

US EPA ARCHIVE DOCUMENT

ENGINEERING MANAGEMENT SUPPORT, INC.

West Lake OU-1

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #13-07153-OR

August 29, 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 # 13-07153

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

Date for Partial	Initials	Date	Initials	Checklist Items
		7/24/13	KC	Sample Log-In
		8/21/13	HBB	Data Compilation
		8/22/13	MLT	First Technical Data Review
		8/23/13	MSA	Second Technical Data Review
		8/28/13	[Signature]	Data Entry/Electronic Deliverable
		8/28/13	[Signature]	Case Narrative
		8/28/13	KPS	Electronic Deliverable Proof
		8/28/13	MSA	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		8/28/13	MSA	QA/QC Review
				Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by: [Signature] 8/29/13
 Laboratory Manager Date

Copy No. _____

Radiochemistry Services

US EPA ARCHIVE DOCUMENT

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET

13-07153

REC'D JUL 22 2013

Chain of Custody Record

No 1604

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:
Send Report To: <u>Paul Rootsoo</u>	Sampler (Print Name):
Address: <u>7220 W. Johnson Ave</u>	Sampler (Print Name):
<u>Site 406</u>	Shipment Method: <u>Carrier</u>
<u>Woodward, Co 80035</u>	Airbill Number:
Phone:	Laboratory Receiving:
Fax:	

Analysis Requested
 Diss U-386 U-385 U-384
 Diss RA-206 Hk-208
 Tot Ther 232, 230, 208
 Tot RA-206, 235, 237
 Tot Ther - 232, 230, 208

Page 2 of 3
 ①
 samples preserved w/
 AUCs
 Purchase Order #:

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Analysis Requested						Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
PZ-302-AS	7/16/13	1530	Aqueous	2	✓	✓	✓	✓	✓	✓	①	
LR-100	7/17/13	1023	↑	2	✓	✓	✓	✓	✓	✓	↑	
D-01	↑	1043		3	✓	✓	✓	✓	✓	✓		
PZ-201-SS		1140		2	✓	✓	✓	✓	✓	✓		
LR-103		1215		2	✓	✓	✓	✓	✓	✓		
PZ-111-KS		1309		2	✓	✓	✓	✓	✓	✓		
PZ-203-SS		1350		3	✓	✓	✓	✓	✓	✓		
D-07	↓	1411		2	✓	✓	✓	✓	✓	✓		
DJP 06	7/17/13	N/A		2	✓	✓	✓	✓	✓	✓		
206 S-53	7/18/13	0730		2	✓	✓	✓	✓	✓	✓		
D-14	↑	0930		2	✓	✓	✓	✓	✓	✓		
PZ-205-AS		0946		2	✓	✓	✓	✓	✓	✓		
I-65		1059		2	✓	✓	✓	✓	✓	✓		
D-13		1219		2	✓	✓	✓	✓	✓	✓		
PZ-104-KS 4.5		1301		2	✓	✓	✓	✓	✓	✓		
PZ-200-SS 6.7		1335	↓	3	✓	✓	✓	✓	✓	✓	↓	* 3rd container is
PZ-207-AS 8.9	7/18/13	1432	Aqueous	2	✓	✓	✓	✓	✓	✓	①	TOTAL. 8/10/2013

Relinquished by: (Signature) 	Received by: (Signature) <u>First Capital Center</u>	Date: <u>7/22/13</u>	Time: <u>0900</u>	Sample Custodian Remarks (Completed By Laboratory):			
Relinquished by: (Signature) 	Received by: (Signature) <u>K. Bannister</u>	Date: <u>7/22/13</u>	Time: <u>1715</u>	QA/QC Level	Turnaround	Sample Receipt	
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:	Level I <input type="checkbox"/>	Routine <input type="checkbox"/>	Total # Containers Received?	
				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?	

13-07153

REC'D JUL 22 2013

Chain of Custody Record

No 1604

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



Project Name: <u>West Lake Out</u>	Project Number:
Send Report To: <u>Paul Rostica</u>	Sampler (Print Name):
Address: <u>7220 W. Johnson Ave</u>	Sampler (Print Name):
<u>Suite 406</u>	Shipment Method: <u>Carrier</u>
<u>Lakewood, Co 80035</u>	Airbill Number:
Phone:	Laboratory Receiving:
Fax:	

Analysis Requested
 Diss U-238 U-235 U-237
 Diss R-226 R-228
 Tot Th-232 U-238
 Tot PA-235 237 237
 Tot Th-232 232

Page 3 of 3
 ① samples preserved w/ ANO₃
 Purchase Order #: _____

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers	Analysis Requested	Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)
DJP 07	10, 11	7/18/13	N/A	2	✓	①	
FBO I-73	12	7/19/13	0850	1	✓	↑	
T-73	13, 14	↑	0855	2	✓		
P2-103-SS	15, 16	↑	0945	2	✓		
P2-102L-SS	17, 18	↑	1015	2	✓		
P2-200-SS		↑	1019	2	✓		
P2-102-SS		↑	1030	2	✓		
P2-107-SS		↑	1240	3	✓		
P2-106-KS		↓	1309	2	✓		
DJP 08		7/19/13	N/A	2	✓	↓	
			↓				
			Aqueous			①	

Relinquished by: (Signature) 	Received by: (Signature) <u>First Capital Carrier</u>	Date: <u>7/22/13</u>	Time: <u>0800</u>	Sample Custodian Remarks (Completed By Laboratory): QA/QC Level Level I <input type="checkbox"/> Level II <input type="checkbox"/> Level III <input type="checkbox"/> Other <input type="checkbox"/> Turnaround Routine <input type="checkbox"/> 24 Hour <input type="checkbox"/> 1 Week <input type="checkbox"/> Other _____
Relinquished by: (Signature) 	Received by: (Signature) <u>K. Bannister</u>	Date: <u>7/22/13</u>	Time: <u>1715</u>	
Relinquished by: (Signature) 	Received by: (Signature)	Date:	Time:	

Sample Receipt	
Total # Containers Received?	
COC Seals Present?	
COC Seals Intact?	
Received Containers Intact?	
Temperature?	



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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-07153
Lab Deadline	8/13/2013
Analysis	UUISO - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p>	04	46	W1.3
	05	46	W1.3
	06	43	W1.3
	07	43	W1.3
	08	44	W1.3
	09	44	W1.3
	10	43	W1.3
	11	43	W1.3
	12	37	W1.3
	13	44	W1.3
	14	44	W1.3
	15	39	W1.3
	16	39	W1.3
	17	44	W1.3
	18	44	W1.3

MUST USE FXN 06 FOR DUP

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/13/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/13/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0730 PM	8/8/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0810	TUN 8/13/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	0826	8/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	8/13/13 1533
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07153

Lab Deadline

8/13/2013

Analysis

THISO - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location	
<p>Fxns 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p>	04	46	W1.3	
	05	46	W1.3	
	06	43	W1.3	
	07	43	W1.3	
	08	44	W1.3	
	09	44	W1.3	
	10	43	W1.3	
	11	43	W1.3	
	12	37	W1.3	
	13	44	W1.3	
	14	44	W1.3	
	15	39	W1.3	
	16	39	W1.3	
	17	44	W1.3	
	18	44	W1.3	
	<p>MUST USE FXN 06 FOR DUP</p>			

JW 8/8/13

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>JW</i>	<i>8/13/13</i>
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>JW</i>	<i>8/13/13</i>
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>0930 TM</i>	<i>8/8/13</i>
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>0900 TM</i>	<i>8/14/13</i>
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>0907</i>	<i>8/15/13</i>
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	<i>0915</i>	<i>0915</i>
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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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07153

Lab Deadline

8/13/2013

Analysis

Ra226 - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p> <p>MUST USE FXN 06 FOR DUP</p>	04	46	W1.3
	05	46	W1.3
	06	43	W1.3
	07	43	W1.3
	08	44	W1.3
	09	44	W1.3
	10	43	W1.3
	11	43	W1.3
	12	37	W1.3
	13	44	W1.3
	14	44	W1.3
	15	39	W1.3
	16	39	W1.3
	17	44	W1.3
	18	44	W1.3

	Location (circle one)					Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/14/13
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	J Wolfe	8/13/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/8/13 1915
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	JW	8/9/13 1725
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	KB	8/9/13 1729
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	C	8/17/13
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

US EPA ARCHIVE DOCUMENT

	<h1>Internal Chain of Custody</h1>	Work Order #	13-07153
		Lab Deadline	See Comments
		Analysis	Ra226 - Level 4
		Sample Matrix	WA

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Re-Analysis: 2Fxn 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p> <p style="text-align: right;">KBS 8/13/13</p> <hr/> <p>Original Lab Deadline: 08/19/13</p> <p>Rerun Lab Deadline: 08/19/13 MUST USE FXN 06 FOR DUP</p> <p style="text-align: right;">8/13/13 KBS</p>	04	46	W1.3
	05	46	W1.3
	06	43	W1.3
	07	43	W1.3
	08	44	W1.3
	09	44	W1.3
	10	43	W1.3
	11	43	W1.3
	12	37	W1.3
	13	44	W1.3
	14	44	W1.3
	15	39	W1.3
	16	39	W1.3
	17	44	W1.3
	18	44	W1.3

	Location (circle one)					Technician Initials	
	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	<u>Sample Storage</u>					Judge	8/13/13 1000
Relinquished by	Sample Storage		<u>Prep</u>			Judge	8/14/13 1245
Received by	Sample Storage			<u>Separations</u>		JW	8/14/13 1200
Relinquished by	Sample Storage			<u>Separations</u>		JW	8/14/13 1230
Received by	Sample Storage				<u>Count Room</u>	AG	8/14/13 1230
Relinquished by	Sample Storage				<u>Count Room</u>	KB	8/19/13 1149
Received by	<u>Sample Storage</u>						
Relinquished by	Sample Storage						
Received by	Sample Storage						
Relinquished by	Sample Storage						
Received by	Sample Storage						
Relinquished by	Sample Storage						
Received by	Sample Storage						
Relinquished by	Sample Storage						



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Oak Ridge Laboratory

Internal Chain of Custody

Work Order #	13-07153
Lab Deadline	8/13/2013
Analysis	Ra228 - Level 4
Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Fxns 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p> <p><i>KBS OK - 8/20/13</i></p> <p>MUST USE FXN 06 FOR DUP <i>leku</i></p>	04	46	W1.3
	05	46	W1.3
	06	43	W1.3
	07	43	W1.3
	08	44	W1.3
	09	44	W1.3
	10	43	W1.3
	11	43	W1.3
	12	37	W1.3
	13	44	W1.3
	14	44	W1.3
	15	39	W1.3
	16	39	W1.3
	17	44	W1.3
	18	44	W1.3

	Location (circle one)					Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room	<i>J Wolfe</i>	<i>8/6/13 1200</i>
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room	<i>J Wolfe</i>	<i>8/8/13 0200</i>
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>yw</i>	<i>8/8/13 1915</i>
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>yw</i>	<i>8/9/13 1725</i>
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	<i>KBS</i>	<i>8/9/13 1729</i>
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>yw</i>	<i>8/13/13 1708</i>
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	<i>yw</i>	<i>8/16/13 1052</i>
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>	<i>AG</i>	<i>8/16/13 1545</i>
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room		
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		

US EPA ARCHIVE DOCUMENT



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SERVICES

Oak Ridge Laboratory

Internal Chain of Custody

Work Order #

13-07153

Lab Deadline

See Comments

Analysis

Ra228 - Level 4

Sample Matrix

WA

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
<p>Re-Analysis: 2Fxns 04, 06, 08, 10, 12, 13, 15 & 17 are TOTAL</p> <p>Fxns 05, 07, 09, 11, 14, 16 & 18 are DISSOLVED</p> <p style="text-align: right;"><i>KBS</i></p> <p style="text-align: right;"><i>8/20/13</i></p> <p>Original Lab Deadline: 08/19/13</p> <p>Rerun Lab Deadline: 08/19/13 MUST USE FXN 06 FOR DUP</p>	04	46	W1.3
	05	46	W1.3
	06	43	W1.3
	07	43	W1.3
	08	44	W1.3
	09	44	W1.3
	10	43	W1.3
	11	43	W1.3
	12	37	W1.3
	13	44	W1.3
	14	44	W1.3
	15	39	W1.3
	16	39	W1.3
	17	44	W1.3
	18	44	W1.3

Received by	Location (circle one)					Technician Initials
	Sample Storage	Rough Prep	Prep	Separations	Count Room	
Received by	<u>Sample Storage</u>					<i>JWH 8/13/13 1200</i>
Relinquished by	Sample Storage		<u>Prep</u>			<i>JWH 8/14/13 1245</i>
Received by	Sample Storage		<u>Prep</u>	<u>Separations</u>		<i>AW 8/14/13 1200</i>
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>		<i>JW 8/16/13 1230</i>
Received by	Sample Storage		<u>Prep</u>	<u>Separations</u>	<u>Count Room</u>	<i>AG 8/16/13 1230</i>
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>	<u>Count Room</u>	<i>KBS 8/19/13 1149</i>
Received by	Sample Storage		<u>Prep</u>	<u>Separations</u>	Count Room	<i>JW 8/19/13 1550</i>
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>	Count Room	<i>AW 8/21/13 0725</i>
Received by	Sample Storage		<u>Prep</u>	<u>Separations</u>	<u>Count Room</u>	<i>8/22/13 0725</i>
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>	<u>Count Room</u>	<i>8/22/13 1000</i>
Received by	<u>Sample Storage</u>		<u>Prep</u>	<u>Separations</u>	Count Room	
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>	Count Room	
Received by	Sample Storage		<u>Prep</u>	<u>Separations</u>	Count Room	
Relinquished by	Sample Storage		<u>Prep</u>	<u>Separations</u>	Count Room	



EBERLINE
SERVICES

Sample Receiving Report
(Volumes, pH, & CPM)

Internal Work Order

13-07153

Received By

KCOULSTON

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	W1.3		
02	BLANK	0		WA	W1.3		
03	DUP	0		WA	W1.3		
04	PZ-104-KS TOT /	2		WA	W1.3	8.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	46
			2	<2	<2	4.0000	44
05	PZ-104-KS DIS /	2		WA	W1.3	0.00	46
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				46
			2				44
06	PZ-206-SS TOT / Dup	3		WA	W1.3	12.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	43
			2	<2	<2	4.0000	36
			3	<2	<2	4.0000	39
07	PZ-206-SS DIS /	3		WA	W1.3	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				43
			2				36
			3				39
08	PZ-207-AS TOT /	2		WA	W1.3	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	40
			2	<2	<2	4.0000	44
09	PZ-207-AS DIS /	2		WA	W1.3	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				40
			2				44
10	DUP 07 TOT /	2		WA	W1.3	8.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	41
			2	<2	<2	4.0000	43
11	DUP 07 DIS /	2		WA	W1.3	0.00	43
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				41
			2				43
12	FB I-73 TOT /	1		WA	W1.3	4.00	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	37
13	I-73 TOT /	2		WA	W1.3	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	35
			2	<2	<2	4.0000	44
14	I-73 DIS /	2		WA	W1.3	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				35
			2				44
15	PZ-103-SS TOT /	2		WA	W1.3	8.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	36
			2	<2	<2	4.0000	39
16	PZ-103-SS DIS /	2		WA	W1.3	0.00	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				36
			2				39
17	PZ-102R-SS TOT /	2		WA	W1.3	8.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	<2	<2	4.0000	44
			2	<2	<2	4.0000	40
18	PZ-102R-SS DIS /	2		WA	W1.3	0.00	44
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1				44
			2				40

1/21 07/24/13

Received by: Kristen Coulston

Date: 7/24/13

US EPA ARCHIVE DOCUMENT

SECTION II
SAMPLE ACKNOWLEDGEMENT



Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST

MP-001-2

WORK ORDER # 13-07153

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

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

WERE SAMPLES:

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

WERE CHAIN OF CUSTODY SEALS:

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

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

REMARKS: _____

SIGNATURE: Kristen Carleton DATE: 7/24/13

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**SECTION III
CASE NARRATIVE**



EBS-OR-36008

August 29, 2013

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

CASE NARRATIVE
Work Order # 13-07153-OR

SAMPLE RECEIPT

This work order contains eight water samples received 07/22/2013. Seven 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-104-KS TOT	13-07153-04	FB at I-73 TOT	13-07153-12
PZ-104-KS DIS	13-07153-05	I-73 TOT	13-07153-13
PZ-206-SS TOT	13-07153-06	I-73 DIS	13-07153-14
PZ-206-SS DIS	13-07153-07	PZ-103-SS TOT	13-07153-15
PZ-207-AS TOT	13-07153-08	PZ-103-SS DIS	13-07153-16
PZ-207-AS DIS	13-07153-09	PZ-102R-SS TOT	13-07153-17
DUP 07 TOT	13-07153-10	PZ-102R-SS DIS	13-07153-18
DUP 07 DIS	13-07153-11		

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

SPECIAL CIRCUMSTANCES

Sample numbers I-73TOT and I-73 DIS contained high solids. Due to this circumstance, these samples for Radium analyses were prepared with EDTA, Phenolphthalein and hydroxide precipitation.

ISOTOPIC URANIUM

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

Samples demonstrated acceptable results for all Uranium analyses. Chemical recovery was slightly low for sample number PZ-207-AS TOT. Chemical recovery was acceptable for all other samples. The Uranium-234 method blank demonstrated results slightly greater than the detection limit. The Uranium-235 and Uranium-238 method blank demonstrated acceptable results. Results for the Uranium-234 duplicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Uranium-235 and Uranium-238 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Uranium-234 and Uranium-238 laboratory control sample demonstrated an acceptable percent recovery.

ISOTOPIC THORIUM

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

Samples demonstrated acceptable results for all Thorium analyses. Chemical recovery was acceptable for all samples. The Thorium-228, Thorium-230 and Thorium-232 method blank demonstrated acceptable results. Results for the Thorium-228, Thorium-230 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-228, Thorium-230 and Thorium-232 laboratory control sample demonstrated an acceptable percent recovery.

RADIUM-226

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

ANALYTICAL RESULTS CONTINUED

RADIUM-226 CONTINUED

1st Analytical Attempt

Samples demonstrated acceptable results for all Radium-226 analyses. Chemical recovery was low for sample numbers I-73 TOT and I-73 DIS. This appears to be related to the presence of a sulfate forming element being present in this sample which interfered with the initial precipitation of Radium as sulfate. Chemical recovery was acceptable for all other 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.

2nd Analytical Attempt

Sample numbers I-73 TOT and I-73 DIS were reanalyzed due to low chemical recoveries. Samples demonstrated acceptable results for all Radium-226 analyses. However, due to the required use of a smaller aliquot, detection limits are slightly high. 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.

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.

1st Analytical Attempt

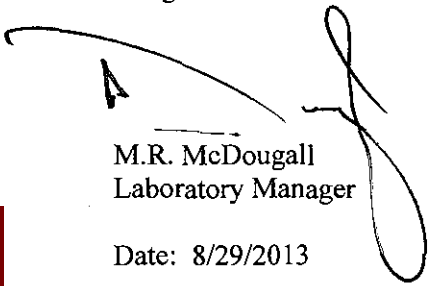
Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all samples. The Radium-228 method blank demonstrated acceptable results. Inadvertently the duplicate sample was not analyzed. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

2nd Analytical Attempt

Sample numbers I-73 TOT and I-73 DIS were reanalyzed due to low chemical recoveries for the first Radium-226 analytical attempt. Samples demonstrated acceptable results for all Radium-228 analyses. All sample results demonstrated slightly high detection limits. 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.



A

M.R. McDougall
Laboratory Manager

Date: 8/29/2013

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**SECTION IV
ANALYTICAL RESULTS SUMMARY**

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Analysis Date/Time</u>	<u>Analyte</u>	<u>Method</u>	<u>Result</u>	<u>Error</u>	<u>CSU</u>	<u>MDA</u>	<u>Qualifier</u>	<u>Units</u>
LCS13-07153-01	13-07153-01	08/12/2013 12:56:40	Radium-226	E903.0	10.58	1.22	2.55	0.20		pCi/l
LCS13-07153-01	13-07153-01	08/19/2013 08:53:39	Radium-226	E903.0	9.62	1.13	2.32	0.15		pCi/l
LCS13-07153-01	13-07153-01	08/16/2013 12:58:47	Radium-228	E904.0	8.63	0.97	2.18	1.21		pCi/l
LCS13-07153-01	13-07153-01	08/21/2013 07:55:31	Radium-228	E904.0	7.44	1.76	2.44	1.86		pCi/l
LCS13-07153-01	13-07153-01	08/14/2013 12:47:17	Thorium-228	HASL 300, 4.5.2	4.05	0.81	0.90	0.14		pCi/l
LCS13-07153-01	13-07153-01	08/14/2013 12:47:17	Thorium-230	HASL 300, 4.5.2	4.98	0.95	1.13	0.10		pCi/l
LCS13-07153-01	13-07153-01	08/14/2013 12:47:17	Thorium-232	HASL 300, 4.5.2	4.70	0.91	1.00	0.09		pCi/l
LCS13-07153-01	13-07153-01	08/13/2013 09:06:53	Uranium-234	HASL 300, 4.5.2	7.07	0.94	1.07	0.07		pCi/l
LCS13-07153-01	13-07153-01	08/13/2013 09:06:53	Uranium-235	HASL 300, 4.5.2	0.71	0.22	0.22	0.09		pCi/l
LCS13-07153-01	13-07153-01	08/13/2013 09:06:53	Uranium-238	HASL 300, 4.5.2	7.39	0.97	1.11	0.06		pCi/l
BLANK13-07153-02	13-07153-02	08/12/2013 12:56:42	Radium-226	E903.0	-0.01	0.07	0.07	0.15	U	pCi/l
BLANK13-07153-02	13-07153-02	08/19/2013 08:53:41	Radium-226	E903.0	0.04	0.09	0.09	0.17	U	pCi/l
BLANK13-07153-02	13-07153-02	08/16/2013 12:58:47	Radium-228	E904.0	0.56	0.63	0.65	1.29	U	pCi/l
BLANK13-07153-02	13-07153-02	08/21/2013 07:56:43	Radium-228	E904.0	0.36	0.82	0.82	1.72	U	pCi/l
BLANK13-07153-02	13-07153-02	08/14/2013 12:47:18	Thorium-228	HASL 300, 4.5.2	0.01	0.07	0.07	0.20	U	pCi/l
BLANK13-07153-02	13-07153-02	08/14/2013 12:47:18	Thorium-230	HASL 300, 4.5.2	0.20	0.18	0.18	0.19	J	pCi/l
BLANK13-07153-02	13-07153-02	08/14/2013 12:47:18	Thorium-232	HASL 300, 4.5.2	0.00	0.08	0.08	0.23	U	pCi/l
BLANK13-07153-02	13-07153-02	08/13/2013 09:06:55	Uranium-234	HASL 300, 4.5.2	0.27	0.12	0.12	0.05		pCi/l
BLANK13-07153-02	13-07153-02	08/13/2013 09:06:55	Uranium-235	HASL 300, 4.5.2	0.13	0.10	0.10	0.10	J	pCi/l
BLANK13-07153-02	13-07153-02	08/13/2013 09:06:55	Uranium-238	HASL 300, 4.5.2	0.12	0.08	0.08	0.05	J	pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/12/2013 12:56:44	Radium-226	E903.0	2.27	0.57	0.75	0.19		pCi/l
I-73 TOT_07_19_2013 DUP	13-07153-03	08/19/2013 08:53:35	Radium-226	E903.0	2.20	1.52	1.59	1.72	J	pCi/l
I-73 TOT_07_19_2013 DUP	13-07153-03	08/21/2013 07:56:44	Radium-228	E904.0	2.88	1.22	1.39	2.29	J	pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/14/2013 12:47:20	Thorium-228	HASL 300, 4.5.2	0.27	0.13	0.13	0.08		pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/14/2013 12:47:20	Thorium-230	HASL 300, 4.5.2	0.43	0.17	0.18	0.07		pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/14/2013 12:47:20	Thorium-232	HASL 300, 4.5.2	0.16	0.10	0.10	0.06		pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/13/2013 09:06:56	Uranium-234	HASL 300, 4.5.2	0.44	0.16	0.16	0.08		pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/13/2013 09:06:56	Uranium-235	HASL 300, 4.5.2	0.16	0.10	0.10	0.07	J	pCi/l
PZ-206-SS TOT_07_18_2013 DUP	13-07153-03	08/13/2013 09:06:56	Uranium-238	HASL 300, 4.5.2	0.21	0.11	0.11	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>
PZ-104-KS TOT_07_18_2013	13-07153-04	08/12/2013 12:56:46	Radium-226	E903.0	0.26	0.20	0.21	0.16	J	pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/16/2013 12:58:48	Radium-228	E904.0	0.12	0.69	0.69	1.46	U	pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/14/2013 12:47:22	Thorium-228	HASL 300, 4.5.2	0.02	0.05	0.05	0.09	U	pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/14/2013 12:47:22	Thorium-230	HASL 300, 4.5.2	0.24	0.13	0.14	0.10		pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/14/2013 12:47:22	Thorium-232	HASL 300, 4.5.2	0.03	0.04	0.04	0.07	U	pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/13/2013 09:06:58	Uranium-234	HASL 300, 4.5.2	0.62	0.19	0.20	0.07		pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/13/2013 09:06:58	Uranium-235	HASL 300, 4.5.2	0.27	0.14	0.14	0.10		pCi/l
PZ-104-KS TOT_07_18_2013	13-07153-04	08/13/2013 09:06:58	Uranium-238	HASL 300, 4.5.2	0.18	0.10	0.10	0.08	J	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/12/2013 12:56:36	Radium-226	E903.0	0.10	0.13	0.13	0.18	U	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/16/2013 12:58:49	Radium-228	E904.0	0.28	0.77	0.78	1.62	U	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/14/2013 12:47:24	Thorium-228	HASL 300, 4.5.2	0.00	0.05	0.05	0.13	U	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/14/2013 12:47:24	Thorium-230	HASL 300, 4.5.2	0.24	0.15	0.15	0.12	J	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/14/2013 12:47:24	Thorium-232	HASL 300, 4.5.2	0.04	0.06	0.06	0.10	U	pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/13/2013 09:06:59	Uranium-234	HASL 300, 4.5.2	0.56	0.18	0.19	0.06		pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/13/2013 09:06:59	Uranium-235	HASL 300, 4.5.2	0.30	0.15	0.15	0.10		pCi/l
PZ-104-KS DIS_07_18_2013	13-07153-05	08/13/2013 09:06:59	Uranium-238	HASL 300, 4.5.2	0.29	0.13	0.13	0.06		pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/12/2013 12:56:38	Radium-226	E903.0	2.30	0.60	0.77	0.19		pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/16/2013 12:58:52	Radium-228	E904.0	1.63	0.72	0.81	1.35	J	pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/14/2013 12:47:27	Thorium-228	HASL 300, 4.5.2	0.15	0.09	0.09	0.07	J	pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/14/2013 12:47:27	Thorium-230	HASL 300, 4.5.2	0.17	0.09	0.09	0.06		pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/14/2013 12:47:27	Thorium-232	HASL 300, 4.5.2	0.10	0.07	0.07	0.05	J	pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/13/2013 09:07:01	Uranium-234	HASL 300, 4.5.2	0.53	0.17	0.18	0.07		pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/13/2013 09:07:01	Uranium-235	HASL 300, 4.5.2	0.23	0.12	0.12	0.07		pCi/l
PZ-206-SS TOT_07_18_2013	13-07153-06	08/13/2013 09:07:01	Uranium-238	HASL 300, 4.5.2	0.49	0.16	0.17	0.07		pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/12/2013 16:47:56	Radium-226	E903.0	1.04	0.41	0.46	0.27		pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/16/2013 12:58:53	Radium-228	E904.0	0.63	0.83	0.84	1.71	U	pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/14/2013 12:47:29	Thorium-228	HASL 300, 4.5.2	0.07	0.07	0.07	0.07	U	pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/14/2013 12:47:29	Thorium-230	HASL 300, 4.5.2	0.13	0.11	0.11	0.12	J	pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/14/2013 12:47:29	Thorium-232	HASL 300, 4.5.2	0.03	0.07	0.07	0.15	U	pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/13/2013 09:07:03	Uranium-234	HASL 300, 4.5.2	0.28	0.13	0.13	0.07		pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/13/2013 09:07:03	Uranium-235	HASL 300, 4.5.2	0.07	0.07	0.07	0.07	U	pCi/l
PZ-206-SS DIS_07_18_2013	13-07153-07	08/13/2013 09:07:03	Uranium-238	HASL 300, 4.5.2	0.10	0.08	0.08	0.08	J	pCi/l

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Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-207-AS TOT_07_18_2013	13-07153-08	08/12/2013 16:47:57	Radium-226	E903.0	0.88	0.40	0.44	0.34		pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/16/2013 12:58:53	Radium-228	E904.0	1.88	0.75	0.86	1.37	J	pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/14/2013 12:47:32	Thorium-228	HASL 300, 4.5.2	0.04	0.06	0.06	0.10	U	pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/14/2013 12:47:32	Thorium-230	HASL 300, 4.5.2	0.22	0.13	0.13	0.07		pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/14/2013 12:47:32	Thorium-232	HASL 300, 4.5.2	0.00	0.04	0.04	0.11	U	pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/13/2013 09:07:04	Uranium-234	HASL 300, 4.5.2	0.10	0.22	0.22	0.43	U	pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/13/2013 09:07:04	Uranium-235	HASL 300, 4.5.2	0.10	0.22	0.22	0.43	U	pCi/l
PZ-207-AS TOT_07_18_2013	13-07153-08	08/13/2013 09:07:04	Uranium-238	HASL 300, 4.5.2	-0.03	0.14	0.14	0.44	U	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/12/2013 16:47:50	Radium-226	E903.0	0.82	0.38	0.42	0.35		pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/16/2013 12:58:54	Radium-228	E904.0	1.30	0.80	0.85	1.56	J	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/14/2013 12:47:34	Thorium-228	HASL 300, 4.5.2	0.05	0.07	0.07	0.10	U	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/14/2013 12:47:34	Thorium-230	HASL 300, 4.5.2	0.24	0.13	0.14	0.10		pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/14/2013 12:47:34	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.06	0.10	U	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/13/2013 09:07:06	Uranium-234	HASL 300, 4.5.2	0.21	0.18	0.18	0.18	J	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/13/2013 09:07:06	Uranium-235	HASL 300, 4.5.2	0.28	0.24	0.25	0.28	J	pCi/l
PZ-207-AS DIS_07_18_2013	13-07153-09	08/13/2013 09:07:06	Uranium-238	HASL 300, 4.5.2	0.11	0.15	0.15	0.23	U	pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/12/2013 16:47:51	Radium-226	E903.0	0.63	0.28	0.31	0.15		pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/16/2013 12:58:45	Radium-228	E904.0	1.44	0.78	0.84	1.49	J	pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/14/2013 12:47:37	Thorium-228	HASL 300, 4.5.2	0.48	0.24	0.25	0.15		pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/14/2013 12:47:37	Thorium-230	HASL 300, 4.5.2	0.41	0.22	0.22	0.10		pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/14/2013 12:47:37	Thorium-232	HASL 300, 4.5.2	0.14	0.12	0.12	0.10	J	pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/13/2013 09:07:08	Uranium-234	HASL 300, 4.5.2	1.38	0.33	0.34	0.09		pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/13/2013 09:07:08	Uranium-235	HASL 300, 4.5.2	0.34	0.16	0.17	0.11		pCi/l
DUP 07 TOT_07_18_2013	13-07153-10	08/13/2013 09:07:08	Uranium-238	HASL 300, 4.5.2	0.77	0.23	0.24	0.09		pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/12/2013 16:47:52	Radium-226	E903.0	0.20	0.17	0.18	0.17	J	pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/16/2013 12:58:46	Radium-228	E904.0	0.53	0.88	0.89	1.82	U	pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/14/2013 12:47:40	Thorium-228	HASL 300, 4.5.2	0.03	0.06	0.06	0.11	U	pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/14/2013 12:47:40	Thorium-230	HASL 300, 4.5.2	0.21	0.13	0.13	0.09	J	pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/14/2013 12:47:40	Thorium-232	HASL 300, 4.5.2	0.07	0.08	0.08	0.08	U	pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/13/2013 09:07:10	Uranium-234	HASL 300, 4.5.2	1.16	0.30	0.31	0.07		pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/13/2013 09:07:10	Uranium-235	HASL 300, 4.5.2	0.33	0.16	0.16	0.08		pCi/l
DUP 07 DIS_07_18_2013	13-07153-11	08/13/2013 09:07:10	Uranium-238	HASL 300, 4.5.2	0.93	0.26	0.27	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>
FB at I-73 TOT_07_19_2013	13-07153-12	08/12/2013 16:47:53	Radium-226	E903.0	0.05	0.10	0.10	0.20	U	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/16/2013 12:58:46	Radium-228	E904.0	0.56	0.80	0.81	1.64	U	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/14/2013 12:47:42	Thorium-228	HASL 300, 4.5.2	0.00	0.05	0.05	0.10	U	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/14/2013 12:47:42	Thorium-230	HASL 300, 4.5.2	0.23	0.15	0.16	0.14	J	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/14/2013 12:47:42	Thorium-232	HASL 300, 4.5.2	0.00	0.06	0.06	0.13	U	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/13/2013 09:07:12	Uranium-234	HASL 300, 4.5.2	0.07	0.06	0.06	0.06	J	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/13/2013 09:07:12	Uranium-235	HASL 300, 4.5.2	0.15	0.10	0.10	0.09	J	pCi/l
FB at I-73 TOT_07_19_2013	13-07153-12	08/13/2013 09:07:12	Uranium-238	HASL 300, 4.5.2	0.06	0.06	0.06	0.06	U	pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/19/2013 08:53:37	Radium-226	E903.0	1.90	1.30	1.36	1.05	J	pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/21/2013 07:56:44	Radium-228	E904.0	1.07	1.16	1.19	2.36	U	pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/14/2013 12:47:44	Thorium-228	HASL 300, 4.5.2	0.34	0.17	0.17	0.08		pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/14/2013 12:47:44	Thorium-230	HASL 300, 4.5.2	0.49	0.20	0.21	0.07		pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/14/2013 12:47:44	Thorium-232	HASL 300, 4.5.2	0.08	0.08	0.08	0.08	U	pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/13/2013 09:07:13	Uranium-234	HASL 300, 4.5.2	1.56	0.58	0.59	0.18		pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/13/2013 09:07:13	Uranium-235	HASL 300, 4.5.2	0.67	0.39	0.39	0.22		pCi/l
I-73 TOT_07_19_2013	13-07153-13	08/13/2013 09:07:13	Uranium-238	HASL 300, 4.5.2	1.10	0.47	0.48	0.25		pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/19/2013 08:53:33	Radium-226	E903.0	2.83	1.50	1.62	0.85		pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/21/2013 07:56:44	Radium-228	E904.0	1.97	1.06	1.15	2.05	J	pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/14/2013 12:47:47	Thorium-228	HASL 300, 4.5.2	0.14	0.12	0.12	0.12	J	pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/14/2013 12:47:47	Thorium-230	HASL 300, 4.5.2	0.57	0.25	0.26	0.10		pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/14/2013 12:47:47	Thorium-232	HASL 300, 4.5.2	0.06	0.07	0.07	0.09	U	pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/13/2013 09:07:15	Uranium-234	HASL 300, 4.5.2	0.97	0.44	0.44	0.18		pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/13/2013 09:07:15	Uranium-235	HASL 300, 4.5.2	0.10	0.18	0.18	0.31	U	pCi/l
I-73 DIS_07_19_2013	13-07153-14	08/13/2013 09:07:15	Uranium-238	HASL 300, 4.5.2	0.87	0.41	0.42	0.20		pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/12/2013 16:48:29	Radium-226	E903.0	3.87	0.85	1.18	0.28		pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/16/2013 12:58:46	Radium-228	E904.0	7.01	1.01	1.88	1.48		pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/14/2013 16:15:14	Thorium-228	HASL 300, 4.5.2	0.62	0.50	0.50	0.64	J	pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/14/2013 16:15:14	Thorium-230	HASL 300, 4.5.2	1.30	0.64	0.66	0.43		pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/14/2013 16:15:14	Thorium-232	HASL 300, 4.5.2	0.31	0.31	0.31	0.36	U	pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/13/2013 09:07:17	Uranium-234	HASL 300, 4.5.2	0.63	0.39	0.40	0.28	J	pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/13/2013 09:07:17	Uranium-235	HASL 300, 4.5.2	0.13	0.21	0.21	0.31	U	pCi/l
PZ-103-SS TOT_07_19_2013	13-07153-15	08/13/2013 09:07:17	Uranium-238	HASL 300, 4.5.2	1.01	0.51	0.51	0.36		pCi/l



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Client Sample ID	Lab Sample ID	Analysis Date/Time	Analyte	Method	Result	Error	CSU	MDA	Qualifier	Units
PZ-103-SS DIS_07_19_2013	13-07153-16	08/12/2013 16:48:30	Radium-226	E903.0	3.44	0.86	1.12	0.43		pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/16/2013 13:25:03	Radium-228	E904.0	1.14	0.80	0.85	1.59	J	pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/14/2013 16:15:15	Thorium-228	HASL 300, 4.5.2	0.06	0.14	0.14	0.27	U	pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/14/2013 16:15:15	Thorium-230	HASL 300, 4.5.2	0.04	0.10	0.10	0.20	U	pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/14/2013 16:15:15	Thorium-232	HASL 300, 4.5.2	0.06	0.10	0.10	0.16	U	pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/13/2013 12:16:24	Uranium-234	HASL 300, 4.5.2	0.33	0.14	0.14	0.07		pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/13/2013 12:16:24	Uranium-235	HASL 300, 4.5.2	0.14	0.10	0.10	0.09	J	pCi/l
PZ-103-SS DIS_07_19_2013	13-07153-16	08/13/2013 12:16:24	Uranium-238	HASL 300, 4.5.2	0.14	0.09	0.09	0.08	J	pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/12/2013 16:48:31	Radium-226	E903.0	3.25	0.73	1.01	0.28		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/16/2013 13:25:03	Radium-228	E904.0	1.32	1.01	1.05	2.02	J	pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/14/2013 16:15:12	Thorium-228	HASL 300, 4.5.2	0.40	0.20	0.20	0.17		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/14/2013 16:15:12	Thorium-230	HASL 300, 4.5.2	0.49	0.21	0.22	0.14		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/14/2013 16:15:12	Thorium-232	HASL 300, 4.5.2	0.53	0.22	0.23	0.13		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/13/2013 12:16:25	Uranium-234	HASL 300, 4.5.2	4.13	0.80	0.85	0.11		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/13/2013 12:16:25	Uranium-235	HASL 300, 4.5.2	0.76	0.26	0.27	0.12		pCi/l
PZ-102R-SS TOT_07_19_2013	13-07153-17	08/13/2013 12:16:25	Uranium-238	HASL 300, 4.5.2	3.53	0.70	0.75	0.10		pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/12/2013 16:48:32	Radium-226	E903.0	1.98	0.54	0.69	0.28		pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/16/2013 13:25:03	Radium-228	E904.0	2.25	0.79	0.94	1.43		pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/14/2013 16:15:13	Thorium-228	HASL 300, 4.5.2	0.00	0.04	0.04	0.11	U	pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/14/2013 16:15:13	Thorium-230	HASL 300, 4.5.2	0.14	0.10	0.11	0.08	J	pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/14/2013 16:15:13	Thorium-232	HASL 300, 4.5.2	0.05	0.06	0.06	0.08	U	pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/13/2013 12:16:23	Uranium-234	HASL 300, 4.5.2	3.47	0.66	0.70	0.10		pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/13/2013 12:16:23	Uranium-235	HASL 300, 4.5.2	0.72	0.25	0.26	0.14		pCi/l
PZ-102R-SS DIS_07_19_2013	13-07153-18	08/13/2013 12:16:23	Uranium-238	HASL 300, 4.5.2	2.25	0.48	0.50	0.09		pCi/l



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**SECTION V
ANALYTICAL STANDARDS**

QA/QC REVIEWED

Date 1/16/95 Initials WA

CERTIFICATE OF CALIBRATION

ALPHA STANDARD SOLUTION

U-8

Radionuclide: U-238NAT Customer: TMA EBERLINE
Half Life: $(4.468 \pm 0.005) \times 10^9$ years P.O.No.: OR2778
Catalog No.: 7338 Reference Date: January 1 1995 12:00 PST.
Source No.: 479-50 Contained Radioactivity: (Total U) 8.016 μ Ci
Contained Radioactivity: (Total U) 297 kBq

Description of Solution

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

Radioimpurities Refer to attached technical data sheet

Radioactive Daughters Refer to attached technical data sheet

Radionuclide Concentration

(Total U) 0.1228 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



QUALITY CONTROL PROGRAM

MP-009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

Chemical Composition of Standard Solution
Uranyl nitrate in dilute HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: September 6, 2013

Verified & Approved By 

Date: 9/26/2012 0:00

QC Approval 

Date: 9/26/12



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Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

Chemical Composition of Standard Solution
Uranly Nitrate in 1M HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

NOTES:

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

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

Expiration Date: September 6, 2013

Verified & Approved By [Signature]

Date: 9/26/2012 0:00

QC Approval [Signature]

Date: 9/26/12

US EPA ARCHIVE DOCUMENT

RECORD COPY

Tracer Solution for Environmental Analysis & Disequilibrium Studies

Product Description & Measurement Certificate

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

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

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

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

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

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

Not measured

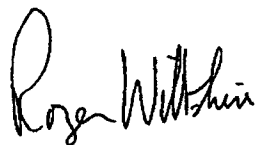
Chemical Composition Calculated weight of U-232, 4.42E-08 grams, as 2M HNO₃ solution in a flame sealed glass vial.
This Tracer solution has been produced 'carrier free'.

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

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

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

Approved
Signatory



Roger Wiltshire

Project Ref. AE2315

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



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

Radionuclide ²³² U	Reference Date 3/1/2000 0:00
Certified Activity 9.760E-01 μ CI	
Certified Concentration μ CI per gram	

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

Chemical Composition of Standard Solution

²³²U(NO₃)₆ in 2M HNO₃

Dilution Instructions: **Dilution Solvent Used** 2M HNO₃

Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 0.9760 μ CI **Which Equals** 2.167E+03 dpm at the date listed above

And after dilution the activity of this solution is 2.167E+03 dpm/ml

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

Expiration Date: December 7, 2013

Verified & Approved By _____

Date: 12/13/2012 0:00

QC Approval *Saha* _____

Date: 12/13/12



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**
AEA/Amersham 92/232/67

Date: **12/7/2012 0:00**
Solution # **U-10a**

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

Radionuclide of Interest: ²³²U
Parent Solution Conc. **2.167E+03** dpm/ml

Reference Date: **3/1/2000 0:00**

Chemical Composition of Standard Solution

²³²U(NO₃)₆ in 2M HNO₃

Dilution Instructions:

Dilution Solvent Used: **2M HNO₃**

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: **10.0000** ml

Total Activity: **2.1670E+04** dpm

Final 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: 

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

QC Approval: 

Date: **12/13/12**

US EPA ARCHIVE DOCUMENT

Received
 OCT 14 1991
 TMA/Eberline
 Oak Ridge Lab

QA/QC REVIEWED

Date 10/14/91 Initials wt

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

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

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

Description of Solution

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

Radioimpurities
 See attached technical data sheet

Radioactive Daughters
 See attached technical data sheet

Radionuclide Concentration
 0.207 μ Cl/gram.

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

Uncertainty of Measurement

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

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

Notes

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



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[Signature]
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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 ²³⁰Th Half Life, Years 7.540E+04 Half Life, Days 2.754E+07

Radionuclide of Interest ²³⁰Thorium Reference Date 11/1/1991 0:00
Parent Solution Conc. 2.30E+03 dpm/ml

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

Dilution Instructions: Dilution Solvent Used 0.1N HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 10.0000 ml
Total Activity: 2.2999E+04 dpm Final Activity Concentration: 2.2999E+01 dpm/ml
Final Volume: 1000.00 ml

NOTES:

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

Expiration Date: March 4, 2014

Recertified By [Signature]

Date: 3/21/2013 0:00

Verified & Approved By [Signature]

Date: 3/21/13

QC Approval [Signature]

Date: 3/21/13

US EPA ARCHIVE DOCUMENT



QUALITY CONTROL PROGRAM
MP-009

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

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

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

Radionuclide ²³⁰Thorium Reference Date 11/1/1991 0:00
Certified Activity 1.036E+00 μ Ci
Certified Concentration μ 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 μ Ci

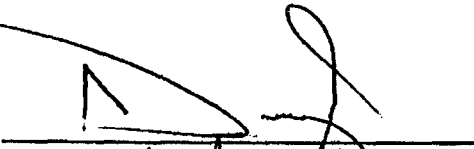
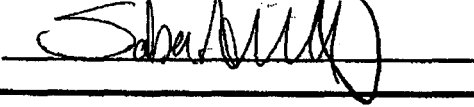
Chemical Composition of Standard Solution
²³⁰Th(NO₃)₄ in 0.1N HNO₃

Dilution Instructions: Dilution Solvent Used 0.1N HNO₃
Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0360 μ 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  Date: 3/21/2013 0:00
QC Approval  Date: 3/21/13

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Description of Solution

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

Radioimpurities: None detected (other than daughters).

Radioactive Daughters

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

Radionuclide Concentration

(Th-232) 0.00779 μ Ci/g.

Method of Calibration

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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).



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Anna U. Khan
QUALITY CONTROL

Nov. 8, 1993
Date Signed



QUALITY CONTROL PROGRAM

MP-009

Rev.8; 1/10/03

Title: Radioactive Reference Standards Solutions & Records

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

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

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

Radionuclide ²³² & ²²⁸Th Reference Date 11/1/1993 0:00
Certified Activity 9.330E-02 μCi
Certified Concentration $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution

Th(NO₃)₄ in H₂O

Dilution Instructions: Dilution Solvent Used 1% Nitric Acid

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.071E+02 dpm/ml

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

Expiration Date: October 9, 2013

Verified & Approved By [Signature]

Date: 10/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12



QUALITY CONTROL PROGRAM
MP-009

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

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

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

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

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

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

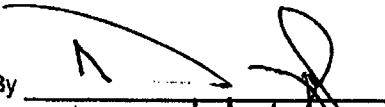
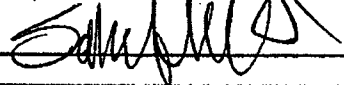
Dilution Instructions: | Dilution Solvent Used **1% Nitric Acid**

SECONDARY VOLUMETRIC DILUTION

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

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

Expiration Date: **October 9, 2013**

Verified & Approved By 
QC Approval 

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

US EPA ARCHIVE DOCUMENT

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Physical Description:

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

Radiopurities:

None detected (daughters in equilibrium)

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

Method of Calibration:

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

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

Uncertainty of Measurement:

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

Notes:

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


Quality Control

9-Jan-02
Date Signed

IPL Ref. No.: 867-54



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

Radionuclide ²²⁹Th Reference Date 1/15/2002 0:00
Certified Activity 1.013E+00 μCi
Certified Concentration $\mu\text{Ci per gram}$

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

Chemical Composition of Standard Solution
²²⁹Th(NO₃)₄ in 0.1M HNO₃

Dilution Instructions: Dilution Solvent Used 0.1 M HNO₃
Dilute to a volume of 1000.00 milliliters

Certified Total Activity of 1.0130 μCi Which Equals 2.249E+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



QUALITY CONTROL PROGRAM
MP-009

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

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 0.1M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

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

Expiration Date: October 9, 2013

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

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

US EPA ARCHIVE DOCUMENT



Ba-6
(f 6a)

National Institute of Standards & Technology Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM

QCP-009

Rev.8; 11/10/03

Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

Chemical Composition of Standard Solution

¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used 1M HCl

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: June 16, 2014

Verified & Approved By 

Date: 7/1/13

QC Approval 

Date: 7/2/13



QUALITY CONTROL PROGRAM
QCP-009

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

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

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

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

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

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

Chemical Composition of Standard Solution

¹³³BaCl₂ in 1M HCl

Dilution Instructions: Dilution Solvent Used **1M HCl**

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: **25:0000** ml
Total Activity: **3.6950E+06** dpm Final Activity Concentration: **3.6950E+03** dpm/ml
Final Volume: **1000:00** ml

NOTES:

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

Expiration Date: **June 18, 2014**

Verified & Approved By 

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

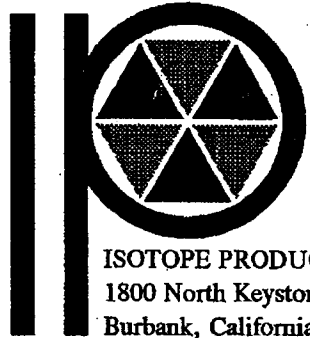
This calibration is implicitly traceable to the National Institute of Standards and Technology.

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).



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Anna H. Kuen
 QUALITY CONTROL
Feb. 3, 1994
 Date Signed



QUALITY CONTROL PROGRAM

MP 009

Rev.8; 11/01/03

Title: Radioactive Reference Standards Solutions & Records

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

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

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

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

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

Chemical Composition of Standard Solution

²²⁶Ra(NO₃)₂ in 1M HNO₃

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 2.222E+03 dpm/ml

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

Expiration Date: November 9, 2013

Verified & Approved By 

Date: 11/9/2012

QC Approval 

Date: 11/12/12



QUALITY CONTROL PROGRAM
MP 009

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

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 20.0000 ml
Total Activity: 4.4440E+04 dpm Final Activity Concentration: 4.4440E+01 dpm/ml
Final Volume: 1000.00 ml
This activity concentration is based on the original reference date listed above. All activities are corrected to the date and time of analysis by the laboratory data processing software.

NOTES:

Expiration Date: November 9, 2013

Verified & Approved By [Signature]

Date: 11/9/2012 0:00

QC Approval [Signature]

Date: 11/12/12

US EPA ARCHIVE DOCUMENT

RA-11

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

*99% Confidence Level

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

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

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

SOURCE PREPARED BY:

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

Q A APPROVED:

RCM 11/7/01

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

US EPA ARCHIVE DOCUMENT





QUALITY CONTROL PROGRAM
MP-009

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

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

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

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

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

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

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

Dilution Instructions: Dilution Solvent Used 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: March 26, 2014

Recertified By [Signature]

Date: 5/30/13

QC Approval [Signature]

Date: 5/30/13

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	UISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
U-234	1.99	86.51%	15.08%	100.00%	3.60%	8.18E+00	2.94E-01	7.07E+00	1.07E+00	U-8a	3.52E+01	3.60E+00	5.15E-01
U-238	1.01	92.74%	14.98%	100.00%	3.60%	7.97E+00	2.87E-01	7.39E+00	1.11E+00	U-8a	3.44E+01	3.60E+00	5.15E-01

Matrix Spike

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

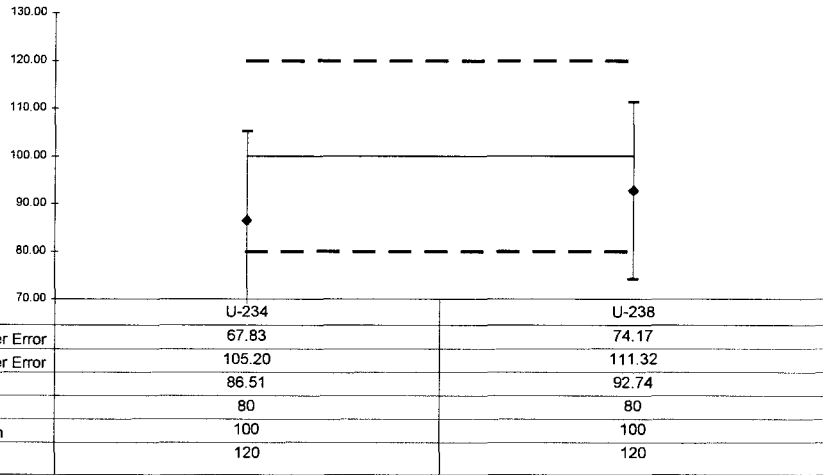
Replicate Sample

QC Summary

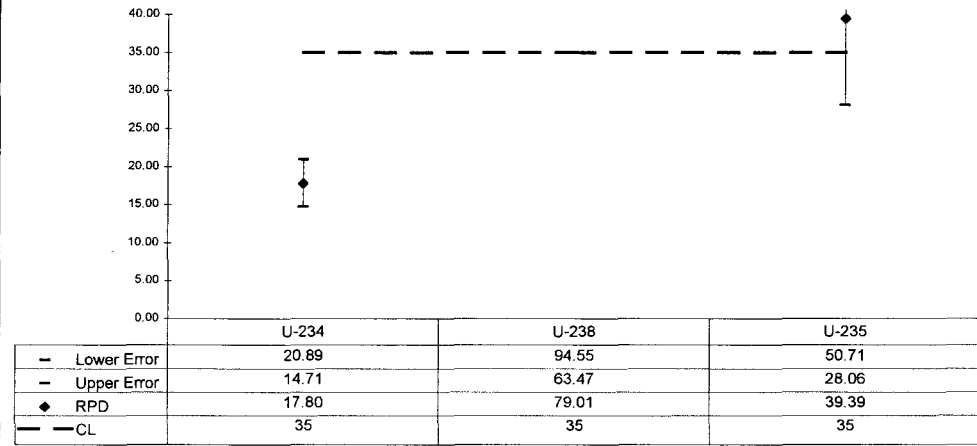
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
U-234	0.71	17.80	5.26E-01	1.76E-01	4.40E-01	1.60E-01	0.87	OK	OK			OK	OK
U-238	2.72	79.01	4.88E-01	1.68E-01	2.12E-01	1.08E-01	0.93	OK	OK			INV	OK
U-235	0.94	39.39	2.33E-01	1.23E-01	1.56E-01	1.01E-01		OK	OK			INV	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	UUISO	1	pCi	I	Engineering Management Support, Inc.

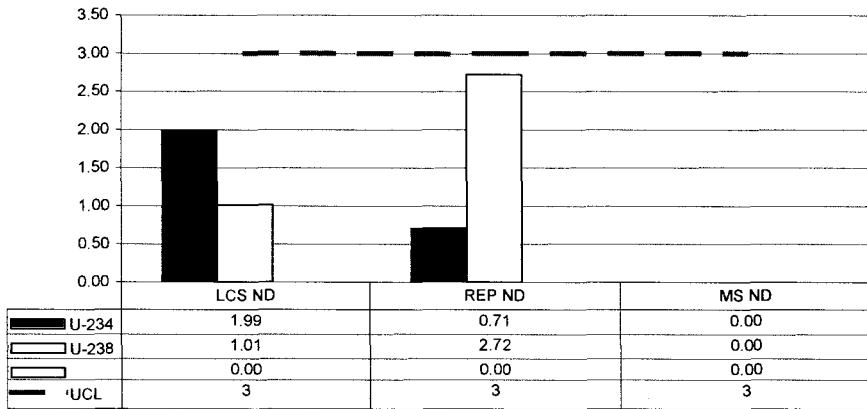
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	ThISO	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
TH-228	1.86	82.52%	22.16%	100.00%	3.60%	4.91E+00	1.77E-01	4.05E+00	8.98E-01	Th-8b	1.04E+02	3.60E+00	1.05E-01
TH-230	0.90	90.53%	22.75%	100.00%	2.70%	5.50E+00	1.48E-01	4.98E+00	1.13E+00	Th-1b	2.35E+01	2.70E+00	5.19E-01
TH-232	0.42	95.65%	21.24%	100.00%	3.60%	4.91E+00	1.77E-01	4.70E+00	9.98E-01	Th-8b	1.04E+02	3.60E+00	1.05E-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)

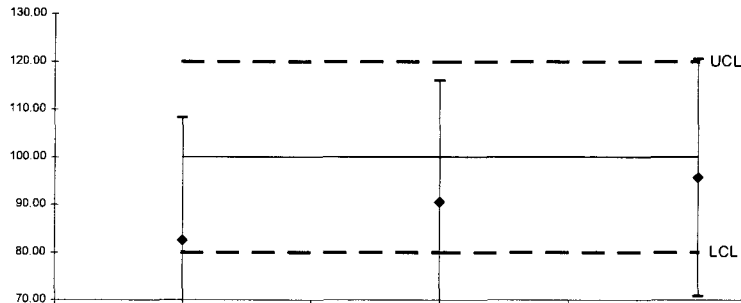
Replicate Sample

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	1.46	56.45	1.52E-01	8.93E-02	2.72E-01	1.34E-01	0.83	OK	OK			NA	OK
TH-230	2.57	86.13	1.73E-01	9.47E-02	4.34E-01	1.76E-01	0.91	OK	OK			NA	OK
TH-232	1.06	49.68	9.74E-02	6.84E-02	1.62E-01	9.76E-02	0.96	OK	OK			NA	OK

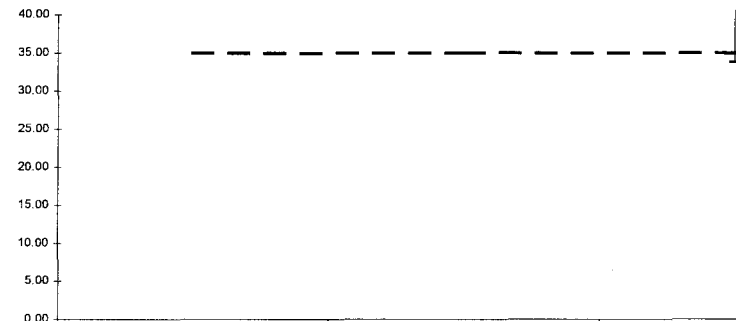
WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	ThISO	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



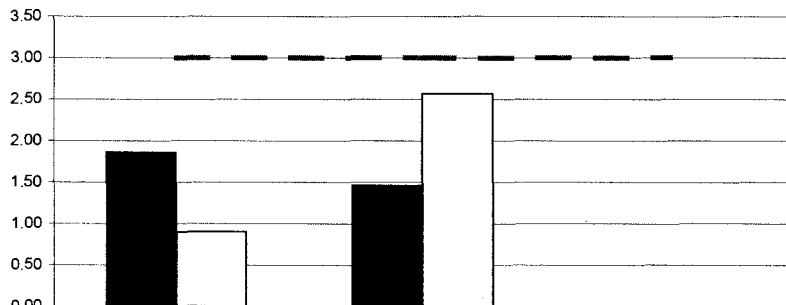
	TH-228	TH-230	TH-232
- Lower Error	56.76	65.09	70.80
- Upper Error	108.27	115.98	120.49
◆ %R	82.52	90.53	95.65
- - LCL	80	80	80
- - Mean	100	100	100
- - UCL	120	120	120

Replicate Sample RPD



	TH-228	TH-230	TH-232
- Lower Error	71.29	105.32	65.59
- Upper Error	41.61	66.94	33.77
◆ RPD	56.45	86.13	49.68
- - CL	35	35	35

Normalized Difference



	LCS ND	REP ND	MS ND
■ TH-228	1.86	1.46	0.00
□ TH-230	0.90	2.57	0.00
- - UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra226	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226	0.25	103.15%	24.09%	100.00%	4.60%	1.03E+01	4.72E-01	1.06E+01	2.55E+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	0.05	1.24	2.30E+00	7.73E-01	2.27E+00	7.47E-01	1.03	OK	OK			OK	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra226	1	pCi	I	Engineering Management Support, Inc.

