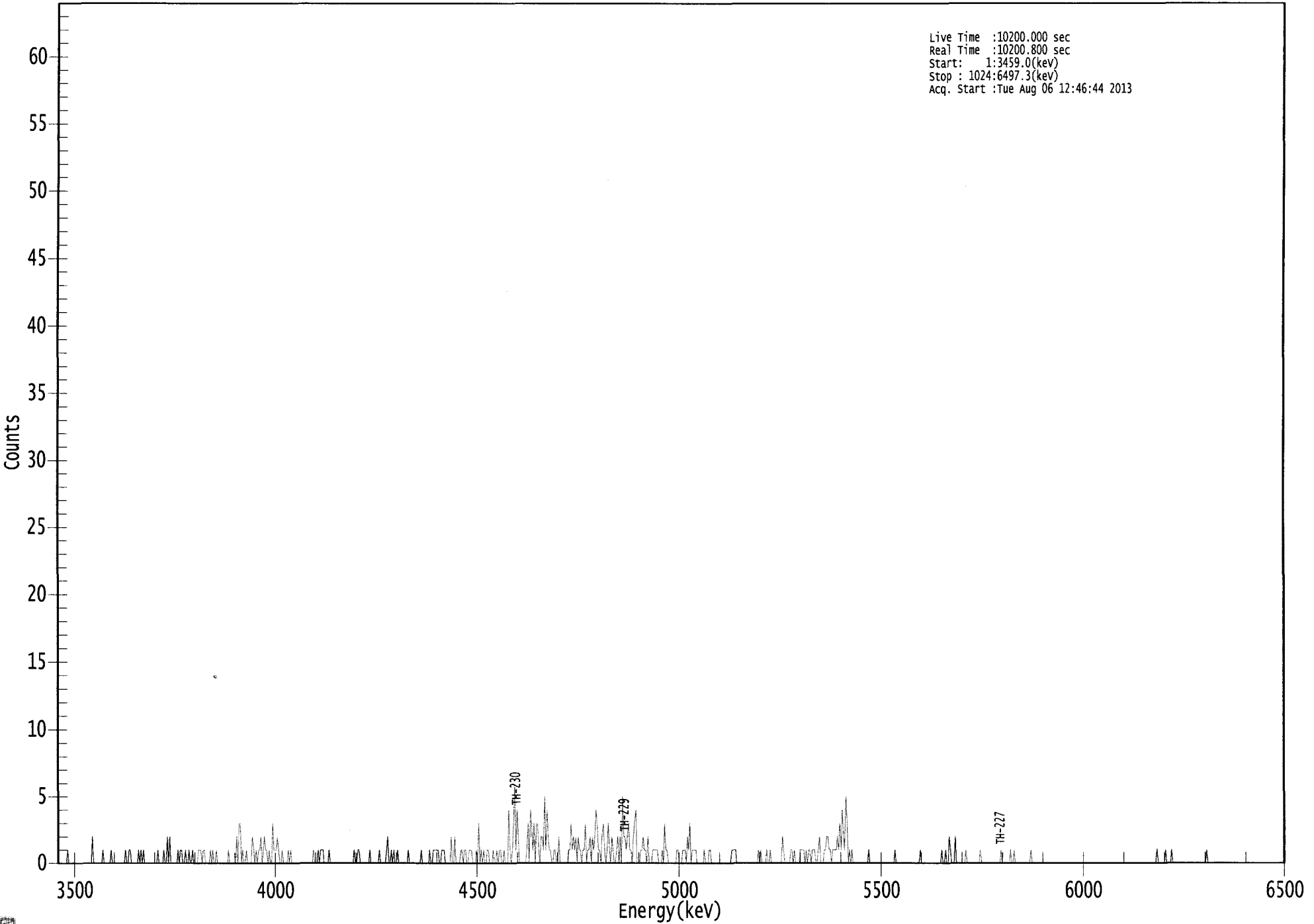
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
TH-227	0.985	5850.00*	1.15E-001 +/- 1.01E-001	9.74E-002 +/- 1.85E-002
TH-228	0.989	5400.00*	1.18E+000 +/- 3.79E-001	1.14E-001 +/- 2.17E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 4.52E-001	9.53E-002 +/- 1.81E-002
TH-230	0.973	4672.00*	1.80E+000 +/- 5.05E-001	9.50E-002 +/- 1.80E-002
TH-232	0.984	3997.00*	9.09E-001 +/- 3.15E-001	8.28E-002 +/- 1.57E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065310.CNF

Live Time :10200.000 sec  
Real Time :10200.800 sec  
Start: 1:3459.0(kev)  
Stop : 1024:6497.3(kev)  
Acq. Start :Tue Aug 06 12:46:44 2013



ROI Type: 1

ROI Type: 3

0204

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10201

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

369: 0 1 1 0 0 1 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 12

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





8/7/13

Sample Description: MW-103 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 13  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_041  
 Chamber Serial Number: 05026930A  
 Detector Serial Number: 91087  
 Env. Background: System Bkgd 64058  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:38 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: 0.1341 +/- 0.0129  
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM  
 Chem. Recovery Factor: 0.6776 +/- 0.0665

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	6.023	0.15	1397.8	0.85	0.00E+000	3.0
TH-228	5.335	2.83	120.53	0.17	0.00E+000	3.0
TH-229 T	4.879	120.32	17.93	0.68	0.00E+000	3.5
TH-230	4.618	18.47	47.77	1.53	0.00E+000	3.0
TH-232	3.969	1.45	284.62	2.55	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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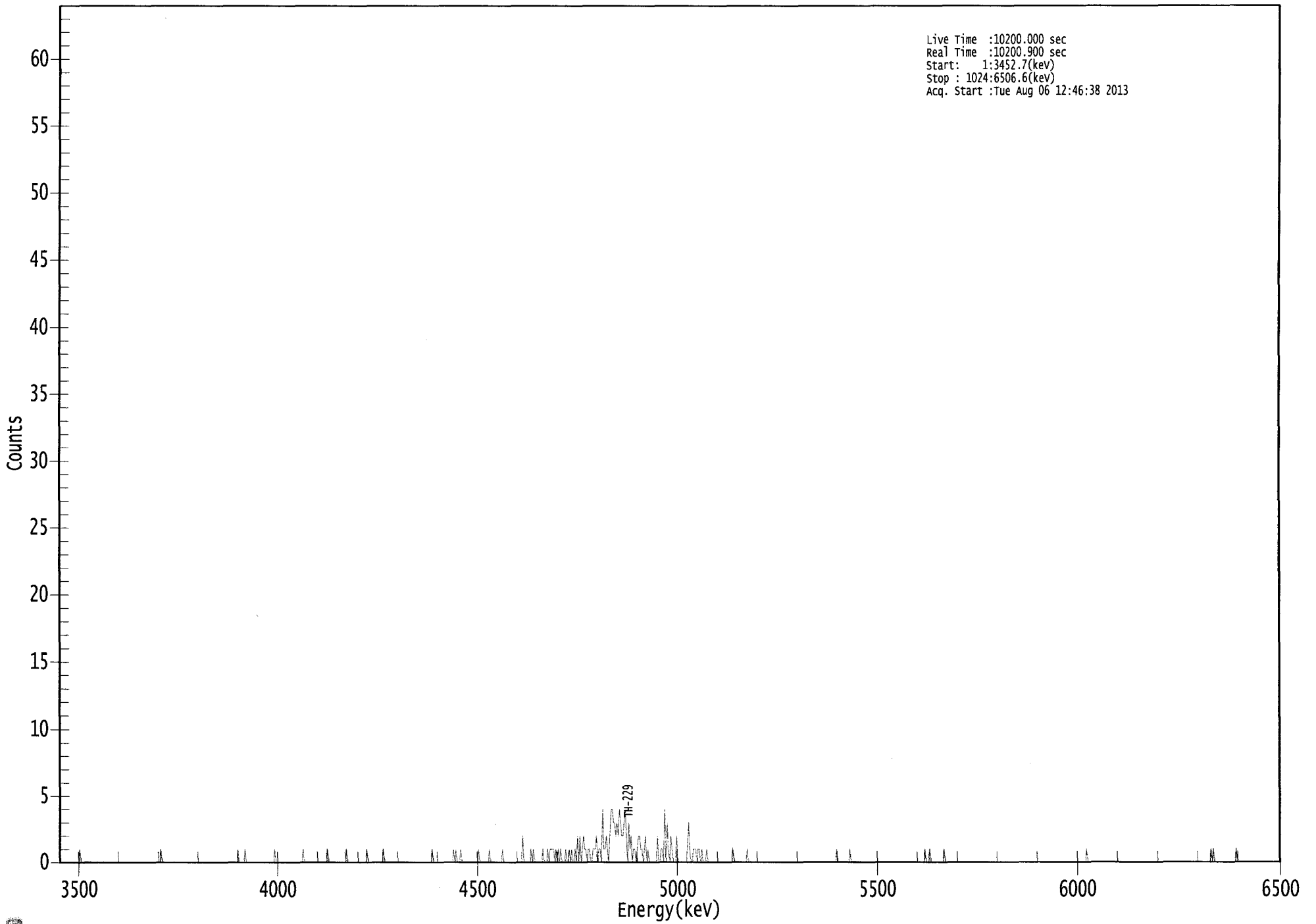
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.855	5850.00*	3.05E-003 +/- 4.26E-002	1.22E-001 +/- 2.30E-002
TH-228	0.978	5400.00*	5.72E-002 +/- 6.98E-002	8.44E-002 +/- 1.60E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.52E-001	1.12E-001 +/- 2.12E-002
TH-230	0.985	4672.00*	3.66E-001 +/- 1.88E-001	1.41E-001 +/- 2.66E-002
TH-232	0.996	3997.00*	2.87E-002 +/- 8.17E-002	1.66E-001 +/- 3.14E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065303.CNF

Live Time :10200.000 sec  
Real Time :10200.900 sec  
Start: 1:3452.7(kev)  
Stop : 1024:6506.6(kev)  
Acq. Start :Tue Aug 06 12:46:38 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	1	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	1	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	1	0
153:	0	0	0	0	1	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	1	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	1	0	0	0	0	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	1	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	1	0	1	0	0
337:	0	1	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369: 0 0 0 0 1 0 0 0

Sample Title: 13

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	2	0	0
393:	0	0	0	0	1	0	1	0
401:	0	0	0	0	0	0	1	0
409:	0	0	1	0	1	1	1	1
417:	0	1	0	1	0	1	0	0
425:	0	1	0	0	1	0	1	0
433:	0	1	0	2	0	2	0	1
441:	2	1	1	0	1	1	0	0
449:	1	1	1	2	0	1	1	0
457:	4	1	1	2	1	0	2	4
465:	4	3	3	2	3	2	4	3
473:	2	2	3	4	2	0	3	1
481:	2	0	1	1	0	1	2	2
489:	1	1	0	1	2	0	1	0
497:	0	0	0	0	0	0	2	0
505:	0	1	1	0	4	0	3	1
513:	0	2	1	0	0	0	2	0
521:	0	0	0	0	0	0	0	1
529:	3	1	0	0	1	1	1	0
537:	1	1	0	1	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	1	0	0
569:	0	0	0	0	0	0	0	0
577:	0	1	0	0	0	0	0	0
585:	0	0	0	0	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	1	0	0	0
657:	0	0	0	0	0	0	0	1
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	0
729:	0	0	1	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	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	1	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	1	0	1
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	1	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



c  
8/7/13

Sample Description: PZ-303-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 14  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 64059  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 12:46:40 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: 0.1433 +/- 0.0134  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Chem. Recovery Factor: 0.7762 +/- 0.0739

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.738	-0.19	1131.1	1.19	0.00E+000	3.0
TH-228	5.332	3.64	123.16	1.36	0.00E+000	3.0
TH-229 T	4.860	128.66	17.31	0.34	0.00E+000	11.0
TH-230	4.608	35.66	33.00	0.34	0.00E+000	3.0
TH-232	3.972	7.15	78.23	0.85	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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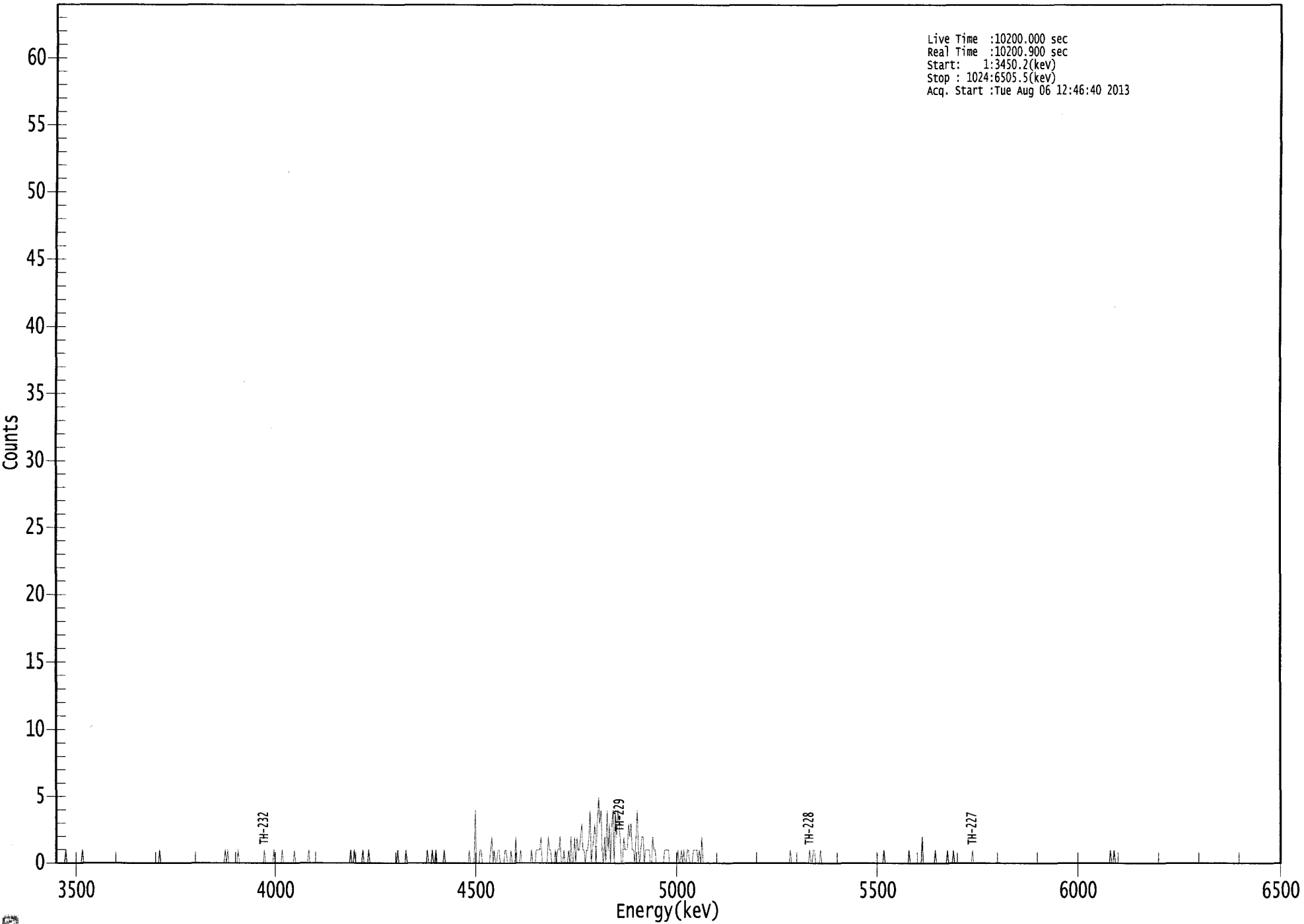
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
TH-227	0.936	5850.00*	-3.61E-003 +/- 4.08E-002	1.25E-001 +/- 2.30E-002
TH-228	0.976	5400.00*	6.88E-002 +/- 8.57E-002	1.30E-001 +/- 2.38E-002
TH-229	0.999	4872.00*	2.39E+000 +/- 4.38E-001	8.88E-002 +/- 1.63E-002
TH-230	0.979	4672.00*	6.61E-001 +/- 2.49E-001	8.86E-002 +/- 1.62E-002
TH-232	0.997	3997.00*	1.32E-001 +/- 1.06E-001	1.11E-001 +/- 2.03E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065304.CNF

Live Time :10200.000 sec  
Real Time :10200.900 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Tue Aug 06 12:46:40 2013



ROI Type: 1

ROI Type: 3

0294

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10201

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



369: 0 0 1 1 0 0 0 0

Sample Title: 14

Channel	1	2	3	4	5	6	7	8
377:	1	1	0	0	0	1	0	0
385:	0	2	0	0	0	1	0	0
393:	0	0	0	0	0	0	1	0
401:	0	0	1	1	1	1	2	0
409:	0	0	0	0	2	1	1	0
417:	0	0	1	0	1	1	2	0
425:	0	1	0	0	0	1	0	2
433:	0	0	2	0	2	1	1	2
441:	3	1	1	0	1	1	2	4
449:	0	1	2	3	0	3	5	3
457:	4	1	0	2	0	4	1	3
465:	0	3	4	0	4	2	4	3
473:	2	0	0	2	1	1	1	3
481:	2	3	1	1	0	2	4	1
489:	0	1	2	2	0	1	1	1
497:	1	0	0	2	1	1	0	0
505:	0	0	0	0	0	1	1	1
513:	1	0	0	0	0	0	0	0
521:	1	0	0	1	0	1	0	0
529:	1	1	0	0	0	1	1	1
537:	1	0	1	0	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	1	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	1	0
633:	0	1	1	0	0	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	1	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	2	0	0	0
729:	0	0	0	0	0	0	0	1
737:	0	0	0	0	0	0	0	0
745:	0	1	0	0	0	0	1	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	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	1	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	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  
8/7/13

Sample Description: PZ-303-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 15  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_003  
 Chamber Serial Number:  
 Detector Serial Number: 3  
 Env. Background: System Bkgd 64034  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:54 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: 0.1557 +/- 0.0140  
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM  
 Chem. Recovery Factor: 0.8915 +/- 0.0821

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.707	-1.42	267.34	4.42	0.00E+000	3.0
TH-228	5.329	0.45	807.07	2.55	0.00E+000	3.0
TH-229 T	4.876	139.66	16.61	0.34	0.00E+000	5.2
TH-230	4.589	20.49	43.93	0.51	0.00E+000	3.0
TH-232	3.987	0.66	305.43	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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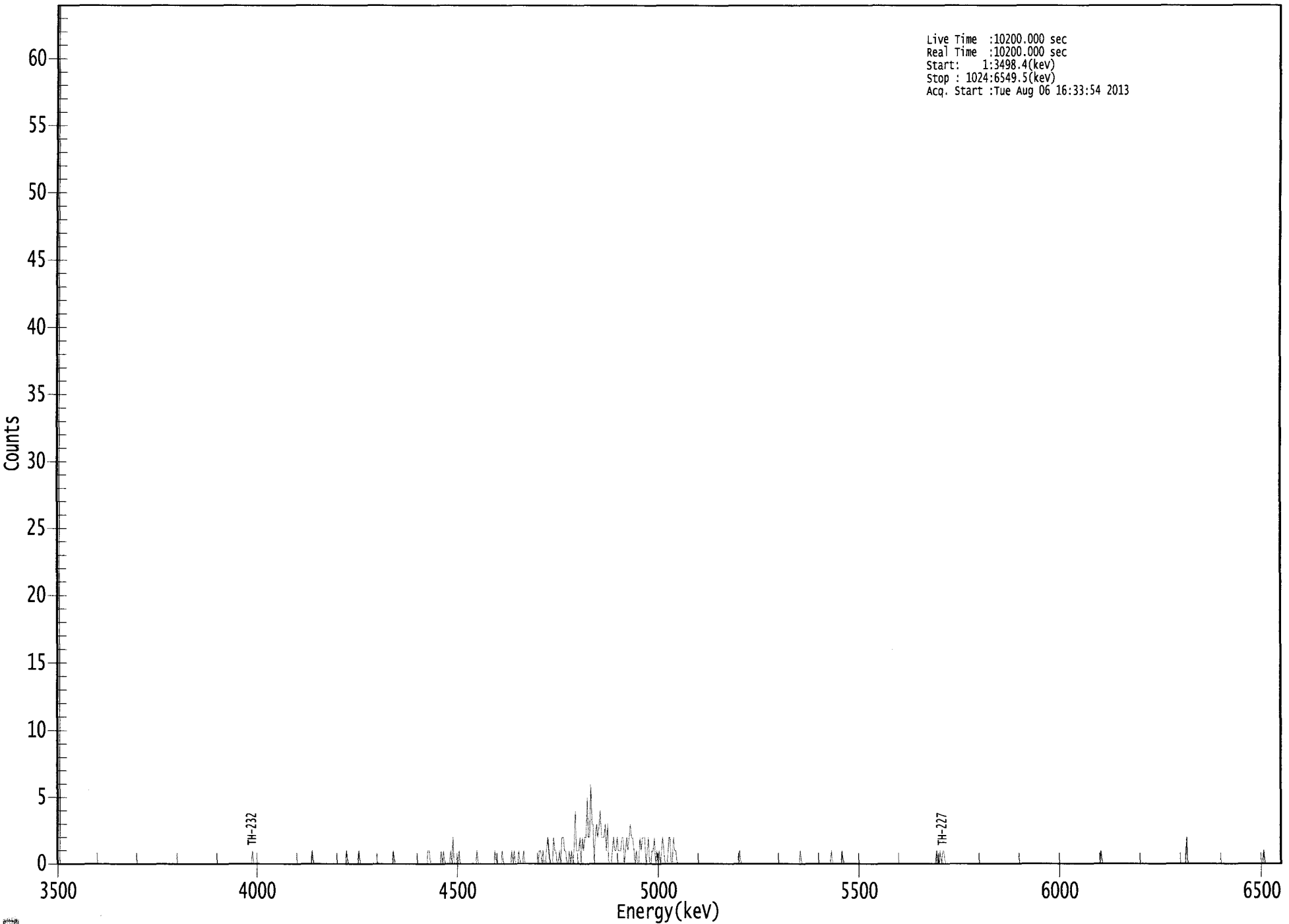
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.899	5850.00*	-2.48E-002 +/- 6.65E-002	1.78E-001 +/- 3.15E-002
TH-228	0.974	5400.00*	7.84E-003 +/- 6.33E-002	1.46E-001 +/- 2.58E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.22E-001	8.18E-002 +/- 1.45E-002
TH-230	0.965	4672.00*	3.49E-001 +/- 1.65E-001	8.95E-002 +/- 1.58E-002
TH-232	1.000	3997.00*	1.12E-002 +/- 3.44E-002	8.14E-002 +/- 1.44E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

000065315.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3498.4(kev)  
Stop : 1024:6549.5(kev)  
Acq. Start :Tue Aug 06 16:33:54 2013



ROI Type: 1

ROI Type: 3

0299

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

Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	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	1	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	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	0	1	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	1
313:	1	0	0	0	0	0	0	0
321:	0	0	1	0	1	0	0	0
329:	0	0	1	0	2	0	0	0
337:	0	1	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 1 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	1	0	1
385:	0	0	0	1	0	0	0	1
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	1	1	0	1
409:	0	0	1	2	1	0	0	0
417:	2	1	1	0	0	1	0	2
425:	2	1	1	0	0	1	0	1
433:	0	1	4	1	1	1	2	0
441:	2	1	2	2	5	2	2	6
449:	3	3	0	2	3	2	3	4
457:	2	2	2	3	1	3	0	0
465:	0	1	2	1	1	2	1	1
473:	1	2	2	0	1	2	1	2
481:	3	2	2	1	0	1	0	0
489:	2	1	2	2	2	0	1	2
497:	0	0	1	1	2	0	1	0
505:	1	0	1	2	1	0	0	0
513:	2	2	0	0	2	1	1	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	1	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	1	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	1	0	0	1	0	1	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	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
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	1	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:	2	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:	1	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0



C  
8/7m

Sample Description: I-11 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 16  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_004  
 Chamber Serial Number:  
 Detector Serial Number: 4  
 Env. Background: System Bkgd 64035  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:55 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: 0.1380 +/- 0.0132  
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM  
 Chem. Recovery Factor: 0.7114 +/- 0.0690

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.710	0.30	988.92	1.70	0.00E+000	2.9
TH-228	5.326	10.28	69.96	2.72	0.00E+000	2.9
TH-229 T	4.863	124.15	17.66	0.85	0.00E+000	3.7
TH-230	4.586	39.64	31.75	1.36	0.00E+000	3.7
TH-232	4.039	2.32	149.13	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.903	5850.00*	5.92E-003 +/- 5.85E-002	1.45E-001 +/- 2.71E-002
TH-228	0.972	5400.00*	2.02E-001 +/- 1.46E-001	1.68E-001 +/- 3.15E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.47E-001	1.15E-001 +/- 2.16E-002
TH-230	0.962	4672.00*	7.62E-001 +/- 2.81E-001	1.32E-001 +/- 2.46E-002
TH-232	0.991	3997.00*	4.45E-002 +/- 6.69E-002	1.08E-001 +/- 2.02E-002

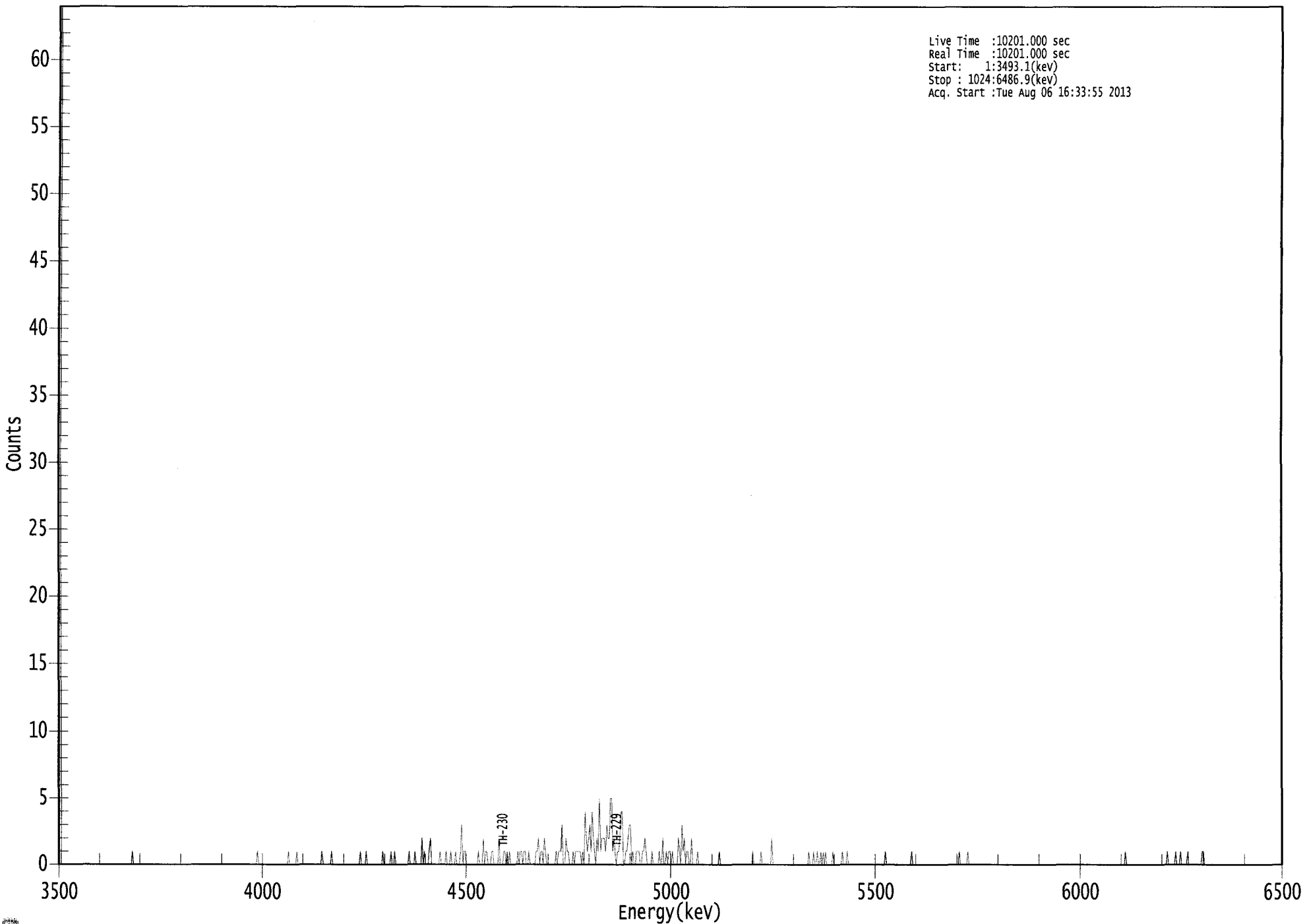
AG  
8/7/13

US EPA ARCHIVE DOCUMENT



0000065316.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3493.1(kev)  
Stop : 1024:6486.9(kev)  
Acq. Start :Tue Aug 06 16:33:55 2013



ROI Type: 1

ROI Type: 3

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

369: 0 2 0 0 0 1 1 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 16

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



C  
P/7w

Sample Description: I-11 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 17  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_010  
 Chamber Serial Number:  
 Detector Serial Number: 10  
 Env. Background: System Bkgd 64036  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:50 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: 0.0991 +/- 0.0111  
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM  
 Chem. Recovery Factor: 0.5036 +/- 0.0572

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.862	-1.25	302.54	4.25	0.00E+000	2.9
TH-228	5.344	7.43	89.87	3.57	0.00E+000	2.9
TH-229 T	4.853	88.79	21.10	2.21	0.00E+000	3.9
TH-230	4.645	25.64	39.89	1.36	0.00E+000	3.4
TH-232	3.994	0.49	416.97	0.51	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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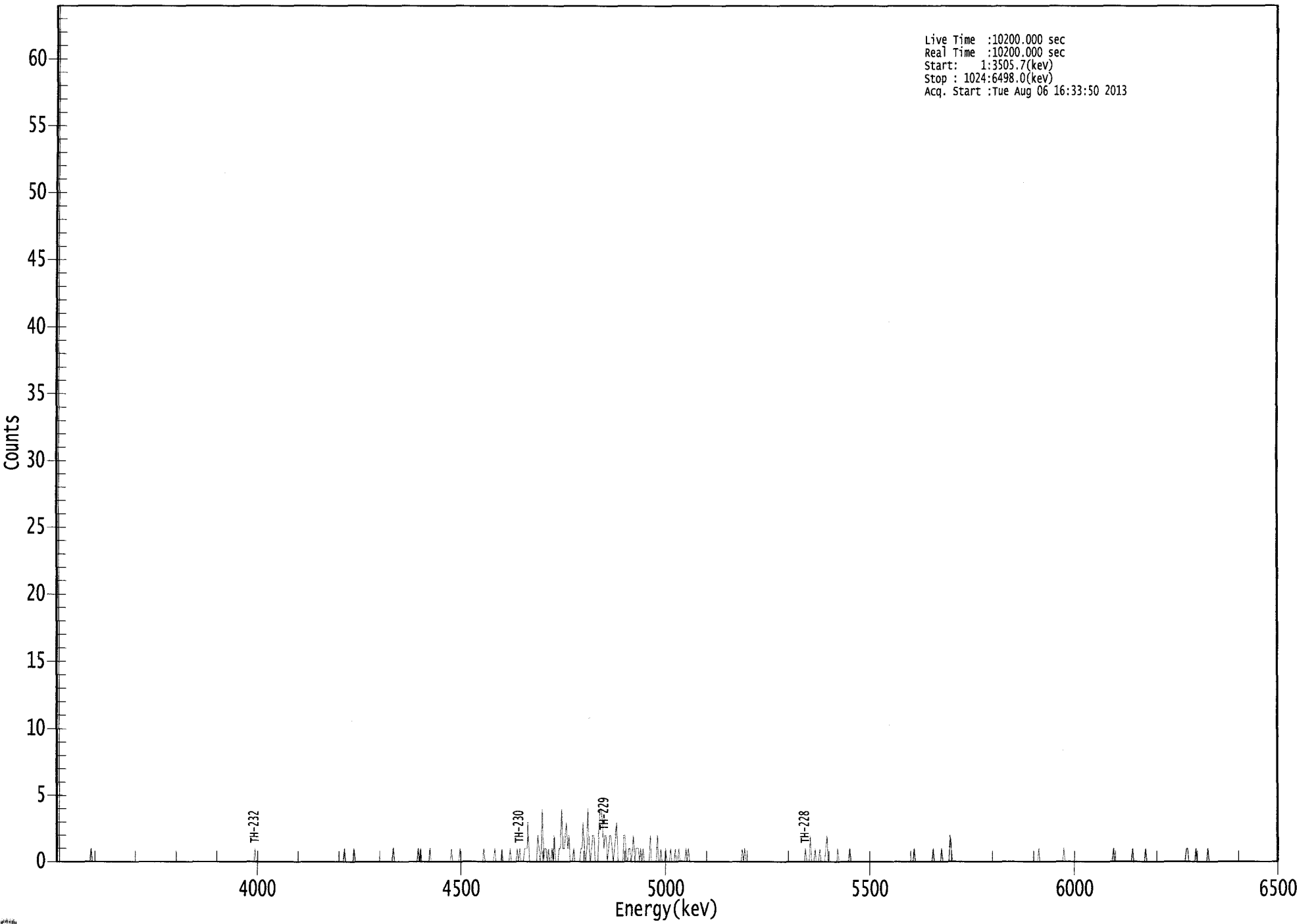
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.999	5850.00*	-3.44E-002 +/- 1.04E-001	2.76E-001 +/- 6.06E-002
TH-228	0.984	5400.00*	2.03E-001 +/- 1.88E-001	2.58E-001 +/- 5.67E-002
TH-229	0.998	4872.00*	2.39E+000 +/- 5.24E-001	2.15E-001 +/- 4.72E-002
TH-230	0.996	4672.00*	6.87E-001 +/- 3.13E-001	1.84E-001 +/- 4.03E-002
TH-232	1.000	3997.00*	1.31E-002 +/- 5.47E-002	1.40E-001 +/- 3.08E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

000065312.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3505.7(kev)  
Stop : 1024:6498.0(kev)  
Acq. Start :Tue Aug 06 16:33:50 2013



ROI Type: 1

ROI Type: 3

0000

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 \*\*\*\*\* 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	1	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	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	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	1	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	1	0	1	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	1	0	0	0
337:	0	0	0	1	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	1
361:	0	0	0	0	0	0	0	0

369: 1 0 0 0 0 0 1 0

Sample Title: 17

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



801: 0 0 0 0 0 0 0 0

Sample Title: 17

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



C  
8/7/13

Sample Description: S-10 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 18  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso  
 Detector Name: Alpha\_011  
 Chamber Serial Number:  
 Detector Serial Number: 11  
 Env. Background: System Bkgd 64037  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:51 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: 0.2079 +/- 0.0166  
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM  
 Chem. Recovery Factor: 1.0138 +/- 0.0826

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.796	3.00	130.67	0.00	0.00E+000	2.6
TH-228	5.352	4.15	107.12	0.85	0.00E+000	2.6
TH-229 T	4.882	185.83	14.39	0.17	0.00E+000	10.5
TH-230	4.600	32.00	35.19	0.00	0.00E+000	2.6
TH-232	3.962	14.49	52.54	0.51	0.00E+000	2.6

T = Tracer Peak used for Effective Efficiency

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

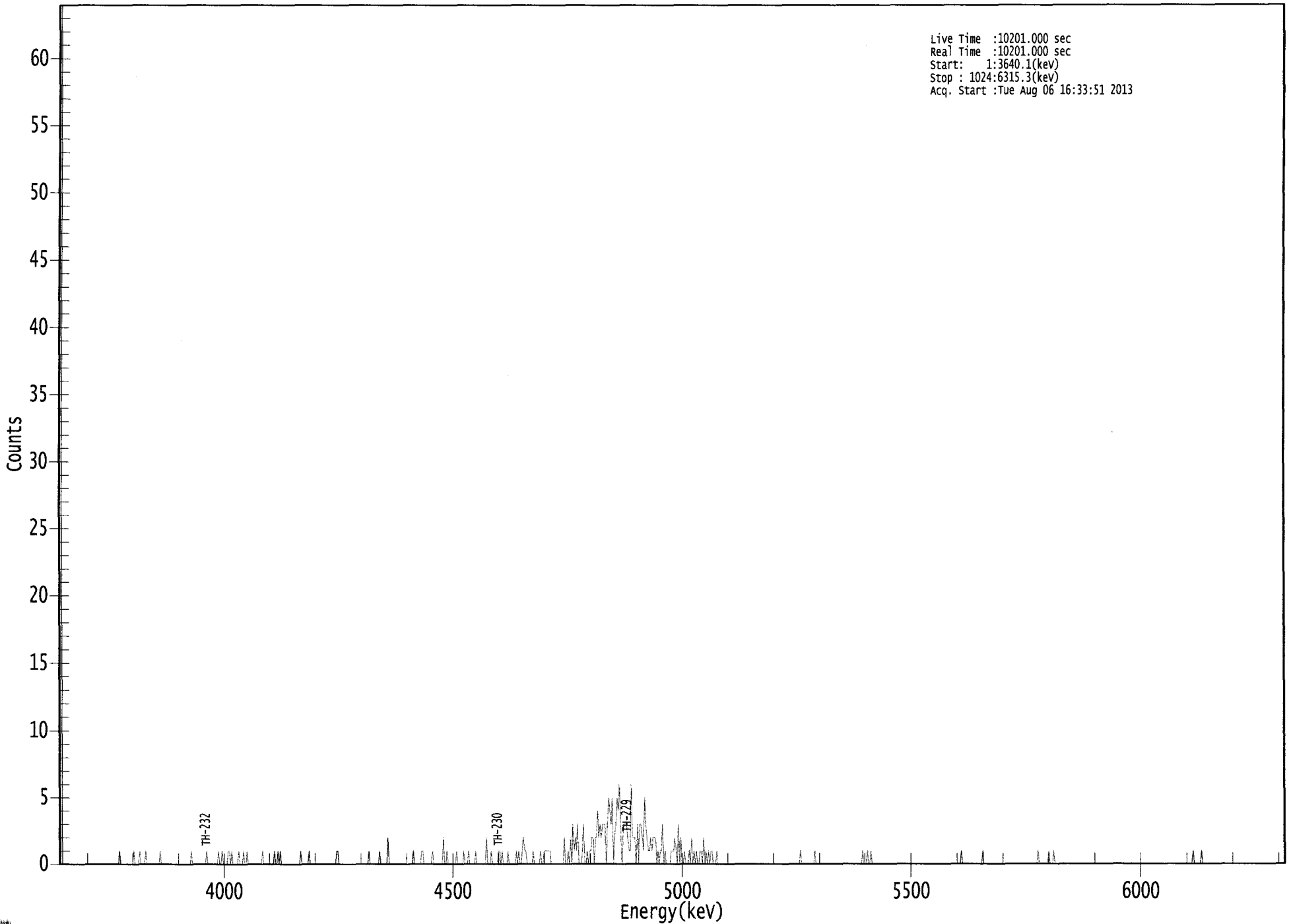
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.985	5850.00*	3.93E-002 +/- 5.17E-002	7.85E-002 +/- 1.23E-002
TH-228	0.988	5400.00*	5.41E-002 +/- 5.86E-002	7.81E-002 +/- 1.22E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 3.72E-001	5.34E-002 +/- 8.34E-003
TH-230	0.974	4672.00*	4.08E-001 +/- 1.57E-001	7.65E-002 +/- 1.20E-002
TH-232	0.994	3997.00*	1.85E-001 +/- 1.01E-001	6.69E-002 +/- 1.04E-002