LCS % Recovery



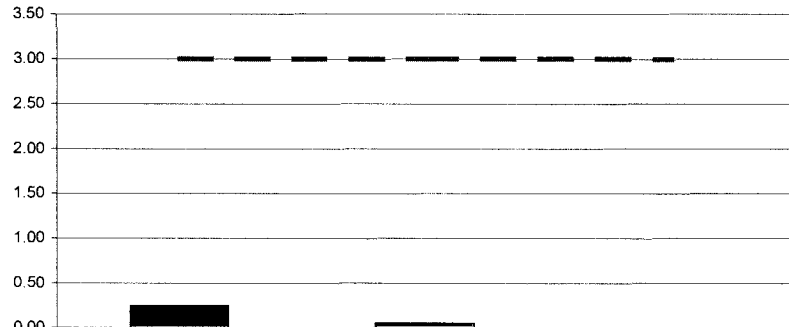
	RA-226
- Lower Error	74.46
- Upper Error	131.83
◆ %R	103.15
- LCL	80
- Mean	100
- UCL	120

Replicate Sample RPD



	RA-226
- Lower Error	1.45
- Upper Error	1.03
◆ RPD	1.24
- CL	35

Normalized Difference



	LCS ND	REP ND	MS ND
■ RA-226	0.25	0.05	0.00
■ UCL	3	3	3

No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra226	2	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226	0.54	93.70%	24.16%	100.00%	4.60%	1.03E+01	4.72E-01	9.62E+00	2.32E+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)

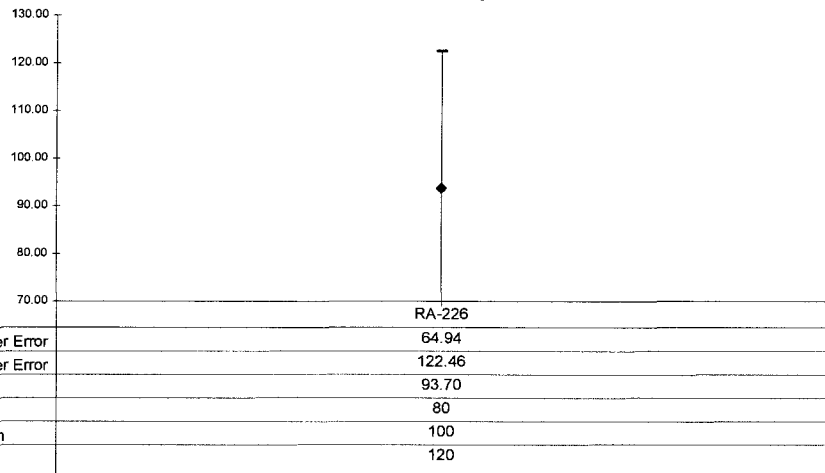
Replicate Sample

QC Summary

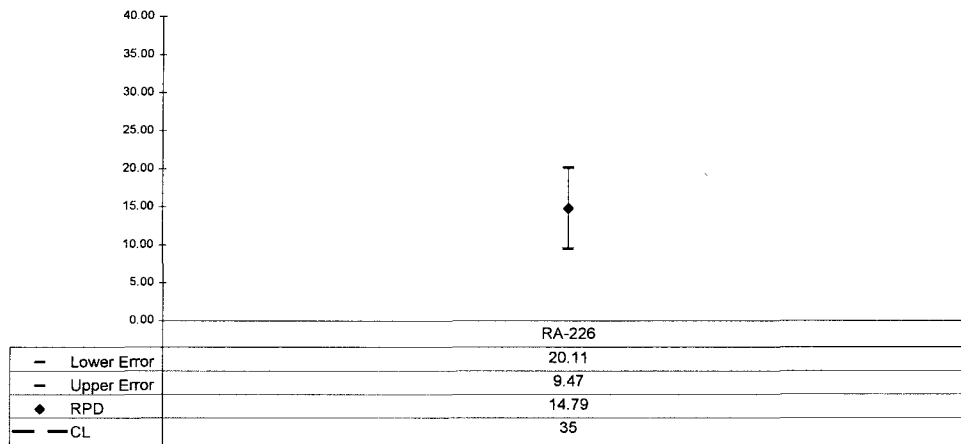
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.28	14.79	1.90E+00	1.36E+00	2.20E+00	1.59E+00	0.94	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra226	2	pCi	I	Engineering Management Support, Inc.

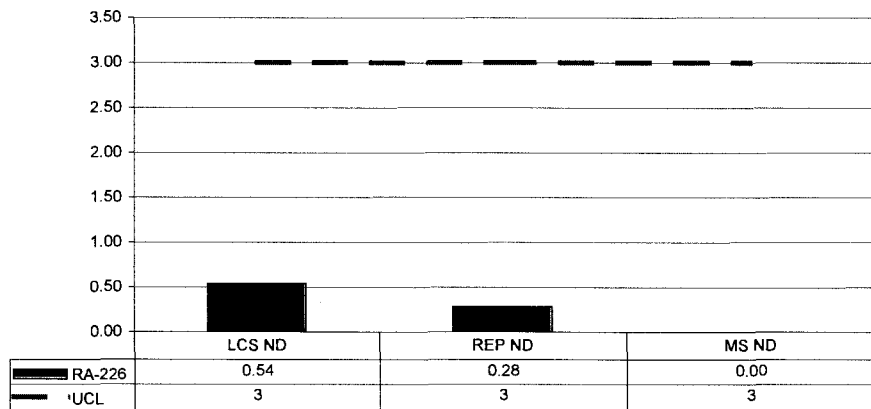
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike



WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra228	1	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.09	98.85%	25.27%	100.00%	5.10%	8.73E+00	4.45E-01	8.63E+00	2.18E+00	Ra-11	3.76E+01	5.10E+00	5.15E-01

Matrix Spike

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

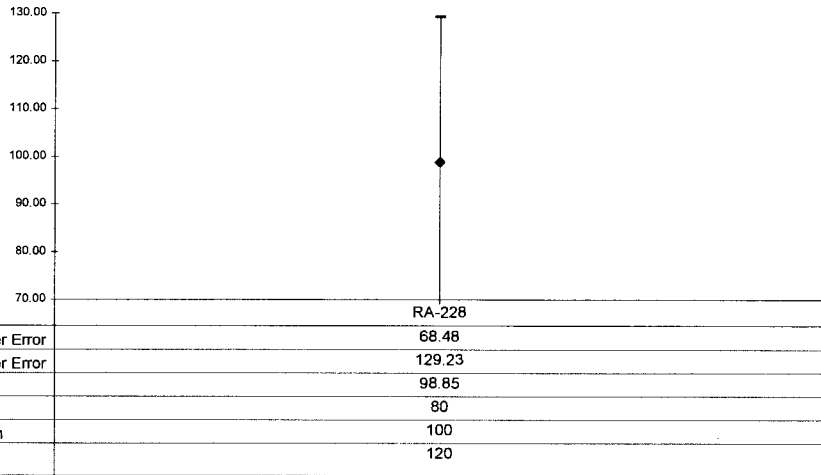
Replicate Sample

QC Summary

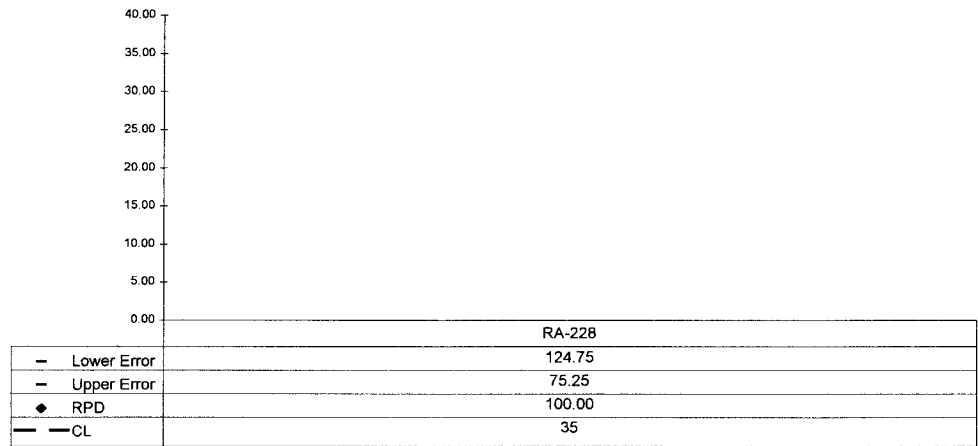
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	3.96	100.00	1.63E+00	8.09E-01			0.99	OK	OK				INV

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra228	1	pCi	I	Engineering Management Support, Inc.

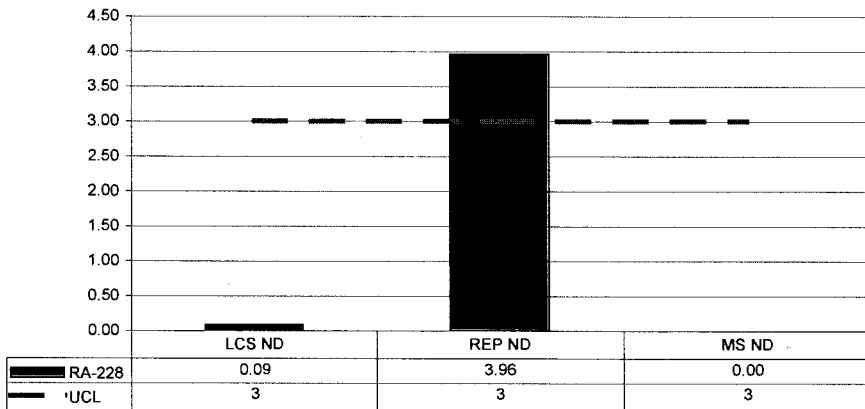
LCS % Recovery



Replicate Sample RPD



Normalized Difference



No Matrix Spike

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra228	2	pCi	I	Engineering Management Support, Inc.

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	0.98	85.86%	32.78%	100.00%	5.10%	8.67E+00	4.42E-01	7.44E+00	2.44E+00	Ra-11	3.75E+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)

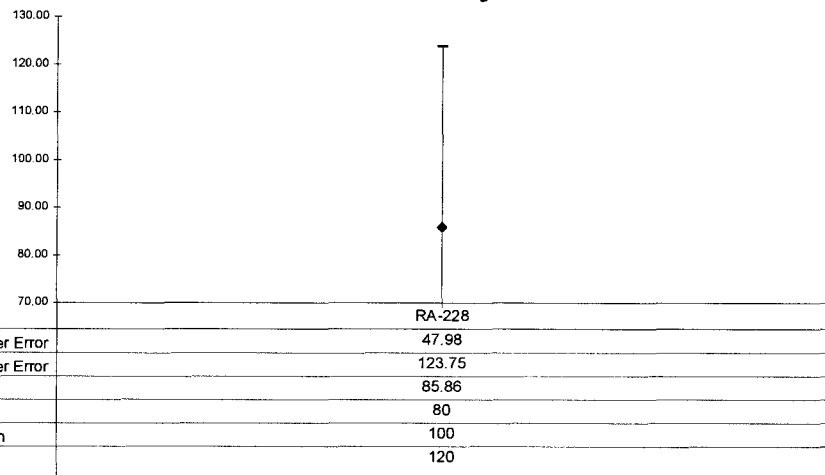
Replicate Sample

QC Summary

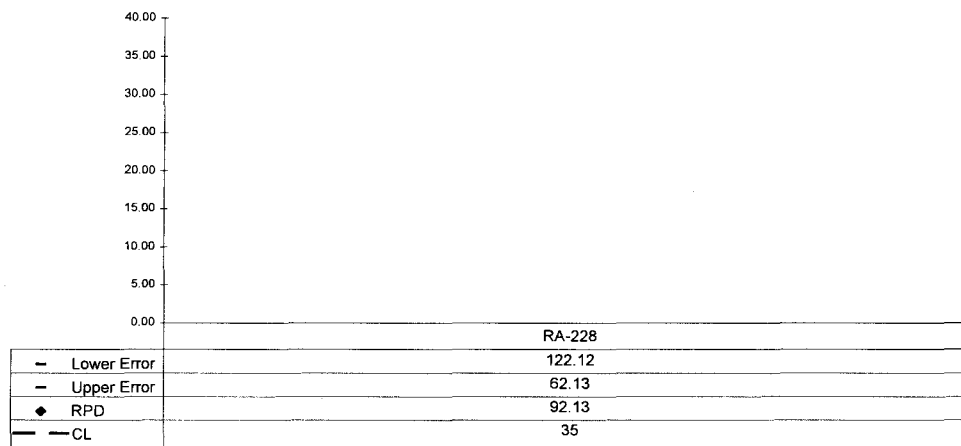
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
RA-228	1.95	92.13	1.07E+00	1.19E+00	2.88E+00	1.39E+00	0.86	OK	OK			NA	OK

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
13-07153	Ra228	2	pCi	I	Engineering Management Support, Inc.

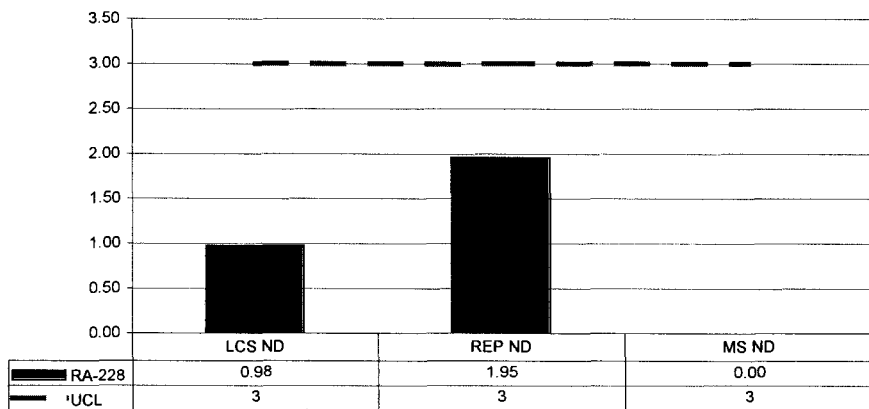
LCS % Recovery



Replicate Sample RPD




Normalized Difference



No Matrix Spike

**SECTION VII
LABORATORY TECHNICIAN'S NOTES**


ISO U NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED

J Wolfe
 8/7/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	UISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED
2	08/12/13 17:29	CHEM	JDEMELAS	Added concentrated HCl to sample beakers and heated to dryness; Added 20 ml 8N HCL to samples and transferred to new, labeled C-Tubes, rinsing with 8N HCl to bring volume to ~35 ml; Preconditioned resin columns with 35 ml 8N HCl; Centrifuged samples and loaded onto columns; Rinsed C-Tubes with 20 ml 8N HCl, centrifuged as needed and loaded onto columns; Rinsed columns with 35 ml 8N HCl - 0.1N NH4I, 35 ml of 6.5N HCl - 0.04N HF, and 10 ml of 6.5N HCl; Eluted Uranium with 50 ml of 0.5N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with DI H2O. Set samples aside for later precipitation and filtering.

John Demelas
8/12/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	UUISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIQOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED
2	08/12/13 17:29	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	08/13/13 06:31	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:
 8/13/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

UUISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	8/7/2013
014164P	Anion Exchange Resin	Reagent Grade	JDEMELAS	8/12/2013
014230S	HCl - HF	6.5N - 0.04N	JDEMELAS	8/12/2013
014248S	HCl - NH4I	8N - 0.1M	JDEMELAS	8/12/2013
014143D01	Hydrochloric Acid	0.5N	JDEMELAS	8/12/2013
014199S	Hydrochloric Acid	6.5N	JDEMELAS	8/12/2013
014237S	Hydrochloric Acid	8N	JDEMELAS	8/12/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	8/12/2013
014042S	Carbon substrate	Solution	RMARTZ	8/13/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/13/2013
013191S	Neodymium Carrier	1 mg/ml	RMARTZ	8/13/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/13/2013
014220P	Titanous Chloride	Reagent Grade	RMARTZ	8/13/2013

US EPA ARCHIVE DOCUMENT

Alpha # 3


Date	Sample #	Client	Food Item	OT Item	Assignment	Task
8/19/17	Daily Pulser	LAB	0506	10	run	-
8/19/17	SECCAL	LAB	0522	2hr	run	-
8/19/17	1707154A(1-12)	Eng. Man	0904	2hr	Rate	c
8/19/13	1307146A(4)	UWON	1204	2hr50	Np	KB
8/19/13	1308003A(1-9)	Access	1209	2hr50	Rate	KB
8/19/13	System Bkgd	Lab	1624	16.40 hrs	α	KB
8/10/13	Daily Pulser	Lab	1123	10 min	NA	AG
8/10/13	1307147A(9-19)	Eng. Manage	1502	2hr50m	iso-Th	AG
8/12/17	Daily Pulser	LAB	0515	10	run	-
8/12/17	1707149A(1-15)	Eng. Man	0577	2hr	4hr30	c
8/12/17	1707152A(4-18)	Eng. Man	0979	2hr	4hr30	-
8/12/17	1307145A(4)	Eng. Man	0940	2hr	4hr30	-
8/12/13	1307170A(1-10)	EMS	1256	2hr50min	Rate	KB
8/12/13	1307153A(1-6)	EMS	1256	2hr50min	Rate	KB
8/12/13	1308004A(1-3,5)	UWON	1649	2hr50	Rate	KB
8/12/13	1307144A(1-5)	Enl. Emerg	1650	2hr50	Rate	KB
8/17/17	Daily Pulser	LAB	0524	10	run	-
8/17/17	1707186A(4)	UWON	0906	2hr	4hr30	-
8/17/17	1707157A(1-15)	Eng. Man	0906	2hr	4hr30	-

US EPA ARCHIVE DOCUMENT

Alpha #1

Date	Sample #	Client	Lead Time	CT Time	Analysis	Test
8/7/13	1308006A(1-4)	UCOR	0917	2hr	Pit 30	✓
8/7/13	1308016A(1-4)	Unitech	0914	2hr	Unitech	✓
8/7/13	1308006A(1-4)	UCOR	1243	2hr 50mins	Np	KB
8/7/13	1307138A(1-4)	Unitech	1243	2hr 50mins	UU	KB
8/7/13	1307146A(15-20)	EMS	1603	2hr 50-	TUU	KB
8/7/13	1307110B(1-2)	EMS	1607	2hr 50-	UU	KB
8/8/13	Daily Pulse	LAB	0578	1hr	---	---
8/8/13	1307147A(1-8)	Eng Man	0906	2hr	Unitech	✓
8/8/13	1307116B(4,6,9)	UCOR	1159	2hr 50mins	PU	KB
8/8/13	1307116B(4,6)	UCOR	1200	2hr 50min	PUNT	KB
8/8/13	1307140A(1-3)	UCOR	1200	2hr 50-	PU	KB
8/8/13	1307152A(14-19)	EMS	1454	2hr 50-	Rate	KB
8/9/13	Daily Pulse	LAB	0506	1hr	---	---
8/9/13	SEC CAL	LAB	0800	2hr 7hr	---	---
8/9/13	1308071A(1-5)	UCOR	1076	2hr	Unitech	✓
8/9/13	1307186A(1-7)	UCOR	1076	2hr	NA 737	✓
8/9/13	1307171A(2-4,6)	UCOR	1729	2hr	Unitech	✓
8/9/13	System Bkgd	Lab	1624	16:40 hrs	---	KB
8/10/13	Daily Pulse	Lab	1123	10min	NA	AG
8/10/13	1307147A(1-8)	Eng Manage	1455	2hr 50min	150-Th	AG
8/12/13	Daily Pulse	LAB	0519	1hr	---	---
8/12/13	1307172A(1-4)	UCOR	0936	2hr	Unitech	✓
8/12/13	1307172A(1-4)	UCOR	0937	2hr	Unitech	✓
8/12/13	1307171A(1-7)	UCOR	0937	2hr 50-	Pit 30	✓
8/12/13	1307152A(19)	EMS	1254	2hr 50min	UU	KB
8/12/13	1307149A(1-7)	EMS	1255	2hr 50mins	Th	KB
8/12/13	1307153A(7-14)	EMS	1647	2hr 50-	Rate	KB
8/12/13	Daily Pulse	LAB	0525	1hr	---	---
8/13/13	1308004A(1-7)	UCOR	0905	2hr	A240	✓
8/13/13	1308004A(1-7)	UCOR	0905	2hr	A240	✓
8/13/13	1307153A(16-18)	EMS	1216	2hr 50mins	UU	KB
8/13/13	1308004A(1-35)	UCOR	1217	2hr 50-	Np	KB


ISO TH NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED

J Wolfe
8/7/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	THISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED
2	08/13/13 15:46	CHEM	JDEMELAS	Added concentrated HNO3 to sample beakers and heated to dryness; Added 20 ml 8N HNO3 to samples and transferred to new, labeled C-Tubes, adding 8N HNO3 to bring volume to ~35 ml; Preconditioned resin columns with 50 ml 8N HNO3; Centrifuged samples as needed, and passed through columns; Rinsed C-Tubes with 20 ml 8N HNO3; Centrifuged rinsates and loaded onto columns; Rinsed columns with 40 ml 8N HNO3; Eluted Thorium with 50 ml of 8N HCl into clean, labeled 100-ml beakers; Dried-down samples on hotplate; Dissolved samples in ~10 ml of concentrated HCl; Transferred to new, labeled C-Tubes with deionized water, bringing volume to ~15ml. Set samples aside for later precipitation and filtering.

John Demelas
8/13/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	ThISO
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:29	PREP	JWOLFE	ALIQOTED AND ADDED SPIKES AND TRACERS- PRESERVED FRACTIONS 8,9, AND 13-16 WITH HNO3 AND DRIED SAMPLES DOWN- BECAUSE OF LOW VOLUME ON FRACTION 15 THE ALIQUOT WAS REDUCED
2	08/13/13 15:46	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	08/14/13 05:57	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.

RM
 8/14/13

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

ThISO

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
014109P	Nitric Acid	Reagent Grade	JWOLFE	8/7/2013
014164P	Anion Exchange Resin	Reagent Grade	JDEMELAS	8/13/2013
014142P	Hydrochloric Acid	Reagent Grade	JDEMELAS	8/13/2013
014236S	Nitric Acid	8N	JDEMELAS	8/13/2013
014109P	Nitric Acid	Reagent Grade	JDEMELAS	8/13/2013
014249S	Nitric Acid	8N	JDEMELAS	8/13/2013
014243S	Hydrochloric Acid	8N	JDEMELAS	8/13/2013
014042S	Carbon substrate	Solution	RMARTZ	8/14/2013
014040S	Cerium Carrier	0.1mg/ml	RMARTZ	8/14/2013
013221P	Hydrofluoric Acid	Reagent Grade	RMARTZ	8/14/2013
013574P	Reagent Alcohol	Reagent Grade	RMARTZ	8/14/2013

US EPA ARCHIVE DOCUMENT


Alpha # 3

Date	Sample #	Client	Food Item	OT Time	Surrogate Test	
8/9/17	Daily Pulser	Labs	0506	1m	nm	-
8/9/17	SECCAL	Labs	0522	2hr	nm	-
8/9/17	(1707154A(1-2))	Engma	0904	2hr	Rule	C
8/9/13	1307146A(4)	ULON	1209	2hr50m	NP	KB
8/9/13	1308003A(1-9)	Access	1209	2hr50m	Rule	KB
8/9/13	System Bkgd	Lab	1624	16:40 hr	α	KB
8/10/13	Daily Pulser	Lab	1123	10 mn	NA	AG
8/10/13	1307147A(9-19)	Eng. Manage	1502	2hr50m	iso-Th	AG
8/10/17	Daily Pulser	Labs	0515	1m	nm	-
8/11/17	1307149A(1-15)	Eng. Man	0577	2hr	4hr50	C
8/12/17	1707152A(4-18)	Engma	0979	2hr	4hr50	-
8/12/17	1307145A(4)	Engma	0940	2hr	4hr50	-
8/12/13	1307170A(1-10)	EMS	1256	2hr50mins	Rule	KB
8/12/13	1307153A(1-6)	EMS	1256	2hr50min	Rule	KB
8/12/13	1308004A(1-3,5)	ULON	1649	2hr50m	Rule	KB
8/12/13	1307144A(1-5)	CalEnergy	1650	2hr50m	Rule	KB
8/12/17	Daily Pulser	Labs	0525	1m	nm	-
8/12/17	1707186A(4)	ULON	0906	2hr	4hr50	-
8/12/17	1707157A(1-15)	Engma	0506	2hr	4hr50	-
8/13/13	1307152A(9-19)	EMS	1218	2hr50m	Th	KB
8/13/13	1307182A(1-6)	Accutest	1622	2hr50m	Rule	KB
8/13/13	1308024A(1-5)	Gulf Coast	1623	2hr50m	Rule	KB
8/13/13	1308002A(1-4)	TEC	1624	2hr50m	Rule	KB
8/14/17	Daily Pulser	Labs	0522	1m	nm	-
8/14/17	1707154A(12-13)	Engma	0928	2hr	4hr50	-
8/14/17	1708004A(1-3,5,12)	ULON	0929	2hr	PuTso	C
8/14/17	1708004A(NT(5))	ULON	0971	2hr	PuNT	C
8/14/17	1307172A(1-4,7)	ULON	0972	2hr	PuTso	C
8/14/17	1307172A(NT(4))	ULON	0972	2hr	PuNT	C
8/14/17	1307186A(NT(4))	ULON	0972	2hr	PuNT	C
8/14/13	1307154A(12-13)	EMS	1246	2hr50m	Th	KB
8/14/13	1307153A(1-14)	EMS	1247	2hr50m	Th	KB

Alpha #1

Date	Sample #	Client	Facility	C/T/In	Analysis	Test
8/14/13	1708004A(1-2)	UWON	0925	2hr	UITS	C
8/14/13	1708104A(1-5)	UWON	0926	2hr	UITS	C
8/14/13	1707154A(4-7)	Bayman	0926	2hr	UITS	C
8/14/13	1307186A(1-4,7)	UWON	1245	2hrs	PU	ICB
8/14/13	1307154A(1-3)	EMS	1244	2hrs	TH	ICB
8/14/13	1307153A(15-18)	EMS	1615	2hrs	TH	ICB
8/14/13	1308005A(1-4)	UWON	1615	2hrs	Plate	ICB


**RA-226 NOTES
RUN 1**

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:31	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 13 AN 14 DOWN AND DIGESTED DUE TO SAMPLES HAVING A HIGH AMOUNT OF SOLIDS PRESENT- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
 8/7/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:31	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 13 AN 14 DOWN AND DIGESTED DUE TO SAMPLES HAVING A HIGH AMOUNT OF SOLIDS PRESENT- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/08/13 19:35	PREP	LWALKER	ADDED EDTA TO PRECIP-VORTEX-LET SIT OVERNIGHT TO DIGEST.
3	08/09/13 17:21	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.8 IN AP-006 REV 12 FOR RA 226 ANALYSIS-(SYRINGE FILTERED- PRECIP-FILTERED-DRIED-OBTAIN FINAL WEIGHT)-SUBMIT TO COUNT ROOM.

L Walker
 8/9/13



Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

Ra226

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	8/7/2013
013930D03	Ammonium Sulfate	200 mg/ml	JWOLFE	8/7/2013
014007D02	Barium Carrier	1 mg/ml	JWOLFE	8/7/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	8/7/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	8/7/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	8/7/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	8/7/2013
014212S	EDTA	0.25M	LWALKER	8/8/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	8/9/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	8/9/2013

US EPA ARCHIVE DOCUMENT

Alpha #1


Date	Sample #	Client	Lead Time (CT Time)	Analysis	Spec
8/7/13	1708006A(1-4)	Ucon	0917	2hr	Pu 20
8/7/13	1708016A(1-4)	Unitech	0914	2hr	Uu 20
8/7/13	1308006A(1-4)	UCOR	1243	2hr 50 mins	Np
8/7/13	1307138A(1-4)	Unitech	1243	2hr 50 mins	UU
8/7/13	1307146A(15-20)	EMS	1603	2hr 50 min	UU
8/7/13	1307110B(1-2)	EMS	1607	2hr 50 min	UU
8/8/13	Daily Pulse	Ucon	0578	1 hr	uu
8/8/13	1707147A(1-8)	Eng Man	0906	2hr	Uu 20
8/8/13	1307116B(4,6,9)	UCOR	1159	2hr 50 mins	Pu
8/8/13	1307116B(4,6)	UCOR	1200	2hr 50 min	PUNT
8/8/13	1307140A(1-3)	UCOR	1200	2hr 50 min	Pu
8/8/13	1307152A(17-19)	EMS	1454	2hr 50 min	Rule
8/9/13	Daily Pulse	Ucon	0506	1 hr	uu
8/9/13	SEC CAL	Ucon	0802	2hr 7 min	uu
8/9/13	1708071A(4-5)	Ucon	1076	2hr	Uu 20
8/9/13	1707186A(4-7)	Ucon	1076	2hr	Uu 20
8/9/13	1307171A(2-4,6)	Ucon	1729	2hr	Uu 20
8/9/13	System Bkgd	Lab	1624	16:40 hrs	u
8/10/13	Daily Pulse	Lab	1123	10 min	NA
8/10/13	1307147A(1-8)	Eng Manage	1455	2hr 50 min	iso-Th
8/12/13	Daily Pulse	Ucon	0719	1 hr	uu
8/12/13	1707172A(1-4)	Ucon	0976	2hr	Uu 20
8/12/13	1707172A(1-4)	Ucon	0977	2hr	UUNT
8/12/13	1707171A(1-7)	Ucon	0977	2hr 50 min	Pu 20
8/12/13	1307152A(19)	EMS	1254	2hr 50 min	UU
8/12/13	1307149A(1-7)	EMS	1255	2hr 50 min	Th
8/12/13	1307153A(7-14)	EMS	1647	2hr 50 min	Rule

Alpha # 3

Date	Sample #	Client	Food Item	CT Item	Surveyor	Task
8/19/17	Daily Pulser	WVZ	0506	1m	nm	-
8/19/17	SECCAL	WVZ	0522	2hr	nm	-
8/19/17	(1307154A(11-12))	Eng. Man	0904	2hr	Rel	C
8/19/13	1307146A(4)	UWR	1204	2hr 50m	Np	KB
8/19/13	1308003A(1-9)	Access	1209	2hr 50m	Rel	KB
8/19/13	System Bkgd	Lab	1624	16.40 hrs	α	KB
8/10/13	Daily Pulser	Lab	1123	10 mn	NA	AG
8/10/13	1307147A(9-19)	Eng. Manage	1502	2hr 50m	iso-Th	AG
8/10/17	Daily Pulser	WVZ	0515	1m	nm	-
8/12/17	1307149A(1-15)	Eng. Man	0577	2hr	4hr 30	C
8/12/17	1307152A(4-18)	Eng. Man	0979	2hr	4hr 30	-
8/12/17	1307148A(4)	Eng. Man	0940	2hr	4hr 30	-
8/12/13	1307170A(1-10)	EMS	1256	2hr 50min	Rel	KB
8/12/13	1307153A(1-6)	EMS	1256	2hr 50min	Rel	KB

US EPA ARCHIVE DOCUMENT


**RA-226 NOTES
RUN 2**

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra226
		Run Number	2

#	Date	Dept	User	Notes
1	08/14/13 10:34	PREP	JWOLFE	ALIUQUOTED AND ADDED TRACER- DRIED SAMPLES DOWN- PREPARED A SPIKE AND BLANK- ADDED .25M EDTA, PHENOLPHTHALEIN AND AMMONIUM HYDROXIDE TO SAMPLES AND TRANSFERRED TO C-TUBES- CENTRIFUGED AND TRANSFERRED SAMPLES INTO CLEAN C-TUBES AND ADDED BA CARRIER- SUBMITTED TO SEPARATIONS

J Wolfe
 8/14/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra226
		Run Number	2

#	Date	Dept	User	Notes
1	08/14/13 10:34	PREP	JWOLFE	ALIUQUOTED AND ADDED TRACER- DRIED SAMPLES DOWN- PREPARED A SPIKE AND BLANK- ADDED .25M EDTA, PHENOLPHTHALEIN AND AMMONIUM HYDROXIDE TO SAMPLES AND TRANSFERRED TO C-TUBES- CENTRIFUGED AND TRANSFERRED SAMPLES INTO CLEAN C-TUBES AND ADDED BA CARRIER- SUBMITTED TO SEPARATIONS
2	08/16/13 12:26	PREP	LWALKER	DID DILUTIONS ON FRACTIONS 3,13 & 14 THEN 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
 8/16/13



Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

Ra226

2

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	8/14/2013
014007D02	Barium Carrier	1 mg/ml	JWOLFE	8/14/2013
014257S	EDTA	0.25M	JWOLFE	8/14/2013
012706D01	Phenolphthalein Indicator	0.1%	JWOLFE	8/14/2013
011383P	Acetic Acid	Reagent Grade	LWALKER	8/16/2013
013575D05	Ammonium Sulfate	200 mg/ml	LWALKER	8/16/2013

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Location	COT	Analysis	Tech
8/15/13	Daily Pulse	LAB	0526	10		
8/15/13	1307170A (9-10)	EMS	1242	2hr 50m	UM	KB
8/15/13	1307172A (1-4)	UWON	1711	2hr 50m	TH	KB
8/15/13	1307172A (4)	UWON	1717	2hr 50m	THNT	KB
8/15/13	1307171A (4,6)	UWON	1717	2hr 50m	TH	KB
8/15/13	1307171A (4,6)	UWON	1717	2hr 50m	THNT	KB
8/15/13	1307170A (1-2)	EMS	1318	2hr 50m	TH	KB
8/15/13	1308048A (1-4)	Access	1655	2hr 50m	Rob	KB
8/15/13	1307007A (1-4)	Data Resource	1656	2hr 50m	Rob	KB
8/16/13	Daily Pulse	LAB	0526	10		
8/16/13	SECCAL	LAB	0521	2hr 20m		
8/16/13	1708061A (1-4)	UWON	1702	2hr	UWON	
8/16/13	1708061A (1-4)	UWON	1771	2hr	Pulse	
8/16/13	1708061A (1-4)	UWON	1777	2hr	Pulse	
8/16/13	1708061A (1-4)	UWON	1776	2hr	7620	
8/16/13	1308061A (1-4)	UWON	1777	2hr	7620	
8/16/13	System Bkgd	Lab	1653	16hr 40min		AG
8/17/13	Daily Pulse	Lab	1014	10min	NA	AG
8/17/13	1307174A (1-12)	TN Dept Health	1135	16hr	ISO TH	AG
8/17/13	1307176A (8-11)	TN Dept Health	1137	16hr	ISO	AG
8/18/13	Daily Pulse	LAB	0527	10		
8/19/13	1308061A (1-4)	UWON	0876	2hr	Rob	
8/19/13	1307157B (1-7, 7A)	UWON	0854	2hr	Rob	


**RA-228 NOTES
RUN 1**

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:31	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 13 AN 14 DOWN AND DIGESTED DUE TO SAMPLES HAVING A HIGH AMOUNT OF SOLIDS PRESENT- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/13/13 17:09	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/15/13 17:05	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

J. Walker
 8/15/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:31	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 13 AN 14 DOWN AND DIGESTED DUE TO SAMPLES HAVING A HIGH AMOUNT OF SOLIDS PRESENT- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
8/7/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	08/07/13 09:31	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- DRIED FRACTIONS 13 AN 14 DOWN AND DIGESTED DUE TO SAMPLES HAVING A HIGH AMOUNT OF SOLIDS PRESENT- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	08/13/13 17:09	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/15/13 17:05	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/16/13 09:45	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)

8-16-13
[Signature]

US EPA ARCHIVE DOCUMENT



Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

Ra228


1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	8/7/2013
013930D03	Ammonium Sulfate	200 mg/ml	JWOLFE	8/7/2013
014007D02	Barium Carrier	1 mg/ml	JWOLFE	8/7/2013
014008D02	Lead Carrier	166 mg/ml	JWOLFE	8/7/2013
014109P	Nitric Acid	Reagent Grade	JWOLFE	8/7/2013
013416P	Perchloric Acid	Reagent Grade	JWOLFE	8/7/2013
009098P	Sulfuric Acid	Reagent Grade	JWOLFE	8/7/2013
011504D33	Ammonium Sulfide	2%	LWALKER	8/15/2013
014008D03	Lead Carrier	1.5 mg/ml	LWALKER	8/15/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	8/15/2013
013065D10	Sodium Hydroxide	10M	LWALKER	8/15/2013
013955D01	Yttrium Carrier	9 mg/ml	LWALKER	8/15/2013
013763D02	Ammonium Oxalate	5%	TSMITH	8/16/2013
013910D07	Nitric Acid	1N	TSMITH	8/16/2013
014110D04	Nitric Acid	6N	TSMITH	8/16/2013
013065D10	Sodium Hydroxide	10M	TSMITH	8/16/2013
013065D09	Sodium Hydroxide	18M	TSMITH	8/16/2013

Date	Sample #	Client	Janet Thin	CT Time	Analysis	Test
8/13/12	1307119ADK(2-1)	ERT	1119	2h	L1B	C
8/13/12	1707119AB2(6-17)	ERA	1257	2h	L1B	C
8/14/12	BLEDOE	UM	0712	6m	L1B	C
8/14/12	ET FAC	UM	0646	7m	L1B	C
8/14/12	1707149RA(13-15)	Eng Mgr	0755	2h	RTS	C
8/14/12	130714054(2-416)	ULOR	0843	2h	SL904	C
8/14/12	130717234(2-416)	ULOR	0847	2h	SL904	C
8/14/12	130717154(168)	ULOR	1002	2h	SL904	C
8/14/13	1307147RA(9-16)	EMS	1109	2hrs	Rad	KB
8/15/12	BLEDOE	UM	0508	6m	L1B	C
8/15/12	ET FAC	UM	0614	3m	L1B	C
8/15/13	1308066AB(1-5)	ULOR	0755	2h	L1B	C
8/15/13	1307154RA(1)	Eng Mgr	0755	7m	RTS	C
8/15/13	130712154(11)	ERT	0829	30min	SL904	C
8/15/13	130712154(2-5) 130712154(2-5)	ERT	0829	2h	SL904	C
8/15/13	1707117AD(1)	Montgomery	0901	30min	L1B	C
8/15/13	1707157AB(10-11)	Montgomery	0926	2h	L1B	C
8/15/13	170712154(1)	ERT	1006	30min	SL707	C
8/15/13	170712154(1-5)	ERT	1006	2h	SL707	C
8/15/13	170712154(6-9)	ERT	1075	2h	SL707	C
8/15/13	1304005NP(1-4)	ULOR	1221	10min	NP	KB
8/15/13	1308042CL(1-3,5)	ULOR	1509	30mins	CL36	KB
8/15/13	1308043CL(1-3,5)	ULOR	1510	30mins	CL36	KB
8/16/12	BLEDOE	UM	0720	6m	L1B	C
8/16/12	ET FAC	UM	0625	7m	L1B	C
8/16/12	1707141RA(1)	Chl Energy	0811	7min	RTS	C
8/16/12	1707141AD(1)	Acctest	0828	7min	L1B	C
8/16/12	1707141AB(2-5)	Acctest	0828	2h	L1B	C
8/16/12	170806154(4-4,6)	ULOR	0947	2h	SL707	C
8/16/12	170714154(4-4)	Unitech	1071	2h	SL707	C
8/16/12	1707182AB(1-6)	Acctest	1148	2h	L1B	C
8/16/12	170806154(1-4)	ULOR	1704	1m	NP77	C
8/16/13	1307153RA(16-18)	Eng Manage	1327	2hr	Pa-228	KB

Date	Sample #	Client	Temperature	CT/Time	Analysis	Pass
8/15/13	1307154RA(12-13)	Eng Man	0752	2L	RA8	C
8/15/13	130712154(6-9)	ERT	0959	2L	SR904	C
8/15/13	1307157AX(2-9)	Montgomery	0959	2L	A13	C
8/15/13	1308005NPL(1-4)	Udon	1700	10min	AP272	C
8/15/13	1308061CL(1-3,5)	Udon	1505	30mins.	CL36	142
8/15/13	1308063CL(1-3,5)	Udon	1506	30mins.	CL36	142
8/16/13	EF70e	W3	0820	2L	A13	C
8/16/13	BL600e	W3	0820	2L	A13	C
8/16/13	1708042RA(1-4)	Udon	0810	2L	RA8	C
8/16/13	1708047RA(1-4)	Udon	0810	2L	RA8	C
8/16/13	1707184RA(12-15)	Cal Energy	0810	2L	RA8	C
8/16/13	1308042Pb(1-4)	Udon	1018	2L	Pb210	C
8/16/13	1308047Pb(1-4)	Udon	1018	2L	Pb210	C
8/16/13	1308061Pb(1-4)	Udon	1018	2L	Pb210	C
8/16/13	1707157RA(1, 2, 4-12, 15)	Eng Man	1700	2L	RA8	C
8/16/13	1708061NPL(1-4)	Udon	0810	10min	AP272	C


**RA-228 NOTES
RUN 2**

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	2

#	Date	Dept	User	Notes
1	08/14/13 10:35	PREP	JWOLFE	ALIUQUOTED AND ADDED TRACER- DRIED SAMPLES DOWN- PREPARED A SPIKE AND BLANK- ADDED .25M EDTA, PHENOLPHTHALEIN AND AMMONIUM HYDROXIDE TO SAMPLES AND TRANSFERRED TO C TUBES- CENTRIFUGED AND TRANSFERRED SAMPLES INTO CLEAN C-TUBES AND ADDED BA CARRIER- SUBMITTED TO SEPARATIONS

J Wolfe
8/14/13


US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	2

#	Date	Dept	User	Notes
1	08/14/13 10:35	PREP	JWOLFE	ALIUQUOTED AND ADDED TRACER- DRIED SAMPLES DOWN- PREPARED A SPIKE AND BLANK- ADDED .25M EDTA, PHENOLPHTHALEIN AND AMMONIUM HYDROXIDE TO SAMPLES AND TRANSFERRED TO C-TUBES- CENTRIFUGED AND TRANSFERRED SAMPLES INTO CLEAN C-TUBES AND ADDED BA CARRIER- SUBMITTED TO SEPARATIONS
2	08/19/13 16:00	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/20/13 19:29	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)

J. Walker
 8/20/13

US EPA ARCHIVE DOCUMENT

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	13-07153
		Analysis Code	Ra228
		Run Number	2

#	Date	Dept	User	Notes
1	08/14/13 10:35	PREP	JWOLFE	ALIQUOTED AND ADDED TRACER- DRIED SAMPLES DOWN- PREPARED A SPIKE AND BLANK- ADDED .25M EDTA, PHENOLPHTHALEIN AND AMMONIUM HYDROXIDE TO SAMPLES AND TRANSFERRED TO C-TUBES- CENTRIFUGED AND TRANSFERRED SAMPLES INTO CLEAN C-TUBES AND ADDED BA CARRIER- SUBMITTED TO SEPARATIONS
2	08/19/13 16:00	PREP	LWALKER	RECEIVED FILTERS BACK FROM COUNT ROOM-PUT BACK INTO C-TUBES-ADDED EDTA AND SWIRLED-LET SIT OVERNIGHT TO DIGEST.
3	08/20/13 19:29	PREP	LWALKER	FOLLOWED STEPS 12.1 TO 12.7 IN AP-007 REV 18 (CHEMICAL CLEANUP FOR RA 228)
4	08/21/13 06:04	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)

8-21-13
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Reagents Used in an Analysis

Internal Work Order

13-07153

Analysis Code

Run

Ra228

2

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
013376P	Ammonium Hydroxide	Reagent Grade	JWOLFE	8/14/2013
014007D02	Barium Carrier	1 mg/ml	JWOLFE	8/14/2013
014257S	EDTA	0.25M	JWOLFE	8/14/2013
012706D01	Phenolphthalein Indicator	0.1%	JWOLFE	8/14/2013
011504D34	Ammonium Sulfide	2%	LWALKER	8/20/2013
014008D03	Lead Carrier	1.5 mg/ml	LWALKER	8/20/2013
014109P	Nitric Acid	Reagent Grade	LWALKER	8/20/2013
013065D10	Sodium Hydroxide	10M	LWALKER	8/20/2013
013955D01	Yttrium Carrier	9 mg/ml	LWALKER	8/20/2013
014110D04	Nitric Acid	6N	TSMITH	8/21/2013
013065D10	Sodium Hydroxide	10M	TSMITH	8/21/2013
014278S	Sodium Hydroxide	18M	TSMITH	8/21/2013
014109D04	Nitric Acid	1N	TSMITH	8/21/2013
013763D03	Ammonium Oxalate	5%	TSMITH	8/21/2013

US EPA ARCHIVE DOCUMENT

Date	Sample #	Client	Location	CTOTin	Analysis	Rel
8/21/11	170800454(1)	Uva	0755	30L	SR504	C
8/21/11	1707117RA12(1)	Engtha	0755	2L	RA8	C
8/21/11	1707117RA12(1)	Engtha	0755	30L	RA8	C

US EPA ARCHIVE DOCUMENT

SECTION VIII
ANALYTICAL DATA (ISOTOPIC URANIUM)

Work Order	13-07153	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	UUISO	01	LCS	LCS		07/24/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/24/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Lab Deadline	8/13/2013	04	TRG	PZ-104-KS TOT	46	07/18/13 13:01	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-104-KS DIS	46	07/18/13 13:01	1.0000E+00
Project	West Lake OU-1	06	DO	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Report Level	4	07	TRG	PZ-206-SS DIS	43	07/18/13 13:35	1.0000E+00
Activity Units	pCi	08	TRG	PZ-207-AS TOT	44	07/18/13 14:32	1.0000E+00
Aliquot Units	I	09	TRG	PZ-207-AS DIS	44	07/18/13 14:32	1.0000E+00
Matrix	WA	10	TRG	DUP 07 TOT	43	07/18/13 00:00	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	DUP 07 DIS	43	07/18/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	FB at I-73 TOT	37	07/19/13 08:50	1.0000E+00
Radiometric Tracer	U-232	13	TRG	I-73 TOT	44	07/19/13 08:55	1.0000E+00
Radiometric Sol#	U-10a	14	TRG	I-73 DIS	44	07/19/13 08:55	1.0000E+00
Tracer Act (dpm/g)	19.041	15	TRG	PZ-103-SS TOT	39	07/19/13 09:45	2.3000E-01
Carrier		16	TRG	PZ-103-SS DIS	39	07/19/13 09:45	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-102R-SS TOT	44	07/19/13 10:15	1.0000E+00
		18	TRG	PZ-102R-SS DIS	44	07/19/13 10:15	1.0000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.6123	11.7		0.00								
02	MBL	0.6036	11.5		0.00								
03	DUP	0.6032	11.5		0.00								
04	TRG	0.6026	11.5		0.00								
05	TRG	0.6008	11.4		0.00								
06	DO	0.6014	11.5		0.00								
07	TRG	0.6014	11.5		0.00								
08	TRG	0.6035	11.5		0.00								
09	TRG	0.6026	11.5		0.00								
10	TRG	0.6007	11.4		0.00								
11	TRG	0.6015	11.5		0.00								
12	TRG	0.6030	11.5		0.00								
13	TRG	0.5992	11.4		0.00								
14	TRG	0.6040	11.5		0.00								
15	TRG	0.6006	11.4		0.00								
16	TRG	0.6003	11.4		0.00								
17	TRG	0.3222	6.1		0.00								
18	TRG	0.3723	7.1		0.00								

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

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

0100

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-UISO-1

Run	1
Analysis Code	UISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	U-234	LCS	LCS	pCi/l	7.07E+00	9.39E-01	7.31E-02	8.18E+00	86.51	OK		OK	
02	U-234	MBL	BLANK	pCi/l	2.73E-01	1.22E-01	5.47E-02					OK	OK
03	U-234	DUP	PZ-206-SS TOT	pCi/l	4.40E-01	1.57E-01	7.72E-02				OK	OK	
04	U-234	TRG	PZ-104-KS TOT	pCi/l	6.21E-01	1.94E-01	6.50E-02					OK	
05	U-234	TRG	PZ-104-KS DIS	pCi/l	5.63E-01	1.82E-01	5.61E-02					OK	
06	U-234	DO	PZ-206-SS TOT	pCi/l	5.26E-01	1.72E-01	7.19E-02					OK	
07	U-234	TRG	PZ-206-SS DIS	pCi/l	2.85E-01	1.28E-01	6.60E-02					OK	
08	U-234	TRG	PZ-207-AS TOT	pCi/l	1.02E-01	2.20E-01	4.27E-01					OK	
09	U-234	TRG	PZ-207-AS DIS	pCi/l	2.12E-01	1.84E-01	1.79E-01					OK	
10	U-234	TRG	DUP 07 TOT	pCi/l	1.38E+00	3.27E-01	9.10E-02					OK	
11	U-234	TRG	DUP 07 DIS	pCi/l	1.16E+00	2.99E-01	6.62E-02					OK	
12	U-234	TRG	FB at I-73 TOT	pCi/l	7.10E-02	6.10E-02	6.00E-02					OK	
13	U-234	TRG	I-73 TOT	pCi/l	1.56E+00	5.81E-01	1.77E-01					OK	
14	U-234	TRG	I-73 DIS	pCi/l	9.67E-01	4.36E-01	1.77E-01					OK	
15	U-234	TRG	PZ-103-SS TOT	pCi/l	6.35E-01	3.94E-01	2.85E-01					OK	
16	U-234	TRG	PZ-103-SS DIS	pCi/l	3.29E-01	1.37E-01	7.05E-02					OK	
17	U-234	TRG	PZ-102R-SS TOT	pCi/l	4.13E+00	7.96E-01	1.07E-01					OK	
18	U-234	TRG	PZ-102R-SS DIS	pCi/l	3.47E+00	6.59E-01	1.04E-01					OK	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	07/24/13 00:00	1.00E+00	117.33	0.00	0.00			
02	U-234	MBL	07/24/13 00:00	1.00E+00	110.86	0.00	0.00			
03	U-234	DUP	07/18/13 13:35	1.00E+00	107.81	0.00	0.00			
04	U-234	TRG	07/18/13 13:01	1.00E+00	109.48	0.00	0.00			
05	U-234	TRG	07/18/13 13:01	1.00E+00	114.67	0.00	0.00			
06	U-234	DO	07/18/13 13:35	1.00E+00	106.06	0.00	0.00			
07	U-234	TRG	07/18/13 13:35	1.00E+00	101.30	0.00	0.00			
08	U-234	TRG	07/18/13 14:32	1.00E+00	22.25	0.00	0.00			
09	U-234	TRG	07/18/13 14:32	1.00E+00	38.41	0.00	0.00			
10	U-234	TRG	07/18/13 00:00	1.00E+00	87.30	0.00	0.00			
11	U-234	TRG	07/18/13 00:00	1.00E+00	87.17	0.00	0.00			
12	U-234	TRG	07/19/13 08:50	1.00E+00	110.84	0.00	0.00			
13	U-234	TRG	07/19/13 08:55	1.00E+00	35.07	0.00	0.00			
14	U-234	TRG	07/19/13 08:55	1.00E+00	34.41	0.00	0.00			
15	U-234	TRG	07/19/13 09:45	2.30E-01	115.41	0.00	0.00			
16	U-234	TRG	07/19/13 09:45	1.00E+00	113.17	0.00	0.00			
17	U-234	TRG	07/19/13 10:15	1.00E+00	91.03	0.00	0.00			
18	U-234	TRG	07/19/13 10:15	1.00E+00	92.63	0.00	0.00			

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.



Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-UISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-234	LCS	08/13/13 09:06		A_Spec	Alpha_034	170	5.80 E+02	0.00 E+00	18.6
02	U-234	MBL	08/13/13 09:06		A_Spec	Alpha_035	170	2.08 E+01	1.00 E-03	18.3
03	U-234	DUP	08/13/13 09:06		A_Spec	Alpha_036	170	3.42 E+01	5.00 E-03	19.1
04	U-234	TRG	08/13/13 09:06		A_Spec	Alpha_037	170	4.57 E+01	2.00 E-03	17.8
05	U-234	TRG	08/13/13 09:06		A_Spec	Alpha_038	170	4.18 E+01	1.00 E-03	17.2
06	U-234	DO	08/13/13 09:07		A_Spec	Alpha_039	170	4.13 E+01	4.00 E-03	19.7
07	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_040	170	2.07 E+01	2.00 E-03	19
08	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_041	170	1.64 E+00	8.00 E-03	19.2
09	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_042	170	5.66 E+00	2.00 E-03	18.5
10	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_043	170	9.10 E+01	0.00 E+00	20
11	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_044	170	7.28 E+01	1.00 E-03	19.2
12	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_045	170	5.66 E+00	2.00 E-03	19.1
13	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_046	170	3.68 E+01	1.00 E-03	17.9
14	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_047	170	2.28 E+01	1.00 E-03	18.2
15	U-234	TRG	08/13/13 09:07		A_Spec	Alpha_048	170	1.07 E+01	2.00 E-03	16.8
16	U-234	TRG	08/13/13 12:16		A_Spec	Alpha_003	170.02	2.45 E+01	3.00 E-03	17.5
17	U-234	TRG	08/13/13 12:16		A_Spec	Alpha_004	170.02	2.74 E+02	9.00 E-03	19.4
18	U-234	TRG	08/13/13 12:16		A_Spec	Alpha_010	170	2.38 E+02	9.00 E-03	19.7

Run	1
Analysis Code	UISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	7.39E+00	9.73E-01	5.81E-02	7.97E+00	92.74	OK		OK	
02	U-238	MBL	BLANK	pCi/l	1.15E-01	7.79E-02	5.45E-02					OK	OK
03	U-238	DUP	PZ-206-SS TOT	pCi/l	2.12E-01	1.07E-01	6.74E-02				INV	OK	
04	U-238	TRG	PZ-104-KS TOT	pCi/l	1.76E-01	1.01E-01	8.12E-02					OK	
05	U-238	TRG	PZ-104-KS DIS	pCi/l	2.90E-01	1.27E-01	6.40E-02					OK	
06	U-238	DO	PZ-206-SS TOT	pCi/l	4.88E-01	1.64E-01	6.66E-02					OK	
07	U-238	TRG	PZ-206-SS DIS	pCi/l	9.61E-02	7.69E-02	8.24E-02					OK	
08	U-238	TRG	PZ-207-AS TOT	pCi/l	-3.29E-02	1.37E-01	4.41E-01					OK	
09	U-238	TRG	PZ-207-AS DIS	pCi/l	1.11E-01	1.51E-01	2.35E-01					OK	
10	U-238	TRG	DUP 07 TOT	pCi/l	7.71E-01	2.32E-01	9.07E-02					OK	
11	U-238	TRG	DUP 07 DIS	pCi/l	9.29E-01	2.62E-01	6.59E-02					OK	
12	U-238	TRG	FB at I-73 TOT	pCi/l	5.82E-02	5.54E-02	5.97E-02					OK	
13	U-238	TRG	I-73 TOT	pCi/l	1.10E+00	4.74E-01	2.53E-01					OK	
14	U-238	TRG	I-73 DIS	pCi/l	8.71E-01	4.12E-01	2.02E-01					OK	
15	U-238	TRG	PZ-103-SS TOT	pCi/l	1.01E+00	5.06E-01	3.56E-01					OK	
16	U-238	TRG	PZ-103-SS DIS	pCi/l	1.38E-01	8.87E-02	7.54E-02					OK	
17	U-238	TRG	PZ-102R-SS TOT	pCi/l	3.53E+00	7.01E-01	9.86E-02					OK	
18	U-238	TRG	PZ-102R-SS DIS	pCi/l	2.25E+00	4.76E-01	8.69E-02					OK	

Run	1
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.



Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	07/24/13 00:00	1.00E+00	117.33	0.00	0.00			
02	U-238	MBL	07/24/13 00:00	1.00E+00	110.86	0.00	0.00			
03	U-238	DUP	07/18/13 13:35	1.00E+00	107.81	0.00	0.00			
04	U-238	TRG	07/18/13 13:01	1.00E+00	109.48	0.00	0.00			
05	U-238	TRG	07/18/13 13:01	1.00E+00	114.67	0.00	0.00			
06	U-238	DO	07/18/13 13:35	1.00E+00	106.06	0.00	0.00			
07	U-238	TRG	07/18/13 13:35	1.00E+00	101.30	0.00	0.00			
08	U-238	TRG	07/18/13 14:32	1.00E+00	22.25	0.00	0.00			
09	U-238	TRG	07/18/13 14:32	1.00E+00	38.41	0.00	0.00			
10	U-238	TRG	07/18/13 00:00	1.00E+00	87.30	0.00	0.00			
11	U-238	TRG	07/18/13 00:00	1.00E+00	87.17	0.00	0.00			
12	U-238	TRG	07/19/13 08:50	1.00E+00	110.84	0.00	0.00			
13	U-238	TRG	07/19/13 08:55	1.00E+00	35.07	0.00	0.00			
14	U-238	TRG	07/19/13 08:55	1.00E+00	34.41	0.00	0.00			
15	U-238	TRG	07/19/13 09:45	2.30E-01	115.41	0.00	0.00			
16	U-238	TRG	07/19/13 09:45	1.00E+00	113.17	0.00	0.00			
17	U-238	TRG	07/19/13 10:15	1.00E+00	91.03	0.00	0.00			
18	U-238	TRG	07/19/13 10:15	1.00E+00	92.63	0.00	0.00			



Run **1**

Analysis Code **UUISO**

Eberline Services Work Order **13-07153**

Client **Engineering Management Support, Inc.**


Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-UUISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	U-238	LCS	08/13/13 09:06		A_Spec	Alpha_034	170	6.09 E+02	2.00 E-03	18.6
02	U-238	MBL	08/13/13 09:06		A_Spec	Alpha_035	170	8.83 E+00	1.00 E-03	18.3
03	U-238	DUP	08/13/13 09:06		A_Spec	Alpha_036	170	1.65 E+01	3.00 E-03	19.1
04	U-238	TRG	08/13/13 09:06		A_Spec	Alpha_037	170	1.30 E+01	0.00 E+00	17.8
05	U-238	TRG	08/13/13 09:06		A_Spec	Alpha_038	170	2.17 E+01	2.00 E-03	17.2
06	U-238	DO	08/13/13 09:07		A_Spec	Alpha_039	170	3.85 E+01	3.00 E-03	19.7
07	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_040	170	7.00 E+00	0.00 E+00	19
08	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_041	170	-5.30 E-01	9.00 E-03	19.2
09	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_042	170	2.98 E+00	6.00 E-03	18.5
10	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_043	170	5.10 E+01	0.00 E+00	20
11	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_044	170	5.88 E+01	1.00 E-03	19.2
12	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_045	170	4.66 E+00	2.00 E-03	19.1
13	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_046	170	2.60 E+01	0.00 E+00	17.9
14	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_047	170	2.07 E+01	2.00 E-03	18.2
15	U-238	TRG	08/13/13 09:07		A_Spec	Alpha_048	170	1.70 E+01	0.00 E+00	16.8
16	U-238	TRG	08/13/13 12:16		A_Spec	Alpha_003	170.02	1.03 E+01	4.00 E-03	17.5
17	U-238	TRG	08/13/13 12:16		A_Spec	Alpha_004	170.02	2.36 E+02	7.00 E-03	19.4
18	U-238	TRG	08/13/13 12:16		A_Spec	Alpha_010	170	1.55 E+02	5.00 E-03	19.7

	Run	1
	Analysis Code	UUISO
Eberline Services Work Order	13-07153	
Client	Engineering Management Support, Inc.	

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	7.07E-01	2.17E-01	9.02E-02					OK	
02	U-235	MBL	BLANK	pCi/l	1.29E-01	9.62E-02	9.70E-02					OK	OK
03	U-235	DUP	PZ-206-SS TOT	pCi/l	1.56E-01	1.00E-01	6.64E-02				INV	OK	
04	U-235	TRG	PZ-104-KS TOT	pCi/l	2.68E-01	1.39E-01	1.01E-01					OK	
05	U-235	TRG	PZ-104-KS DIS	pCi/l	2.99E-01	1.46E-01	9.95E-02					OK	
06	U-235	DO	PZ-206-SS TOT	pCi/l	2.33E-01	1.22E-01	6.56E-02					OK	
07	U-235	TRG	PZ-206-SS DIS	pCi/l	6.52E-02	6.73E-02	7.10E-02					OK	
08	U-235	TRG	PZ-207-AS TOT	pCi/l	1.01E-01	2.20E-01	4.33E-01					OK	
09	U-235	TRG	PZ-207-AS DIS	pCi/l	2.77E-01	2.44E-01	2.77E-01					OK	
10	U-235	TRG	DUP 07 TOT	pCi/l	3.37E-01	1.65E-01	1.12E-01					OK	
11	U-235	TRG	DUP 07 DIS	pCi/l	3.29E-01	1.63E-01	8.17E-02					OK	
12	U-235	TRG	FB at I-73 TOT	pCi/l	1.55E-01	1.02E-01	9.28E-02					OK	
13	U-235	TRG	I-73 TOT	pCi/l	6.70E-01	3.89E-01	2.18E-01					OK	
14	U-235	TRG	I-73 DIS	pCi/l	1.05E-01	1.78E-01	3.13E-01					OK	
15	U-235	TRG	PZ-103-SS TOT	pCi/l	1.34E-01	2.06E-01	3.07E-01					OK	
16	U-235	TRG	PZ-103-SS DIS	pCi/l	1.41E-01	9.91E-02	8.70E-02					OK	
17	U-235	TRG	PZ-102R-SS TOT	pCi/l	7.60E-01	2.63E-01	1.17E-01					OK	
18	U-235	TRG	PZ-102R-SS DIS	pCi/l	7.21E-01	2.51E-01	1.36E-01					OK	

	
Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	08/13/13 09:06		A_Spec	Alpha_034	170	4.70 E+01	0.00 E+00	18.6
02	U-235	MBL	08/13/13 09:06		A_Spec	Alpha_035	170	8.00 E+00	0.00 E+00	18.3
03	U-235	DUP	08/13/13 09:06		A_Spec	Alpha_036	170	9.83 E+00	1.00 E-03	19.1
04	U-235	TRG	08/13/13 09:06		A_Spec	Alpha_037	170	1.60 E+01	0.00 E+00	17.8
05	U-235	TRG	08/13/13 09:06		A_Spec	Alpha_038	170	1.80 E+01	0.00 E+00	17.2
06	U-235	DO	08/13/13 09:07		A_Spec	Alpha_039	170	1.48 E+01	1.00 E-03	19.7
07	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_040	170	3.83 E+00	1.00 E-03	19
08	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_041	170	1.32 E+00	4.00 E-03	19.2
09	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_042	170	6.00 E+00	0.00 E+00	18.5
10	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_043	170	1.80 E+01	0.00 E+00	20
11	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_044	170	1.68 E+01	1.00 E-03	19.2
12	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_045	170	1.00 E+01	0.00 E+00	19.1
13	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_046	170	1.28 E+01	1.00 E-03	17.9
14	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_047	170	2.00 E+00	0.00 E+00	18.2
15	U-235	TRG	08/13/13 09:07		A_Spec	Alpha_048	170	1.83 E+00	1.00 E-03	16.8
16	U-235	TRG	08/13/13 12:16		A_Spec	Alpha_003	170.02	8.49 E+00	3.00 E-03	17.5
17	U-235	TRG	08/13/13 12:16		A_Spec	Alpha_004	170.02	4.10 E+01	6.00 E-03	19.4
18	U-235	TRG	08/13/13 12:16		A_Spec	Alpha_010	170	4.01 E+01	1.10 E-02	19.7

Run	1
Analysis Code	UUISO
Eberline Services Work Order	13-07153
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	07/24/13 00:00	1.0000	0.6123	11.6588		0.00		
02	MBL	BLANK	07/24/13 00:00	1.0000	0.6036	11.4931		0.00		
03	DUP	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.6032	11.4855		0.00		
04	TRG	PZ-104-KS TOT	07/18/13 13:01	1.0000	0.6026	11.4741		0.00		
05	TRG	PZ-104-KS DIS	07/18/13 13:01	1.0000	0.6008	11.4398		0.00		
06	DO	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.6014	11.4513		0.00		
07	TRG	PZ-206-SS DIS	07/18/13 13:35	1.0000	0.6014	11.4513		0.00		
08	TRG	PZ-207-AS TOT	07/18/13 14:32	1.0000	0.6035	11.4912		0.00		
09	TRG	PZ-207-AS DIS	07/18/13 14:32	1.0000	0.6026	11.4741		0.00		
10	TRG	DUP 07 TOT	07/18/13 00:00	1.0000	0.6007	11.4379		0.00		
11	TRG	DUP 07 DIS	07/18/13 00:00	1.0000	0.6015	11.4532		0.00		
12	TRG	FB at I-73 TOT	07/19/13 08:50	1.0000	0.6030	11.4817		0.00		
13	TRG	I-73 TOT	07/19/13 08:55	1.0000	0.5992	11.4094		0.00		
14	TRG	I-73 DIS	07/19/13 08:55	1.0000	0.6040	11.5008		0.00		
15	TRG	PZ-103-SS TOT	07/19/13 09:45	0.2300	0.6006	11.4360		0.00		
16	TRG	PZ-103-SS DIS	07/19/13 09:45	1.0000	0.6003	11.4303		0.00		
17	TRG	PZ-102R-SS TOT	07/19/13 10:15	1.0000	0.3222	6.1350		0.00		
18	TRG	PZ-102R-SS DIS	07/19/13 10:15	1.0000	0.3723	7.0890		0.00		

34-

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Internal Work Order					Run	Analysis Code				Date	Technician			Technician Initials		Witness Initials	
13-07153					1	UIISO				8/7/2013 9:15	JWOLFE			<i>JW</i>			
LCS & Matrix Spikes					LCS	MS	LCSD	MSD	LCS		MS		LCSD		MSD		
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	Volume Used (g)	Volume Used (g)	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate	
U-234	U-8a	35.240	8/7/2013	0.500	0.5150				8.18	0.294	0.00	0.000	0.00	0.000	0.00	0.000	
U-238	U-8a	34.350	8/7/2013	0.500	0.5150				7.97	0.287	0.00	0.000	0.00	0.000	0.00	0.000	

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition										
01	U-232	U-10a	19.041	8/7/2013	0.6123	0.6300	0.6123 g									
02	U-232	U-10a	19.041	8/7/2013	0.6036	0.6300	0.6036 g									
03	U-232	U-10a	19.041	8/7/2013	0.6032	0.6300										
04	U-232	U-10a	19.041	8/7/2013	0.6026	0.6300	0.6026 g									
05	U-232	U-10a	19.041	8/7/2013	0.6008	0.6300	0.6008 g									
06	U-232	U-10a	19.041	8/7/2013	0.6014	0.6300	0.6014 g									
07	U-232	U-10a	19.041	8/7/2013	0.6014	0.6300	0.6014 g									
08	U-232	U-10a	19.041	8/7/2013	0.6035	0.6300	0.6035 g									
09	U-232	U-10a	19.041	8/7/2013	0.6026	0.6300	0.6026 g									
10	U-232	U-10a	19.041	8/7/2013	0.6007	0.6300	0.6007 g									
11	U-232	U-10a	19.041	8/7/2013	0.6015	0.6300	0.6015 g									
12	U-232	U-10a	19.041	8/7/2013	0.6030	0.6300	0.6030 g									
13	U-232	U-10a	19.041	8/7/2013	0.5992	0.6300	0.5992 g									
14	U-232	U-10a	19.041	8/7/2013	0.6040	0.6300	0.6040 g									
15	U-232	U-10a	19.041	8/7/2013	0.6006	0.6300	0.6006 g									
16	U-232	U-10a	19.041	8/7/2013	0.6003	0.6300	0.6003 g									
17	U-232	U-10a	19.041	8/7/2013	0.3222	0.6300	0.3222 g									
18	U-232	U-10a	19.041	8/7/2013	0.3723	0.6300	0.3723 g									

LCS	
0.5150 g	
Matrix Spike	



Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	1	UIISO	liters	8/13/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data		Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre		No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS						1.0000E+00	1.0000E+00				
02	BLANK	MBL						1.0000E+00	1.0000E+00				
03	PZ-206-SS TOT	DUP						1.0000E+00	1.0000E+00				
04	PZ-104-KS TOT	TRG						1.0000E+00	1.0000E+00				
05	PZ-104-KS DIS	TRG						1.0000E+00	1.0000E+00				
06	PZ-206-SS TOT	DO						1.0000E+00	1.0000E+00				
07	PZ-206-SS DIS	TRG						1.0000E+00	1.0000E+00				
08	PZ-207-AS TOT	TRG						1.0000E+00	1.0000E+00				
09	PZ-207-AS DIS	TRG						1.0000E+00	1.0000E+00				
10	DUP 07 TOT	TRG						1.0000E+00	1.0000E+00				
11	DUP 07 DIS	TRG						1.0000E+00	1.0000E+00				
12	FB at I-73 TOT	TRG						1.0000E+00	1.0000E+00				
13	I-73 TOT	TRG						1.0000E+00	1.0000E+00				
14	I-73 DIS	TRG						1.0000E+00	1.0000E+00				
15	PZ-103-SS TOT	TRG						2.3000E-01	2.3000E-01				
16	PZ-103-SS DIS	TRG						1.0000E+00	1.0000E+00				
17	PZ-102R-SS TOT	TRG						1.0000E+00	1.0000E+00				
18	PZ-102R-SS DIS	TRG						1.0000E+00	1.0000E+00				

Comments

Technician: J Wolfe Date: 8, 7, 13

145
8/13/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_034
 Chamber Serial Number: 04026479B
 Detector Serial Number: 91136
 Env. Background: System Bkgd 64782
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/13/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:06:53 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.612 mL
 Effective Efficiency: 0.2177 +/- 0.0117
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM
 Chem. Recovery Factor: 1.1733 +/- 0.0661

Control Certificate Name: NatU_U-8A
 Chem. Recov. of Control: U-238 0.904044 +/- 0.066495
 Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.287	429.00	9.47	0.00	0.00E+000	29.7
U-234	4.737	580.00	8.15	0.00	0.00E+000	43.4
U-235	4.406	47.00	28.89	0.00	0.00E+000	3.5
U-238	4.159	608.66	7.95	0.34	0.00E+000	16.2

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

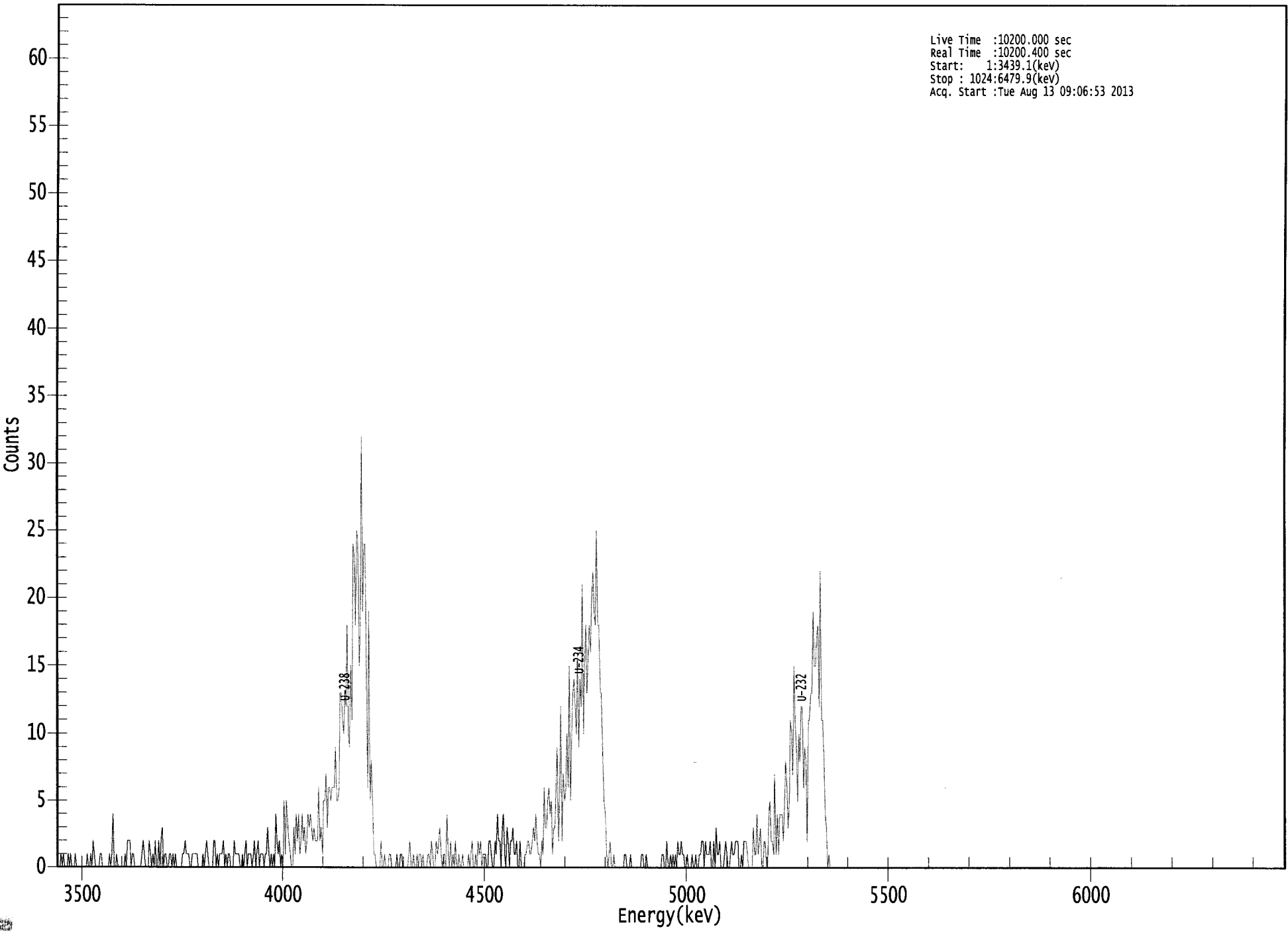
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.23E+000 +/- 5.49E-001	7.31E-002 +/- 7.67E-003
U-234	0.996	4761.50*	7.07E+000 +/- 9.39E-001	7.31E-002 +/- 7.67E-003
U-235	0.997	4385.50*	7.07E-001 +/- 2.17E-001	9.02E-002 +/- 9.46E-003
U-238	0.995	4184.40*	7.39E+000 +/- 9.73E-001	5.81E-002 +/- 6.09E-003

AG
8/14/13

US EPA ARCHIVE DOCUMENT

000066038.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3439.1(kev)
Stop : 1024:6479.9(kev)
Acq. Start :Tue Aug 13 09:06:53 2013



ROI Type: 1

ROI Type: 3

0122

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	1	0	1	0	0
9:	0	1	0	1	0	0	0	1
17:	0	0	0	0	0	0	0	0
25:	0	1	0	0	1	0	2	1
33:	0	0	0	0	1	1	0	0
41:	0	0	0	0	1	0	1	4
49:	0	0	1	0	0	0	0	0
57:	0	1	0	2	2	2	0	1
65:	1	0	0	0	0	0	0	1
73:	2	1	0	0	0	2	1	0
81:	1	0	2	0	0	2	0	2
89:	3	0	1	1	0	0	1	1
97:	0	1	0	1	0	0	0	0
105:	0	1	1	2	1	1	1	0
113:	0	1	1	1	1	1	0	0
121:	0	0	1	0	1	2	1	0
129:	0	0	0	2	2	0	1	0
137:	1	1	1	2	0	1	0	1
145:	1	0	0	0	2	1	1	1
153:	1	0	0	1	0	1	2	0
161:	1	1	1	0	1	2	0	1
169:	2	0	1	1	1	0	1	1
177:	3	1	0	1	0	1	0	4
185:	2	1	2	0	1	0	5	1
193:	5	3	2	1	0	0	3	1
201:	4	2	4	1	2	4	2	3
209:	1	2	4	3	4	3	2	3
217:	2	2	2	6	2	3	1	5
225:	5	7	3	6	6	5	6	6
233:	6	9	5	5	6	13	13	11
241:	10	13	12	18	10	9	15	11
249:	24	23	18	25	24	15	18	32
257:	19	24	24	14	6	19	5	8
265:	5	1	1	0	0	0	0	2
273:	0	0	1	0	0	0	1	1
281:	0	0	0	0	1	0	0	1
289:	1	0	0	0	0	0	1	2
297:	0	0	1	0	0	1	0	1
305:	1	0	1	0	0	0	1	1
313:	0	2	1	0	0	2	1	2
321:	3	1	0	1	1	0	4	1
329:	0	2	0	1	0	2	0	0
337:	1	0	0	1	0	0	0	0
345:	1	0	1	2	0	0	1	0
353:	2	1	2	0	1	1	1	0
361:	0	2	2	1	0	0	2	1

369: 4 2 2 0 3 4 1 0

Sample Title: 01

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	3	2	0	2	2	3	1	1
385:	2	0	0	2	0	0	0	1
393:	1	2	2	1	1	2	3	2
401:	4	2	1	1	0	2	1	6
409:	3	3	5	6	4	5	1	3
417:	3	6	9	2	5	12	2	7
425:	5	6	10	6	15	5	10	13
433:	14	12	10	16	9	14	12	21
441:	10	15	18	13	16	18	16	20
449:	22	19	18	25	18	18	13	13
457:	8	5	4	1	0	1	2	0
465:	0	1	0	0	0	0	0	0
473:	0	0	1	1	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	1	1	0	0	1	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	1	1	0	0	2	0	0
513:	1	0	1	0	1	0	2	1
521:	1	2	1	1	0	0	1	0
529:	0	0	1	0	0	1	0	0
537:	1	1	2	2	0	2	1	1
545:	1	2	0	0	2	0	3	1
553:	1	2	0	0	0	1	2	1
561:	0	0	1	2	1	1	2	2
569:	2	0	0	1	0	2	2	2
577:	1	0	0	0	0	3	1	1
585:	4	1	2	3	0	0	2	2
593:	0	0	4	5	2	2	1	7
601:	1	4	1	4	4	4	2	5
609:	8	6	3	5	11	10	7	15
617:	11	9	5	10	8	12	12	6
625:	9	8	2	11	11	13	13	19
633:	15	15	17	18	12	22	11	11
641:	8	4	3	0	1	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	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	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



KB
8/13/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 64783
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/13/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:06:55 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.2024 +/- 0.0112
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 1.1086 +/- 0.0645

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 5.304	393.15	9.90	0.85	0.00E+000	14.4
U-234	4.712	20.83	43.15	0.17	0.00E+000	3.7
U-235	4.375	8.00	73.50	0.00	0.00E+000	4.4
U-238	4.181	8.83	66.70	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

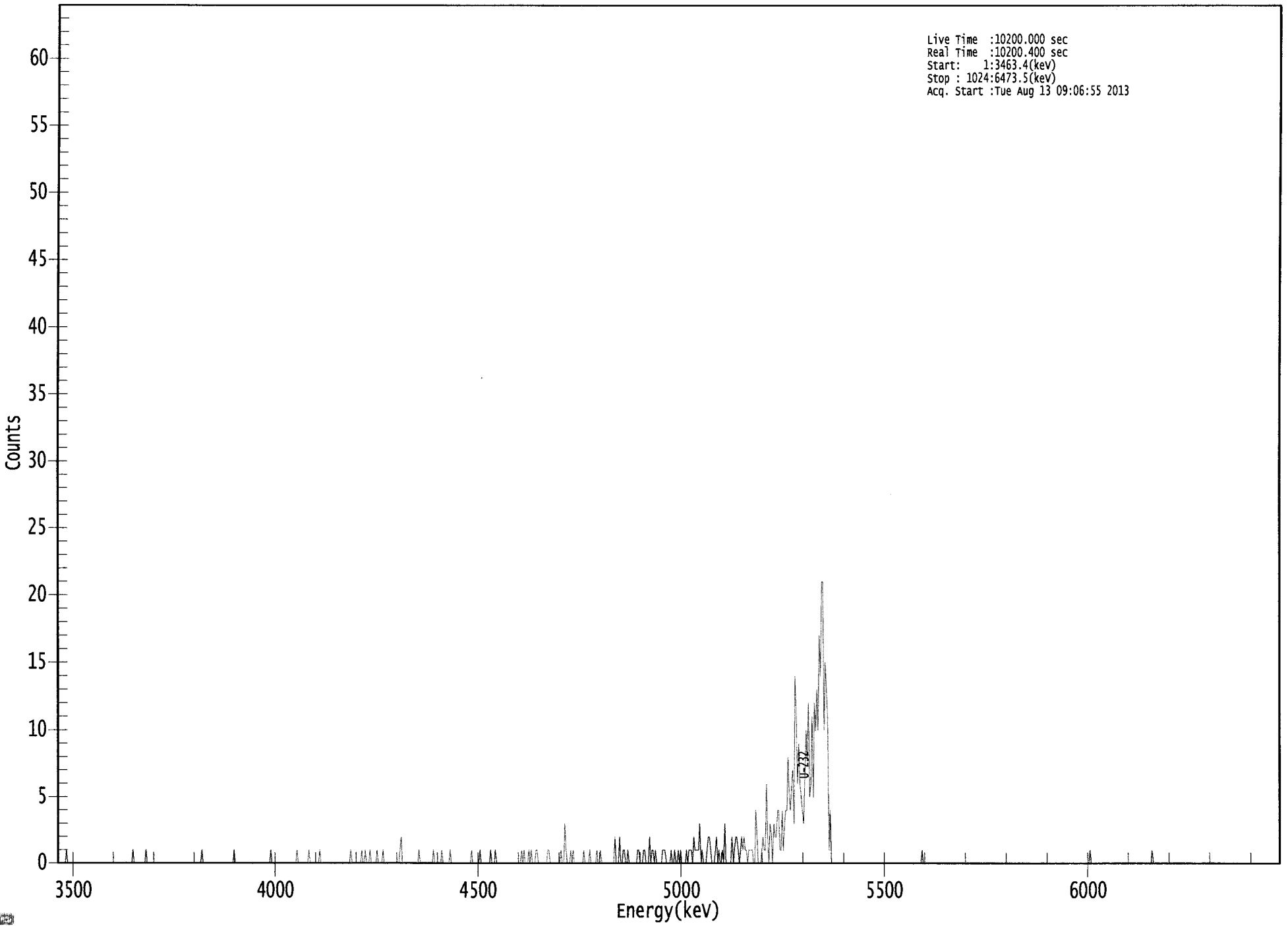
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	1.000	5302.50*	5.16E+000 +/- 5.61E-001	7.85E-002 +/- 8.54E-003
U-234	0.983	4761.50*	2.73E-001 +/- 1.22E-001	5.47E-002 +/- 5.95E-003
U-235	0.999	4385.50*	1.29E-001 +/- 9.62E-002	9.70E-002 +/- 1.06E-002
U-238	1.000	4184.40*	1.15E-001 +/- 7.79E-002	5.45E-002 +/- 5.93E-003

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US EPA ARCHIVE DOCUMENT

000066039.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3463.4(keV)
Stop : 1024:6473.5(keV)
Acq. Start :Tue Aug 13 09:06:55 2013



ROI Type: 1

ROI Type: 3

0127

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	1
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	1
65:	0	0	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	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	1	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	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	1	0	0	0	0	0	0
209:	0	0	0	1	0	0	0	0
217:	0	0	0	0	1	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	1	0
249:	0	0	0	0	0	0	0	1
257:	0	0	1	0	0	0	1	0
265:	0	0	0	0	1	0	0	0
273:	0	1	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1
289:	2	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	1	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	1	0	0	0	0
353:	0	0	1	0	0	0	0	0
361:	0	0	0	1	0	0	0	1

369: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	1	0	1
393:	0	0	0	1	0	1	0	0
401:	0	1	1	0	0	0	0	0
409:	0	0	0	1	1	0	0	0
417:	0	0	0	0	0	0	1	0
425:	0	3	1	0	0	0	1	0
433:	1	0	0	0	0	0	0	0
441:	0	1	0	0	0	0	1	0
449:	0	0	0	0	1	0	0	1
457:	0	0	0	0	0	0	0	0
465:	0	0	0	2	0	0	0	2
473:	0	0	1	1	0	0	1	0
481:	0	0	0	0	0	0	1	1
489:	0	0	0	1	1	0	0	0
497:	2	0	1	1	0	1	0	0
505:	0	0	0	1	1	1	0	0
513:	0	0	1	0	0	1	0	0
521:	1	0	1	0	0	0	0	1
529:	0	1	1	1	0	2	1	1
537:	1	1	3	0	1	0	0	0
545:	1	2	2	1	0	0	0	1
553:	2	0	1	0	0	1	0	3
561:	0	0	0	0	0	2	0	1
569:	2	2	1	0	1	2	1	2
577:	1	1	0	1	1	1	1	0
585:	0	4	2	0	0	0	1	2
593:	1	1	6	2	0	3	2	0
601:	3	2	2	4	4	1	1	4
609:	1	3	4	4	8	5	4	6
617:	7	3	14	11	6	9	6	5
625:	4	3	6	10	8	12	5	6
633:	11	5	12	10	13	10	17	14
641:	21	21	10	15	13	11	1	4
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	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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



KB
8/13/13

Sample Description: PZ-206-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_036
 Chamber Serial Number: 04026477B
 Detector Serial Number: 84167
 Env. Background: System Bkgd 64784
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:06:56 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: 0.2059 +/- 0.0113
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 1.0781 +/- 0.0623

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	399.66	9.81	0.34	0.00E+000	18.2
U-234	4.740	34.15	34.02	0.85	0.00E+000	4.4
U-235	4.411	9.83	63.14	0.17	0.00E+000	3.0
U-238	4.159	16.49	49.13	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

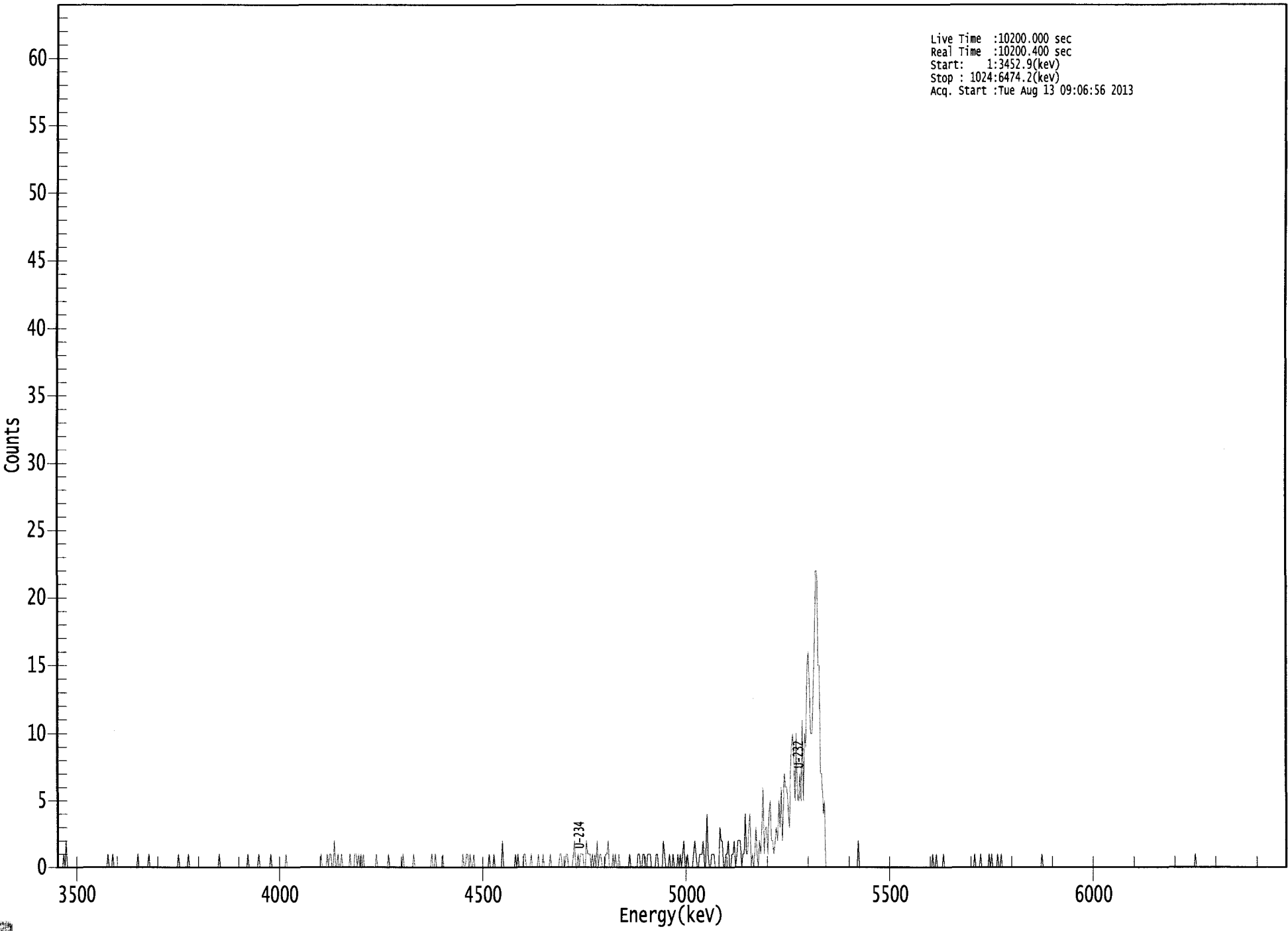
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.16E+000 +/- 5.57E-001	6.17E-002 +/- 6.66E-003
U-234	0.997	4761.50*	4.40E-001 +/- 1.57E-001	7.72E-002 +/- 8.33E-003
U-235	0.995	4385.50*	1.56E-001 +/- 1.00E-001	6.64E-002 +/- 7.17E-003
U-238	0.996	4184.40*	2.12E-001 +/- 1.07E-001	6.74E-002 +/- 7.27E-003

AG
8/14/13

US EPA ARCHIVE DOCUMENT

000066040.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :Tue Aug 13 09:06:56 2013



ROI Type: 1

ROI Type: 3

0132

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

369: 0 0 0 2 0 0 0 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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

ICB
8/13/13

Apex-Alpha™

Sample Description: PZ-104-KS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_037
 Chamber Serial Number: 04026478A
 Detector Serial Number: 91133
 Env. Background: System Bkgd 62769
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:06:58 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: 0.1952 +/- 0.0110
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 1.0948 +/- 0.0650

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.287	378.49	10.08	0.51	0.00E+000	35.7
U-234	4.752	45.66	29.13	0.34	0.00E+000	2.9
U-235	4.400	16.00	50.51	0.00	0.00E+000	2.9
U-238	4.152	13.00	56.41	0.00	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

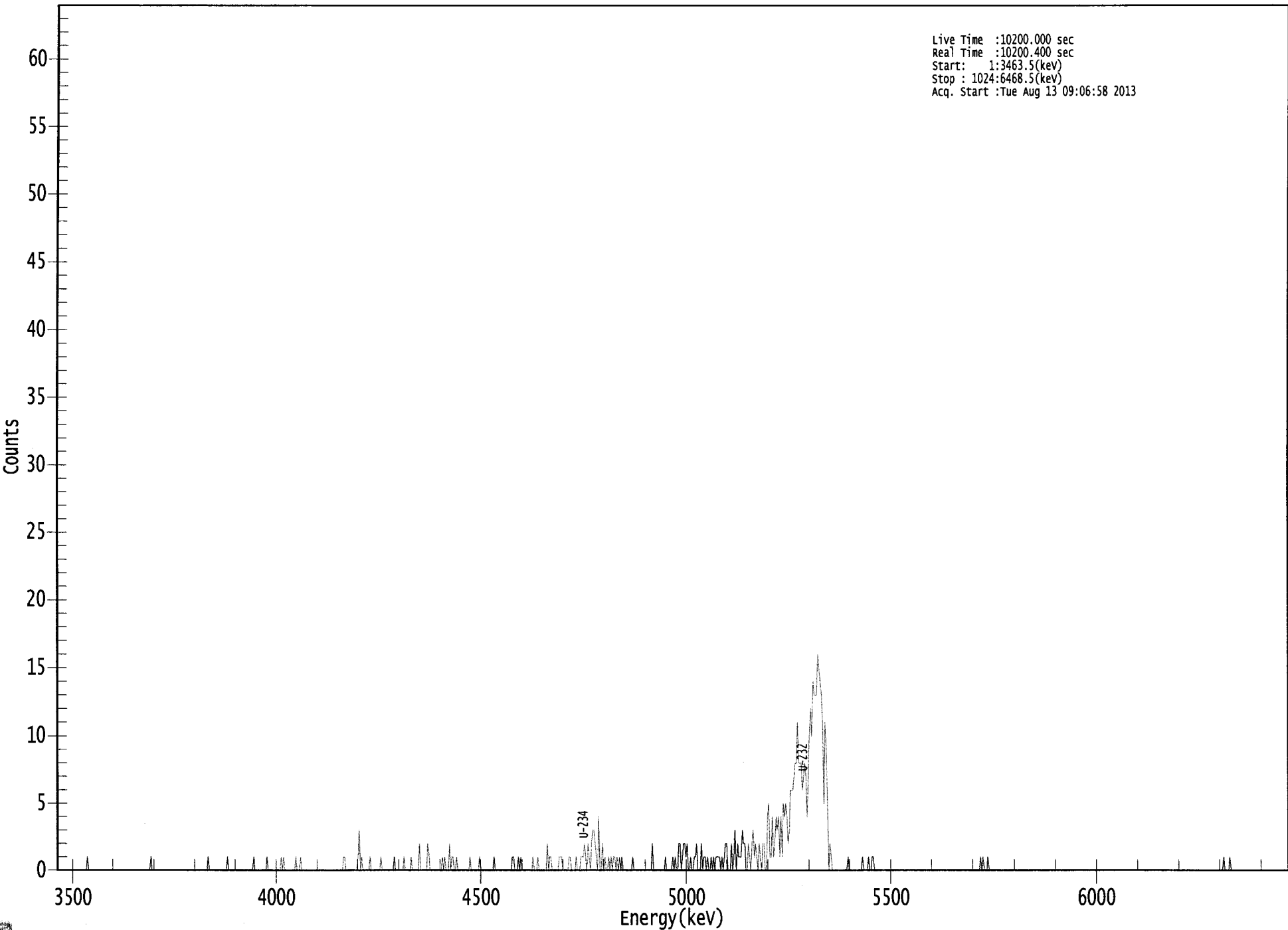
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	5.15E+000 +/- 5.69E-001	7.14E-002 +/- 7.89E-003
U-234	0.999	4761.50*	6.21E-001 +/- 1.94E-001	6.50E-002 +/- 7.18E-003
U-235	0.998	4385.50*	2.68E-001 +/- 1.39E-001	1.01E-001 +/- 1.11E-002
U-238	0.993	4184.40*	1.76E-001 +/- 1.01E-001	8.12E-002 +/- 8.97E-003

AG
8/14/13

US EPA ARCHIVE DOCUMENT

000066034.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :Tue Aug 13 09:06:58 2013



ROI Type: 1

ROI Type: 3

0137

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 04

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	1	0	0	0
385:	1	0	1	0	0	0	0	0
393:	0	0	0	0	1	0	0	0
401:	1	0	0	0	0	0	0	0
409:	2	0	1	1	0	0	0	0
417:	0	0	1	1	1	0	0	0
425:	0	0	1	1	0	0	0	0
433:	1	0	0	0	1	1	1	2
441:	1	0	2	1	0	2	3	3
449:	2	1	0	4	0	0	2	0
457:	1	0	0	1	0	1	0	1
465:	1	0	1	0	1	0	1	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	2
497:	0	0	0	0	0	0	0	0
505:	0	0	1	0	0	0	0	0
513:	1	0	1	0	0	2	2	0
521:	1	2	2	1	2	0	0	1
529:	0	0	1	1	2	0	0	0
537:	2	0	1	1	0	1	0	0
545:	1	0	1	0	1	1	1	1
553:	0	1	0	1	2	2	0	0
561:	0	2	0	1	3	0	2	1
569:	1	1	3	2	2	0	0	2
577:	1	0	2	3	1	2	1	0
585:	2	1	0	2	2	0	0	4
593:	5	1	1	4	1	2	4	3
601:	4	1	4	1	5	4	5	4
609:	2	3	6	6	6	7	8	8
617:	11	8	8	8	6	7	8	7
625:	4	7	10	12	10	14	13	13
633:	13	16	15	14	13	11	5	11
641:	9	5	0	2	1	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	1	0
673:	0	0	0	1	0	0	1	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:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	1	0	1	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: 04

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



108
8/13/13

Sample Description: PZ-104-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_038
 Chamber Serial Number: 04026478B
 Detector Serial Number: 91134
 Env. Background: System Bkgd 64785
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:06:59 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1974 +/- 0.0111
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 1.1467 +/- 0.0675

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 5.294	381.66	10.04	0.34	0.00E+000	7.3
U-234	4.734	41.83	30.38	0.17	0.00E+000	3.4
U-235	4.402	18.00	47.46	0.00	0.00E+000	3.0
U-238	4.128	21.66	42.50	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

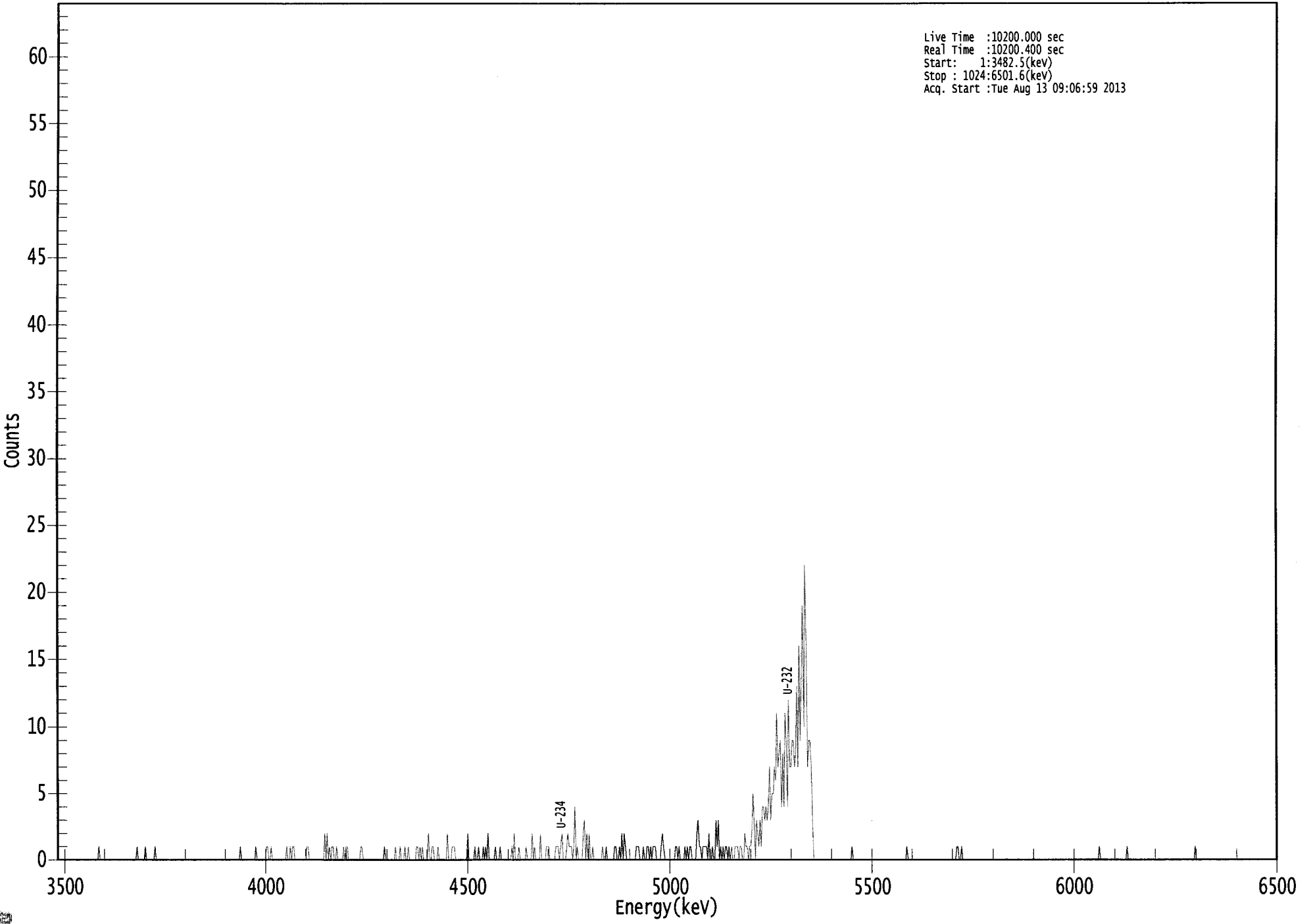
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.999	5302.50*	5.14E+000 +/- 5.65E-001	6.43E-002 +/- 7.08E-003
U-234	0.994	4761.50*	5.63E-001 +/- 1.82E-001	5.61E-002 +/- 6.18E-003
U-235	0.998	4385.50*	2.99E-001 +/- 1.46E-001	9.95E-002 +/- 1.09E-002
U-238	0.977	4184.40*	2.90E-001 +/- 1.27E-001	6.40E-002 +/- 7.05E-003

AG
8/14/13

US EPA ARCHIVE DOCUMENT

000066035.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :Tue Aug 13 09:06:59 2013



ROI Type: 1

ROI Type: 3

2710

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 1 0 0 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	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	1	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	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™

KB
8/13/13

Sample Description: PZ-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 64786
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:01 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.2084 +/- 0.0114
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 1.0606 +/- 0.0611

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.277	403.32	9.77	0.68	0.00E+000	27.2
U-234	4.728	41.32	30.78	0.68	0.00E+000	3.0
U-235	4.411	14.83	51.24	0.17	0.00E+000	4.5
U-238	4.143	38.49	31.84	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

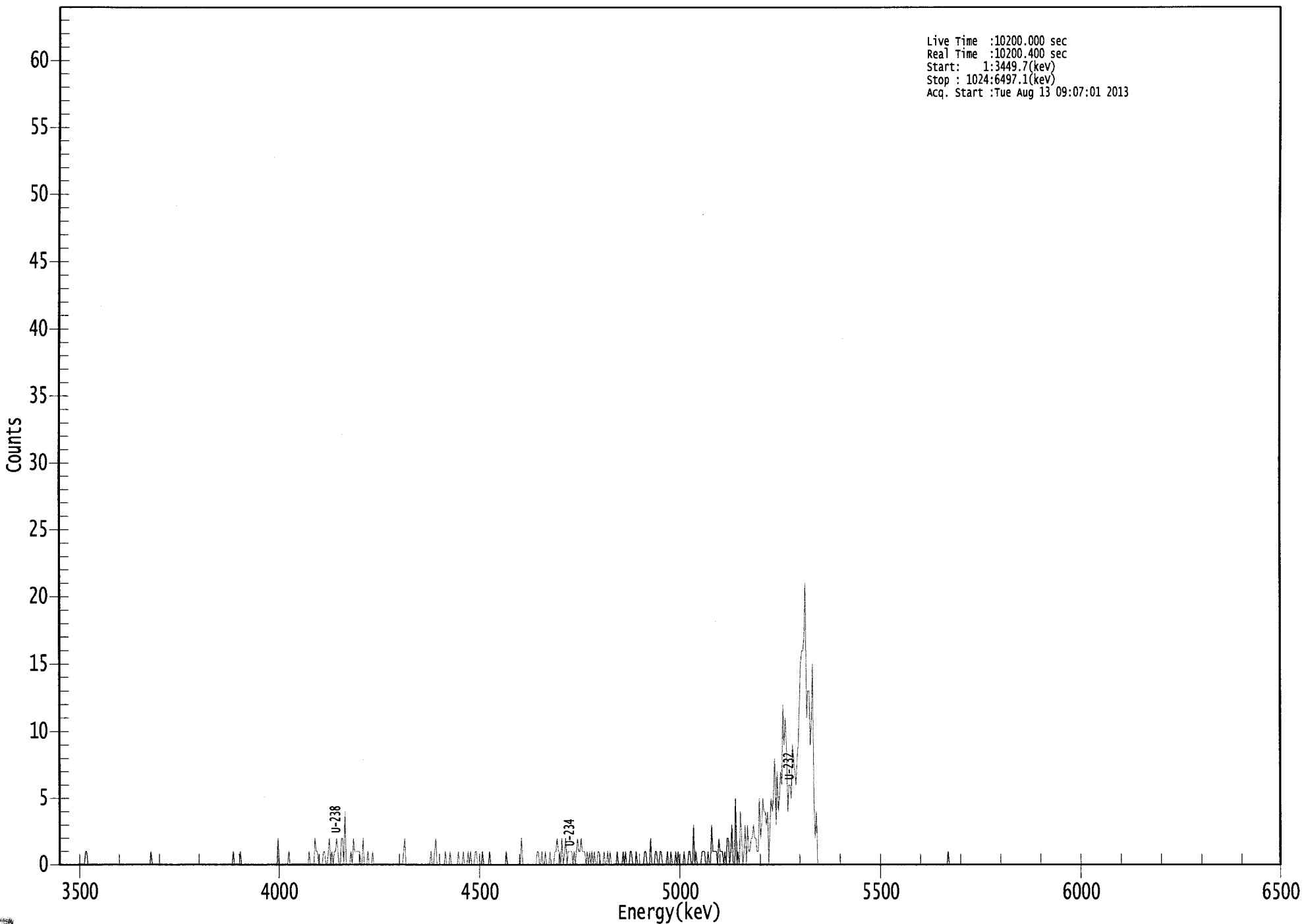
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.14E+000 +/- 5.53E-001	7.19E-002 +/- 7.74E-003
U-234	0.992	4761.50*	5.26E-001 +/- 1.72E-001	7.19E-002 +/- 7.73E-003
U-235	0.995	4385.50*	2.33E-001 +/- 1.22E-001	6.56E-002 +/- 7.06E-003
U-238	0.988	4184.40*	4.88E-001 +/- 1.64E-001	6.66E-002 +/- 7.16E-003

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US EPA ARCHIVE DOCUMENT

0000066041.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Tue Aug 13 09:07:01 2013



ROI Type: 1

ROI Type: 3

2710

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

369: 0 0 0 0 0 0 0 0 1

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	2	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	1	1	0	0	1	0	0
409:	1	0	0	0	1	0	0	0
417:	1	1	2	1	1	0	2	0
425:	1	2	0	1	1	1	1	0
433:	1	0	1	2	1	1	2	1
441:	1	1	0	1	0	1	0	1
449:	0	1	0	0	1	1	0	0
457:	0	1	0	0	1	0	1	0
465:	0	0	0	0	1	0	0	0
473:	0	1	0	1	0	0	0	1
481:	1	0	0	0	1	0	0	0
489:	0	0	0	1	1	0	0	0
497:	2	0	0	0	1	1	0	0
505:	1	1	0	0	0	0	1	0
513:	0	1	0	0	0	1	0	1
521:	0	0	0	0	1	0	0	0
529:	1	1	0	0	3	0	1	0
537:	0	0	0	1	1	1	0	0
545:	1	0	0	3	1	1	1	1
553:	0	2	1	1	1	0	1	0
561:	2	2	0	1	3	0	0	5
569:	0	1	0	4	2	0	1	3
577:	0	3	1	1	2	2	3	2
585:	2	1	1	5	2	3	5	4
593:	4	3	4	0	3	5	4	5
601:	8	3	7	4	5	7	6	12
609:	9	11	9	4	6	6	5	9
617:	8	7	6	8	9	12	15	16
625:	16	17	21	11	13	13	9	11
633:	15	5	2	4	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	1	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 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

103
8/13/13

Apex-Alpha™

Sample Description: PZ-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 64787
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:03 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1925 +/- 0.0109
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.0130 +/- 0.0601

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.274	372.49	10.16	0.51	0.00E+000	8.4
U-234	4.718	20.66	43.53	0.34	0.00E+000	3.7
U-235	4.380	3.83	102.72	0.17	0.00E+000	3.0
U-238	4.132	7.00	79.20	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

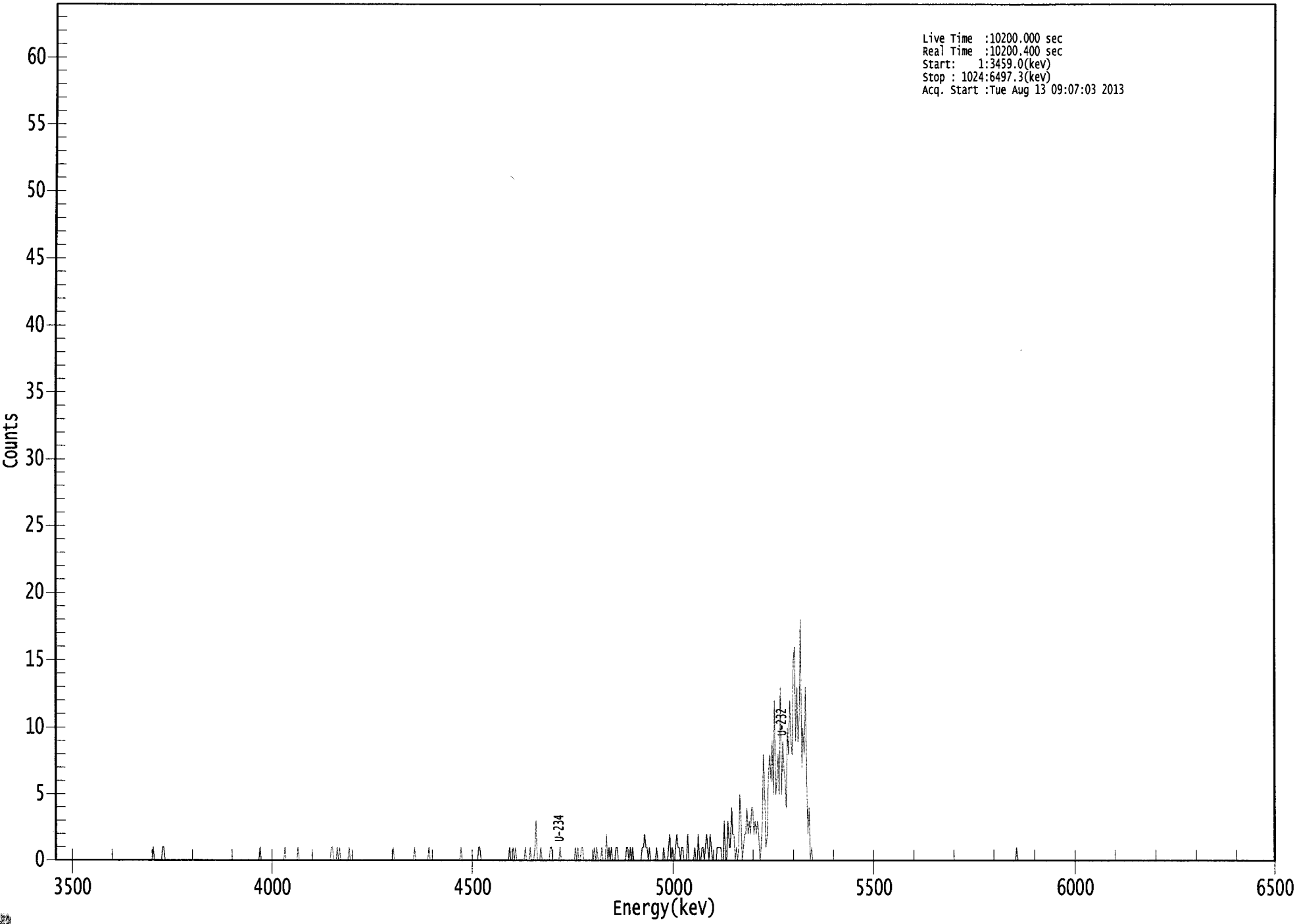
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.14E+000 +/- 5.72E-001	7.24E-002 +/- 8.05E-003
U-234	0.986	4761.50*	2.85E-001 +/- 1.28E-001	6.60E-002 +/- 7.33E-003
U-235	1.000	4385.50*	6.52E-002 +/- 6.73E-002	7.10E-002 +/- 7.90E-003
U-238	0.980	4184.40*	9.61E-002 +/- 7.69E-002	8.24E-002 +/- 9.16E-003

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US EPA ARCHIVE DOCUMENT

0000066042.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Tue Aug 13 09:07:03 2013



ROI Type: 1

ROI Type: 3

0152

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	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	1	0	0	0	0	0
89:	0	0	1	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	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	1	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	1	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	1	0	0	0	1	0	1
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	1	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	1	0
305:	0	0	0	0	0	0	0	0
313:	0	0	1	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	1	1	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0 1

Sample Title: 07

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

KB
8/13/13

Sample Description: PZ-207-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: U 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: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:04 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.0427 +/- 0.0048
 Counting Efficiency: 0.1917 +/- 0.0033 on 8/10/2013 2:59:03 PM
 Chem. Recovery Factor: 0.2225 +/- 0.0253

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.284	82.83	21.56	0.17	0.00E+000	4.5
U-234	4.751	1.64	214.83	1.36	0.00E+000	3.0
U-235	4.378	1.32	215.97	0.68	0.00E+000	3.0
U-238	4.222	-0.53	415.13	1.53	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

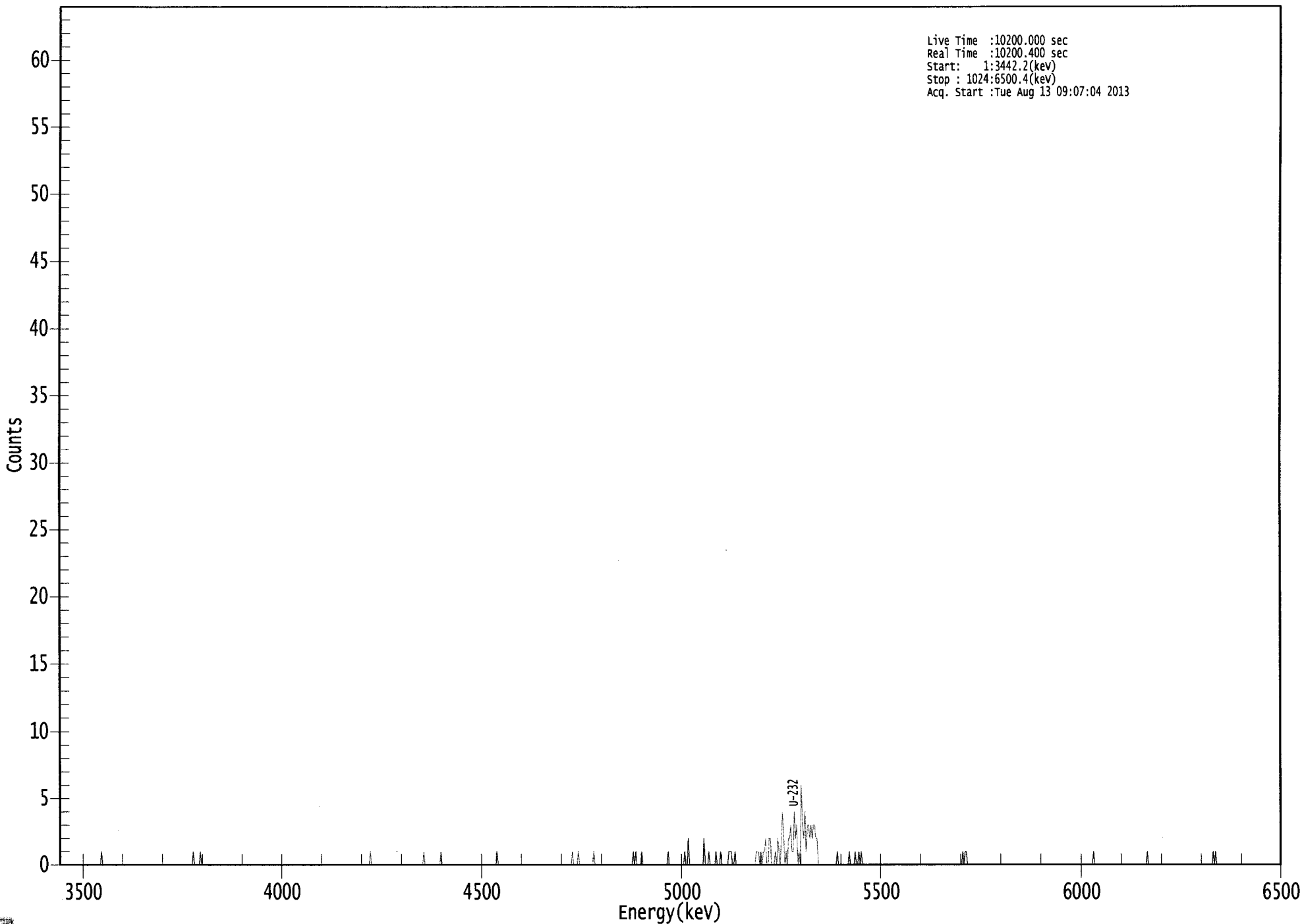
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.16E+000 +/- 1.14E+000	2.60E-001 +/- 5.73E-002
U-234	0.999	4761.50*	1.02E-001 +/- 2.20E-001	4.27E-001 +/- 9.40E-002
U-235	1.000	4385.50*	1.01E-001 +/- 2.20E-001	4.33E-001 +/- 9.54E-002
U-238	0.990	4184.40*	-3.29E-002 +/- 1.37E-001	4.41E-001 +/- 9.70E-002

AG
8/14/13

US EPA ARCHIVE DOCUMENT

0000066043.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3442.2(kev)
Stop : 1024:6500.4(kev)
Acq. Start :Tue Aug 13 09:07:04 2013



ROI Type: 1

ROI Type: 3

0157

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	1	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	1	0	0	0	0	0	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	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	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	1	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	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 0 0 0 0

Sample Title: 08

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	1
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	1	0
969:	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

100
8/13/13

Apex-Alpha™

Sample Description: PZ-207-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-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 64788
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:06 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: 0.0709 +/- 0.0063
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.3841 +/- 0.0346

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232 T	5.277	137.49	16.75	0.51	0.00E+000	5.4
U-234	4.756	5.66	85.23	0.34	0.00E+000	3.0
U-235	4.362	6.00	86.43	0.00	0.00E+000	6.0
U-238	4.112	2.98	134.36	1.02	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

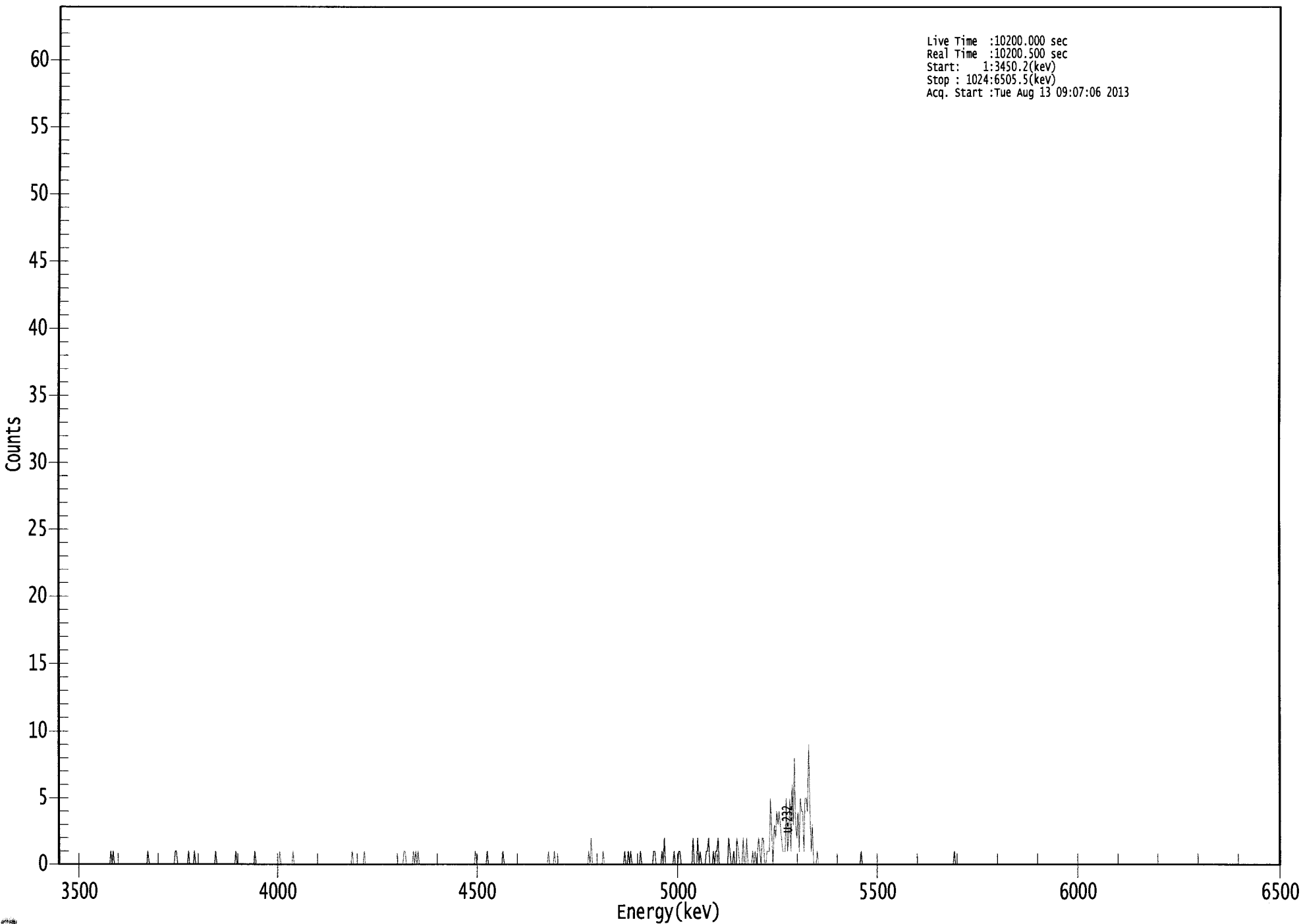
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.995	5302.50*	5.15E+000 +/- 8.94E-001	1.97E-001 +/- 3.41E-002
U-234	1.000	4761.50*	2.12E-001 +/- 1.84E-001	1.79E-001 +/- 3.11E-002
U-235	0.996	4385.50*	2.77E-001 +/- 2.44E-001	2.77E-001 +/- 4.81E-002
U-238	0.964	4184.40*	1.11E-001 +/- 1.51E-001	2.35E-001 +/- 4.08E-002