AG  
8/7/13

US EPA ARCHIVE DOCUMENT

0000065313.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3640.1(kev)  
Stop : 1024:6315.3(kev)  
Acq. Start :Tue Aug 06 16:33:51 2013



ROI Type: 1

ROI Type: 3

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

369: 1 0 1 0 0 0 0 1

Sample Title: 18

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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



C  
8/7m

Sample Description: S-10 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 19  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_012  
 Chamber Serial Number:  
 Detector Serial Number: 12  
 Env. Background: System Bkgd 64038  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:52 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: 0.1494 +/- 0.0137  
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM  
 Chem. Recovery Factor: 0.7508 +/- 0.0702

Peak Match Tolerance: 0.175 MeV

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 -----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.951	2.66	128.85	0.34	0.00E+000	3.0
TH-228	5.274	4.15	107.12	0.85	0.00E+000	3.0
TH-229 T	4.872	133.83	16.96	0.17	0.00E+000	8.5
TH-230	4.612	32.49	34.70	0.51	0.00E+000	4.4
TH-232	3.909	3.00	130.67	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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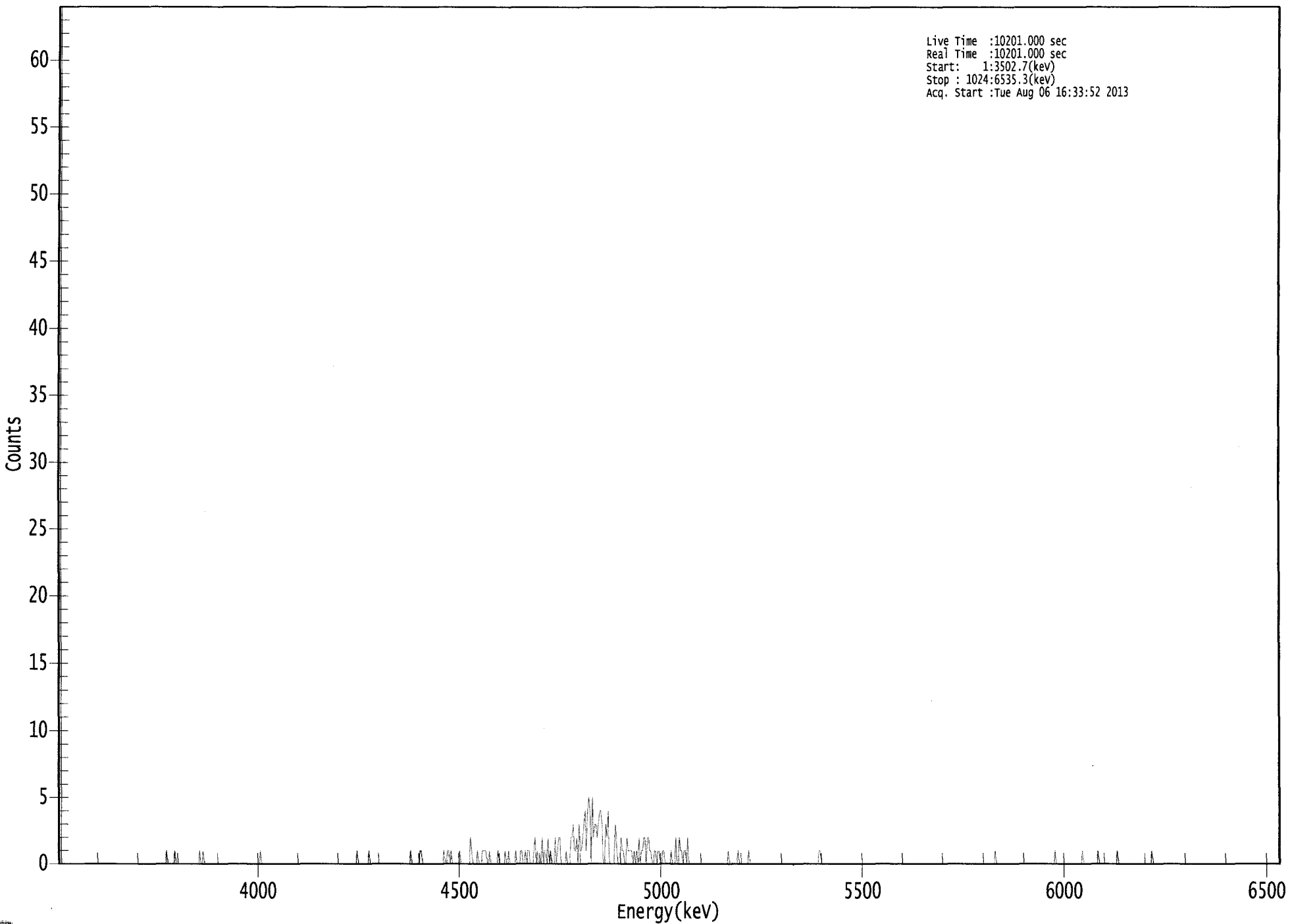
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.948	5850.00*	4.85E-002 +/- 6.31E-002	8.72E-002 +/- 1.57E-002
TH-228	0.921	5400.00*	7.53E-002 +/- 8.18E-002	1.09E-001 +/- 1.96E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.30E-001	7.44E-002 +/- 1.34E-002
TH-230	0.981	4672.00*	5.77E-001 +/- 2.26E-001	9.33E-002 +/- 1.68E-002
TH-232	0.960	3997.00*	5.32E-002 +/- 7.02E-002	1.06E-001 +/- 1.92E-002

AG  
8/1/13

US EPA ARCHIVE DOCUMENT

000065311.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3502.7(kev)  
Stop : 1024:6535.3(kev)  
Acq. Start :Tue Aug 06 16:33:52 2013



ROI Type: 1

ROI Type: 3



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

369: 0 1 0 0 0 0 0 1

Sample Title: 19

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	0	0	0
385:	1	0	0	0	1	1	0	0
393:	1	0	1	1	0	0	0	1
401:	2	0	1	0	0	0	2	0
409:	1	1	0	2	0	1	0	0
417:	0	2	0	1	2	2	0	0
425:	0	0	1	0	0	0	2	2
433:	3	1	1	2	0	3	1	1
441:	2	3	4	1	4	5	4	0
449:	5	2	3	3	2	3	4	4
457:	3	0	0	3	2	4	0	0
465:	0	0	0	3	2	0	0	0
473:	2	1	1	0	0	2	1	1
481:	1	1	0	1	0	1	0	2
489:	0	1	1	2	2	0	2	2
497:	1	1	0	0	1	1	0	1
505:	1	0	0	1	1	0	0	0
513:	0	0	1	0	0	0	2	0
521:	0	2	1	1	0	1	1	0
529:	2	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	1	0	0	0	0	0
569:	0	0	1	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	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	1	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	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 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	1	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	1	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	1
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	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: FB AT D-12 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000653  
 Batch Identification: 1307146A-TH  
 Sample Identification: 20  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_013  
 Chamber Serial Number:  
 Detector Serial Number: 13  
 Env. Background: System Bkgd 64039  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 7/15/2013 7:36:38 AM  
 Acquisition Date/Time: 8/6/2013 4:33:53 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.236 mL  
 Effective Efficiency: 0.1426 +/- 0.0134  
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM  
 Chem. Recovery Factor: 0.7630 +/- 0.0730

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.771	9.79	70.43	2.21	0.00E+000	2.8
TH-228	5.339	-4.08	62.51	4.08	0.00E+000	0.0
TH-229 T	4.858	128.32	17.36	0.68	0.00E+000	3.1
TH-230	4.640	24.81	40.44	1.19	0.00E+000	3.5
TH-232	4.040	6.66	78.18	0.34	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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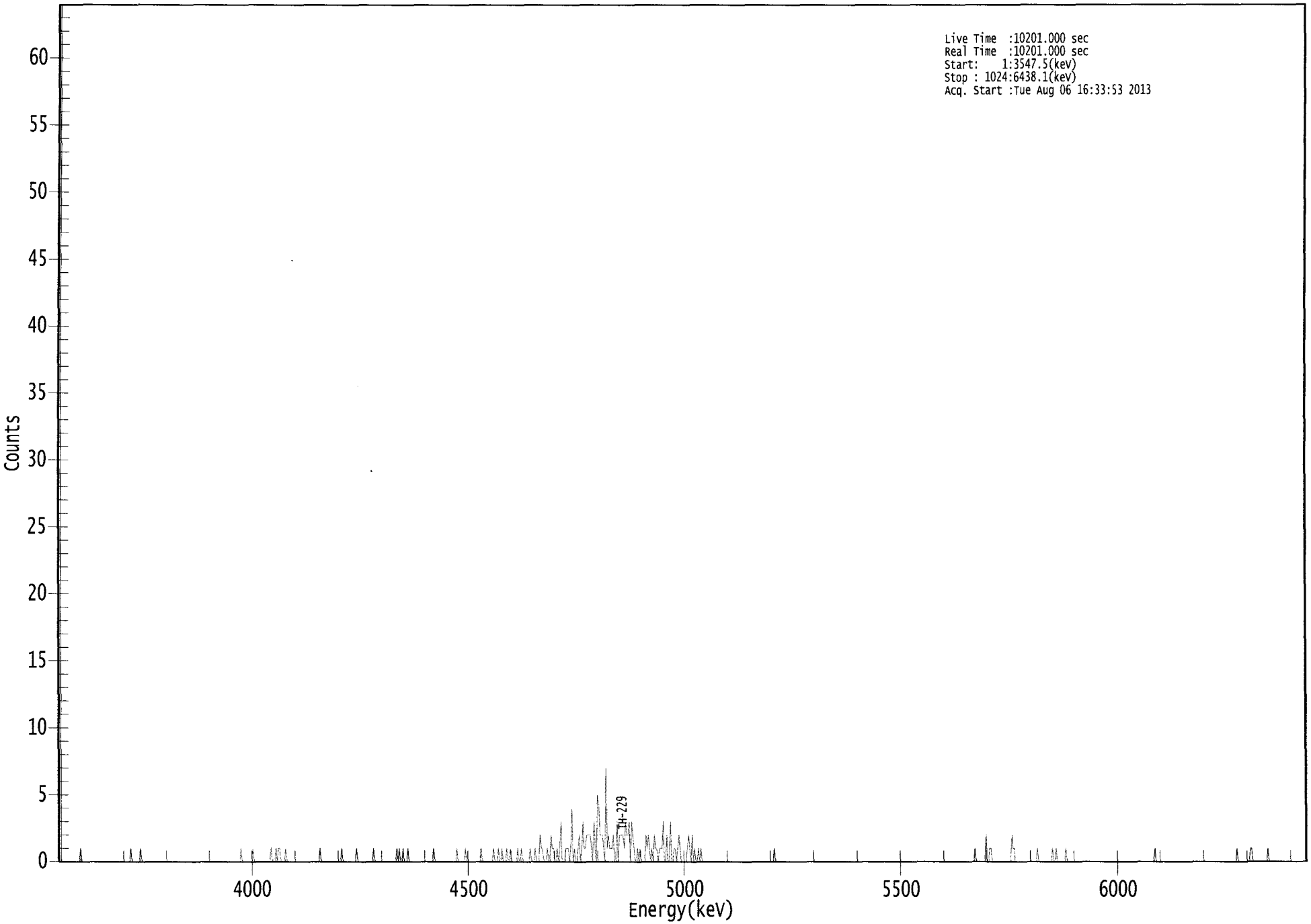
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.968	5850.00*	1.87E-001 +/- 1.36E-001	1.53E-001 +/- 2.81E-002
TH-228	0.981	5400.00*	-7.76E-002 +/- 5.05E-002	1.88E-001 +/- 3.46E-002
TH-229	0.999	4872.00*	2.40E+000 +/- 4.41E-001	1.05E-001 +/- 1.94E-002
TH-230	0.995	4672.00*	4.62E-001 +/- 2.05E-001	1.23E-001 +/- 2.25E-002
TH-232	0.990	3997.00*	1.24E-001 +/- 9.94E-002	8.88E-002 +/- 1.63E-002

AG  
 8/7/13

US EPA ARCHIVE DOCUMENT

000065371.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3547.5(kev)  
Stop : 1024:6438.1(kev)  
Acq. Start :Tue Aug 06 16:33:53 2013



ROI Type: 1

ROI Type: 3

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 20

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	1	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	1	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	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	1
153:	0	0	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	1	0	0	0	1	0	1	1
185:	0	0	0	0	1	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	0	1	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	1
281:	0	1	0	0	1	0	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	1	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	1	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:	0	0	0	0	0	0	1	0
361:	0	0	1	0	0	1	0	0

369: 0 1 0 0 1 0 0 0

Sample Title: 20

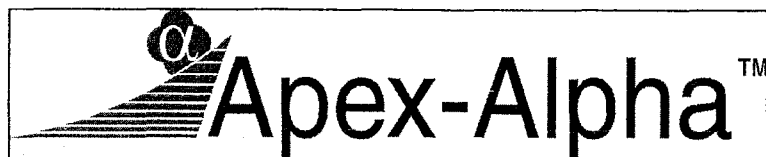
Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	1	0	0
385:	0	0	0	0	1	0	0	0
393:	1	0	0	0	2	1	1	0
401:	0	0	1	0	0	2	1	1
409:	0	0	1	0	1	3	0	0
417:	0	1	1	1	0	1	4	0
425:	1	0	0	1	2	0	1	3
433:	1	1	2	2	2	2	1	0
441:	3	1	0	5	4	2	2	2
449:	1	0	7	1	2	1	1	1
457:	2	0	0	3	0	2	2	2
465:	2	1	3	2	2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

801: 0 0 0 1 0 0 0 0

Sample Title: 20

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





## QA SUMMARY REPORT

### Review Of QA Results - Pulser Check

Date : 8/6/2013

Time : 5:51:01 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/6/2013 5:29:13 AM
Alpha 004	21f	ALL	Passed	8/6/2013 5:29:14 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/6/2013 5:29:14 AM
Alpha 011	21f	ALL	Passed	8/6/2013 5:29:15 AM
Alpha 012	21f	ALL	Passed	8/6/2013 5:29:16 AM
Alpha 013	21f	ALL	Passed	8/6/2013 5:29:17 AM
Alpha 014	21f	ALL	Passed	8/6/2013 5:29:18 AM
Alpha 015	21f	ALL	Passed	8/6/2013 5:29:18 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/6/2013 5:29:19 AM
Alpha 019	AIM730	ALL	Passed	8/6/2013 5:29:20 AM
Alpha 020	AIM730	ALL	Passed	8/2/2013 5:14:08 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/6/2013 5:29:21 AM
Alpha 023	AIM730	ALL	Passed	8/6/2013 5:29:22 AM
Alpha 024	AIM730	ALL	Passed	8/6/2013 5:29:22 AM
Alpha 025	AIM730	ALL	Passed	8/6/2013 5:29:23 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/6/2013 5:29:24 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/6/2013 5:29:25 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/6/2013 5:29:26 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:27 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:28 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:30 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:31 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/6/2013 5:29:32 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:34 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:35 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:37 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:38 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:40 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:42 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:43 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/6/2013 5:29:45 AM

APPROVED BY: \_\_\_\_\_

APPROVAL DATE: 8/6/13

US EPA ARCHIVE DOCUMENT

\*\*\*\*\*  
 \*\*\*\*\* 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	13-07146	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		07/23/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/23/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
Lab Deadline	8/13/2013	04	DO	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-105-SS DIS	48	07/12/13 09:42	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-114-AS TOT	46	07/12/13 10:56	1.0000E+00
Report Level	4	07	TRG	PZ-114-AS DIS	46	07/12/13 10:56	1.0000E+00
Activity Units	pCi	08	TRG	I-66 TOT	42	07/15/13 10:44	1.0000E+00
Aliquot Units	I	09	TRG	I-66 DIS	42	07/15/13 10:44	1.0000E+00
Matrix	WA	10	TRG	MW-102 TOT	41	07/15/13 11:10	1.0000E+00
Method	E903.0	11	TRG	MW-102 DIS	41	07/15/13 11:10	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	MW-103 TOT	44	07/15/13 11:44	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	MW-103 DIS	44	07/15/13 11:44	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-303-AS TOT	42	07/15/13 12:20	1.0000E+00
Tracer Act (dpm/g)	991.658	15	TRG	PZ-303-AS DIS	42	07/15/13 12:20	1.0000E+00
Carrier		16	TRG	I-11 TOT	39	07/15/13 13:12	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	I-11 DIS	39	07/15/13 13:12	1.0000E+00
		18	TRG	S-10 TOT	44	07/15/13 14:05	1.0000E+00
		19	TRG	S-10 DIS	44	07/15/13 14:05	1.0000E+00
		20	TRG	FB at D-12 TOT	40	07/15/13 14:30	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.

0032

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	0.9161	908.5	422.9	103.34		0.0220	0.0280	0.0060		103.34	2.16	1.00
02	MBL	0.9106	903.0	413.2	101.58		0.0224	0.0280	0.0056		101.58	2.00	1.00
03	DUP	0.9067	899.1	386.1	95.33		0.0224	0.0285	0.0061		95.33	2.20	1.00
04	DO	0.9053	897.7	406.1	100.42		0.0219	0.0283	0.0064		100.42	2.31	1.00
05	TRG	0.9056	898.0	414.6	102.49		0.0222	0.0282	0.0060		102.49	2.16	1.00
06	TRG	0.9066	899.0	344.8	85.14		0.0221	0.0277	0.0056		85.14	2.00	1.00
07	TRG	0.9070	899.4	362.4	89.45		0.0220	0.0280	0.0060		89.45	2.16	1.00
08	TRG	0.9060	898.4	362.9	89.67		0.0221	0.0288	0.0067		89.67	2.40	1.00
09	TRG	0.9020	894.5	366.4	90.94		0.0224	0.0292	0.0068		90.94	2.44	1.00
10	TRG	0.9045	897.0	319.6	79.10		0.0220	0.0277	0.0057		79.10	2.04	1.00
11	TRG	0.9053	897.7	368.9	91.22		0.0224	0.0289	0.0065		91.22	2.34	1.00
12	TRG	0.9068	899.2	372.0	91.84		0.0221	0.0282	0.0061		91.84	2.20	1.00
13	TRG	0.9054	897.8	358.6	88.67		0.0220	0.0308	0.0088		88.67	2.96	1.00
14	TRG	0.9060	898.4	350.2	86.53		0.0221	0.0302	0.0081		86.53	2.79	1.00
15	TRG	0.9037	896.2	359.4	89.03		0.0221	0.0302	0.0081		89.03	2.79	1.00
16	TRG	0.9046	897.1	387.7	95.95		0.0224	0.0289	0.0065		95.95	2.34	1.00
17	TRG	0.9049	897.4	360.2	89.11		0.0222	0.0292	0.0070		89.11	2.50	1.00
18	TRG	0.9057	898.1	369.2	91.26		0.0221	0.0286	0.0065		91.26	2.34	1.00
19	TRG	0.9050	897.5	387.1	95.76		0.0223	0.0288	0.0065		95.76	2.34	1.00
20	TRG	0.9062	898.6	372.5	92.02		0.0224	0.0273	0.0049		92.02	1.66	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.

0000

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
02	MBL			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
03	DUP			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
04	DO			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
05	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
06	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
07	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
08	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
09	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
10	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
11	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
12	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
13	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
14	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
15	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
16	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
17	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
18	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
19	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	LWALKER		
20	TRG			07/30/13 10:25	JWOLFE	08/01/13 14:15	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.

534

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-Ra226-1**

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-226	LCS	LCS	pCi/l	1.04E+01	1.17E+00	1.75E-01	1.03E+01	101.32	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	6.91E-02	9.56E-02	1.46E-01					OK	OK
03	RA-226	DUP	PZ-105-SS TOT	pCi/l	1.77E+00	4.87E-01	1.63E-01				NA	OK	
04	RA-226	DO	PZ-105-SS TOT	pCi/l	1.54E+00	4.60E-01	2.42E-01					OK	
05	RA-226	TRG	PZ-105-SS DIS	pCi/l	1.48E+00	4.44E-01	1.63E-01					OK	
06	RA-226	TRG	PZ-114-AS TOT	pCi/l	5.37E-01	3.07E-01	2.86E-01					OK	
07	RA-226	TRG	PZ-114-AS DIS	pCi/l	1.88E-01	1.95E-01	2.80E-01					OK	
08	RA-226	TRG	I-66 TOT	pCi/l	3.30E-01	2.57E-01	3.11E-01					OK	
09	RA-226	TRG	I-66 DIS	pCi/l	3.35E-01	2.39E-01	2.28E-01					OK	
10	RA-226	TRG	MW-102 TOT	pCi/l	1.09E+00	4.22E-01	2.96E-01					OK	
11	RA-226	TRG	MW-102 DIS	pCi/l	3.32E-01	2.14E-01	1.65E-01					OK	
12	RA-226	TRG	MW-103 TOT	pCi/l	7.01E-01	3.71E-01	3.45E-01					OK	
13	RA-226	TRG	MW-103 DIS	pCi/l	2.10E-01	2.15E-01	2.74E-01					OK	
14	RA-226	TRG	PZ-303-AS TOT	pCi/l	1.01E+00	4.48E-01	2.12E-01					OK	
15	RA-226	TRG	PZ-303-AS DIS	pCi/l	5.38E-01	3.25E-01	2.68E-01					OK	
16	RA-226	TRG	I-11 TOT	pCi/l	1.44E+00	4.42E-01	2.52E-01					OK	
17	RA-226	TRG	I-11 DIS	pCi/l	1.43E+00	4.73E-01	3.02E-01					OK	
18	RA-226	TRG	S-10 TOT	pCi/l	4.25E-01	2.35E-01	1.38E-01					OK	
19	RA-226	TRG	S-10 DIS	pCi/l	1.41E-01	1.44E-01	1.84E-01					OK	
20	RA-226	TRG	FB at D-12 TOT	pCi/l	2.07E-02	7.44E-02	1.68E-01					OK	

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	07/23/13 00:00	1.00E+00	100.00	0.00	103.34		8/1/2013 14:15	
02	RA-226	MBL	07/23/13 00:00	1.00E+00	100.00	0.00	101.58		8/1/2013 14:15	
03	RA-226	DUP	07/12/13 09:42	1.00E+00	95.33	0.00	95.33		8/1/2013 14:15	
04	RA-226	DO	07/12/13 09:42	1.00E+00	100.00	0.00	100.42		8/1/2013 14:15	
05	RA-226	TRG	07/12/13 09:42	1.00E+00	100.00	0.00	102.49		8/1/2013 14:15	
06	RA-226	TRG	07/12/13 10:56	1.00E+00	85.14	0.00	85.14		8/1/2013 14:15	
07	RA-226	TRG	07/12/13 10:56	1.00E+00	89.45	0.00	89.45		8/1/2013 14:15	
08	RA-226	TRG	07/15/13 10:44	1.00E+00	89.67	0.00	89.67		8/1/2013 14:15	
09	RA-226	TRG	07/15/13 10:44	1.00E+00	90.94	0.00	90.94		8/1/2013 14:15	
10	RA-226	TRG	07/15/13 11:10	1.00E+00	79.10	0.00	79.10		8/1/2013 14:15	
11	RA-226	TRG	07/15/13 11:10	1.00E+00	91.22	0.00	91.22		8/1/2013 14:15	
12	RA-226	TRG	07/15/13 11:44	1.00E+00	91.84	0.00	91.84		8/1/2013 14:15	
13	RA-226	TRG	07/15/13 11:44	1.00E+00	88.67	0.00	88.67		8/1/2013 14:15	
14	RA-226	TRG	07/15/13 12:20	1.00E+00	86.53	0.00	86.53		8/1/2013 14:15	
15	RA-226	TRG	07/15/13 12:20	1.00E+00	89.03	0.00	89.03		8/1/2013 14:15	
16	RA-226	TRG	07/15/13 13:12	1.00E+00	95.95	0.00	95.95		8/1/2013 14:15	
17	RA-226	TRG	07/15/13 13:12	1.00E+00	89.11	0.00	89.11		8/1/2013 14:15	
18	RA-226	TRG	07/15/13 14:05	1.00E+00	91.26	0.00	91.26		8/1/2013 14:15	
19	RA-226	TRG	07/15/13 14:05	1.00E+00	95.76	0.00	95.76		8/1/2013 14:15	
20	RA-226	TRG	07/15/13 14:30	1.00E+00	92.02	0.00	92.02		8/1/2013 14:15	

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-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	08/05/13 12:32		A_Spec	Alpha_042	170	3.35 E+02	4.00 E-03	18.5
02	RA-226	MBL	08/05/13 12:32		A_Spec	Alpha_045	170	2.49 E+00	3.00 E-03	19.1
03	RA-226	DUP	08/05/13 12:32		A_Spec	Alpha_046	170	5.17 E+01	2.00 E-03	17.9
04	RA-226	DO	08/05/13 12:49		A_Spec	Alpha_018	172.92	4.54 E+01	9.00 E-03	17.8
05	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_019	172.9	4.37 E+01	2.00 E-03	16.6
06	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_022	172.88	1.34 E+01	9.00 E-03	15.3
07	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_023	172.87	5.10 E+00	1.10 E-02	17.1
08	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_024	172.85	8.10 E+00	1.10 E-02	17.1
09	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_025	172.82	8.31 E+00	4.00 E-03	17.4
10	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_027	172.8	2.81 E+01	1.10 E-02	17.3
11	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_029	172.78	9.65 E+00	2.00 E-03	19.5
12	RA-226	TRG	08/05/13 12:49		A_Spec	Alpha_031	172.78	1.59 E+01	1.20 E-02	14.2
13	RA-226	TRG	08/05/13 12:50		A_Spec	Alpha_047	170	4.32 E+00	4.00 E-03	18.2
14	RA-226	TRG	08/05/13 12:50		A_Spec	Alpha_048	170	1.98 E+01	1.00 E-03	16.8
15	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_003	170.02	1.13 E+01	4.00 E-03	17.5
16	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_004	170.02	4.31 E+01	1.10 E-02	19.4
17	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_010	170.03	3.78 E+01	1.30 E-02	19.7
18	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_011	170	1.28 E+01	1.00 E-03	20.5
19	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_012	170.02	4.32 E+00	4.00 E-03	19.9
20	RA-226	TRG	08/05/13 16:10		A_Spec	Alpha_013	170.02	8.10 E-01	7.00 E-03	18.7

Run	1	Analysis Code	Ra226	Eberline Services Work Order	13-07146	Client	Engineering Management Support, Inc.

2013

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Allquot	Tracer Allquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/23/13 00:00	1.0000	0.9161	908.4579	422.9000	103.34	2.16	1.00
02	MBL	BLANK	07/23/13 00:00	1.0000	0.9106	903.0038	413.2000	101.58	2.00	1.00
03	DUP	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.9067	899.1363	386.1000	95.33	2.20	1.00
04	DO	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.9053	897.7480	406.1000	100.42	2.31	1.00
05	TRG	PZ-105-SS DIS	07/12/13 09:42	1.0000	0.9056	898.0455	414.6000	102.49	2.16	1.00
06	TRG	PZ-114-AS TOT	07/12/13 10:56	1.0000	0.9066	899.0371	344.8000	85.14	2.00	1.00
07	TRG	PZ-114-AS DIS	07/12/13 10:56	1.0000	0.9070	899.4338	362.4000	89.45	2.16	1.00
08	TRG	I-66 TOT	07/15/13 10:44	1.0000	0.9060	898.4421	362.9000	89.67	2.40	1.00
09	TRG	I-66 DIS	07/15/13 10:44	1.0000	0.9020	894.4755	366.4000	90.94	2.44	1.00
10	TRG	MW-102 TOT	07/15/13 11:10	1.0000	0.9045	896.9547	319.6000	79.10	2.04	1.00
11	TRG	MW-102 DIS	07/15/13 11:10	1.0000	0.9053	897.7480	368.9000	91.22	2.34	1.00
12	TRG	MW-103 TOT	07/15/13 11:44	1.0000	0.9068	899.2355	372.0000	91.84	2.20	1.00
13	TRG	MW-103 DIS	07/15/13 11:44	1.0000	0.9054	897.8472	358.6000	88.67	2.96	1.00
14	TRG	PZ-303-AS TOT	07/15/13 12:20	1.0000	0.9060	898.4421	350.2000	86.53	2.79	1.00
15	TRG	PZ-303-AS DIS	07/15/13 12:20	1.0000	0.9037	896.1613	359.4000	89.03	2.79	1.00
16	TRG	I-11 TOT	07/15/13 13:12	1.0000	0.9046	897.0538	387.7000	95.95	2.34	1.00
17	TRG	I-11 DIS	07/15/13 13:12	1.0000	0.9049	897.3513	360.2000	89.11	2.50	1.00
18	TRG	S-10 TOT	07/15/13 14:05	1.0000	0.9057	898.1447	369.2000	91.26	2.34	1.00
19	TRG	S-10 DIS	07/15/13 14:05	1.0000	0.9050	897.4505	387.1000	95.76	2.34	1.00
20	TRG	FB at D-12 TOT	07/15/13 14:30	1.0000	0.9062	898.6405	372.5000	92.02	1.66	1.00


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### Spike and Tracer Worksheet

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
13-07146		1	Ra226		7/30/2013 10:23	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
Ra-226	Ra-5b	44.066	7/30/2013	0.500	0.5169				10.26	0.472	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes	
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition		
01	Ba-133	Ba-6a	991.658	7/30/2013	0.9161	1.0200	0.9161 g	
02	Ba-133	Ba-6a	991.658	7/30/2013	0.9106	1.0200	0.9106 g	
03	Ba-133	Ba-6a	991.658	7/30/2013	0.9067	1.0200		
04	Ba-133	Ba-6a	991.658	7/30/2013	0.9053	1.0200	-0.9047 g	
05	Ba-133	Ba-6a	991.658	7/30/2013	0.9056	1.0200	-0.9053 g	
06	Ba-133	Ba-6a	991.658	7/30/2013	0.9066	1.0200	-0.9056 g	
07	Ba-133	Ba-6a	991.658	7/30/2013	0.9070	1.0200	-0.9066 g	
08	Ba-133	Ba-6a	991.658	7/30/2013	0.9060	1.0200	-0.9070 g	
09	Ba-133	Ba-6a	991.658	7/30/2013	0.9020	1.0200	-0.9060 g	
10	Ba-133	Ba-6a	991.658	7/30/2013	0.9045	1.0200	-0.9020 g	
11	Ba-133	Ba-6a	991.658	7/30/2013	0.9053	1.0200	-0.9045 g	
12	Ba-133	Ba-6a	991.658	7/30/2013	0.9068	1.0200		
13	Ba-133	Ba-6a	991.658	7/30/2013	0.9054	1.0200		
14	Ba-133	Ba-6a	991.658	7/30/2013	0.9060	1.0200		
15	Ba-133	Ba-6a	991.658	7/30/2013	0.9037	1.0200		
16	Ba-133	Ba-6a	991.658	7/30/2013	0.9046	1.0200		
17	Ba-133	Ba-6a	991.658	7/30/2013	0.9049	1.0200	-0.9068 g	
18	Ba-133	Ba-6a	991.658	7/30/2013	0.9057	1.0200	-0.9054 g	
19	Ba-133	Ba-6a	991.658	7/30/2013	0.9050	1.0200	-0.9060 g	
20	Ba-133	Ba-6a	991.658	7/30/2013	0.9062	1.0200	-0.9037 g	

Balance Printer Tapes	
LCS	0.5169 g 0.5126 g
Matrix Spike	

# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-07146</b>	<b>1</b>	<b>Ra226</b>	<b>liters</b>	<b>8/13/2013</b>	<b>JWOLFE</b>

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-105-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-105-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-105-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	I-66 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-66 DIS	TRG					1.0000E+00	1.0000E+00				
10	MW-102 TOT	TRG					1.0000E+00	1.0000E+00				
11	MW-102 DIS	TRG					1.0000E+00	1.0000E+00				
12	MW-103 TOT	TRG					1.0000E+00	1.0000E+00				
13	MW-103 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-303-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-303-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	I-11 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-11 DIS	TRG					1.0000E+00	1.0000E+00				
18	S-10 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-10 DIS	TRG					1.0000E+00	1.0000E+00				
20	FB at D-12 TOT	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: \_\_\_\_\_

*J Wolfe* Date: 7,30,13

# Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
<b>13-07146</b>	<b>1</b>	<b>Ra226</b>			<b>LWALKER</b>

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0220	0.0280	0.0060	
02	BLANK	MBL		0.0224	0.0280	0.0056	
03	DUP	DUP		0.0224	0.0285	0.0061	
04	PZ-105-SS TOT	DO		0.0219	0.0283	0.0064	
05	PZ-105-SS DIS	TRG		0.0222	0.0282	0.0060	
06	PZ-114-AS TOT	TRG		0.0221	0.0277	0.0056	
07	PZ-114-AS DIS	TRG		0.0220	0.0280	0.0060	
08	I-66 TOT	TRG		0.0221	0.0288	0.0067	
09	I-66 DIS	TRG		0.0224	0.0292	0.0068	
10	MW-102 TOT	TRG		0.0220	0.0277	0.0057	
11	MW-102 DIS	TRG		0.0224	0.0289	0.0065	
12	MW-103 TOT	TRG		0.0221	0.0282	0.0061	
13	MW-103 DIS	TRG		0.0220	0.0308	0.0088	
14	PZ-303-AS TOT	TRG		0.0221	0.0302	0.0081	
15	PZ-303-AS DIS	TRG		0.0221	0.0302	0.0081	
16	I-11 TOT	TRG		0.0224	0.0289	0.0065	
17	I-11 DIS	TRG		0.0222	0.0292	0.0070	
18	S-10 TOT	TRG		0.0221	0.0286	0.0065	
19	S-10 DIS	TRG		0.0223	0.0288	0.0065	
20	FB at D-12 TOT	TRG		0.0224	0.0273	0.0049	

Technician: J. Walker

Date: 8, 1, 13

0341



Sample Description: SPIKE  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000652  
 Batch Identification: 1307146A-RA  
 Sample Identification: 01  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 64059  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.160E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 8/5/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:32:44 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Effective Efficiency: 0.1846 +/- 0.0032

Control Certificate Name: Ra226\_Ra-5b  
 Chem. Recov. of Control: RA-226 0.469046 +/- 0.030367  
 Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.527	415.81	9.63	1.19	0.00E+000	7.7
RA-226	4.689	335.32	10.72	0.68	0.00E+000	6.3

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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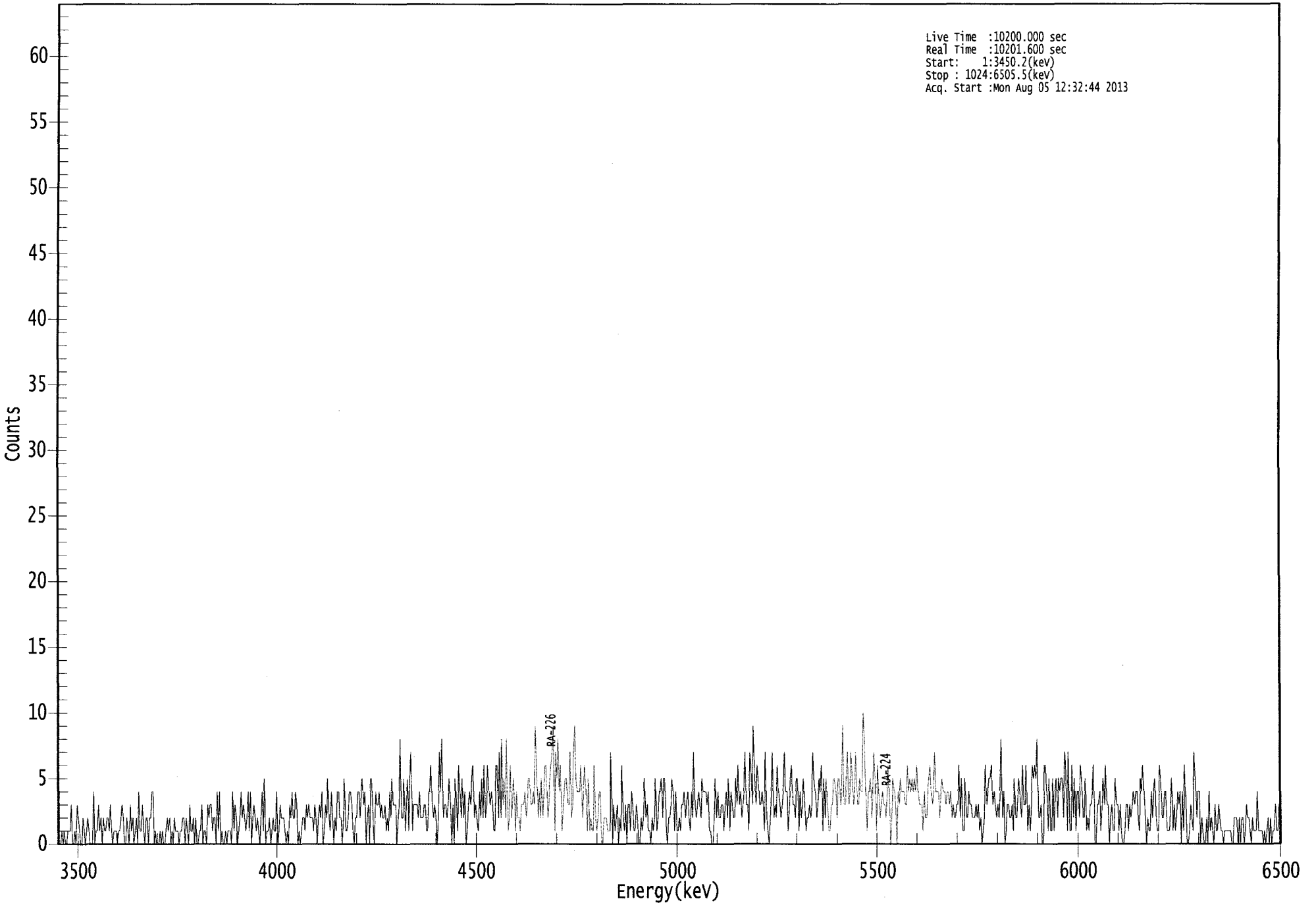
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	1.36E+001 +/- 1.38E+000	2.15E-001 +/- 7.32E-003
RA-226	0.988	4785.00*	1.04E+001 +/- 1.17E+000	1.75E-001 +/- 5.96E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