AG
8/14/13

US EPA ARCHIVE DOCUMENT

0000066044.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Tue Aug 13 09:07:06 2013



ROI Type: 1

ROI Type: 3

0167

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

369: 0 0 0 0 0 1 0 0

Sample Title: 09

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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

KCS
8/13/13

Apex-Alpha™

Sample Description: DUP 07 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_043
 Chamber Serial Number: 04026481A
 Detector Serial Number: 91088
 Env. Background: System Bkgd 57707
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:08 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1749 +/- 0.0103
 Counting Efficiency: 0.2003 +/- 0.0035 on 8/11/2013 2:21:17 PM
 Chem. Recovery Factor: 0.8730 +/- 0.0538

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.280	338.00	10.68	0.00	0.00E+000	23.3
U-234	4.734	91.00	20.66	0.00	0.00E+000	3.5
U-235	4.410	18.00	47.46	0.00	0.00E+000	3.0
U-238	4.148	51.00	27.71	0.00	0.00E+000	4.5

T = Tracer Peak used for Effective Efficiency

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

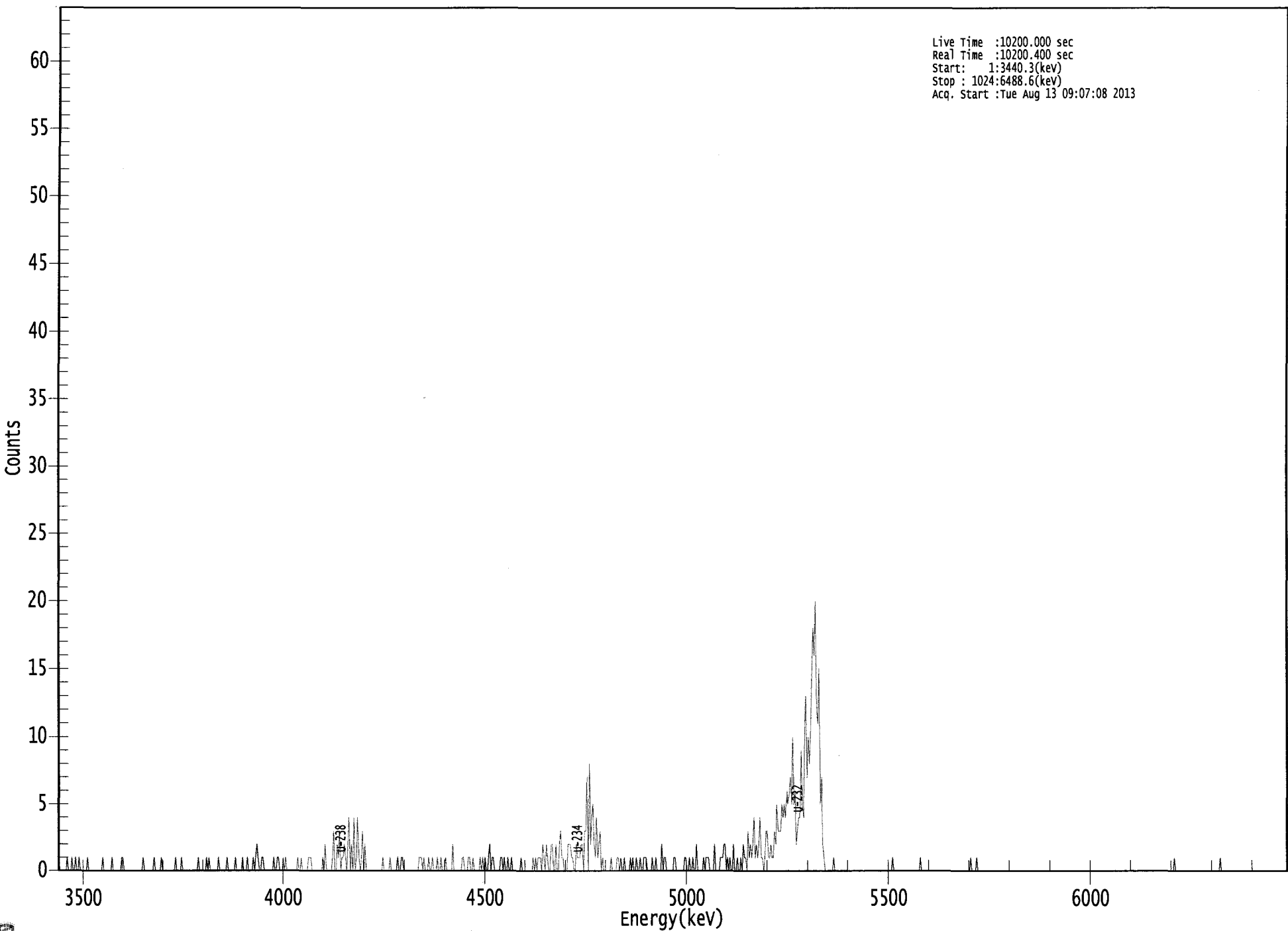
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.14E+000 +/- 5.95E-001	9.11E-002 +/- 1.06E-002
U-234	0.994	4761.50*	1.38E+000 +/- 3.27E-001	9.10E-002 +/- 1.06E-002
U-235	0.996	4385.50*	3.37E-001 +/- 1.65E-001	1.12E-001 +/- 1.30E-002
U-238	0.990	4184.40*	7.71E-001 +/- 2.32E-001	9.07E-002 +/- 1.05E-002

AG
8/14/13

US EPA ARCHIVE DOCUMENT

0000066048.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3440.3(keV)
Stop : 1024:6488.6(keV)
Acq. Start :Tue Aug 13 09:07:08 2013



ROI Type: 1

ROI Type: 3

0157

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 1 0 1 0 0 1

Sample Title: 10

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

801: 0 0 0 0 0 0 0 0

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	1	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	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



168
8/13/13

Sample Description: DUP 07 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_044
 Chamber Serial Number: 04026481B
 Detector Serial Number: 84168
 Env. Background: System Bkgd 60396
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:10 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1674 +/- 0.0101
 Counting Efficiency: 0.1920 +/- 0.0033 on 8/11/2013 2:17:37 PM
 Chem. Recovery Factor: 0.8717 +/- 0.0546

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.278	324.00	10.91	0.00	0.00E+000	4.7
U-234	4.737	72.83	23.00	0.17	0.00E+000	6.9
U-235	4.418	16.83	48.06	0.17	0.00E+000	3.0
U-238	4.141	58.83	25.60	0.17	0.00E+000	5.9

T = Tracer Peak used for Effective Efficiency

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

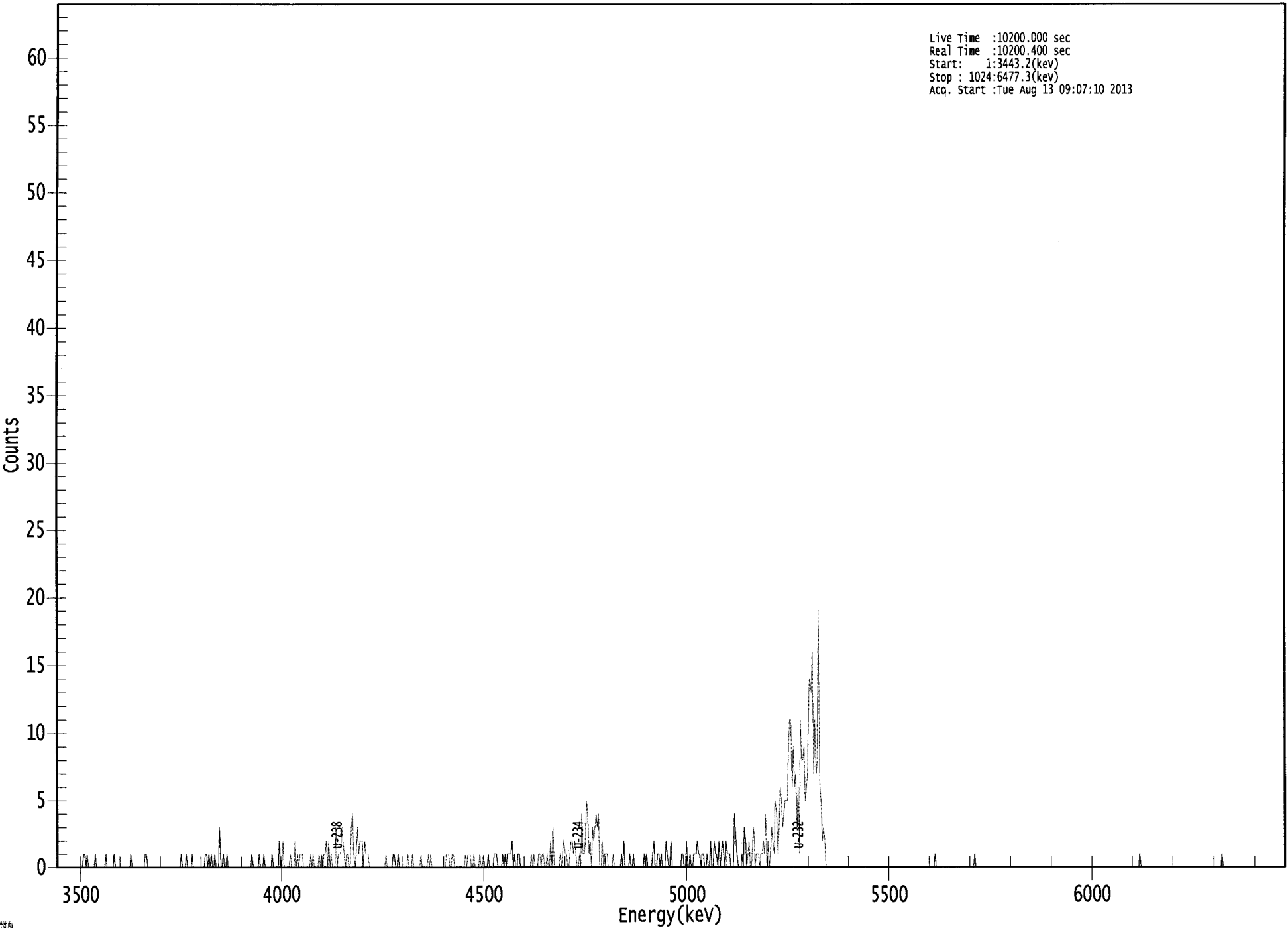
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	5.14E+000 +/- 6.07E-001	9.52E-002 +/- 1.12E-002
U-234	0.996	4761.50*	1.16E+000 +/- 2.99E-001	6.62E-002 +/- 7.81E-003
U-235	0.993	4385.50*	3.29E-001 +/- 1.63E-001	8.17E-002 +/- 9.64E-003
U-238	0.986	4184.40*	9.29E-001 +/- 2.62E-001	6.59E-002 +/- 7.78E-003

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US EPA ARCHIVE DOCUMENT

0000066049.CNF

Live Time :10200.000 sec
Real Time :10200.400 sec
Start: 1:3443.2(kev)
Stop : 1024:6477.3(kev)
Acq. Start :Tue Aug 13 09:07:10 2013



ROI Type: 1

ROI Type: 3

0172

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 1 0 1 0

Sample Title: 11

Channel	1	2	3	4	5	6	7	8
377:	1	1	1	1	2	0	1	0
385:	0	1	1	0	0	0	0	0
393:	0	0	0	0	1	0	1	0
401:	0	0	1	1	0	1	1	0
409:	0	1	0	0	2	0	3	0
417:	0	0	0	0	1	0	1	2
425:	1	1	0	0	1	2	2	1
433:	2	1	0	0	1	0	4	1
441:	1	2	5	4	1	2	0	3
449:	2	3	4	3	4	0	0	2
457:	0	1	1	1	0	0	0	0
465:	1	0	0	0	0	0	0	1
473:	0	2	0	0	0	0	1	0
481:	0	1	0	0	0	0	0	0
489:	0	0	1	0	1	0	0	0
497:	0	1	2	0	0	1	1	0
505:	1	0	0	0	2	1	0	0
513:	2	0	0	0	0	0	0	0
521:	0	1	1	0	0	2	0	0
529:	1	0	0	1	1	1	2	1
537:	1	0	1	1	0	0	1	0
545:	0	2	0	0	2	1	1	0
553:	2	0	1	2	1	0	2	1
561:	1	1	0	0	0	4	2	1
569:	0	0	0	1	0	3	2	0
577:	1	2	0	0	2	3	0	1
585:	1	1	0	1	1	2	1	4
593:	0	2	0	1	3	2	1	5
601:	4	1	3	6	5	3	4	5
609:	5	5	9	11	11	6	9	6
617:	7	3	6	1	11	8	8	9
625:	5	6	7	13	14	13	16	7
633:	11	7	8	19	6	5	2	3
641:	2	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	1	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	1	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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

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8/13/13

Apex-Alpha™

Sample Description: FB AT I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha 045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 64789
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:12 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: 0.2116 +/- 0.0115
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Chem. Recovery Factor: 1.1084 +/- 0.0634

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.283	410.66	9.68	0.34	0.00E+000	25.5
U-234	4.769	5.66	85.23	0.34	0.00E+000	4.5
U-235	4.395	10.00	65.01	0.00	0.00E+000	3.0
U-238	4.133	4.66	94.59	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

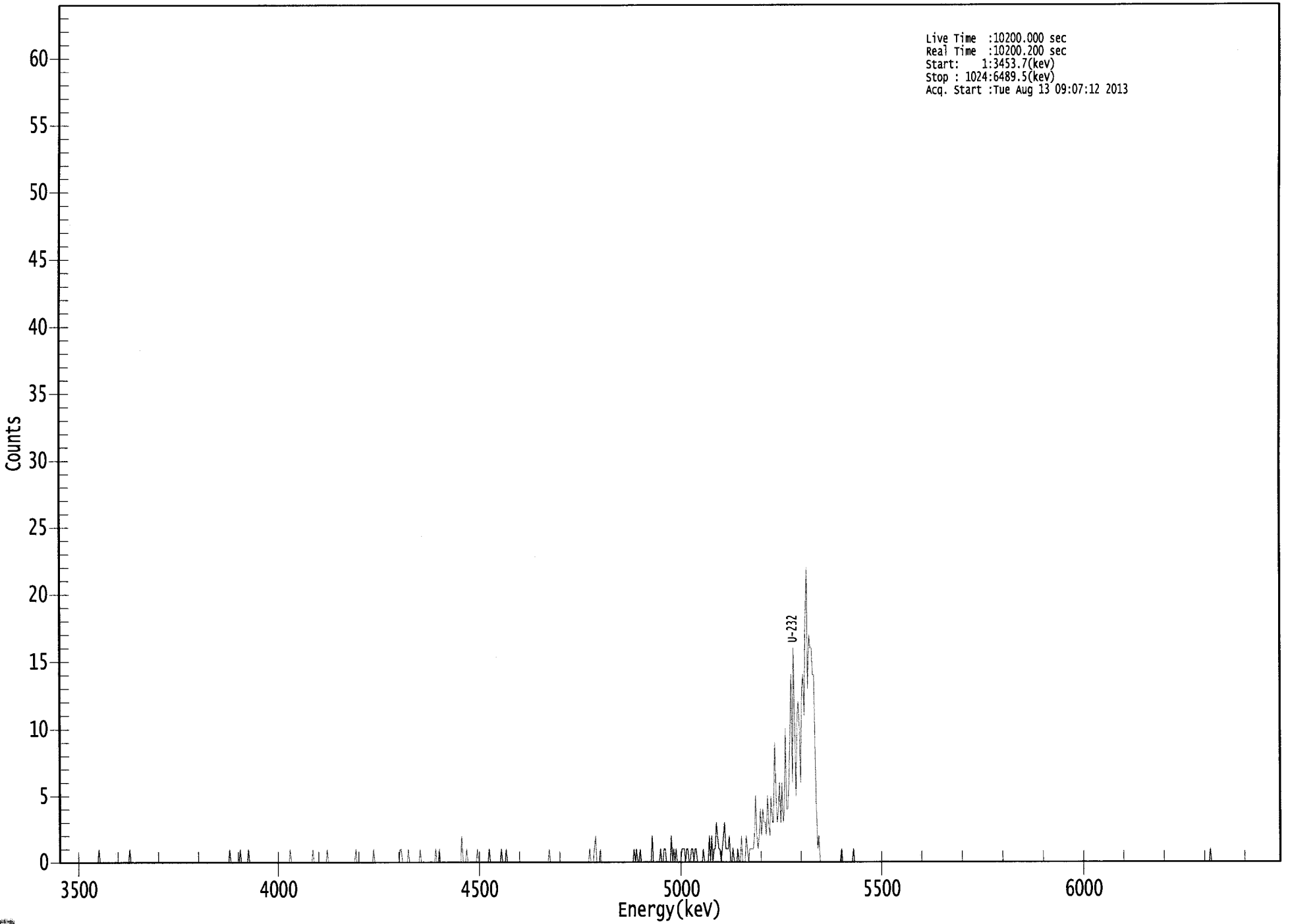
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	5.16E+000 +/- 5.50E-001	6.00E-002 +/- 6.41E-003
U-234	1.000	4761.50*	7.10E-002 +/- 6.10E-002	6.00E-002 +/- 6.40E-003
U-235	0.999	4385.50*	1.55E-001 +/- 1.02E-001	9.28E-002 +/- 9.91E-003
U-238	0.982	4184.40*	5.82E-002 +/- 5.54E-002	5.97E-002 +/- 6.38E-003

AG
8/14/13

US EPA ARCHIVE DOCUMENT

000066045.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3453.7(keV)
Stop : 1024:6489.5(keV)
Acq. Start :Tue Aug 13 09:07:12 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	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	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	1
145:	0	0	0	0	0	0	0	0
153:	1	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	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	0	0
217:	0	0	0	0	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	1	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	1	1
289:	0	0	0	0	0	1	0	0
297:	0	0	0	0	0	0	0	1
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	0	1
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	2	0	0	0	1	0
345:	0	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0	0
361:	0	1	0	0	0	0	0	0

369: 0 0 0 1 0 0 0 1

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	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	1	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	1	0	0
449:	0	1	2	0	0	0	1	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	1	0	1	0	0	1
489:	0	0	0	0	0	0	0	0
497:	0	2	0	0	0	0	0	0
505:	1	0	0	1	1	0	0	0
513:	0	2	0	1	0	1	0	0
521:	0	0	1	1	1	0	1	1
529:	0	0	1	1	0	1	1	0
537:	0	0	0	0	1	0	0	0
545:	0	2	0	2	0	1	1	3
553:	2	1	1	0	1	2	3	1
561:	1	1	2	0	0	1	0	0
569:	0	1	0	0	2	0	0	0
577:	2	1	0	1	1	1	1	2
585:	5	2	1	2	4	2	4	3
593:	3	2	5	3	2	5	3	3
601:	9	5	3	4	6	3	6	3
609:	4	10	4	4	6	10	14	6
617:	16	10	5	11	12	10	6	13
625:	14	11	18	22	13	17	16	16
633:	14	14	9	4	1	2	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	1	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	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	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

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8/13/13

Apex-Alpha™

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 64790
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:13 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.599 mL
 Effective Efficiency: 0.0628 +/- 0.0059
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.3507 +/- 0.0336

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 5.233	121.00	17.89	0.00	0.00E+000	4.8
U-234	4.714	36.83	32.38	0.17	0.00E+000	3.0
U-235	4.413	12.83	55.14	0.17	0.00E+000	3.7
U-238	4.099	26.00	39.17	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

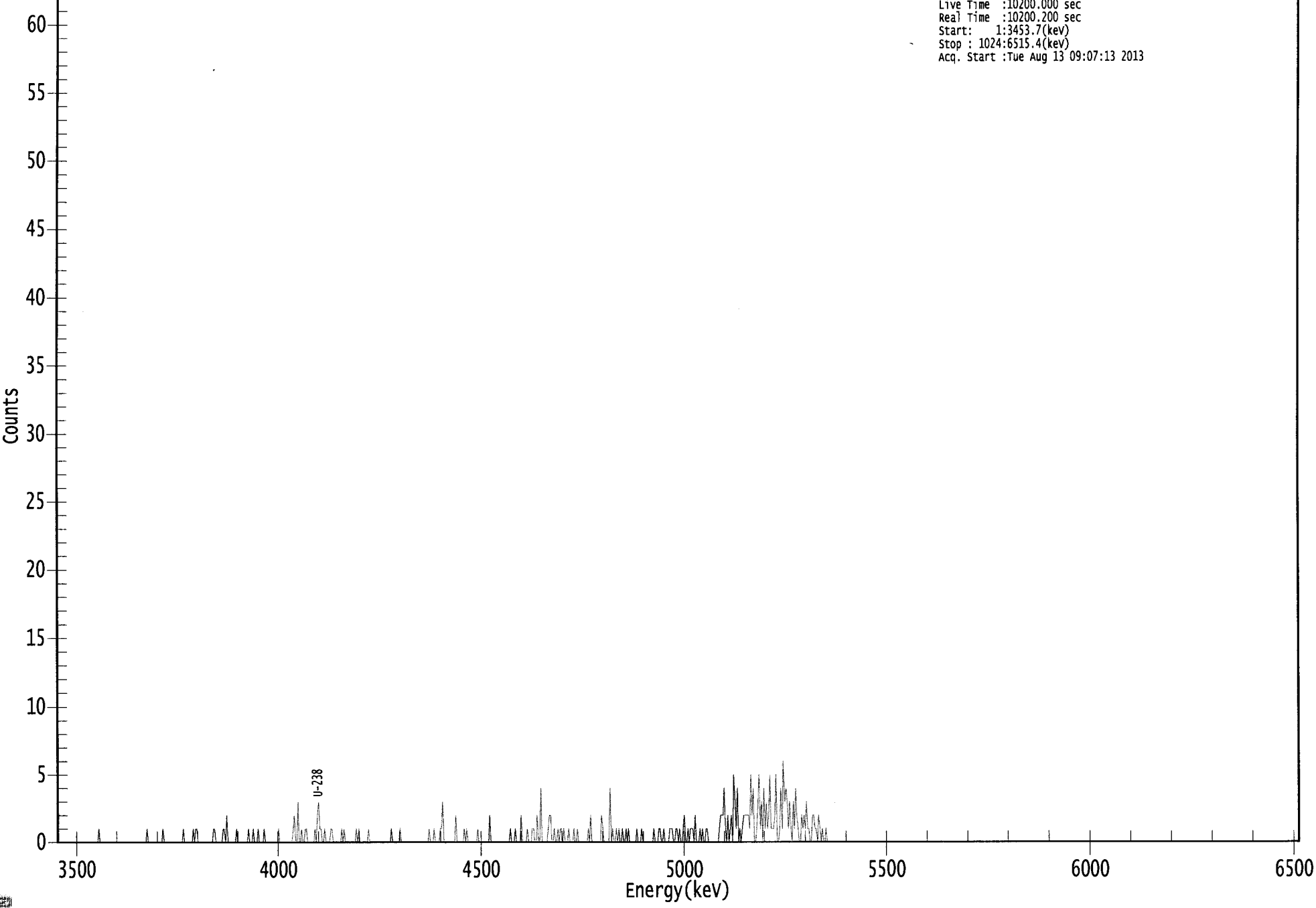
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.967	5302.50*	5.12E+000 +/- 9.45E-001	2.54E-001 +/- 4.68E-002
U-234	0.984	4761.50*	1.56E+000 +/- 5.81E-001	1.77E-001 +/- 3.26E-002
U-235	0.995	4385.50*	6.70E-001 +/- 3.89E-001	2.18E-001 +/- 4.02E-002
U-238	0.949	4184.40*	1.10E+000 +/- 4.74E-001	2.53E-001 +/- 4.66E-002

AG
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US EPA ARCHIVE DOCUMENT

0000066036.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Tue Aug 13 09:07:13 2013



ROI Type: 1

ROI Type: 3

0182

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

369: 0 0 0 0 0 0 1 0

Sample Title: 13

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

Apex-Alpha™

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8/13/13

Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 64791
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:15 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.604 mL
 Effective Efficiency: 0.0627 +/- 0.0059
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.3441 +/- 0.0327

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.243	121.83	17.77	0.17	0.00E+000	3.6
U-234	4.699	22.83	41.20	0.17	0.00E+000	2.9
U-235	4.395	2.00	169.74	0.00	0.00E+000	2.9
U-238	4.130	20.66	43.53	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

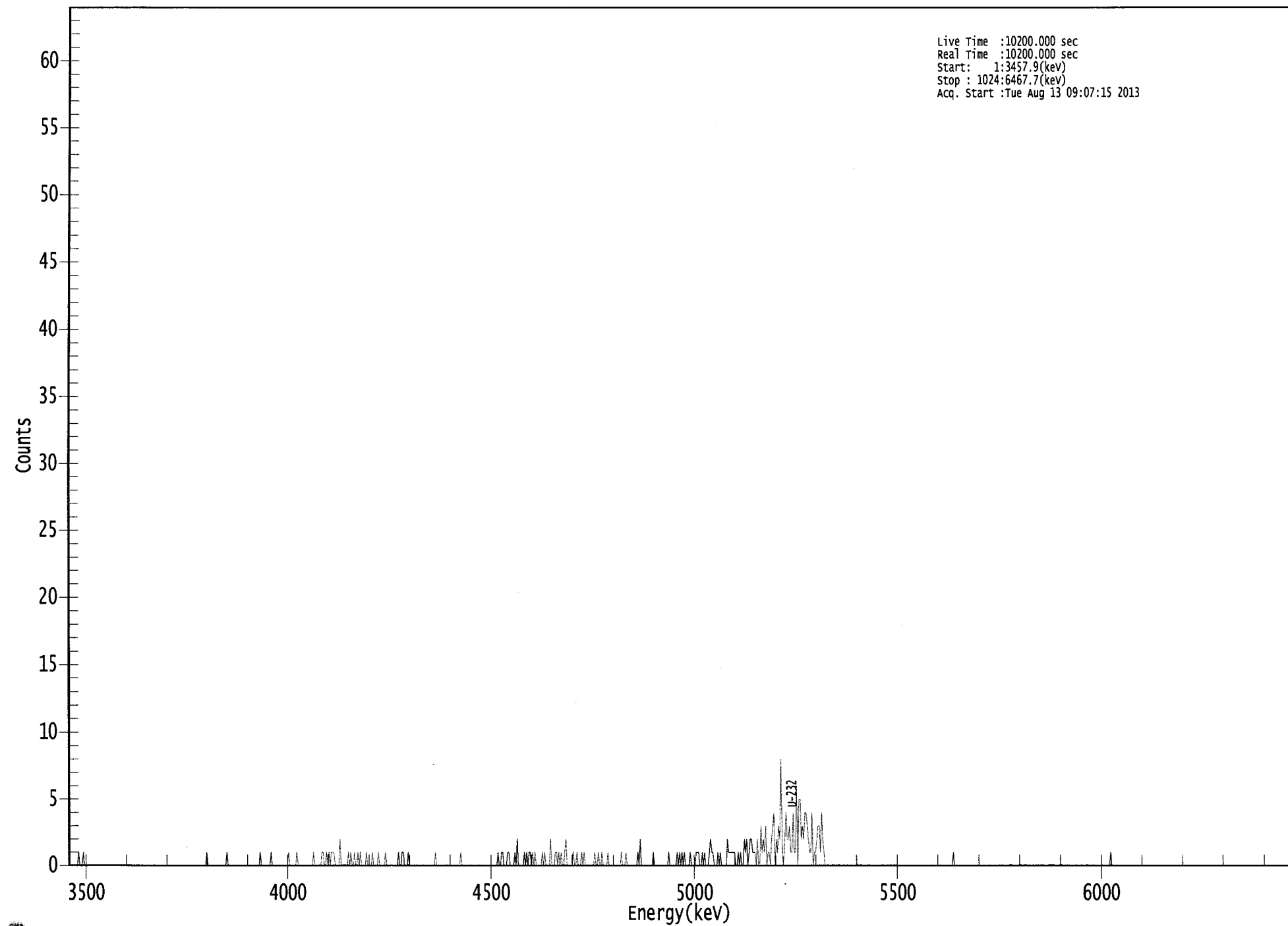
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.975	5302.50*	5.16E+000 +/- 9.47E-001	1.77E-001 +/- 3.24E-002
U-234	0.972	4761.50*	9.67E-001 +/- 4.36E-001	1.77E-001 +/- 3.24E-002
U-235	0.999	4385.50*	1.05E-001 +/- 1.78E-001	3.13E-001 +/- 5.74E-002
U-238	0.979	4184.40*	8.71E-001 +/- 4.12E-001	2.02E-001 +/- 3.70E-002

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US EPA ARCHIVE DOCUMENT

0000066046.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Tue Aug 13 09:07:15 2013



ROI Type: 1

ROI Type: 3

0187

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

Sample Title: 14

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 1 1 0 0 0 0 1 0

Sample Title: 14

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

801: 0 0 0 0 0 0 0 0

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

10/3
8/13/13

Apex-Alpha™

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 64792
 Reagent Blank: <not performed>

Sample Size: 2.300E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 9:07:17 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.601 mL
 Effective Efficiency: 0.1939 +/- 0.0110
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 1.1541 +/- 0.0684

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.285	374.66	10.13	0.34	0.00E+000	27.3
U-234	4.737	10.66	61.14	0.34	0.00E+000	3.0
U-235	4.369	1.83	152.56	0.17	0.00E+000	5.9
U-238	4.142	17.00	48.92	0.00	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

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

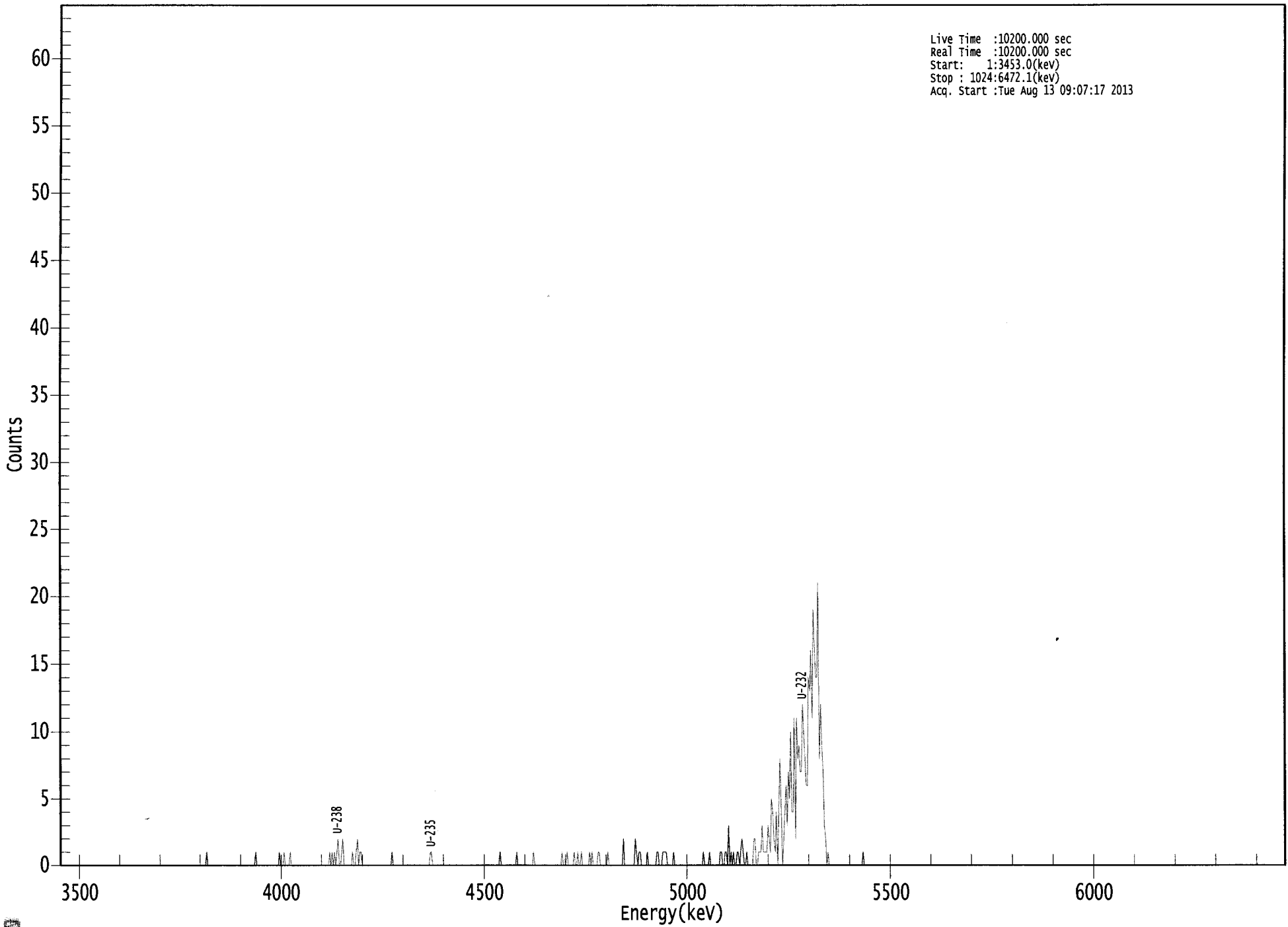
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.998	5302.50*	2.23E+001 +/- 2.48E+000	2.85E-001 +/- 3.16E-002
U-234	0.996	4761.50*	6.35E-001 +/- 3.94E-001	2.85E-001 +/- 3.16E-002
U-235	0.998	4385.50*	1.34E-001 +/- 2.06E-001	3.07E-001 +/- 3.40E-002
U-238	0.987	4184.40*	1.01E+000 +/- 5.06E-001	3.56E-001 +/- 3.94E-002

AG
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US EPA ARCHIVE DOCUMENT

0000066047.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :Tue Aug 13 09:07:17 2013



ROI Type: 1

ROI Type: 3

0192

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

Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1	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	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	1	0	0	0
425:	1	0	0	0	0	0	1	0
433:	0	1	0	0	1	0	0	0
441:	0	0	0	1	0	1	0	0
449:	0	0	1	1	0	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	2
473:	0	0	0	0	0	0	0	0
481:	0	2	1	0	1	1	0	0
489:	0	0	0	1	0	0	0	0
497:	0	0	0	1	1	0	0	0
505:	1	1	1	1	0	0	0	0
513:	0	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	1	0	0	0	0	1
545:	0	0	0	0	0	0	0	0
553:	1	1	0	0	1	1	0	3
561:	0	1	0	1	0	0	1	1
569:	0	1	2	1	0	0	1	0
577:	0	0	0	0	2	2	0	0
585:	1	1	1	3	1	1	1	1
593:	3	2	1	5	4	2	1	4
601:	0	5	8	4	0	2	4	6
609:	3	7	5	10	4	4	11	2
617:	11	8	9	7	7	12	10	8
625:	6	6	14	13	16	11	19	16
633:	14	14	21	8	12	9	7	3
641:	2	0	1	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	1
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: 15

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

KAS
8/13/13

Apex-Alpha™

Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 64764
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 12:16:24 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: 0.1976 +/- 0.0111
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 1.1317 +/- 0.0670

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.274	381.81	10.05	1.19	0.00E+000	5.7
U-234	4.703	24.49	40.09	0.51	0.00E+000	3.0
U-235	4.426	8.49	69.59	0.51	0.00E+000	3.0
U-238	4.141	10.32	63.32	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

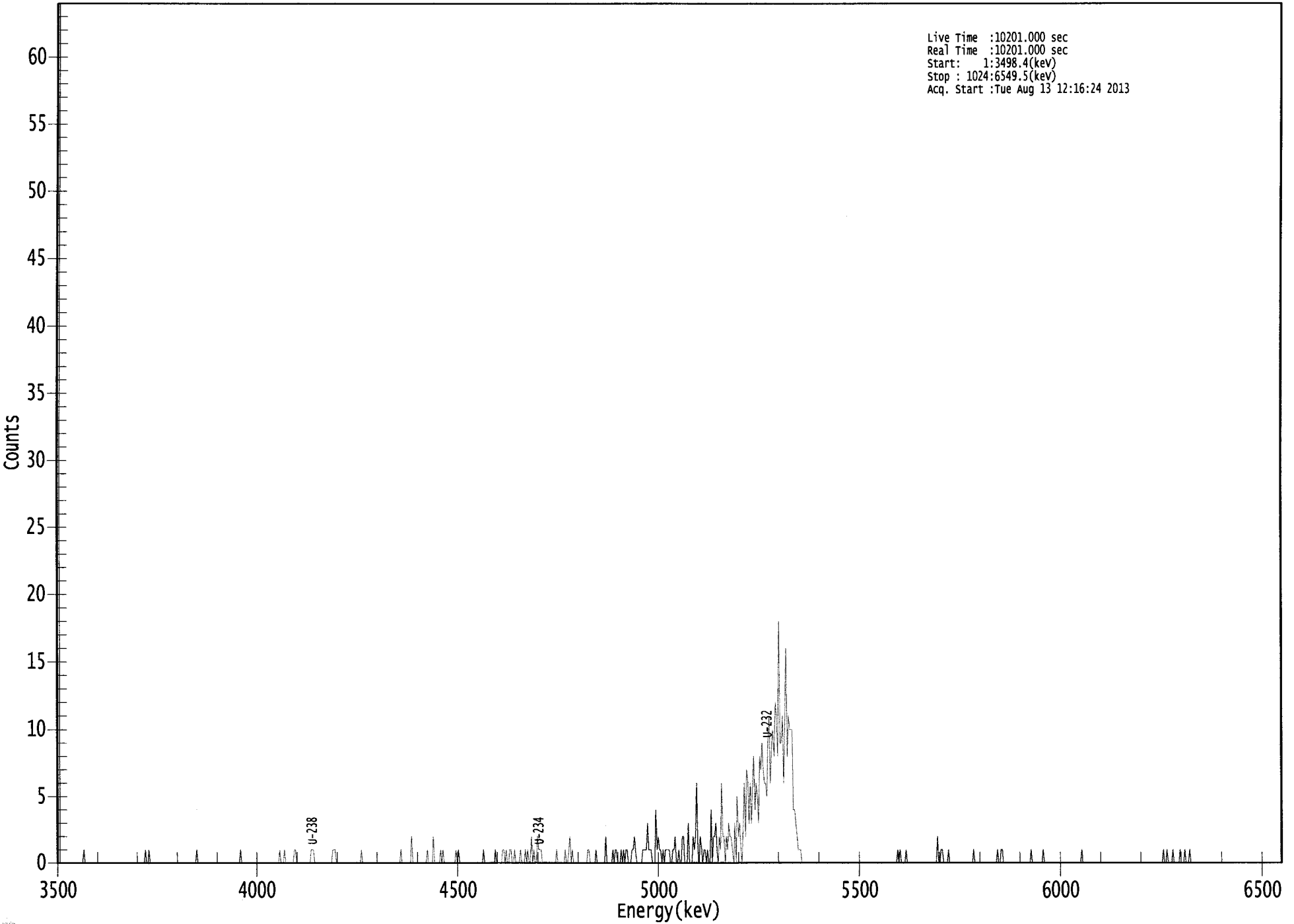
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	5.13E+000 +/- 5.65E-001	8.86E-002 +/- 9.75E-003
U-234	0.976	4761.50*	3.29E-001 +/- 1.37E-001	7.05E-002 +/- 7.76E-003
U-235	0.988	4385.50*	1.41E-001 +/- 9.91E-002	8.70E-002 +/- 9.58E-003
U-238	0.987	4184.40*	1.38E-001 +/- 8.87E-002	7.54E-002 +/- 8.31E-003

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US EPA ARCHIVE DOCUMENT

000066054.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3498.4(keV)
Stop : 1024:6549.5(keV)
Acq. Start :Tue Aug 13 12:16:24 2013



ROI Type: 1

ROI Type: 3

4618

 ***** 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	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	1	0	0	1	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	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	0	0	0	0	0
185:	0	0	0	1	0	0	0	1
193:	0	0	0	0	0	0	0	1
201:	1	0	0	0	0	0	0	0
209:	0	0	0	0	0	1	1	1
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
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	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:	1	0	0	0	0	0	0	0
297:	0	2	0	0	0	0	0	0
305:	0	0	0	0	0	0	1	0
313:	0	0	0	2	0	0	0	0
321:	0	1	0	1	0	0	0	0
329:	0	0	0	0	0	0	1	0
337:	1	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	1	0	0
361:	0	0	0	0	0	0	0	1

369: 0 0 0 0 0 1 1 0

Sample Title: 16

Channel	1	2	3	4	5	6	7	8
377:	1	0	0	1	1	0	0	1
385:	0	0	0	0	1	0	0	0
393:	1	0	1	0	0	2	0	1
401:	0	0	2	1	1	1	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	1	0	0	0	0	0
425:	0	1	0	0	1	2	0	1
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	1	1	0	0
449:	0	0	0	1	0	0	0	0
457:	0	0	0	2	0	0	0	0
465:	0	1	0	1	1	0	0	0
473:	1	0	1	0	1	1	0	0
481:	0	1	1	2	1	0	0	0
489:	0	0	1	1	1	1	3	1
497:	1	1	0	0	0	4	1	2
505:	1	1	0	1	0	1	1	1
513:	1	0	0	1	1	2	0	0
521:	1	0	0	2	2	0	0	0
529:	3	0	0	0	2	1	2	6
537:	1	0	2	1	0	1	1	0
545:	1	0	0	4	0	2	2	3
553:	1	0	2	1	6	2	2	0
561:	2	1	3	2	2	1	0	3
569:	0	5	2	3	1	0	3	6
577:	2	7	6	3	6	3	6	8
585:	4	6	5	3	8	7	9	7
593:	6	6	5	9	11	6	9	10
601:	8	12	11	8	18	9	9	11
609:	6	11	16	8	11	10	10	10
617:	4	4	3	2	1	1	1	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	1
705:	0	1	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:	2	0	0	1	1	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	1	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	1	0	0	1	1	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 16

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

100
8/13/13

Apex-Alpha™

Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_004
 Chamber Serial Number:
 Detector Serial Number: 4
 Env. Background: System Bkgd 64765
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 12:16:25 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.322 mL
 Effective Efficiency: 0.1766 +/- 0.0137
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.9103 +/- 0.0726

Peak Match Tolerance: 0.150 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.271	183.15	14.52	0.85	0.00E+000	5.5
U-234	4.727	274.47	11.87	1.53	0.00E+000	7.1
U-235	4.395	40.98	31.06	1.02	0.00E+000	3.7
U-238	4.146	235.81	12.80	1.19	0.00E+000	4.5

T = Tracer Peak used for Effective Efficiency

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

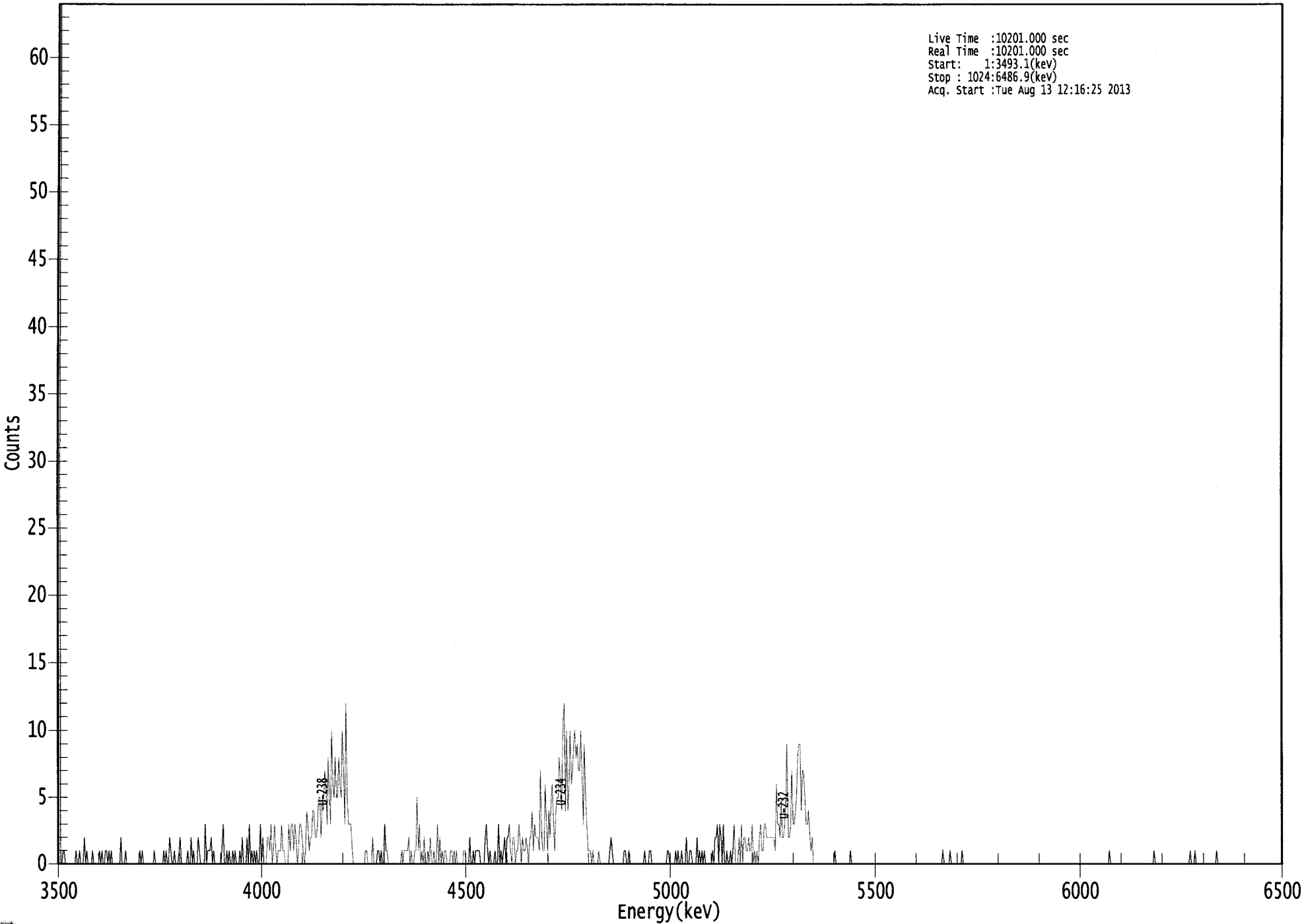
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	2.75E+000 +/- 4.19E-001	9.00E-002 +/- 1.37E-002
U-234	0.992	4761.50*	4.13E+000 +/- 7.96E-001	1.07E-001 +/- 1.62E-002
U-235	0.999	4385.50*	7.60E-001 +/- 2.63E-001	1.17E-001 +/- 1.78E-002
U-238	0.989	4184.40*	3.53E+000 +/- 7.01E-001	9.86E-002 +/- 1.50E-002

AG
8/14/13

US EPA ARCHIVE DOCUMENT

0000066055.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 13 12:16:25 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 17

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 3 0 1 0 1 2 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	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	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	1	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	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



Apex-Alpha™

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8/13/10

Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-UU
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_010
 Chamber Serial Number:
 Detector Serial Number: 10
 Env. Background: System Bkgd 64766
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:09:52 AM
 Acquisition Date/Time: 8/13/2013 12:16:23 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.372 mL
 Effective Efficiency: 0.1822 +/- 0.0131
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.9263 +/- 0.0686

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	218.30	13.33	1.70	0.00E+000	6.6
U-234	4.727	238.47	12.74	1.53	0.00E+000	27.3
U-235	4.410	40.13	31.77	1.87	0.00E+000	3.7
U-238	4.146	155.15	15.79	0.85	0.00E+000	4.4

T = Tracer Peak used for Effective Efficiency

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

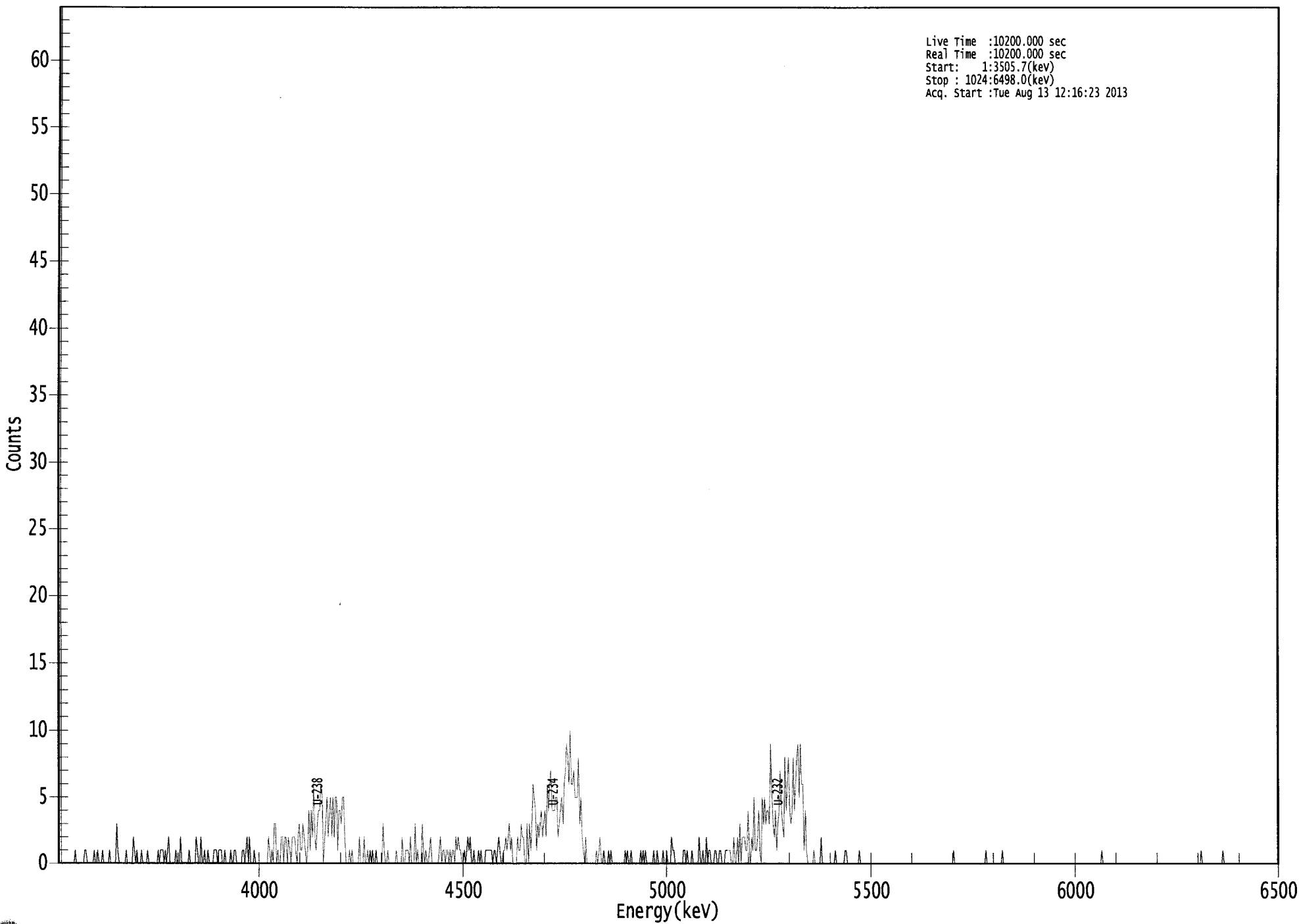
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.994	5302.50*	3.18E+000 +/- 4.48E-001	1.07E-001 +/- 1.51E-002
U-234	0.991	4761.50*	3.47E+000 +/- 6.59E-001	1.04E-001 +/- 1.46E-002
U-235	0.996	4385.50*	7.21E-001 +/- 2.51E-001	1.36E-001 +/- 1.91E-002
U-238	0.990	4184.40*	2.25E+000 +/- 4.76E-001	8.69E-002 +/- 1.22E-002

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US EPA ARCHIVE DOCUMENT

0000066053.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 13 12:16:23 2013



ROI Type: 1

ROI Type: 3

0209

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

Sample Title: 18

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 1 2 1 0 0 1 1

Sample Title: 18

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/13/2013
Time : 5:41:01 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/13/2013 5:25:16 AM
Alpha 004	21f	ALL	Passed	8/13/2013 5:25:17 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	8/13/2013 5:25:18 AM
Alpha 011	21f	ALL	Passed	8/13/2013 5:25:18 AM
Alpha 012	21f	ALL	Passed	8/13/2013 5:25:19 AM
Alpha 013	21f	ALL	Passed	8/13/2013 5:25:20 AM
Alpha 014	21f	ALL	Passed	8/13/2013 5:25:21 AM
Alpha 015	21f	Peak Energy	Action	8/13/2013 5:25:22 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/10/2013 11:23:01 AM
Alpha 019	AIM730	ALL	Passed	8/13/2013 5:25:22 AM
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/13/2013 5:25:23 AM
Alpha 023	AIM730	ALL	Passed	8/13/2013 5:25:24 AM
Alpha 024	AIM730	ALL	Passed	8/13/2013 5:25:25 AM
Alpha 025	AIM730	ALL	Passed	8/13/2013 5:25:26 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/13/2013 5:25:26 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/13/2013 5:25:27 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/13/2013 5:25:28 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:29 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:30 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:31 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:33 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:34 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:35 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:37 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:38 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:40 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:41 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:42 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:44 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:46 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:47 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:49 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:50 AM

APPROVED BY: C APPROVAL DATE: 8/13/13

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

Nuclide Library Title: Uranium

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

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

* = key line

TOTALS: 4 Nuclides 4 Energy Lines

SECTION IX
ANALYTICAL DATA (ISOTOPIC THORIUM)

Work Order	13-07153	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	ThISO	01	LCS	LCS		07/24/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/24/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Lab Deadline	8/13/2013	04	TRG	PZ-104-KS TOT	46	07/18/13 13:01	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-104-KS DIS	46	07/18/13 13:01	1.0000E+00
Project	West Lake OU-1	06	DO	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Report Level	4	07	TRG	PZ-206-SS DIS	43	07/18/13 13:35	1.0000E+00
Activity Units	pCi	08	TRG	PZ-207-AS TOT	44	07/18/13 14:32	1.0000E+00
Aliquot Units	I	09	TRG	PZ-207-AS DIS	44	07/18/13 14:32	1.0000E+00
Matrix	WA	10	TRG	DUP 07 TOT	43	07/18/13 00:00	1.0000E+00
Method	HASL 300, 4.5.2	11	TRG	DUP 07 DIS	43	07/18/13 00:00	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	FB at I-73 TOT	37	07/19/13 08:50	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	I-73 TOT	44	07/19/13 08:55	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	I-73 DIS	44	07/19/13 08:55	1.0000E+00
Tracer Act (dpm/g)	22.466	15	TRG	PZ-103-SS TOT	39	07/19/13 09:45	2.3000E-01
Carrier		16	TRG	PZ-103-SS DIS	39	07/19/13 09:45	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-102R-SS TOT	44	07/19/13 10:15	1.0000E+00
		18	TRG	PZ-102R-SS DIS	44	07/19/13 10:15	1.0000E+00

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

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.4801	10.8		0.00								
02	MBL	0.2380	5.3		0.00								
03	DUP	0.2379	5.3		0.00								
04	TRG	0.2365	5.3		0.00								
05	TRG	0.2390	5.4		0.00								
06	DO	0.2366	5.3		0.00								
07	TRG	0.2360	5.3		0.00								
08	TRG	0.2348	5.3		0.00								
09	TRG	0.2341	5.3		0.00								
10	TRG	0.2369	5.3		0.00								
11	TRG	0.2362	5.3		0.00								
12	TRG	0.2353	5.3		0.00								
13	TRG	0.2350	5.3		0.00								
14	TRG	0.2346	5.3		0.00								
15	TRG	0.2370	5.3		0.00								
16	TRG	0.2346	5.3		0.00								
17	TRG	0.2335	5.2		0.00								
18	TRG	0.2337	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			08/07/13 09:15	JWOLFE				
02	MBL			08/07/13 09:15	JWOLFE				
03	DUP			08/07/13 09:15	JWOLFE				
04	TRG			08/07/13 09:15	JWOLFE				
05	TRG			08/07/13 09:15	JWOLFE				
06	DO			08/07/13 09:15	JWOLFE				
07	TRG			08/07/13 09:15	JWOLFE				
08	TRG			08/07/13 09:15	JWOLFE				
09	TRG			08/07/13 09:15	JWOLFE				
10	TRG			08/07/13 09:15	JWOLFE				
11	TRG			08/07/13 09:15	JWOLFE				
12	TRG			08/07/13 09:15	JWOLFE				
13	TRG			08/07/13 09:15	JWOLFE				
14	TRG			08/07/13 09:15	JWOLFE				
15	TRG			08/07/13 09:15	JWOLFE				
16	TRG			08/07/13 09:15	JWOLFE				
17	TRG			08/07/13 09:15	JWOLFE				
18	TRG			08/07/13 09:15	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.

9217

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	4.05E+00	8.13E-01	1.38E-01	4.91E+00	82.52	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	1.15E-02	7.46E-02	2.03E-01					OK	OK
03	TH-228	DUP	PZ-206-SS TOT	pCi/l	2.72E-01	1.31E-01	7.93E-02				NA	OK	
04	TH-228	TRG	PZ-104-KS TOT	pCi/l	2.17E-02	4.70E-02	9.27E-02					OK	
05	TH-228	TRG	PZ-104-KS DIS	pCi/l	3.27E-03	4.57E-02	1.30E-01					OK	
06	TH-228	DO	PZ-206-SS TOT	pCi/l	1.52E-01	8.82E-02	6.92E-02					OK	
07	TH-228	TRG	PZ-206-SS DIS	pCi/l	6.85E-02	7.14E-02	7.46E-02					OK	
08	TH-228	TRG	PZ-207-AS TOT	pCi/l	4.10E-02	6.15E-02	9.96E-02					OK	
09	TH-228	TRG	PZ-207-AS DIS	pCi/l	4.94E-02	6.51E-02	9.87E-02					OK	
10	TH-228	TRG	DUP 07 TOT	pCi/l	4.78E-01	2.42E-01	1.51E-01					OK	
11	TH-228	TRG	DUP 07 DIS	pCi/l	2.61E-02	5.65E-02	1.11E-01					OK	
12	TH-228	TRG	FB at I-73 TOT	pCi/l	-3.93E-03	4.59E-02	9.64E-02					OK	
13	TH-228	TRG	I-73 TOT	pCi/l	3.40E-01	1.66E-01	7.53E-02					OK	
14	TH-228	TRG	I-73 DIS	pCi/l	1.39E-01	1.19E-01	1.24E-01					OK	
15	TH-228	TRG	PZ-103-SS TOT	pCi/l	6.17E-01	4.99E-01	6.40E-01					OK	
16	TH-228	TRG	PZ-103-SS DIS	pCi/l	5.88E-02	1.43E-01	2.74E-01					OK	
17	TH-228	TRG	PZ-102R-SS TOT	pCi/l	4.01E-01	1.99E-01	1.67E-01					OK	
18	TH-228	TRG	PZ-102R-SS DIS	pCi/l	2.81E-03	3.92E-02	1.12E-01					OK	

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

8120

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	07/24/13 00:00	1.00E+00	69.45	0.00	0.00			
02	TH-228	MBL	07/24/13 00:00	1.00E+00	38.59	0.00	0.00			
03	TH-228	DUP	07/18/13 13:35	1.00E+00	108.65	0.00	0.00			
04	TH-228	TRG	07/18/13 13:01	1.00E+00	96.25	0.00	0.00			
05	TH-228	TRG	07/18/13 13:01	1.00E+00	63.64	0.00	0.00			
06	TH-228	DO	07/18/13 13:35	1.00E+00	123.96	0.00	0.00			
07	TH-228	TRG	07/18/13 13:35	1.00E+00	79.47	0.00	0.00			
08	TH-228	TRG	07/18/13 14:32	1.00E+00	83.55	0.00	0.00			
09	TH-228	TRG	07/18/13 14:32	1.00E+00	82.65	0.00	0.00			
10	TH-228	TRG	07/18/13 00:00	1.00E+00	56.41	0.00	0.00			
11	TH-228	TRG	07/18/13 00:00	1.00E+00	72.28	0.00	0.00			
12	TH-228	TRG	07/19/13 08:50	1.00E+00	65.82	0.00	0.00			
13	TH-228	TRG	07/19/13 08:55	1.00E+00	82.77	0.00	0.00			
14	TH-228	TRG	07/19/13 08:55	1.00E+00	73.42	0.00	0.00			
15	TH-228	TRG	07/19/13 09:45	2.30E-01	96.37	0.00	0.00			
16	TH-228	TRG	07/19/13 09:45	1.00E+00	49.83	0.00	0.00			
17	TH-228	TRG	07/19/13 10:15	1.00E+00	72.75	0.00	0.00			
18	TH-228	TRG	07/19/13 10:15	1.00E+00	70.92	0.00	0.00			

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-07153	
Client	Engineering Management Support, Inc.	