# 0000065246.CNF

Live Time :10200.000 sec  
Real Time :10201.600 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Mon Aug 05 12:32:44 2013



ROI Type: 1

0343



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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10202

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

369: 6 6 2 7 2 8 3 5

Sample Title: 01

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

801: 1 5 2 2 4 5 3 2

Sample Title: 01

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



C  
8/6/13

Sample Description: BLANK  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 02  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_045  
 Chamber Serial Number: 04026482A  
 Detector Serial Number: 91131  
 Env. Background: System Bkgd 64060  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.000E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 8/5/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:32:39 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

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.529	1.49	190.02	0.51	0.00E+000	3.0
RA-226	4.665	2.49	138.29	0.51	0.00E+000	3.0

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 NUCLIDE ANALYSIS RESULTS  
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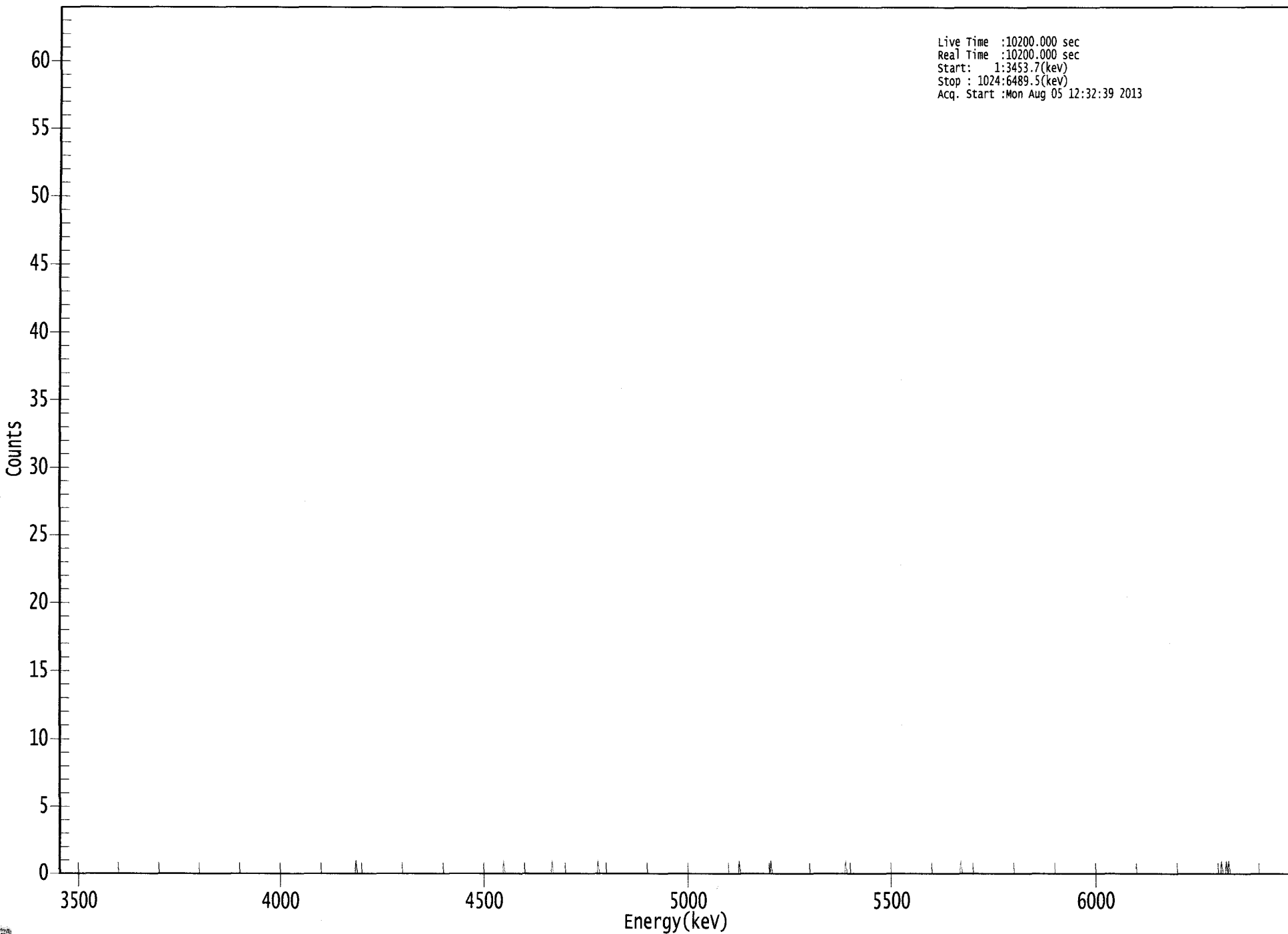
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	4.35E-002 +/- 8.26E-002	1.53E-001 +/- 5.22E-003
RA-226	0.982	4785.00*	6.91E-002 +/- 9.56E-002	1.46E-001 +/- 4.97E-003

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8/6/13

US EPA ARCHIVE DOCUMENT

0000065162.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3453.7(kev)  
Stop : 1024:6489.5(kev)  
Acq. Start :Mon Aug 05 12:32:39 2013



ROI Type: 1

0348

\*\*\*\*\*  
 \*\*\*\*\* 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	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	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	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 1 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	1	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	1
449:	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0
561:	0	0	0	0	1	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	1
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	1	0	0
657:	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	1	0	0	0
753:	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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





C  
8/6/13

Sample Description: PZ-105-SS TOT-DUP  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 03  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_046  
 Chamber Serial Number: 04026482B  
 Detector Serial Number: 58762  
 Env. Background: System Bkgd 64061  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/12/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:32:41 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9533 +/- 0.0000  
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM  
 Effective Efficiency: 0.1706 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.519	15.83	49.57	0.17	0.00E+000	3.0
RA-226	4.547	51.66	27.37	0.34	0.00E+000	4.5

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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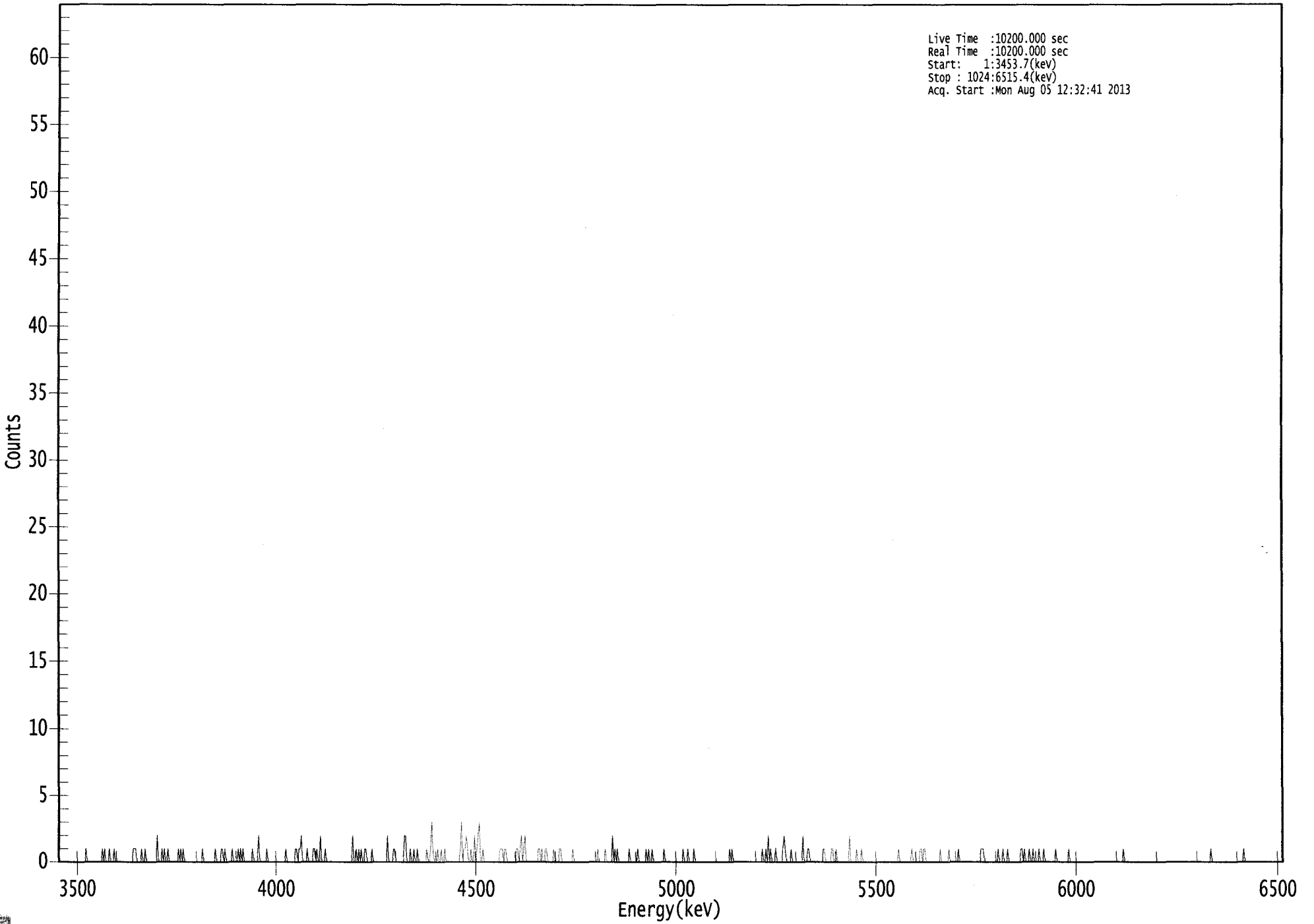
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.965	5685.50*	5.73E-001 +/- 2.85E-001	1.51E-001 +/- 5.22E-003
RA-226	0.929	4785.00*	1.77E+000 +/- 4.87E-001	1.63E-001 +/- 5.62E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065163.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3453.7(keV)  
Stop : 1024:6515.4(keV)  
Acq. Start :Mon Aug 05 12:32:41 2013



ROI Type: 1

0000065163.CNF

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

369: 0 0 1 1 1 0 1 1

Sample Title: 03

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

801: 0 0 0 0 0 1 1 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	1	0	0	0	1	0	0	1
817:	0	0	0	0	1	0	0	0
825:	1	0	0	0	0	0	0	0
833:	0	0	1	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	1	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	1	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	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



C  
8/6/13

Sample Description: PZ-105-SS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 04  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_018  
 Chamber Serial Number:  
 Detector Serial Number: 18  
 Env. Background: System Bkgd 64042  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.310E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/12/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:50 PM  
 Acquisition Live Time: 172.9 minutes  
 Acquisition Real Time: 172.9 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

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.494	12.20	65.59	3.80	0.00E+000	3.1
RA-226	4.577	45.44	29.65	1.56	0.00E+000	3.1

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 -----  
 NUCLIDE ANALYSIS RESULTS  
 -----  
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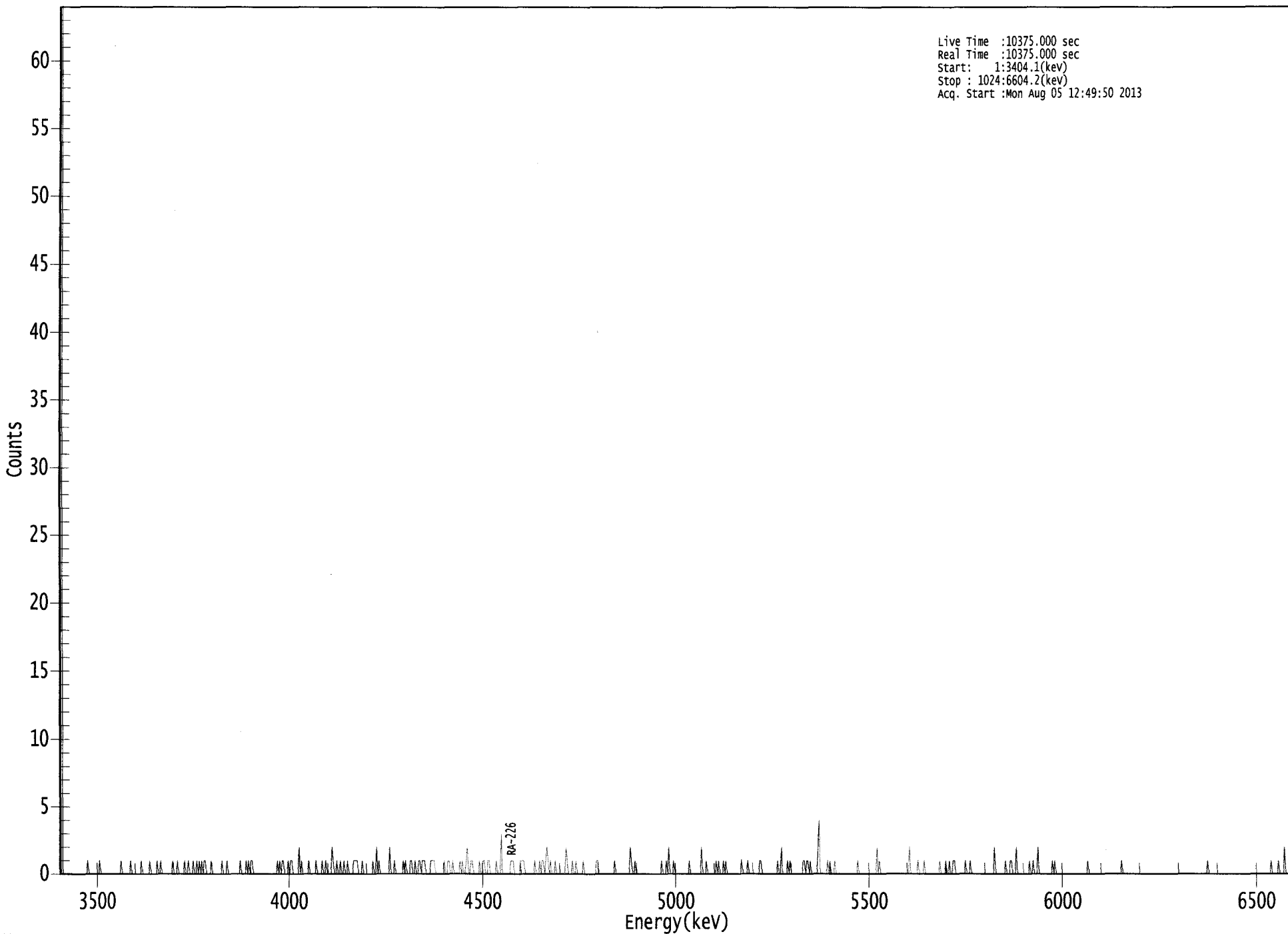
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.953	5685.50*	4.38E-001 +/- 2.88E-001	3.47E-001 +/- 1.27E-002
RA-226	0.945	4785.00*	1.54E+000 +/- 4.60E-001	2.42E-001 +/- 8.83E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065165.CNF

Live Time :10375.000 sec  
Real Time :10375.000 sec  
Start: 1:3404.1(kev)  
Stop : 1024:6604.2(kev)  
Acq. Start :Mon Aug 05 12:49:50 2013



0350

ROI Type: 1

\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title: 04

Elapsed Live time: 10375

Elapsed Real Time: 10375

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10375	10375	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	1	0	0	0	0
57:	0	0	0	1	0	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	1	0	0	0	0
81:	0	1	0	0	1	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	1	0	0	0	0	0
105:	1	0	0	1	0	0	0	1
113:	0	0	1	0	1	0	1	0
121:	1	1	0	0	0	0	1	0
129:	0	0	0	0	0	0	0	1
137:	0	0	0	1	0	0	0	0
145:	0	0	0	0	0	0	1	0
153:	0	0	0	1	0	1	0	1
161:	1	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	0	1
185:	0	1	1	0	0	0	1	0
193:	1	1	0	0	0	0	0	2
201:	0	1	0	0	0	0	0	1
209:	0	0	0	0	0	1	0	0
217:	0	0	1	0	0	1	0	0
225:	0	0	2	1	0	0	1	0
233:	0	1	0	0	1	0	0	1
241:	0	0	0	0	1	1	1	1
249:	0	0	0	1	0	0	0	0
257:	0	0	0	0	1	0	0	2
265:	0	1	0	0	0	0	0	0
273:	0	0	2	0	0	0	1	0
281:	0	0	0	0	0	1	0	1
289:	0	0	0	1	1	0	0	1
297:	0	0	1	1	0	1	1	1
305:	0	0	0	0	1	1	1	1
313:	0	0	0	0	0	0	0	1
321:	0	0	1	1	0	0	1	0
329:	0	0	0	0	1	0	1	0
337:	0	1	2	0	0	1	1	0
345:	0	0	0	0	1	0	0	1
353:	1	0	0	1	1	0	0	0
361:	0	0	1	0	0	0	3	0



369: 0 0 0 0 0 0 0 1 1

Sample Title: 04

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

801: 0 0 0 1 0 0 1 0

Sample Title: 04

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



C  
8/6/13

Sample Description: PZ-105-SS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 05  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_019  
 Chamber Serial Number:  
 Detector Serial Number: 19  
 Env. Background: System Bkgd 64043  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.160E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/12/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:51 PM  
 Acquisition Live Time: 172.9 minutes  
 Acquisition Real Time: 172.9 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000  
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM  
 Effective Efficiency: 0.1659 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.488	21.14	43.64	0.86	0.00E+000	3.9
RA-226	4.623	43.65	29.80	0.35	0.00E+000	3.3

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

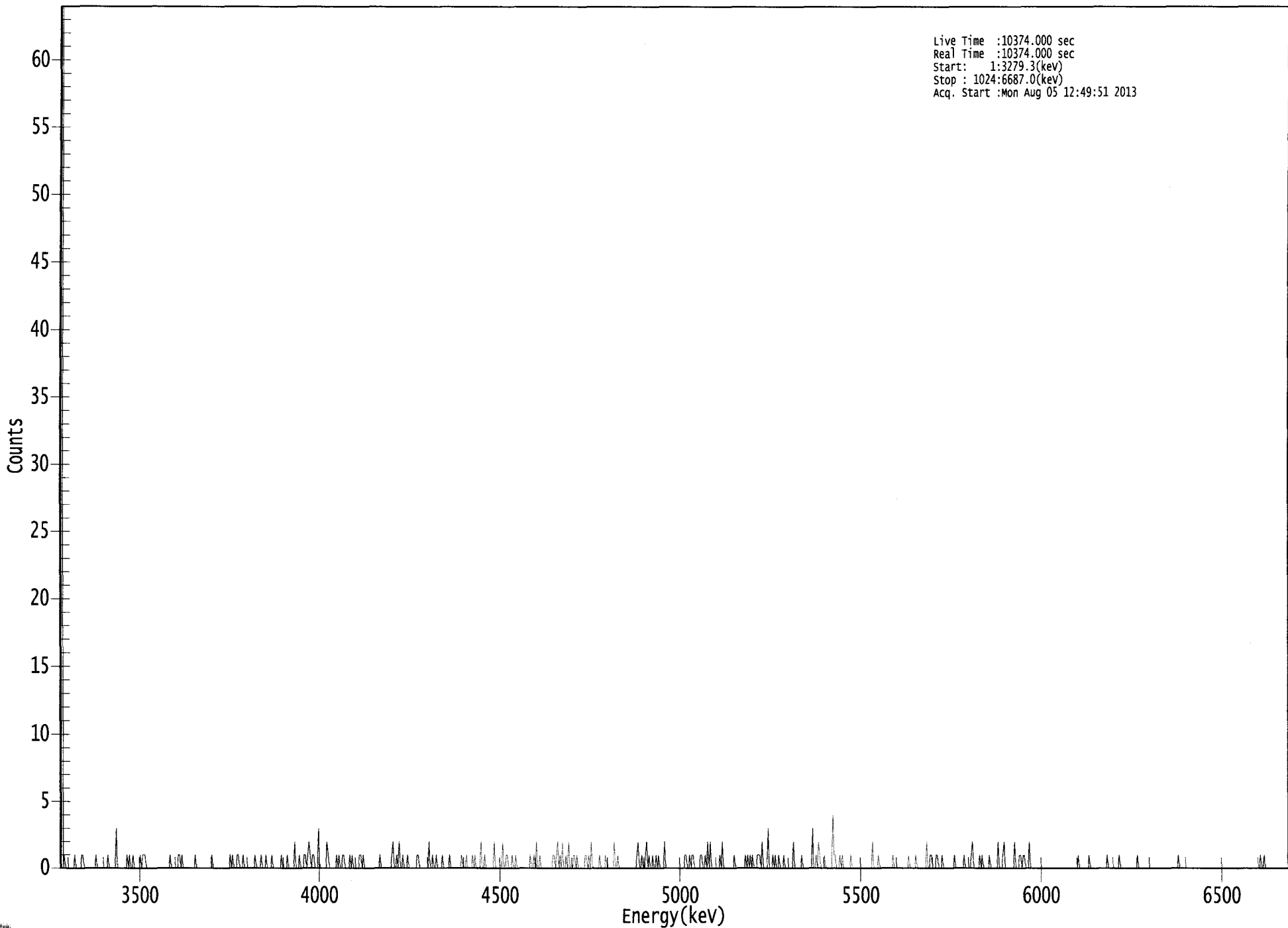
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.950	5685.50*	7.60E-001 +/- 3.33E-001	2.16E-001 +/- 7.53E-003
RA-226	0.966	4785.00*	1.48E+000 +/- 4.44E-001	1.63E-001 +/- 5.65E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065168.CNF

Live Time :10374.000 sec  
Real Time :10374.000 sec  
Start: 1:3279.3(kev)  
Stop : 1024:6687.0(kev)  
Acq. Start :Mon Aug 05 12:49:51 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: 10374

Elapsed Real Time: 10374

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10374	10374	0	1	0	0	0	0
9:	0	0	0	0	1	0	0	0
17:	0	0	1	1	0	0	0	0
25:	0	0	0	0	0	0	1	0
33:	0	0	0	0	0	0	0	0
41:	1	0	0	0	0	0	0	3
49:	0	0	0	0	0	0	0	0
57:	1	0	1	0	0	1	0	0
65:	0	0	0	1	0	1	1	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	1	0	0	0
97:	0	0	0	1	1	0	1	0
105:	0	0	0	0	0	0	0	0
113:	0	1	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	1	0
145:	1	0	0	0	1	1	0	0
153:	0	1	0	0	0	0	0	0
161:	0	0	0	1	0	0	0	0
169:	1	0	0	0	1	0	0	0
177:	0	1	0	0	0	0	0	0
185:	0	1	0	0	0	0	1	0
193:	0	0	0	0	2	0	0	0
201:	1	0	0	0	1	1	0	1
209:	2	1	0	1	1	0	0	0
217:	3	0	0	0	0	0	0	2
225:	1	0	0	0	0	0	0	1
233:	0	1	0	0	1	1	0	0
241:	0	0	1	0	1	0	0	0
249:	0	0	1	1	0	1	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	1	2	0
281:	0	1	0	2	0	0	1	0
289:	0	0	1	0	0	0	0	0
297:	0	0	1	1	0	0	0	0
305:	0	0	0	0	2	0	0	1
313:	0	0	1	0	0	0	0	1
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	0	0	0	1
337:	0	0	0	1	0	0	0	0
345:	1	0	1	0	0	0	0	2
353:	0	0	1	0	0	0	0	0
361:	0	0	2	0	0	0	0	0

369: 0 2 0 0 1 1 0 0

Sample Title: 05

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

801: 1 0 1 1 0 0 0 2

Sample Title: 05

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



C  
8/6/13

Sample Description: PZ-114-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 06  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_022  
 Chamber Serial Number:  
 Detector Serial Number: 22  
 Env. Background: System Bkgd 64044  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.000E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/12/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:52 PM  
 Acquisition Live Time: 172.9 minutes  
 Acquisition Real Time: 172.9 minutes

Chem. Recovery Factor: 0.8514 +/- 0.0000  
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM  
 Effective Efficiency: 0.1304 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.521	4.41	121.39	2.59	0.00E+000	3.1
RA-226	4.548	13.44	56.97	1.56	0.00E+000	3.1

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	1.87E-001 +/- 2.27E-001	3.58E-001 +/- 1.34E-002
RA-226	0.929	4785.00*	5.37E-001 +/- 3.07E-001	2.86E-001 +/- 1.07E-002

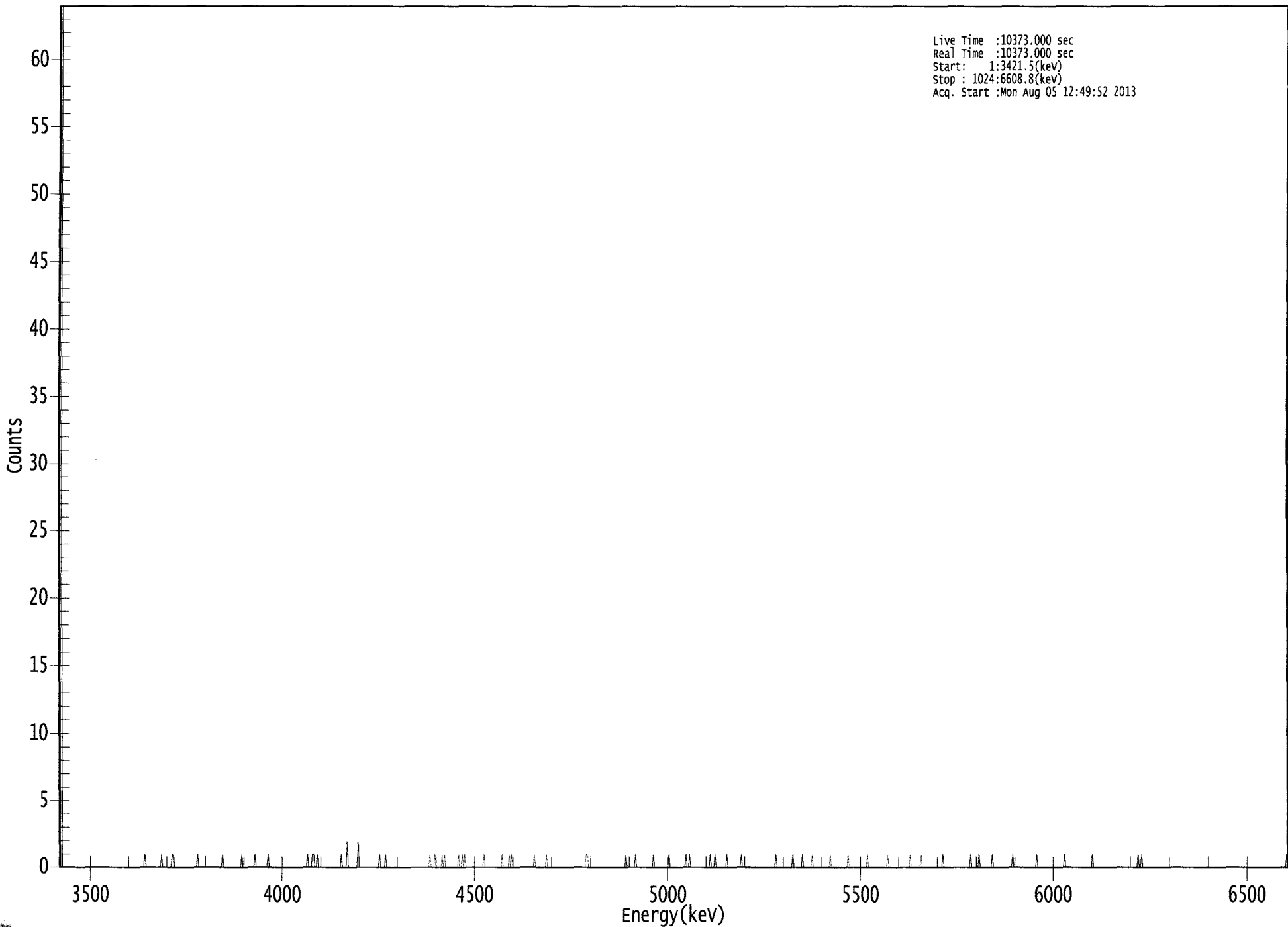
AG  
8/6/13

US EPA ARCHIVE DOCUMENT



0000065169.CNF

Live Time :10373.000 sec  
Real Time :10373.000 sec  
Start: 1:3421.5(kev)  
Stop : 1024:6608.8(kev)  
Acq. Start :Mon Aug 05 12:49:52 2013



5169

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: 10373

Elapsed Real Time: 10373

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10373	10373	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	1	0	0
89:	0	0	0	0	0	0	1	1
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:	1	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	0	1	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	1
209:	0	0	0	1	1	0	0	1
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	2	0	0	0	0	0	0	0
249:	0	2	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:	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	1	0	0
313:	0	1	0	0	0	0	0	1
321:	0	1	0	0	0	0	0	0
329:	0	0	0	0	0	1	0	0
337:	1	0	1	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 1 0 0 0 0 0 1

Sample Title: 06

Channel	1	2	3	4	5	6	7	8
377:	0	1	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	1
441:	1	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	0	0	0	0	0	0	0
481:	1	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	1
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	1	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	1	0	0	1	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	1	0
545:	0	0	1	0	0	0	0	0
553:	0	0	0	0	1	0	0	0
561:	0	0	0	0	0	0	0	0
569:	1	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	1	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	1	0	0	0	0
617:	0	0	0	1	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	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	1	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	1	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	1	0	0
713:	0	0	0	0	0	0	1	0
721:	0	0	0	0	0	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	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	0	0	1	0
769:	0	0	0	0	0	0	0	0
777:	0	1	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	1	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	1	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	1	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	1	0	0	1	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	1	0	0



c  
8/6/13

Sample Description: PZ-114-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 07  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_023  
 Chamber Serial Number:  
 Detector Serial Number: 23  
 Env. Background: System Bkgd 64045  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.160E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/12/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:53 PM  
 Acquisition Live Time: 172.9 minutes  
 Acquisition Real Time: 172.9 minutes

Chem. Recovery Factor: 0.8945 +/- 0.0000  
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM  
 Effective Efficiency: 0.1530 +/- 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	5.515	5.41	105.36	2.59	0.00E+000	3.1
RA-226	4.628	5.10	104.07	1.90	0.00E+000	3.1

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 NUCLIDE ANALYSIS RESULTS  
 -----

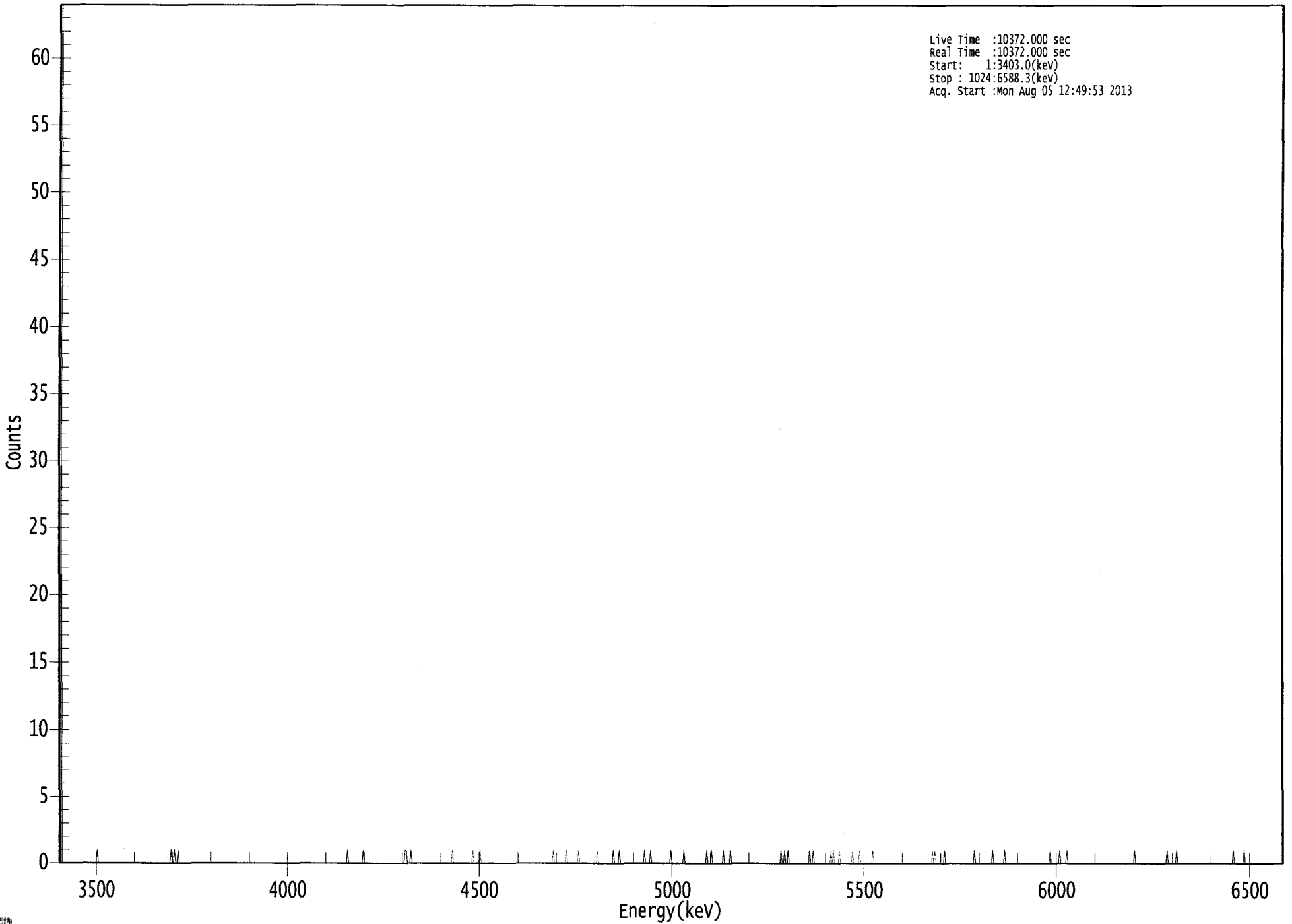
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.963	5685.50*	2.11E-001 +/- 2.22E-001	3.29E-001 +/- 1.14E-002
RA-226	0.969	4785.00*	1.88E-001 +/- 1.95E-001	2.80E-001 +/- 9.69E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065166.CNF

Live Time :10372.000 sec  
Real Time :10372.000 sec  
Start: 1:3403.0(kev)  
Stop : 1024:6588.3(kev)  
Acq. Start :Mon Aug 05 12:49:53 2013



0373

ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 07

Elapsed Live time: 10372

Elapsed Real Time: 10372

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10372	10372	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	1	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	1	0	0	1	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	1	0	0	0	0	0
249:	0	0	0	0	0	0	0	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	1	1	0	0	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	1	0	0	0	0
353:	0	1	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 07

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



801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0
833:	0	0	0	0	0	1	0	0
841:	0	0	0	1	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	1	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	1	0
929:	0	0	0	0	0	0	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	1	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



C  
8/6/13

Sample Description: I-66 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 08  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_024  
 Chamber Serial Number:  
 Detector Serial Number: 24  
 Env. Background: System Bkgd 64046  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.400E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:54 PM  
 Acquisition Live Time: 172.8 minutes  
 Acquisition Real Time: 172.8 minutes

Chem. Recovery Factor: 0.8967 +/- 0.0000  
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM  
 Effective Efficiency: 0.1534 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.528	7.62	78.21	1.38	0.00E+000	3.1
RA-226	4.657	8.10	77.78	1.90	0.00E+000	3.1

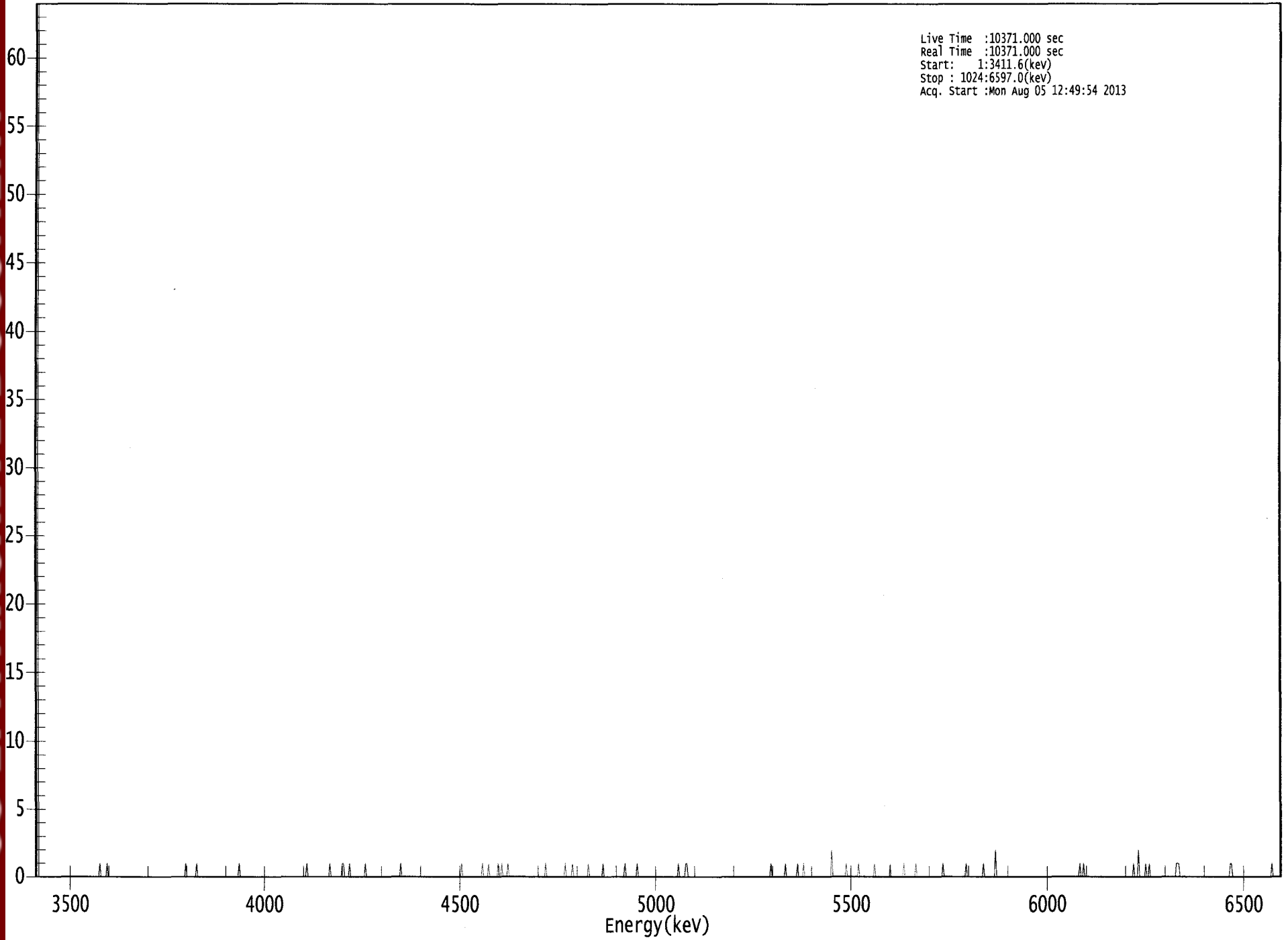
-----  
 NUCLIDE ANALYSIS RESULTS  
 -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	3.29E-001 +/- 2.58E-001	2.98E-001 +/- 1.09E-002
RA-226	0.979	4785.00*	3.30E-001 +/- 2.57E-001	3.11E-001 +/- 1.14E-002

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

Live Time :10371.000 sec  
Real Time :10371.000 sec  
Start: 1:3411.6(kev)  
Stop : 1024:6597.0(kev)  
Acq. Start :Mon Aug 05 12:49:54 2013



ROI Type: 1

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

Sample Title:    08

Elapsed Live time:        10371

Elapsed Real Time:       10371

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10371	10371	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	1	0	0
57:	0	0	0	1	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	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	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:	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:	1	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	0	0	0
249:	0	0	0	0	0	1	1	0
257:	0	0	0	1	0	0	0	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	1	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 1 0 0 0 0 1 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

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



C  
8/6/13

Sample Description: I-66 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 09  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_025  
 Chamber Serial Number:  
 Detector Serial Number: 25  
 Env. Background: System Bkgd 64047  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.440E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:55 PM  
 Acquisition Live Time: 172.8 minutes  
 Acquisition Real Time: 172.8 minutes

Chem. Recovery Factor: 0.9094 +/- 0.0000  
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM  
 Effective Efficiency: 0.1578 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.485	5.10	104.06	1.90	0.00E+000	4.7
RA-226	4.632	8.31	71.24	0.69	0.00E+000	3.1

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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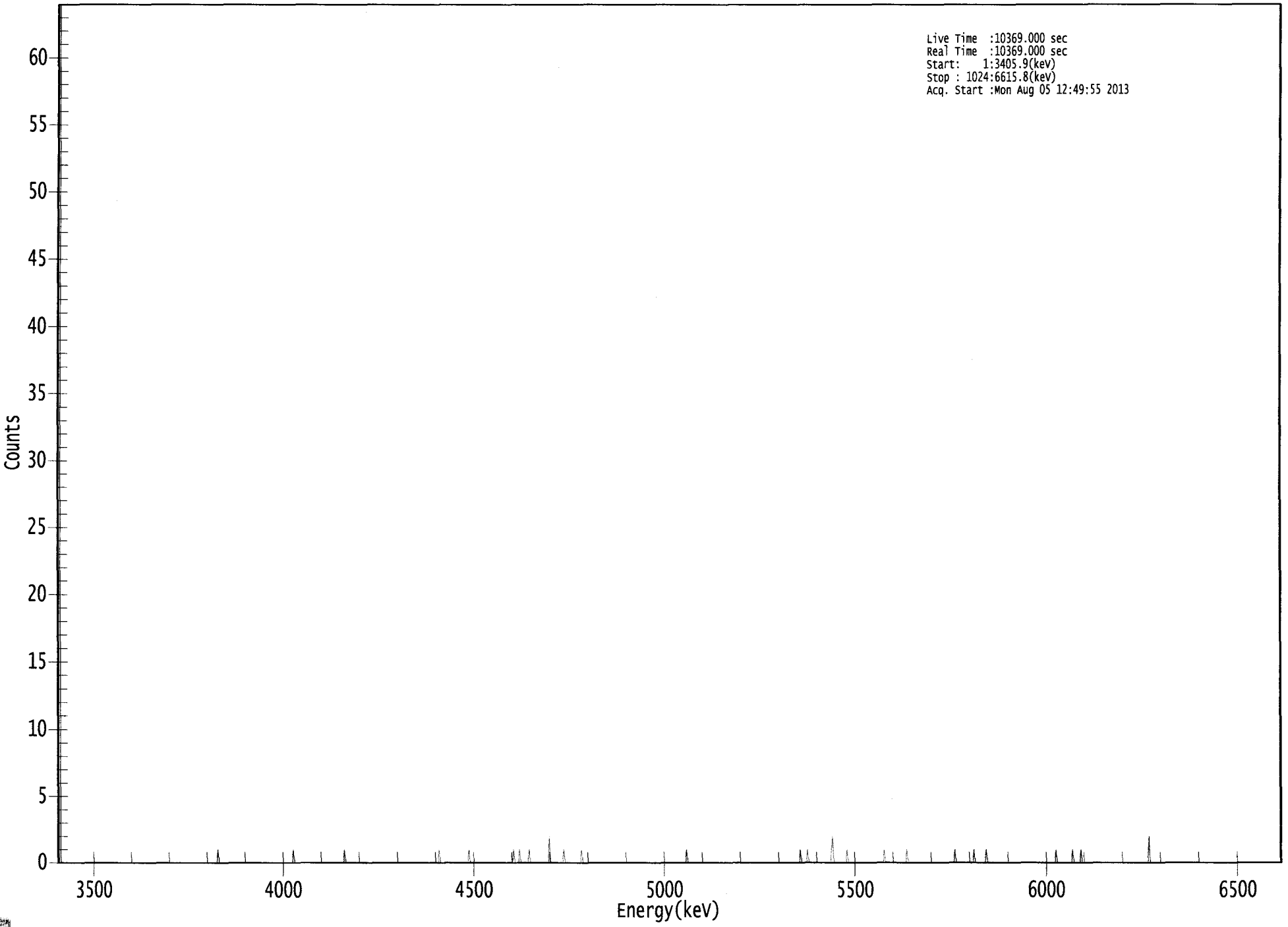
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.949	5685.50*	2.18E-001 +/- 2.27E-001	3.25E-001 +/- 1.19E-002
RA-226	0.970	4785.00*	3.35E-001 +/- 2.39E-001	2.28E-001 +/- 8.35E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

000065171.CNF

Live Time :10369.000 sec  
Real Time :10369.000 sec  
Start: 1:3405.9(kev)  
Stop : 1024:6615.8(kev)  
Acq. Start :Mon Aug 05 12:49:55 2013



5302

ROI Type: 1



\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title:    09

Elapsed Live time:        10369

Elapsed Real Time:       10369

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10369	10369	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	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	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	1	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	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: 09

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1
385:	0	0	0	1	0	0	0
393:	0	0	0	1	0	0	0
401:	0	0	0	0	0	0	0
409:	0	0	0	0	2	0	0
417:	0	0	0	0	0	0	0
425:	1	0	0	0	0	0	0
433:	0	0	0	0	0	0	1
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	1
529:	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0
585:	0	0	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	1
625:	0	0	0	0	1	0	0
633:	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0
649:	1	2	0	0	0	0	0
657:	0	0	0	0	0	1	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	1	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0
721:	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	1
753:	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	1
769:	0	0	0	0	0	0	0
777:	0	1	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 0

Sample Title: 09

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



✓  
8/6/13

Sample Description: MW-102 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 10  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_027  
 Chamber Serial Number:  
 Detector Serial Number: 27  
 Env. Background: System Bkgd 64048  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.040E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:56 PM  
 Acquisition Live Time: 172.8 minutes  
 Acquisition Real Time: 172.8 minutes

Chem. Recovery Factor: 0.7910 +/- 0.0000  
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM  
 Effective Efficiency: 0.1366 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.521	7.93	79.58	2.07	0.00E+000	3.2
RA-226	4.619	28.10	38.41	1.90	0.00E+000	4.8

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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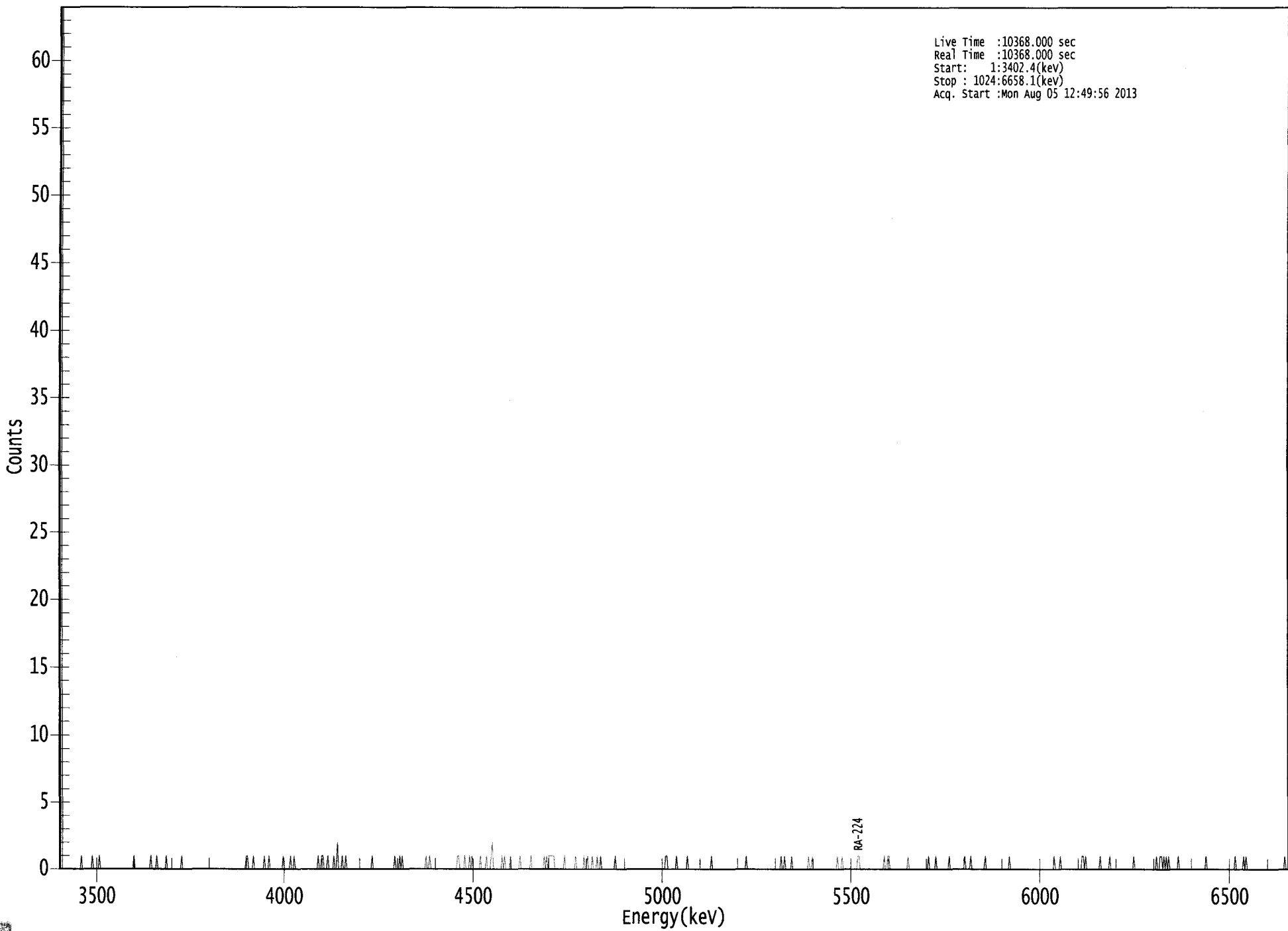
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.965	5685.50*	3.27E-001 +/- 2.60E-001	3.23E-001 +/- 1.19E-002
RA-226	0.965	4785.00*	1.09E+000 +/- 4.22E-001	2.96E-001 +/- 1.09E-002

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8/6/13

US EPA ARCHIVE DOCUMENT

0000065172.CNF

Live Time :10368.000 sec  
Real Time :10368.000 sec  
Start: 1:3402.4(kev)  
Stop : 1024:6658.1(kev)  
Acq. Start :Mon Aug 05 12:49:56 2013



0000065172

ROI Type: 1

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

Sample Title: 10

Elapsed Live time: 10368

Elapsed Real Time: 10368

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10368	10368	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	1	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	1	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0	0
81:	0	1	0	0	0	0	0	0
89:	0	1	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	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	1	0	0
161:	0	0	1	0	0	0	0	0
169:	0	0	0	1	0	0	0	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	1	0	0	0	0
193:	0	1	0	0	1	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	1	1	0	0	0
225:	1	0	0	0	0	1	0	0
233:	2	0	0	0	1	0	0	1
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	1	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	1	0	0	0	1	0	1	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	1	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	1	1	0	0
337:	0	0	1	0	0	0	1	0
345:	1	0	0	0	0	0	0	1
353:	0	0	0	0	1	0	0	0
361:	1	2	0	0	0	0	0	0

369: 0 1 0 1 0 0 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 10

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





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8/6/13

Sample Description: MW-102 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 11  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_029  
 Chamber Serial Number:  
 Detector Serial Number: 29  
 Env. Background: System Bkgd 64049  
 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: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:57 PM  
 Acquisition Live Time: 172.8 minutes  
 Acquisition Real Time: 172.8 minutes

Chem. Recovery Factor: 0.9122 +/- 0.0000  
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM  
 Effective Efficiency: 0.1775 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.517	5.93	95.61	2.07	0.00E+000	3.1
RA-226	4.580	9.65	64.39	0.35	0.00E+000	3.1

-----  
 NUCLIDE ANALYSIS RESULTS  
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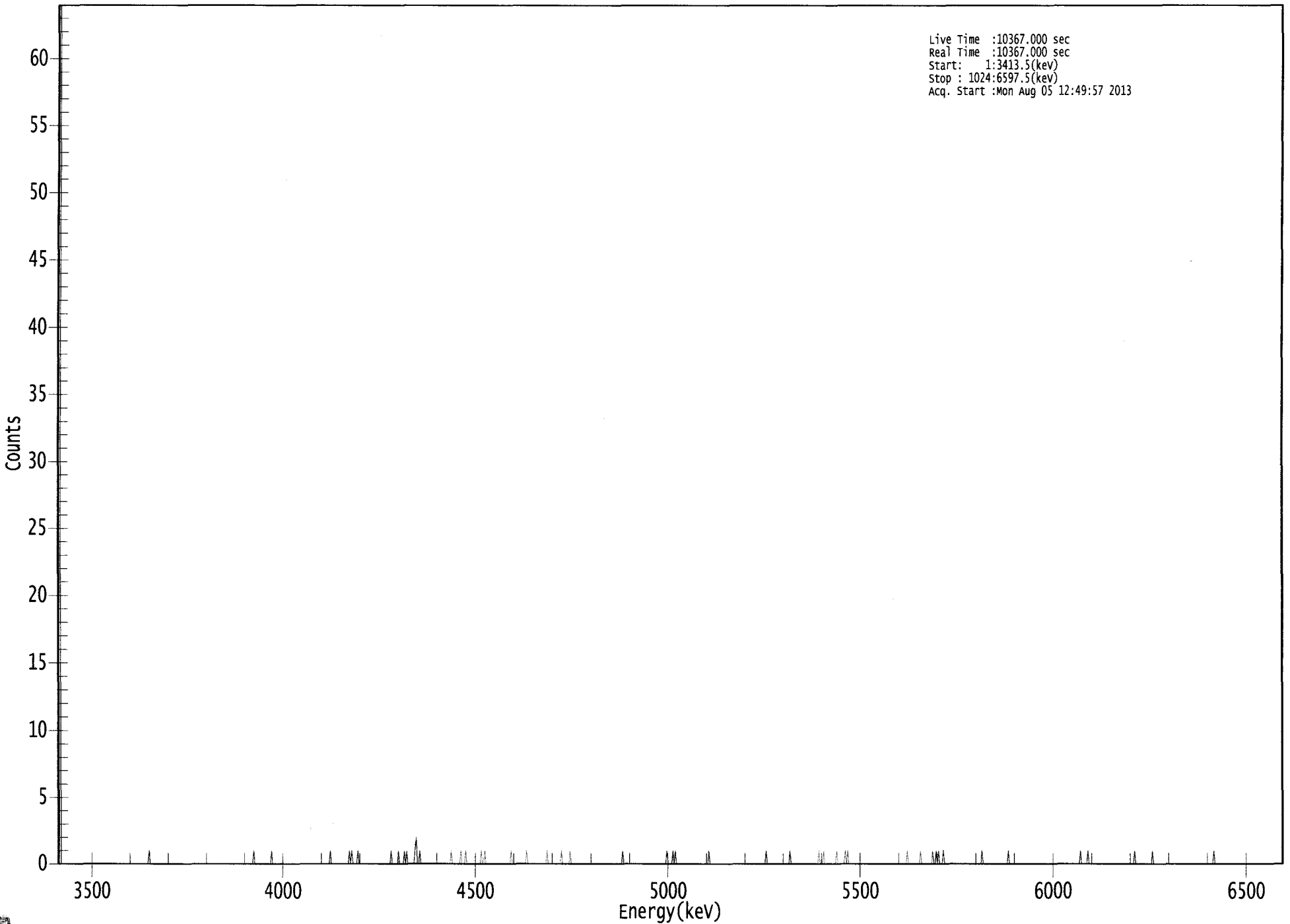
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	2.16E-001 +/- 2.06E-001	2.85E-001 +/- 1.03E-002
RA-226	0.946	4785.00*	3.32E-001 +/- 2.14E-001	1.65E-001 +/- 5.94E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065167.CNF

Live Time :10367.000 sec  
Real Time :10367.000 sec  
Start: 1:3413.5(kev)  
Stop : 1024:6597.5(kev)  
Acq. Start :Mon Aug 05 12:49:57 2013



5599

ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 11

Elapsed Live time: 10367

Elapsed Real Time: 10367

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10367	10367	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	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	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	1	0	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	1	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	1	0
249:	0	0	0	1	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	1
281:	0	0	0	0	0	1	0	0
289:	0	0	1	0	1	0	0	0
297:	0	0	0	1	2	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	1	0	0	0	0	0	0
337:	0	1	0	0	0	1	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	1	0	0	1	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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



C  
8/6/13

Sample Description: MW-103 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 12  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_031  
 Chamber Serial Number:  
 Detector Serial Number: 31  
 Env. Background: System Bkgd 64050  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:49:58 PM  
 Acquisition Live Time: 172.8 minutes  
 Acquisition Real Time: 172.8 minutes

Chem. Recovery Factor: 0.9184 +/- 0.0000  
 Counting Efficiency: 0.1418 +/- 0.0034 on 6/13/2013 3:23:29 PM  
 Effective Efficiency: 0.1303 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.536	21.31	43.26	0.69	0.00E+000	6.3
RA-226	4.652	15.93	52.73	2.07	0.00E+000	3.1

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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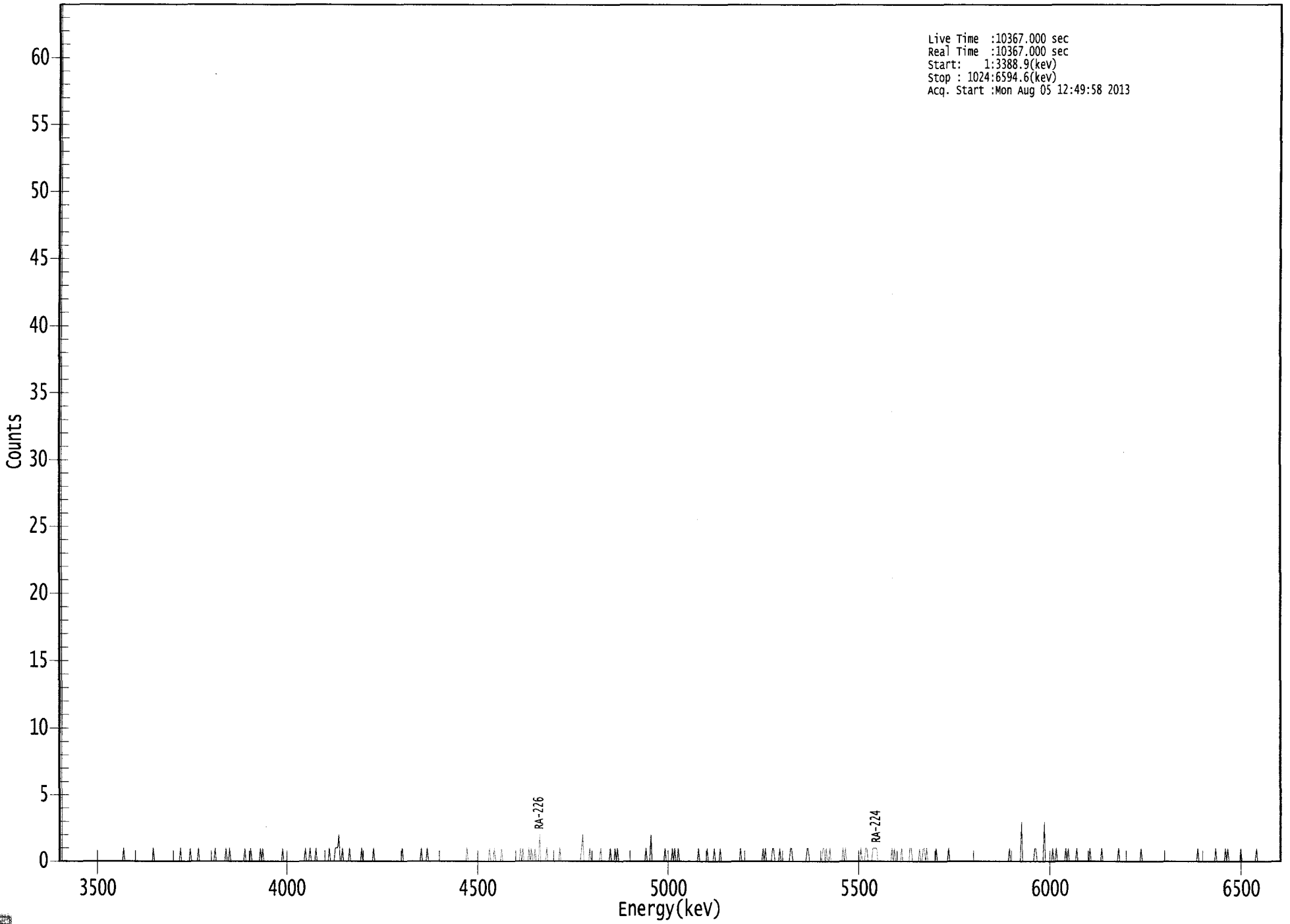
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.971	5685.50*	9.93E-001 +/- 4.32E-001	2.64E-001 +/- 1.26E-002
RA-226	0.977	4785.00*	7.01E-001 +/- 3.71E-001	3.45E-001 +/- 1.64E-002

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065164.CNF

Live Time :10367.000 sec  
Real Time :10367.000 sec  
Start: 1:3388.9(kev)  
Stop : 1024:6594.6(kev)  
Acq. Start :Mon Aug 05 12:49:58 2013



0550

ROI Type: 1

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

Sample Title: 12

Elapsed Live time: 10367

Elapsed Real Time: 10367

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10367	10367	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	1
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	1	0
105:	0	0	0	0	0	0	1	0
113:	0	0	0	0	0	1	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	1	0	0	1
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	1	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	1	0	1	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	1	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	1	0	0	0	0
217:	1	0	0	0	0	0	0	0
225:	0	0	0	1	0	0	0	0
233:	1	1	1	2	0	0	1	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	1	0
257:	0	0	0	0	0	0	0	0
265:	1	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	1	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	1	0	0



369: 0 0 0 1 0 0 0 0

Sample Title: 12

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

801: 0 0 0 0 0 0 0 3 0

Sample Title: 12

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



# Apex-Alpha™

C  
8/6/13

Sample Description: MW-103 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 13  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_047  
 Chamber Serial Number: 02030596A  
 Detector Serial Number: 91086  
 Env. Background: System Bkgd 64062  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.960E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:50:11 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8867 +/- 0.0000  
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM  
 Effective Efficiency: 0.1615 +/- 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	5.447	2.83	120.53	0.17	0.00E+000	2.9
RA-226	4.659	4.32	102.62	0.68	0.00E+000	2.9

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

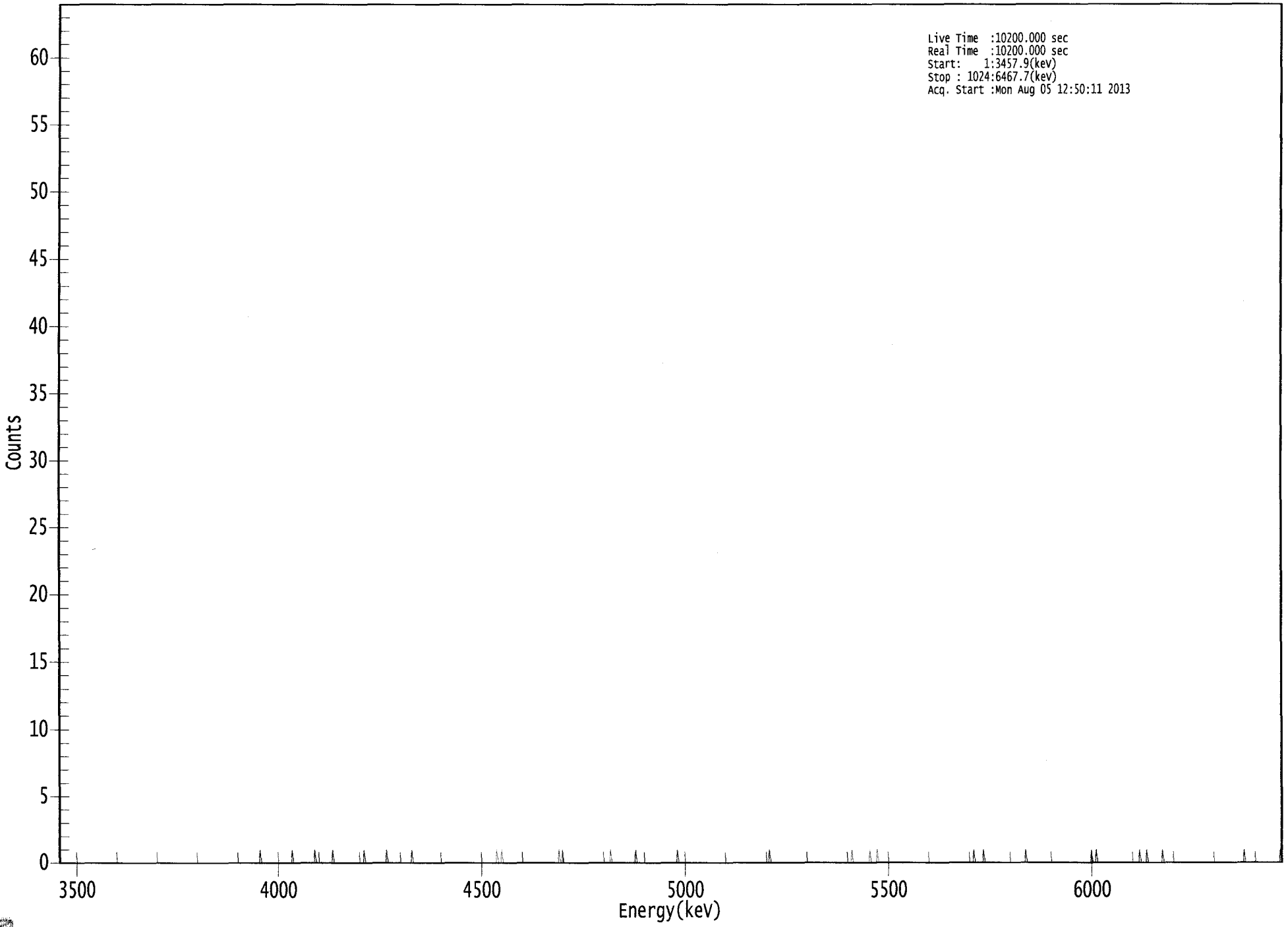
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.928	5685.50*	1.46E-001 +/- 1.75E-001	2.15E-001 +/- 7.38E-003
RA-226	0.979	4785.00*	2.10E-001 +/- 2.15E-001	2.74E-001 +/- 9.40E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065173.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3457.9(kev)  
Stop : 1024:6467.7(kev)  
Acq. Start :Mon Aug 05 12:50:11 2013



5079

ROI Type: 1

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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	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	1	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	1
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	1	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	1	0	0	0	0	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	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	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 1 0 0 0 0

Sample Title: 13

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	1	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	1	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	1	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	1	0
521:	0	0	0	0	0	0	0	0
529:	0	0	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	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	1	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	1
681:	0	0	0	0	0	1	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	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	1	0
769:	0	0	0	0	0	0	1	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 13

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	0	0	0	0
865:	1	0	0	0	1	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	1	0	0	0	0	0	1	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	1
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	1	0	0



C  
8/16/13

Sample Description: PZ-303-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 14  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_048  
 Chamber Serial Number: 02030596B  
 Detector Serial Number: 83111  
 Env. Background: System Bkgd 64063  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.790E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 12:50:13 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8653 +/- 0.0000  
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM  
 Effective Efficiency: 0.1453 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.566	9.32	66.89	0.68	0.00E+000	3.0
RA-226	4.585	19.83	44.23	0.17	0.00E+000	3.0

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.981	5685.50*	5.02E-001 +/- 3.36E-001	3.04E-001 +/- 1.05E-002
RA-226	0.949	4785.00*	1.01E+000 +/- 4.48E-001	2.12E-001 +/- 7.35E-003

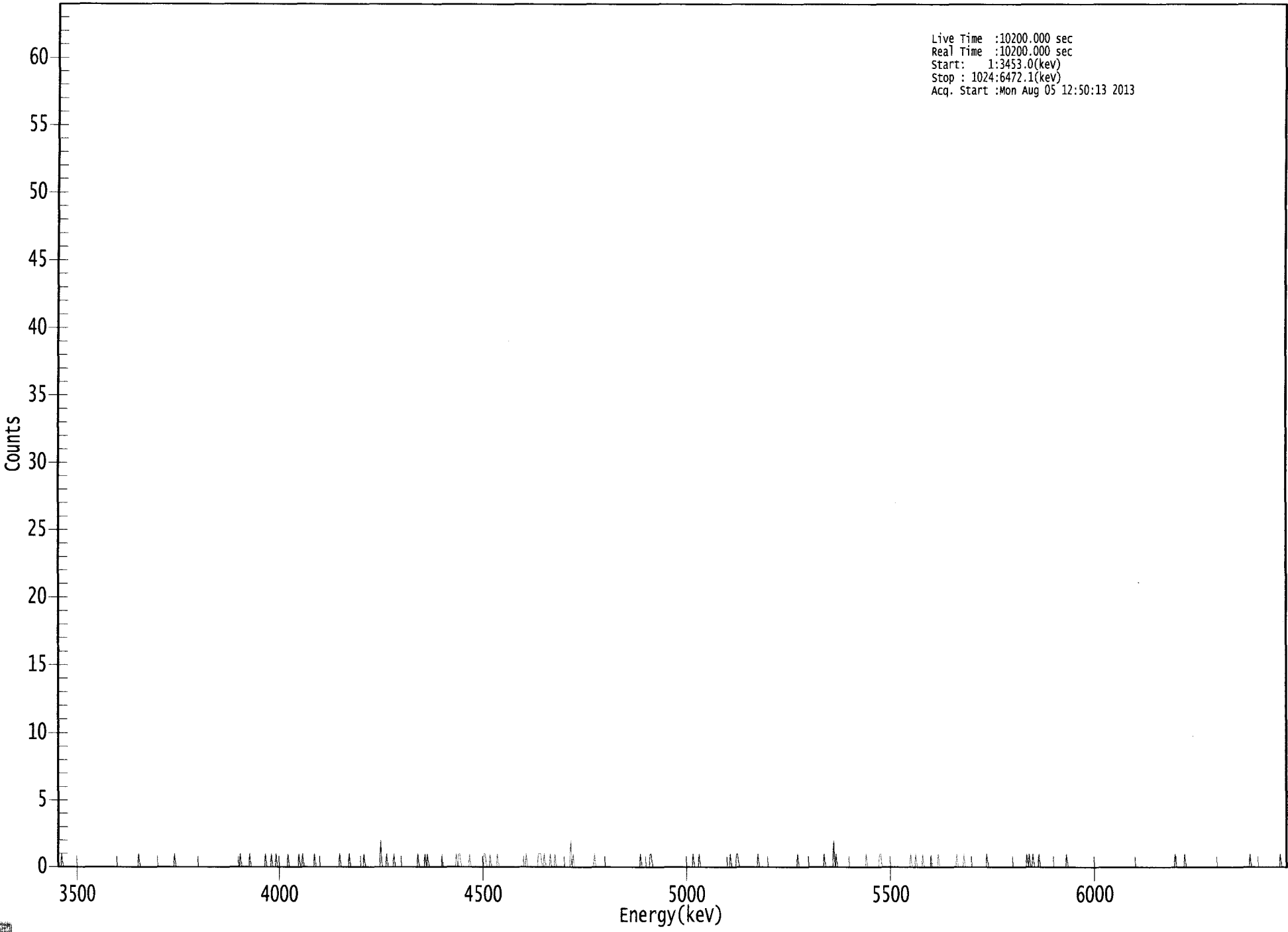
AG  
8/6/13

US EPA ARCHIVE DOCUMENT



0000065174.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3453.0(kev)  
Stop : 1024:6472.1(kev)  
Acq. Start :Mon Aug 05 12:50:13 2013



ROI Type: 1

0405

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 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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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	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	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	1	0	0	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0
177:	0	0	0	1	0	0	0	1
185:	0	0	0	0	0	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	0	1	0	0	1	0	0
209:	0	0	0	0	0	0	0	1
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	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	1	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	2	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	1	0	0
305:	0	0	0	1	0	1	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	1	0	1
337:	1	0	0	0	0	0	0	0
345:	1	0	0	0	0	0	0	0
353:	0	0	0	0	1	1	0	0
361:	0	1	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0 1

Sample Title: 14

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	1	0	0	1	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:	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	1	0	0	0	0	0
937:	0	0	1	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	1	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	1	0	0	0	0	0	0



C  
8/6/13

Sample Description: PZ-303-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 15  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_003  
 Chamber Serial Number:  
 Detector Serial Number: 3  
 Env. Background: System Bkgd 64034  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.790E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:32 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8903 +/- 0.0000  
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM  
 Effective Efficiency: 0.1555 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

-----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.577	8.58	84.72	4.42	0.00E+000	3.0
RA-226	4.602	11.32	60.27	0.68	0.00E+000	3.0

-----  
 NUCLIDE ANALYSIS RESULTS  
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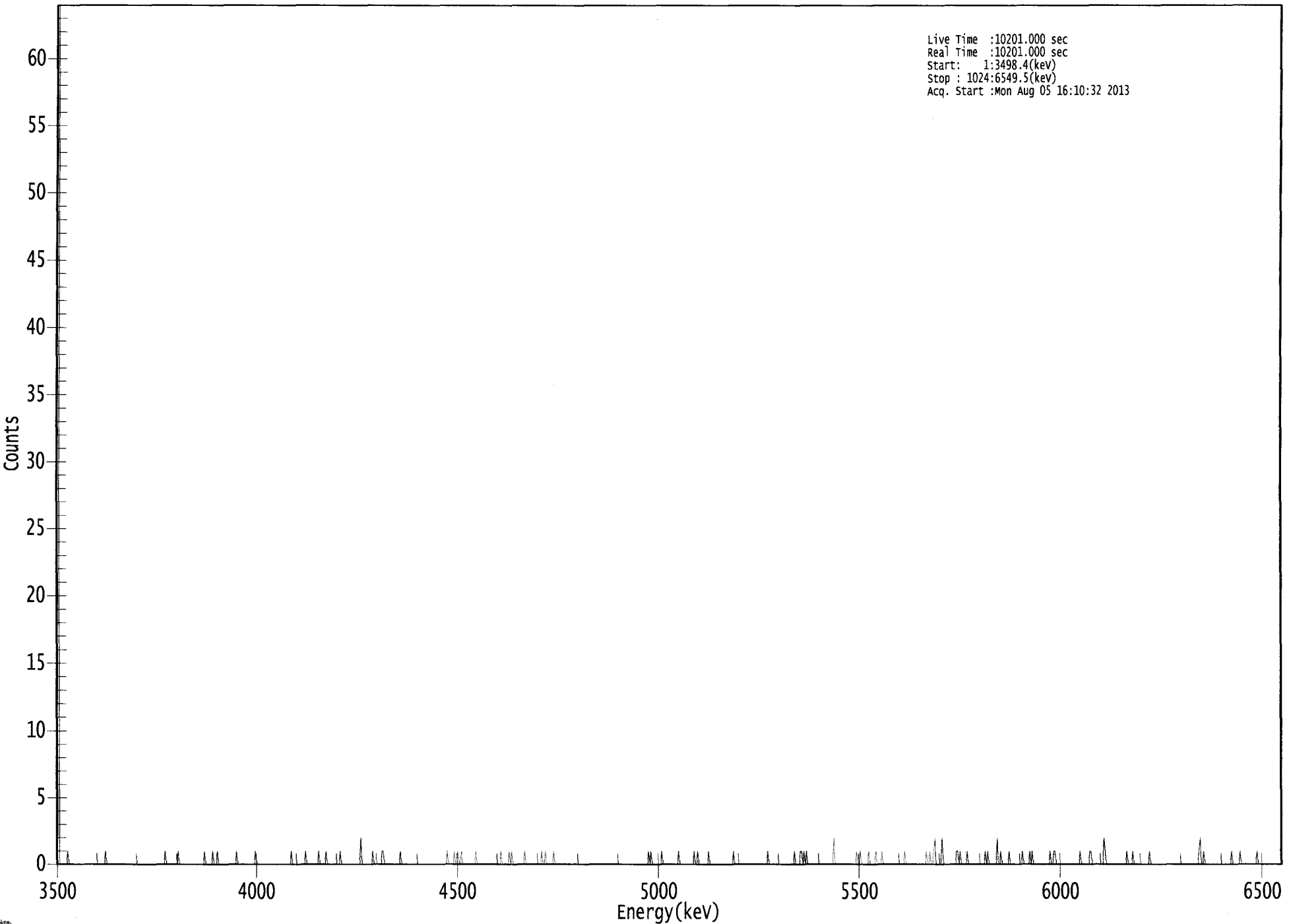
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.985	5685.50*	4.32E-001 +/- 3.66E-001	5.13E-001 +/- 1.88E-002
RA-226	0.957	4785.00*	5.38E-001 +/- 3.25E-001	2.68E-001 +/- 9.82E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