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	08/14/13 12:47		A_Spec	Alpha_035	170	1.94 E+02	7.00 E-03	18.3
02	TH-228	MBL	08/14/13 12:47		A_Spec	Alpha_036	170	3.20 E-01	4.00 E-03	19.1
03	TH-228	DUP	08/14/13 12:47		A_Spec	Alpha_037	170	1.93 E+01	4.00 E-03	17.8
04	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_038	170	1.32 E+00	4.00 E-03	17.2
05	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_039	170	1.50 E-01	5.00 E-03	19.7
06	TH-228	DO	08/14/13 12:47		A_Spec	Alpha_040	170	1.31 E+01	5.00 E-03	19
07	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_041	170	3.83 E+00	1.00 E-03	19.2
08	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_042	170	2.32 E+00	4.00 E-03	18.5
09	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_043	170	3.00 E+00	0.00 E+00	20
10	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_044	170	1.90 E+01	0.00 E+00	19.2
11	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_045	170	1.32 E+00	4.00 E-03	19.1
12	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_046	170	-1.70 E-01	1.00 E-03	17.9
13	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_047	170	1.88 E+01	1.00 E-03	18.2
14	TH-228	TRG	08/14/13 12:47		A_Spec	Alpha_048	170	6.32 E+00	4.00 E-03	16.8
15	TH-228	TRG	08/14/13 16:15		A_Spec	Alpha_003	170	8.77 E+00	1.90 E-02	17.5
16	TH-228	TRG	08/14/13 16:15		A_Spec	Alpha_004	170.02	2.09 E+00	2.30 E-02	19.4
17	TH-228	TRG	08/14/13 16:15		A_Spec	Alpha_010	170	2.11 E+01	1.70 E-02	19.7
18	TH-228	TRG	08/14/13 16:15		A_Spec	Alpha_011	170.02	1.50 E-01	5.00 E-03	20.5

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

0220

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-THISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-230	LCS	LCS	pCi/l	4.98E+00	9.50E-01	1.00E-01	5.50E+00	90.53	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.98E-01	1.81E-01	1.89E-01					OK	OK
03	TH-230	DUP	PZ-206-SS TOT	pCi/l	4.34E-01	1.67E-01	6.55E-02				NA	OK	
04	TH-230	TRG	PZ-104-KS TOT	pCi/l	2.40E-01	1.32E-01	9.61E-02					OK	
05	TH-230	TRG	PZ-104-KS DIS	pCi/l	2.40E-01	1.52E-01	1.20E-01					OK	
06	TH-230	DO	PZ-206-SS TOT	pCi/l	1.73E-01	9.23E-02	6.36E-02					OK	
07	TH-230	TRG	PZ-206-SS DIS	pCi/l	1.30E-01	1.06E-01	1.24E-01					OK	
08	TH-230	TRG	PZ-207-AS TOT	pCi/l	2.21E-01	1.28E-01	7.18E-02					OK	
09	TH-230	TRG	PZ-207-AS DIS	pCi/l	2.41E-01	1.32E-01	9.61E-02					OK	
10	TH-230	TRG	DUP 07 TOT	pCi/l	4.12E-01	2.16E-01	1.02E-01					OK	
11	TH-230	TRG	DUP 07 DIS	pCi/l	2.05E-01	1.31E-01	9.20E-02					OK	
12	TH-230	TRG	FB at I-73 TOT	pCi/l	2.25E-01	1.53E-01	1.35E-01					OK	
13	TH-230	TRG	I-73 TOT	pCi/l	4.90E-01	2.03E-01	7.35E-02					OK	
14	TH-230	TRG	I-73 DIS	pCi/l	5.74E-01	2.47E-01	1.03E-01					OK	
15	TH-230	TRG	PZ-103-SS TOT	pCi/l	1.30E+00	6.43E-01	4.32E-01					OK	
16	TH-230	TRG	PZ-103-SS DIS	pCi/l	3.57E-02	9.79E-02	2.02E-01					OK	
17	TH-230	TRG	PZ-102R-SS TOT	pCi/l	4.88E-01	2.14E-01	1.36E-01					OK	
18	TH-230	TRG	PZ-102R-SS DIS	pCi/l	1.43E-01	1.05E-01	7.62E-02					OK	

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-07153	
Client	Engineering Management Support, Inc.	

1220

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	07/24/13 00:00	1.00E+00	69.45	0.00	0.00			
02	TH-230	MBL	07/24/13 00:00	1.00E+00	38.59	0.00	0.00			
03	TH-230	DUP	07/18/13 13:35	1.00E+00	108.65	0.00	0.00			
04	TH-230	TRG	07/18/13 13:01	1.00E+00	96.25	0.00	0.00			
05	TH-230	TRG	07/18/13 13:01	1.00E+00	63.64	0.00	0.00			
06	TH-230	DO	07/18/13 13:35	1.00E+00	123.96	0.00	0.00			
07	TH-230	TRG	07/18/13 13:35	1.00E+00	79.47	0.00	0.00			
08	TH-230	TRG	07/18/13 14:32	1.00E+00	83.55	0.00	0.00			
09	TH-230	TRG	07/18/13 14:32	1.00E+00	82.65	0.00	0.00			
10	TH-230	TRG	07/18/13 00:00	1.00E+00	56.41	0.00	0.00			
11	TH-230	TRG	07/18/13 00:00	1.00E+00	72.28	0.00	0.00			
12	TH-230	TRG	07/19/13 08:50	1.00E+00	65.82	0.00	0.00			
13	TH-230	TRG	07/19/13 08:55	1.00E+00	82.77	0.00	0.00			
14	TH-230	TRG	07/19/13 08:55	1.00E+00	73.42	0.00	0.00			
15	TH-230	TRG	07/19/13 09:45	2.30E-01	96.37	0.00	0.00			
16	TH-230	TRG	07/19/13 09:45	1.00E+00	49.83	0.00	0.00			
17	TH-230	TRG	07/19/13 10:15	1.00E+00	72.75	0.00	0.00			
18	TH-230	TRG	07/19/13 10:15	1.00E+00	70.92	0.00	0.00			

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

2220

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	08/14/13 12:47		A_Spec	Alpha_035	170	2.38 E+02	2.00 E-03	18.3
02	TH-230	MBL	08/14/13 12:47		A_Spec	Alpha_036	170	5.49 E+00	3.00 E-03	19.1
03	TH-230	DUP	08/14/13 12:47		A_Spec	Alpha_037	170	3.17 E+01	2.00 E-03	17.8
04	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_038	170	1.50 E+01	0.00 E+00	17.2
05	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_039	170	1.13 E+01	4.00 E-03	19.7
06	TH-230	DO	08/14/13 12:47		A_Spec	Alpha_040	170	1.53 E+01	4.00 E-03	19
07	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_041	170	7.47 E+00	9.00 E-03	19.2
08	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_042	170	1.28 E+01	1.00 E-03	18.5
09	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_043	170	1.50 E+01	0.00 E+00	20
10	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_044	170	1.68 E+01	1.00 E-03	19.2
11	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_045	170	1.07 E+01	2.00 E-03	19.1
12	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_046	170	1.00 E+01	0.00 E+00	17.9
13	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_047	170	2.78 E+01	1.00 E-03	18.2
14	TH-230	TRG	08/14/13 12:47		A_Spec	Alpha_048	170	2.67 E+01	2.00 E-03	16.8
15	TH-230	TRG	08/14/13 16:15		A_Spec	Alpha_003	170	1.90 E+01	6.00 E-03	17.5
16	TH-230	TRG	08/14/13 16:15		A_Spec	Alpha_004	170.02	1.30 E+00	1.00 E-02	19.4
17	TH-230	TRG	08/14/13 16:15		A_Spec	Alpha_010	170	2.63 E+01	1.00 E-02	19.7
18	TH-230	TRG	08/14/13 16:15		A_Spec	Alpha_011	170.02	7.83 E+00	1.00 E-03	20.5

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

5220


Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-THISO-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-232	LCS	LCS	pCi/l	4.70E+00	9.08E-01	8.72E-02	4.91E+00	95.65	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	-7.19E-04	7.63E-02	2.27E-01					OK	OK
03	TH-232	DUP	PZ-206-SS TOT	pCi/l	1.62E-01	9.65E-02	5.71E-02				NA	OK	
04	TH-232	TRG	PZ-104-KS TOT	pCi/l	2.93E-02	4.49E-02	6.67E-02					OK	
05	TH-232	TRG	PZ-104-KS DIS	pCi/l	3.52E-02	6.00E-02	1.01E-01					OK	
06	TH-232	DO	PZ-206-SS TOT	pCi/l	9.74E-02	6.79E-02	5.38E-02					OK	
07	TH-232	TRG	PZ-206-SS DIS	pCi/l	2.52E-02	7.19E-02	1.46E-01					OK	
08	TH-232	TRG	PZ-207-AS TOT	pCi/l	-3.44E-04	3.65E-02	1.08E-01					OK	
09	TH-232	TRG	PZ-207-AS DIS	pCi/l	4.80E-02	6.33E-02	9.60E-02					OK	
10	TH-232	TRG	DUP 07 TOT	pCi/l	1.43E-01	1.21E-01	1.02E-01					OK	
11	TH-232	TRG	DUP 07 DIS	pCi/l	7.35E-02	7.68E-02	8.01E-02					OK	
12	TH-232	TRG	FB at I-73 TOT	pCi/l	0.00E+00	6.24E-02	1.35E-01					OK	
13	TH-232	TRG	I-73 TOT	pCi/l	8.19E-02	7.88E-02	8.40E-02					OK	
14	TH-232	TRG	I-73 DIS	pCi/l	6.08E-02	7.43E-02	8.97E-02					OK	
15	TH-232	TRG	PZ-103-SS TOT	pCi/l	3.07E-01	3.07E-01	3.59E-01					OK	
16	TH-232	TRG	PZ-103-SS DIS	pCi/l	5.89E-02	9.61E-02	1.64E-01					OK	
17	TH-232	TRG	PZ-102R-SS TOT	pCi/l	5.30E-01	2.22E-01	1.27E-01					OK	
18	TH-232	TRG	PZ-102R-SS DIS	pCi/l	5.15E-02	6.28E-02	7.60E-02					OK	

Run	1
Analysis Code	THISO
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

0220

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-THISO-1



Run **1**

Analysis Code **THISO**

Eberline Services Work Order **13-07153**

Client **Engineering Management Support, Inc.**

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-232	LCS	07/24/13 00:00	1.00E+00	69.45	0.00	0.00			
02	TH-232	MBL	07/24/13 00:00	1.00E+00	38.59	0.00	0.00			
03	TH-232	DUP	07/18/13 13:35	1.00E+00	108.65	0.00	0.00			
04	TH-232	TRG	07/18/13 13:01	1.00E+00	96.25	0.00	0.00			
05	TH-232	TRG	07/18/13 13:01	1.00E+00	63.64	0.00	0.00			
06	TH-232	DO	07/18/13 13:35	1.00E+00	123.96	0.00	0.00			
07	TH-232	TRG	07/18/13 13:35	1.00E+00	79.47	0.00	0.00			
08	TH-232	TRG	07/18/13 14:32	1.00E+00	83.55	0.00	0.00			
09	TH-232	TRG	07/18/13 14:32	1.00E+00	82.65	0.00	0.00			
10	TH-232	TRG	07/18/13 00:00	1.00E+00	56.41	0.00	0.00			
11	TH-232	TRG	07/18/13 00:00	1.00E+00	72.28	0.00	0.00			
12	TH-232	TRG	07/19/13 08:50	1.00E+00	65.82	0.00	0.00			
13	TH-232	TRG	07/19/13 08:55	1.00E+00	82.77	0.00	0.00			
14	TH-232	TRG	07/19/13 08:55	1.00E+00	73.42	0.00	0.00			
15	TH-232	TRG	07/19/13 09:45	2.30E-01	96.37	0.00	0.00			
16	TH-232	TRG	07/19/13 09:45	1.00E+00	49.83	0.00	0.00			
17	TH-232	TRG	07/19/13 10:15	1.00E+00	72.75	0.00	0.00			
18	TH-232	TRG	07/19/13 10:15	1.00E+00	70.92	0.00	0.00			

5220

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-THISO-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-232	LCS	08/14/13 12:47		A_Spec	Alpha_035	170	2.25 E+02	1.00 E-03	18.3
02	TH-232	MBL	08/14/13 12:47		A_Spec	Alpha_036	170	-2.00 E-02	6.00 E-03	19.1
03	TH-232	DUP	08/14/13 12:47		A_Spec	Alpha_037	170	1.18 E+01	1.00 E-03	17.8
04	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_038	170	1.83 E+00	1.00 E-03	17.2
05	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_039	170	1.66 E+00	2.00 E-03	19.7
06	TH-232	DO	08/14/13 12:47		A_Spec	Alpha_040	170	8.66 E+00	2.00 E-03	19
07	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_041	170	1.45 E+00	1.50 E-02	19.2
08	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_042	170	-2.00 E-02	6.00 E-03	18.5
09	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_043	170	3.00 E+00	0.00 E+00	20
10	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_044	170	5.83 E+00	1.00 E-03	19.2
11	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_045	170	3.83 E+00	1.00 E-03	19.1
12	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_046	170	1.00 E+00	0.00 E+00	17.9
13	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_047	170	4.66 E+00	2.00 E-03	18.2
14	TH-232	TRG	08/14/13 12:47		A_Spec	Alpha_048	170	2.83 E+00	1.00 E-03	16.8
15	TH-232	TRG	08/14/13 16:15		A_Spec	Alpha_003	170	4.49 E+00	3.00 E-03	17.5
16	TH-232	TRG	08/14/13 16:15		A_Spec	Alpha_004	170.02	2.15 E+00	5.00 E-03	19.4
17	TH-232	TRG	08/14/13 16:15		A_Spec	Alpha_010	170	2.86 E+01	8.00 E-03	19.7
18	TH-232	TRG	08/14/13 16:15		A_Spec	Alpha_011	170.02	2.83 E+00	1.00 E-03	20.5

	Run	1
	Analysis Code	THISO
Eberline Services Work Order	13-07153	
Client	Engineering Management Support, Inc.	


9220

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	07/24/13 00:00	1.0000	0.4801	10.7859		0.00		
02	MBL	BLANK	07/24/13 00:00	1.0000	0.2380	5.3469		0.00		
03	DUP	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.2379	5.3447		0.00		
04	TRG	PZ-104-KS TOT	07/18/13 13:01	1.0000	0.2365	5.3132		0.00		
05	TRG	PZ-104-KS DIS	07/18/13 13:01	1.0000	0.2390	5.3694		0.00		
06	DO	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.2366	5.3155		0.00		
07	TRG	PZ-206-SS DIS	07/18/13 13:35	1.0000	0.2360	5.3020		0.00		
08	TRG	PZ-207-AS TOT	07/18/13 14:32	1.0000	0.2348	5.2750		0.00		
09	TRG	PZ-207-AS DIS	07/18/13 14:32	1.0000	0.2341	5.2593		0.00		
10	TRG	DUP 07 TOT	07/18/13 00:00	1.0000	0.2369	5.3222		0.00		
11	TRG	DUP 07 DIS	07/18/13 00:00	1.0000	0.2362	5.3065		0.00		
12	TRG	FB at I-73 TOT	07/19/13 08:50	1.0000	0.2353	5.2862		0.00		
13	TRG	I-73 TOT	07/19/13 08:55	1.0000	0.2350	5.2795		0.00		
14	TRG	I-73 DIS	07/19/13 08:55	1.0000	0.2346	5.2705		0.00		
15	TRG	PZ-103-SS TOT	07/19/13 09:45	0.2300	0.2370	5.3244		0.00		
16	TRG	PZ-103-SS DIS	07/19/13 09:45	1.0000	0.2346	5.2705		0.00		
17	TRG	PZ-102R-SS TOT	07/19/13 10:15	1.0000	0.2335	5.2458		0.00		
18	TRG	PZ-102R-SS DIS	07/19/13 10:15	1.0000	0.2337	5.2503		0.00		

4-2

1

0227

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07153	1	ThISO	8/7/2013 9:13	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
Th-228	Th-8b	103.560	8/7/2013	0.100	0.1053				4.91	0.177	0.00	0.000	0.00	0.000	0.00	0.000
Th-230	Th-1b	23.525	8/7/2013	0.500	0.5186				5.50	0.148	0.00	0.000	0.00	0.000	0.00	0.000
Th-232	Th-8b	103.560	8/7/2013	0.100	0.1053				4.91	0.177	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	Th-229	Th-18a	22.466	8/7/2013	0.4801	0.2200	0.4801 g									
02	Th-229	Th-18a	22.466	8/7/2013	0.2380	0.2200	0.2380 g									
03	Th-229	Th-18a	22.466	8/7/2013	0.2379	0.2200	-0.2379 g									
04	Th-229	Th-18a	22.466	8/7/2013	0.2365	0.2200	-0.2365 g									
05	Th-229	Th-18a	22.466	8/7/2013	0.2390	0.2200	-0.2390 g									
06	Th-229	Th-18a	22.466	8/7/2013	0.2366	0.2200	-0.2366 g									
07	Th-229	Th-18a	22.466	8/7/2013	0.2360	0.2200	-0.2360 g									
08	Th-229	Th-18a	22.466	8/7/2013	0.2348	0.2200	-0.2348 g									
09	Th-229	Th-18a	22.466	8/7/2013	0.2341	0.2200	-0.2341 g									
10	Th-229	Th-18a	22.466	8/7/2013	0.2369	0.2200	-0.2369 g									
11	Th-229	Th-18a	22.466	8/7/2013	0.2362	0.2200	-0.2362 g									
12	Th-229	Th-18a	22.466	8/7/2013	0.2353	0.2200	-0.2353 g									
13	Th-229	Th-18a	22.466	8/7/2013	0.2350	0.2200	-0.2350 g									
14	Th-229	Th-18a	22.466	8/7/2013	0.2346	0.2200	-0.2346 g									
15	Th-229	Th-18a	22.466	8/7/2013	0.2370	0.2200	-0.2370 g									
16	Th-229	Th-18a	22.466	8/7/2013	0.2346	0.2200	-0.2346 g									
17	Th-229	Th-18a	22.466	8/7/2013	0.2335	0.2200	-0.2335 g									
18	Th-229	Th-18a	22.466	8/7/2013	0.2337	0.2200	-0.2337 g									

LCS

0.5186 g
0.1053 g

Matrix Spike

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	1	ThISO	liters	8/13/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-206-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-104-KS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-104-KS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-206-SS TOT	DO					1.0000E+00	1.0000E+00				
07	PZ-206-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-207-AS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-207-AS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 07 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 07 DIS	TRG					1.0000E+00	1.0000E+00				
12	FB at I-73 TOT	TRG					1.0000E+00	1.0000E+00				
13	I-73 TOT	TRG					1.0000E+00	1.0000E+00				
14	I-73 DIS	TRG					1.0000E+00	1.0000E+00				
15	PZ-103-SS TOT	TRG					2.3000E-01	2.3000E-01				
16	PZ-103-SS DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-102R-SS TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-102R-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J Wolfe Date: 8,7,13



✓
8/15/13

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_035
 Chamber Serial Number: 04026477A
 Detector Serial Number: 58771
 Env. Background: System Bkgd 64783
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/14/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:17 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.480 mL
 Effective Efficiency: 0.1268 +/- 0.0092
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM
 Chem. Recovery Factor: 0.6945 +/- 0.0519

Control Certificate Name: NatTh_Th-8
 Chem. Recov. of Control: TH-232 0.956466 +/- 0.098590
 Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.758	15.32	51.36	0.68	0.00E+000	8.8
TH-228	5.379	193.81	14.13	1.19	0.00E+000	10.6
TH-229 T	4.896	232.49	12.87	0.51	0.00E+000	6.8
TH-230	4.643	237.66	12.72	0.34	0.00E+000	9.7
TH-232	3.979	224.83	13.08	0.17	0.00E+000	16.6

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

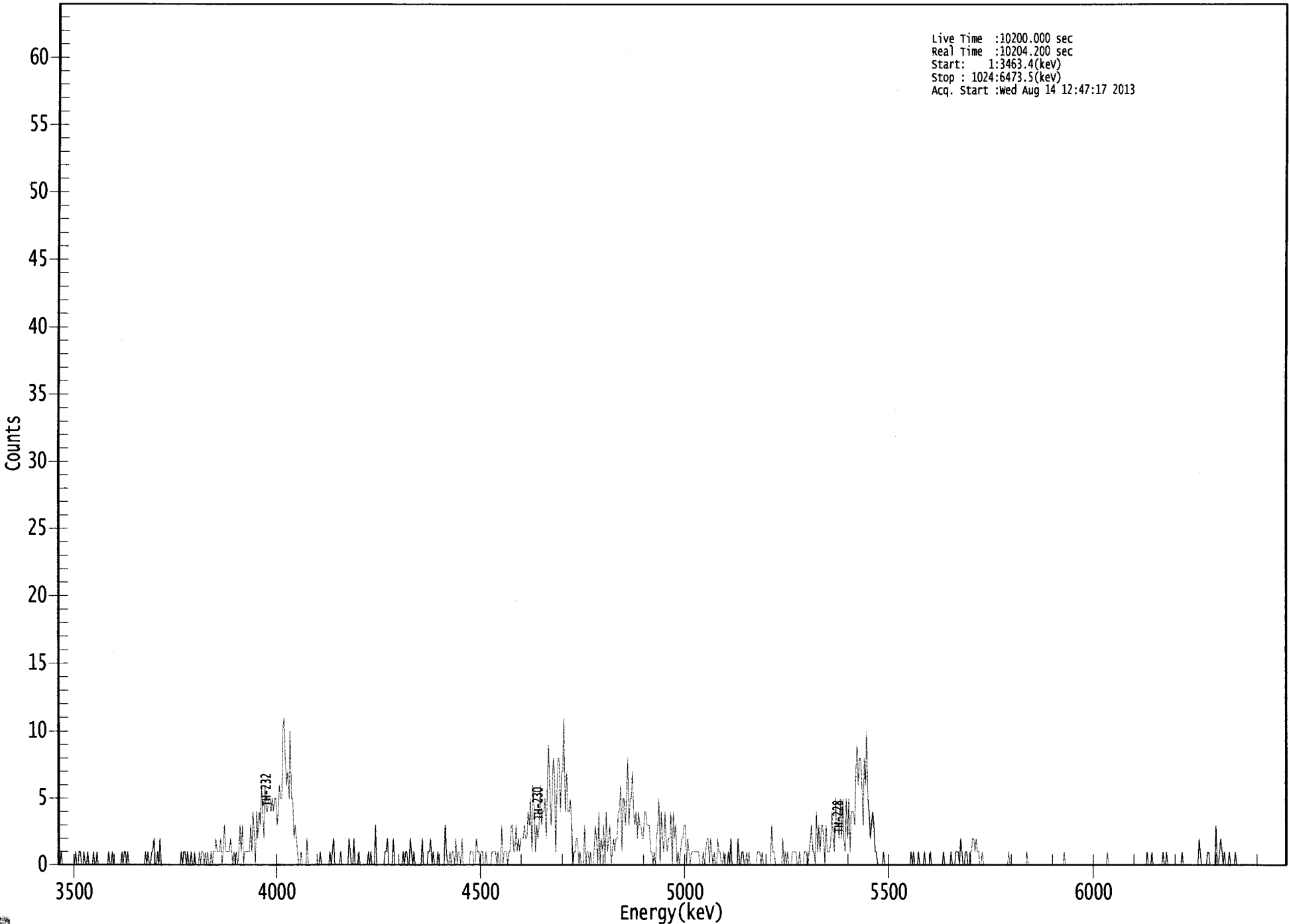
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.957	5850.00*	3.28E-001 +/- 1.75E-001	1.21E-001 +/- 1.72E-002
TH-228	0.998	5400.00*	4.05E+000 +/- 8.13E-001	1.38E-001 +/- 1.96E-002
TH-229	0.997	4872.00*	4.88E+000 +/- 6.95E-001	1.10E-001 +/- 1.57E-002
TH-230	0.995	4672.00*	4.98E+000 +/- 9.50E-001	1.00E-001 +/- 1.42E-002
TH-232	0.998	3997.00*	4.70E+000 +/- 9.08E-001	8.72E-002 +/- 1.24E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

000066183.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3463.4(keV)
Stop : 1024:6473.5(keV)
Acq. Start :wed Aug 14 12:47:17 2013



ROI Type: 1

ROI Type: 3

0.52

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 0 0 3 0 1 1 1 0

Sample Title: 01

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

801: 0 0 0 0 0 0 0 1

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	1	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	1	0	0	0	1
913:	0	0	0	0	0	0	0	0
921:	1	0	0	1	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	2	1
953:	0	0	0	0	0	1	1	0
961:	0	0	0	0	3	0	0	1
969:	2	1	0	1	0	0	0	1
977:	0	0	0	0	1	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

C
Bill ✓

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_036
 Chamber Serial Number: 04026477B
 Detector Serial Number: 84167
 Env. Background: System Bkgd 64784
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 8/14/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:18 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.238 mL
 Effective Efficiency: 0.0737 +/- 0.0094
 Counting Efficiency: 0.1910 +/- 0.0033 on 7/20/2013 2:31:37 PM
 Chem. Recovery Factor: 0.3859 +/- 0.0495

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	-0.51	400.63	0.51	0.00E+000	0.0
TH-228	5.278	0.32	646.93	0.68	0.00E+000	3.0
TH-229	T 4.874	66.98	24.16	1.02	0.00E+000	6.6
TH-230	4.589	5.49	88.08	0.51	0.00E+000	3.0
TH-232	3.973	-0.02	10615.	1.02	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

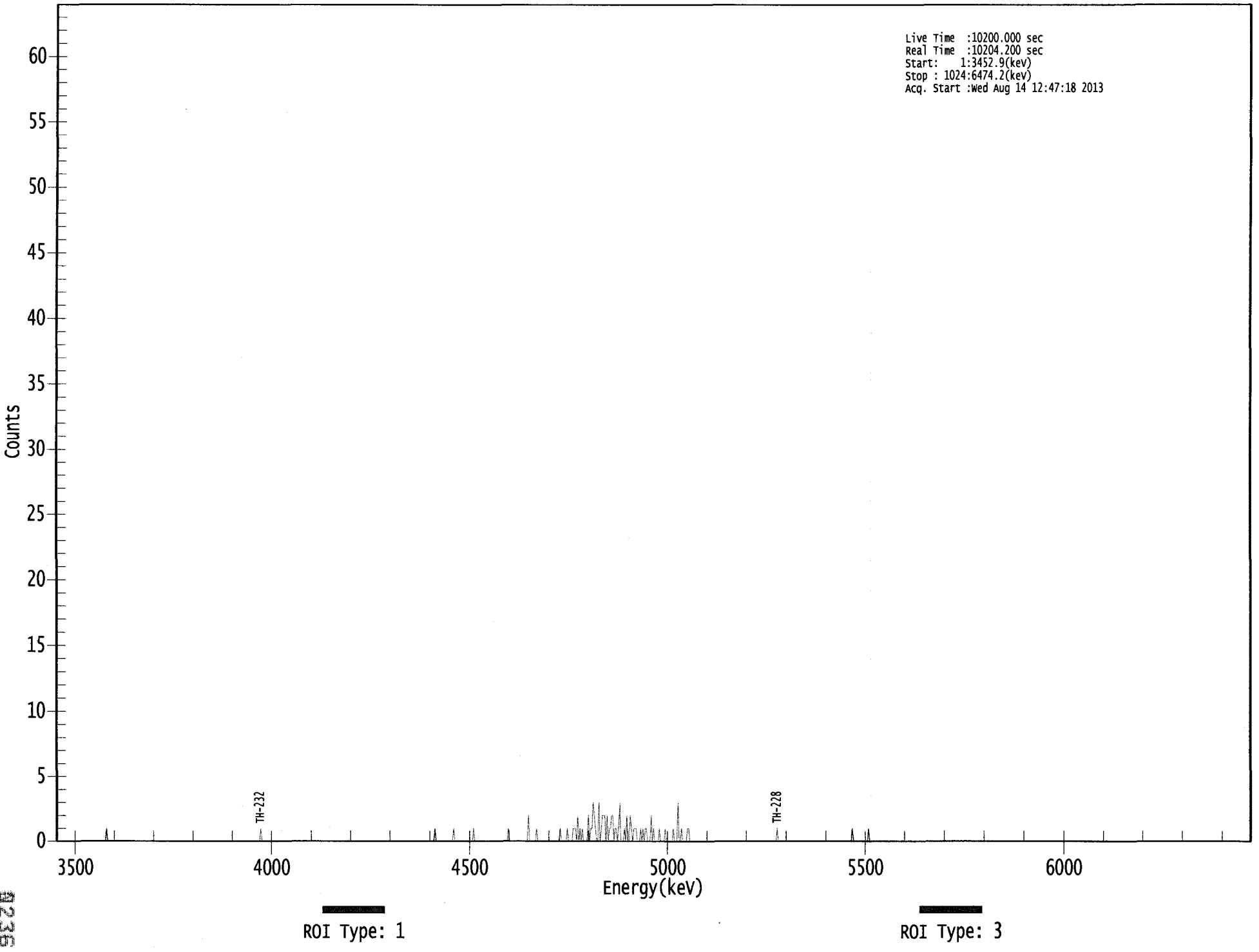
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	-1.88E-002 +/- 7.55E-002	1.94E-001 +/- 4.82E-002
TH-228	0.925	5400.00*	1.15E-002 +/- 7.46E-002	2.03E-001 +/- 5.06E-002
TH-229	1.000	4872.00*	2.42E+000 +/- 6.03E-001	2.28E-001 +/- 5.67E-002
TH-230	0.965	4672.00*	1.98E-001 +/- 1.81E-001	1.89E-001 +/- 4.71E-002
TH-232	0.997	3997.00*	-7.19E-004 +/- 7.63E-002	2.27E-001 +/- 5.64E-002

AG
8/15/13

0000066184.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3452.9(kev)
Stop : 1024:6474.2(kev)
Acq. Start :wed Aug 14 12:47:18 2013



9236

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 0 0 0 0 0 0 0 0

Sample Title: 02

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

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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



copy

Sample Description: PZ-206-SS TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_037
 Chamber Serial Number: 04026478A
 Detector Serial Number: 91133
 Env. Background: System Bkgd 62769
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:20 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.238 mL
 Effective Efficiency: 0.1937 +/- 0.0158
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM
 Chem. Recovery Factor: 1.0865 +/- 0.0910

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	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.379	19.32	45.50	0.68	0.00E+000	5.9
TH-229 T	4.888	176.00	14.82	0.00	0.00E+000	6.1
TH-230	4.598	31.66	35.05	0.34	0.00E+000	5.9
TH-232	3.936	11.83	57.46	0.17	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

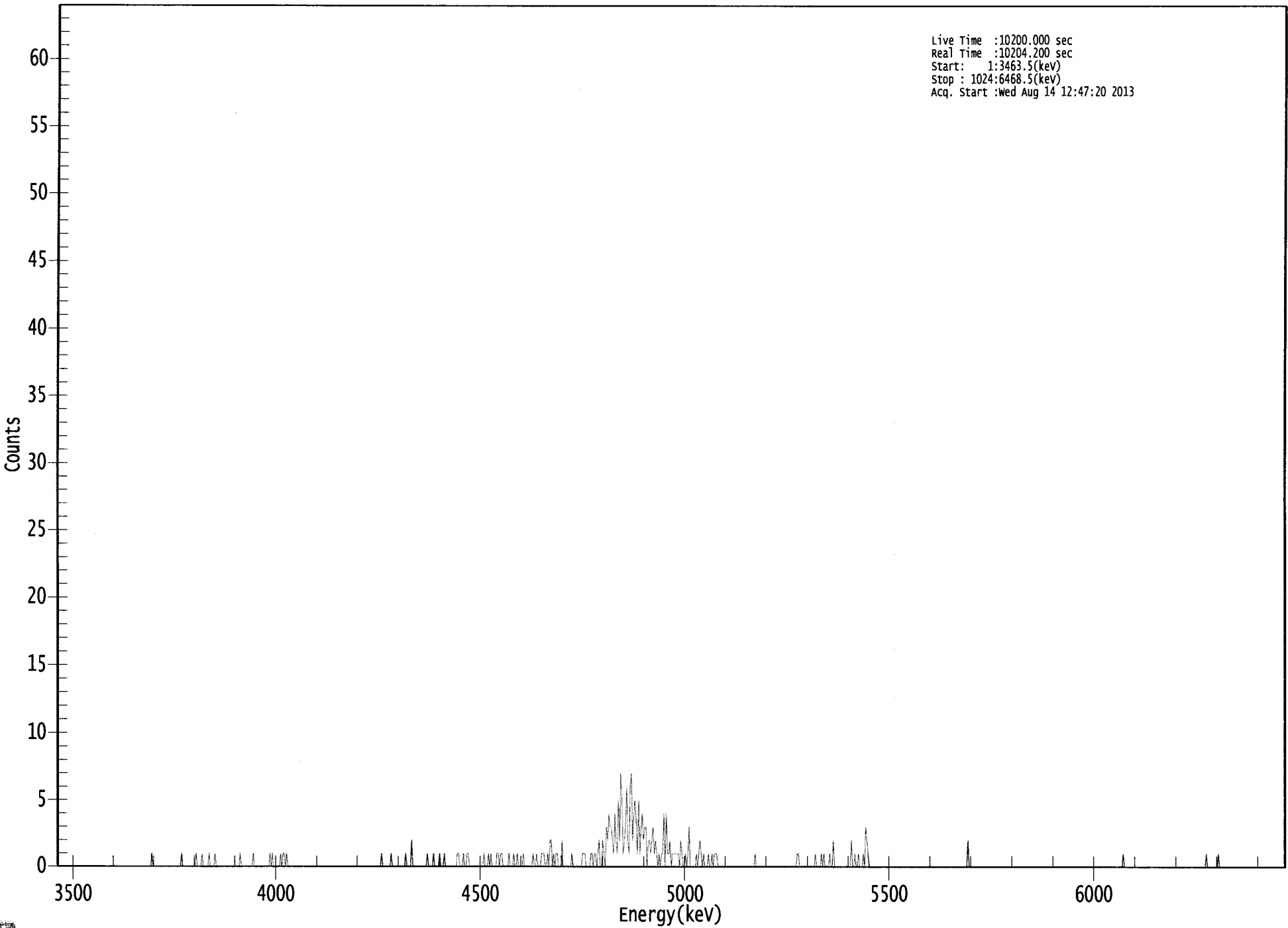
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-2.39E-003 +/- 2.80E-002	5.87E-002 +/- 9.40E-003
TH-228	0.998	5400.00*	2.72E-001 +/- 1.31E-001	7.93E-002 +/- 1.27E-002
TH-229	0.999	4872.00*	2.42E+000 +/- 3.87E-001	8.24E-002 +/- 1.32E-002
TH-230	0.972	4672.00*	4.34E-001 +/- 1.67E-001	6.55E-002 +/- 1.05E-002
TH-232	0.981	3997.00*	1.62E-001 +/- 9.65E-002	5.71E-002 +/- 9.14E-003

AG
 8/15/13

US EPA ARCHIVE DOCUMENT

0000066182.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3463.5(kev)
Stop : 1024:6468.5(kev)
Acq. Start :Wed Aug 14 12:47:20 2013



ROI Type: 1

ROI Type: 3

0241

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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 1 0 1 1 0 0 0 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

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



8/11/13

Sample Description: PZ-104-KS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_038
 Chamber Serial Number: 04026478B
 Detector Serial Number: 91134
 Env. Background: System Bkgd 64785
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:22 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.236 mL
 Effective Efficiency: 0.1657 +/- 0.0145
 Counting Efficiency: 0.1722 +/- 0.0030 on 5/11/2013 5:13:35 PM
 Chem. Recovery Factor: 0.9625 +/- 0.0859

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.783	2.00	169.74	0.00	0.00E+000	3.0
TH-228	5.439	1.32	215.97	0.68	0.00E+000	3.0
TH-229 T	4.897	149.66	16.04	0.34	0.00E+000	4.6
TH-230	4.633	15.00	52.27	0.00	0.00E+000	3.0
TH-232	3.980	1.83	152.56	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

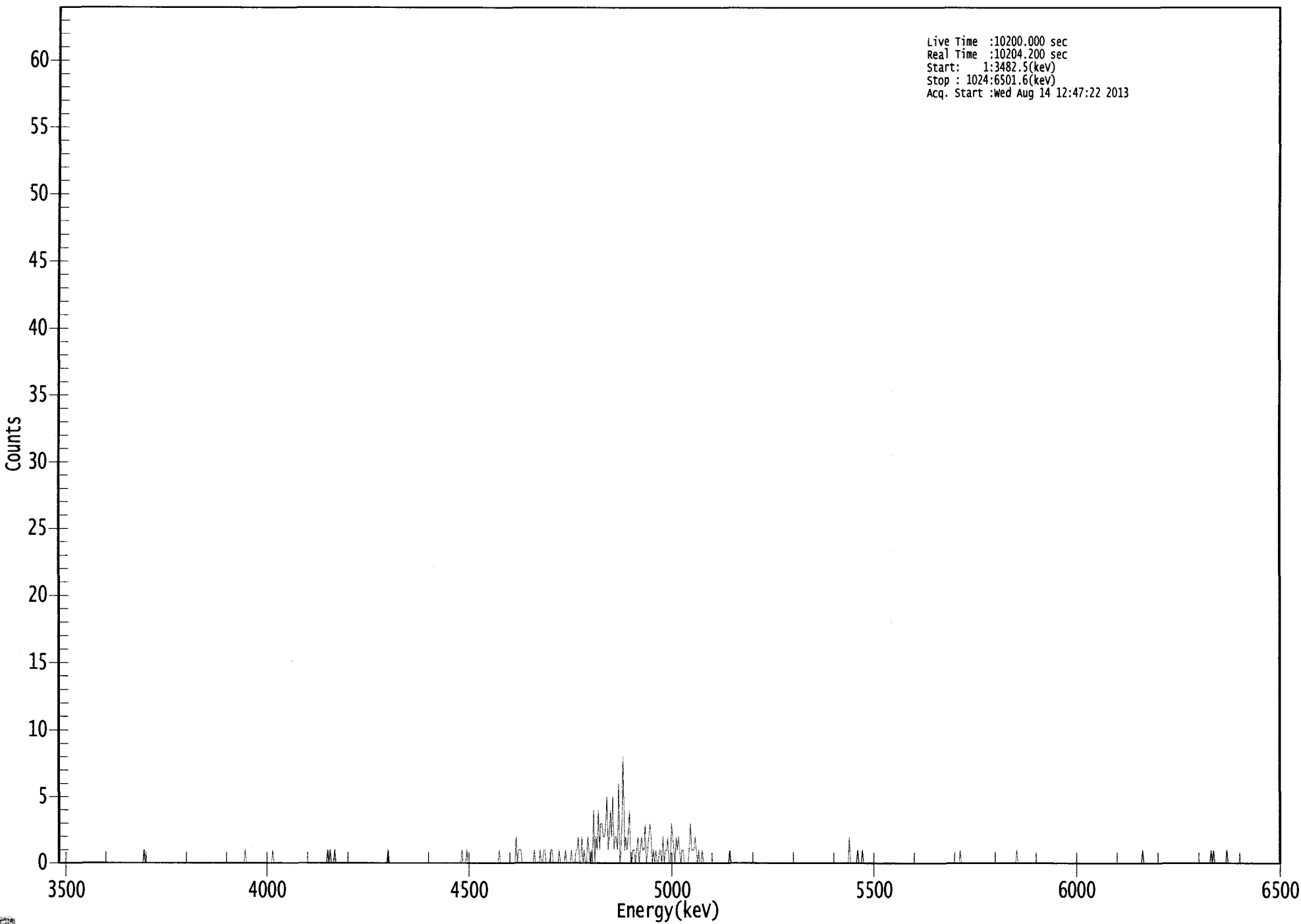
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.977	5850.00*	3.29E-002 +/- 5.61E-002	9.86E-002 +/- 1.69E-002
TH-228	0.992	5400.00*	2.17E-002 +/- 4.70E-002	9.27E-002 +/- 1.59E-002
TH-229	0.997	4872.00*	2.40E+000 +/- 4.13E-001	7.68E-002 +/- 1.32E-002
TH-230	0.992	4672.00*	2.40E-001 +/- 1.32E-001	9.61E-002 +/- 1.65E-002
TH-232	0.998	3997.00*	2.93E-002 +/- 4.49E-002	6.67E-002 +/- 1.14E-002

AG
 8/15/13

US EPA ARCHIVE DOCUMENT

0000066185.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3482.5(kev)
Stop : 1024:6501.6(kev)
Acq. Start :wed Aug 14 12:47:22 2013



ROI Type: 1

ROI Type: 3

0246

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 0 0 1 0 0 0 0 0

Sample Title: 04

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	2	0	1	1	1	0	0	0
393:	0	0	0	0	0	0	0	1
401:	0	0	0	0	1	0	0	1
409:	1	0	0	0	0	1	1	0
417:	0	0	0	0	1	0	0	0
425:	0	1	0	0	0	0	1	0
433:	0	0	1	1	2	0	0	2
441:	0	1	0	0	2	1	0	1
449:	0	4	0	2	1	4	1	3
457:	3	2	2	3	5	1	2	4
465:	2	5	1	2	2	1	6	0
473:	1	4	8	1	2	1	2	4
481:	1	0	1	1	0	1	2	0
489:	1	2	1	1	3	0	1	2
497:	3	2	0	1	0	1	0	0
505:	1	1	0	2	0	1	1	2
513:	0	0	3	2	1	0	2	1
521:	2	1	0	1	1	0	0	0
529:	0	1	3	1	1	1	2	1
537:	0	1	0	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	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	2
665:	0	0	0	0	0	0	1	0
673:	0	0	1	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	1	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	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: 04

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



C
0111

Sample Description: PZ-104-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 64786
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:24 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.239 mL
 Effective Efficiency: 0.1251 +/- 0.0124
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.6364 +/- 0.0640

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	-0.51	400.63	0.51	0.00E+000	0.0
TH-228	5.309	0.15	1397.8	0.85	0.00E+000	3.0
TH-229 T	4.866	114.15	18.42	0.85	0.00E+000	6.0
TH-230	4.612	11.32	60.27	0.68	0.00E+000	3.0
TH-232	3.899	1.66	169.38	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

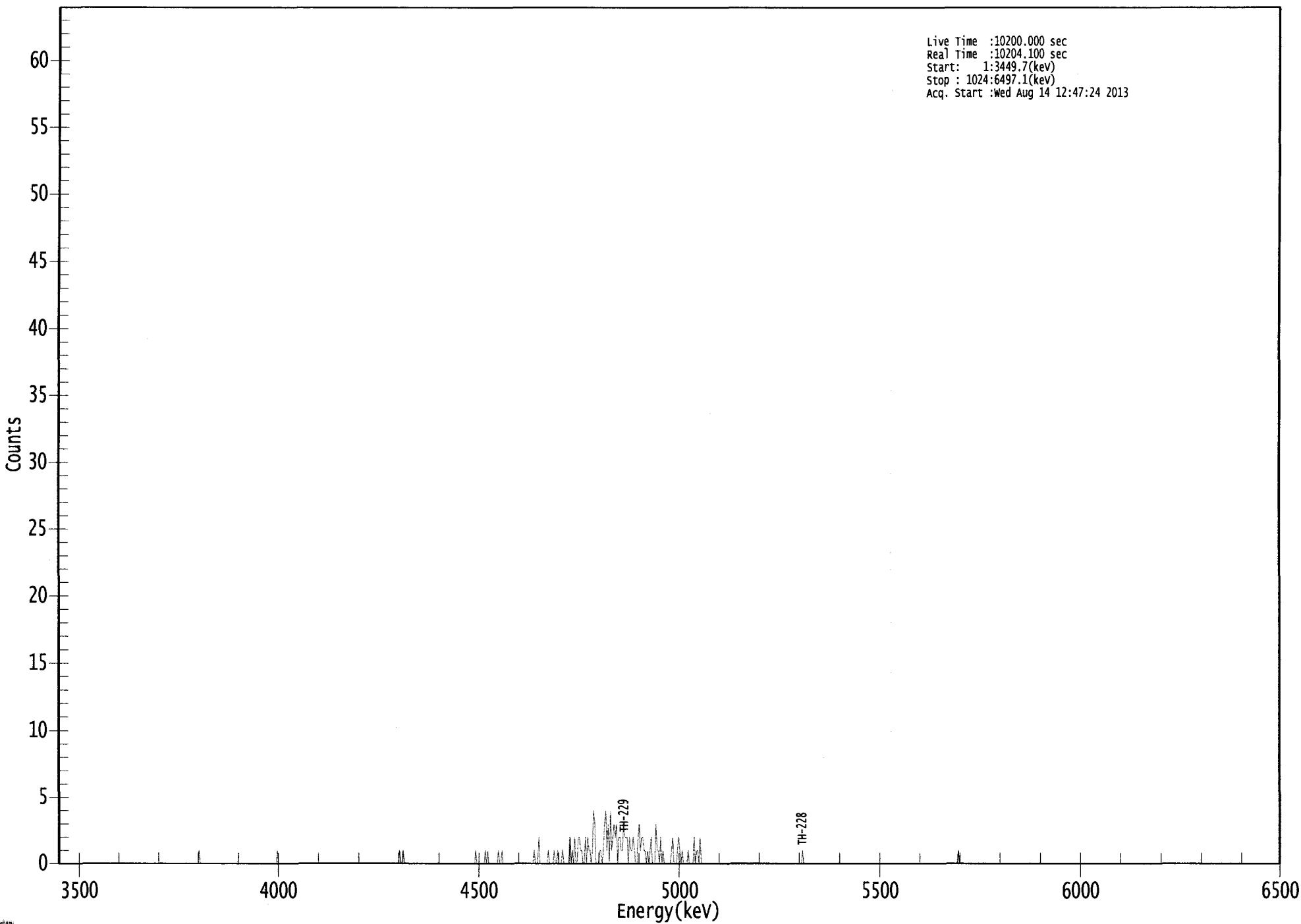
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	-1.11E-002 +/- 4.46E-002	1.14E-001 +/- 2.22E-002
TH-228	0.957	5400.00*	3.27E-003 +/- 4.57E-002	1.30E-001 +/- 2.53E-002
TH-229	1.000	4872.00*	2.43E+000 +/- 4.71E-001	1.27E-001 +/- 2.47E-002
TH-230	0.981	4672.00*	2.40E-001 +/- 1.52E-001	1.20E-001 +/- 2.32E-002
TH-232	0.952	3997.00*	3.52E-002 +/- 6.00E-002	1.01E-001 +/- 1.97E-002

AG
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US EPA ARCHIVE DOCUMENT

0000066186.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Wed Aug 14 12:47:24 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10204

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

369: 0 1 0 0 1 0 0 0

Sample Title: 05

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	0	1
401:	0	0	0	2	0	0	0	0
409:	0	0	0	1	0	0	0	0
417:	1	0	0	1	0	0	0	1
425:	0	0	0	0	0	2	0	1
433:	0	2	0	0	2	2	1	1
441:	0	0	2	0	2	1	1	0
449:	1	4	3	0	0	0	1	1
457:	0	1	3	4	1	3	0	4
465:	1	2	3	2	3	0	2	2
473:	1	1	3	2	2	2	0	2
481:	1	1	2	1	0	0	2	3
489:	1	2	2	1	1	0	1	0
497:	1	2	0	0	0	3	1	1
505:	0	2	0	1	0	0	0	0
513:	0	0	1	2	0	0	0	1
521:	2	1	0	1	0	0	0	0
529:	1	0	0	0	0	2	0	1
537:	1	0	2	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:	1	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	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	1	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 05

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



C
8/11

Sample Description: PZ-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 64787
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:27 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.237 mL
 Effective Efficiency: 0.2355 +/- 0.0177
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 1.2396 +/- 0.0957

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	6.007	0.66	305.43	0.34	0.00E+000	3.0
TH-228	5.370	13.15	56.06	0.85	0.00E+000	3.0
TH-229 T	4.879	212.83	13.44	0.17	0.00E+000	7.8
TH-230	4.599	15.32	51.36	0.68	0.00E+000	4.5
TH-232	3.974	8.66	68.12	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

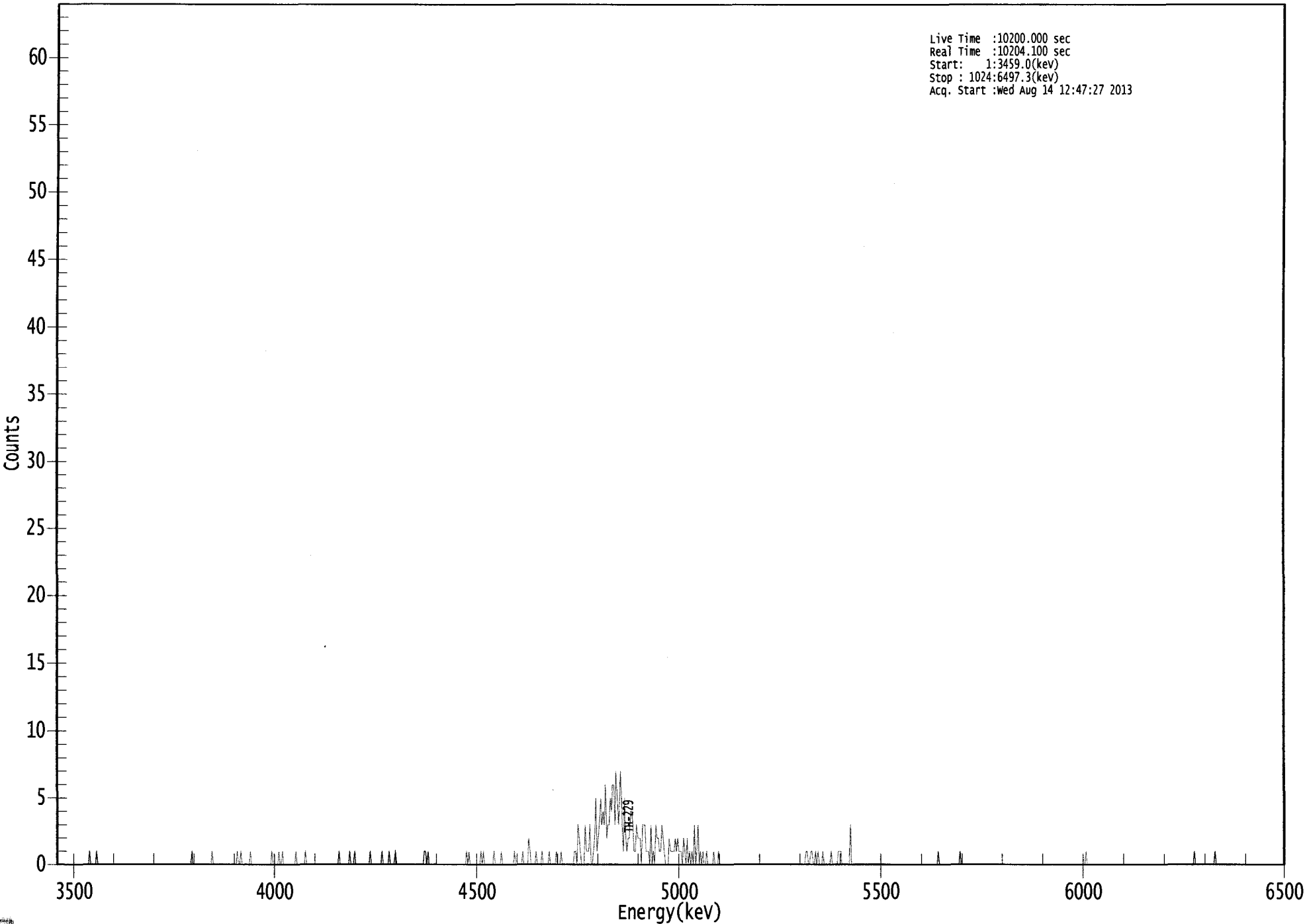
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.879	5850.00*	7.63E-003 +/- 2.33E-002	5.53E-002 +/- 8.16E-003
TH-228	0.995	5400.00*	1.52E-001 +/- 8.82E-002	6.92E-002 +/- 1.02E-002
TH-229	1.000	4872.00*	2.41E+000 +/- 3.55E-001	4.72E-002 +/- 6.96E-003
TH-230	0.972	4672.00*	1.73E-001 +/- 9.23E-002	6.36E-002 +/- 9.38E-003
TH-232	0.997	3997.00*	9.74E-002 +/- 6.79E-002	5.38E-002 +/- 7.93E-003

AG
8/15/13

US EPA ARCHIVE DOCUMENT

0000066187.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :wed Aug 14 12:47:27 2013



ROI Type: 1

ROI Type: 3

9550

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10204

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	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	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	1	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	1	0	0	0	0	0
161:	0	0	1	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	1	0	0	0
185:	0	0	1	0	0	1	0	0
193:	0	0	0	0	0	0	0	0
201:	1	0	0	0	0	0	0	0
209:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	1	0	0
249:	0	1	0	0	0	0	0	0
257:	0	0	0	0	0	0	1	0
265:	0	0	0	0	0	0	0	0
273:	1	0	0	0	0	0	1	0
281:	0	0	0	1	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	1	1	0	1	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	1	0
345:	1	0	0	0	0	0	0	0
353:	0	0	1	0	1	0	0	0
361:	0	0	0	0	0	1	0	0

369: 0 0 0 1 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	1	0	0
393:	0	0	2	1	0	0	0	0
401:	1	0	0	0	0	1	0	0
409:	0	0	0	1	0	0	0	0
417:	0	1	0	0	0	1	0	0
425:	0	0	0	0	0	0	0	0
433:	1	1	0	3	2	1	0	0
441:	0	3	1	1	1	3	0	0
449:	1	2	5	1	2	3	5	3
457:	4	3	6	2	3	3	5	4
465:	6	6	3	7	5	3	5	7
473:	3	1	5	2	1	2	2	4
481:	4	3	1	1	3	2	2	2
489:	0	3	3	3	1	1	1	0
497:	3	0	1	0	3	2	2	1
505:	1	3	2	1	0	0	0	2
513:	1	1	1	1	2	1	2	1
521:	1	1	0	2	1	0	2	0
529:	1	0	1	0	3	0	1	3
537:	0	1	0	1	0	0	1	0
545:	0	0	0	0	1	0	0	0
553:	1	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	1	1	0	0	1	1	0
633:	0	1	0	1	0	0	0	1
641:	0	0	0	0	0	0	1	0
649:	0	0	0	0	1	1	1	0
657:	0	0	0	0	0	0	3	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	1
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	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	1	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	0	0	0	0	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
8/11/13

Sample Description: PZ-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 07
 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: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:29 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.236 mL
 Effective Efficiency: 0.1524 +/- 0.0139
 Counting Efficiency: 0.1917 +/- 0.0033 on 8/10/2013 2:59:03 PM
 Chem. Recovery Factor: 0.7947 +/- 0.0736

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	5.714	0.15	1397.8	0.85	0.00E+000	3.0
TH-228	5.403	3.83	102.72	0.17	0.00E+000	3.0
TH-229 T	4.872	137.32	16.77	0.68	0.00E+000	5.4
TH-230	4.641	7.47	79.84	1.53	0.00E+000	3.0
TH-232	3.975	1.45	284.62	2.55	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

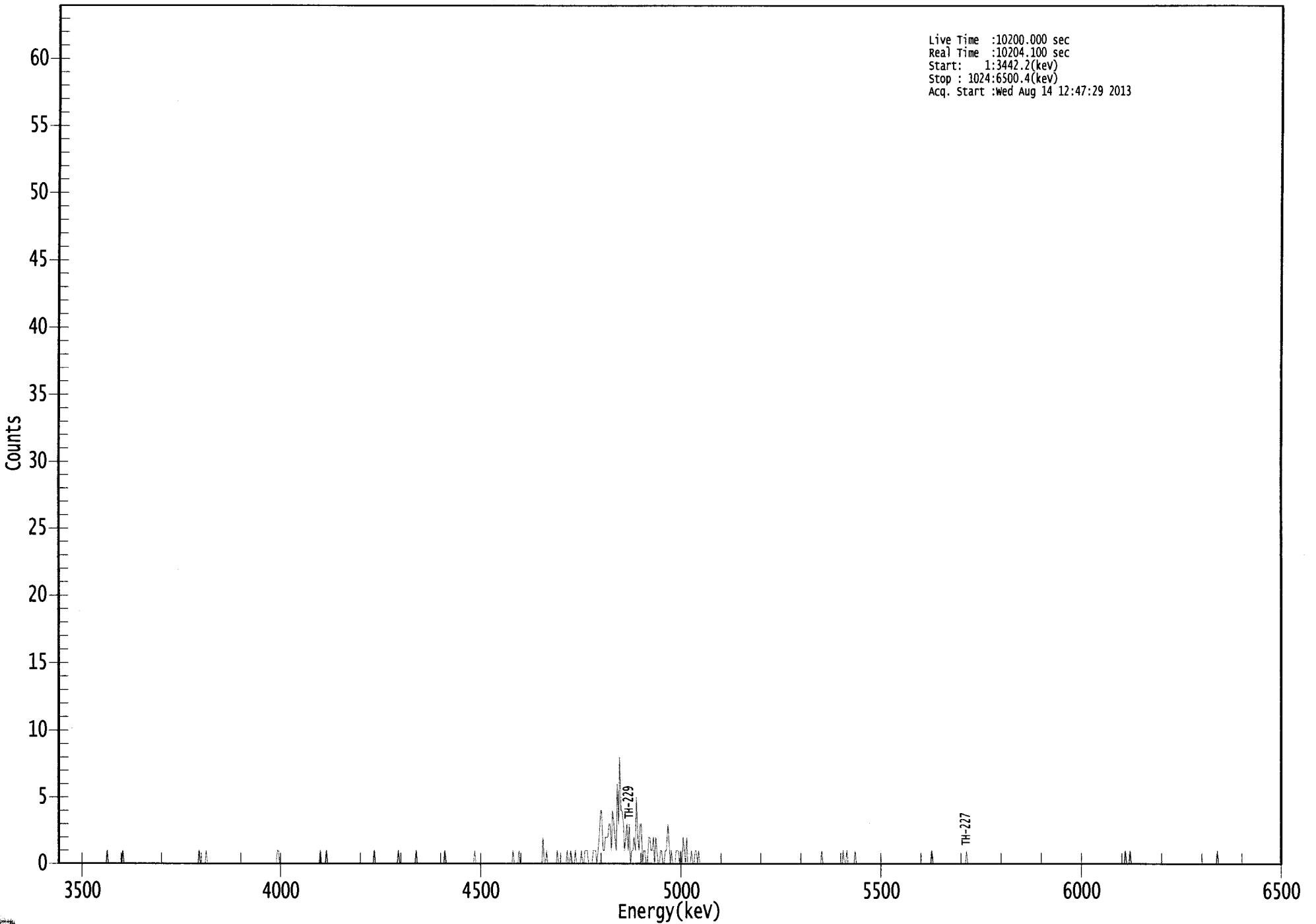
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.908	5850.00*	2.68E-003 +/- 3.75E-002	1.07E-001 +/- 1.91E-002
TH-228	1.000	5400.00*	6.85E-002 +/- 7.14E-002	7.46E-002 +/- 1.33E-002
TH-229	1.000	4872.00*	2.40E+000 +/- 4.28E-001	9.86E-002 +/- 1.76E-002
TH-230	0.995	4672.00*	1.30E-001 +/- 1.06E-001	1.24E-001 +/- 2.21E-002
TH-232	0.997	3997.00*	2.52E-002 +/- 7.19E-002	1.46E-001 +/- 2.60E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