000065179.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3498.4(kev)  
Stop : 1024:6549.5(kev)  
Acq. Start :Mon Aug 05 16:10:32 2013



ROI Type: 1

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 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title: 15

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	1	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	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	1	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	1	0	0	0
129:	0	0	0	1	0	0	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	1
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0
217:	0	0	0	0	1	0	0	0
225:	0	0	1	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	2
257:	0	0	0	0	0	0	0	0
265:	0	1	0	0	0	0	0	0
273:	0	1	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	1
329:	0	0	0	0	0	1	0	0
337:	1	0	0	1	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 1 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	0	1	0	0
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	1	0
409:	0	1	0	0	0	0	0	0
417:	1	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	1
497:	0	1	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:	1	0	0	0	0	0	0	0
529:	0	0	0	0	0	1	0	0
537:	1	0	0	0	0	0	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	1	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	1	0	0	0	0	1	1
625:	0	1	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	2	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	1	0	0	0	0	0	0	1
681:	0	0	0	0	0	1	0	0
689:	0	0	1	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	1	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	1
729:	0	0	1	0	0	1	2	0
737:	0	0	0	0	2	0	0	0
745:	0	0	0	0	0	0	0	0
753:	1	1	0	1	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	1	0	0	0	0	0
785:	0	0	2	0	0	1	0	0
793:	0	0	0	0	1	0	0	0



801: 0 0 0 0 0 0 0 0 1

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	1
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	1	0
833:	0	1	1	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	0	0	0	0	1
865:	1	0	0	0	0	0	0	0
873:	0	0	0	2	1	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	1	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	1	2	0	0	1	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	1	0	0
985:	0	0	0	0	1	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	1	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C  
B/6/13

Sample Description: I-11 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 16  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_004  
 Chamber Serial Number:  
 Detector Serial Number: 4  
 Env. Background: System Bkgd 64035  
 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: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:33 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9595 +/- 0.0000  
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM  
 Effective Efficiency: 0.1862 +/- 0.0034

Peak Match Tolerance: 0.350 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.527	16.28	53.11	2.72	0.00E+000	2.9
RA-226	4.580	43.13	30.59	1.87	0.00E+000	2.9

-----  
 NUCLIDE ANALYSIS RESULTS  
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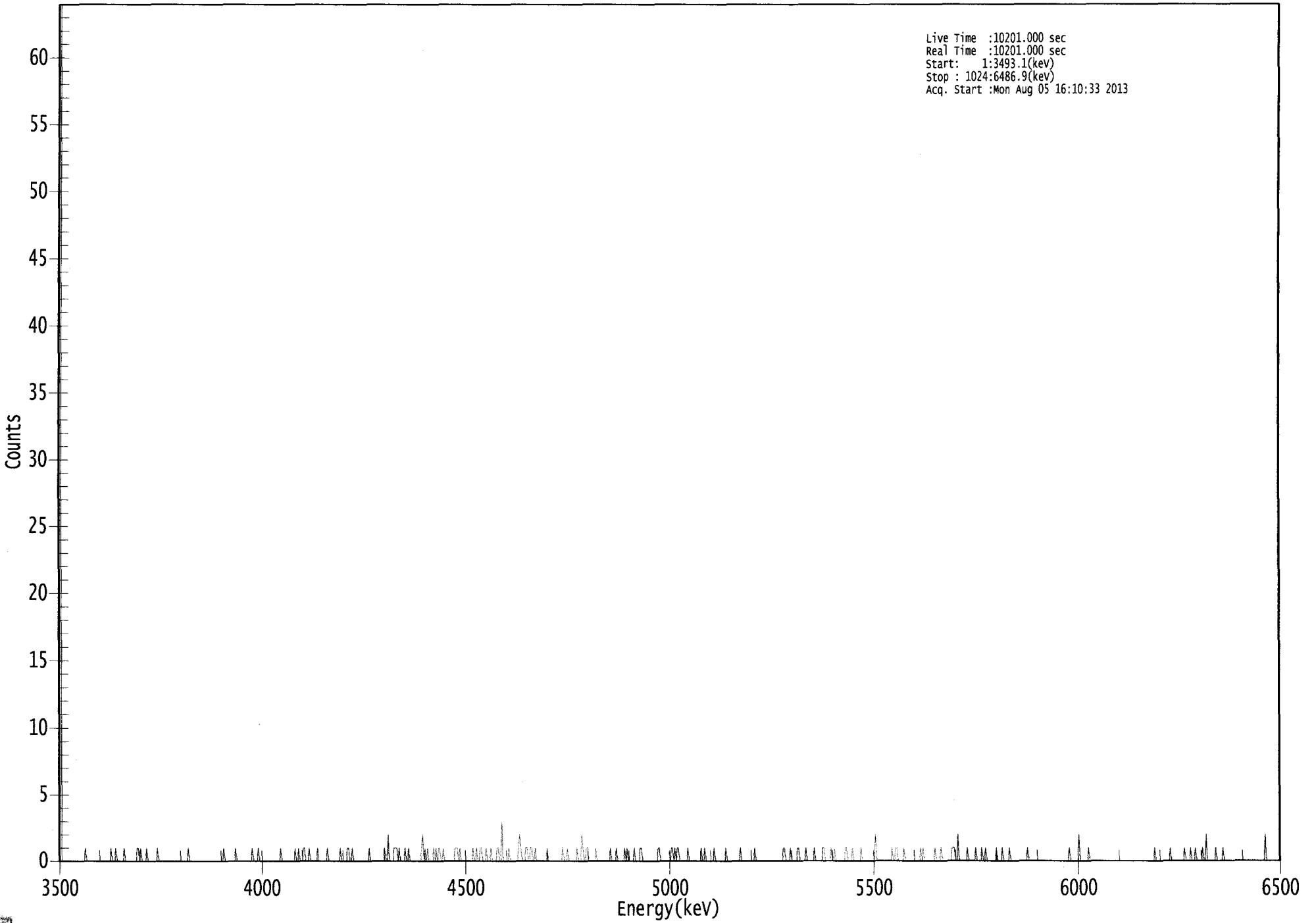
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	5.74E-001 +/- 3.06E-001	3.02E-001 +/- 1.09E-002
RA-226	0.946	4785.00*	1.44E+000 +/- 4.42E-001	2.52E-001 +/- 9.08E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065180.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3493.1(kev)  
Stop : 1024:6486.9(kev)  
Acq. Start :Mon Aug 05 16:10:33 2013



0170

ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 16

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

369: 1 1 0 0 3 0 0 0

Sample Title: 16

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	0	0	0
385:	0	0	1	2	1	0	0	0
393:	1	1	0	0	1	1	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	1	0	0	0	0	0
417:	0	0	0	0	0	0	0	1
425:	0	0	0	1	0	0	0	0
433:	0	0	0	1	0	0	0	2
441:	1	0	0	1	1	0	0	0
449:	0	0	0	1	0	0	0	0
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	1	0	0	0
473:	0	0	0	1	0	1	0	0
481:	0	0	0	1	0	0	0	0
489:	1	1	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	1
505:	1	0	0	0	0	0	0	0
513:	0	0	1	1	0	1	0	1
521:	1	0	0	0	0	0	0	0
529:	1	0	0	0	0	0	0	0
537:	0	0	0	1	0	0	1	0
545:	0	0	0	0	0	0	1	0
553:	0	0	0	0	0	0	0	0
561:	1	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:	1	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	1	1	0	0	0	0	1	0
617:	0	0	0	0	1	1	0	0
625:	0	0	0	1	0	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	1	1	0	0	0	0	0
649:	1	0	0	1	0	0	0	0
657:	0	0	0	0	1	1	0	0
665:	0	0	1	0	0	0	0	0
673:	0	1	0	0	0	0	0	0
681:	0	0	0	0	0	2	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	1	0	0	1	1
705:	0	0	0	0	0	1	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	1	0	1	0	0
729:	0	0	0	0	0	0	0	1
737:	0	0	0	0	1	0	0	0
745:	0	0	0	0	0	1	1	1
753:	0	0	2	0	0	0	0	0
761:	0	0	1	0	0	0	0	0
769:	0	1	0	0	0	0	1	0
777:	0	1	0	0	0	0	0	0
785:	0	0	1	0	0	0	0	1
793:	0	0	0	0	0	1	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	1
849:	0	0	0	0	0	0	0	2
857:	0	0	0	0	0	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	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	0	0
937:	0	0	0	0	0	0	0	1
945:	0	0	0	0	1	0	0	0
953:	1	0	0	0	0	0	1	0
961:	0	2	0	0	0	0	0	0
969:	0	1	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	2	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C  
8/6/13

Sample Description: I-11 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 17  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_010  
 Chamber Serial Number:  
 Detector Serial Number: 10  
 Env. Background: System Bkgd 64036  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.500E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:27 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8911 +/- 0.0000  
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM  
 Effective Efficiency: 0.1753 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.532	16.88	56.94	6.12	0.00E+000	4.4
RA-226	4.592	37.79	32.96	2.21	0.00E+000	2.9

-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
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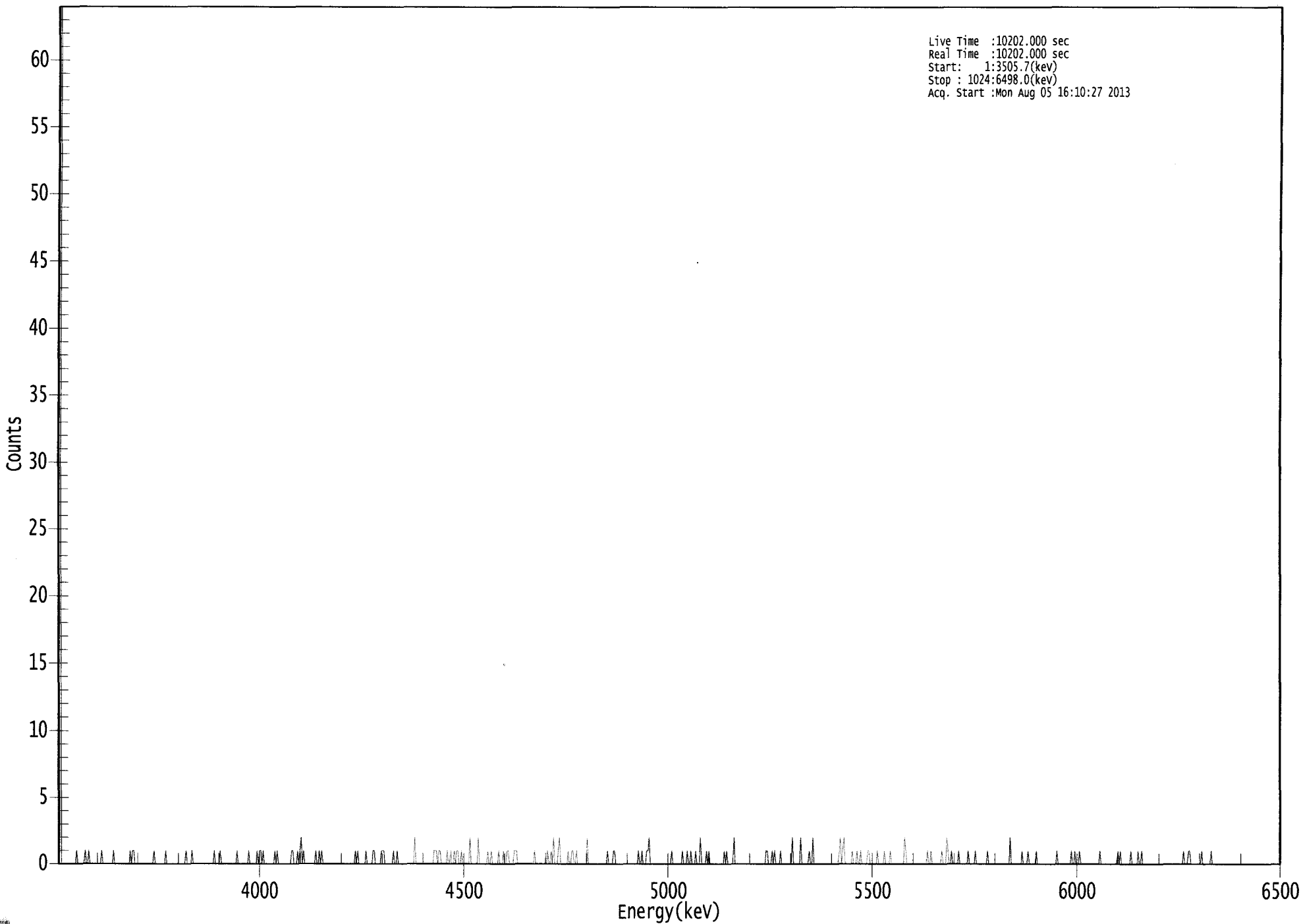
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.970	5685.50*	6.75E-001 +/- 3.85E-001	4.61E-001 +/- 1.65E-002
RA-226	0.953	4785.00*	1.43E+000 +/- 4.73E-001	3.02E-001 +/- 1.08E-002

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065176.CNF

Live Time :10202.000 sec  
Real Time :10202.000 sec  
Start: 1:3505.7(kev)  
Stop : 1024:6498.0(kev)  
Acq. Start :Mon Aug 05 16:10:27 2013



ROI Type: 1

0423



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

Sample Title: 17

Elapsed Live time: 10202

Elapsed Real Time: 10202

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10202	10202	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	1
17:	0	0	0	0	0	0	1	0
25:	0	1	0	0	0	0	0	0
33:	0	0	0	0	1	0	0	0
41:	0	0	0	0	0	0	1	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	1	0	1	1
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	1	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	1	0	0	0	0
113:	1	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:	1	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:	1	0	0	0	0	0	0	1
169:	0	1	1	0	1	0	0	0
177:	0	0	0	0	0	0	1	0
185:	1	0	0	0	0	0	0	0
193:	0	0	0	0	1	1	0	0
201:	0	1	0	1	2	0	1	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	1	0	1	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	0	1	0	0	0	0
257:	0	0	1	0	0	0	0	0
265:	1	1	0	0	0	0	0	1
273:	1	1	0	0	0	0	0	0
281:	0	1	0	0	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	2	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	1	1	0	1
321:	1	0	0	0	0	0	1	0
329:	0	1	0	0	1	0	1	1
337:	0	0	1	0	0	0	0	0
345:	0	2	0	0	0	0	0	0
353:	2	0	0	0	0	0	0	0
361:	1	0	0	1	0	0	0	0

369: 0 1 0 0 0 1 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0 1

Sample Title: 17

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



C  
8/6/13

Sample Description: S-10 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 18  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_011  
 Chamber Serial Number:  
 Detector Serial Number: 11  
 Env. Background: System Bkgd 64037  
 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: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:28 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9126 +/- 0.0000  
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM  
 Effective Efficiency: 0.1872 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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 PEAK AREA REPORT  
 -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.533	4.32	102.62	0.68	0.00E+000	2.6
RA-226	4.659	12.83	55.14	0.17	0.00E+000	2.6

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

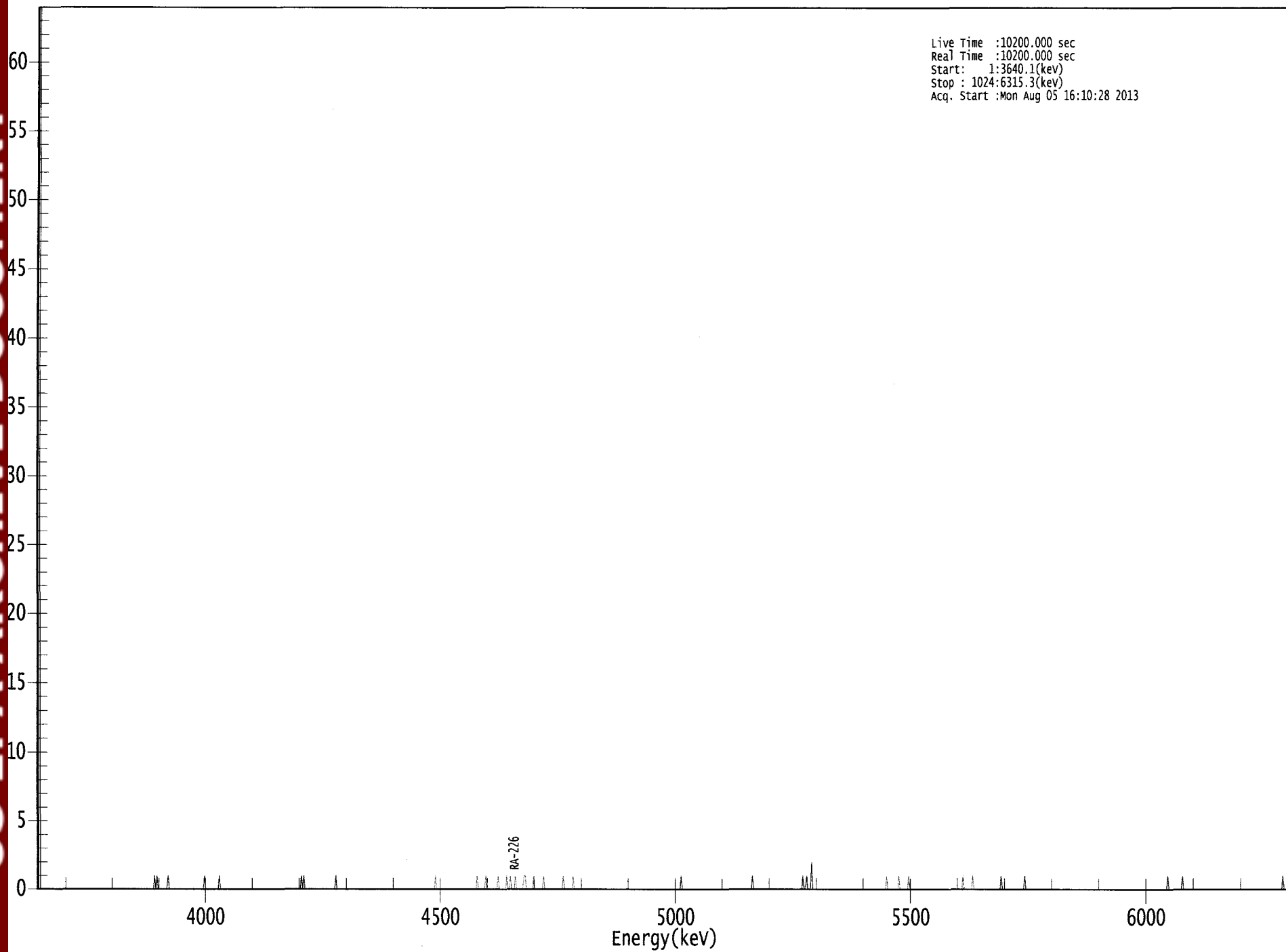
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.970	5685.50*	1.52E-001 +/- 1.56E-001	1.98E-001 +/- 6.71E-003
RA-226	0.979	4785.00*	4.25E-001 +/- 2.35E-001	1.38E-001 +/- 4.67E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3640.1(kev)  
Stop : 1024:6315.3(kev)  
Acq. Start :Mon Aug 05 16:10:28 2013

US EPA ARCHIVE DOCUMENT



ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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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	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	1	0	1	0	0	0	0	0
105:	0	0	0	1	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	1	0	0	0	0	0	0
145:	0	0	0	0	0	1	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	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	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	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	0	0	0	1
361:	0	0	0	0	0	0	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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

801: 0 0 0 0 1 0 0 0

Sample Title: 18

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





C  
8/6/13

Sample Description: S-10 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 19  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_012  
 Chamber Serial Number:  
 Detector Serial Number: 12  
 Env. Background: System Bkgd 64038  
 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: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:30 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9576 +/- 0.0000  
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM  
 Effective Efficiency: 0.1905 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

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 -----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.474	2.32	149.13	0.68	0.00E+000	3.0
RA-226	4.607	4.32	102.62	0.68	0.00E+000	3.0

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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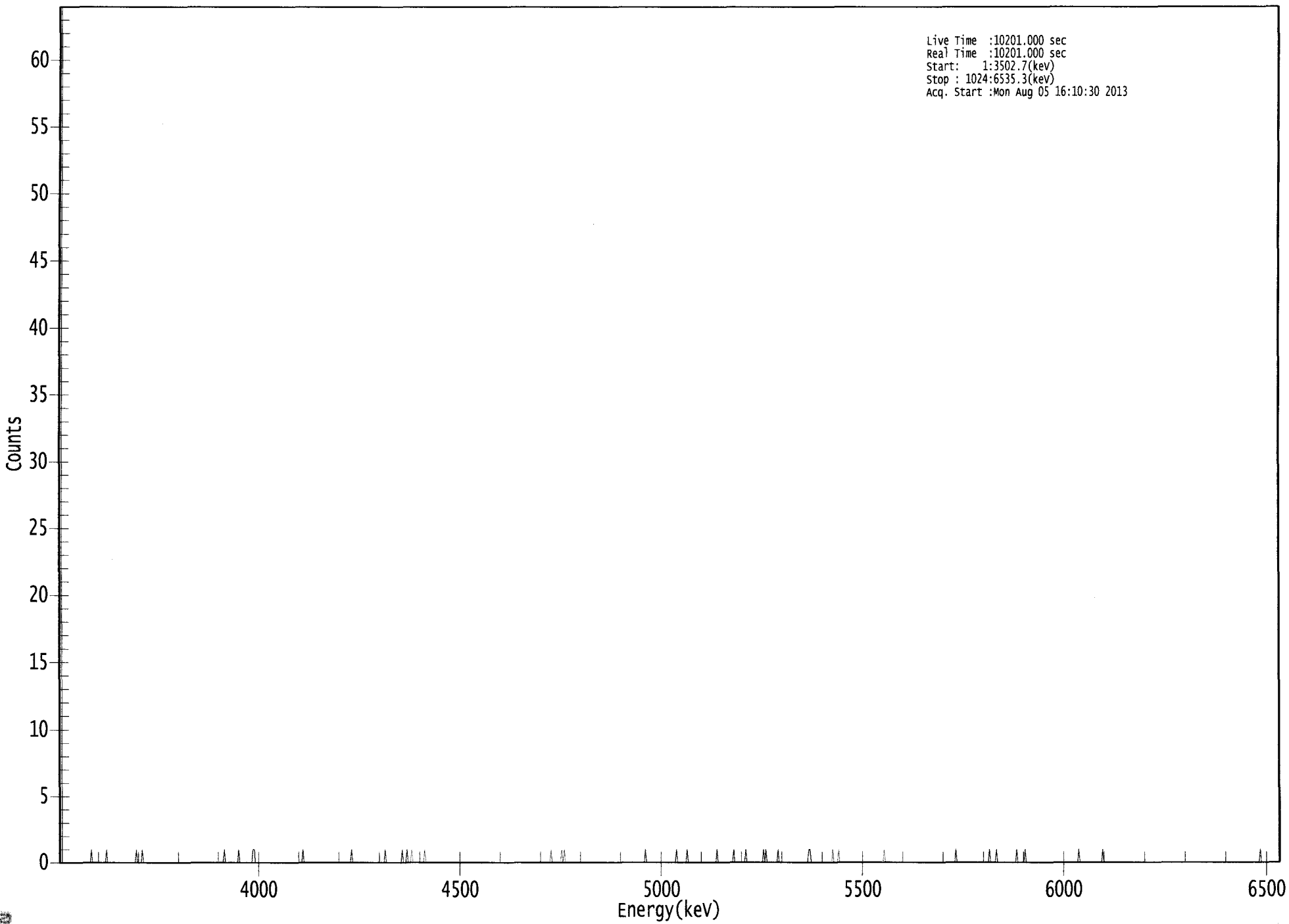
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.943	5685.50*	8.00E-002 +/- 1.19E-001	1.94E-001 +/- 6.62E-003
RA-226	0.959	4785.00*	1.41E-001 +/- 1.44E-001	1.84E-001 +/- 6.23E-003

AG  
8/6/13

US EPA ARCHIVE DOCUMENT

0000065177.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3502.7(kev)  
Stop : 1024:6535.3(kev)  
Acq. Start :Mon Aug 05 16:10:30 2013



ROI Type: 1

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 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title: 19

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 19

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

801: 0 0 0 1 0 0 0 0

Sample Title: 19

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



# Apex-Alpha™

C  
8/6/13

Sample Description: FB AT D-12 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000651  
 Batch Identification: 1307146A-RA  
 Sample Identification: 20  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_013  
 Chamber Serial Number:  
 Detector Serial Number: 13  
 Env. Background: System Bkgd 64039  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 1.660E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 7/15/2013 10:45:58 AM  
 Acquisition Date/Time: 8/5/2013 4:10:31 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9202 +/- 0.0000  
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM  
 Effective Efficiency: 0.1720 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.521	-1.08	348.68	4.08	0.00E+000	2.8
RA-226	4.674	0.81	359.14	1.19	0.00E+000	2.8

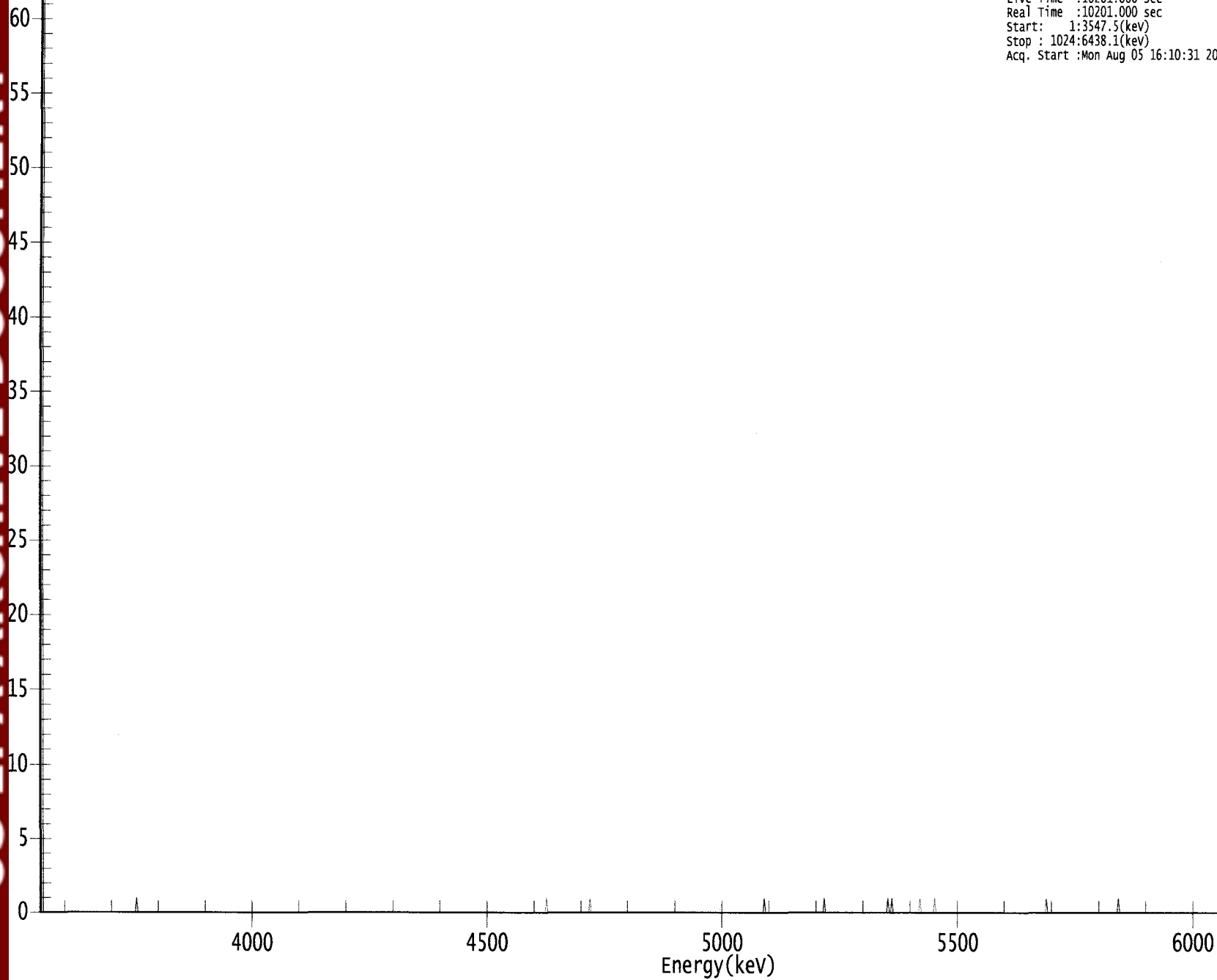
-----  
 ----- NUCLIDE ANALYSIS RESULTS -----  
 -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.965	5685.50*	-2.93E-002 +/- 1.02E-001	2.68E-001 +/- 9.73E-003
RA-226	0.984	4785.00*	2.07E-002 +/- 7.44E-002	1.68E-001 +/- 6.10E-003

AG  
8/6/13

0000065178.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3547.5(kev)  
Stop : 1024:6438.1(kev)  
Acq. Start :Mon Aug 05 16:10:31 2013



US EPA ARCHIVE DOCUMENT

ROI Type: 1

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

Sample Title: 20

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	1	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	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: 20

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1
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	1
417:	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0
545:	0	0	1	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	1
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	1
641:	0	0	1	0	0	0	0
649:	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	1
665:	0	0	0	0	0	0	0
673:	0	0	1	0	0	0	0
681:	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0
753:	0	0	0	0	0	1	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 0

Sample Title: 20

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



## QA SUMMARY REPORT

### Review Of QA Results - Pulser Check

Date : 8/5/2013  
Time : 5:48:22 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/5/2013 5:23:00 AM
Alpha 004	21f	ALL	Passed	8/5/2013 5:23:01 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/5/2013 5:23:02 AM
Alpha 011	21f	ALL	Passed	8/5/2013 5:23:03 AM
Alpha 012	21f	ALL	Passed	8/5/2013 5:23:03 AM
Alpha 013	21f	ALL	Passed	8/5/2013 5:23:04 AM
Alpha 014	21f	ALL	Passed	8/5/2013 5:23:05 AM
Alpha 015	21f	ALL	Passed	8/5/2013 5:23:06 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/5/2013 5:23:07 AM
Alpha 019	AIM730	ALL	Passed	8/5/2013 5:23:08 AM
Alpha 020	AIM730	ALL	Passed	8/2/2013 5:14:08 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/5/2013 5:23:09 AM
Alpha 023	AIM730	ALL	Passed	8/5/2013 5:23:10 AM
Alpha 024	AIM730	ALL	Passed	8/5/2013 5:23:11 AM
Alpha 025	AIM730	ALL	Passed	8/5/2013 5:23:11 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/5/2013 5:23:12 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/5/2013 5:23:13 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/5/2013 5:23:14 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:15 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:16 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:18 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:20 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/5/2013 5:23:21 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:22 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:24 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:26 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:27 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Not Done	
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:29 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:31 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:32 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/5/2013 5:23:34 AM

APPROVED BY: \_\_\_\_\_

APPROVAL DATE: 8/5/13

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\*\*\*\*\* LIBRARY LISTING REPORT \*\*\*\*\*  
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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	13-07146	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra228	01	LCS	LCS		07/23/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/23/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
Lab Deadline	8/13/2013	04	DO	PZ-105-SS TOT	48	07/12/13 09:42	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-105-SS DIS	48	07/12/13 09:42	1.0000E+00
Project	West Lake OU-1	06	TRG	PZ-114-AS TOT	46	07/12/13 10:56	1.0000E+00
Report Level	4	07	TRG	PZ-114-AS DIS	46	07/12/13 10:56	1.0000E+00
Activity Units	pCi	08	TRG	I-66 TOT	42	07/15/13 10:44	1.0000E+00
Aliquot Units	I	09	TRG	I-66 DIS	42	07/15/13 10:44	1.0000E+00
Matrix	WA	10	TRG	MW-102 TOT	41	07/15/13 11:10	1.0000E+00
Method	E904.0	11	TRG	MW-102 DIS	41	07/15/13 11:10	1.0000E+00
Instrument Type	Alpha/Beta GPC	12	TRG	MW-103 TOT	44	07/15/13 11:44	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	MW-103 DIS	44	07/15/13 11:44	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	PZ-303-AS TOT	42	07/15/13 12:20	1.0000E+00
Tracer Act (dpm/g)	991.658	15	TRG	PZ-303-AS DIS	42	07/15/13 12:20	1.0000E+00
Carrier	Yttrium	16	TRG	I-11 TOT	39	07/15/13 13:12	1.0000E+00
Carrier Conc (mg/ml)	34	17	TRG	I-11 DIS	39	07/15/13 13:12	1.0000E+00
		18	TRG	S-10 TOT	44	07/15/13 14:05	1.0000E+00
		19	TRG	S-10 DIS	44	07/15/13 14:05	1.0000E+00
		20	TRG	FB at D-12 TOT	40	07/15/13 14:30	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.

545

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	0.9161	908.5	422.9	103.34	2.000	0.0965	0.1572	0.0607	89.26	92.25	1.00	1.00
02	MBL	0.9106	903.0	413.2	101.58	2.000	0.0969	0.1567	0.0598	87.94	89.33	1.00	1.00
03	DUP	0.9067	899.1	386.1	95.33	2.000	0.0967	0.1494	0.0527	77.50	73.88	1.00	1.00
04	DO	0.9053	897.7	406.1	100.42	2.000	0.0961	0.1528	0.0567	83.38	83.73	1.00	1.00
05	TRG	0.9056	898.0	414.6	102.49	2.000	0.0969	0.1536	0.0567	83.38	85.46	1.00	1.00
06	TRG	0.9066	899.0	344.8	85.14	2.000	0.0965	0.1542	0.0577	84.85	72.25	1.00	1.00
07	TRG	0.9070	899.4	362.4	89.45	2.000	0.0966	0.1526	0.0560	82.35	73.66	1.00	1.00
08	TRG	0.9060	898.4	362.9	89.67	2.000	0.0971	0.1542	0.0571	83.97	75.30	1.00	1.00
09	TRG	0.9020	894.5	366.4	90.94	2.000	0.0967	0.1528	0.0561	82.50	75.02	1.00	1.00
10	TRG	0.9045	897.0	319.6	79.10	2.000	0.0966	0.1550	0.0584	85.88	67.93	1.00	1.00
11	TRG	0.9053	897.7	368.9	91.22	2.000	0.0971	0.1546	0.0575	84.56	77.14	1.00	1.00
12	TRG	0.9068	899.2	372.0	91.84	2.000	0.0963	0.1549	0.0586	86.18	79.14	1.00	1.00
13	TRG	0.9054	897.8	358.6	88.67	2.000	0.0970	0.1547	0.0577	84.85	75.24	1.00	1.00
14	TRG	0.9060	898.4	350.2	86.53	2.000	0.0975	0.1560	0.0585	86.03	74.44	1.00	1.00
15	TRG	0.9037	896.2	359.4	89.03	2.000	0.0964	0.1547	0.0583	85.74	76.33	1.00	1.00
16	TRG	0.9046	897.1	387.7	95.95	2.000	0.0953	0.1535	0.0582	85.59	82.12	1.00	1.00
17	TRG	0.9049	897.4	360.2	89.11	2.000	0.0951	0.1492	0.0541	79.56	70.90	1.00	1.00
18	TRG	0.9057	898.1	369.2	91.26	2.000	0.0950	0.1537	0.0587	86.32	78.78	1.00	1.00
19	TRG	0.9050	897.5	387.1	95.76	2.000	0.0953	0.1546	0.0593	87.21	83.50	1.00	1.00
20	TRG	0.9062	898.6	372.5	92.02	2.000	0.0952	0.1544	0.0592	87.06	80.11	1.00	1.00

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



Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
02	MBL			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
03	DUP			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
04	DO			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
05	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
06	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
07	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
08	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
09	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
10	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
11	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
12	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
13	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
14	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
15	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
16	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
17	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
18	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
19	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	TSMITH
20	TRG			07/30/13 10:26	JWOLFE	08/01/13 14:15	LWALKER	08/12/13 06:34	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: 13-07146-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	7.50E+00	8.32E-01	1.02E+00	8.71E+00	86.04	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	7.34E-01	5.30E-01	1.04E+00					OK	OK
03	RA-228	DUP	PZ-105-SS TOT	pCi/l	1.61E+00	7.20E-01	1.35E+00				NA	OK	
04	RA-228	DO	PZ-105-SS TOT	pCi/l	9.22E-01	6.64E-01	1.32E+00					OK	
05	RA-228	TRG	PZ-105-SS DIS	pCi/l	1.89E+00	6.94E-01	1.28E+00					OK	
06	RA-228	TRG	PZ-114-AS TOT	pCi/l	1.34E+00	7.73E-01	1.50E+00					OK	
07	RA-228	TRG	PZ-114-AS DIS	pCi/l	1.09E+00	6.88E-01	1.34E+00					OK	
08	RA-228	TRG	I-66 TOT	pCi/l	1.59E+00	6.86E-01	1.27E+00					OK	
09	RA-228	TRG	I-66 DIS	pCi/l	8.52E-01	7.23E-01	1.45E+00					OK	
10	RA-228	TRG	MW-102 TOT	pCi/l	1.80E+00	9.23E-01	1.78E+00					OK	
11	RA-228	TRG	MW-102 DIS	pCi/l	1.57E+00	7.59E-01	1.45E+00					OK	
12	RA-228	TRG	MW-103 TOT	pCi/l	1.73E+00	7.36E-01	1.38E+00					OK	
13	RA-228	TRG	MW-103 DIS	pCi/l	1.24E+00	7.84E-01	1.54E+00					OK	
14	RA-228	TRG	PZ-303-AS TOT	pCi/l	1.54E+00	7.19E-01	1.36E+00					OK	
15	RA-228	TRG	PZ-303-AS DIS	pCi/l	1.61E+00	8.38E-01	1.62E+00					OK	
16	RA-228	TRG	I-11 TOT	pCi/l	1.82E+00	7.71E-01	1.45E+00					OK	
17	RA-228	TRG	I-11 DIS	pCi/l	2.91E+00	8.61E-01	1.52E+00					OK	
18	RA-228	TRG	S-10 TOT	pCi/l	2.55E+00	7.80E-01	1.38E+00					OK	
19	RA-228	TRG	S-10 DIS	pCi/l	1.39E+00	6.99E-01	1.34E+00					OK	
20	RA-228	TRG	FB at D-12 TOT	pCi/l	1.20E+00	6.81E-01	1.32E+00					OK	

Run	1	Analysis Code	Ra228	Eberline Services Work Order	13-07146	Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-Ra228-1**

Run	1
Eberline Services Work Order	13-07146
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	07/23/13 00:00	1.00E+00	103.34	89.26	92.25	1.00	8/1/2013 14:15	8/12/2013 6:34
02	RA-228	MBL	07/23/13 00:00	1.00E+00	101.58	87.94	89.33	1.00	8/1/2013 14:15	8/12/2013 6:34
03	RA-228	DUP	07/12/13 09:42	1.00E+00	95.33	77.50	73.88	1.00	8/1/2013 14:15	8/12/2013 6:34
04	RA-228	DO	07/12/13 09:42	1.00E+00	100.42	83.38	83.73	1.00	8/1/2013 14:15	8/12/2013 6:34
05	RA-228	TRG	07/12/13 09:42	1.00E+00	102.49	83.38	85.46	1.00	8/1/2013 14:15	8/12/2013 6:34
06	RA-228	TRG	07/12/13 10:56	1.00E+00	85.14	84.85	72.25	1.00	8/1/2013 14:15	8/12/2013 6:34
07	RA-228	TRG	07/12/13 10:56	1.00E+00	89.45	82.35	73.66	1.00	8/1/2013 14:15	8/12/2013 6:34
08	RA-228	TRG	07/15/13 10:44	1.00E+00	89.67	83.97	75.30	1.00	8/1/2013 14:15	8/12/2013 6:34
09	RA-228	TRG	07/15/13 10:44	1.00E+00	90.94	82.50	75.02	1.00	8/1/2013 14:15	8/12/2013 6:34
10	RA-228	TRG	07/15/13 11:10	1.00E+00	79.10	85.88	67.93	1.00	8/1/2013 14:15	8/12/2013 6:34
11	RA-228	TRG	07/15/13 11:10	1.00E+00	91.22	84.56	77.14	1.00	8/1/2013 14:15	8/12/2013 6:34
12	RA-228	TRG	07/15/13 11:44	1.00E+00	91.84	86.18	79.14	1.00	8/1/2013 14:15	8/12/2013 6:34
13	RA-228	TRG	07/15/13 11:44	1.00E+00	88.67	84.85	75.24	1.00	8/1/2013 14:15	8/12/2013 6:34
14	RA-228	TRG	07/15/13 12:20	1.00E+00	86.53	86.03	74.44	1.00	8/1/2013 14:15	8/12/2013 6:34
15	RA-228	TRG	07/15/13 12:20	1.00E+00	89.03	85.74	76.33	1.00	8/1/2013 14:15	8/12/2013 6:34
16	RA-228	TRG	07/15/13 13:12	1.00E+00	95.95	85.59	82.12	1.00	8/1/2013 14:15	8/12/2013 6:34
17	RA-228	TRG	07/15/13 13:12	1.00E+00	89.11	79.56	70.90	1.00	8/1/2013 14:15	8/12/2013 6:34
18	RA-228	TRG	07/15/13 14:05	1.00E+00	91.26	86.32	78.78	1.00	8/1/2013 14:15	8/12/2013 6:34
19	RA-228	TRG	07/15/13 14:05	1.00E+00	95.76	87.21	83.50	1.00	8/1/2013 14:15	8/12/2013 6:34
20	RA-228	TRG	07/15/13 14:30	1.00E+00	92.02	87.06	80.11	1.00	8/1/2013 14:15	8/12/2013 6:34

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-07146-Ra228-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	08/12/13 11:15		LB4110R	A1	120	571	0.916666667	0.4776
02	RA-228	MBL	08/12/13 11:15		LB4110R	A2	120	147	0.866666667	0.4699
03	RA-228	DUP	08/12/13 11:15		LB4110R	A3	120	206	1.05	0.4809
04	RA-228	DO	08/12/13 11:15		LB4110R	A4	120	201	1.25	0.4732
05	RA-228	TRG	08/12/13 11:15		LB4110R	B1	120	255	1.233333333	0.4754
06	RA-228	TRG	08/12/13 11:15		LB4110R	B2	120	203	1.166666667	0.4658
07	RA-228	TRG	08/12/13 11:15		LB4110R	B3	120	171	0.983333333	0.4713
08	RA-228	TRG	08/12/13 11:15		LB4110R	B4	120	194	0.95	0.4773
09	RA-228	TRG	08/12/13 11:15		LB4110R	C1	120	186	1.2	0.4705
10	RA-228	TRG	08/12/13 11:15		LB4110R	C2	120	258	1.483333333	0.4676
11	RA-228	TRG	08/12/13 11:15		LB4110R	C3	120	224	1.216666667	0.4614
12	RA-228	TRG	08/12/13 11:15		LB4110R	C4	120	236	1.216666667	0.4714
13	RA-228	TRG	08/12/13 11:16		LB4110A	B1	120	218	1.316666667	0.4626
14	RA-228	TRG	08/12/13 11:16		LB4110A	B2	120	197	1.016666667	0.4691
15	RA-228	TRG	08/12/13 11:16		LB4110A	B3	120	247	1.416666667	0.449
16	RA-228	TRG	08/12/13 11:16		LB4110A	B4	120	264	1.4	0.4619
17	RA-228	TRG	08/12/13 11:16		LB4110A	C1	120	272	1.15	0.4667
18	RA-228	TRG	08/12/13 11:16		LB4110A	C2	120	264	1.133333333	0.4578
19	RA-228	TRG	08/12/13 11:16		LB4110A	C3	120	228	1.266666667	0.4699
20	RA-228	TRG	08/12/13 11:16		LB4110A	C4	120	197	1.116666667	0.4692

	Run	1
	Analysis Code	Ra228
Eberline Services Work Order	13-07146	
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	07/23/13 00:00	1.0000	0.9161	908.4579	422.9000	103.34	1.00	1.00
02	MBL	BLANK	07/23/13 00:00	1.0000	0.9106	903.0038	413.2000	101.58	1.00	1.00
03	DUP	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.9067	899.1363	386.1000	95.33	1.00	1.00
04	DO	PZ-105-SS TOT	07/12/13 09:42	1.0000	0.9053	897.7480	406.1000	100.42	1.00	1.00
05	TRG	PZ-105-SS DIS	07/12/13 09:42	1.0000	0.9056	898.0455	414.6000	102.49	1.00	1.00
06	TRG	PZ-114-AS TOT	07/12/13 10:56	1.0000	0.9066	899.0371	344.8000	85.14	1.00	1.00
07	TRG	PZ-114-AS DIS	07/12/13 10:56	1.0000	0.9070	899.4338	362.4000	89.45	1.00	1.00
08	TRG	I-66 TOT	07/15/13 10:44	1.0000	0.9060	898.4421	362.9000	89.67	1.00	1.00
09	TRG	I-66 DIS	07/15/13 10:44	1.0000	0.9020	894.4755	366.4000	90.94	1.00	1.00
10	TRG	MW-102 TOT	07/15/13 11:10	1.0000	0.9045	896.9547	319.6000	79.10	1.00	1.00
11	TRG	MW-102 DIS	07/15/13 11:10	1.0000	0.9053	897.7480	368.9000	91.22	1.00	1.00
12	TRG	MW-103 TOT	07/15/13 11:44	1.0000	0.9068	899.2355	372.0000	91.84	1.00	1.00
13	TRG	MW-103 DIS	07/15/13 11:44	1.0000	0.9054	897.8472	358.6000	88.67	1.00	1.00
14	TRG	PZ-303-AS TOT	07/15/13 12:20	1.0000	0.9060	898.4421	350.2000	86.53	1.00	1.00
15	TRG	PZ-303-AS DIS	07/15/13 12:20	1.0000	0.9037	896.1613	359.4000	89.03	1.00	1.00
16	TRG	I-11 TOT	07/15/13 13:12	1.0000	0.9046	897.0538	387.7000	95.95	1.00	1.00
17	TRG	I-11 DIS	07/15/13 13:12	1.0000	0.9049	897.3513	360.2000	89.11	1.00	1.00
18	TRG	S-10 TOT	07/15/13 14:05	1.0000	0.9057	898.1447	369.2000	91.26	1.00	1.00
19	TRG	S-10 DIS	07/15/13 14:05	1.0000	0.9050	897.4505	387.1000	95.76	1.00	1.00
20	TRG	FB at D-12 TOT	07/15/13 14:30	1.0000	0.9062	898.6405	372.5000	92.02	1.00	1.00



# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-07146</b>	<b>1</b>	<b>Ra228</b>	<b>liters</b>	<b>8/13/2013</b>	<b>JWOLFE</b>

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-105-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-105-SS TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-105-SS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-114-AS TOT	TRG					1.0000E+00	1.0000E+00				
07	PZ-114-AS DIS	TRG					1.0000E+00	1.0000E+00				
08	I-66 TOT	TRG					1.0000E+00	1.0000E+00				
09	I-66 DIS	TRG					1.0000E+00	1.0000E+00				
10	MW-102 TOT	TRG					1.0000E+00	1.0000E+00				
11	MW-102 DIS	TRG					1.0000E+00	1.0000E+00				
12	MW-103 TOT	TRG					1.0000E+00	1.0000E+00				
13	MW-103 DIS	TRG					1.0000E+00	1.0000E+00				
14	PZ-303-AS TOT	TRG					1.0000E+00	1.0000E+00				
15	PZ-303-AS DIS	TRG					1.0000E+00	1.0000E+00				
16	I-11 TOT	TRG					1.0000E+00	1.0000E+00				
17	I-11 DIS	TRG					1.0000E+00	1.0000E+00				
18	S-10 TOT	TRG					1.0000E+00	1.0000E+00				
19	S-10 DIS	TRG					1.0000E+00	1.0000E+00				
20	FB at D-12 TOT	TRG					1.0000E+00	1.0000E+00				

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

0455

# Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
<b>13-07146</b>	<b>1</b>	<b>Ra228</b>	<b>Yttirum</b>	<b>34.0000</b>	<b>TSMITH</b>

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	0.0965	0.1572	0.0607	89.26
02	BLANK	MBL	2.0000	0.0969	0.1567	0.0598	87.94
03	DUP	DUP	2.0000	0.0967	0.1494	0.0527	77.50
04	PZ-105-SS TOT	DO	2.0000	0.0961	0.1528	0.0567	83.38
05	PZ-105-SS DIS	TRG	2.0000	0.0969	0.1536	0.0567	83.38
06	PZ-114-AS TOT	TRG	2.0000	0.0965	0.1542	0.0577	84.85
07	PZ-114-AS DIS	TRG	2.0000	0.0966	0.1526	0.0560	82.35
08	I-66 TOT	TRG	2.0000	0.0971	0.1542	0.0571	83.97
09	I-66 DIS	TRG	2.0000	0.0967	0.1528	0.0561	82.50
10	MW-102 TOT	TRG	2.0000	0.0966	0.1550	0.0584	85.88
11	MW-102 DIS	TRG	2.0000	0.0971	0.1546	0.0575	84.56
12	MW-103 TOT	TRG	2.0000	0.0963	0.1549	0.0586	86.18
13	MW-103 DIS	TRG	2.0000	0.0970	0.1547	0.0577	84.85
14	PZ-303-AS TOT	TRG	2.0000	0.0975	0.1560	0.0585	86.03
15	PZ-303-AS DIS	TRG	2.0000	0.0964	0.1547	0.0583	85.74
16	I-11 TOT	TRG	2.0000	0.0953	0.1535	0.0582	85.59
17	I-11 DIS	TRG	2.0000	0.0951	0.1492	0.0541	79.56
18	S-10 TOT	TRG	2.0000	0.0950	0.1537	0.0587	86.32
19	S-10 DIS	TRG	2.0000	0.0953	0.1546	0.0593	87.21
20	FB at D-12 TOT	TRG	2.0000	0.0952	0.1544	0.0592	87.06

Technician: 

Date: 8, 12, 13



8/12/13  
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Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307146-09	9	186	120	1400	8/12/13 13:15
C2	1307146-10	21	258	120	1400	8/12/13 13:15
C3	1307146-11	11	224	120	1400	8/12/13 13:15
A1	1307146-01	15	571	120	1400	8/12/13 13:15
C4	1307146-12	7	236	120	1400	8/12/13 13:15
A2	1307146-02	15	147	120	1400	8/12/13 13:15
A3	1307146-03	14	206	120	1400	8/12/13 13:15
A4	1307146-04	10	201	120	1400	8/12/13 13:15
B1	1307146-05	21	255	120	1400	8/12/13 13:15
B2	1307146-06	11	203	120	1400	8/12/13 13:15
B3	1307146-07	6	171	120	1400	8/12/13 13:15
B4	1307146-08	8	194	120	1400	8/12/13 13:15

8/12/13  
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Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1307146-13	11	218	120	1400	8/12/13 13:16
B2	1307146-14	15	197	120	1400	8/12/13 13:16
B3	1307146-15	15	247	120	1400	8/12/13 13:16
B4	1307146-16	16	264	120	1400	8/12/13 13:16
C1	1307146-17	22	272	120	1400	8/12/13 13:16
C2	1307146-18	30	264	120	1400	8/12/13 13:16
C3	1307146-19	10	228	120	1400	8/12/13 13:16
C4	1307146-20	16	197	120	1400	8/12/13 13:16

*c*  
*8/12/13*

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/12/2013	8.33E-02	P	-2.13E+01	2.83E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/12/2013	5.00E-02	P	-1.81E+01	2.54E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/12/2013	0.00E+00	P	-1.76E+01	2.17E-01	1.81E+01
LB4110A - A4	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-1.87E+01	2.37E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/12/2013	1.67E-02	P	-9.69E-02	7.52E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/12/2013	5.00E-02	P	-7.81E-02	7.22E-02	2.22E-01
LB4110A - B3	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-6.30E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-1.40E-01	7.88E-02	2.98E-01
LB4110A - C1	Alpha	11/18/2007	8/12/2013	0.00E+00	P	-1.49E-01	8.86E-02	3.26E-01
LB4110A - C2	Alpha	11/18/2007	8/12/2013	8.33E-02	P	-1.77E-01	8.66E-02	3.50E-01
LB4110A - C3	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-1.72E-01	1.00E-01	3.73E-01
LB4110A - C4	Alpha	11/18/2007	8/12/2013	1.67E-02	P	-6.27E-02	6.83E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-5.36E-02	8.33E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/12/2013	0.00E+00	P	-6.99E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/12/2013	3.33E-02	P	-4.85E-02	7.07E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/12/2013	1.67E-02	P	-5.73E-02	7.03E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/12/2013	1.00E-01	P	-9.81E-02	1.01E-01	3.00E-01
LB4110R - A2	Alpha	11/24/2006	8/12/2013	6.67E-02	P	-8.92E-02	7.64E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/12/2013	6.67E-02	P	-7.32E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/12/2013	8.33E-02	P	-5.27E-02	7.08E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/12/2013	6.67E-02	P	-9.42E-02	6.16E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	8/12/2013	3.33E-02	P	-6.94E-02	6.33E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/12/2013	3.33E-02	P	-6.48E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/12/2013	1.67E-02	P	-6.38E-02	7.02E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/12/2013	8.33E-02	P	-7.68E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/12/2013	5.00E-02	P	-7.55E-02	7.10E-02	2.17E-01
LB4110R - C3	Alpha	11/24/2006	8/12/2013	3.33E-02	P	-8.78E-02	8.44E-02	2.57E-01
LB4110R - C4	Alpha	11/24/2006	8/12/2013	5.00E-02	P	-6.18E-02	8.12E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/12/2013	0.00E+00	P	-1.03E-01	7.02E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/12/2013	0.00E+00	P	-7.78E-02	6.96E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/12/2013	0.00E+00	P	-8.28E-02	6.94E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/12/2013	0.00E+00	P	-7.52E-02	7.42E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

GPC Detector Report  
(ALL Backgrounds)

*C*  
*8/12/13*

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/12/2013	9.07E+00	P	-2.89E+02	7.63E+00	3.04E+02
LB4110A - A2	Beta	11/18/2007	8/12/2013	3.53E+00	P	-3.03E+01	2.59E+00	3.55E+01
LB4110A - A3	Beta	11/18/2007	8/12/2013	1.65E+00	P	-5.02E+01	2.63E+00	5.54E+01
LB4110A - A4	Beta	11/18/2007	8/12/2013	7.10E+00	P	-3.24E+01	3.21E+00	3.89E+01
LB4110A - B1	Beta	11/18/2007	8/12/2013	1.32E+00	P	-1.04E+01	3.23E+00	1.68E+01
LB4110A - B2	Beta	11/18/2007	8/12/2013	1.02E+00	P	-7.63E+00	2.00E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/12/2013	1.42E+00	P	1.16E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/12/2013	1.40E+00	P	-7.62E+00	1.97E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/12/2013	1.15E+00	P	-5.39E+00	2.12E+00	9.62E+00
LB4110A - C2	Beta	11/18/2007	8/12/2013	1.13E+00	P	3.81E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/12/2013	1.27E+00	P	4.71E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/12/2013	1.12E+00	P	-1.75E+00	2.10E+00	5.95E+00
LB4110A - D1	Beta	11/18/2007	8/12/2013	1.73E+00	P	-2.31E+00	2.56E+00	7.44E+00
LB4110A - D2	Beta	11/18/2007	8/12/2013	1.28E+00	P	-6.41E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/12/2013	4.97E+00	P	1.29E+00	4.48E+00	7.66E+00
LB4110A - D4	Beta	11/18/2007	8/12/2013	1.12E+00	P	-4.24E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/12/2013	9.17E-01	P	-6.08E+01	3.67E+00	6.82E+01
LB4110R - A2	Beta	11/24/2006	8/12/2013	8.67E-01	P	-4.83E+01	2.01E+00	5.23E+01
LB4110R - A3	Beta	11/24/2006	8/12/2013	1.05E+00	P	-4.47E+01	2.73E+00	5.02E+01
LB4110R - A4	Beta	11/24/2006	8/12/2013	1.25E+00	P	-4.46E+01	1.99E+00	4.86E+01
LB4110R - B1	Beta	11/24/2006	8/12/2013	1.23E+00	P	-4.69E+01	2.02E+00	5.10E+01
LB4110R - B2	Beta	11/24/2006	8/12/2013	1.17E+00	P	-4.69E+01	2.05E+00	5.10E+01
LB4110R - B3	Beta	11/24/2006	8/12/2013	9.83E-01	P	-4.67E+01	2.65E+00	5.20E+01
LB4110R - B4	Beta	11/24/2006	8/12/2013	9.50E-01	P	-4.70E+01	1.92E+00	5.09E+01
LB4110R - C1	Beta	11/24/2006	8/12/2013	1.20E+00	P	-4.68E+01	2.96E+00	5.28E+01
LB4110R - C2	Beta	11/24/2006	8/12/2013	1.48E+00	P	-4.68E+01	2.71E+00	5.22E+01
LB4110R - C3	Beta	11/24/2006	8/12/2013	1.22E+00	P	-4.73E+01	2.52E+00	5.23E+01
LB4110R - C4	Beta	11/24/2006	8/12/2013	1.22E+00	P	-5.33E+01	2.95E+00	5.92E+01
LB4110R - D1	Beta	11/24/2006	8/12/2013	0.00E+00	P	-4.45E+01	5.56E+00	5.56E+01
LB4110R - D2	Beta	11/24/2006	8/12/2013	0.00E+00	P	-4.78E+01	1.88E+00	5.15E+01
LB4110R - D3	Beta	11/24/2006	8/12/2013	0.00E+00	P	-5.11E+01	5.53E+00	6.22E+01
LB4110R - D4	Beta	11/24/2006	8/12/2013	0.00E+00	P	-4.75E+01	2.23E+00	5.19E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

*8/12/13*

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/12/2013	0.2465	P	-0.0130	0.2159	0.4447
LB4110A - A2	Alpha	11/18/2007	8/12/2013	0.2071	P	-0.0505	0.1741	0.3987
LB4110A - A3	Alpha	11/18/2007	8/12/2013	0.2017	P	-0.0738	0.1633	0.4004
LB4110A - A4	Alpha	11/18/2007	8/12/2013	0.2188	P	-0.0523	0.1820	0.4163
LB4110A - B1	Alpha	11/18/2007	8/12/2013	0.2165	P	0.1943	0.2243	0.2543
LB4110A - B2	Alpha	11/18/2007	8/12/2013	0.2096	P	0.1924	0.2213	0.2503
LB4110A - B3	Alpha	11/18/2007	8/12/2013	0.2331	P	0.1278	0.2323	0.3367
LB4110A - B4	Alpha	11/18/2007	8/12/2013	0.2243	P	0.2089	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/12/2013	0.2153	P	0.1976	0.2208	0.2439
LB4110A - C2	Alpha	11/18/2007	8/12/2013	0.2172	P	0.1971	0.2252	0.2532
LB4110A - C3	Alpha	11/18/2007	8/12/2013	0.2517	P	0.2233	0.2494	0.2755
LB4110A - C4	Alpha	11/18/2007	8/12/2013	0.2180	P	0.1969	0.2257	0.2544
LB4110A - D1	Alpha	11/18/2007	8/12/2013	0.2121	P	0.2029	0.2329	0.2628
LB4110A - D2	Alpha	11/18/2007	8/12/2013	0.2382	P	0.2277	0.2581	0.2884
LB4110A - D3	Alpha	11/18/2007	8/12/2013	0.2507	P	0.2310	0.2634	0.2958
LB4110A - D4	Alpha	11/18/2007	8/12/2013	0.1795	P	0.1643	0.1992	0.2342
LB4110R - A1	Alpha	11/24/2006	8/12/2013	0.2335	P	0.1983	0.2385	0.2787
LB4110R - A2	Alpha	11/24/2006	8/12/2013	0.2167	P	0.1851	0.2201	0.2551
LB4110R - A3	Alpha	11/24/2006	8/12/2013	0.2150	P	0.1924	0.2243	0.2563
LB4110R - A4	Alpha	11/24/2006	8/12/2013	0.2428	P	0.2118	0.2454	0.2789
LB4110R - B1	Alpha	11/24/2006	8/12/2013	0.2228	P	0.1832	0.2257	0.2682
LB4110R - B2	Alpha	11/24/2006	8/12/2013	0.2054	P	0.1754	0.2170	0.2585
LB4110R - B3	Alpha	11/24/2006	8/12/2013	0.2465	P	0.2015	0.2438	0.2861
LB4110R - B4	Alpha	11/24/2006	8/12/2013	0.2204	P	0.1883	0.2313	0.2743
LB4110R - C1	Alpha	11/24/2006	8/12/2013	0.2069	P	0.1833	0.2150	0.2466
LB4110R - C2	Alpha	11/24/2006	8/12/2013	0.2199	P	0.1932	0.2245	0.2558
LB4110R - C3	Alpha	11/24/2006	8/12/2013	0.2302	P	0.2034	0.2394	0.2754
LB4110R - C4	Alpha	11/24/2006	8/12/2013	0.2122	P	0.1826	0.2222	0.2618
LB4110R - D1	Alpha	11/24/2006	8/12/2013	0.0000	F	0.0044	0.1994	0.3944
LB4110R - D2	Alpha	11/24/2006	8/12/2013	0.0000	F	0.0057	0.2268	0.4479
LB4110R - D3	Alpha	11/24/2006	8/12/2013	0.0000	F	0.0056	0.2228	0.4399
LB4110R - D4	Alpha	11/24/2006	8/12/2013	0.0000	F	0.0031	0.1795	0.3560
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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GPC Detector Report  
(ALL Efficiencies)

*C*  
*8/12/13*

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/12/2013	0.5665	P	0.2109	0.5625	0.9140
LB4110A - A2	Beta	11/18/2007	8/12/2013	0.4920	P	0.1619	0.4648	0.7678
LB4110A - A3	Beta	11/18/2007	8/12/2013	0.4580	P	0.0899	0.4572	0.8246
LB4110A - A4	Beta	11/18/2007	8/12/2013	0.5183	P	0.1426	0.4892	0.8357
LB4110A - B1	Beta	11/18/2007	8/12/2013	0.5113	P	0.4634	0.5297	0.5961
LB4110A - B2	Beta	11/18/2007	8/12/2013	0.5056	P	0.4631	0.5268	0.5905
LB4110A - B3	Beta	11/18/2007	8/12/2013	0.5298	P	0.3168	0.5314	0.7460
LB4110A - B4	Beta	11/18/2007	8/12/2013	0.5403	P	0.4918	0.5538	0.6159
LB4110A - C1	Beta	11/18/2007	8/12/2013	0.4956	P	0.4511	0.5026	0.5542
LB4110A - C2	Beta	11/18/2007	8/12/2013	0.4898	P	0.4292	0.5010	0.5728
LB4110A - C3	Beta	11/18/2007	8/12/2013	0.5926	P	0.5290	0.5907	0.6523
LB4110A - C4	Beta	11/18/2007	8/12/2013	0.5018	P	0.4578	0.5248	0.5918
LB4110A - D1	Beta	11/18/2007	8/12/2013	0.5122	P	0.4784	0.5530	0.6276
LB4110A - D2	Beta	11/18/2007	8/12/2013	0.5418	P	0.4887	0.5871	0.6856
LB4110A - D3	Beta	11/18/2007	8/12/2013	0.5973	P	0.5374	0.6149	0.6925
LB4110A - D4	Beta	11/18/2007	8/12/2013	0.4274	P	0.3846	0.4719	0.5592
LB4110R - A1	Beta	11/24/2006	8/12/2013	0.5626	P	0.4743	0.5672	0.6602
LB4110R - A2	Beta	11/24/2006	8/12/2013	0.5113	P	0.4157	0.5085	0.6014
LB4110R - A3	Beta	11/24/2006	8/12/2013	0.5140	P	0.4503	0.5384	0.6265
LB4110R - A4	Beta	11/24/2006	8/12/2013	0.5879	P	0.5031	0.5914	0.6797
LB4110R - B1	Beta	11/24/2006	8/12/2013	0.5310	P	0.4463	0.5422	0.6381
LB4110R - B2	Beta	11/24/2006	8/12/2013	0.5032	P	0.4246	0.5195	0.6145
LB4110R - B3	Beta	11/24/2006	8/12/2013	0.6061	P	0.4939	0.5917	0.6895
LB4110R - B4	Beta	11/24/2006	8/12/2013	0.5282	P	0.4540	0.5489	0.6438
LB4110R - C1	Beta	11/24/2006	8/12/2013	0.4637	P	0.4160	0.5016	0.5872
LB4110R - C2	Beta	11/24/2006	8/12/2013	0.5095	P	0.4440	0.5283	0.6127
LB4110R - C3	Beta	11/24/2006	8/12/2013	0.5608	P	0.4754	0.5706	0.6657
LB4110R - C4	Beta	11/24/2006	8/12/2013	0.4889	P	0.4258	0.5250	0.6241
LB4110R - D1	Beta	11/24/2006	8/12/2013	0.0000	F	0.0097	0.4769	0.9440
LB4110R - D2	Beta	11/24/2006	8/12/2013	0.0000	F	0.0116	0.5358	1.0601
LB4110R - D3	Beta	11/24/2006	8/12/2013	0.0000	F	0.0112	0.5204	1.0297
LB4110R - D4	Beta	11/24/2006	8/12/2013	0.0000	F	0.0063	0.4284	0.8505
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

0461

**SECTION XII**  
**BARIUM-133 ANALYTICAL TRACER DATA**

*B/T*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714601\_GE5\_BAFIL\_194255.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : SPIKE  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 07:29:09.  
 Sample ID : 1307146-01 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.17 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	6.28	21	7	0.30	65.62	58	15	2.38E-02	34.9	
2	0	21.16	106	38	0.69	208.43	194	25	1.18E-01	18.3	
3	0	30.97	2163	96	0.82	302.56	290	32	2.40E+00	2.6	
4	1	35.09	392	33	0.62	342.05	333	26	4.36E-01	6.4	6.62E-01
5	1	36.00	69	19	0.62	350.80	333	26	7.61E-02	28.5	
6	0	42.70	12	7	0.91	415.13	408	13	1.28E-02	54.4	
7	0	61.69	263	47	0.90	597.32	586	25	2.92E-01	8.5	
8	0	65.83	103	34	0.59	637.05	628	20	1.14E-01	15.3	
9	2	79.49	40	32	0.84	768.12	753	39	4.42E-02	45.0	2.12E+00
10	2	80.97	838	22	0.67	782.34	753	39	9.31E-01	3.7	
11	0	105.81	15	19	1.73	1020.71	1004	23	1.66E-02	69.5	
12	0	111.71	197	27	0.55	1077.36	1067	20	2.19E-01	9.0	
13	0	120.32	12	8	0.20	1159.92	1150	17	1.28E-02	57.7	
14	0	275.66	43	11	0.22	2650.51	2636	24	4.75E-02	22.2	
15	0	302.06	101	9	0.55	2903.85	2888	26	1.12E-01	11.6	
16	0	332.86	58	6	0.89	3199.45	3184	26	6.46E-02	15.1	
17	0	355.08	417	12	0.78	3412.65	3396	31	4.63E-01	5.2	
18	1	382.42	71	2	1.16	3675.00	3662	28	7.85E-02	14.5	2.72E+00
19	1	383.36	69	2	1.16	3684.00	3662	28	7.65E-02	12.1	
20	0	385.79	158	8	0.61	3707.31	3693	27	1.76E-01	8.7	
21	1	389.72	20	8	1.16	3745.00	3730	29	2.24E-02	40.1	4.01E-01
22	1	390.13	18	6	1.16	3749.00	3730	29	1.95E-02	40.7	



Total number of lines in spectrum 22  
 Number of unidentified lines 15  
 Number of lines tentatively identified by NID 7 31.82%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
CO-57	270.90D	1.00	1.329E+01	1.330E+01	1.599E+01	120.25		
BA-133	10.50Y	1.00	4.229E+02	4.229E+02	0.716E+02	16.93		
Total Activity :			4.362E+02	4.362E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	2.377E+02	2.377E+02	0.416E+02	17.52		
Total Activity :			2.377E+02	2.377E+02				

Grand Total Activity : 6.739E+02 6.739E+02

Flags: "K" = Keyline not found "M" = Manually accepted  
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
CO-57	122.06	85.51*	3.044E+00	1.329E+01	1.330E+01	120.25	OK
	136.48	10.60	2.254E+00	-----	Line Not Found	-----	Absent

Final Mean for 1 Valid Peaks = 1.330E+01 +/- 1.599E+01 (120.25%)

BA-133	81.00	33.00*	1.802E+01	4.229E+02	4.229E+02	16.93	OK
	302.84	17.80	2.575E+00	6.594E+02	6.594E+02	35.19	OK
	356.01	60.00	4.312E+00	4.841E+02	4.841E+02	17.79	OK

Final Mean for 3 Valid Peaks = 4.229E+02 +/- 7.158E+01 ( 16.93%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.377E+02	2.377E+02	17.52	OK

Final Mean for 1 Valid Peaks = 2.377E+02 +/- 4.165E+01 ( 17.52%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.330E+01	1.599E+01	3.167E+01	1.074E+01	0.420
BA-133	4.229E+02	7.158E+01	1.365E+01	2.009E+00	30.991
TH-234	2.377E+02	4.165E+01	2.707E+01	3.483E-01	8.779

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	1.499E+01	1.089E+02	2.000E+02	1.925E+01	0.075
PA-231	1.508E-01	8.911E-01	1.680E+00	1.891E-02	0.090
PA-234	4.911E+00 +	1.812E+00	2.092E+00	2.355E-02	2.348
NP-237	3.667E+00	3.021E+01	5.525E+01	4.874E+00	0.066
AM-241	8.523E-01	1.532E+00	2.561E+00	2.883E-02	0.333

*81m*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714602\_GE5\_BAFIL\_194256.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : BLANK  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 07:49:42.  
 Sample ID : 1307146-02 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 00:15:01.19 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	20.18	27	39	0.61	199.01	191	26	2.98E-02	49.4	1.84E+00
2	2	21.22	59	26	0.61	208.98	191	26	6.58E-02	25.3	
3	0	25.46	17	10	0.19	249.69	244	10	1.85E-02	45.9	
4	0	30.98	2028	110	0.66	302.62	290	30	2.25E+00	2.7	
5	2	35.08	369	29	0.68	342.02	333	27	4.10E-01	6.4	6.63E-01
6	2	35.99	90	21	0.62	350.76	333	27	1.00E-01	23.4	
7	0	53.54	25	25	0.47	519.18	509	17	2.77E-02	50.4	
8	0	61.72	278	42	0.95	597.64	584	28	3.09E-01	8.2	
9	0	65.92	124	42	0.40	637.94	628	21	1.38E-01	14.3	
10	0	80.98	818	70	0.65	782.45	770	25	9.09E-01	4.2	
11	0	84.35	11	24	0.13	814.80	800	20	1.27E-02	92.9	
12	1	111.36	81	24	0.76	1074.00	1046	45	8.98E-02	22.4	2.65E+00
13	1	112.20	79	11	0.77	1082.00	1046	45	8.78E-02	21.0	
14	0	160.85	25	24	1.16	1548.83	1536	20	2.80E-02	41.9	
15	0	170.19	16	14	1.29	1638.47	1625	22	1.72E-02	56.0	
16	10	274.87	21	5	2.00	2642.96	2637	25	2.36E-02	18.6	2.25E+00
17	10	275.60	32	7	1.03	2650.00	2637	25	3.61E-02	23.9	
18	10	276.12	8	1	0.38	2654.99	2637	25	8.54E-03	75.7	
19	0	302.00	108	7	0.56	2903.26	2886	29	1.20E-01	11.0	
20	1	332.30	23	10	1.10	3194.00	3183	27	2.54E-02	38.5	7.23E-01
21	1	332.82	51	9	1.10	3199.00	3183	27	5.63E-02	17.8	
22	0	355.05	356	21	0.82	3412.36	3395	28	3.96E-01	5.9	
23	2	382.54	42	2	1.27	3676.11	3665	24	4.64E-02	22.0	9.30E-01
24	2	382.95	39	2	1.10	3680.11	3665	24	4.37E-02	22.9	
25	1	385.76	107	12	1.16	3707.00	3691	30	1.19E-01	13.4	2.24E+00
26	1	386.38	67	5	1.16	3713.00	3691	30	7.49E-02	18.0	
27	0	390.11	23	12	1.11	3748.78	3727	27	2.56E-02	38.6	
28	0	413.46	26	6	0.88	3972.80	3955	27	2.93E-02	27.8	

Total number of lines in spectrum 28  
 Number of unidentified lines 22  
 Number of lines tentatively identified by NID 6 21.43%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.131E+02	4.132E+02	0.720E+02	17.42	
Total Activity :			4.131E+02	4.132E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	2.509E+02	2.509E+02	0.424E+02	16.88	
Total Activity :			2.509E+02	2.509E+02			

Grand Total Activity : 6.641E+02 6.641E+02

Flags: "K" = Keyline not found "M" = Manually accepted  
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.131E+02	4.132E+02	17.42	OK
	302.84	17.80	2.575E+00	7.077E+02	7.077E+02	34.32	OK
	356.01	60.00	4.312E+00	4.138E+02	4.138E+02	18.71	OK

Final Mean for 3 Valid Peaks = 4.132E+02 +/- 7.197E+01 ( 17.42%)

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	2.509E+02	2.509E+02	16.88	OK

Final Mean for 1 Valid Peaks = 2.509E+02 +/- 4.237E+01 ( 16.88%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.132E+02	7.197E+01	1.720E+01	2.532E+00	24.021
TH-234	2.509E+02	4.237E+01	2.707E+01	3.483E-01	9.269

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.008E-01		1.675E+01	3.057E+01	1.036E+01	0.016
CD-109	7.436E+01		8.869E+01	1.818E+02	1.749E+01	0.409
PA-231	3.890E-02		8.473E-01	1.579E+00	1.778E-02	0.025
PA-234	2.741E+00	+	1.390E+00	1.920E+00	2.161E-02	1.428
NP-237	-2.283E+01		2.741E+01	3.931E+01	3.468E+00	-0.581
AM-241	1.081E+00		1.509E+00	2.590E+00	2.915E-02	0.417

*8/1/13*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714603\_GE5\_BAFIL\_194261.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-105-SS TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:11:25.  
 Sample ID : 1307146-03 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.13 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	20.03	23	8	0.67	197.59	188	31	2.51E-02	42.7	1.14E+00
2	3	21.07	80	4	0.67	207.60	188	31	8.84E-02	15.0	
3	0	30.97	1925	112	0.75	302.53	291	29	2.14E+00	2.8	
4	3	35.06	381	33	0.75	341.84	331	25	4.23E-01	6.8	1.29E+00
5	3	36.07	58	12	0.41	351.48	331	25	6.48E-02	18.0	
6	0	46.90	14	3	0.56	455.47	449	12	1.57E-02	36.0	
7	0	52.08	21	12	0.36	505.10	498	13	2.29E-02	42.1	
8	0	53.31	40	11	0.75	516.92	510	14	4.44E-02	22.1	
9	1	60.02	26	12	0.71	581.34	575	32	2.85E-02	29.2	2.09E+00
10	1	61.24	96	24	0.65	593.00	575	32	1.07E-01	19.2	
11	1	61.82	153	24	0.71	598.62	575	32	1.70E-01	12.0	
12	0	65.96	88	51	0.61	638.35	628	19	9.81E-02	19.6	
13	3	79.59	45	10	0.92	769.13	757	37	5.05E-02	48.1	1.46E+00
14	3	80.97	765	12	0.64	782.33	757	37	8.50E-01	3.8	
15	0	111.71	185	47	0.56	1077.33	1064	27	2.06E-01	11.5	
16	0	115.77	46	27	0.37	1116.31	1105	26	5.11E-02	29.6	
17	0	160.08	37	11	1.90	1541.43	1530	22	4.11E-02	23.9	
18	0	275.84	43	9	0.64	2652.23	2638	24	4.75E-02	20.8	
19	1	301.76	43	4	1.06	2901.00	2889	27	4.73E-02	26.2	9.85E-01
20	1	302.28	83	5	1.06	2906.00	2889	27	9.23E-02	12.8	
21	10	332.30	58	7	1.10	3194.00	3181	29	6.47E-02	16.2	2.22E+00
22	10	333.15	26	6	0.98	3202.21	3181	29	2.92E-02	31.6	
23	0	355.02	363	18	0.92	3412.07	3396	28	4.04E-01	5.7	
24	7	382.11	12	1	1.16	3672.00	3663	27	1.31E-02	65.3	2.19E+00
25	7	382.74	95	2	1.16	3678.00	3663	27	1.05E-01	10.9	
26	7	383.55	14	1	0.55	3685.77	3663	27	1.50E-02	38.8	
27	0	385.81	124	5	1.07	3707.53	3693	27	1.37E-01	9.7	