0000066188.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3442.2(kev)
Stop : 1024:6500.4(kev)
Acq. Start :Wed Aug 14 12:47:29 2013



ROI Type: 1

ROI Type: 3

0251
1920

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

Sample Title: 07

Elapsed Live time: 10200
 Elapsed Real Time: 10204

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	1	0	0	0	1	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	1	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	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
8/11

Sample Description: PZ-207-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Th iso
 Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 64788
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:32 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.235 mL
 Effective Efficiency: 0.1543 +/- 0.0140
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM
 Chem. Recovery Factor: 0.8355 +/- 0.0772

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	5.808	1.49	190.02	0.51	0.00E+000	3.0
TH-228	5.362	2.32	149.12	0.68	0.00E+000	3.0
TH-229 T	4.868	138.32	16.71	0.68	0.00E+000	4.4
TH-230	4.583	12.83	55.14	0.17	0.00E+000	3.0
TH-232	4.018	-0.02	10615.	1.02	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

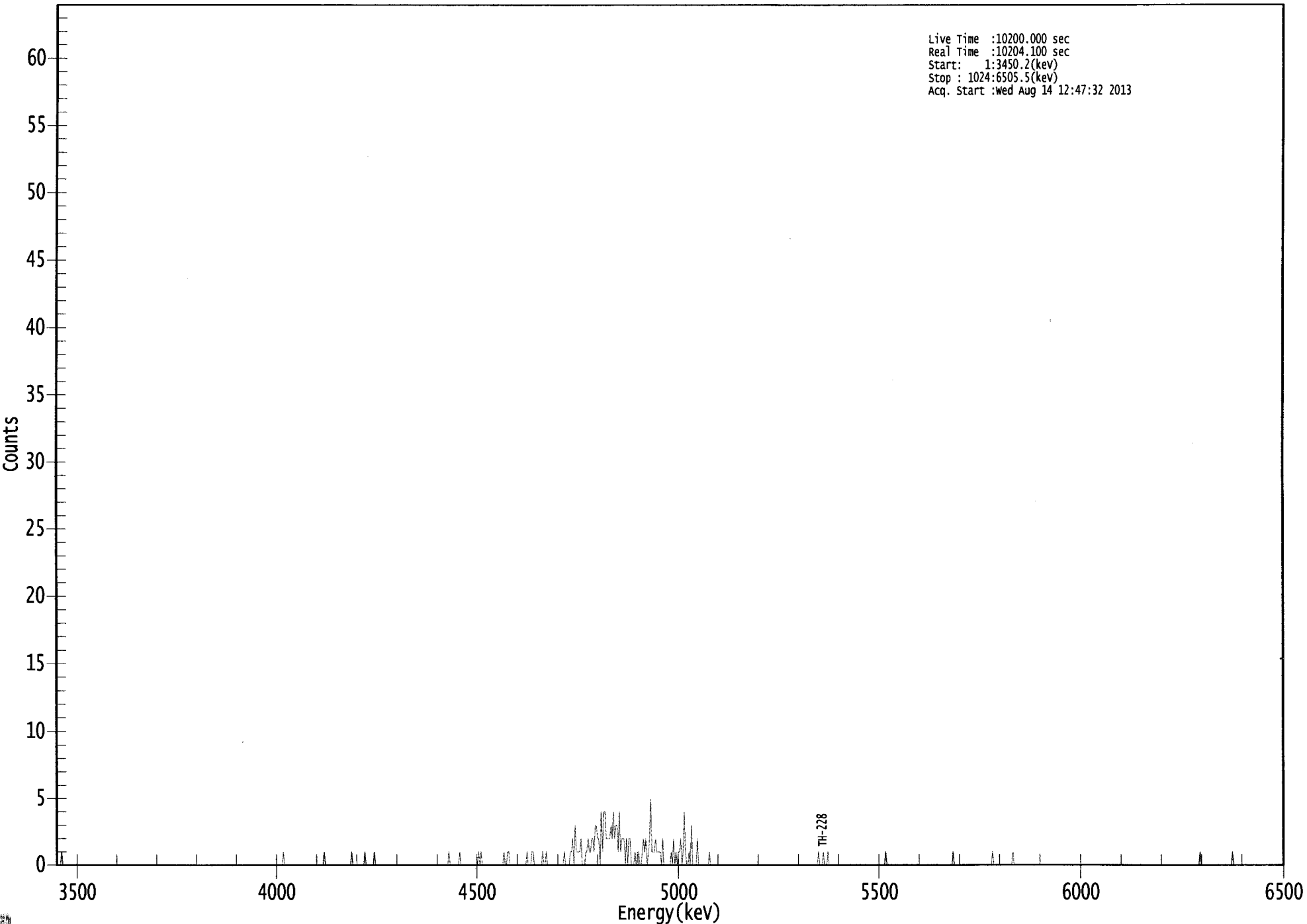
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.991	5850.00*	2.63E-002 +/- 5.02E-002	9.27E-002 +/- 1.65E-002
TH-228	0.992	5400.00*	4.10E-002 +/- 6.15E-002	9.96E-002 +/- 1.77E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.25E-001	9.74E-002 +/- 1.73E-002
TH-230	0.959	4672.00*	2.21E-001 +/- 1.28E-001	7.18E-002 +/- 1.28E-002
TH-232	0.998	3997.00*	-3.44E-004 +/- 3.65E-002	1.08E-001 +/- 1.92E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

0000066189.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :wed Aug 14 12:47:32 2013



ROI Type: 1

ROI Type: 3

0255

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10204

Channel	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	1
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:	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	1
249:	0	0	0	0	0	0	0
257:	0	0	1	0	0	0	0
265:	0	0	1	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:	1	0	0	0	0	0	0
337:	0	1	0	0	0	0	0
345:	0	0	0	0	0	0	0
353:	0	1	0	1	0	0	0
361:	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 1 0

Sample Title: 08

Channel	1	2	3	4	5	6	7	8
377:	0	1	1	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	1	0	0	0	1	1	0
401:	0	0	0	0	0	0	1	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	1	0	0	0	0	1	1	2
433:	0	3	1	1	1	1	2	0
441:	0	0	1	1	2	1	1	2
449:	2	1	3	3	2	2	0	4
457:	1	4	4	2	2	2	2	3
465:	2	4	2	3	3	1	4	1
473:	2	2	2	0	2	0	2	2
481:	0	0	0	1	0	1	1	0
489:	0	1	2	1	2	0	1	2
497:	5	1	1	1	2	1	1	1
505:	1	0	2	0	0	0	0	0
513:	0	1	0	2	0	1	0	1
521:	1	2	0	1	4	1	0	0
529:	1	0	3	0	0	0	0	2
537:	0	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	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:	1	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	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	1	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	1	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	1	0

801: 0 0 0 0 0 0 0 0

Sample Title: 08

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



C
8/11

Sample Description: PZ-207-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_043
 Chamber Serial Number: 04026481A
 Detector Serial Number: 91088
 Env. Background: System Bkgd 57707
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:34 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.234 mL
 Effective Efficiency: 0.1655 +/- 0.0146
 Counting Efficiency: 0.2003 +/- 0.0035 on 8/11/2013 2:21:17 PM
 Chem. Recovery Factor: 0.8265 +/- 0.0742

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	5.855	4.00	109.57	0.00	0.00E+000	3.0
TH-228	5.395	3.00	130.67	0.00	0.00E+000	3.0
TH-229 T	4.856	148.00	16.17	0.00	0.00E+000	7.4
TH-230	4.669	15.00	52.27	0.00	0.00E+000	3.7
TH-232	3.940	3.00	130.67	0.00	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

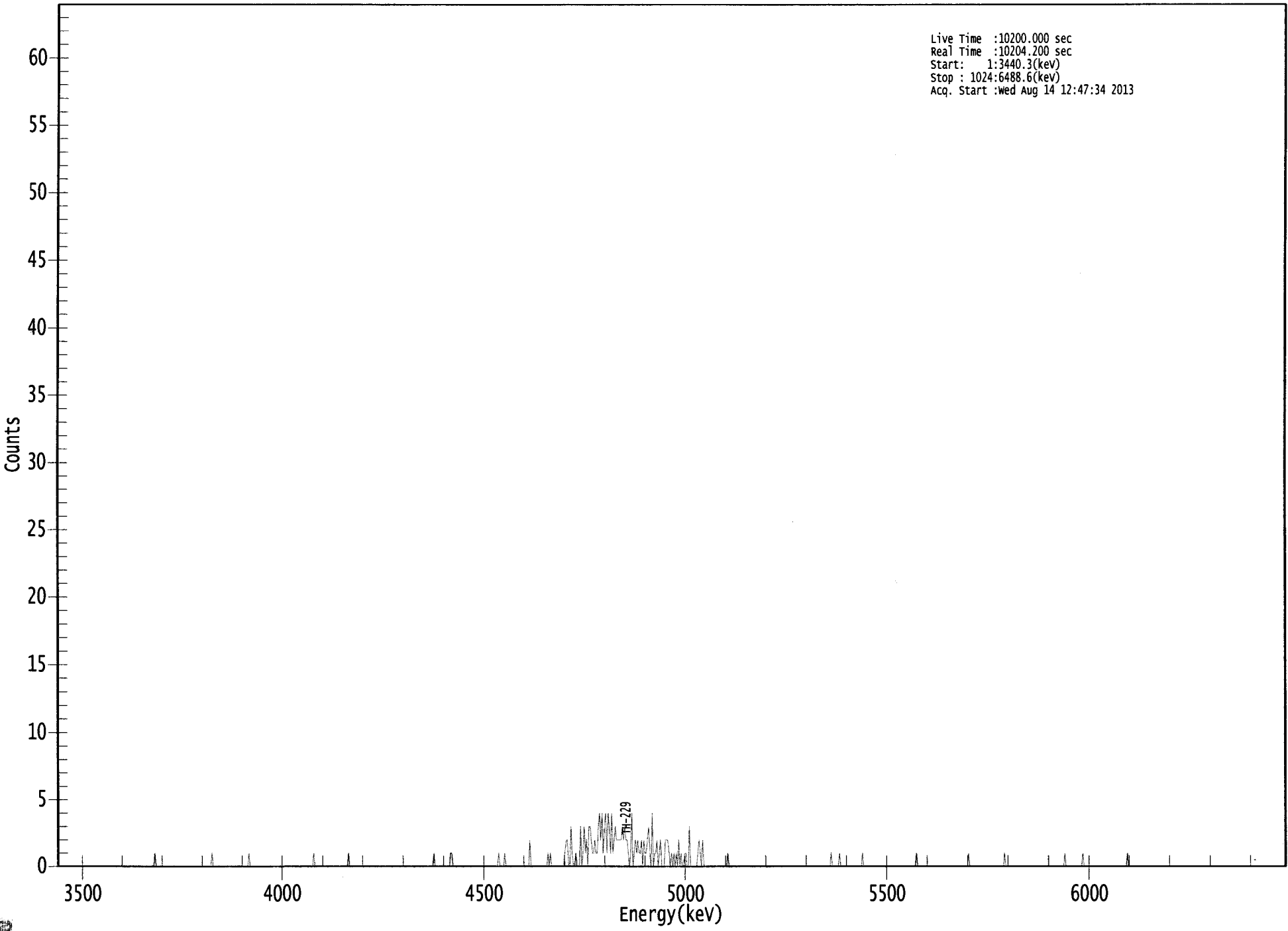
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	6.58E-002 +/- 7.30E-002	9.87E-002 +/- 1.70E-002
TH-228	1.000	5400.00*	4.94E-002 +/- 6.51E-002	9.87E-002 +/- 1.70E-002
TH-229	0.999	4872.00*	2.38E+000 +/- 4.11E-001	9.64E-002 +/- 1.67E-002
TH-230	1.000	4672.00*	2.41E-001 +/- 1.32E-001	9.61E-002 +/- 1.66E-002
TH-232	0.983	3997.00*	4.80E-002 +/- 6.33E-002	9.60E-002 +/- 1.66E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

000066192.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3440.3(kev)
Stop : 1024:6488.6(kev)
Acq. Start :wed Aug 14 12:47:34 2013



ROI Type: 1

ROI Type: 3

9271

 ***** 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: 10204

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

369: 1 0 0 0 0 1 0 0

Sample Title: 09

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	2	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	0	1	0	0	0	0
417:	0	0	0	0	0	0	0	1
425:	2	2	0	0	3	1	0	0
433:	1	0	0	0	3	0	1	3
441:	1	2	0	3	3	2	1	1
449:	2	1	1	3	4	2	4	1
457:	3	4	1	4	3	1	4	1
465:	2	3	2	2	2	2	2	3
473:	2	3	2	2	1	0	1	4
481:	0	1	2	1	2	1	1	2
489:	0	2	1	1	2	3	1	0
497:	4	0	1	1	2	0	1	2
505:	0	0	0	2	2	2	1	0
513:	1	0	1	0	1	0	2	0
521:	1	0	0	1	1	0	0	3
529:	0	0	0	0	0	0	1	2
537:	1	0	2	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	1
561:	0	0	0	0	0	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	1	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	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	1
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	1	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
817:	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	1
841:	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	1
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	1	0	0	0
897:	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0



C
8/15

Sample Description: DUP 07 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha 044
 Chamber Serial Number: 04026481B
 Detector Serial Number: 84168
 Env. Background: System Bkgd 60396
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:37 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: Th229_TH-18A
 Tracer Quantity: 0.237 mL
 Effective Efficiency: 0.1083 +/- 0.0115
 Counting Efficiency: 0.1920 +/- 0.0033 on 8/11/2013 2:17:37 PM
 Chem. Recovery Factor: 0.5641 +/- 0.0607

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.867	2.83	120.53	0.17	0.00E+000	3.0
TH-228	5.345	19.00	46.13	0.00	0.00E+000	3.7
TH-229 T	4.868	98.00	19.90	0.00	0.00E+000	4.9
TH-230	4.606	16.83	48.06	0.17	0.00E+000	3.0
TH-232	3.945	5.83	82.55	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

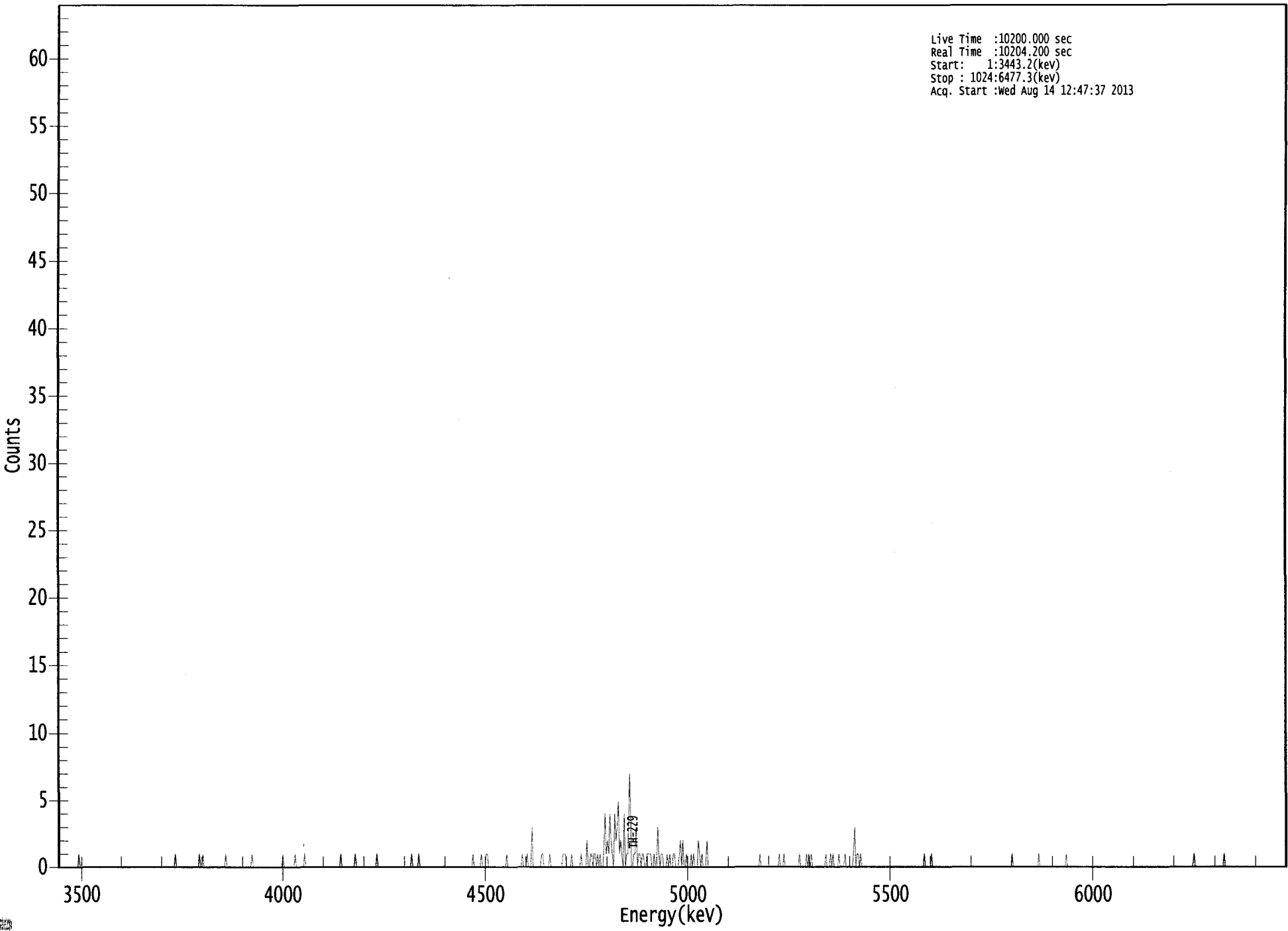
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	7.12E-002 +/- 8.71E-002	1.05E-001 +/- 2.18E-002
TH-228	0.984	5400.00*	4.78E-001 +/- 2.42E-001	1.51E-001 +/- 3.14E-002
TH-229	1.000	4872.00*	2.41E+000 +/- 5.01E-001	1.47E-001 +/- 3.07E-002
TH-230	0.977	4672.00*	4.12E-001 +/- 2.16E-001	1.02E-001 +/- 2.13E-002
TH-232	0.986	3997.00*	1.43E-001 +/- 1.21E-001	1.02E-001 +/- 2.12E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

000066193.CNF

Live Time :10200.000 sec
Real Time :10204.200 sec
Start: 1:3443.2(kev)
Stop : 1024:6477.3(kev)
Acq. Start :wed Aug 14 12:47:37 2013



ROI Type: 1

ROI Type: 3

9276

 ***** 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: 10204

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

369: 0 0 0 0 0 0 1 0

Sample Title: 10

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	1	0	0	0	1
393:	0	0	0	3	0	0	0	0
401:	0	0	0	1	1	0	0	0
409:	0	0	1	0	0	0	0	0
417:	0	0	0	0	0	1	1	1
425:	0	0	0	0	1	0	0	0
433:	0	0	0	0	1	0	0	0
441:	0	2	0	0	1	1	0	1
449:	1	0	1	0	1	0	0	1
457:	4	1	2	1	4	2	1	0
465:	4	2	3	5	1	2	1	0
473:	4	0	1	1	4	7	0	0
481:	1	1	3	0	1	1	0	1
489:	1	0	0	1	1	1	1	0
497:	0	1	0	0	3	1	0	1
505:	1	0	0	0	1	0	1	0
513:	0	1	1	0	0	0	1	2
521:	0	2	0	0	1	0	0	0
529:	1	0	1	0	0	0	2	1
537:	0	1	0	0	0	2	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	1	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	1	0	0	0	1	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	1	0	0	0	0	0
625:	1	0	1	0	1	0	0	0
633:	0	0	0	0	0	0	0	0
641:	1	0	0	0	1	0	1	0
649:	0	0	0	1	0	0	0	0
657:	1	0	0	0	0	0	0	1
665:	3	0	1	1	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	1	0	0	0	0	0
729:	1	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	1	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	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	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	1	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	1	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



Sample Description: DUP 07 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

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Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 64789
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/18/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:40 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: 0.1380 +/- 0.0131
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Chem. Recovery Factor: 0.7228 +/- 0.0698

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	5.724	1.66	169.38	0.34	0.00E+000	3.0
TH-228	5.418	1.32	215.97	0.68	0.00E+000	3.0
TH-229 T	4.861	124.49	17.61	0.51	0.00E+000	4.9
TH-230	4.587	10.66	61.14	0.34	0.00E+000	3.0
TH-232	3.872	3.83	102.72	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

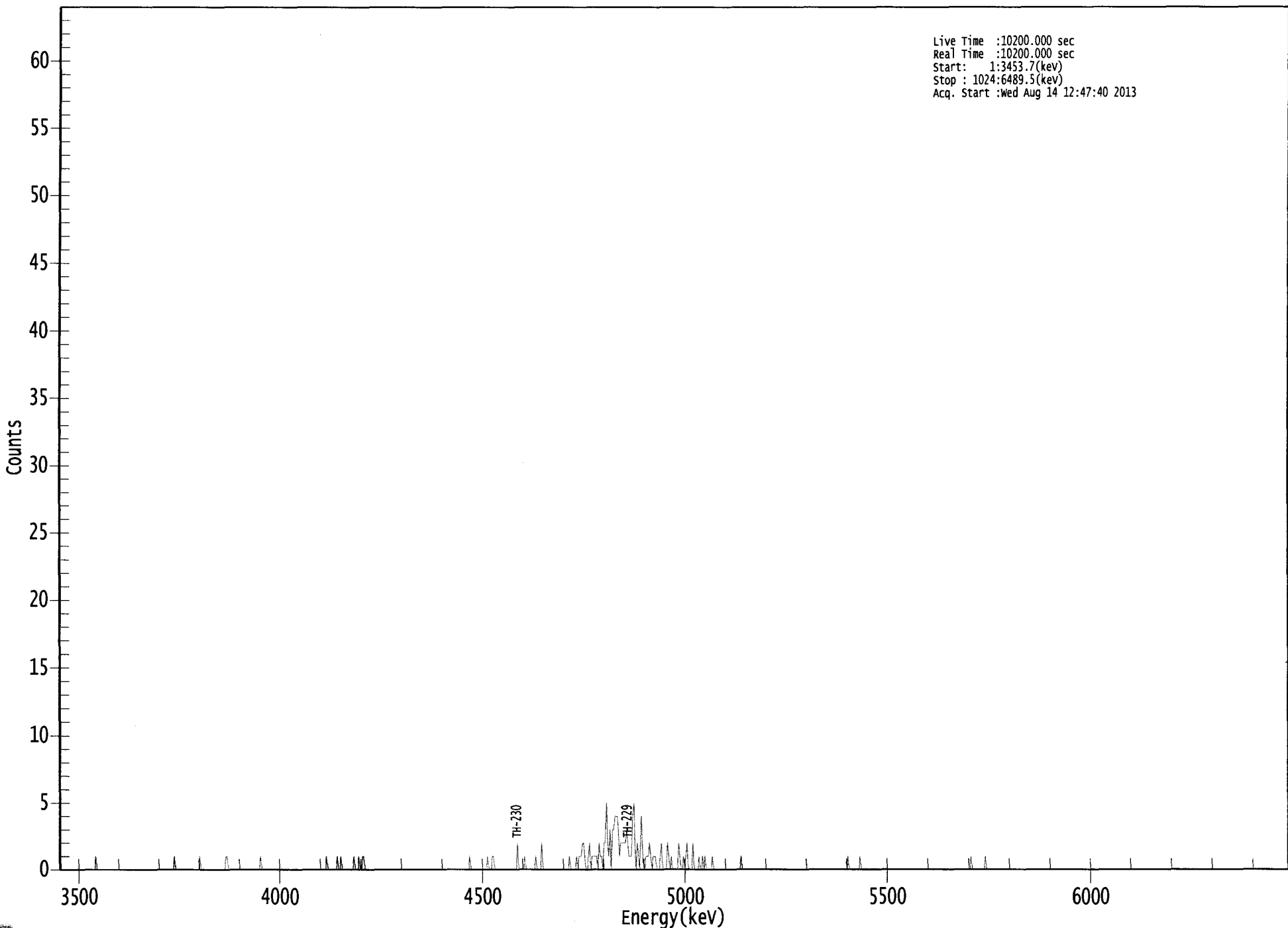
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.920	5850.00*	3.28E-002 +/- 5.58E-002	9.44E-002 +/- 1.76E-002
TH-228	0.998	5400.00*	2.61E-002 +/- 5.65E-002	1.11E-001 +/- 2.07E-002
TH-229	0.999	4872.00*	2.40E+000 +/- 4.47E-001	1.01E-001 +/- 1.89E-002
TH-230	0.963	4672.00*	2.05E-001 +/- 1.31E-001	9.20E-002 +/- 1.71E-002
TH-232	0.922	3997.00*	7.35E-002 +/- 7.68E-002	8.01E-002 +/- 1.49E-002

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US EPA ARCHIVE DOCUMENT

0000066178.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :wed Aug 14 12:47:40 2013



ROI Type: 1

ROI Type: 3

0201

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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



C
00/11

Sample Description: FB AT I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 64790
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:42 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: 0.1178 +/- 0.0120
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Chem. Recovery Factor: 0.6582 +/- 0.0682

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	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.297	-0.17	1169.4	0.17	0.00E+000	0.0
TH-229 T	4.875	105.83	19.07	0.17	0.00E+000	6.4
TH-230	4.602	10.00	65.01	0.00	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 -----

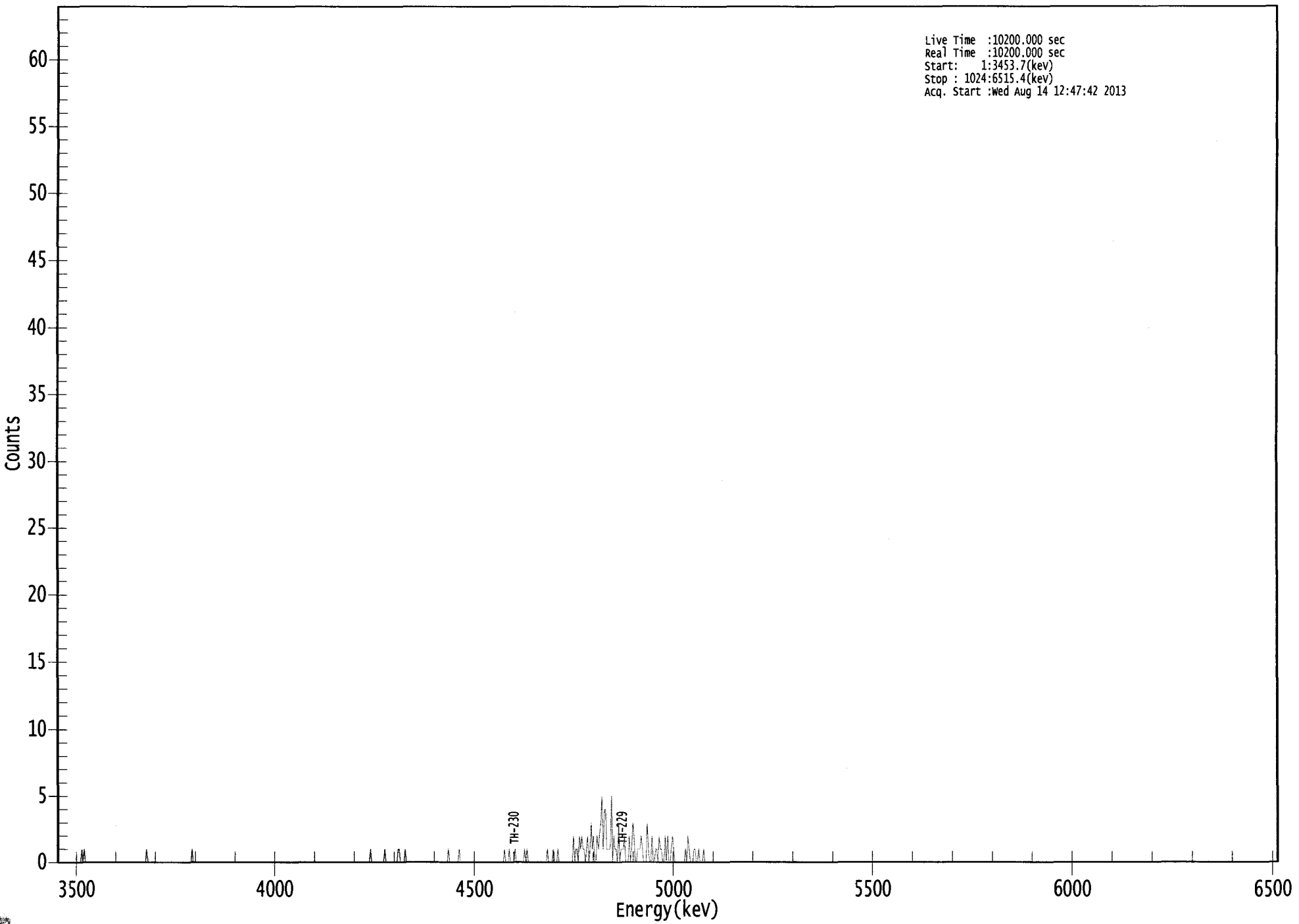
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-3.93E-003 +/- 4.60E-002	9.65E-002 +/- 1.93E-002
TH-228	0.946	5400.00*	-3.93E-003 +/- 4.59E-002	9.64E-002 +/- 1.93E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.79E-001	9.43E-002 +/- 1.89E-002
TH-230	0.975	4672.00*	2.25E-001 +/- 1.53E-001	1.35E-001 +/- 2.71E-002
TH-232	0.987	3997.00*	0.00E+000 +/- 6.24E-002	1.35E-001 +/- 2.70E-002

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US EPA ARCHIVE DOCUMENT

000066179.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Wed Aug 14 12:47:42 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	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	1	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	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	1
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	1	1
289:	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
337:	0	1	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: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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
10/17

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 64791
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:44 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: 0.1508 +/- 0.0138
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Chem. Recovery Factor: 0.8277 +/- 0.0772

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	5.959	0.66	305.43	0.34	0.00E+000	2.9
TH-228	5.357	18.83	45.41	0.17	0.00E+000	2.9
TH-229	T 4.871	135.32	16.90	0.68	0.00E+000	3.9
TH-230	4.606	27.83	37.29	0.17	0.00E+000	5.9
TH-232	3.916	4.66	94.59	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

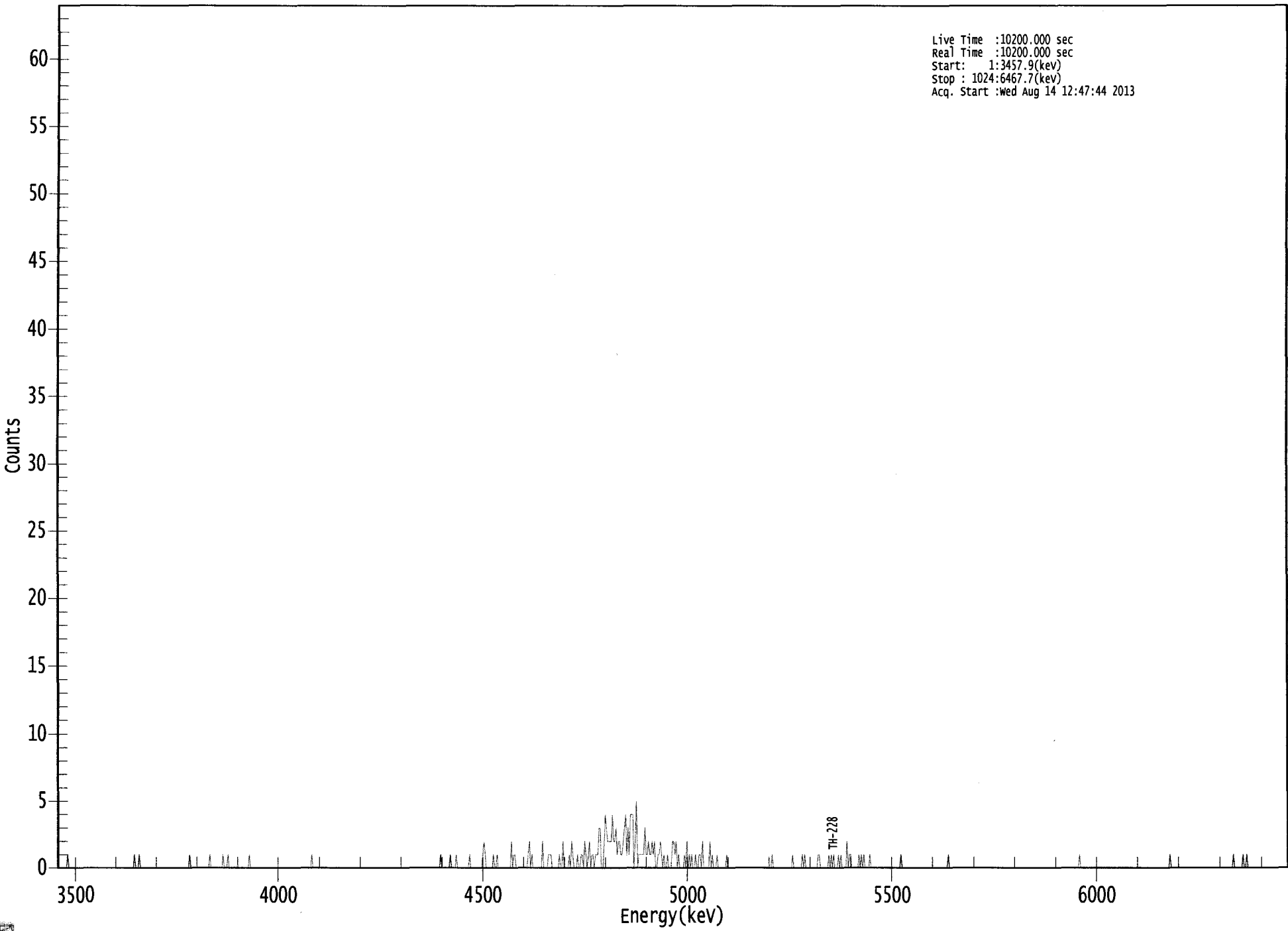
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.940	5850.00*	1.19E-002 +/- 3.65E-002	8.64E-002 +/- 1.55E-002
TH-228	0.990	5400.00*	3.40E-001 +/- 1.66E-001	7.53E-002 +/- 1.35E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.29E-001	9.96E-002 +/- 1.79E-002
TH-230	0.977	4672.00*	4.90E-001 +/- 2.03E-001	7.35E-002 +/- 1.32E-002
TH-232	0.967	3997.00*	8.19E-002 +/- 7.88E-002	8.40E-002 +/- 1.51E-002

AG
 8/15/13

US EPA ARCHIVE DOCUMENT

000066190.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Wed Aug 14 12:47:44 2013



0291

ROI Type: 1

ROI Type: 3

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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	1	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	1	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	1	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	1
129:	0	0	0	0	0	0	0	0
137:	0	0	1	0	0	0	1	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	1	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	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	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	1
321:	0	0	0	0	0	0	0	1
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	0	0	1
345:	0	0	0	0	0	0	0	0
353:	0	0	1	2	1	0	0	0
361:	0	0	0	1	0	0	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 13

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

801: 0 0 0 0 0 0 0 0

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	1	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	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	1	0	0	0	0	0	0
985:	0	1	0	0	1	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



C
8/15/13 ✓

Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-TH
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Th iso

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 64792
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 12:47:47 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: 0.1233 +/- 0.0124
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Chem. Recovery Factor: 0.7342 +/- 0.0748

Peak Match Tolerance: 0.175 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.849	2.00	169.74	0.00	0.00E+000	3.0
TH-228	5.364	6.32	82.73	0.68	0.00E+000	3.0
TH-229 T	4.877	110.49	18.70	0.51	0.00E+000	3.7
TH-230	4.598	26.66	38.24	0.34	0.00E+000	3.0
TH-232	4.004	2.83	120.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

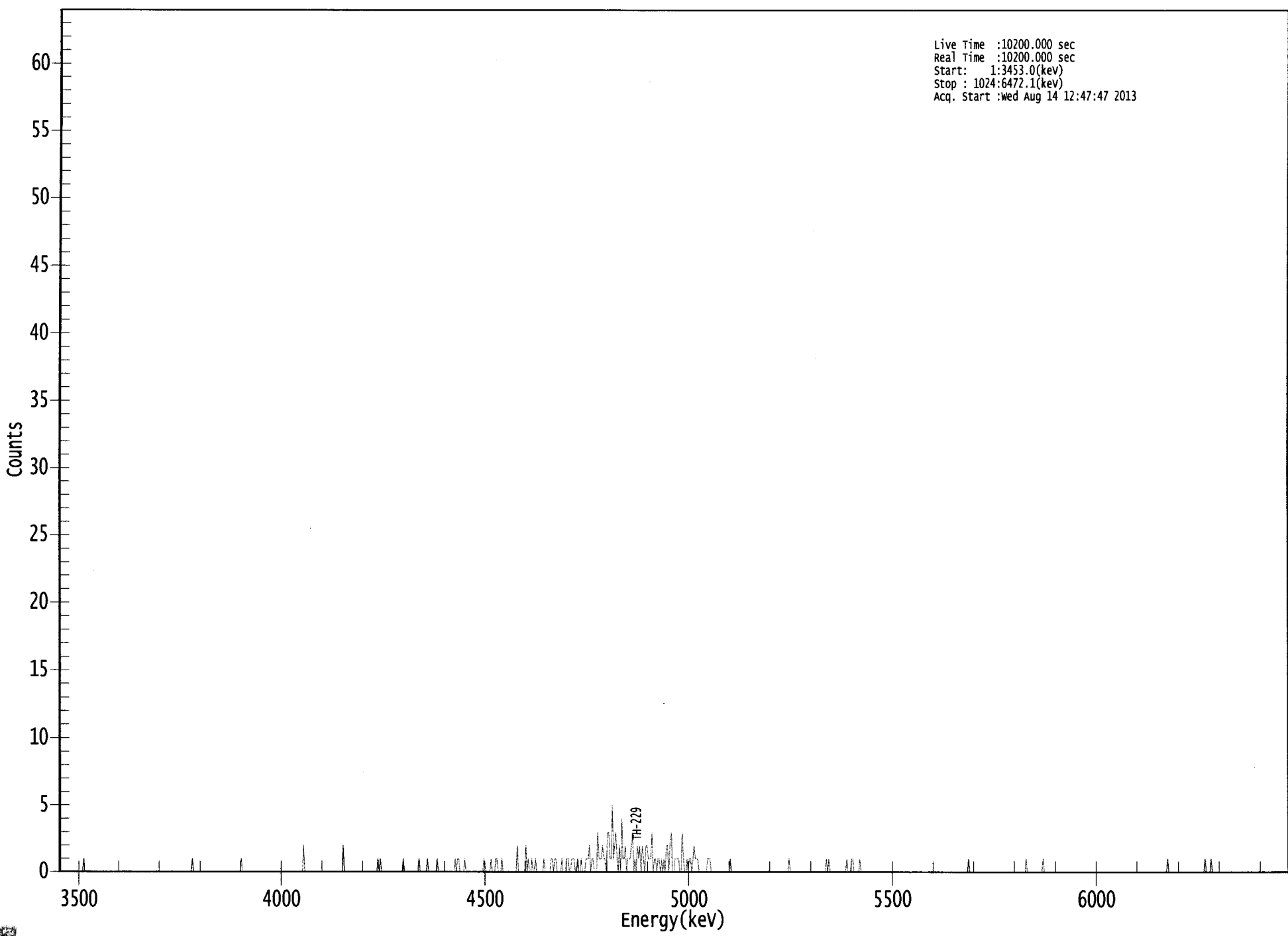
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	1.000	5850.00*	4.42E-002 +/- 7.55E-002	1.32E-001 +/- 2.60E-002
TH-228	0.993	5400.00*	1.39E-001 +/- 1.19E-001	1.24E-001 +/- 2.45E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 4.69E-001	1.13E-001 +/- 2.23E-002
TH-230	0.971	4672.00*	5.74E-001 +/- 2.47E-001	1.03E-001 +/- 2.02E-002
TH-232	1.000	3997.00*	6.08E-002 +/- 7.43E-002	8.97E-002 +/- 1.76E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

0000066191.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start :wed Aug 14 12:47:47 2013



ROI Type: 1

ROI Type: 3

0296
9670

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

Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	1
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	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:	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	2	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	2	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	1	0	1	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	1
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	1	0	0	0
305:	0	0	0	1	0	0	0	0
313:	0	0	0	1	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	1	0	1	1	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	0	0	0	0
361:	1	0	0	0	1	1	0	0

369: 0 1 0 0 0 0 0 0

Sample Title: 14

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

Sample Title: 14

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



Copy ✓

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-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 64764
 Reagent Blank: <not performed>

Sample Size: 2.300E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 4:15:14 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: 0.1683 +/- 0.0146
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 0.9637 +/- 0.0857

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	5.756	0.79	455.82	2.21	0.00E+000	3.0
TH-228	5.350	8.77	79.17	3.23	0.00E+000	3.0
TH-229 T	4.876	152.32	15.92	0.68	0.00E+000	13.4
TH-230	4.593	18.98	46.38	1.02	0.00E+000	3.0
TH-232	3.999	4.49	98.45	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.955	5850.00*	5.56E-002 +/- 2.54E-001	5.63E-001 +/- 9.59E-002
TH-228	0.987	5400.00*	6.17E-001 +/- 4.99E-001	6.40E-001 +/- 1.09E-001
TH-229	1.000	4872.00*	1.05E+001 +/- 1.79E+000	3.88E-001 +/- 6.61E-002
TH-230	0.968	4672.00*	1.30E+000 +/- 6.43E-001	4.32E-001 +/- 7.36E-002
TH-232	1.000	3997.00*	3.07E-001 +/- 3.07E-001	3.59E-001 +/- 6.12E-002

AG
 8/15/13

US EPA ARCHIVE DOCUMENT

0000066197.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(keV)
Stop : 1024:6549.5(keV)
Acq. Start :wed Aug 14 16:15:14 2013

Counts

3500

4000

4500

5000
Energy(keV)

5500

6000

6500

ROI Type: 1

ROI Type: 3

1020

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

369: 1 0 0 0 0 0 0 0 0

Sample Title: 15

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

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



C
Bliss

Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-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 64765
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 4:15:15 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: 0.0967 +/- 0.0109
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Chem. Recovery Factor: 0.4983 +/- 0.0569

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	5.813	2.15	161.66	0.85	0.00E+000	2.9
TH-228	5.380	2.09	242.14	3.91	0.00E+000	2.9
TH-229 T	4.861	86.64	21.25	1.36	0.00E+000	4.3
TH-230	4.601	1.30	273.46	1.70	0.00E+000	2.9
TH-232	3.967	2.15	161.66	0.85	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

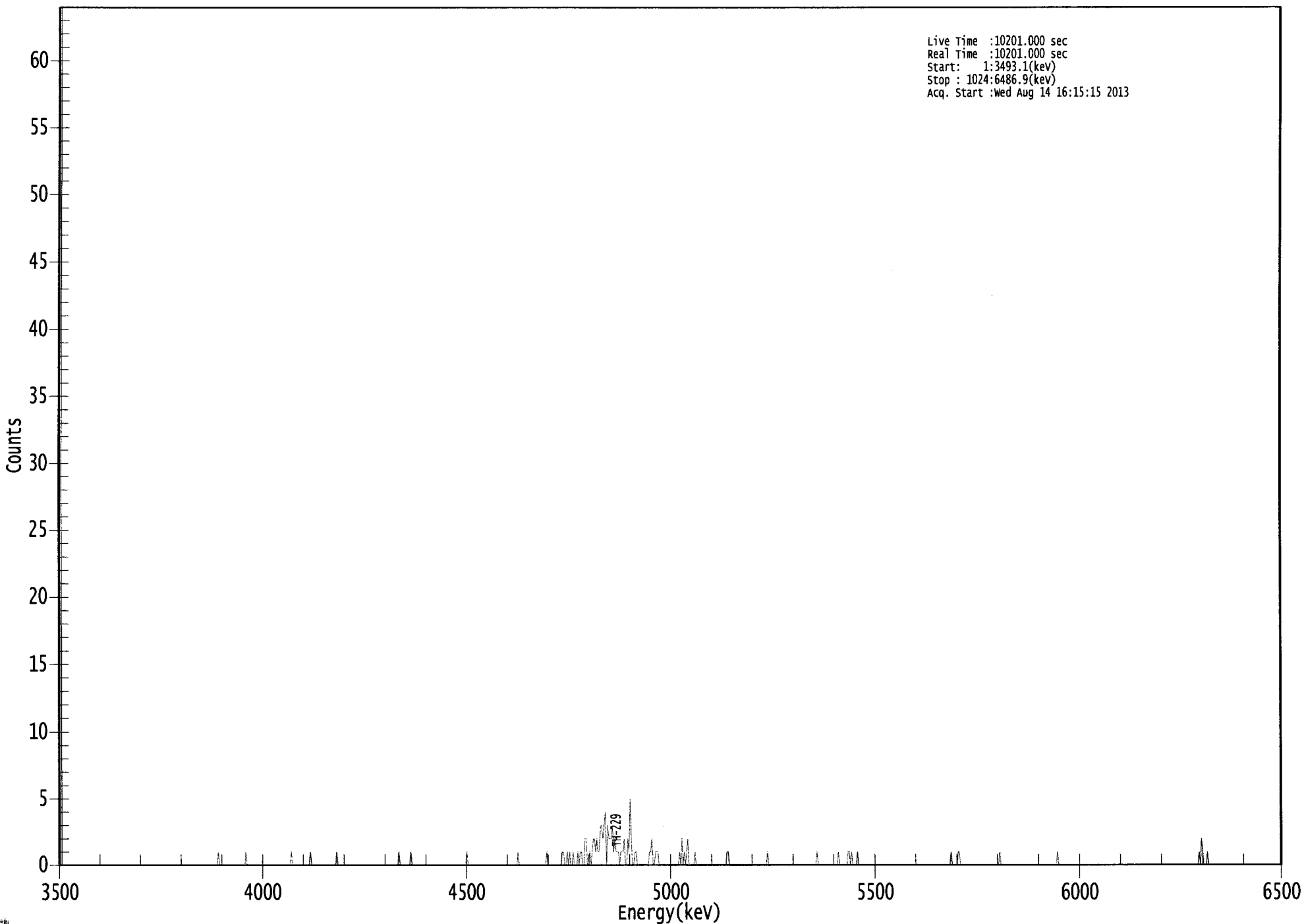
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.993	5850.00*	6.06E-002 +/- 9.88E-002	1.69E-001 +/- 3.73E-002
TH-228	0.998	5400.00*	5.88E-002 +/- 1.43E-001	2.74E-001 +/- 6.06E-002
TH-229	0.999	4872.00*	2.39E+000 +/- 5.27E-001	1.89E-001 +/- 4.17E-002
TH-230	0.974	4672.00*	3.57E-002 +/- 9.79E-002	2.02E-001 +/- 4.46E-002
TH-232	0.995	3997.00*	5.89E-002 +/- 9.61E-002	1.64E-001 +/- 3.63E-002

AG
 8/15/13

US EPA ARCHIVE DOCUMENT

0000066198.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 14 16:15:15 2013



ROI Type: 1

ROI Type: 3

0306

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 16

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

801: 0 0 0 0 0 0 0 0

Sample Title: 16

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



C
B115

Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-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 64766
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 4:15:12 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: 0.1431 +/- 0.0136
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Chem. Recovery Factor: 0.7275 +/- 0.0702

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	5.793	0.28	1302.3	2.72	0.00E+000	2.9
TH-228	5.362	21.11	45.95	2.89	0.00E+000	2.9
TH-229 T	4.884	127.62	17.54	2.38	0.00E+000	4.9
TH-230	4.635	26.30	39.64	1.70	0.00E+000	2.9
TH-232	3.980	28.64	37.63	1.36	0.00E+000	3.7

T = Tracer Peak used for Effective Efficiency

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

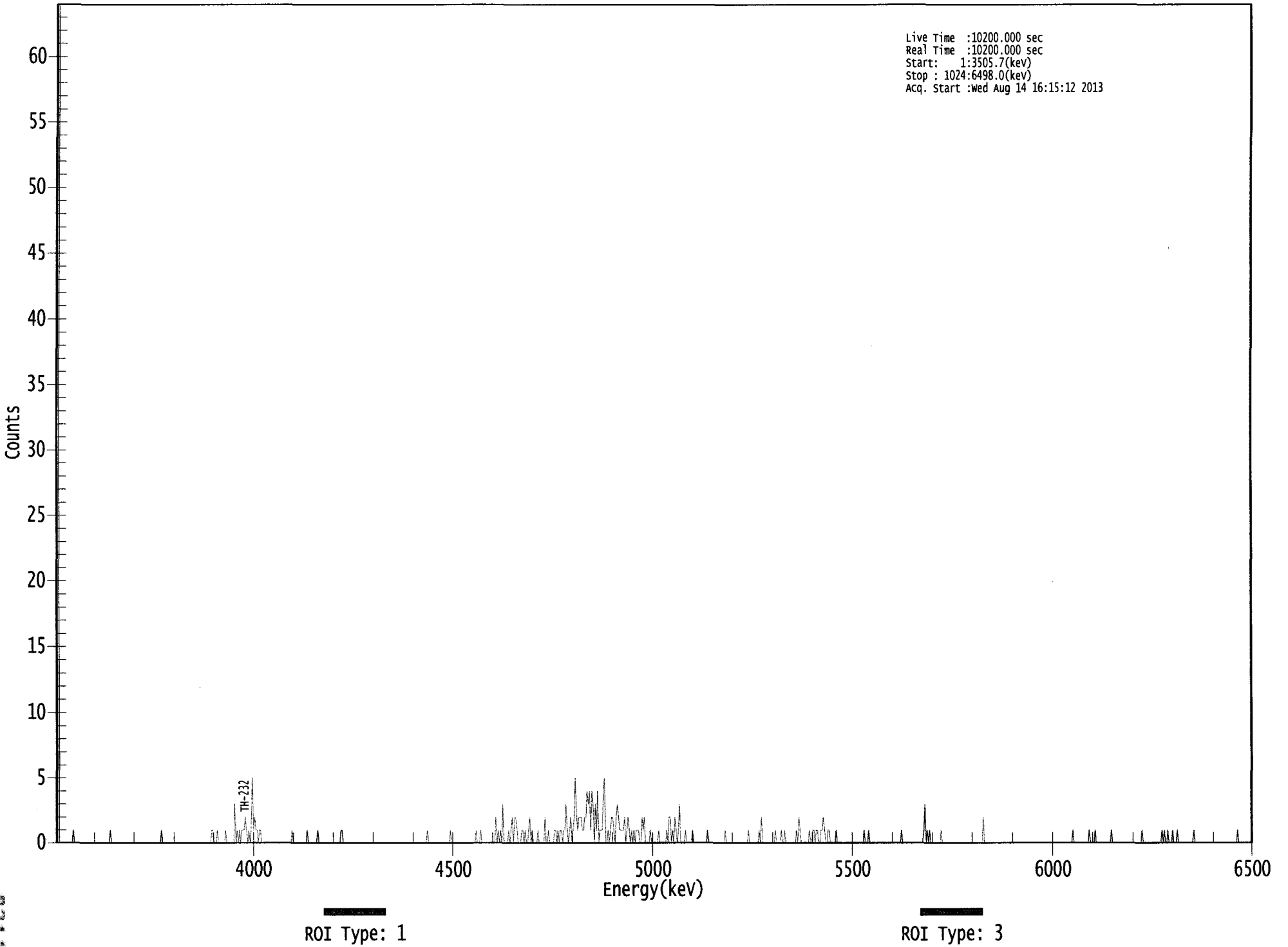
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.983	5850.00*	5.33E-003 +/- 6.94E-002	1.63E-001 +/- 3.03E-002
TH-228	0.992	5400.00*	4.01E-001 +/- 1.99E-001	1.67E-001 +/- 3.09E-002
TH-229	0.999	4872.00*	2.37E+000 +/- 4.41E-001	1.52E-001 +/- 2.83E-002
TH-230	0.993	4672.00*	4.88E-001 +/- 2.14E-001	1.36E-001 +/- 2.53E-002
TH-232	0.998	3997.00*	5.30E-001 +/- 2.22E-001	1.27E-001 +/- 2.36E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

000066195.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :wed Aug 14 16:15:12 2013



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

Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	1	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	1	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	1	1	0
137:	0	0	1	0	0	0	0	0
145:	0	1	0	0	0	0	0	0
153:	0	3	0	1	0	1	0	1
161:	1	1	2	1	0	1	0	1
169:	5	1	2	1	1	0	1	1
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	1	0	0	0	0	0
209:	0	0	0	0	0	0	0	1
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	1	1	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	1	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	0	0	0	0	0	0
361:	1	0	0	0	1	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 0 0 0 0 0 0

Sample Title: 17

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



C
8/15 ✓

Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000661
 Batch Identification: 1307153A-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 64767
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/19/2013 7:16:10 AM
 Acquisition Date/Time: 8/14/2013 4:15:13 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: 0.1455 +/- 0.0135
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
 Chem. Recovery Factor: 0.7092 +/- 0.0672

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.701	0.15	1398.5	0.85	0.00E+000	2.6
TH-228	5.387	0.15	1398.5	0.85	0.00E+000	2.6
TH-229 T	4.880	129.83	17.21	0.17	0.00E+000	2.9
TH-230	4.660	7.83	70.93	0.17	0.00E+000	2.6
TH-232	3.977	2.83	120.54	0.17	0.00E+000	2.6

T = Tracer Peak used for Effective Efficiency

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

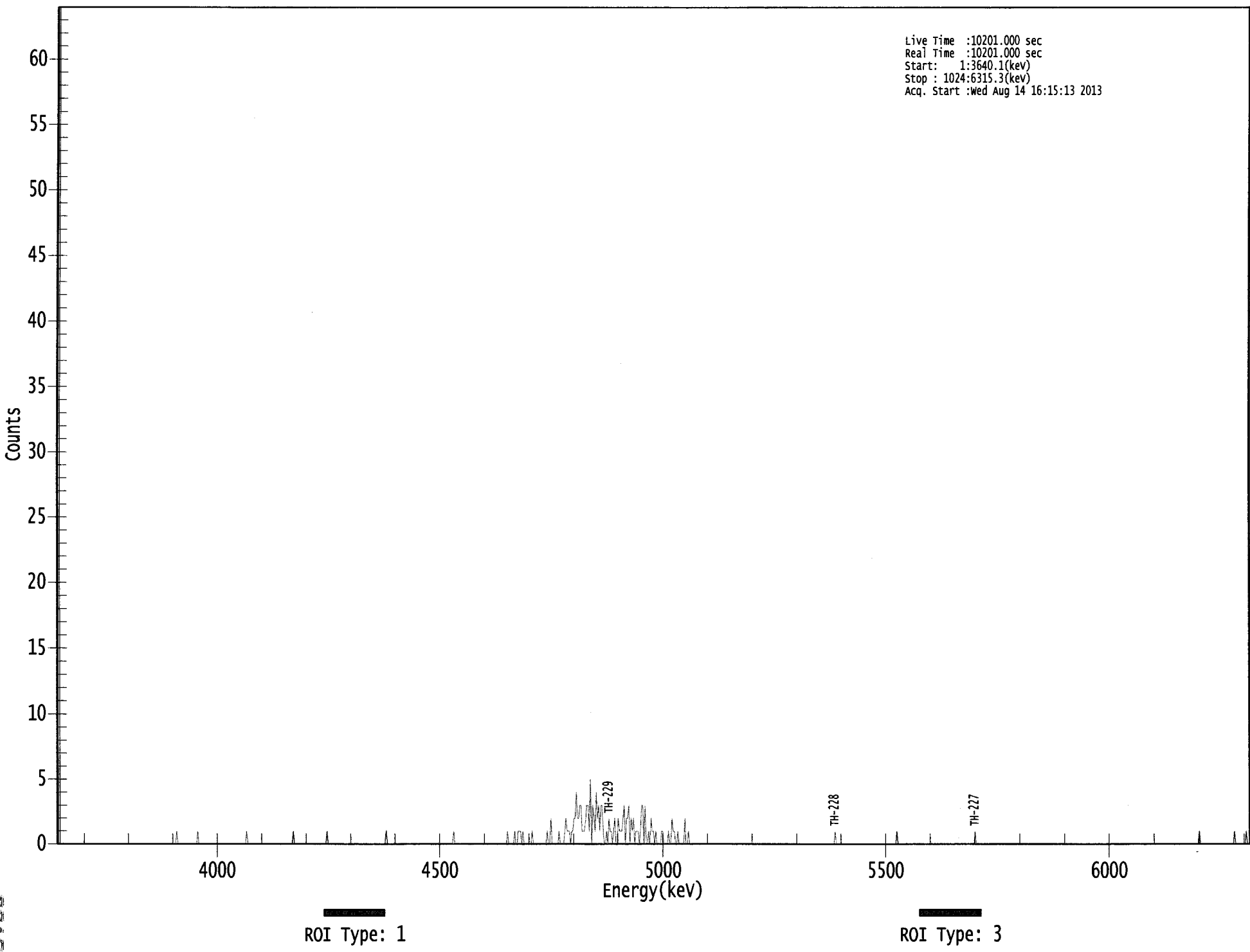
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.890	5850.00*	2.81E-003 +/- 3.93E-002	1.12E-001 +/- 2.05E-002
TH-228	0.999	5400.00*	2.81E-003 +/- 3.92E-002	1.12E-001 +/- 2.04E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 4.34E-001	7.64E-002 +/- 1.39E-002
TH-230	0.999	4672.00*	1.43E-001 +/- 1.05E-001	7.62E-002 +/- 1.39E-002
TH-232	0.998	3997.00*	5.15E-002 +/- 6.28E-002	7.60E-002 +/- 1.39E-002

AG
8/15/13

US EPA ARCHIVE DOCUMENT

000066196.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 14 16:15:13 2013



9169

 ***** 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	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	1
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	1	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	1	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	1	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	1	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	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:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	1	0	0
345:	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 18

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

801: 0 0 0 0 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	1	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	1	0	0	0	0	0	0
1017:	0	0	0	1	0	0	0	0



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/14/2013
Time : 5:45:39 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/14/2013 5:27:31 AM
Alpha 004	21f	ALL	Passed	8/14/2013 5:27:32 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	8/14/2013 5:27:33 AM
Alpha 011	21f	ALL	Passed	8/14/2013 5:27:34 AM
Alpha 012	21f	ALL	Passed	8/14/2013 5:27:34 AM
Alpha 013	21f	ALL	Passed	8/14/2013 5:27:35 AM
Alpha 014	21f	ALL	Passed	8/14/2013 5:27:36 AM
Alpha 015	21f	Peak Energy	Action	8/14/2013 5:27:37 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/10/2013 11:23:01 AM
Alpha 019	AIM730	ALL	Passed	8/14/2013 5:27:38 AM
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/14/2013 5:27:38 AM
Alpha 023	AIM730	ALL	Passed	8/14/2013 5:27:39 AM
Alpha 024	AIM730	ALL	Passed	8/14/2013 5:27:40 AM
Alpha 025	AIM730	ALL	Passed	8/14/2013 5:27:41 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/14/2013 5:27:42 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/14/2013 5:27:42 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/14/2013 5:27:43 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:44 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:46 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/13/2013 5:25:31 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:49 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:50 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:52 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:54 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:56 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:27:58 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:00 AM

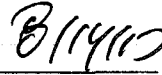
US EPA ARCHIVE DOCUMENT

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:02 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:04 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:07 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:10 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:13 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/14/2013 5:28:15 AM

APPROVED BY: _____



APPROVAL DATE: _____



 ***** 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)

RUN 1

Work Order	13-07153
Analysis Code	Ra226
Run	1
Date Received	7/22/2013
Lab Deadline	8/13/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	1
Matrix	WA
Method	E903.0
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	990.402
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		07/24/13 00:00	1.0000E+00
02	MBL	BLANK		07/24/13 00:00	1.0000E+00
03	DUP	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
04	TRG	PZ-104-KS TOT	46	07/18/13 13:01	1.0000E+00
05	TRG	PZ-104-KS DIS	46	07/18/13 13:01	1.0000E+00
06	DO	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
07	TRG	PZ-206-SS DIS	43	07/18/13 13:35	1.0000E+00
08	TRG	PZ-207-AS TOT	44	07/18/13 14:32	1.0000E+00
09	TRG	PZ-207-AS DIS	44	07/18/13 14:32	1.0000E+00
10	TRG	DUP 07 TOT	43	07/18/13 00:00	1.0000E+00
11	TRG	DUP 07 DIS	43	07/18/13 00:00	1.0000E+00
12	TRG	FB at I-73 TOT	37	07/19/13 08:50	1.0000E+00
13	TRG	I-73 TOT	44	07/19/13 08:55	1.0000E+00
14	TRG	I-73 DIS	44	07/19/13 08:55	1.0000E+00
15	TRG	PZ-103-SS TOT	39	07/19/13 09:45	1.0000E+00
16	TRG	PZ-103-SS DIS	39	07/19/13 09:45	1.0000E+00
17	TRG	PZ-102R-SS TOT	44	07/19/13 10:15	1.0000E+00
18	TRG	PZ-102R-SS DIS	44	07/19/13 10:15	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.