Total number of lines in spectrum 27  
 Number of unidentified lines 20  
 Number of lines tentatively identified by NID 7 25.93%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.861E+02	3.861E+02	0.659E+02	17.07		
Total Activity :			3.861E+02	3.861E+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	1.380E+02	1.380E+02	0.337E+02	24.40		
AM-241	432.20Y	1.00	2.145E+00	2.145E+00	1.255E+00	58.51		
Total Activity :			1.401E+02	1.401E+02				

Grand Total Activity : 5.262E+02 5.262E+02

Flags: "K" = Keyline not found "M" = Manually accepted  
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.861E+02	3.861E+02	17.07	OK
	302.84	17.80	2.575E+00	5.442E+02	5.443E+02	36.71	OK
	356.01	60.00	4.312E+00	4.219E+02	4.219E+02	18.47	OK

Final Mean for 3 Valid Peaks = 3.861E+02 +/- 6.591E+01 ( 17.07%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.380E+02	1.380E+02	24.40	OK

Final Mean for 1 Valid Peaks = 1.380E+02 +/- 3.367E+01 ( 24.40%)

AM-241	59.54	35.90*	1.000E+02	2.145E+00	2.145E+00	58.51	OK
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Final Mean for 1 Valid Peaks = 2.145E+00 +/- 1.255E+00 ( 58.51%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.861E+02	6.591E+01	1.359E+01	2.000E+00	28.420
TH-234	1.380E+02	3.367E+01	3.121E+01	4.015E-01	4.422
AM-241	2.145E+00	1.255E+00	2.204E+00	2.481E-02	0.973

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.620E-01	1.366E+01	2.526E+01	8.562E+00	-0.022
CD-109	1.589E+01	8.112E+01	1.559E+02	1.500E+01	0.102
PA-231	5.069E-01	8.989E-01	1.783E+00	2.008E-02	0.284
PA-234	3.681E+00 +	1.115E+00	2.000E+00	2.251E-02	1.841
NP-237	-6.155E+00	2.268E+01	4.041E+01	3.565E+00	-0.152

*8/15*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714604\_GE5\_BAFIL\_194264.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-105-SS TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:31:23.  
 Sample ID : 1307146-04 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	12.83	8	8	0.45	128.54	120	11	9.13E-03	75.7	
2	0	21.22	82	34	0.82	209.02	202	20	9.09E-02	21.7	
3	0	30.95	2012	114	0.67	302.42	292	23	2.24E+00	2.6	
4	3	35.08	413	24	0.73	342.03	332	27	4.59E-01	6.0	1.53E+00
5	3	36.00	101	4	0.69	350.86	332	27	1.12E-01	19.0	
6	0	53.27	37	23	0.58	516.56	509	16	4.11E-02	33.8	
7	1	61.24	101	34	0.65	593.00	583	29	1.12E-01	18.8	2.53E+00
8	1	61.97	165	30	0.65	600.00	583	29	1.84E-01	11.7	
9	2	65.71	82	26	0.73	635.94	623	29	9.07E-02	18.5	1.10E+00
10	2	66.24	39	19	0.66	641.00	623	29	4.35E-02	37.1	
11	0	80.98	804	89	0.55	782.47	772	23	8.94E-01	4.4	
12	1	111.47	185	30	0.76	1075.00	1063	23	2.06E-01	9.8	4.94E+00
13	1	112.09	40	11	0.77	1081.00	1063	23	4.49E-02	30.9	
14	0	116.29	29	46	0.43	1121.29	1106	21	3.26E-02	52.1	
15	0	275.69	46	8	0.58	2650.86	2636	24	5.06E-02	19.8	
16	0	302.03	116	3	0.71	2903.57	2888	27	1.29E-01	9.7	
17	0	306.95	20	14	0.45	2950.76	2930	24	2.26E-02	39.0	
18	0	332.78	80	0	1.13	3198.63	3183	27	8.89E-02	11.2	
19	0	355.06	370	27	0.73	3412.41	3394	34	4.11E-01	6.0	
20	3	382.74	93	11	1.16	3678.00	3664	25	1.03E-01	11.4	9.84E-01
21	3	383.57	16	4	0.84	3686.02	3664	25	1.76E-02	25.8	
22	0	385.75	122	25	1.13	3706.96	3693	25	1.36E-01	11.9	
23	0	389.95	38	4	0.78	3747.27	3733	25	4.19E-02	19.6	

Total number of lines in spectrum 23  
 Number of unidentified lines 16  
 Number of lines tentatively identified by NID 7 30.43%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.061E+02	4.061E+02	0.717E+02	17.65	
Total Activity :			4.061E+02	4.061E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	1.492E+02	1.492E+02	0.355E+02	23.76	
AM-241	432.20Y	1.00	8.466E+00	8.466E+00	3.204E+00	37.84	
Total Activity :			1.577E+02	1.577E+02			

Grand Total Activity : 5.638E+02 5.638E+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	4.061E+02	4.061E+02	17.65	OK
	302.84	17.80	2.575E+00	7.594E+02	7.595E+02	32.76	OK
	356.01	60.00	4.312E+00	4.293E+02	4.293E+02	18.77	OK

Final Mean for 3 Valid Peaks = 4.061E+02+/- 7.169E+01 ( 17.65%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	1.492E+02	1.492E+02	23.76	OK

Final Mean for 1 Valid Peaks = 1.492E+02+/- 3.546E+01 ( 23.76%)

AM-241	59.54	35.90*	1.000E+02	8.466E+00	8.466E+00	37.84	OK
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Final Mean for 1 Valid Peaks = 8.466E+00+/- 3.204E+00 ( 37.84%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.061E+02	7.169E+01	2.018E+01	2.971E+00	20.125
TH-234	1.492E+02	3.546E+01	2.063E+01	2.655E-01	7.232
AM-241	8.466E+00	3.204E+00	2.204E+00	2.481E-02	3.842

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.240E+00		1.340E+01	2.682E+01	9.091E+00	0.307
CD-109	2.430E+01		8.502E+01	1.643E+02	1.581E+01	0.148
PA-231	-8.386E-02		9.270E-01	1.675E+00	1.886E-02	-0.050
PA-234	3.784E+00	+	1.653E+00	2.056E+00	2.315E-02	1.840
NP-237	-1.400E+01		2.575E+01	4.355E+01	3.841E+00	-0.322

*C*  
*8151*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714605\_GE5\_BAFIL\_194268.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-105-SS DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:52:19.  
 Sample ID : 1307146-05 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.15 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	17.55	11	9	0.33	173.75	165	11	1.24E-02	58.6	
2	0	19.57	12	11	0.30	193.17	188	9	1.30E-02	59.3	
3	1	20.91	27	38	0.50	206.00	200	18	3.04E-02	55.0	1.85E+00
4	1	21.43	64	31	0.51	211.00	200	18	7.14E-02	23.0	
5	0	30.97	2027	121	0.77	302.54	291	25	2.25E+00	2.7	
6	2	35.06	405	6	0.66	341.79	331	30	4.50E-01	5.4	1.91E+00
7	2	36.07	82	1	0.62	351.46	331	30	9.16E-02	22.8	
8	7	53.07	49	16	0.68	514.60	506	17	5.39E-02	23.2	3.35E+00
9	7	53.61	14	7	0.30	519.77	506	17	1.55E-02	46.7	
10	0	61.78	246	30	0.85	598.18	586	27	2.73E-01	8.3	
11	0	65.85	106	34	1.25	637.26	626	23	1.17E-01	15.6	
12	0	79.41	52	22	0.85	767.37	756	18	5.81E-02	23.8	
13	0	80.99	821	43	0.62	782.53	773	22	9.12E-01	3.9	
14	0	111.72	183	59	0.75	1077.39	1063	27	2.04E-01	12.3	
15	6	115.72	64	22	0.75	1115.78	1109	21	7.10E-02	16.6	9.60E+00
16	6	116.26	21	32	0.77	1121.00	1109	21	2.37E-02	59.2	
17	1	275.40	14	8	1.13	2648.01	2639	24	1.53E-02	54.4	6.96E+00
18	1	276.02	75	6	1.03	2654.00	2639	24	8.31E-02	10.2	
19	8	301.87	87	0	1.17	2902.02	2889	26	9.72E-02	11.7	1.15E+00
20	8	302.67	24	0	0.46	2909.74	2889	26	2.68E-02	33.1	
21	0	333.02	58	12	0.54	3200.99	3183	27	6.46E-02	17.1	
22	0	355.05	354	15	0.86	3412.37	3395	30	3.94E-01	5.7	
23	1	382.21	12	3	1.16	3673.00	3661	33	1.31E-02	78.4	1.64E+01
24	1	382.63	211	8	1.16	3677.00	3661	33	2.34E-01	5.0	
25	1	383.05	12	9	1.16	3681.00	3661	33	1.31E-02	87.5	
26	0	385.83	134	19	1.03	3707.67	3693	27	1.49E-01	10.7	



Summary of Nuclide Activity

Sample ID : 1307146-05

Acquisition date : 5-AUG-2013 08:52:19

Total number of lines in spectrum 26  
 Number of unidentified lines 20  
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	4.146E+02	4.146E+02	0.711E+02	17.16	
Total Activity :			4.146E+02	4.146E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	2.223E+02	2.223E+02	0.381E+02	17.13	
Total Activity :			2.223E+02	2.223E+02			

Grand Total Activity : 6.368E+02 6.369E+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	4.146E+02	4.146E+02	17.16	OK
	302.84	17.80	2.575E+00	1.582E+02	1.582E+02	71.33	OK
	356.01	60.00	4.312E+00	4.114E+02	4.115E+02	18.47	OK

Final Mean for 3 Valid Peaks = 4.146E+02+/- 7.114E+01 ( 17.16%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.223E+02	2.223E+02	17.13	OK

Final Mean for 1 Valid Peaks = 2.223E+02+/- 3.808E+01 ( 17.13%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.146E+02	7.114E+01	1.657E+01	2.440E+00	25.016
TH-234	2.223E+02	3.808E+01	2.817E+01	3.624E-01	7.890

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.864E+01		1.596E+01	2.143E+01	7.265E+00	-0.870
CD-109	-1.625E+01		8.789E+01	1.580E+02	1.521E+01	-0.103
PA-231	2.041E-01		8.491E-01	1.629E+00	1.833E-02	0.125
PA-234	2.973E+00	+	1.376E+00	2.191E+00	2.467E-02	1.357
NP-237	1.746E+00		2.203E+01	4.161E+01	3.670E+00	0.042
AM-241	6.545E-02		1.634E+00	2.495E+00	2.808E-02	0.026

*815*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714606\_GE5\_BAFIL\_194272.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-114-AS TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:17:56.  
 Sample ID : 1307146-06 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	6.43	10	6	0.82	67.09	60	13	1.06E-02	63.7	
2	0	30.97	1705	91	0.77	302.54	290	27	1.89E+00	2.9	
3	2	35.08	352	25	0.61	341.98	328	33	3.91E-01	6.4	1.54E+00
4	2	36.02	57	5	0.57	351.00	328	33	6.29E-02	31.6	
5	0	53.44	30	22	0.29	518.17	509	15	3.33E-02	34.7	
6	0	61.71	217	14	0.74	597.54	588	26	2.41E-01	7.8	
7	0	66.00	101	34	0.34	638.72	625	29	1.12E-01	17.2	
8	2	79.55	43	11	0.84	768.69	761	31	4.76E-02	22.5	6.89E-01
9	2	80.95	683	16	0.65	782.20	761	31	7.59E-01	4.0	
10	1	111.36	13	45	0.76	1074.00	1065	23	1.49E-02	132.0	1.17E+00
11	1	111.79	150	30	0.80	1078.05	1065	23	1.67E-01	12.0	
12	0	160.36	28	18	2.34	1544.12	1526	28	3.14E-02	36.6	
13	1	275.50	47	2	1.03	2649.00	2641	19	5.20E-02	13.7	2.98E+00
14	1	276.12	12	2	1.03	2655.00	2641	19	1.35E-02	39.9	
15	0	301.99	91	0	0.43	2903.23	2888	26	1.01E-01	10.5	
16	1	332.40	53	2	1.10	3195.00	3182	27	5.92E-02	15.9	1.34E+00
17	1	333.03	32	2	1.10	3201.00	3182	27	3.60E-02	25.0	
18	4	355.08	367	7	0.97	3412.62	3394	30	4.07E-01	5.3	1.23E+00
19	4	355.65	14	4	1.24	3418.08	3394	30	1.55E-02	106.2	
20	0	382.72	80	2	0.68	3677.89	3662	27	8.86E-02	11.8	
21	0	385.81	125	14	0.99	3707.50	3691	29	1.39E-01	10.8	

Total number of lines in spectrum 21  
 Number of unidentified lines 16  
 Number of lines tentatively identified by NID 5 23.81%

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	3.448E+02	3.448E+02	0.595E+02	17.24		
Total Activity :			3.448E+02	3.448E+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	1.959E+02	1.959E+02	0.317E+02	16.18		
Total Activity :			1.959E+02	1.959E+02				

Grand Total Activity : 5.407E+02 5.407E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.448E+02	3.448E+02	17.24	OK		
	302.84	17.80	2.575E+00	5.961E+02	5.962E+02	33.71	OK		
	356.01	60.00	4.312E+00	1.614E+01	1.614E+01	212.98	OK		

Final Mean for 3 Valid Peaks = 3.448E+02+/- 5.946E+01 ( 17.24%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	8.750E+01	1.959E+02	1.959E+02	16.18	OK		

Final Mean for 1 Valid Peaks = 1.959E+02+/- 3.171E+01 ( 16.18%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.448E+02	5.946E+01	1.188E+01	1.750E+00	29.020
TH-234	1.959E+02	3.171E+01	2.063E+01	2.655E-01	9.495

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.397E+01		1.486E+01	2.967E+01	1.006E+01	0.471
CD-109	3.052E+01		6.105E+01	1.296E+02	1.247E+01	0.235
PA-231	-1.955E-01		7.500E-01	1.345E+00	1.514E-02	-0.145
PA-234	5.669E-01		1.020E+00	1.868E+00	2.103E-02	0.303
NP-237	-2.303E+01		1.741E+01	2.303E+01	2.031E+00	-1.000
AM-241	7.847E-01		1.260E+00	2.209E+00	2.487E-02	0.355

*c*  
*81*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714607\_GE5\_BAFIL\_194276.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-114-AS DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:37:22.  
 Sample ID : 1307146-07 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.08 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	10.00	7	5	0.18	101.36	97	8	8.19E-03	66.4	
2	0	21.15	98	12	0.69	208.33	201	16	1.09E-01	12.8	
3	0	25.24	22	3	1.02	247.53	241	13	2.42E-02	27.4	
4	0	30.97	1637	139	0.75	302.58	290	32	1.82E+00	3.3	
5	3	35.12	383	18	0.71	342.36	334	24	4.26E-01	5.8	8.41E-01
6	3	36.14	53	6	0.51	352.16	334	24	5.93E-02	21.6	
7	0	53.49	28	33	0.60	518.68	504	20	3.06E-02	47.6	
8	1	61.24	57	14	0.65	593.00	585	27	6.30E-02	27.0	1.04E+00
9	1	61.86	140	20	0.65	599.00	585	27	1.55E-01	12.0	
10	4	65.61	97	10	0.80	634.94	621	34	1.08E-01	13.4	2.17E+00
11	4	66.28	29	3	0.45	641.42	621	34	3.21E-02	38.7	
12	4	66.76	34	3	0.66	646.00	621	34	3.82E-02	33.3	
13	0	80.92	718	28	0.75	781.85	763	29	7.98E-01	4.1	
14	0	102.03	15	9	0.50	984.45	971	19	1.62E-02	50.6	
15	0	111.73	175	45	0.52	1077.52	1065	22	1.94E-01	11.2	
16	0	160.44	14	9	0.69	1544.90	1535	15	1.51E-02	46.9	
17	0	275.50	47	4	0.53	2649.03	2632	29	5.22E-02	17.1	
18	0	302.06	106	5	0.84	2903.84	2888	27	1.17E-01	10.6	
19	0	332.82	56	0	1.55	3198.98	3184	26	6.22E-02	13.4	
20	0	355.02	327	6	0.75	3412.08	3395	30	3.63E-01	5.7	
21	0	382.81	80	10	0.75	3678.70	3662	27	8.92E-02	13.6	
22	0	385.74	119	8	0.76	3706.81	3691	26	1.32E-01	10.2	



Summary of Nuclide Activity

Sample ID : 1307146-07

Acquisition date : 5-AUG-2013 09:37:22

Total number of lines in spectrum 22  
 Number of unidentified lines 14  
 Number of lines tentatively identified by NID 8 36.36%

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	3.624E+02	3.624E+02	0.627E+02	17.31		
Total Activity :			3.624E+02	3.624E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
PA-231	3.28E+04Y	1.00	5.273E-01	5.273E-01	7.009E-01	132.92		
PA-234	4.47E+09Y	1.00	4.552E+00	4.552E+00	1.179E+00	25.89		
TH-234	4.47E+09Y	1.00	1.264E+02	1.264E+02	0.307E+02	24.29		
AM-241	432.20Y	1.00	4.743E+00	4.743E+00	2.568E+00	54.14		
Total Activity :			1.362E+02	1.362E+02				

Grand Total Activity : 4.986E+02 4.986E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr		2-Sigma %Error	Status
				pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.624E+02	3.624E+02	17.31	OK
	302.84	17.80	2.575E+00	6.918E+02	6.918E+02	33.88	OK
	356.01	60.00	4.312E+00	3.796E+02	3.796E+02	18.45	OK

Final Mean for 3 Valid Peaks = 3.624E+02+/- 6.275E+01 ( 17.31%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr		2-Sigma %Error	Status
				pCi/filter	pCi/filter		
PA-231	9.28	42.00*	1.000E+02	5.273E-01	5.273E-01	132.92	OK
	10.11	20.20	1.000E+02	1.096E+00	1.096E+00	132.92	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	5.362E+03	5.362E+03	32.37	OK

Final Mean for 3 Valid Peaks = 5.273E-01+/- 7.009E-01 (132.92%)

PA-234	9.89	89.00	1.000E+02	2.488E-01	2.488E-01	132.92	OK
	21.72	64.90*	1.000E+02	4.552E+00	4.552E+00	25.89	OK
	37.93	23.75	1.000E+02	6.745E+00	6.745E+00	43.32	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 4.552E+00+/- 1.179E+00 ( 25.89%)

TH-234	63.29	3.80*	8.750E+01	1.264E+02	1.264E+02	24.29	OK
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Final Mean for 1 Valid Peaks = 1.264E+02+/- 3.070E+01 ( 24.29%)

AM-241	59.54	35.90*	1.000E+02	4.743E+00	4.743E+00	54.14	OK
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Final Mean for 1 Valid Peaks = 4.743E+00+/- 2.568E+00 ( 54.14%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.624E+02	6.275E+01	1.280E+01	1.884E+00	28.316
PA-231	5.273E-01	7.009E-01	1.533E+00	1.726E-02	0.344
PA-234	4.552E+00	1.179E+00	7.073E-01	7.962E-03	6.436
TH-234	1.264E+02	3.070E+01	1.531E+01	1.969E-01	8.256
AM-241	4.743E+00	2.568E+00	1.979E+00	2.228E-02	2.396

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.315E-01		1.307E+01	2.470E+01	8.373E+00	0.034
CD-109	4.721E+01		8.163E+01	1.650E+02	1.588E+01	0.286
NP-237	-3.256E+00		2.044E+01	3.750E+01	3.308E+00	-0.087

*c*  
*81m*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714608\_GE1\_BAFIL\_194259.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-66 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:10:19.  
 Sample ID : 1307146-08 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.89	2085	76	1.58	31.13	27	13	2.32E+00	2.3	1.43E+01
2	3	35.17	482	59	1.72	35.41	27	13	5.35E-01	5.3	
3	0	52.72	73	98	2.96	52.95	49	9	8.14E-02	27.1	
4	3	61.98	235	77	1.84	62.21	58	14	2.62E-01	9.0	3.97E+00
5	3	65.79	102	100	1.91	66.02	58	14	1.13E-01	19.6	
6	4	81.28	783	61	1.57	81.51	76	13	8.69E-01	3.9	2.34E+00
7	4	84.95	22	67	2.14	85.18	76	13	2.47E-02	109.9	
8	0	93.09	53	109	1.46	93.32	89	9	5.93E-02	37.7	
9	0	111.83	218	104	1.83	112.06	108	7	2.43E-01	10.3	
10	0	190.07	105	128	13.08	190.29	182	18	1.16E-01	27.0	
11	0	277.03	45	32	1.32	277.25	274	7	4.94E-02	25.7	
12	4	303.27	198	13	1.71	303.48	299	17	2.20E-01	7.5	2.50E+00
13	4	307.33	26	18	2.20	307.55	299	17	2.92E-02	50.3	
14	0	333.72	78	34	1.87	333.93	328	9	8.66E-02	17.8	
15	5	352.35	16	5	2.24	352.56	351	14	1.81E-02	30.8	3.48E+00
16	5	356.44	532	16	1.58	356.65	351	14	5.91E-01	4.5	
17	0	376.76	16	12	3.69	376.97	373	8	1.83E-02	43.8	
18	2	384.09	126	6	2.06	384.30	381	18	1.39E-01	9.7	1.07E+01
19	2	387.43	218	6	2.07	387.64	381	18	2.43E-01	7.8	
20	2	391.81	48	6	2.07	392.01	381	18	5.33E-02	19.0	
21	0	417.21	72	19	5.01	417.42	412	14	7.95E-02	17.9	
22	0	437.42	104	17	1.82	437.62	432	11	1.15E-01	12.4	
23	0	467.79	31	6	2.11	468.00	463	9	3.42E-02	23.5	
24	0	511.68	20	4	1.75	511.88	508	9	2.27E-02	28.6	
25	0	1492.74	4	2	2.57	1492.87	1487	7	4.35E-03	76.9	

Total number of lines in spectrum 25  
 Number of unidentified lines 20  
 Number of lines tentatively identified by NID 5 20.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.628E+02	3.629E+02	0.674E+02	18.58	
NP-237	2.14E+06Y	1.00	3.458E+01	3.458E+01	7.615E+01	220.20	
Total Activity :			3.974E+02	3.974E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.172E+02	3.172E+02	0.593E+02	18.69	
Total Activity :			3.172E+02	3.172E+02			

Grand Total Activity : 7.147E+02 7.147E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.628E+02	3.629E+02	18.58	OK
	302.84	17.80	4.915E+00	6.797E+02	6.798E+02	32.83	OK
	356.01	60.00	6.963E+00	3.826E+02	3.826E+02	17.62	OK

Final Mean for 3 Valid Peaks = 3.629E+02 +/- 6.742E+01 ( 18.58%)

NP-237	86.50	12.60*	1.532E+01	3.458E+01	3.458E+01	220.20	OK
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Final Mean for 1 Valid Peaks = 3.458E+01 +/- 7.615E+01 (220.20%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.172E+02	3.172E+02	18.69	OK

Final Mean for 1 Valid Peaks = 3.172E+02 +/- 5.930E+01 ( 18.69%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.629E+02	6.742E+01	1.813E+01	2.976E+00	20.012
TH-234	3.172E+02	5.930E+01	5.564E+01	1.783E+00	5.702
NP-237	3.458E+01	7.615E+01	5.450E+01	6.635E+00	0.634

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.363E+00	1.177E+01	1.889E+01	5.897E+00	-0.337
CD-109	2.687E+00	1.400E+02	1.977E+02	2.557E+01	0.014
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.724E+00	1.799E+00	3.741E+00	7.031E-02	2.599
AM-241	7.220E+00	3.224E+00	5.981E+00	1.403E-01	1.207

81515

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714609\_GE1\_BAFIL\_194262.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-66 DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:30:04.  
 Sample ID : 1307146-09 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 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	30.91	1979	78	1.55	31.14	27	13	2.20E+00	2.3	1.23E+01
2	3	35.11	532	56	1.85	35.35	27	13	5.92E-01	5.2	
3	0	52.40	36	86	2.36	52.63	50	7	3.99E-02	45.7	
4	1	61.91	244	74	1.58	62.14	57	14	2.71E-01	8.7	4.75E+00
5	1	65.63	99	74	1.58	65.86	57	14	1.10E-01	19.2	
6	0	81.32	790	177	1.92	81.55	77	11	8.78E-01	4.9	
7	0	92.72	30	71	1.40	92.94	90	6	3.34E-02	47.9	
8	2	111.98	205	42	1.81	112.20	108	14	2.28E-01	8.6	1.69E+00
9	2	116.02	50	49	1.81	116.25	108	14	5.57E-02	26.6	
10	0	160.91	23	51	2.66	161.13	157	7	2.51E-02	57.0	
11	0	192.73	32	74	2.92	192.95	189	8	3.50E-02	50.6	
12	0	276.96	66	26	1.70	277.18	274	8	7.29E-02	18.3	
13	2	303.12	162	21	1.73	303.34	299	20	1.80E-01	8.6	4.71E+00
14	2	308.03	37	15	2.01	308.24	299	20	4.15E-02	26.4	
15	1	330.62	11	10	1.84	330.83	328	17	1.24E-02	63.7	2.67E+00
16	1	333.96	93	12	1.84	334.17	328	17	1.03E-01	12.0	
17	1	338.62	29	16	1.84	338.83	328	17	3.17E-02	27.6	
18	2	356.52	537	19	1.62	356.73	351	20	5.97E-01	4.4	2.95E+00
19	2	362.79	10	11	1.69	363.00	351	20	1.16E-02	64.2	
20	0	386.39	299	71	2.02	386.60	382	9	3.33E-01	7.7	
21	0	392.09	48	15	1.25	392.29	391	5	5.30E-02	21.2	
22	0	417.25	66	26	3.61	417.45	410	15	7.30E-02	21.0	
23	0	437.78	96	14	1.34	437.98	434	8	1.07E-01	12.2	
24	0	469.83	28	12	2.69	470.04	465	10	3.09E-02	31.6	
25	0	511.58	29	7	2.92	511.78	507	9	3.25E-02	24.4	
26	0	603.46	10	2	2.71	603.65	600	7	1.15E-02	37.6	
27	0	609.73	6	3	1.32	609.92	607	6	6.30E-03	64.8	



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	3.664E+02	3.664E+02	0.715E+02	19.51		
Total Activity :			3.664E+02	3.664E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	3.286E+02	3.286E+02	0.595E+02	18.12		
Total Activity :			3.286E+02	3.286E+02				

Grand Total Activity : 6.951E+02 6.951E+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*	1.963E+01	3.664E+02	3.664E+02	19.51	OK
	302.84	17.80	4.915E+00	5.555E+02	5.556E+02	33.90	OK
	356.01	60.00	6.963E+00	3.861E+02	3.861E+02	17.54	OK

Final Mean for 3 Valid Peaks = 3.664E+02 +/- 7.151E+01 ( 19.51%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.286E+02	3.286E+02	18.12	OK

Final Mean for 1 Valid Peaks = 3.286E+02 +/- 5.955E+01 ( 18.12%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.664E+02	7.151E+01	2.026E+01	3.325E+00	18.089
TH-234	3.286E+02	5.955E+01	5.398E+01	1.730E+00	6.088

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.872E+00	1.476E+01	2.178E+01	6.800E+00	-0.316
CD-109	-7.362E+01	1.555E+02	2.010E+02	2.600E+01	-0.366
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.789E+00	1.798E+00	3.744E+00	7.035E-02	2.615
NP-237	9.381E+00	4.196E+01	6.069E+01	7.389E+00	0.155
AM-241	1.101E+01	3.417E+00	6.609E+00	1.550E-01	1.666

*8/1*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714610\_GE1\_BAFIL\_194266.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : MW-102 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:51:05.  
 Sample ID : 1307146-10 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.94	1887	66	1.50	31.17	27	13	2.10E+00	2.4	8.27E+00
2	3	35.14	440	51	1.76	35.37	27	13	4.89E-01	5.5	
3	5	61.90	246	84	2.05	62.13	57	17	2.74E-01	8.5	2.15E+00
4	5	66.18	106	77	2.32	66.41	57	17	1.18E-01	19.2	
5	0	81.43	689	173	1.94	81.66	76	12	7.66E-01	5.4	
6	0	93.06	38	62	2.17	93.29	90	6	4.26E-02	36.6	
7	0	111.88	193	83	1.83	112.11	108	7	2.15E-01	10.6	
8	0	117.22	32	64	1.62	117.45	116	6	3.57E-02	45.4	
9	0	159.68	7	77	1.20	159.90	157	7	8.12E-03	201.1	
10	0	276.60	72	34	1.51	276.81	272	10	8.00E-02	19.3	
11	2	303.46	166	5	1.65	303.67	299	18	1.85E-01	8.1	1.98E+00
12	2	307.77	35	11	1.99	307.98	299	18	3.88E-02	22.8	
13	0	335.81	38	56	1.81	336.02	330	8	4.24E-02	37.6	
14	0	339.30	17	23	2.01	339.51	337	6	1.90E-02	50.3	
15	0	356.60	524	31	1.55	356.81	353	9	5.82E-01	4.8	
16	0	377.92	12	21	2.88	378.13	373	8	1.29E-02	75.4	
17	4	384.42	125	14	2.29	384.63	381	15	1.39E-01	12.9	6.49E+00
18	4	387.39	207	10	1.68	387.60	381	15	2.30E-01	8.3	
19	4	391.31	48	16	2.50	391.52	381	15	5.37E-02	29.9	
20	3	415.00	52	14	2.29	415.20	411	16	5.77E-02	18.9	2.90E+00
21	3	418.36	30	14	2.30	418.57	411	16	3.36E-02	35.4	
22	0	437.64	91	24	1.94	437.85	434	9	1.01E-01	14.4	
23	0	473.09	10	1	1.39	473.30	472	4	1.09E-02	36.7	
24	0	511.44	29	2	3.06	511.64	507	9	3.20E-02	20.9	

Summary of Nuclide Activity

Sample ID : 1307146-10

Acquisition date : 5-AUG-2013 08:51:05

Total number of lines in spectrum 24  
 Number of unidentified lines 20  
 Number of lines tentatively identified by NID 4 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.196E+02	3.196E+02	0.641E+02	20.05	
Total Activity :			3.196E+02	3.196E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	3.317E+02	3.317E+02	0.591E+02	17.81	
Total Activity :			3.317E+02	3.317E+02			

Grand Total Activity : 6.514E+02 6.514E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.196E+02	3.196E+02	20.05	OK
	302.84	17.80	4.915E+00	5.703E+02	5.703E+02	33.44	OK
	356.01	60.00	6.963E+00	3.765E+02	3.765E+02	17.95	OK

Final Mean for 3 Valid Peaks = 3.196E+02+/- 6.409E+01 ( 20.05%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.317E+02	3.317E+02	17.81	OK

Final Mean for 1 Valid Peaks = 3.317E+02+/- 5.908E+01 ( 17.81%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.196E+02	6.409E+01	1.843E+01	3.025E+00	17.343
TH-234	3.317E+02	5.908E+01	5.314E+01	1.703E+00	6.243

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.515E+00		1.251E+01	2.054E+01	6.412E+00	0.122
CD-109	2.861E+01		1.541E+02	2.212E+02	2.861E+01	0.129
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.514E+00		1.671E+00	3.501E+00	6.579E-02	2.432
NP-237	1.756E+01		4.180E+01	6.209E+01	7.559E+00	0.283
AM-241	9.937E+00		3.159E+00	6.373E+00	1.495E-01	1.559

*c*  
*815*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714611\_GE1\_BAFIL\_194270.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : MW-102 DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:16:31.  
 Sample ID : 1307146-11 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.91	1993	66	1.48	31.15	27	13	2.21E+00	2.3	4.98E+00
2	3	35.15	510	66	1.85	35.38	27	13	5.66E-01	5.3	
3	0	52.07	32	96	2.01	52.30	49	7	3.59E-02	52.9	
4	1	61.90	194	70	1.58	62.13	58	17	2.16E-01	10.3	4.37E+00
5	1	65.63	104	68	1.58	65.86	58	17	1.16E-01	17.6	
6	1	70.91	21	66	1.59	71.14	58	17	2.34E-02	63.7	
7	0	81.27	796	142	1.98	81.50	76	11	8.84E-01	4.6	
8	0	92.42	37	91	1.29	92.65	89	7	4.11E-02	45.8	
9	4	111.91	210	55	1.85	112.14	107	14	2.34E-01	8.9	1.96E+00
10	4	116.66	57	60	2.20	116.89	107	14	6.36E-02	27.0	
11	0	134.18	23	43	2.90	134.41	132	6	2.61E-02	48.0	
12	0	270.02	14	22	1.73	270.24	267	6	1.59E-02	58.3	
13	4	276.58	56	23	2.40	276.80	273	16	6.20E-02	20.2	2.29E+00
14	4	285.02	10	27	2.40	285.24	273	16	1.12E-02	90.1	
15	4	303.17	167	18	1.68	303.38	297	19	1.86E-01	8.3	2.46E+00
16	4	307.50	45	14	2.43	307.71	297	19	4.96E-02	29.6	
17	4	311.88	22	9	2.43	312.09	297	19	2.43E-02	47.5	
18	3	334.12	102	15	2.17	334.33	330	12	1.13E-01	12.1	1.60E+00
19	3	338.17	28	15	2.02	338.38	330	12	3.07E-02	36.9	
20	0	356.49	587	22	1.77	356.70	352	10	6.53E-01	4.4	
21	0	366.54	41	7	4.85	366.75	362	10	4.52E-02	20.1	
22	3	384.20	107	26	1.73	384.41	382	9	1.19E-01	12.2	1.78E+01
23	3	387.46	194	41	1.60	387.67	382	9	2.16E-01	9.2	
24	1	414.83	44	12	1.88	415.03	410	16	4.91E-02	19.0	2.04E+00
25	1	418.77	25	9	1.90	418.97	410	16	2.76E-02	32.7	
26	1	422.70	13	7	1.90	422.91	410	16	1.40E-02	48.2	
27	0	437.46	97	20	2.00	437.66	433	11	1.08E-01	13.4	
28	0	468.56	28	10	1.19	468.76	465	8	3.13E-02	27.0	
29	0	511.41	33	7	2.23	511.60	507	9	3.71E-02	22.3	
30	0	711.02	6	2	2.37	711.21	708	6	6.11E-03	55.3	



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	3.689E+02	3.689E+02	0.709E+02	19.23	
Total Activity :			3.689E+02	3.689E+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	4.447E+03	4.447E+03	1.427E+03	32.10	
TH-234	4.47E+09Y	1.00	2.614E+02	2.614E+02	0.555E+02	21.24	
Total Activity :			4.708E+03	4.708E+03			

Grand Total Activity : 5.077E+03 5.077E+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*	1.963E+01	3.689E+02	3.689E+02	19.23	OK
	302.84	17.80	4.915E+00	5.740E+02	5.741E+02	33.62	OK
	356.01	60.00	6.963E+00	4.222E+02	4.222E+02	17.52	OK

Final Mean for 3 Valid Peaks = 3.689E+02+/- 7.092E+01 ( 19.23%)

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	4.408E+00	4.303E+02	4.303E+02	182.88	OK
	302.67	2.30	4.910E+00	4.447E+03	4.447E+03	32.10	OK

Final Mean for 2 Valid Peaks = 4.447E+03+/- 1.427E+03 ( 32.10%)

TH-234	63.29	3.80*	5.865E+01	2.614E+02	2.614E+02	21.24	OK
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Final Mean for 1 Valid Peaks = 2.614E+02+/- 5.553E+01 ( 21.24%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.689E+02	7.092E+01	1.833E+01	3.009E+00	20.124
PA-231	4.447E+03	1.427E+03	1.933E-01	3.632E-03	23011.039
TH-234	2.614E+02	5.553E+01	5.930E+01	1.900E+00	4.409

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.103E+00		1.258E+01	2.037E+01	6.359E+00	0.054
CD-109	-2.925E+01		1.556E+02	2.112E+02	2.732E+01	-0.139
PA-234	9.023E+00		1.683E+00	3.548E+00	6.667E-02	2.543
NP-237	-2.270E+00		4.349E+01	6.027E+01	7.338E+00	-0.038
AM-241	7.432E+00		3.399E+00	6.225E+00	1.460E-01	1.194

*Big*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714612\_GE1\_BAFIL\_194274.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : MW-103 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:35:56.  
 Sample ID : 1307146-12 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.89	1906	72	1.54	31.12	27	13	2.12E+00	2.4	1.15E+01
2	3	35.14	475	40	1.77	35.38	27	13	5.27E-01	5.3	
3	0	53.21	79	76	2.72	53.44	50	8	8.83E-02	21.9	
4	1	59.77	31	47	1.43	60.00	58	12	3.40E-02	39.3	3.96E+01
5	1	65.63	107	69	1.58	65.86	58	12	1.19E-01	17.7	
6	0	81.25	802	88	1.96	81.48	77	10	8.91E-01	4.2	
7	0	93.37	53	59	2.03	93.60	90	6	5.92E-02	26.7	
8	5	108.31	15	51	2.40	108.54	106	15	1.64E-02	75.2	2.52E+00
9	5	112.13	207	55	1.87	112.36	106	15	2.30E-01	8.9	
10	5	116.08	46	59	2.20	116.31	106	15	5.12E-02	38.1	
11	0	161.12	17	64	1.00	161.34	157	6	1.89E-02	78.3	
12	0	277.01	59	44	1.22	277.23	274	7	6.50E-02	23.1	
13	0	303.29	162	40	1.92	303.50	299	8	1.80E-01	10.4	
14	0	308.01	22	17	1.37	308.22	307	4	2.41E-02	34.8	
15	3	334.21	69	13	2.04	334.42	328	18	7.64E-02	15.8	1.60E+00
16	3	338.23	26	21	2.23	338.44	328	18	2.84E-02	42.0	
17	0	356.45	508	40	1.88	356.66	351	12	5.65E-01	5.1	
18	1	384.96	126	15	1.88	385.17	381	15	1.40E-01	12.5	2.51E+01
19	1	391.82	53	7	1.88	392.03	381	15	5.88E-02	18.7	
20	2	414.93	37	9	2.06	415.14	411	15	4.12E-02	20.9	2.39E+00
21	2	418.97	22	6	1.90	419.17	411	15	2.44E-02	36.2	
22	6	434.80	9	0	1.73	435.00	434	12	1.01E-02	3.9	7.50E+00
23	6	437.79	75	3	1.95	437.99	434	12	8.29E-02	14.2	
24	0	469.37	11	17	1.56	469.58	465	8	1.24E-02	69.5	
25	0	512.51	26	4	3.12	512.71	508	12	2.94E-02	23.6	
26	0	628.14	6	4	2.61	628.33	623	7	7.00E-03	63.7	