0325

Ra226

Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.9207	911.9	435.0	105.90		0.0230	0.0301	0.0071		105.90	2.53	1.00
02	MBL	0.9170	908.2	398.1	97.31		0.0224	0.0293	0.0069		97.31	2.47	1.00
03	DUP	0.9171	908.3	390.3	95.39		0.0224	0.0294	0.0070		95.39	2.50	1.00
04	TRG	0.9150	906.2	399.1	97.77		0.0226	0.0298	0.0072		97.77	2.55	1.00
05	TRG	0.9180	909.2	401.1	97.94		0.0224	0.0294	0.0070		97.94	2.50	1.00
06	DO	0.9155	906.7	412.3	100.95		0.0226	0.0297	0.0071		100.95	2.53	1.00
07	TRG	0.9150	906.2	387.8	95.00		0.0229	0.0297	0.0068		95.00	2.44	1.00
08	TRG	0.9149	906.1	378.5	92.73		0.0227	0.0308	0.0081		92.73	2.79	1.00
09	TRG	0.9157	906.9	363.6	89.00		0.0225	0.0298	0.0073		89.00	2.58	1.00
10	TRG	0.9147	905.9	383.7	94.03		0.0230	0.0295	0.0065		94.03	2.34	1.00
11	TRG	0.9131	904.3	389.0	95.49		0.0225	0.0297	0.0072		95.49	2.55	1.00
12	TRG	0.9138	905.0	364.6	89.43		0.0226	0.0288	0.0062		89.43	2.23	1.00
13	TRG	0.9209	912.1	0.5	0.12		0.0224	0.0359	0.0135		0.12	5.02	1.00
14	TRG	0.9136	904.8	27.8	6.82		0.0224	0.0347	0.0123		6.82	4.22	1.00
15	TRG	0.9128	904.0	405.4	99.55		0.0225	0.0312	0.0087		99.55	2.94	1.00
16	TRG	0.9132	904.4	386.2	94.80		0.0222	0.0306	0.0084		94.80	2.87	1.00
17	TRG	0.9129	904.1	335.8	82.45		0.0227	0.0288	0.0061		82.45	2.20	1.00
18	TRG	0.9137	904.9	404.3	99.18		0.0225	0.0290	0.0065		99.18	2.34	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.

<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			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
02	MBL			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
03	DUP			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
04	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
05	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
06	DO			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
07	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
08	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
09	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
10	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
11	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
12	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
13	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
14	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
15	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
16	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
17	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	LWALKER		
18	TRG			08/06/13 19:53	LWALKER	08/09/13 15:38	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.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-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	1.06E+01	1.22E+00	2.01E-01	1.03E+01	103.15	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-5.95E-03	6.96E-02	1.46E-01					OK	OK
03	RA-226	DUP	PZ-206-SS TOT	pCi/l	2.27E+00	5.72E-01	1.91E-01				OK	OK	
04	RA-226	TRG	PZ-104-KS TOT	pCi/l	2.64E-01	2.01E-01	1.61E-01					OK	
05	RA-226	TRG	PZ-104-KS DIS	pCi/l	9.88E-02	1.27E-01	1.78E-01					OK	
06	RA-226	DO	PZ-206-SS TOT	pCi/l	2.30E+00	6.01E-01	1.91E-01					OK	
07	RA-226	TRG	PZ-206-SS DIS	pCi/l	1.04E+00	4.08E-01	2.67E-01					OK	
08	RA-226	TRG	PZ-207-AS TOT	pCi/l	8.81E-01	3.99E-01	3.45E-01					OK	
09	RA-226	TRG	PZ-207-AS DIS	pCi/l	8.18E-01	3.80E-01	3.49E-01					OK	
10	RA-226	TRG	DUP 07 TOT	pCi/l	6.32E-01	2.83E-01	1.54E-01					OK	
11	RA-226	TRG	DUP 07 DIS	pCi/l	2.01E-01	1.72E-01	1.70E-01					OK	
12	RA-226	TRG	FB at I-73 TOT	pCi/l	4.67E-02	1.01E-01	1.99E-01					OK	
13	RA-226	TRG	I-73 TOT	pCi/l	4.69E+01	1.38E+02	3.01E+02					INV	
14	RA-226	TRG	I-73 DIS	pCi/l	-8.94E-01	2.21E+00	6.30E+00					INV	
15	RA-226	TRG	PZ-103-SS TOT	pCi/l	3.87E+00	8.53E-01	2.83E-01					OK	
16	RA-226	TRG	PZ-103-SS DIS	pCi/l	3.44E+00	8.59E-01	4.29E-01					OK	
17	RA-226	TRG	PZ-102R-SS TOT	pCi/l	3.25E+00	7.34E-01	2.83E-01					OK	
18	RA-226	TRG	PZ-102R-SS DIS	pCi/l	1.98E+00	5.43E-01	2.77E-01					OK	

Client	Engineering Management Support, Inc.
	13-07153
Eberline Services Work Order	13-07153
Analysis Code	Ra226
Run	1

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-Ra226-1

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	07/24/13 00:00	1.00E+00	100.00	0.00	105.90		8/9/2013 15:38	
02	RA-226	MBL	07/24/13 00:00	1.00E+00	97.31	0.00	97.31		8/9/2013 15:38	
03	RA-226	DUP	07/18/13 13:35	1.00E+00	95.39	0.00	95.39		8/9/2013 15:38	
04	RA-226	TRG	07/18/13 13:01	1.00E+00	97.77	0.00	97.77		8/9/2013 15:38	
05	RA-226	TRG	07/18/13 13:01	1.00E+00	97.94	0.00	97.94		8/9/2013 15:38	
06	RA-226	DO	07/18/13 13:35	1.00E+00	100.00	0.00	100.95		8/9/2013 15:38	
07	RA-226	TRG	07/18/13 13:35	1.00E+00	95.00	0.00	95.00		8/9/2013 15:38	
08	RA-226	TRG	07/18/13 14:32	1.00E+00	92.73	0.00	92.73		8/9/2013 15:38	
09	RA-226	TRG	07/18/13 14:32	1.00E+00	89.00	0.00	89.00		8/9/2013 15:38	
10	RA-226	TRG	07/18/13 00:00	1.00E+00	94.03	0.00	94.03		8/9/2013 15:38	
11	RA-226	TRG	07/18/13 00:00	1.00E+00	95.49	0.00	95.49		8/9/2013 15:38	
12	RA-226	TRG	07/19/13 08:50	1.00E+00	89.43	0.00	89.43		8/9/2013 15:38	
13	RA-226	TRG	07/19/13 08:55	1.00E+00	0.12	0.00	0.12		8/9/2013 15:38	
14	RA-226	TRG	07/19/13 08:55	1.00E+00	6.82	0.00	6.82		8/9/2013 15:38	
15	RA-226	TRG	07/19/13 09:45	1.00E+00	99.55	0.00	99.55		8/9/2013 15:38	
16	RA-226	TRG	07/19/13 09:45	1.00E+00	94.80	0.00	94.80		8/9/2013 15:38	
17	RA-226	TRG	07/19/13 10:15	1.00E+00	82.45	0.00	82.45		8/9/2013 15:38	
18	RA-226	TRG	07/19/13 10:15	1.00E+00	99.18	0.00	99.18		8/9/2013 15:38	

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Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-Ra226-1

	
Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	08/12/13 12:56		A_Spec	Alpha_043	170	3.16 E+02	0.00 E+00	20
02	RA-226	MBL	08/12/13 12:56		A_Spec	Alpha_044	170	-1.70 E-01	1.00 E-03	19.2
03	RA-226	DUP	08/12/13 12:56		A_Spec	Alpha_045	170	6.25 E+01	3.00 E-03	19.1
04	RA-226	TRG	08/12/13 12:56		A_Spec	Alpha_046	170	6.83 E+00	1.00 E-03	17.9
05	RA-226	TRG	08/12/13 12:56		A_Spec	Alpha_047	170	2.66 E+00	2.00 E-03	18.2
06	RA-226	DO	08/12/13 12:56		A_Spec	Alpha_048	170	5.77 E+01	2.00 E-03	16.8
07	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_003	170	2.66 E+01	8.00 E-03	17.5
08	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_004	170	2.15 E+01	1.50 E-02	19.4
09	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_010	170.02	2.09 E+01	1.80 E-02	19.7
10	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_011	170.02	1.97 E+01	2.00 E-03	20.5
11	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_012	170.02	5.66 E+00	2.00 E-03	19.9
12	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_013	170.02	1.32 E+00	4.00 E-03	18.7
13	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_014	170.02	9.80 E-01	6.00 E-03	18.5
14	RA-226	TRG	08/12/13 16:47		A_Spec	Alpha_015	170.02	-8.50 E-01	5.00 E-03	14.8
15	RA-226	TRG	08/12/13 16:48		A_Spec	Alpha_019	170.02	8.20 E+01	0.00 E+00	16.6
16	RA-226	TRG	08/12/13 16:48		A_Spec	Alpha_022	170	6.56 E+01	1.40 E-02	15.3
17	RA-226	TRG	08/12/13 16:48		A_Spec	Alpha_023	170.02	7.86 E+01	8.00 E-03	17.1
18	RA-226	TRG	08/12/13 16:48		A_Spec	Alpha_024	170	5.41 E+01	1.10 E-02	17.1

0000

2.5

Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	07/24/13 00:00	1.0000	0.9207	911.8631	435.0000	105.90	2.53	1.00
02	MBL	BLANK	07/24/13 00:00	1.0000	0.9170	908.1986	398.1000	97.31	2.47	1.00
03	DUP	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.9171	908.2977	390.3000	95.39	2.50	1.00
04	TRG	PZ-104-KS TOT	07/18/13 13:01	1.0000	0.9150	906.2178	399.1000	97.77	2.55	1.00
05	TRG	PZ-104-KS DIS	07/18/13 13:01	1.0000	0.9180	909.1890	401.1000	97.94	2.50	1.00
06	DO	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.9155	906.7130	412.3000	100.95	2.53	1.00
07	TRG	PZ-206-SS DIS	07/18/13 13:35	1.0000	0.9150	906.2178	387.8000	95.00	2.44	1.00
08	TRG	PZ-207-AS TOT	07/18/13 14:32	1.0000	0.9149	906.1188	378.5000	92.73	2.79	1.00
09	TRG	PZ-207-AS DIS	07/18/13 14:32	1.0000	0.9157	906.9111	363.6000	89.00	2.58	1.00
10	TRG	DUP 07 TOT	07/18/13 00:00	1.0000	0.9147	905.9207	383.7000	94.03	2.34	1.00
11	TRG	DUP 07 DIS	07/18/13 00:00	1.0000	0.9131	904.3361	389.0000	95.49	2.55	1.00
12	TRG	FB at I-73 TOT	07/19/13 08:50	1.0000	0.9138	905.0293	364.6000	89.43	2.23	1.00
13	TRG	I-73 TOT	07/19/13 08:55	1.0000	0.9209	912.0612	0.5066	0.12	5.02	1.00
14	TRG	I-73 DIS	07/19/13 08:55	1.0000	0.9136	904.8313	27.8100	6.82	4.22	1.00
15	TRG	PZ-103-SS TOT	07/19/13 09:45	1.0000	0.9128	904.0389	405.4000	99.55	2.94	1.00
16	TRG	PZ-103-SS DIS	07/19/13 09:45	1.0000	0.9132	904.4351	386.2000	94.80	2.87	1.00
17	TRG	PZ-102R-SS TOT	07/19/13 10:15	1.0000	0.9129	904.1380	335.8000	82.45	2.20	1.00
18	TRG	PZ-102R-SS DIS	07/19/13 10:15	1.0000	0.9137	904.9303	404.3000	99.18	2.34	1.00

13-52

15

2-21

03
03
04

JW

Internal Work Order	Run	Analysis Code	Date	Technician	Technician Initials	Witness Initials
13-07153	1	Ra226	8/6/2013 19:53	LWALKER		

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	8/6/2013	0.500	0.5166				10.25	0.472	0.00	0.000	0.00	0.000	0.00	0.000
Ra-224	Ra-11	37.640	8/6/2013	0.530	0.5149				8.73	0.445	0.00	0.000	0.00	0.000	0.00	0.000

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	Ba-133	Ba-6a	990.402	8/6/2013	0.9207	1.0200										
02	Ba-133	Ba-6a	990.402	8/6/2013	0.9170	1.0200										
03	Ba-133	Ba-6a	990.402	8/6/2013	0.9171	1.0200										
04	Ba-133	Ba-6a	990.402	8/6/2013	0.9150	1.0200										
05	Ba-133	Ba-6a	990.402	8/6/2013	0.9180	1.0200										
06	Ba-133	Ba-6a	990.402	8/6/2013	0.9155	1.0200										
07	Ba-133	Ba-6a	990.402	8/6/2013	0.9150	1.0200										
08	Ba-133	Ba-6a	990.402	8/6/2013	0.9149	1.0200										
09	Ba-133	Ba-6a	990.402	8/6/2013	0.9157	1.0200										
10	Ba-133	Ba-6a	990.402	8/6/2013	0.9147	1.0200										
11	Ba-133	Ba-6a	990.402	8/6/2013	0.9131	1.0200										
12	Ba-133	Ba-6a	990.402	8/6/2013	0.9138	1.0200										
13	Ba-133	Ba-6a	990.402	8/6/2013	0.9209	1.0200										
14	Ba-133	Ba-6a	990.402	8/6/2013	0.9136	1.0200										
15	Ba-133	Ba-6a	990.402	8/6/2013	0.9128	1.0200										
16	Ba-133	Ba-6a	990.402	8/6/2013	0.9132	1.0200										
17	Ba-133	Ba-6a	990.402	8/6/2013	0.9129	1.0200										
18	Ba-133	Ba-6a	990.402	8/6/2013	0.9137	1.0200										

0.9207 g
0.9170 g
-0.9171 g
-0.9150 g
-0.9180 g
-0.9155 g
-0.9150 g
-0.9149 g
-0.9157 g
-0.9147 g
-0.9131 g
-0.9138 g
-0.9209 g
-0.9136 g
-0.9128 g
-0.9132 g
0.9129 g
-0.9137 g

0.5166 g

Matrix Spike

0322

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	1	Ra226	liters	8/13/2013	LWALKER

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-206-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-104-KS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-104-KS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-206-SS TOT	DO					1.0000E+00	1.0000E+00				
07	PZ-206-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-207-AS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-207-AS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 07 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 07 DIS	TRG					1.0000E+00	1.0000E+00				
12	FB at I-73 TOT	TRG					1.0000E+00	1.0000E+00				
13	I-73 TOT	TRG					1.0000E+00	1.0000E+00				
14	I-73 DIS	TRG					1.0000E+00	1.0000E+00				
15	PZ-103-SS TOT	TRG					1.0000E+00	1.0000E+00				
16	PZ-103-SS DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-102R-SS TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-102R-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments

Technician: *J. Walker* Date: 8,6,13



Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07153	1	Ra226			LWALKER

TRetek 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		0.0230	0.0301	0.0071	
02	BLANK	MBL		0.0224	0.0293	0.0069	
03	DUP	DUP		0.0224	0.0294	0.0070	
04	PZ-104-KS TOT	TRG		0.0226	0.0298	0.0072	
05	PZ-104-KS DIS	TRG		0.0224	0.0294	0.0070	
06	PZ-206-SS TOT	DO		0.0226	0.0297	0.0071	
07	PZ-206-SS DIS	TRG		0.0229	0.0297	0.0068	
08	PZ-207-AS TOT	TRG		0.0227	0.0308	0.0081	
09	PZ-207-AS DIS	TRG		0.0225	0.0298	0.0073	
10	DUP 07 TOT	TRG		0.0230	0.0295	0.0065	
11	DUP 07 DIS	TRG		0.0225	0.0297	0.0072	
12	FB at I-73 TOT	TRG		0.0226	0.0288	0.0062	
13	I-73 TOT	TRG		0.0224	0.0359	0.0135	
14	I-73 DIS	TRG		0.0224	0.0347	0.0123	
15	PZ-103-SS TOT	TRG		0.0225	0.0312	0.0087	
16	PZ-103-SS DIS	TRG		0.0222	0.0306	0.0084	
17	PZ-102R-SS TOT	TRG		0.0227	0.0288	0.0061	
18	PZ-102R-SS DIS	TRG		0.0225	0.0290	0.0065	

Technician: *L Walker*

Date: 8, 9, 13

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Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000660
 Batch Identification: 1307153A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_043
 Chamber Serial Number: 04026481A
 Detector Serial Number: 91088
 Env. Background: System Bkgd 57707
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.530E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 8/12/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:40 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.2003 +/- 0.0035 on 8/11/2013 2:21:17 PM
 Effective Efficiency: 0.2003 +/- 0.0035

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.409020 +/- 0.027051
 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	5.526	502.00	8.76	0.00	0.00E+000	4.8
RA-226	4.712	316.00	11.04	0.00	0.00E+000	4.6

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

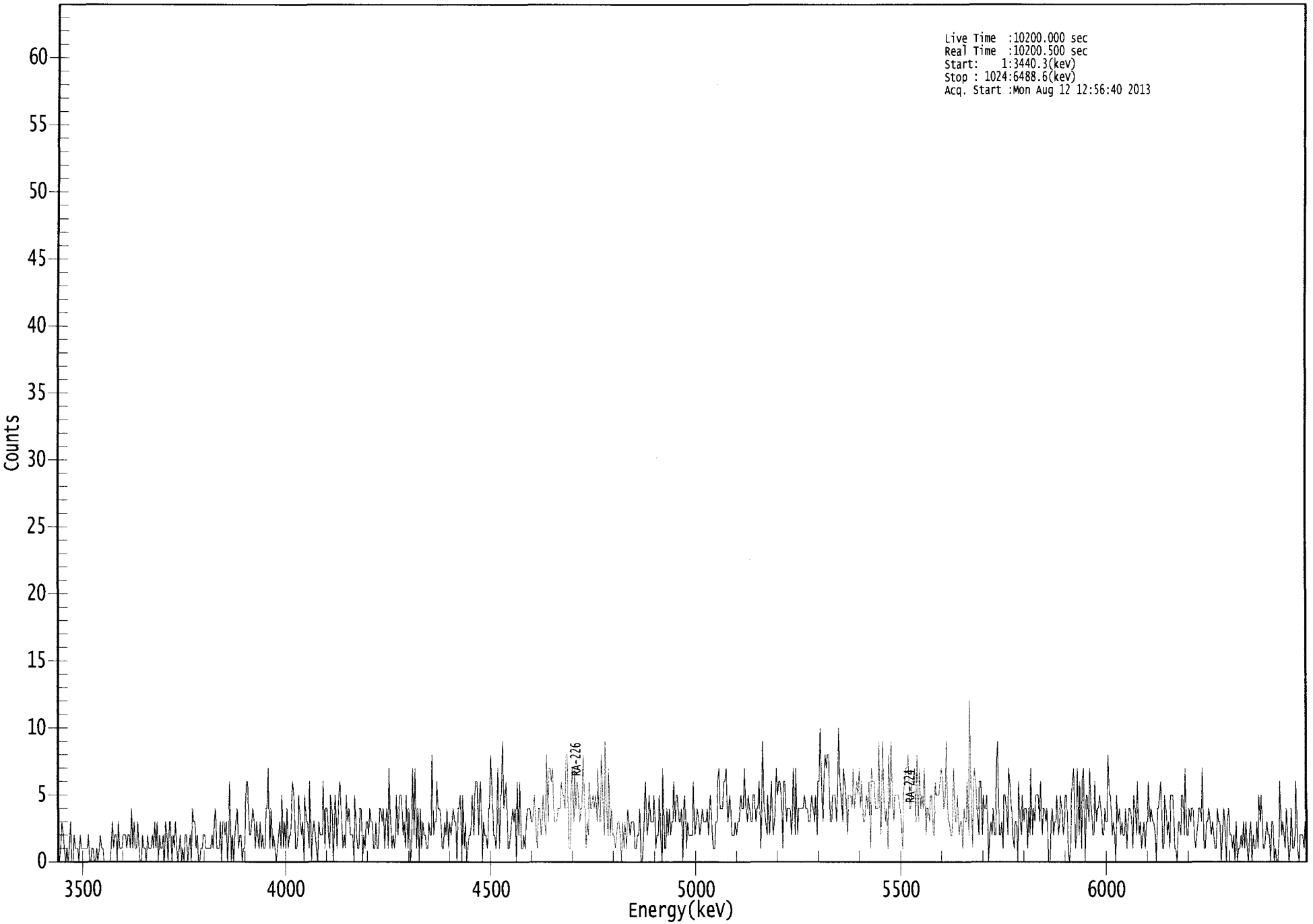
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	1.77E+001 +/- 1.66E+000	2.11E-001 +/- 7.16E-003
RA-226	0.993	4785.00*	1.06E+001 +/- 1.22E+000	2.01E-001 +/- 6.80E-003

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 8/13/13

US EPA ARCHIVE DOCUMENT

000066016.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start : 1:3440.3(kev)
Stop : 1024:6488.6(kev)
Acq. Start :Mon Aug 12 12:56:40 2013



ROI Type: 1

0335
9900

 ***** 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: 10201

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

369: 5 6 1 1 2 3 4 3

Sample Title: 01

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

801: 4 3 5 5 5 3 6 2

Sample Title: 01

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



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Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_044
 Chamber Serial Number: 04026481B
 Detector Serial Number: 84168
 Env. Background: System Bkgd 60396
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.470E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:42 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9731 +/- 0.0000
 Counting Efficiency: 0.1920 +/- 0.0033 on 8/11/2013 2:17:37 PM
 Effective Efficiency: 0.1869 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.485	5.00	96.02	0.00	0.00E+000	3.0
RA-226	4.603	-0.17	1169.4	0.17	0.00E+000	0.0

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

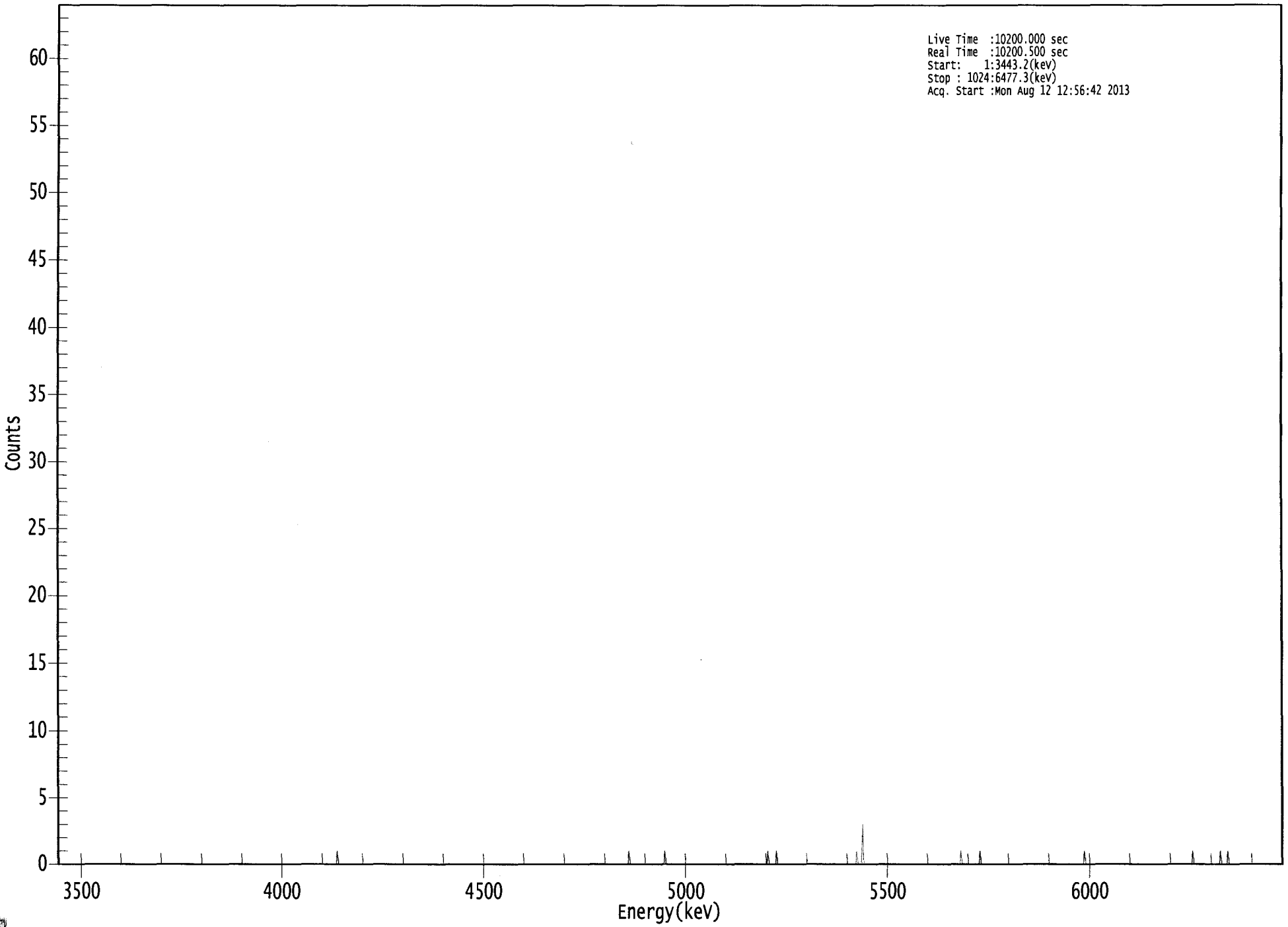
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.949	5685.50*	1.86E-001 +/- 1.78E-001	2.23E-001 +/- 7.62E-003
RA-226	0.958	4785.00*	-5.95E-003 +/- 6.96E-002	1.46E-001 +/- 4.99E-003

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US EPA ARCHIVE DOCUMENT

000065928.CNF

Live Time :10200.000 sec
Real Time :10200.500 sec
Start: 1:3443.2(kev)
Stop : 1024:6477.3(kev)
Acq. Start :Mon Aug 12 12:56:42 2013



ROI Type: 1

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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	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	1	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: 02

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

801: 0 0 0 0 0 0 0 0

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



8/12/13

Sample Description: PZ-206-SS TOT DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 64789
 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: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:44 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9539 +/- 0.0000
 Counting Efficiency: 0.1909 +/- 0.0033 on 7/20/2013 2:31:26 PM
 Effective Efficiency: 0.1821 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.525	26.15	39.05	0.85	0.00E+000	4.5
RA-226	4.585	62.49	24.91	0.51	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

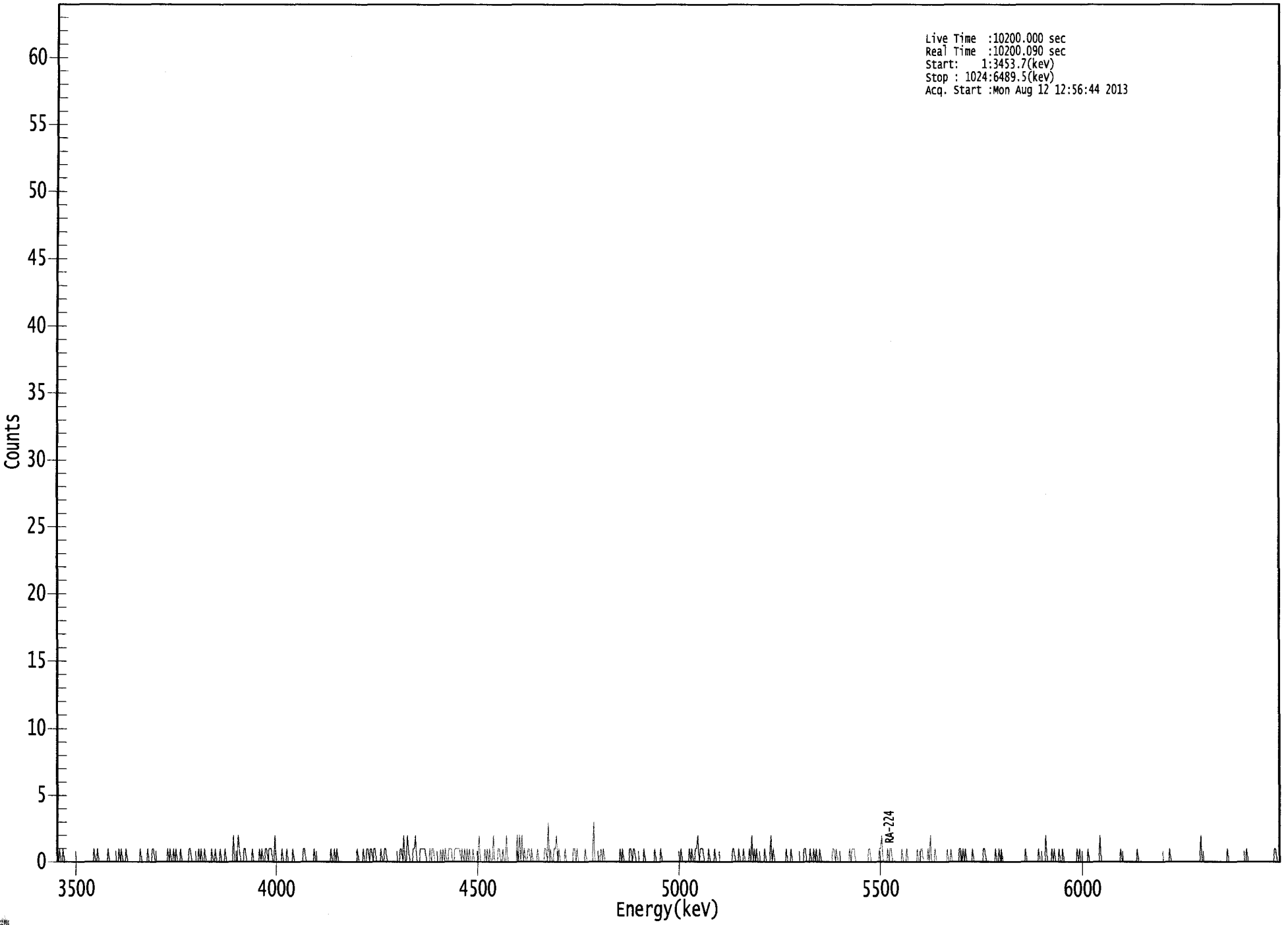
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	1.01E+000 +/- 3.95E-001	2.31E-001 +/- 7.90E-003
RA-226	0.949	4785.00*	2.27E+000 +/- 5.72E-001	1.91E-001 +/- 6.51E-003

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 8/13/13

US EPA ARCHIVE DOCUMENT

000065922.CNF

Live Time :10200.000 sec
Real Time :10200.090 sec
Start: 1:3453.7(kev)
Stop : 1024:6489.5(kev)
Acq. Start :Mon Aug 12 12:56:44 2013



ROI Type: 1

0345

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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 1 1 0 0 1 0

Sample Title: 03

Channel	1	2	3	4	5	6	7	8
377:	0	2	0	0	0	0	0	0
385:	0	0	2	0	2	0	2	0
393:	1	0	0	1	1	0	1	0
401:	0	0	0	1	0	0	0	0
409:	0	1	1	0	3	0	1	0
417:	0	1	1	2	0	1	0	0
425:	0	0	1	0	0	0	0	0
433:	0	1	1	0	1	0	0	0
441:	0	0	0	1	0	0	0	0
449:	0	0	3	0	0	0	0	0
457:	1	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	0	1	0	0	0	0	0
481:	1	1	0	1	1	0	0	0
489:	0	0	0	0	1	0	0	0
497:	0	0	0	0	0	1	0	0
505:	0	0	1	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	1	0	0	0	0
529:	0	0	1	0	1	0	0	1
537:	1	2	0	1	1	1	0	0
545:	0	0	1	0	0	0	0	1
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	1	1
569:	0	0	0	1	0	0	0	1
577:	0	0	0	0	1	0	2	0
585:	1	0	1	0	0	0	0	0
593:	0	1	0	0	0	0	2	0
601:	1	0	0	0	0	0	0	0
609:	0	0	0	1	0	0	0	1
617:	0	0	0	0	0	0	0	0
625:	0	0	1	1	0	0	0	1
633:	0	0	1	0	1	0	0	1
641:	0	0	0	0	0	0	0	0
649:	0	0	1	1	0	1	0	0
657:	0	0	0	0	0	0	0	0
665:	1	0	1	1	1	0	0	0
673:	0	0	0	0	0	0	0	0
681:	1	1	0	0	0	0	0	0
689:	0	1	1	2	0	0	0	0
697:	1	0	1	1	0	0	0	0
705:	0	0	0	0	1	0	0	0
713:	1	0	0	0	0	0	0	0
721:	0	1	0	0	1	1	0	0
729:	0	0	1	0	2	0	0	0
737:	1	0	0	0	0	0	0	0
745:	0	0	1	0	0	1	0	0
753:	0	0	0	0	1	1	0	1
761:	0	1	0	0	0	0	0	1
769:	0	0	0	0	0	0	0	0
777:	1	1	0	0	0	0	0	0
785:	0	0	1	0	0	1	0	1
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	1	0	0	0	0
817:	0	0	0	0	0	0	1	0
825:	0	0	0	0	2	0	0	0
833:	0	1	0	1	0	0	0	1
841:	0	0	1	0	0	0	0	0
849:	0	0	0	0	0	0	1	0
857:	1	0	0	0	0	0	0	1
865:	0	0	0	0	0	0	0	0
873:	0	2	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:	1	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	1	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	2	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	1	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	1	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	1	1	0	0	0	0



e
8/17

Sample Description: PZ-104-KS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 64790
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:46 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9777 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM
 Effective Efficiency: 0.1749 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.506	2.66	128.85	0.34	0.00E+000	3.0
RA-226	4.623	6.83	76.08	0.17	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

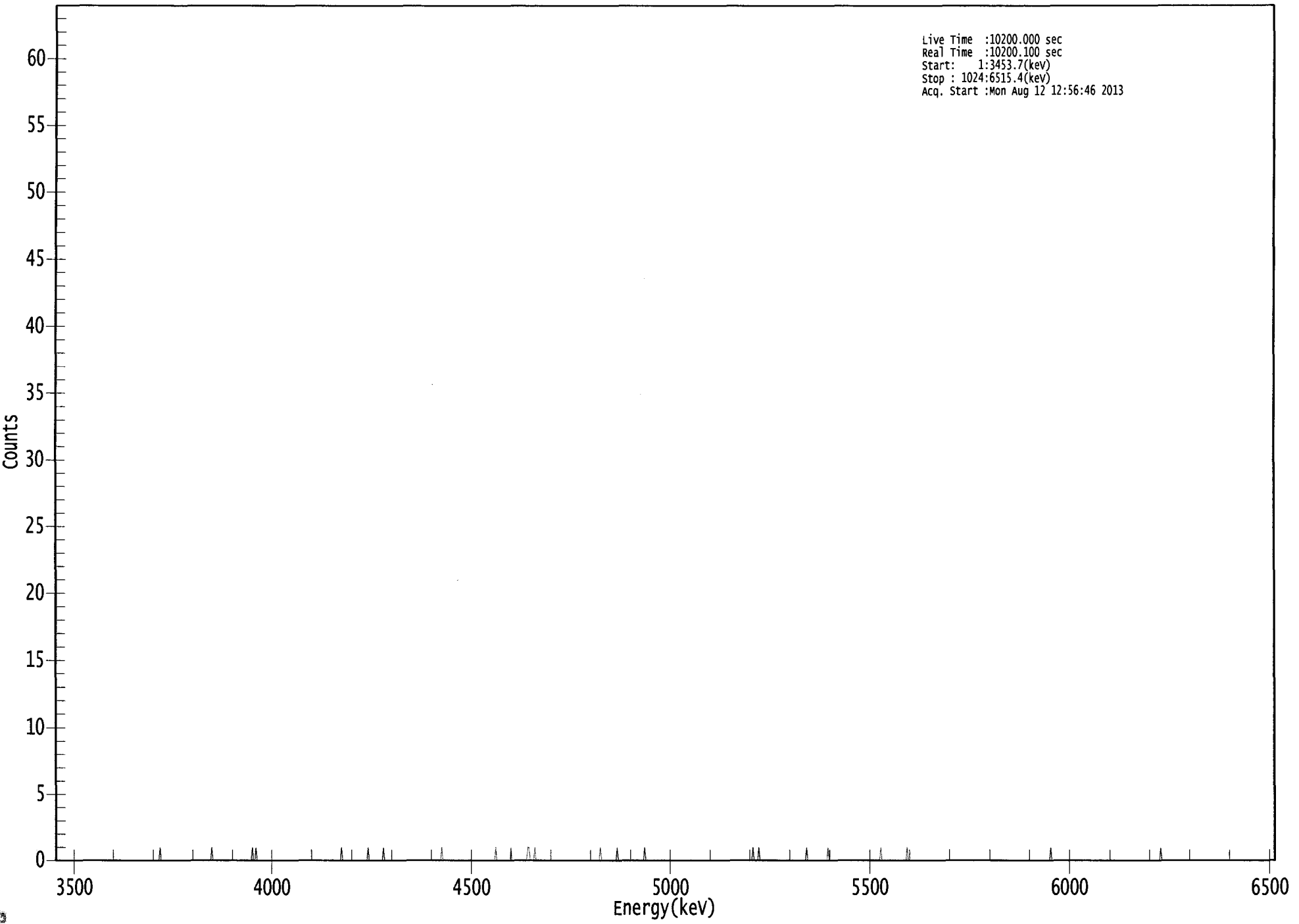
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.959	5685.50*	1.09E-001 +/- 1.40E-001	1.96E-001 +/- 6.76E-003
RA-226	0.966	4785.00*	2.64E-001 +/- 2.01E-001	1.61E-001 +/- 5.55E-003

AQ
8/13/13

US EPA ARCHIVE DOCUMENT

0000065923.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3453.7(kev)
Stop : 1024:6515.4(kev)
Acq. Start :Mon Aug 12 12:56:46 2013



ROI Type: 1

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	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:	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	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	1	0
169:	0	1	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	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	1
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	1	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	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	0
361:	0	0	0	0	0	0	0	0

369: 0 0 1 0 0 0 0 0

Sample Title: 04

Channel								
377:	0	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	1	0
401:	0	0	0	1	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	1	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	1	0	0	0	0	0	0	0
481:	0	0	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	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	1	0	0	0	0	1
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	1
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	1	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

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



C
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Sample Description: PZ-104-KS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 64791
 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: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:36 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9794 +/- 0.0000
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM
 Effective Efficiency: 0.1784 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.438	0.66	305.43	0.34	0.00E+000	2.9
RA-226	4.536	2.66	128.85	0.34	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

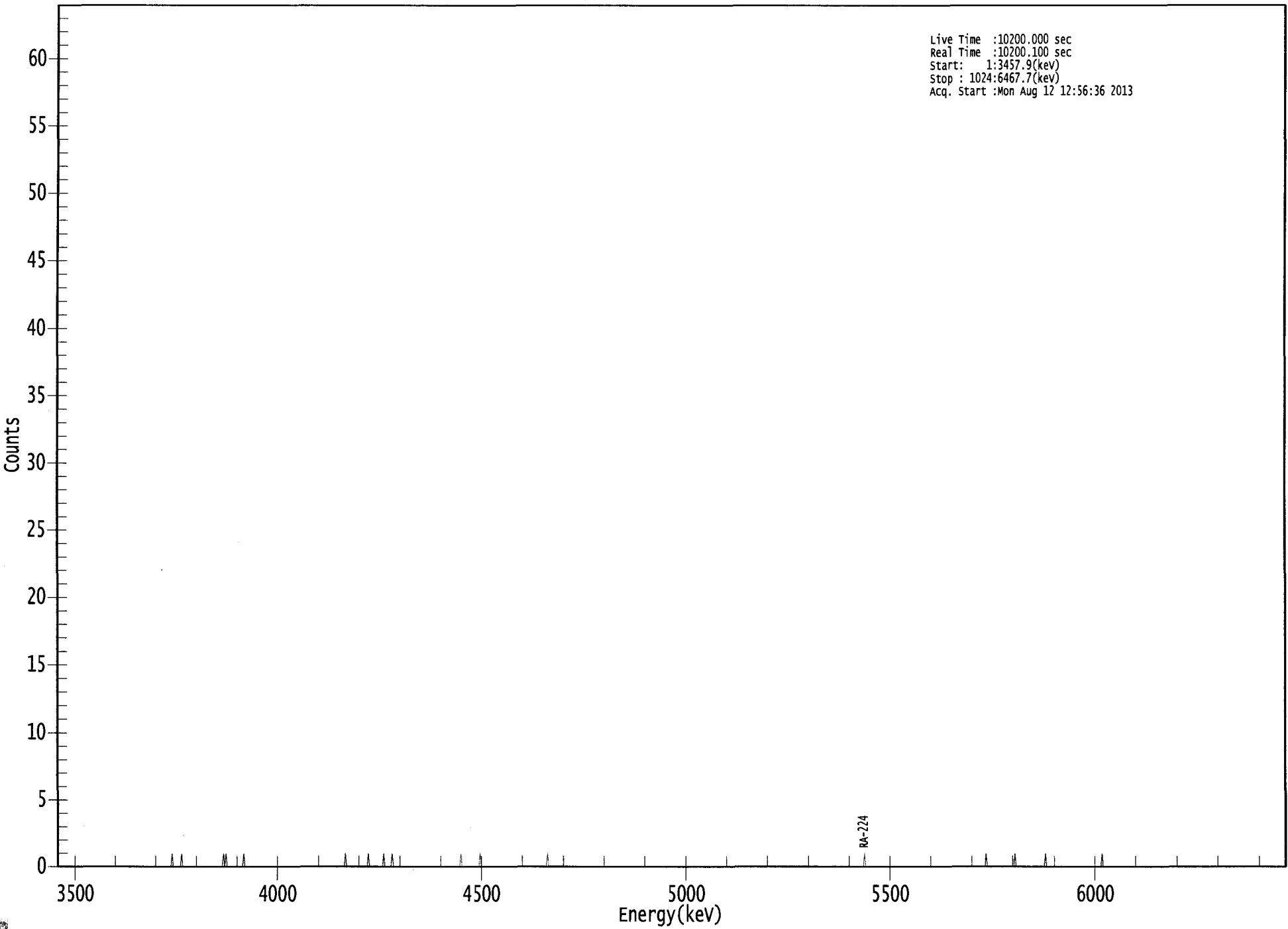
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.923	5685.50*	2.60E-002 +/- 7.94E-002	1.88E-001 +/- 6.48E-003
RA-226	0.922	4785.00*	9.88E-002 +/- 1.27E-001	1.78E-001 +/- 6.09E-003

AG
8/13/13

US EPA ARCHIVE DOCUMENT

000065925.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3457.9(kev)
Stop : 1024:6467.7(kev)
Acq. Start :Mon Aug 12 12:56:36 2013



0355
9550

ROI Type: 1

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 05

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	1	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	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	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	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	1	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	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	1	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



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Sample Description: PZ-206-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 64792
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.530E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 12:56:38 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM
 Effective Efficiency: 0.1680 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.514	11.49	59.30	0.51	0.00E+000	3.0
RA-226	4.597	57.66	25.90	0.34	0.00E+000	3.7

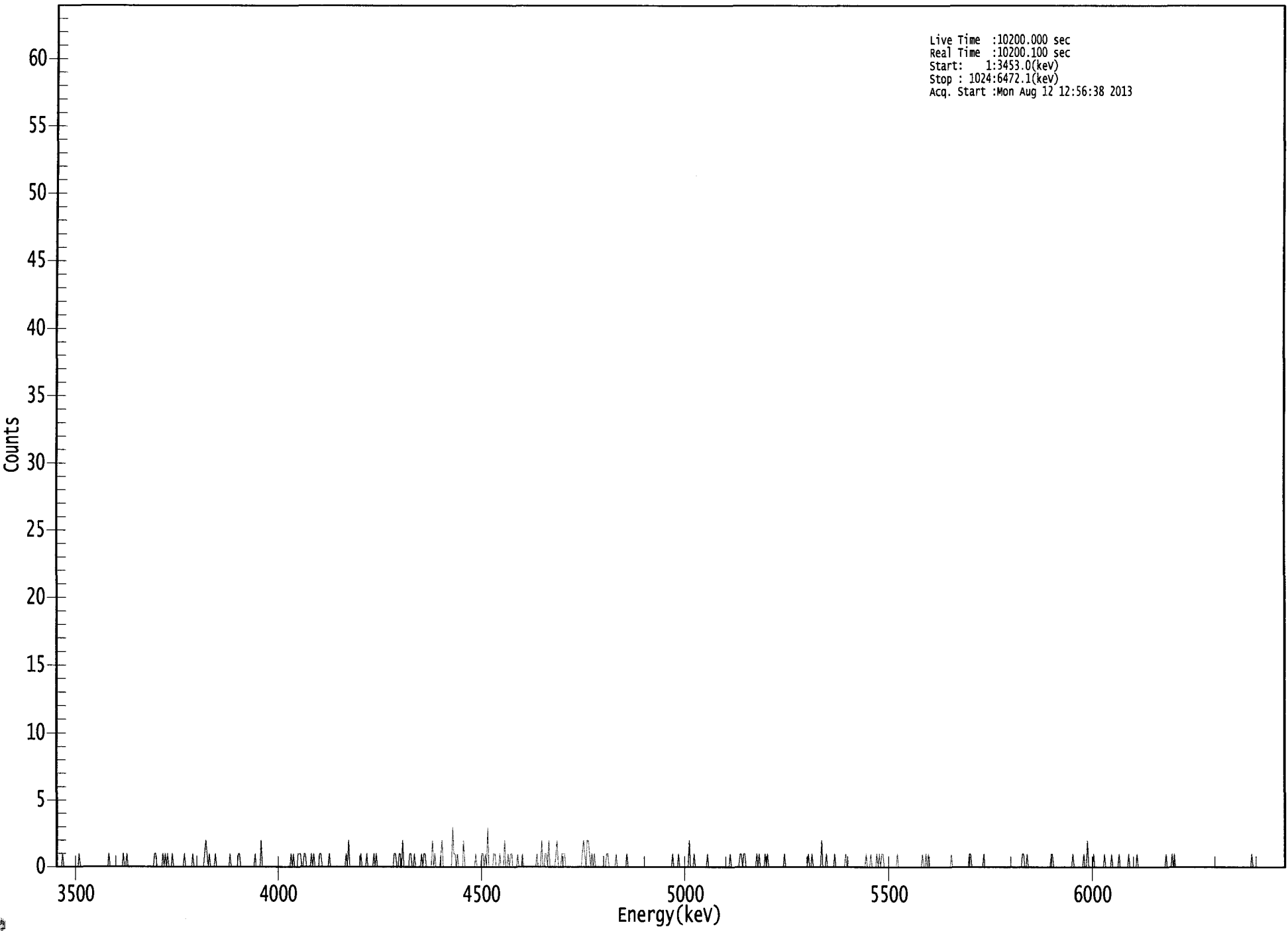
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.962	5685.50*	4.86E-001 +/- 2.89E-001	2.22E-001 +/- 7.71E-003
RA-226	0.955	4785.00*	2.30E+000 +/- 6.01E-001	1.91E-001 +/- 6.61E-003

AG
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0000065924.CNF

Live Time : 10200.000 sec
Real Time : 10200.100 sec
Start : 1:3453.0(kev)
Stop : 1024:6472.1(kev)
Acq. Start : Mon Aug 12 12:56:38 2013



ROI Type: 1

1999

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

369: 0 0 1 0 0 0 2 0

Sample Title: 06

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

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



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Sample Description: PZ-206-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 64764
 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: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:56 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9500 +/- 0.0000
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Effective Efficiency: 0.1659 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.474	5.07	127.27	4.93	0.00E+000	3.0
RA-226	4.646	26.64	39.09	1.36	0.00E+000	3.0

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

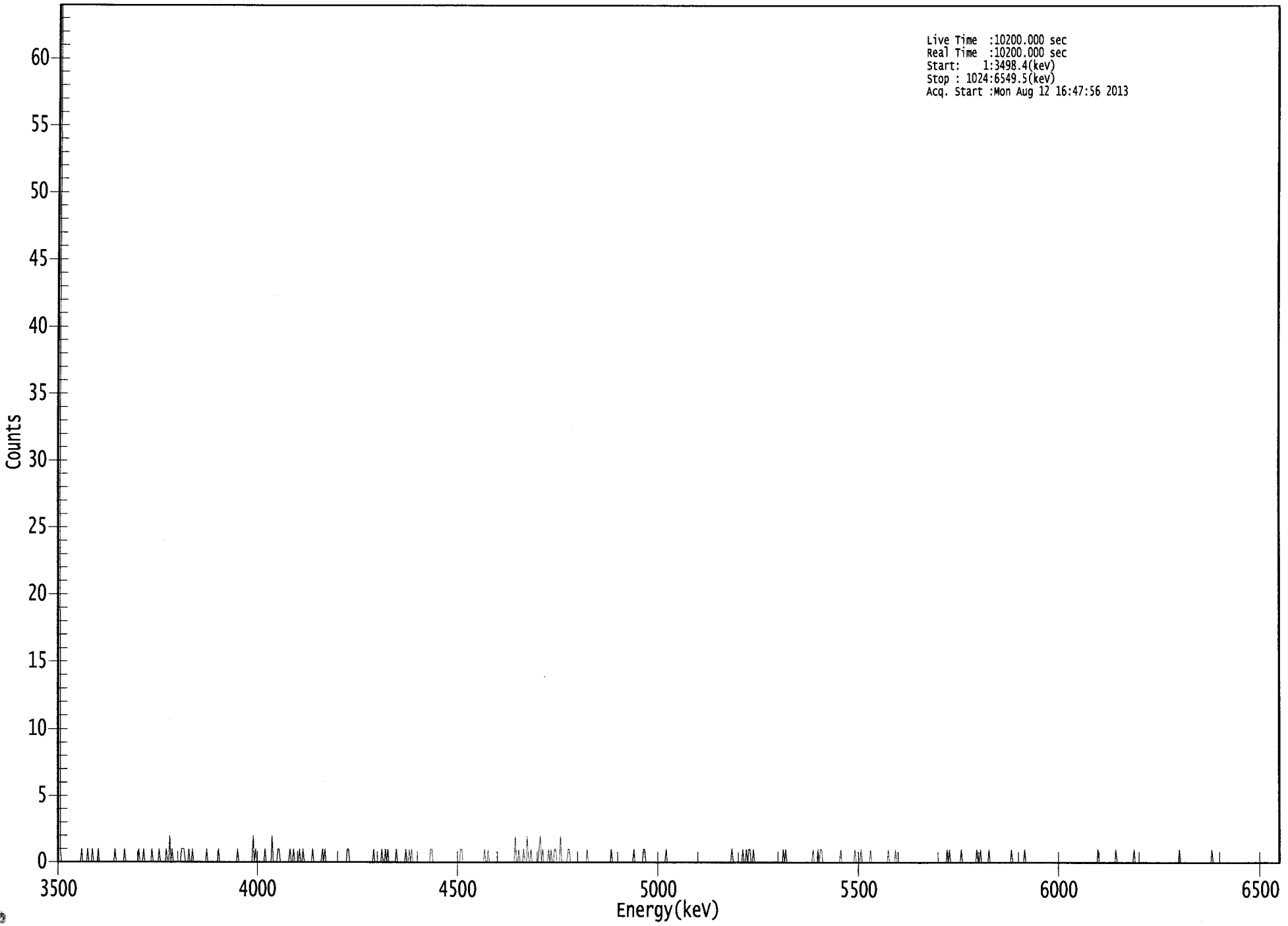
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.943	5685.50*	2.10E-001 +/- 2.67E-001	4.38E-001 +/- 1.61E-002
RA-226	0.975	4785.00*	1.04E+000 +/- 4.08E-001	2.67E-001 +/- 9.79E-003

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US EPA ARCHIVE DOCUMENT

000065960.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3498.4(kev)
Stop : 1024:6549.5(kev)
Acq. Start :Mon Aug 12 16:47:56 2013



ROI Type: 1

000065960

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 07

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	1
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	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	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	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



c
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Sample Description: PZ-207-AS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_004
 Chamber Serial Number:
 Detector Serial Number: 4
 Env. Background: System Bkgd 64765
 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: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:57 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9273 +/- 0.0000
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM
 Effective Efficiency: 0.1799 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.551	7.60	87.75	3.40	0.00E+000	2.9
RA-226	4.645	21.45	45.17	2.55	0.00E+000	2.9

 NUCLIDE ANALYSIS RESULTS

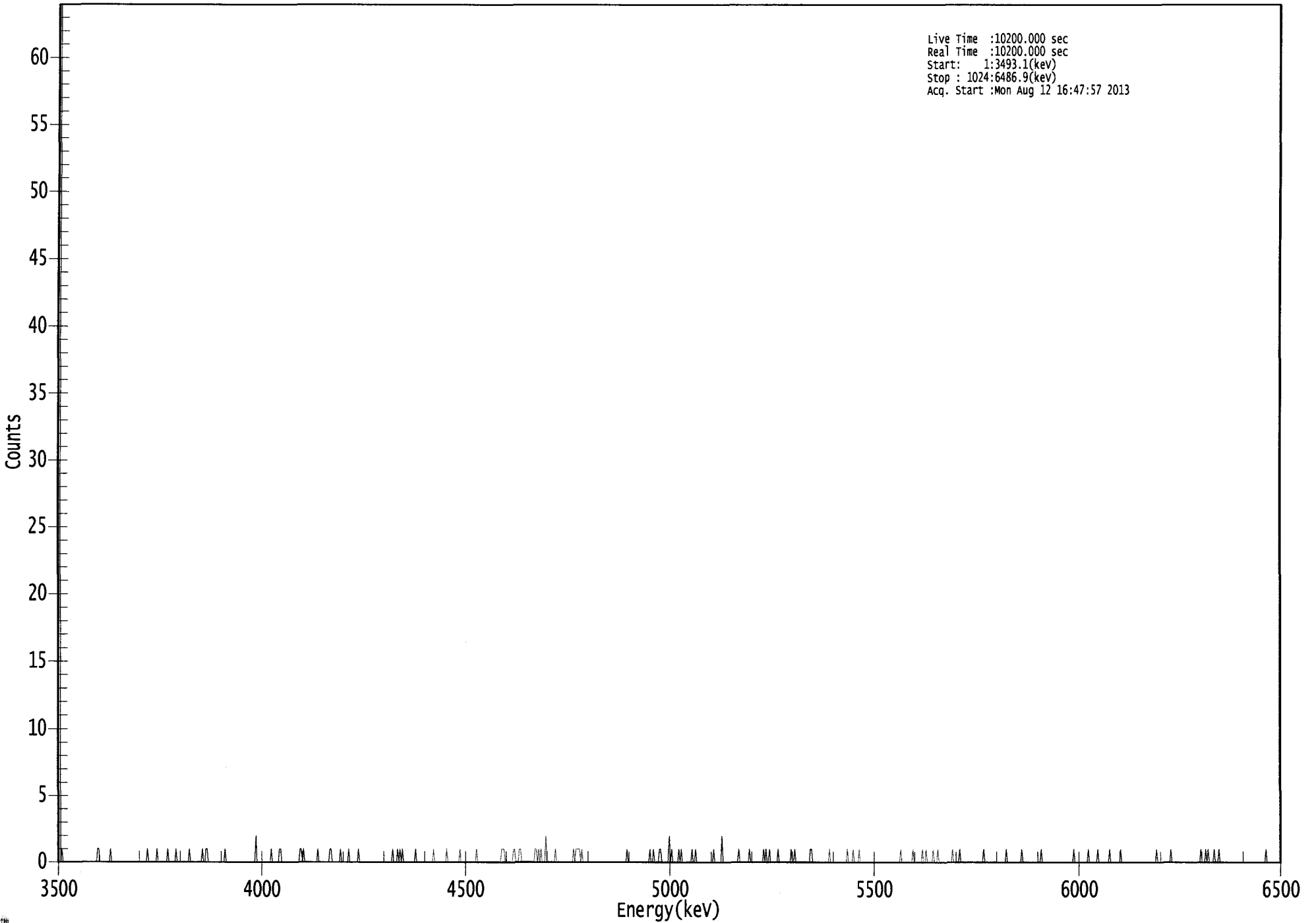
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.977	5685.50*	3.31E-001 +/- 2.91E-001	4.04E-001 +/- 1.46E-002
RA-226	0.975	4785.00*	8.81E-001 +/- 3.99E-001	3.45E-001 +/- 1.24E-002

AG
8/13/13

US EPA ARCHIVE DOCUMENT

0000065964.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3493.1(kev)
Stop : 1024:6486.9(kev)
Acq. Start :Mon Aug 12 16:47:57 2013



ROI Type: 1

0371

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

Sample Title: 08

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

801: 0 0 0 0 0 0 0 1

Sample Title: 08

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



C
8/12/13

Sample Description: PZ-207-AS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_010
 Chamber Serial Number:
 Detector Serial Number: 10
 Env. Background: System Bkgd 64766
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.580E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8900 +/- 0.0000
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM
 Effective Efficiency: 0.1751 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.497	17.11	51.86	2.89	0.00E+000	2.9
RA-226	4.598	20.94	46.35	3.06	0.00E+000	2.9

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

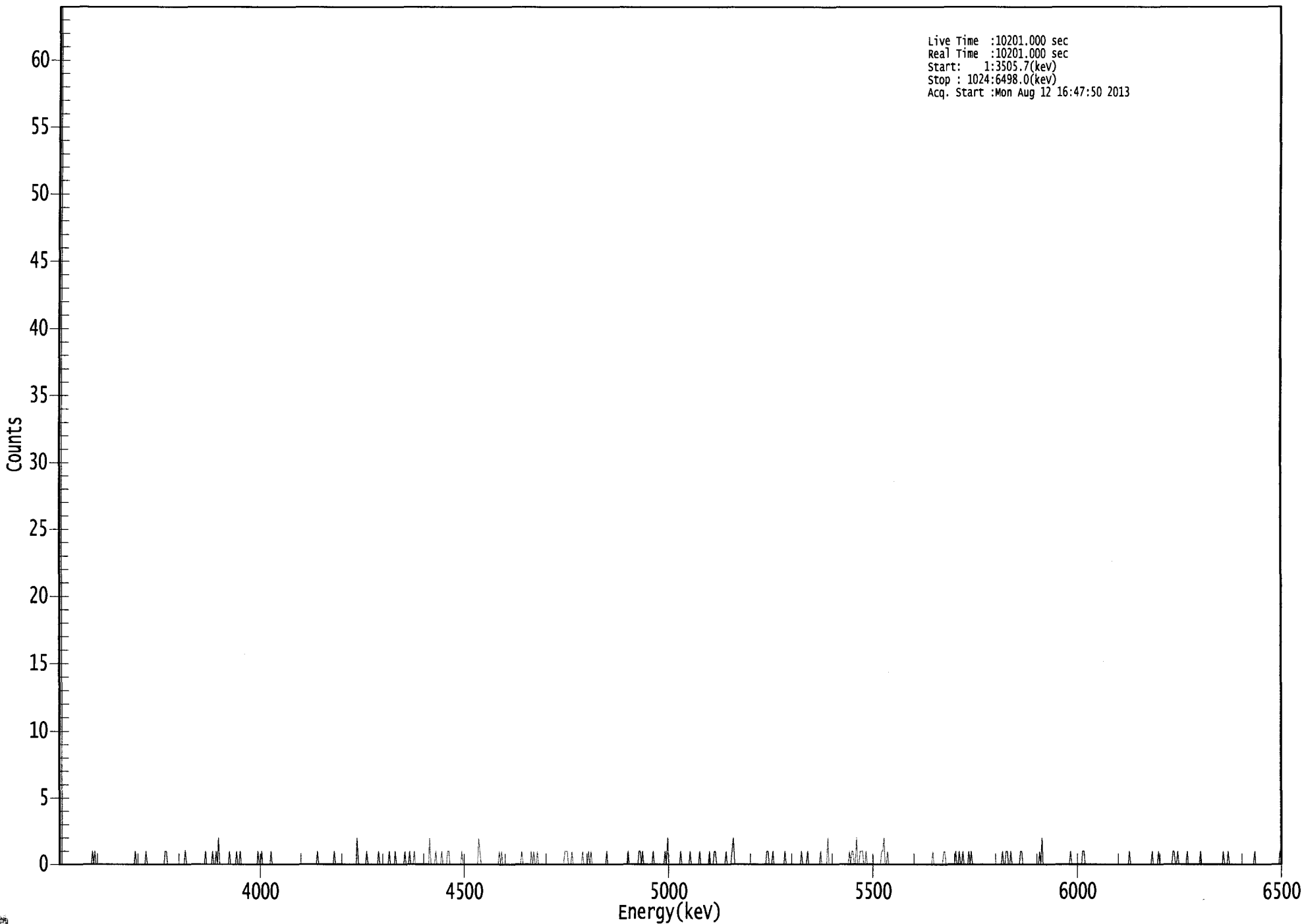
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.955	5685.50*	7.08E-001 +/- 3.68E-001	3.62E-001 +/- 1.30E-002
RA-226	0.955	4785.00*	8.18E-001 +/- 3.80E-001	3.49E-001 +/- 1.25E-002