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.720E+02	3.720E+02	0.700E+02	18.82		
Total Activity :			3.720E+02	3.720E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
AM-241	432.20Y	1.00	3.193E+00	3.193E+00	2.511E+00	78.64		
Total Activity :			3.193E+00	3.193E+00				

Grand Total Activity : 3.752E+02 3.752E+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*	1.963E+01	3.720E+02	3.720E+02	18.82	OK
	302.84	17.80	4.915E+00	5.561E+02	5.561E+02	35.84	OK
	356.01	60.00	6.963E+00	3.655E+02	3.655E+02	18.24	OK

Final Mean for 3 Valid Peaks = 3.720E+02 +/- 7.003E+01 ( 18.82%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
AM-241	59.54	35.90*	8.010E+01	3.193E+00	3.193E+00	78.64	OK

Final Mean for 1 Valid Peaks = 3.193E+00 +/- 2.511E+00 ( 78.64%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.720E+02	7.003E+01	1.552E+01	2.547E+00	23.972
AM-241	3.193E+00	2.511E+00	4.665E+00	1.094E-01	0.684

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	3.833E+00		1.312E+01	2.163E+01	6.754E+00	0.177
CD-109	-4.250E+01		1.489E+02	1.991E+02	2.575E+01	-0.213
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	1.022E+01		1.780E+00	3.744E+00	7.036E-02	2.729
TH-234	3.350E+02		5.955E+01	1.175E+02	3.766E+00	2.850
NP-237	3.299E+01		3.715E+01	5.956E+01	7.251E+00	0.554

*8/15*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714613\_GE1\_BAFIL\_194277.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : MW-103 DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:59:50.  
 Sample ID : 1307146-13 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.91	2003	62	1.58	31.15	27	13	2.23E+00	2.3	9.65E+00
2	3	35.17	493	44	1.66	35.40	27	13	5.48E-01	5.1	
3	6	61.95	217	73	2.54	62.19	50	26	2.41E-01	9.9	3.98E+00
4	6	66.16	156	54	2.34	66.39	50	26	1.73E-01	12.8	
5	6	70.15	28	42	2.08	70.38	50	26	3.16E-02	53.4	
6	3	81.29	773	39	1.78	81.52	76	12	8.59E-01	3.7	1.31E+01
7	3	84.63	18	53	1.95	84.86	76	12	2.02E-02	125.9	
8	0	91.93	65	91	1.44	92.16	88	9	7.26E-02	29.0	
9	0	102.26	21	42	2.13	102.49	100	5	2.33E-02	51.3	
10	5	112.15	156	60	1.90	112.38	108	16	1.73E-01	11.3	1.38E+00
11	5	116.20	54	60	2.42	116.43	108	16	6.04E-02	31.8	
12	0	160.75	33	82	1.47	160.97	156	9	3.72E-02	51.5	
13	0	185.76	47	101	3.58	185.98	180	10	5.24E-02	42.6	
14	0	277.48	47	37	1.55	277.70	273	7	5.20E-02	26.0	
15	3	303.31	157	24	1.80	303.52	298	13	1.75E-01	9.0	6.60E+00
16	3	307.75	22	25	2.21	307.97	298	13	2.46E-02	36.0	
17	4	334.04	62	18	1.91	334.25	329	14	6.84E-02	17.6	1.42E+00
18	4	338.57	17	21	2.29	338.78	329	14	1.85E-02	62.8	
19	0	356.57	531	22	1.75	356.78	352	10	5.90E-01	4.6	
20	0	364.82	21	7	2.94	365.03	362	6	2.30E-02	30.3	
21	0	377.77	14	25	1.41	377.98	374	7	1.54E-02	65.3	
22	2	384.15	111	24	2.06	384.36	381	19	1.23E-01	11.8	8.66E+00
23	2	387.43	213	14	2.07	387.64	381	19	2.37E-01	8.2	
24	2	391.81	52	8	1.83	392.02	381	19	5.79E-02	19.7	
25	2	415.05	36	21	1.92	415.26	410	17	3.98E-02	25.6	1.97E+00
26	2	418.78	29	12	2.09	418.98	410	17	3.24E-02	31.6	
27	1	433.80	7	1	1.73	434.00	433	14	8.17E-03	15.2	2.60E+00
28	1	437.66	111	6	1.91	437.87	433	14	1.23E-01	10.1	
29	0	468.75	19	12	1.46	468.95	465	8	2.06E-02	39.9	
30	0	510.98	32	2	3.47	511.18	506	10	3.50E-02	20.1	
31	0	525.37	4	3	2.20	525.57	522	6	4.44E-03	84.8	
32	0	900.49	6	0	1.92	900.67	898	6	6.67E-03	40.8	



Summary of Nuclide Activity

Sample ID : 1307146-13

Acquisition date : 5-AUG-2013 09:59:50

Total number of lines in spectrum 32  
 Number of unidentified lines 27  
 Number of lines tentatively identified by NID 5 15.63%

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	3.585E+02	3.586E+02	0.662E+02	18.46		
NP-237	2.14E+06Y	1.00	2.821E+01	2.821E+01	7.114E+01	252.18		
Total Activity :			3.868E+02	3.868E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	2.920E+02	2.920E+02	0.598E+02	20.49		
Total Activity :			2.920E+02	2.920E+02				

Grand Total Activity : 6.788E+02 6.788E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.585E+02	3.586E+02	18.46	OK
	302.84	17.80	4.915E+00	5.406E+02	5.406E+02	34.28	OK
	356.01	60.00	6.963E+00	3.816E+02	3.816E+02	17.78	OK

Final Mean for 3 Valid Peaks = 3.586E+02+/- 6.620E+01 ( 18.46%)

NP-237	86.50	12.60*	1.532E+01	2.821E+01	2.821E+01	252.18	OK
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Final Mean for 1 Valid Peaks = 2.821E+01+/- 7.114E+01 (252.18%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	2.920E+02	2.920E+02	20.49	OK

Final Mean for 1 Valid Peaks = 2.920E+02+/- 5.983E+01 ( 20.49%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.586E+02	6.620E+01	1.401E+01	2.300E+00	25.589
TH-234	2.920E+02	5.983E+01	4.475E+01	1.434E+00	6.526
NP-237	2.821E+01	7.114E+01	4.970E+01	6.051E+00	0.568

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.117E+01		1.486E+01	2.064E+01	6.443E+00	-0.541
CD-109	7.390E+01		1.332E+02	2.048E+02	2.649E+01	0.361
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.712E+00		1.713E+00	3.627E+00	6.816E-02	2.678
AM-241	8.944E+00		2.907E+00	5.787E+00	1.358E-01	1.545

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Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714614\_GE2\_BAFIL\_194263.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-303-AS TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:30:43.  
 Sample ID : 1307146-14 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE2 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.91	1787	106	1.33	31.02	27	13	1.99E+00	2.5	3.38E+00
2	2	35.06	453	89	1.53	35.18	27	13	5.03E-01	5.9	
3	0	53.47	46	54	2.24	53.59	50	6	5.14E-02	29.1	
4	2	61.85	194	70	1.60	61.96	58	15	2.16E-01	9.7	2.37E+00
5	2	66.03	91	63	1.61	66.15	58	15	1.01E-01	17.7	
6	0	80.92	692	118	1.29	81.03	77	8	7.69E-01	4.7	
7	0	93.47	63	99	3.38	93.59	89	12	6.95E-02	34.3	
8	3	111.95	180	44	1.55	112.06	108	11	2.00E-01	9.3	9.58E-01
9	3	115.90	39	33	1.88	116.02	108	11	4.31E-02	35.9	
10	0	121.48	34	47	3.54	121.59	119	7	3.74E-02	37.6	
11	0	185.93	37	87	1.75	186.04	181	9	4.14E-02	48.5	
12	1	276.05	45	16	1.76	276.16	272	11	4.99E-02	21.6	1.64E+00
13	1	278.89	12	9	1.60	279.00	272	11	1.37E-02	67.2	
14	0	296.86	15	14	2.38	296.97	292	8	1.66E-02	50.5	
15	1	302.73	142	13	1.64	302.84	299	12	1.57E-01	9.2	1.80E+00
16	1	306.93	27	15	1.79	307.04	299	12	3.04E-02	32.2	
17	0	333.89	48	44	1.37	334.00	330	7	5.29E-02	26.5	
18	1	351.83	12	6	1.83	351.93	350	13	1.36E-02	36.5	1.18E+00
19	1	356.00	478	9	1.63	356.11	350	13	5.31E-01	4.7	
20	0	378.11	11	19	1.99	378.21	374	7	1.20E-02	75.4	
21	0	385.80	229	40	3.70	385.91	382	8	2.54E-01	8.2	
22	0	391.39	35	15	1.83	391.50	390	6	3.88E-02	26.2	
23	6	414.37	25	14	2.51	414.47	410	16	2.81E-02	35.5	1.88E+00
24	6	418.37	33	9	2.69	418.47	410	16	3.71E-02	28.1	
25	6	422.54	22	2	2.88	422.64	410	16	2.41E-02	33.3	
26	0	437.02	76	12	1.30	437.12	433	8	8.44E-02	13.9	
27	0	468.71	16	8	1.67	468.82	466	7	1.73E-02	38.6	
28	0	510.68	30	2	2.78	510.79	507	7	3.35E-02	19.6	
29	0	579.77	5	2	1.10	579.87	577	6	5.95E-03	56.8	
30	0	598.45	10	3	2.69	598.55	595	6	1.11E-02	41.8	
31	0	611.94	27	0	10.58	612.04	605	16	3.00E-02	19.2	
32	0	741.40	8	0	2.83	741.50	738	7	8.89E-03	35.4	
33	0	786.15	8	0	1.47	786.25	783	7	8.89E-03	35.4	

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

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
CO-57	270.90D	1.00	9.360E+00	9.368E+00	7.202E+00	76.88		
BA-133	10.50Y	1.00	3.502E+02	3.502E+02	0.694E+02	19.83		
Total Activity :			3.595E+02	3.595E+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	6.657E+02	6.657E+02	1.432E+02	21.51		
Total Activity :			6.657E+02	6.657E+02				

Grand Total Activity : 1.025E+03 1.025E+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
CO-57	122.06	85.51*	1.264E+01	9.360E+00	9.368E+00	76.88	OK
	136.48	10.60	1.164E+01	-----	Line Not Found	-----	Absent

Final Mean for 1 Valid Peaks = 9.368E+00+/- 7.202E+00 ( 76.88%)

BA-133	81.00	33.00*	1.799E+01	3.502E+02	3.502E+02	19.83	OK
	302.84	17.80	7.560E+00	3.158E+02	3.158E+02	35.16	OK
	356.01	60.00	7.170E+00	3.336E+02	3.336E+02	17.79	OK

Final Mean for 3 Valid Peaks = 3.502E+02+/- 6.944E+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	6.657E+02	6.657E+02	21.51	OK

Final Mean for 1 Valid Peaks = 6.657E+02+/- 1.432E+02 ( 21.51%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	9.368E+00	7.202E+00	7.820E+00	1.201E+00	1.198
BA-133	3.502E+02	6.944E+01	1.947E+01	3.314E+00	17.989
TH-234	6.657E+02	1.432E+02	1.315E+02	1.087E+01	5.063

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	-6.477E+01		1.217E+02	1.598E+02	1.834E+01	-0.405
PA-231	2.677E+01		4.006E+00	8.033E+00	1.530E-01	3.333
PA-234	1.955E+00		1.538E+00	2.903E+00	5.987E-02	0.673
NP-237	-6.421E+00		3.688E+01	5.150E+01	5.815E+00	-0.125
AM-241	2.022E+01		9.183E+00	1.808E+01	1.399E+00	1.118

*C*  
*Bin*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714615\_GE2\_BAFIL\_194267.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-303-AS DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 08:51:45.  
 Sample ID : 1307146-15 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE2 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	30.89	1776	98	1.38	31.01	27	14	1.97E+00	2.5	4.08E+00
2	1	35.01	400	75	1.39	35.13	27	14	4.44E-01	6.1	
3	0	51.90	57	78	1.45	52.02	49	7	6.34E-02	28.9	
4	2	61.70	212	58	1.60	61.81	57	13	2.35E-01	9.2	3.11E+00
5	2	65.86	107	61	1.61	65.98	57	13	1.19E-01	14.6	
6	0	80.94	710	115	1.27	81.06	77	7	7.89E-01	4.5	
7	0	111.93	154	103	1.23	112.04	108	7	1.72E-01	13.5	
8	0	116.53	57	69	1.64	116.65	115	6	6.38E-02	27.0	
9	0	144.29	44	83	2.24	144.40	139	12	4.87E-02	44.4	
10	5	157.79	15	23	2.37	157.90	156	10	1.69E-02	48.4	1.62E+00
11	5	160.90	36	51	2.37	161.01	156	10	4.01E-02	39.4	
12	3	202.89	13	40	1.52	203.00	200	18	1.44E-02	79.0	9.62E-01
13	3	212.40	19	37	2.04	212.51	200	18	2.09E-02	59.5	
14	0	276.55	56	29	2.09	276.66	272	7	6.25E-02	20.6	
15	3	302.76	142	21	1.54	302.87	299	12	1.57E-01	9.7	1.53E+00
16	3	307.28	22	24	2.16	307.39	299	12	2.40E-02	46.3	
17	2	333.66	52	13	1.99	333.76	328	15	5.80E-02	19.4	1.79E+00
18	2	337.55	28	16	2.00	337.65	328	15	3.08E-02	30.7	
19	0	356.01	532	46	1.35	356.11	352	8	5.92E-01	4.9	
20	5	383.87	100	17	2.12	383.98	380	18	1.11E-01	13.8	4.40E+00
21	5	386.93	186	15	1.89	387.04	380	18	2.06E-01	9.4	
22	5	391.32	50	15	2.36	391.43	380	18	5.52E-02	22.7	
23	2	413.79	22	8	2.07	413.89	410	14	2.50E-02	31.5	3.84E+00
24	2	416.89	12	6	1.71	417.00	410	14	1.37E-02	58.9	
25	0	437.04	106	6	1.81	437.15	433	8	1.18E-01	10.5	
26	1	467.73	20	6	1.93	467.83	464	12	2.25E-02	28.4	1.47E+00
27	1	472.90	6	6	1.93	473.00	464	12	6.14E-03	76.8	
28	0	511.05	18	7	2.97	511.15	505	10	1.97E-02	37.2	
29	0	609.24	10	4	1.58	609.34	606	7	1.13E-02	43.9	



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	3.594E+02	3.594E+02	0.707E+02	19.68		
Total Activity :			3.594E+02	3.594E+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	7.259E+02	7.259E+02	1.498E+02	20.63		
Total Activity :			7.259E+02	7.259E+02				

Grand Total Activity : 1.085E+03 1.085E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.799E+01	3.594E+02	3.594E+02	19.68	OK		
	302.84	17.80	7.560E+00	3.159E+02	3.159E+02	35.62	OK		
	356.01	60.00	7.170E+00	3.717E+02	3.717E+02	18.00	OK		

Final Mean for 3 Valid Peaks = 3.594E+02 +/- 7.071E+01 ( 19.68%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	2.305E+01	7.259E+02	7.259E+02	20.63	OK		

Final Mean for 1 Valid Peaks = 7.259E+02 +/- 1.498E+02 ( 20.63%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.594E+02	7.071E+01	2.262E+01	3.852E+00	15.886
TH-234	7.259E+02	1.498E+02	1.430E+02	1.182E+01	5.075

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.638E+00		5.201E+00	8.127E+00	1.248E+00	-0.202
CD-109	-8.582E+01		1.078E+02	1.747E+02	2.006E+01	-0.491
PA-231	3.204E+01		4.368E+00	8.692E+00	1.655E-01	3.686
PA-234	2.494E+00		1.614E+00	3.067E+00	6.325E-02	0.813
NP-237	-1.295E+01		3.490E+01	5.427E+01	6.127E+00	-0.239
AM-241	2.788E+01		1.090E+01	2.041E+01	1.579E+00	1.366

*815*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714616\_GE2\_BAFIL\_194271.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-11 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:17:08.  
 Sample ID : 1307146-16 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	30.88	1885	104	1.45	31.00	26	15	2.09E+00	2.4	7.23E+00
2	2	35.15	447	112	1.53	35.26	26	15	4.97E-01	6.2	
3	0	46.05	38	54	2.22	46.16	44	5	4.25E-02	34.1	
4	0	53.08	55	100	3.03	53.20	50	8	6.09E-02	34.2	
5	1	61.86	201	56	1.46	61.98	58	15	2.23E-01	9.0	3.92E+00
6	1	65.76	97	51	1.47	65.88	58	15	1.07E-01	15.2	
7	1	80.97	766	55	1.50	81.08	76	14	8.51E-01	3.9	4.47E+00
8	1	84.02	21	41	1.50	84.14	76	14	2.36E-02	84.8	
9	0	111.66	196	93	1.41	111.77	107	8	2.18E-01	11.1	
10	0	116.63	38	60	1.82	116.75	115	6	4.27E-02	36.3	
11	0	162.90	28	73	3.49	163.01	159	8	3.09E-02	56.7	
12	0	186.29	42	58	1.95	186.40	182	7	4.71E-02	33.5	
13	1	272.99	16	10	1.75	273.10	271	12	1.81E-02	29.6	3.89E+00
14	1	276.05	46	13	1.76	276.16	271	12	5.09E-02	20.4	
15	0	294.89	19	24	4.63	295.00	289	12	2.11E-02	56.4	
16	0	302.84	153	27	1.39	302.95	300	6	1.70E-01	9.7	
17	0	307.33	34	22	1.98	307.44	306	5	3.74E-02	28.0	
18	5	333.78	57	9	1.78	333.88	331	14	6.38E-02	15.7	3.05E+00
19	5	338.84	28	10	2.66	338.95	331	14	3.11E-02	29.9	
20	0	356.02	488	35	1.45	356.13	351	10	5.42E-01	5.1	
21	1	383.72	106	17	1.86	383.83	381	9	1.18E-01	13.2	5.36E+00
22	1	386.82	175	25	1.52	386.93	381	9	1.95E-01	8.7	
23	0	391.19	35	15	1.88	391.29	390	6	3.87E-02	26.3	
24	1	414.72	25	25	1.88	414.83	411	15	2.78E-02	36.5	2.51E+00
25	1	418.07	18	23	1.89	418.17	411	15	2.05E-02	53.2	
26	0	436.79	88	13	1.52	436.90	432	10	9.82E-02	13.0	
27	1	467.89	24	6	1.93	467.99	465	13	2.71E-02	23.5	1.02E+00
28	1	471.84	11	2	1.93	471.95	465	13	1.18E-02	45.8	
29	0	511.06	31	11	1.83	511.16	506	11	3.44E-02	27.4	
30	0	609.73	6	7	2.09	609.83	606	7	6.67E-03	83.7	
31	0	640.90	7	0	2.50	641.00	638	6	7.78E-03	37.8	

Summary of Nuclide Activity

Sample ID : 1307146-16

Acquisition date : 5-AUG-2013 09:17:08

Total number of lines in spectrum 31  
 Number of unidentified lines 27  
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	2-Sigma Error	%Error	Flags
			Uncorrected	Decay Corr					
BA-133	10.50Y	1.00	3.877E+02	3.877E+02	0.741E+02	19.11			
Total Activity :			3.877E+02	3.877E+02					

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	2-Sigma Error	%Error	Flags
			Uncorrected	Decay Corr					
TH-234	4.47E+09Y	1.00	6.883E+02	6.883E+02	1.395E+02	20.27			
Total Activity :			6.883E+02	6.883E+02					

Grand Total Activity : 1.076E+03 1.076E+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	3.877E+02	3.877E+02	19.11	OK
	302.84	17.80	7.560E+00	3.405E+02	3.405E+02	35.68	OK
	356.01	60.00	7.170E+00	3.406E+02	3.407E+02	18.22	OK

Final Mean for 3 Valid Peaks = 3.877E+02+/- 7.410E+01 ( 19.11%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.883E+02	6.883E+02	20.27	OK

Final Mean for 1 Valid Peaks = 6.883E+02+/- 1.395E+02 ( 20.27%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.877E+02	7.410E+01	1.993E+01	3.393E+00	19.454
TH-234	6.883E+02	1.395E+02	1.339E+02	1.106E+01	5.141

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-7.991E-01		5.768E+00	9.198E+00	1.413E+00	-0.087
CD-109	-3.345E+01		1.035E+02	1.626E+02	1.867E+01	-0.206
PA-231	3.000E+01		4.192E+00	8.387E+00	1.597E-01	3.577
PA-234	2.396E+00		1.712E+00	3.054E+00	6.300E-02	0.784
NP-237	-1.744E+01		3.025E+01	5.027E+01	5.676E+00	-0.347
AM-241	2.344E+01		1.006E+01	1.892E+01	1.464E+00	1.239

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Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714617\_GE2\_BAFIL\_194275.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-11 DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 09:36:44.  
 Sample ID : 1307146-17 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE2 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 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	28.30	48	82	1.66	28.41	27	13	5.38E-02	27.3	2.12E+01
2	3	30.96	1944	97	1.35	31.07	27	13	2.16E+00	2.4	
3	3	35.05	504	102	1.68	35.17	27	13	5.61E-01	5.4	
4	0	46.12	29	53	2.56	46.23	44	5	3.17E-02	43.0	
5	0	52.21	73	81	2.26	52.32	49	8	8.16E-02	24.1	
6	1	59.02	19	42	1.45	59.13	57	15	2.14E-02	54.1	3.08E+00
7	1	61.94	179	44	1.46	62.05	57	15	1.99E-01	9.7	
8	1	65.75	70	45	1.47	65.87	57	15	7.82E-02	18.9	
9	0	81.04	712	122	1.34	81.16	77	8	7.91E-01	4.6	
10	5	111.84	206	40	1.48	111.95	107	14	2.29E-01	8.1	7.53E-01
11	5	116.38	52	60	2.28	116.50	107	14	5.73E-02	31.1	
12	0	162.33	37	78	1.87	162.44	158	10	4.07E-02	48.4	
13	0	276.57	84	34	2.02	276.68	271	12	9.31E-02	17.9	
14	2	302.85	146	11	1.70	302.95	300	27	1.63E-01	8.7	2.55E+00
15	2	306.80	31	11	1.97	306.90	300	27	3.41E-02	30.1	
16	2	311.23	11	10	1.97	311.34	300	27	1.18E-02	69.2	
17	2	322.89	9	8	1.64	323.00	300	27	1.05E-02	64.6	
18	2	333.60	62	15	1.99	333.71	328	17	6.92E-02	15.6	1.75E+00
19	2	338.00	11	15	2.00	338.11	328	17	1.24E-02	65.0	
20	0	356.07	539	36	1.44	356.18	352	9	5.99E-01	4.8	
21	0	364.39	14	12	3.23	364.50	361	6	1.56E-02	47.4	
22	6	383.80	137	10	1.89	383.90	380	15	1.52E-01	10.1	3.97E+00
23	6	386.87	171	11	1.56	386.98	380	15	1.90E-01	8.7	
24	6	391.37	38	15	2.51	391.48	380	15	4.17E-02	22.6	
25	1	414.81	34	9	1.88	414.92	409	20	3.74E-02	23.6	6.38E+00
26	1	421.87	11	4	1.89	421.97	409	20	1.27E-02	51.3	
27	0	436.95	96	6	1.44	437.05	433	8	1.07E-01	11.1	
28	0	468.50	22	11	1.48	468.61	464	9	2.41E-02	35.2	
29	0	511.46	34	12	2.10	511.56	506	12	3.78E-02	26.6	
30	0	608.91	10	5	1.57	609.01	605	7	1.10E-02	49.7	



Summary of Nuclide Activity

Sample ID : 1307146-17

Acquisition date : 5-AUG-2013 09:36:44

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 Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.602E+02	3.602E+02	0.712E+02	19.77	
Total Activity :			3.602E+02	3.602E+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	6.149E+02	6.149E+02	1.317E+02	21.42	
AM-241	432.20Y	1.00	6.561E+00	6.561E+00	7.121E+00	108.53	
Total Activity :			6.215E+02	6.215E+02			

Grand Total Activity : 9.817E+02 9.817E+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	3.602E+02	3.602E+02	19.77	OK
	302.84	17.80	7.560E+00	3.266E+02	3.266E+02	34.60	OK
	356.01	60.00	7.170E+00	3.760E+02	3.761E+02	17.90	OK

Final Mean for 3 Valid Peaks = 3.602E+02+/- 7.123E+01 ( 19.77%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.149E+02	6.149E+02	21.42	OK

Final Mean for 1 Valid Peaks = 6.149E+02+/- 1.317E+02 ( 21.42%)

AM-241	59.54	35.90*	2.461E+01	6.561E+00	6.561E+00	108.53	OK
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Final Mean for 1 Valid Peaks = 6.561E+00+/- 7.121E+00 (108.53%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.602E+02	7.123E+01	1.962E+01	3.341E+00	18.359
TH-234	6.149E+02	1.317E+02	1.255E+02	1.037E+01	4.901
AM-241	6.561E+00	7.121E+00	1.241E+01	9.601E-01	0.529

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.981E+00	5.761E+00	8.688E+00	1.334E+00	-0.343
CD-109	3.522E+01	9.795E+01	1.679E+02	1.928E+01	0.210
PA-231	2.885E+01	4.028E+00	8.119E+00	1.546E-01	3.553
PA-234	4.106E+00	1.643E+00	3.240E+00	6.683E-02	1.267
NP-237	-2.797E-01	2.958E+01	4.843E+01	5.468E+00	-0.006

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714618\_GE2\_BAFIL\_194278.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : S-10 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 10:00:40.  
 Sample ID : 1307146-18 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE2 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.05	32	132	1.66	28.16	26	16	3.54E-02	71.6	1.14E+01
2	3	30.98	1839	92	1.43	31.10	26	16	2.04E+00	2.4	
3	3	35.05	488	91	1.68	35.16	26	16	5.42E-01	5.4	
4	0	52.59	66	89	2.93	52.71	49	8	7.34E-02	27.5	
5	2	61.87	188	66	1.60	61.98	58	12	2.08E-01	10.1	3.14E+00
6	2	65.81	80	83	1.61	65.93	58	12	8.90E-02	20.1	
7	1	80.98	730	44	1.50	81.09	76	20	8.11E-01	3.9	9.64E+00
8	1	83.75	26	55	1.50	83.86	76	20	2.86E-02	71.0	
9	1	92.91	25	55	1.52	93.02	76	20	2.74E-02	48.7	
10	0	111.68	165	79	1.38	111.79	108	7	1.84E-01	11.8	
11	0	144.57	37	76	3.78	144.69	140	9	4.09E-02	46.3	
12	0	275.99	49	21	1.94	276.10	272	7	5.44E-02	21.1	
13	3	302.91	135	16	1.54	303.02	298	21	1.50E-01	9.6	2.59E+00
14	3	307.39	24	15	2.16	307.50	298	21	2.70E-02	39.8	
15	2	333.70	64	15	1.98	333.81	330	15	7.15E-02	15.2	1.68E+00
16	2	338.55	25	11	2.00	338.65	330	15	2.74E-02	30.7	
17	0	356.08	487	26	1.38	356.19	352	8	5.41E-01	4.9	
18	6	383.80	143	15	2.03	383.91	380	15	1.59E-01	9.4	1.50E+01
19	6	386.86	175	7	1.50	386.96	380	15	1.95E-01	8.5	
20	6	391.13	45	5	3.00	391.23	380	15	5.01E-02	21.8	
21	2	414.91	23	8	2.07	415.02	409	20	2.51E-02	30.8	1.25E+00
22	2	418.25	14	7	2.08	418.36	409	20	1.54E-02	53.5	
23	0	437.07	84	10	1.73	437.17	433	8	9.36E-02	12.7	
24	1	464.72	5	0	1.92	464.83	463	9	5.78E-03	54.3	6.03E-01
25	1	468.07	22	3	1.93	468.18	463	9	2.50E-02	25.8	
26	0	511.62	40	4	2.36	511.72	508	11	4.50E-02	17.7	

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	3.692E+02	3.692E+02	0.708E+02	19.18	
Total Activity :			3.692E+02	3.692E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	6.433E+02	6.433E+02	1.430E+02	22.23	
Total Activity :			6.433E+02	6.433E+02			

Grand Total Activity : 1.012E+03 1.012E+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	3.692E+02	3.692E+02	19.18	OK
	302.84	17.80	7.560E+00	3.015E+02	3.016E+02	35.55	OK
	356.01	60.00	7.170E+00	3.399E+02	3.399E+02	18.02	OK

Final Mean for 3 Valid Peaks = 3.692E+02 +/- 7.082E+01 ( 19.18%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	6.433E+02	6.433E+02	22.23	OK

Final Mean for 1 Valid Peaks = 6.433E+02 +/- 1.430E+02 ( 22.23%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.692E+02	7.082E+01	1.931E+01	3.288E+00	19.121
TH-234	6.433E+02	1.430E+02	1.480E+02	1.223E+01	4.347

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.916E+00		5.419E+00	9.153E+00	1.406E+00	-0.209
CD-109	-7.033E-01		1.058E+02	1.858E+02	2.133E+01	-0.004
PA-231	2.387E+01		3.757E+00	7.585E+00	1.445E-01	3.147
PA-234	3.613E+00		1.658E+00	3.097E+00	6.389E-02	1.166
NP-237	1.435E+00		3.084E+01	5.438E+01	6.140E+00	0.026
AM-241	1.229E+01		9.928E+00	1.760E+01	1.362E+00	0.698

*Binn*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130714619\_GE5\_BAFIL\_194279.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : S-10 DIS  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 10:01:20.  
 Sample ID : 1307146-19 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 00:15:01.16 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	17.45	7	8	0.17	172.84	163	12	7.67E-03	93.9	
2	0	21.25	85	43	0.66	209.34	199	23	9.44E-02	24.3	
3	3	28.48	37	33	0.72	278.71	273	47	4.14E-02	27.2	2.10E+00
4	3	29.76	28	46	0.54	291.00	273	47	3.14E-02	69.7	
5	3	31.00	1907	36	0.73	302.87	273	47	2.12E+00	2.5	
6	2	35.09	361	31	0.68	342.13	333	26	4.01E-01	6.6	1.66E+00
7	2	36.02	91	6	0.57	351.00	333	26	1.01E-01	20.6	
8	0	53.30	36	10	0.45	516.79	510	14	3.98E-02	25.4	
9	0	61.76	187	53	0.54	598.02	587	23	2.08E-01	11.3	
10	0	66.02	79	39	0.76	638.93	628	22	8.74E-02	20.7	
11	1	79.34	44	36	0.76	766.66	756	37	4.93E-02	32.2	1.79E+00
12	1	80.94	767	25	0.67	782.08	756	37	8.52E-01	3.8	
13	0	111.70	214	22	0.69	1077.18	1060	31	2.38E-01	8.6	
14	0	115.94	45	13	0.84	1117.94	1106	21	4.96E-02	23.2	
15	3	275.60	54	3	1.03	2650.00	2636	24	6.03E-02	13.6	1.60E+00
16	3	276.17	19	0	0.75	2655.48	2636	24	2.12E-02	23.4	
17	1	301.76	51	6	1.06	2901.00	2887	29	5.69E-02	22.5	2.27E+00
18	1	302.39	86	3	1.06	2907.00	2887	29	9.58E-02	12.2	
19	0	332.79	55	10	0.69	3198.77	3185	24	6.16E-02	16.9	
20	0	354.98	390	7	0.84	3411.67	3395	29	4.33E-01	5.3	
21	0	382.73	65	7	0.62	3677.93	3661	28	7.26E-02	15.0	
22	7	385.81	143	10	1.30	3707.54	3693	27	1.59E-01	8.9	2.50E+00
23	7	386.07	12	7	1.16	3710.00	3693	27	1.31E-02	103.7	
24	0	389.93	38	9	0.85	3747.01	3730	27	4.28E-02	21.6	



Summary of Nuclide Activity

Sample ID : 1307146-19

Acquisition date : 5-AUG-2013 10:01:20

Total number of lines in spectrum 24  
 Number of unidentified lines 18  
 Number of lines tentatively identified by NID 6 25.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.871E+02	3.871E+02	0.661E+02	17.08		
Total Activity :			3.871E+02	3.871E+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	1.689E+02	1.689E+02	0.388E+02	22.97		
Total Activity :			1.689E+02	1.689E+02				

Grand Total Activity : 5.560E+02 5.560E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	3.871E+02	3.871E+02	17.08	OK		
	302.84	17.80	2.575E+00	5.648E+02	5.648E+02	35.89	OK		
	356.01	60.00	4.312E+00	4.523E+02	4.523E+02	17.90	OK		

Final Mean for 3 Valid Peaks = 3.871E+02+/- 6.611E+01 ( 17.08%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	8.750E+01	1.689E+02	1.689E+02	22.97	OK		

Final Mean for 1 Valid Peaks = 1.689E+02+/- 3.879E+01 ( 22.97%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.871E+02	6.611E+01	1.323E+01	1.948E+00	29.259
TH-234	1.689E+02	3.879E+01	3.306E+01	4.254E-01	5.108

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-9.727E+00		1.374E+01	2.184E+01	7.403E+00	-0.445
CD-109	-3.048E+01		1.030E+02	1.799E+02	1.731E+01	-0.169
PA-231	1.565E-01		7.285E-01	1.427E+00	1.606E-02	0.110
PA-234	3.933E+00	+	1.916E+00	2.084E+00	2.346E-02	1.887
NP-237	-8.365E+00		2.709E+01	4.738E+01	4.179E+00	-0.177
AM-241	1.356E-02		1.673E+00	2.535E+00	2.854E-02	0.005

*C*  
*817m*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130714620\_GE5\_BAFIL\_194283.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : FB AT D-12 TOT  
 Deposition Date :  
 Sample Date : 5-AUG-2013 00:00:00. Acquisition date : 5-AUG-2013 10:20:03.  
 Sample ID : 1307146-20 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	21.06	75	20	0.50	207.46	196	18	8.32E-02	17.7	
2	0	30.94	1923	45	0.64	302.32	289	25	2.14E+00	2.5	
3	0	35.02	278	120	0.67	341.45	332	17	3.09E-01	11.1	
4	0	36.07	50	47	0.35	351.52	348	10	5.56E-02	32.6	
5	0	52.04	23	14	0.33	504.71	496	15	2.51E-02	42.8	
6	0	53.36	44	15	0.72	517.37	510	17	4.84E-02	26.3	
7	5	61.41	114	35	1.04	594.65	582	24	1.26E-01	17.1	1.37E+00
8	5	61.85	103	26	0.75	598.88	582	24	1.15E-01	15.8	
9	0	65.96	79	52	0.88	638.27	626	21	8.80E-02	22.4	
10	1	79.53	43	25	0.73	768.51	762	30	4.79E-02	22.3	2.29E+00
11	1	80.96	738	22	0.69	782.21	762	30	8.20E-01	3.9	
12	0	111.64	193	50	0.67	1076.69	1061	26	2.14E-01	11.0	
13	1	275.40	38	10	1.03	2648.00	2636	24	4.17E-02	23.7	1.14E+00
14	1	276.02	27	2	1.03	2654.00	2636	24	3.02E-02	24.6	
15	3	301.97	139	10	1.11	2902.95	2887	26	1.55E-01	8.6	3.67E+00
16	3	302.49	33	5	1.06	2908.00	2887	26	3.70E-02	22.9	
17	0	332.93	41	16	0.89	3200.12	3184	25	4.56E-02	24.4	
18	0	354.99	358	18	0.94	3411.80	3395	28	3.98E-01	5.8	
19	1	382.01	35	2	1.16	3671.00	3660	32	3.90E-02	25.2	1.95E+00
20	1	382.63	52	9	1.16	3677.00	3660	32	5.74E-02	20.7	
21	0	385.81	113	27	0.90	3707.54	3691	30	1.25E-01	13.2	

Summary of Nuclide Activity

Sample ID : 1307146-20

Acquisition date : 5-AUG-2013 10:20:03

Total number of lines in spectrum 21  
 Number of unidentified lines 14  
 Number of lines tentatively identified by NID 7 33.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.725E+02	3.725E+02	0.638E+02	17.12		
Total Activity :			3.725E+02	3.725E+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	9.318E+01	9.318E+01	2.963E+01	31.80		
AM-241	432.20Y	1.00	9.520E+00	9.520E+00	3.279E+00	34.44		
Total Activity :			1.027E+02	1.027E+02				

Grand Total Activity : 4.751E+02 4.752E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	3.725E+02	3.725E+02	17.12	OK
	302.84	17.80	2.575E+00	2.181E+02	2.181E+02	52.84	OK
	356.01	60.00	4.312E+00	4.158E+02	4.159E+02	18.60	OK

Final Mean for 3 Valid Peaks = 3.725E+02+/- 6.376E+01 ( 17.12%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	9.318E+01	9.318E+01	31.80	OK

Final Mean for 1 Valid Peaks = 9.318E+01+/- 2.963E+01 ( 31.80%)

AM-241	59.54	35.90*	1.000E+02	9.520E+00	9.520E+00	34.44	OK
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Final Mean for 1 Valid Peaks = 9.520E+00+/- 3.279E+00 ( 34.44%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.725E+02	6.376E+01	1.280E+01	1.884E+00	29.103
TH-234	9.318E+01	2.963E+01	3.261E+01	4.196E-01	2.857
AM-241	9.520E+00	3.279E+00	2.132E+00	2.400E-02	4.466

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.233E+00		1.238E+01	2.221E+01	7.527E+00	-0.146
CD-109	-3.449E+01		8.968E+01	1.559E+02	1.500E+01	-0.221
PA-231	-4.264E-01		7.649E-01	1.290E+00	1.452E-02	-0.331
PA-234	3.464E+00	+	1.236E+00	1.749E+00	1.968E-02	1.981
NP-237	-2.268E-01		2.300E+01	4.265E+01	3.762E+00	-0.005