AG
8/13/13

US EPA ARCHIVE DOCUMENT

0000065957.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3505.7(kev)
Stop : 1024:6498.0(kev)
Acq. Start :Mon Aug 12 16:47:50 2013



ROI Type: 1

0375
9250

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

Sample Title: 09

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	1	0	1	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	1	0	0	0	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	1	1	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	1	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	1	0	0	0	0
129:	0	1	0	0	1	0	2	0
137:	0	0	0	0	0	0	0	1
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	1
169:	0	0	1	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	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	1
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	2	0	0	0	0	0
257:	0	0	1	0	0	0	0	0
265:	0	0	0	0	1	0	0	0
273:	0	0	0	0	0	1	0	0
281:	0	0	1	0	0	0	0	0
289:	0	0	1	0	0	0	1	0
297:	0	0	1	0	0	0	0	0
305:	0	0	0	0	0	0	0	2
313:	0	0	0	0	1	0	0	0
321:	0	1	0	0	0	0	1	1
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:	2	1	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 1 0 1 0 0 0 0

Sample Title: 09

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

801: 0 0 0 0 0 1 1 0

Sample Title: 09

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



Handwritten signature

Sample Description: DUP 07 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_011
 Chamber Serial Number:
 Detector Serial Number: 11
 Env. Background: System Bkgd 64767
 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: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:51 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9403 +/- 0.0000
 Counting Efficiency: 0.2051 +/- 0.0035 on 7/20/2013 2:50:46 PM
 Effective Efficiency: 0.1929 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.572	13.49	54.53	0.51	0.00E+000	2.6
RA-226	4.594	19.66	44.65	0.34	0.00E+000	2.6

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

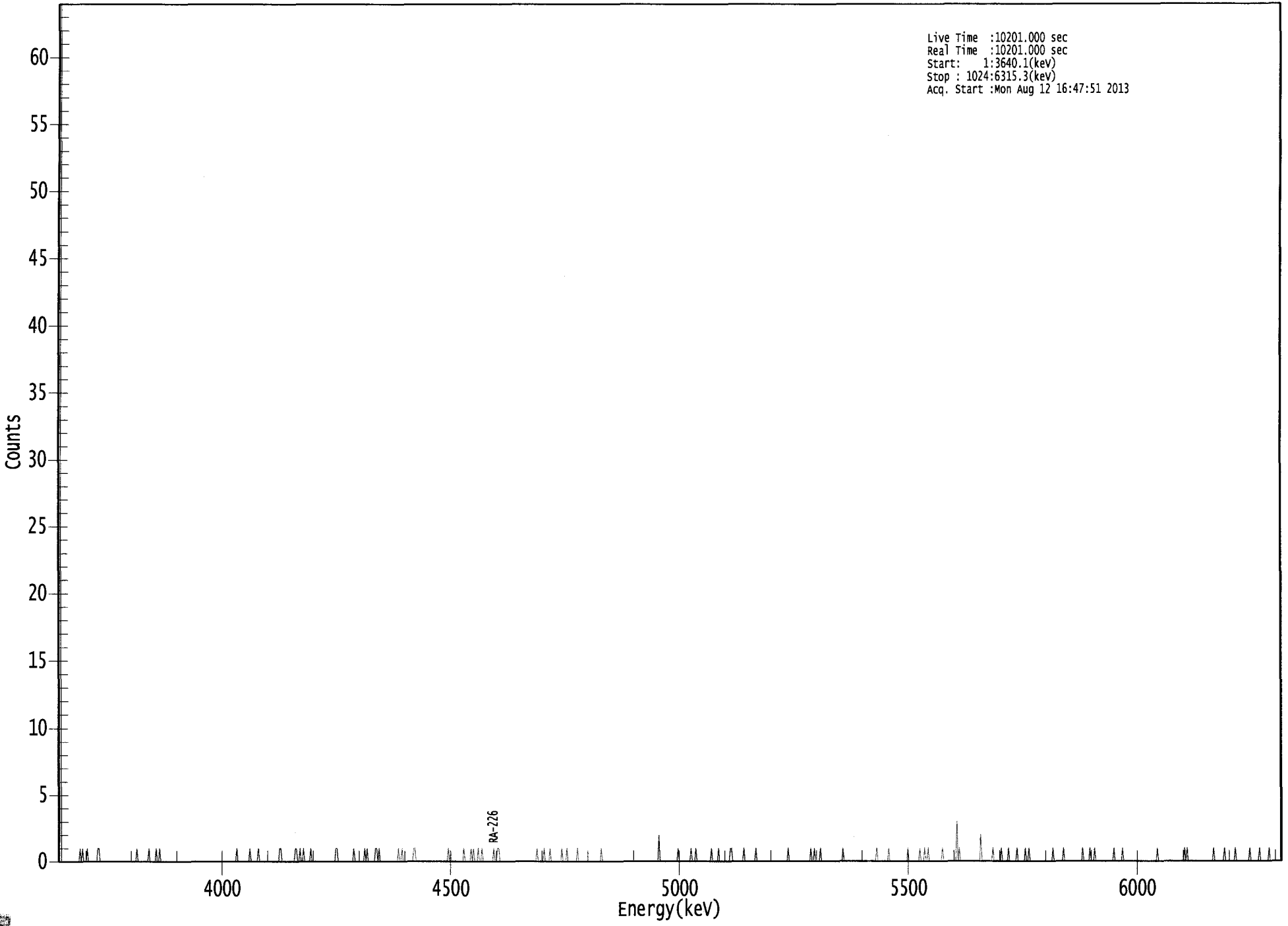
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.983	5685.50*	4.60E-001 +/- 2.51E-001	1.79E-001 +/- 6.07E-003
RA-226	0.954	4785.00*	6.32E-001 +/- 2.83E-001	1.54E-001 +/- 5.20E-003

AG
8/13/13

US EPA ARCHIVE DOCUMENT

0000065958.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3640.1(kev)
Stop : 1024:6315.3(kev)
Acq. Start :Mon Aug 12 16:47:51 2013



ROI Type: 1

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

Sample Title: 10

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	1	0	1	0	0	0
25:	1	0	0	0	0	0	0	0
33:	0	1	1	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	1	0	0	0	0	0
73:	0	0	0	0	1	0	0	0
81:	0	0	1	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	0	0	0	0
161:	0	1	0	0	0	0	0	0
169:	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	1	1	0	0	0	0
193:	0	0	0	0	0	0	0	1
201:	1	0	0	1	0	0	1	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	1	1	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	1	0	0	0	0	0	0	0
257:	0	1	0	1	0	0	0	0
265:	0	0	1	1	0	1	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	1	0	0
289:	1	0	0	0	0	0	0	0
297:	0	0	1	1	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	1
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	1	0	0	0
345:	0	0	1	0	1	0	0	0
353:	1	0	0	1	0	0	0	0
361:	0	0	0	0	0	1	0	0

369: 1 1 0 0 0 0 0 0

Sample Title: 10

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	0	0
401:	0	1	0	0	0	0	0	1
409:	0	0	0	0	1	0	0	0
417:	0	0	0	0	0	0	1	0
425:	0	0	1	0	0	0	0	0
433:	0	0	0	1	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	1
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	2
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	1
521:	0	0	0	0	0	0	0	0
529:	0	0	1	0	0	0	1	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	1	0	0	0	0
553:	0	1	0	0	0	0	0	0
561:	0	0	0	1	1	0	0	0
569:	0	0	0	0	0	0	1	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	1	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	1	0
633:	0	1	0	0	0	0	1	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	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	1	0	0
689:	0	0	0	0	0	0	0	1
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	1
713:	0	0	0	0	0	0	0	0
721:	0	1	0	0	0	1	0	0
729:	1	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:	3	0	1	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	2	0	0	0
777:	0	0	0	0	0	0	1	0
785:	0	0	0	0	0	1	0	0
793:	0	0	0	1	0	0	0	0

801: 0 0 1 0 0 0 0 0 0

Sample Title: 10

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



C
8/17/13

Sample Description: DUP 07 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_012
 Chamber Serial Number:
 Detector Serial Number: 12
 Env. Background: System Bkgd 64768
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/18/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:52 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9549 +/- 0.0000
 Counting Efficiency: 0.1989 +/- 0.0034 on 12/11/2011 2:21:56 PM
 Effective Efficiency: 0.1900 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.530	-0.68	304.41	0.68	0.00E+000	0.0
RA-226	4.670	5.66	85.23	0.34	0.00E+000	3.0

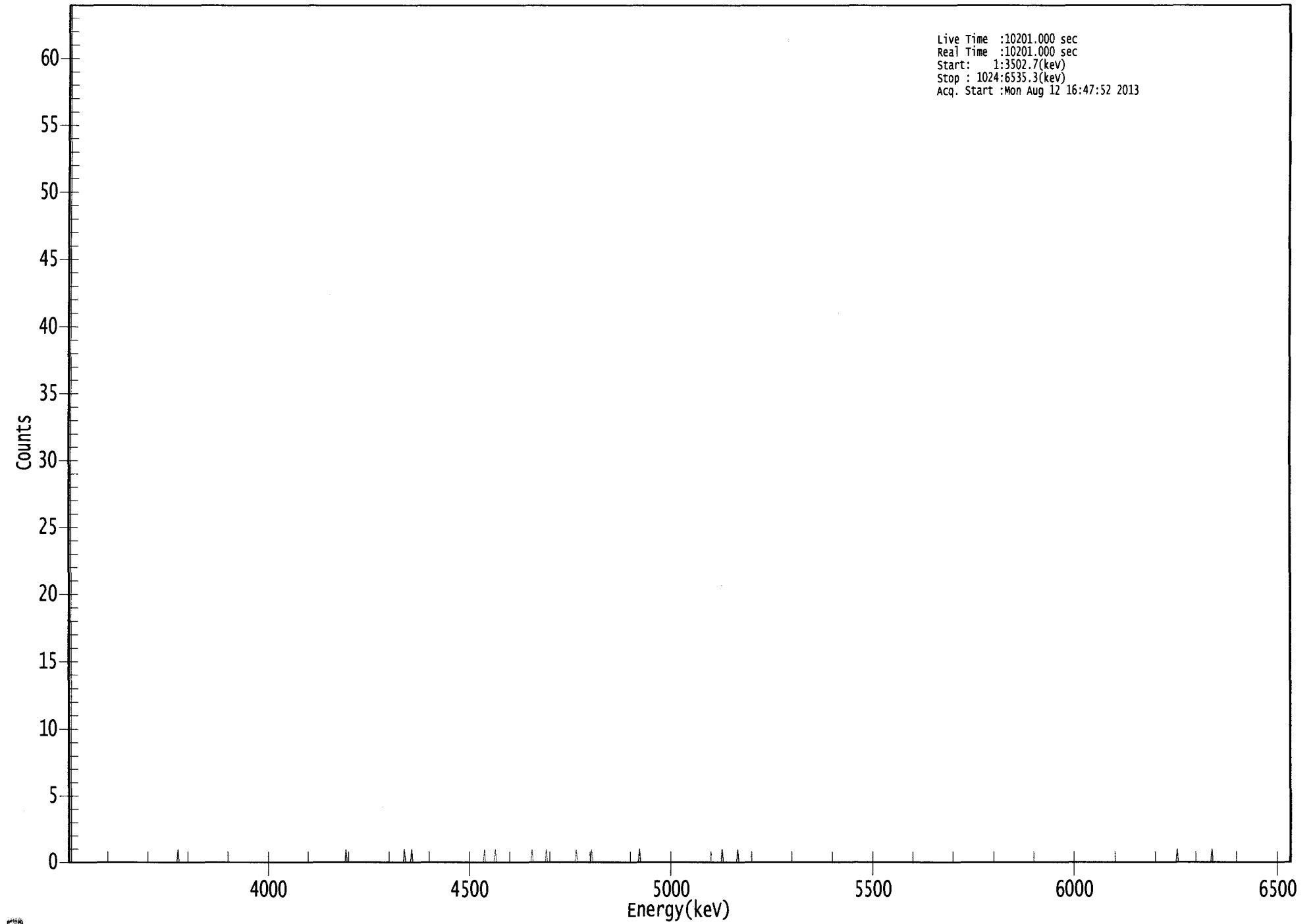
 ----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.969	5685.50*	-2.56E-002 +/- 7.81E-002	2.13E-001 +/- 7.25E-003
RA-226	0.983	4785.00*	2.01E-001 +/- 1.72E-001	1.70E-001 +/- 5.77E-003

AG
8/13/13

0000065959.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 12 16:47:52 2013



ROI Type: 1

0386

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

Sample Title: 11

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	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	1	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	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	1	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	1	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	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	1	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 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	1	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	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	1	0	0	0	0	0
433:	0	0	0	0	0	0	0	1
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	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	1	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	1	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 11

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



C
B/M

Sample Description: FB at I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_013
 Chamber Serial Number:
 Detector Serial Number: 13
 Env. Background: System Bkgd 64769
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:47:53 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8943 +/- 0.0000
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Effective Efficiency: 0.1671 +/- 0.0031

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.446	1.79	229.07	2.21	0.00E+000	2.8
RA-226	4.688	1.32	215.98	0.68	0.00E+000	2.8

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

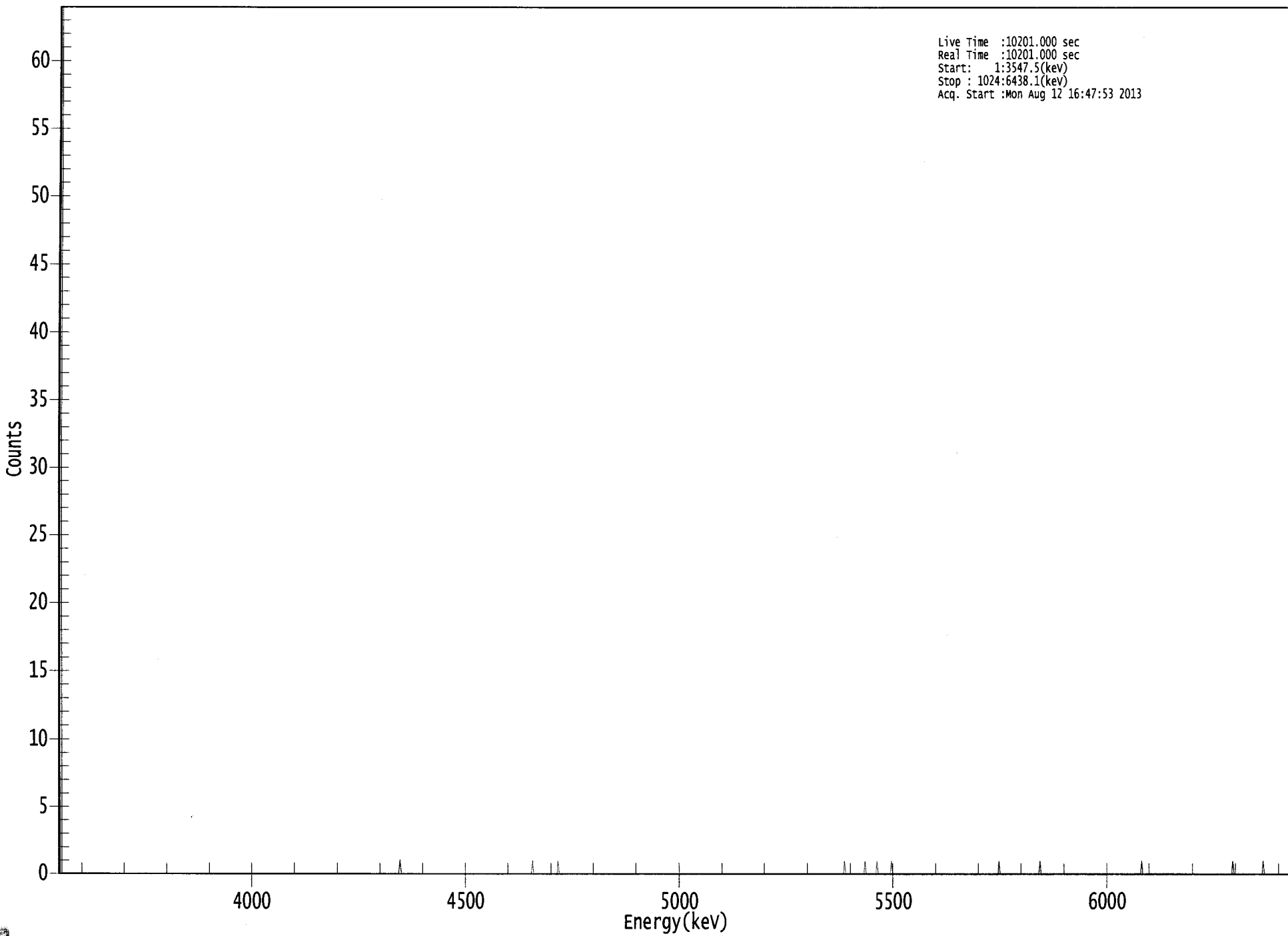
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.928	5685.50*	6.71E-002 +/- 1.54E-001	3.00E-001 +/- 1.09E-002
RA-226	0.988	4785.00*	4.67E-002 +/- 1.01E-001	1.99E-001 +/- 7.22E-003

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8/13/13

US EPA ARCHIVE DOCUMENT

0000065961.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 12 16:47:53 2013



ROI Type: 1

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

Sample Title: 12

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	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	1	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: 12

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

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	1	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	1	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	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	1	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



8/13

Sample Description: PZ-103-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 15
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_019
 Chamber Serial Number:
 Detector Serial Number: 19
 Env. Background: System Bkgd 64773
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.940E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:48:29 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9955 +/- 0.0000
 Counting Efficiency: 0.1659 +/- 0.0029 on 2/17/2013 10:45:23 AM
 Effective Efficiency: 0.1652 +/- 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	5.542	22.32	42.22	0.68	0.00E+000	3.3
RA-226	4.580	82.00	21.78	0.00	0.00E+000	4.2

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

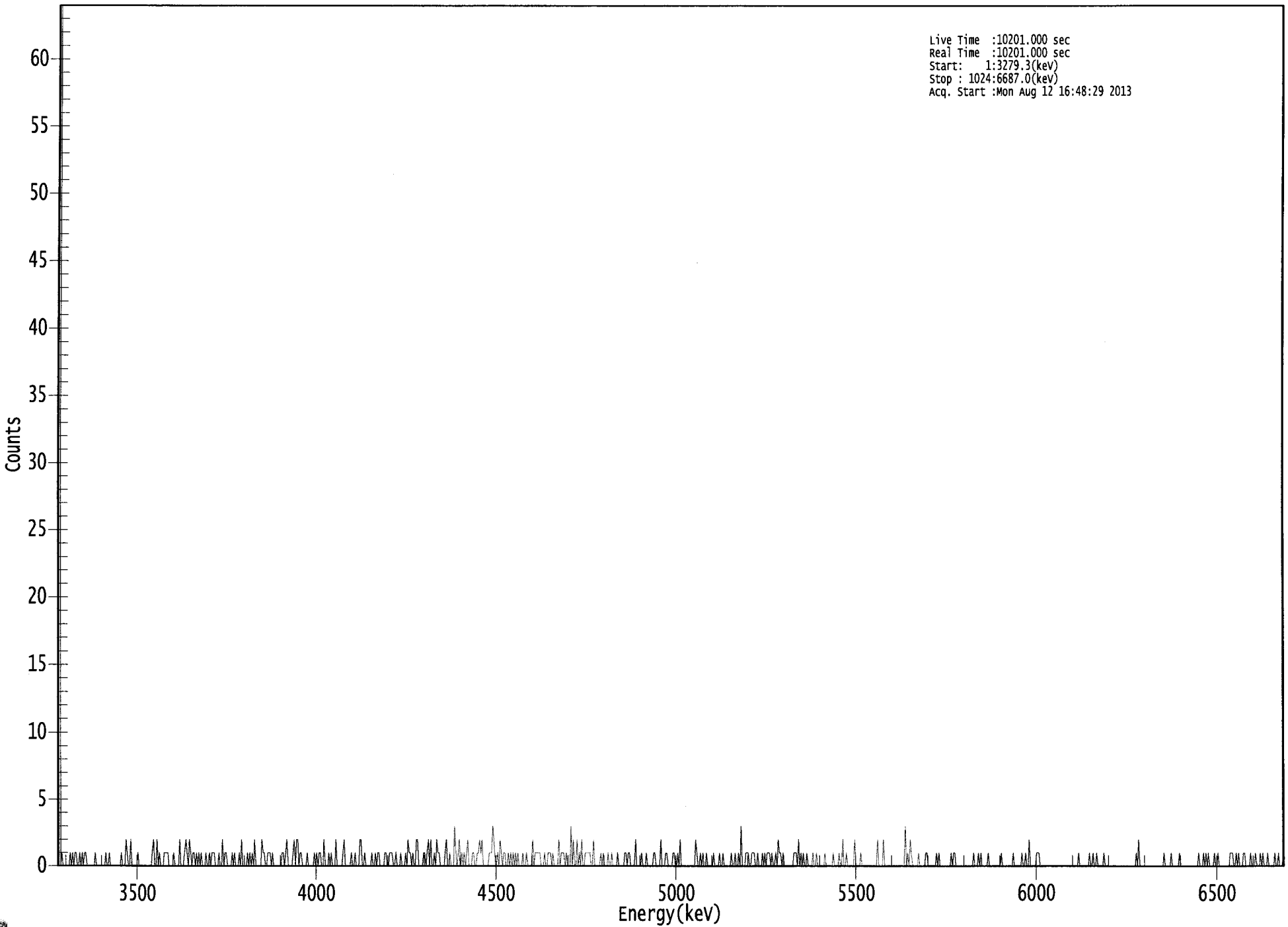
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.973	5685.50*	1.12E+000 +/- 4.73E-001	2.82E-001 +/- 9.81E-003
RA-226	0.946	4785.00*	3.87E+000 +/- 8.53E-001	2.83E-001 +/- 9.81E-003

AG
8/13/13

US EPA ARCHIVE DOCUMENT

0000065965.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3279.3(kev)
Stop : 1024:6687.0(kev)
Acq. Start :Mon Aug 12 16:48:29 2013



ROI Type: 1

8628
8629

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

369: 1 0 2 1 0 1 1 0

Sample Title: 15

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

801: 0 0 0 0 0 1 0 0

Sample Title: 15

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



0101

Sample Description: PZ-103-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 16
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_022
 Chamber Serial Number:
 Detector Serial Number: 22
 Env. Background: System Bkgd 64774
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.870E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:48:30 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9480 +/- 0.0000
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM
 Effective Efficiency: 0.1452 +/- 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	5.522	22.62	43.67	2.38	0.00E+000	4.7
RA-226	4.597	65.62	24.70	2.38	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

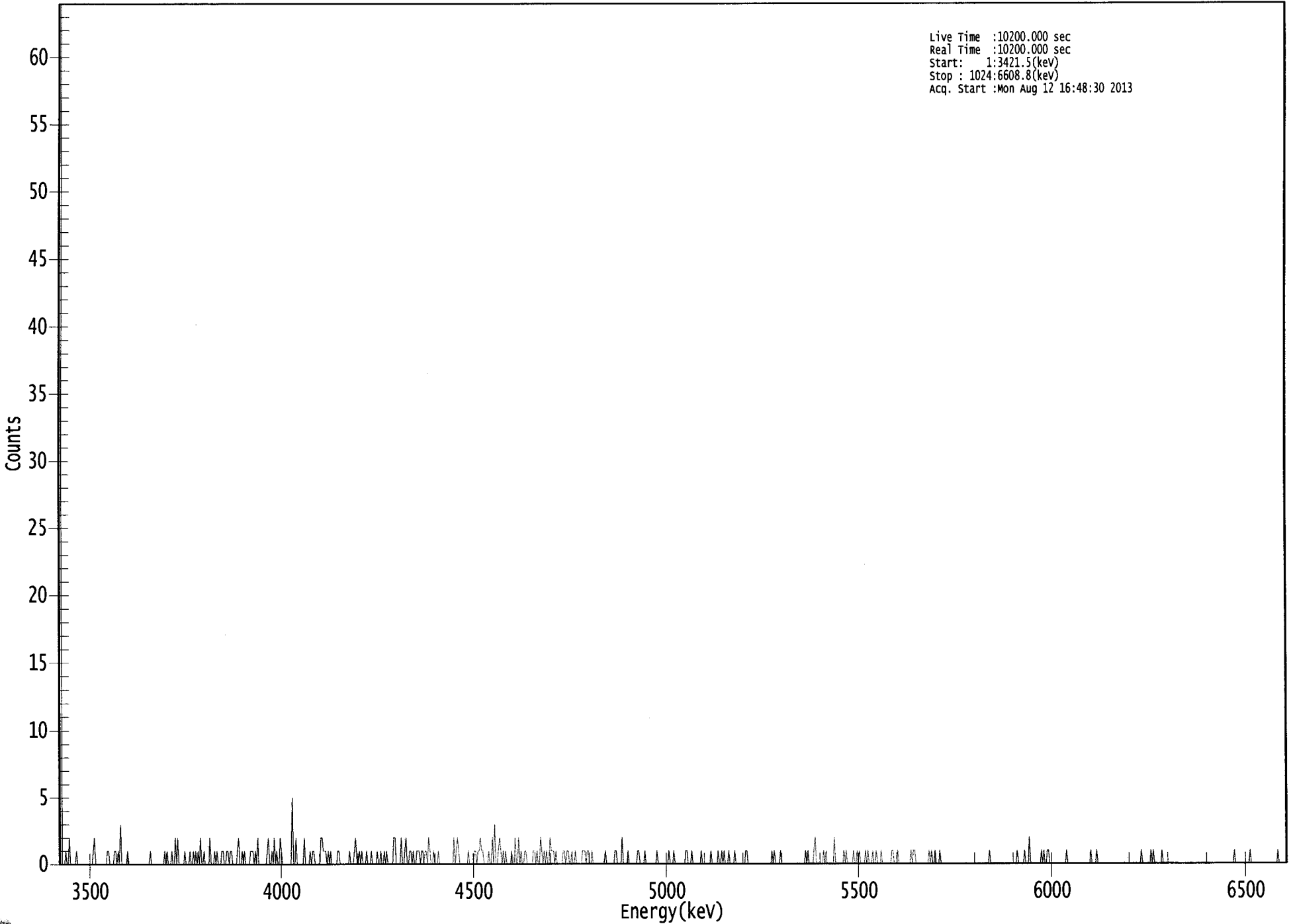
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	1.26E+000 +/- 5.50E-001	4.55E-001 +/- 1.70E-002
RA-226	0.955	4785.00*	3.44E+000 +/- 8.59E-001	4.29E-001 +/- 1.60E-002

AG
 8/13/13

US EPA ARCHIVE DOCUMENT

0000065966.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3421.5(keV)
Stop : 1024:6608.8(keV)
Acq. Start :Mon Aug 12 16:48:30 2013



0491

ROI Type: 1

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

Sample Title: 16

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 2 1 0 1 0 1 0 0

Sample Title: 16

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

801: 0 0 0 0 0 1 0 0

Sample Title: 16

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	2	0	0	0	0	0	0
817:	0	0	0	1	0	1	0	0
825:	1	1	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	1	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	1	0
905:	0	0	0	0	0	0	1	0
913:	1	0	0	0	0	0	0	1
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	1	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	1
1017:	0	0	0	0	0	0	0	0



Handwritten signature

Sample Description: PZ-102R-SS TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 17
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_023
 Chamber Serial Number:
 Detector Serial Number: 23
 Env. Background: System Bkgd 64775
 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: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:48:31 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8245 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0030 on 7/20/2013 6:18:25 PM
 Effective Efficiency: 0.1410 +/- 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	5.517	44.32	29.70	0.68	0.00E+000	3.1
RA-226	4.588	78.64	22.32	1.36	0.00E+000	3.1

 NUCLIDE ANALYSIS RESULTS

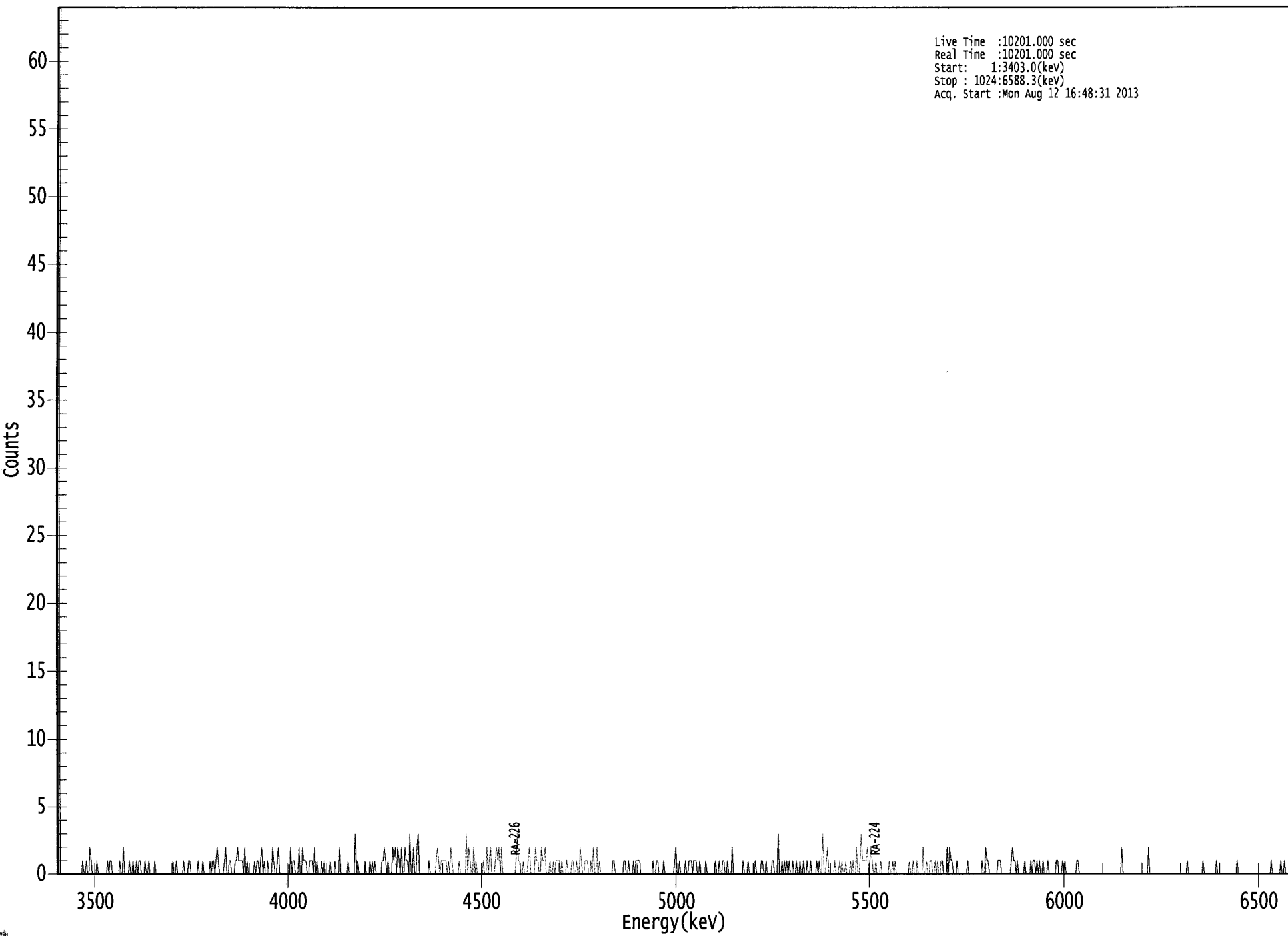
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	1.94E+000 +/- 5.81E-001	2.47E-001 +/- 8.57E-003
RA-226	0.951	4785.00*	3.25E+000 +/- 7.34E-001	2.83E-001 +/- 9.79E-003

*AG
8/13/13*

US EPA ARCHIVE DOCUMENT

0000065967.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start: 1:3403.0(kev)
Stop : 1024:6588.3(kev)
Acq. Start :Mon Aug 12 16:48:31 2013



ROI Type: 1

0406

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

369: 0 2 0 0 0 0 0 0

Sample Title: 17

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

801: 0 0 1 0 0 0 0 0 1

Sample Title: 17

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



Apex-Alpha™

CAF

Sample Description: PZ-102R-SS DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000659
 Batch Identification: 1307153A-RA
 Sample Identification: 18
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_024
 Chamber Serial Number:
 Detector Serial Number: 24
 Env. Background: System Bkgd 64776
 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: 7/19/2013 11:29:01 AM
 Acquisition Date/Time: 8/12/2013 4:48:32 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9918 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM
 Effective Efficiency: 0.1696 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.495	14.41	60.49	4.59	0.00E+000	3.1
RA-226	4.599	54.13	27.17	1.87	0.00E+000	4.7

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

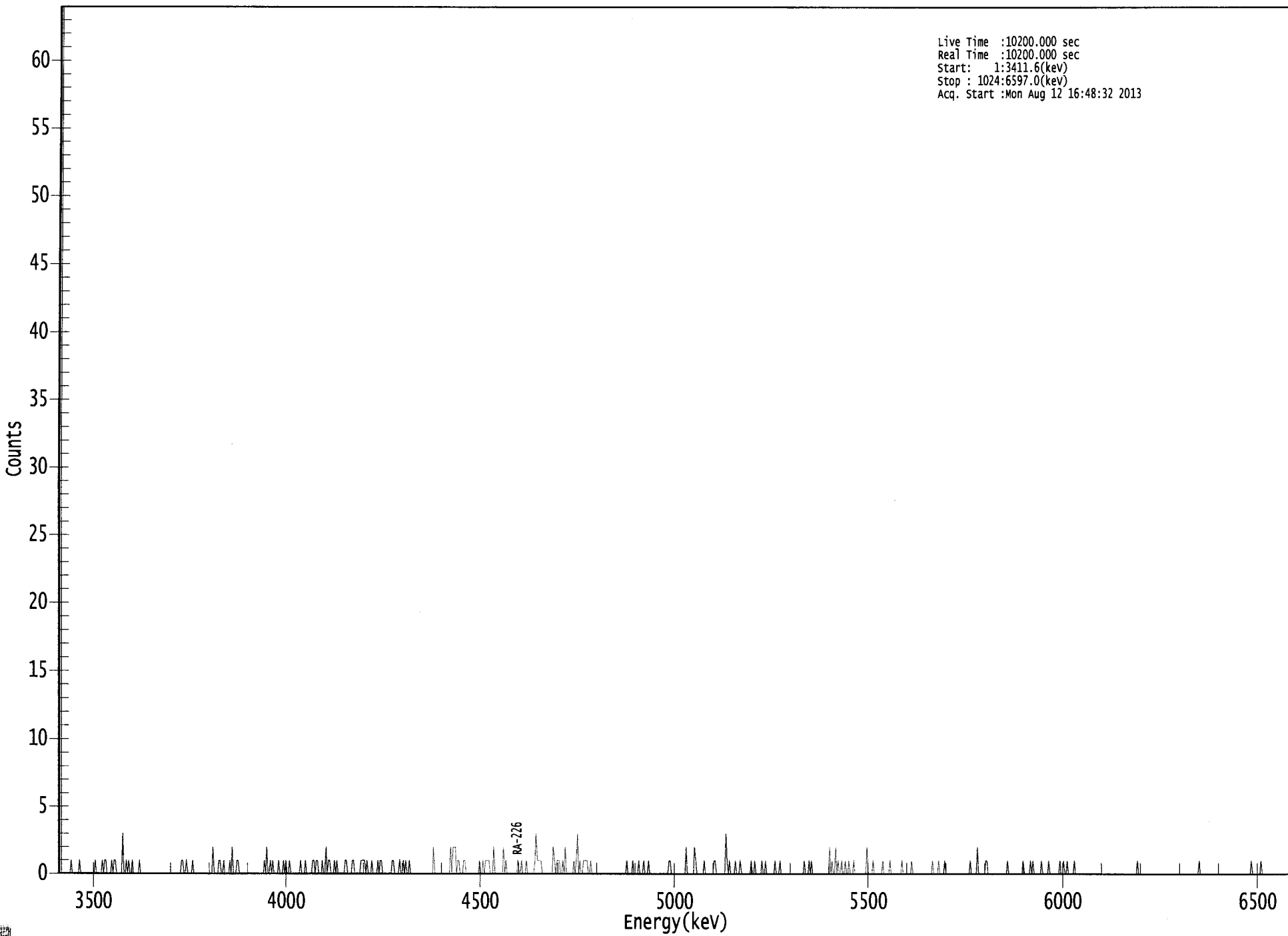
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.954	5685.50*	5.58E-001 +/- 3.38E-001	4.00E-001 +/- 1.47E-002
RA-226	0.956	4785.00*	1.98E+000 +/- 5.43E-001	2.77E-001 +/- 1.01E-002

AG
8/13/13

US EPA ARCHIVE DOCUMENT

0000065968.CNF

Live Time :10200.000 sec
Real Time :10200.000 sec
Start: 1:3411.6(kev)
Stop : 1024:6597.0(kev)
Acq. Start :Mon Aug 12 16:48:32 2013



ROI Type: 1

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 2 0 1 0 0 0 0

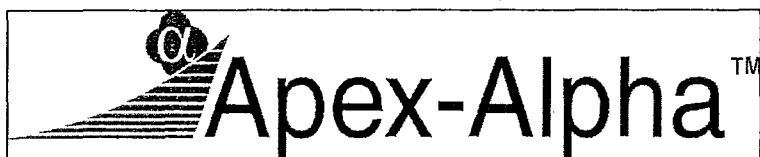
Sample Title: 18

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

801: 0 0 0 0 0 1 0 1

Sample Title: 18

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/12/2013

Time : 6:43:21 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/12/2013 5:20:50 AM
Alpha 004	21f	ALL	Passed	8/12/2013 5:20:50 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	8/12/2013 5:20:51 AM
Alpha 011	21f	ALL	Passed	8/12/2013 5:20:52 AM
Alpha 012	21f	ALL	Passed	8/12/2013 5:20:53 AM
Alpha 013	21f	ALL	Passed	8/12/2013 5:20:53 AM
Alpha 014	21f	ALL	Passed	8/12/2013 5:20:54 AM
Alpha 015	21f	Peak Energy	Action	8/12/2013 5:20:55 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/10/2013 11:23:01 AM
Alpha 019	AIM730	ALL	Passed	8/12/2013 5:20:55 AM
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/12/2013 5:20:56 AM
Alpha 023	AIM730	ALL	Passed	8/12/2013 5:20:57 AM
Alpha 024	AIM730	ALL	Passed	8/12/2013 5:20:57 AM
Alpha 025	AIM730	ALL	Passed	8/12/2013 5:20:58 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/12/2013 5:20:59 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/12/2013 5:20:59 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/12/2013 5:21:00 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	Peak CPS	Action	8/12/2013 5:21:01 AM
Alpha 034	Alpha Analyst100DC	Peak CPS	Action	8/12/2013 5:21:02 AM
Alpha 035	Alpha Analyst100DC	Peak CPS	Action	8/9/2013 5:06:44 AM
Alpha 036	Alpha Analyst100DC	Peak FWHM	Action	8/12/2013 5:21:05 AM
Alpha 036	Alpha Analyst100DC	Peak CPS	Action	8/12/2013 5:21:05 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:06 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:09 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:10 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:12 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:22:26 AM

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CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:15 AM
Alpha 043	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:22:23 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:22:22 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:19 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:21 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:22 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/12/2013 5:21:24 AM

APPROVED BY: _____ *[Signature]*

APPROVAL DATE: _____ *8/12*

US EPA ARCHIVE DOCUMENT

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

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert. (Abs.+)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

RUN 2

Work Order	13-07153	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		07/24/13 00:00	1.0000E+00
Run	2	02	MBL	BLANK		07/24/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	I-73 TOT	44	07/19/13 08:55	2.5000E-01
Lab Deadline	8/13/2013	13	DO	I-73 TOT	44	07/19/13 08:55	2.5000E-01
Client	Engineering Management Support, Inc.	14	TRG	I-73 DIS	44	07/19/13 08:55	2.5000E-01
Project	West Lake OU-1						
Report Level	4						
Activity Units	pCi						
Aliquot Units	1						
Matrix	WA						
Method	E903.0						
Instrument Type	Alpha Spectroscopy						
Radiometric Tracer	Ba-133						
Radiometric Sol#	Ba-6a						
Tracer Act (dpm/g)	988.968						
Carrier							
Carrier Conc (mg/ml)							

* 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.

0419

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			08/14/13 10:28	JWOLFE	08/16/13 10:57	LWALKER		
02	MBL			08/14/13 10:28	JWOLFE	08/16/13 10:57	LWALKER		
03	DUP			08/14/13 10:28	JWOLFE	08/16/13 10:57	LWALKER		
13	DO			08/14/13 10:28	JWOLFE	08/16/13 10:57	LWALKER		
14	TRG			08/14/13 10:28	JWOLFE	08/16/13 10:57	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.

9421

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-Ra226-2

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-226	LCS	08/19/13 08:53		A_Spec	Alpha_039	170	3.07 E+02	2.00 E-03	19.7
02	RA-226	MBL	08/19/13 08:53		A_Spec	Alpha_040	170	1.32 E+00	4.00 E-03	19
03	RA-226	DUP	08/19/13 08:53		A_Spec	Alpha_041	170	9.96 E+00	1.20 E-02	19.2
13	RA-226	DO	08/19/13 08:53		A_Spec	Alpha_042	170	8.66 E+00	2.00 E-03	18.5
14	RA-226	TRG	08/19/13 08:53		A_Spec	Alpha_043	170	1.38 E+01	1.00 E-03	20



Run	2
Analysis Code	Ra226
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.


Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	2	Ra226	liters	8/13/2013	LWALKER

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS				1.00E+00	1.0000E+00	1.0000E+00				
02	BLANK	MBL				1.00E+00	1.0000E+00	1.0000E+00				
03	I-73 TOT	DUP		1	2.00	5.00E-01	5.0000E-01	2.5000E-01				
13	I-73 TOT	DO		1	2.00	5.00E-01	5.0000E-01	2.5000E-01				
14	I-73 DIS	TRG		1	2.00	5.00E-01	5.0000E-01	2.5000E-01				

Comments	
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Technician: *J. Walker* Date: *8.16.13*

	Internal Work Order	13-07153
	Fraction	> 03 <
	Analysis Code	Ra226
	Run Number	2
Dilution Worksheet	Analyst	LWALKER


Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	15	ml	from the original sample and diluted it to	30	ml	0.5000
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1
------------------------	----------

Dilution Ratio	0.5
Dilution Factor	2

Diluted by: J. Walker

Date: 8/16/13

 Dilution Worksheet	Internal Work Order	13-07153
	Fraction	> 13 <
	Analysis Code	Ra226
	Run Number	2
	Analyst	LWALKER


Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	15	ml	from the original sample and diluted it to	30	ml	0.5000
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1
------------------------	----------

Dilution Ratio	0.5
Dilution Factor	2

Diluted by: J. Walker

Date: 8/16/13

 Dilution Worksheet	Internal Work Order	13-07153
	Fraction	> 14 <
	Analysis Code	Ra226
	Run Number	2
	Analyst	LWALKER

Dilution Number	...	Amount Taken	Units	...	Diluted To	Units	Ratio
1	I took	15	ml	from the original sample and diluted it to	30	ml	0.5000
2	I took		ml	from the 1st dilution and diluted it to		ml	
3	I took		ml	from the 2nd dilution and diluted it to		ml	
4	I took		ml	from the 3rd dilution and diluted it to		ml	
5	I took		ml	from the 4th dilution and diluted it to		ml	

Dilutions Taken	1
------------------------	----------

Dilution Ratio	0.5
Dilution Factor	2

Diluted by: J. Walker

Date: 8/16/13

8/19/13

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000665
 Batch Identification: 1307153B-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 65397
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.230E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 8/19/2013 8:49:33 AM
 Acquisition Date/Time: 8/19/2013 8:53:39 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9586 +/- 0.0000
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Effective Efficiency: 0.1884 +/- 0.0033

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.420177 +/- 0.028077
 Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.522	438.49	9.37	0.51	0.00E+000	15.9
RA-226	4.528	306.66	11.20	0.34	0.00E+000	6.9

 NUCLIDE ANALYSIS RESULTS

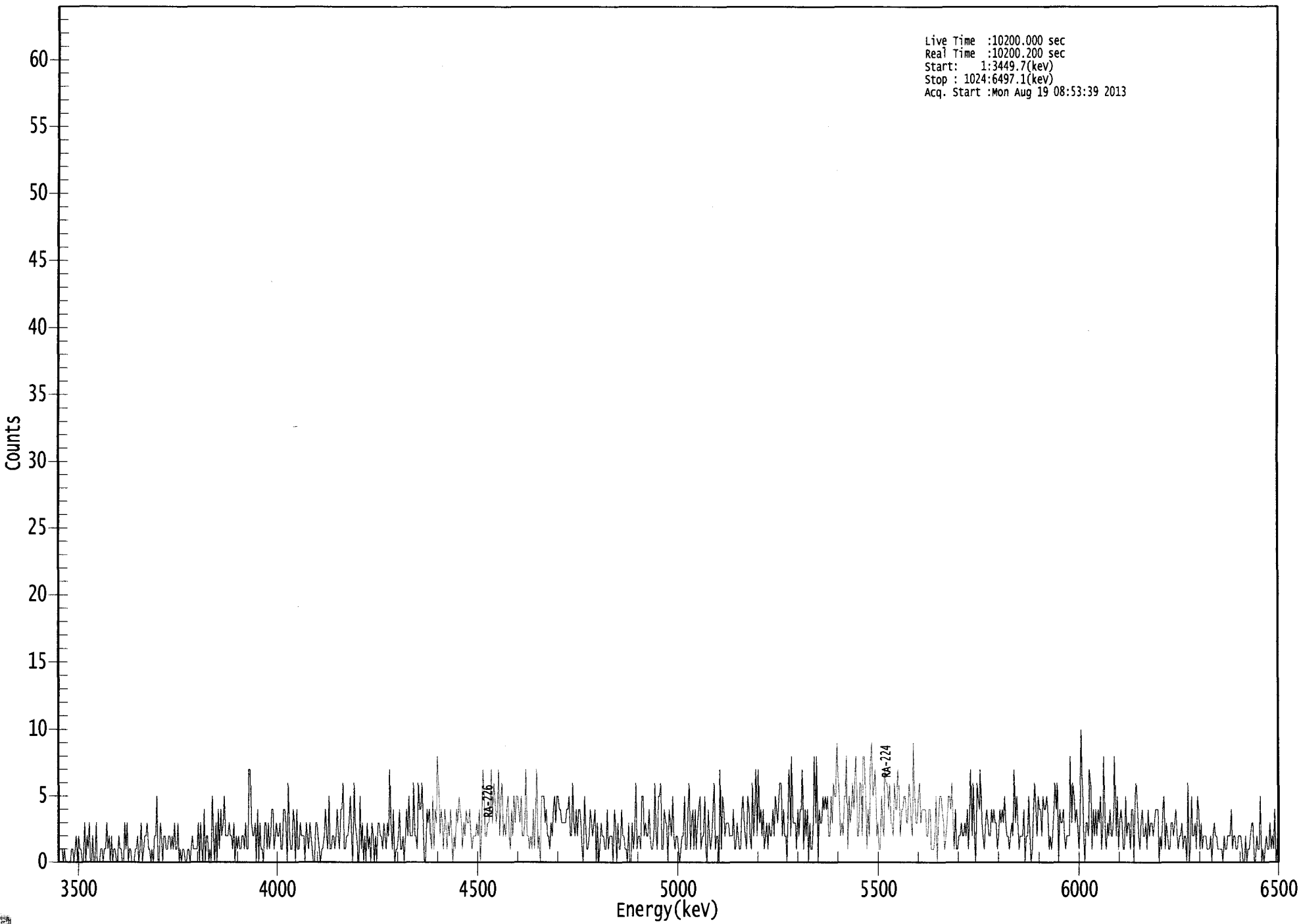
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.965	5685.50*	1.45E+001 +/- 1.44E+000	1.73E-001 +/- 5.88E-003
RA-226	0.917	4785.00*	9.62E+000 +/- 1.13E+000	1.50E-001 +/- 5.09E-003

AG
8/19/13

US EPA ARCHIVE DOCUMENT

000066565.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Mon Aug 19 08:53:39 2013



ROI Type: 1

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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 3 4 7 2 5 6 2 3

Sample Title: 01

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

801: 3 2 7 3 5 3 1 2

Sample Title: 01

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



KB
8/19/13

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000665
 Batch Identification: 1307153B-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 65398
 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: 8/19/2013 8:49:33 AM
 Acquisition Date/Time: 8/19/2013 8:53:41 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7494 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Effective Efficiency: 0.1424 +/- 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	5.388	0.81	359.09	1.19	0.00E+000	3.0
RA-226	4.602	1.32	215.97	0.68	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

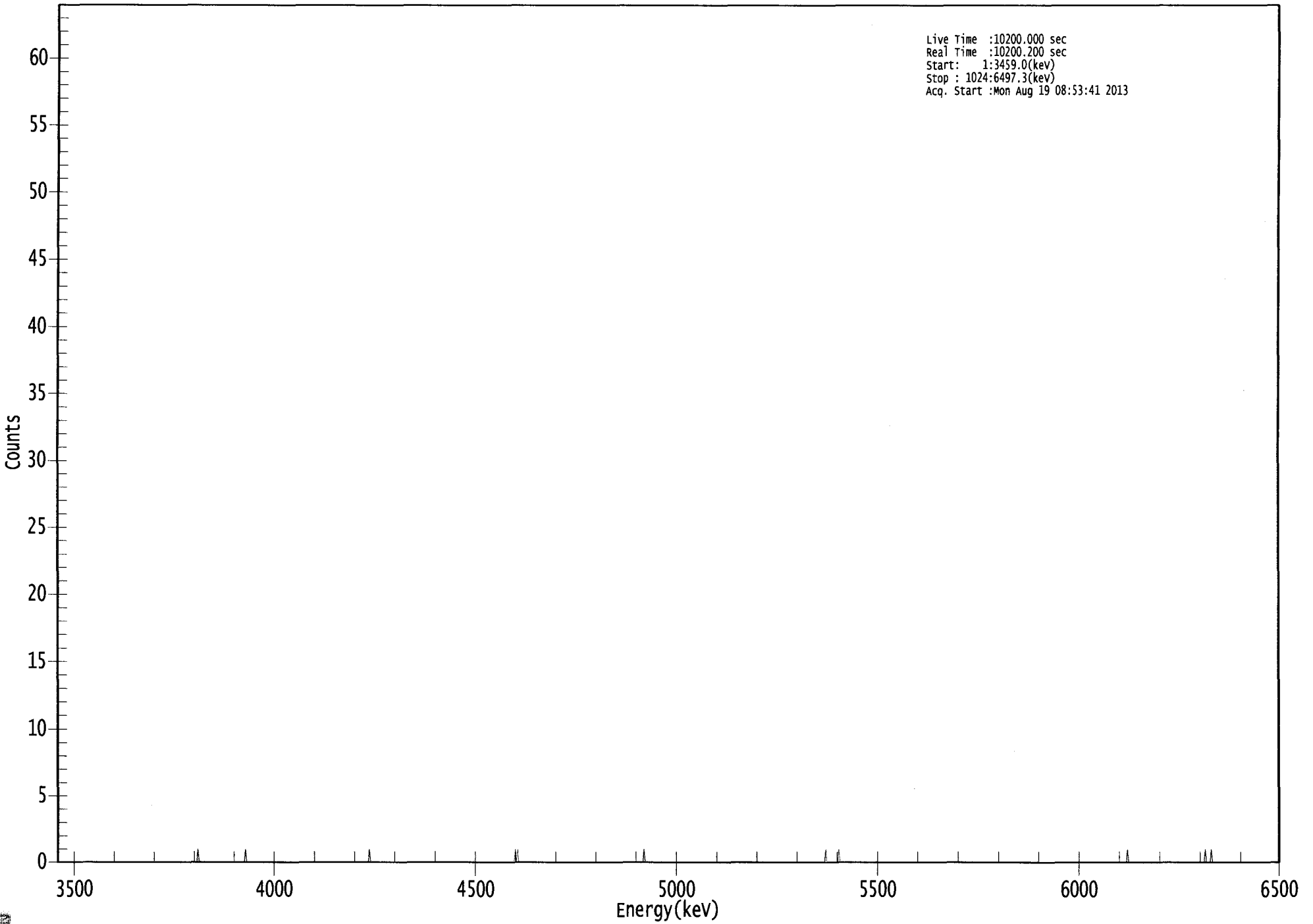
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.891	5685.50*	2.63E-002 +/- 9.45E-002	2.14E-001 +/- 7.28E-003
RA-226	0.957	4785.00*	4.08E-002 +/- 8.81E-002	1.74E-001 +/- 5.93E-003

AG
 8/19/13

US EPA ARCHIVE DOCUMENT

0000066556.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start :Mon Aug 19 08:53:41 2013



ROI Type: 1

0438

 ***** 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	1	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	1	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	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	1	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	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: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	1	0	1	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	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	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	0	1
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	1	0	0	0	0	1	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KB
8/19/13

Apex-Alpha™

Sample Description: I-73 TOT-DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000665
 Batch Identification: 1307153B-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 65399
 Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
 Generic Mult. Factor: 4.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 8:49:33 AM
 Acquisition Date/Time: 8/19/2013 8:53:35 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1917 +/- 0.0033 on 8/10/2013 2:59:03 PM
 Effective Efficiency: 0.1917 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.430	-0.89	347.60	2.89	0.00E+000	3.0
RA-226	4.586	9.96	69.15	2.04	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

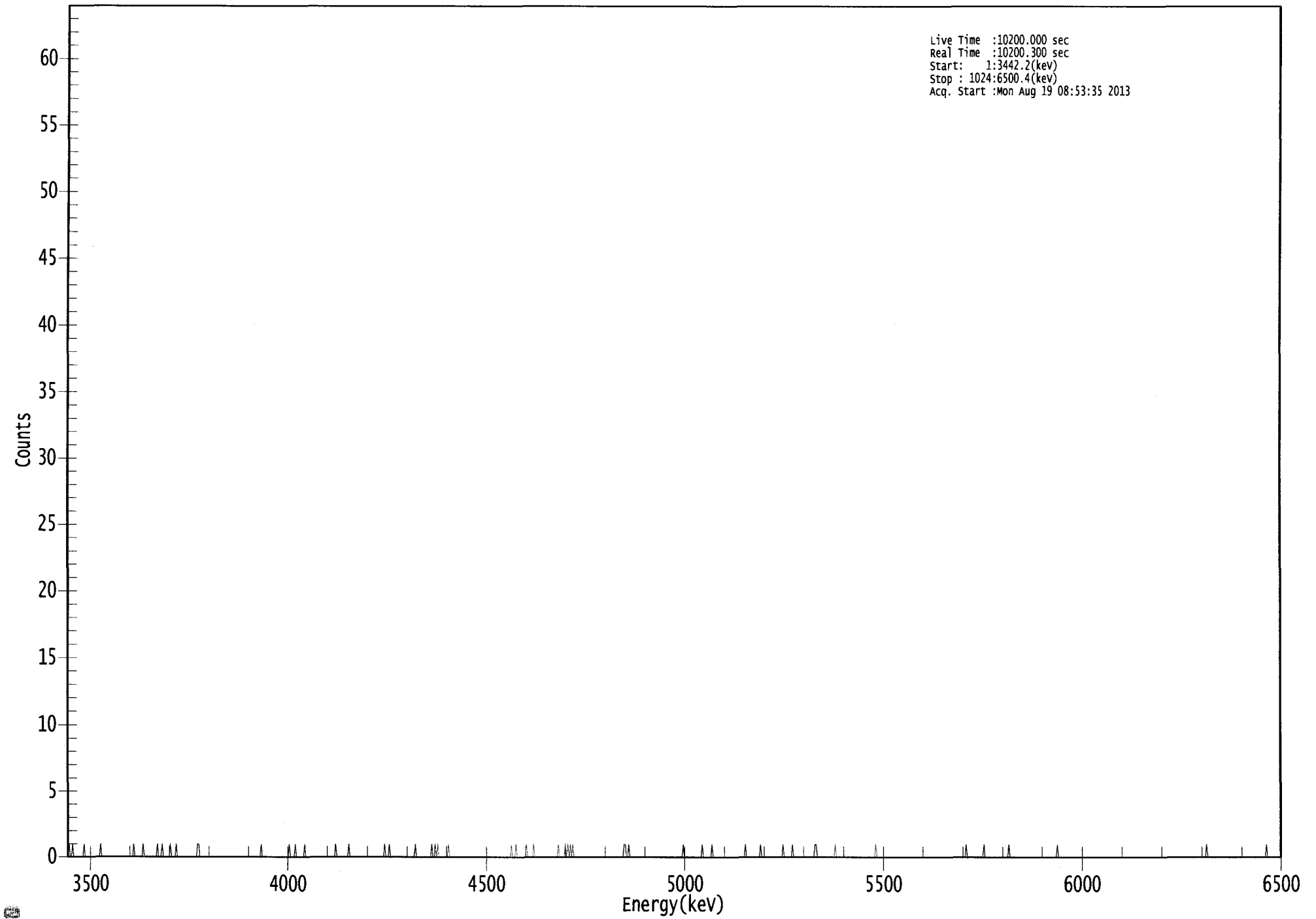
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.918	5685.50*	-2.09E-001 +/- 7.27E-001	2.06E+000 +/- 7.03E-002
RA-226	0.950	4785.00*	2.20E+000 +/- 1.52E+000	1.72E+000 +/- 5.85E-002

AG
8/19/13

US EPA ARCHIVE DOCUMENT

0000066553.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3442.2(kev)
Stop : 1024:6500.4(kev)
Acq. Start :Mon Aug 19 08:53:35 2013



ROI Type: 1

043
043

 ***** 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	1	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	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:	1	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:	1	0	0	0	0	0	0	1
89:	0	0	0	0	1	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	1	1
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	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	1	0	0	0
193:	0	1	0	0	0	0	0	0
201:	0	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	1	0	0	0	0
233:	0	0	0	0	0	0	1	0
241:	0	0	0	0	0	0	0	0
249:	0	0	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:	1	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	1	0	0	1
313:	0	1	0	0	0	0	0	0
321:	0	0	1	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	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: 03

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 03

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

KB
8/19/13

Apex-Alpha™

Sample Description: I-73 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000665
 Batch Identification: 1307153B-RA
 Sample Identification: 13
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 65400
 Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.820E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 8:49:33 AM
 Acquisition Date/Time: 8/19/2013 8:53:37 AM
 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

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	5.471	4.81	101.48	1.19	0.00E+000	3.0
RA-226	4.556	8.66	68.12	0.34	0.00E+000	3.0

 NUCLIDE ANALYSIS RESULTS

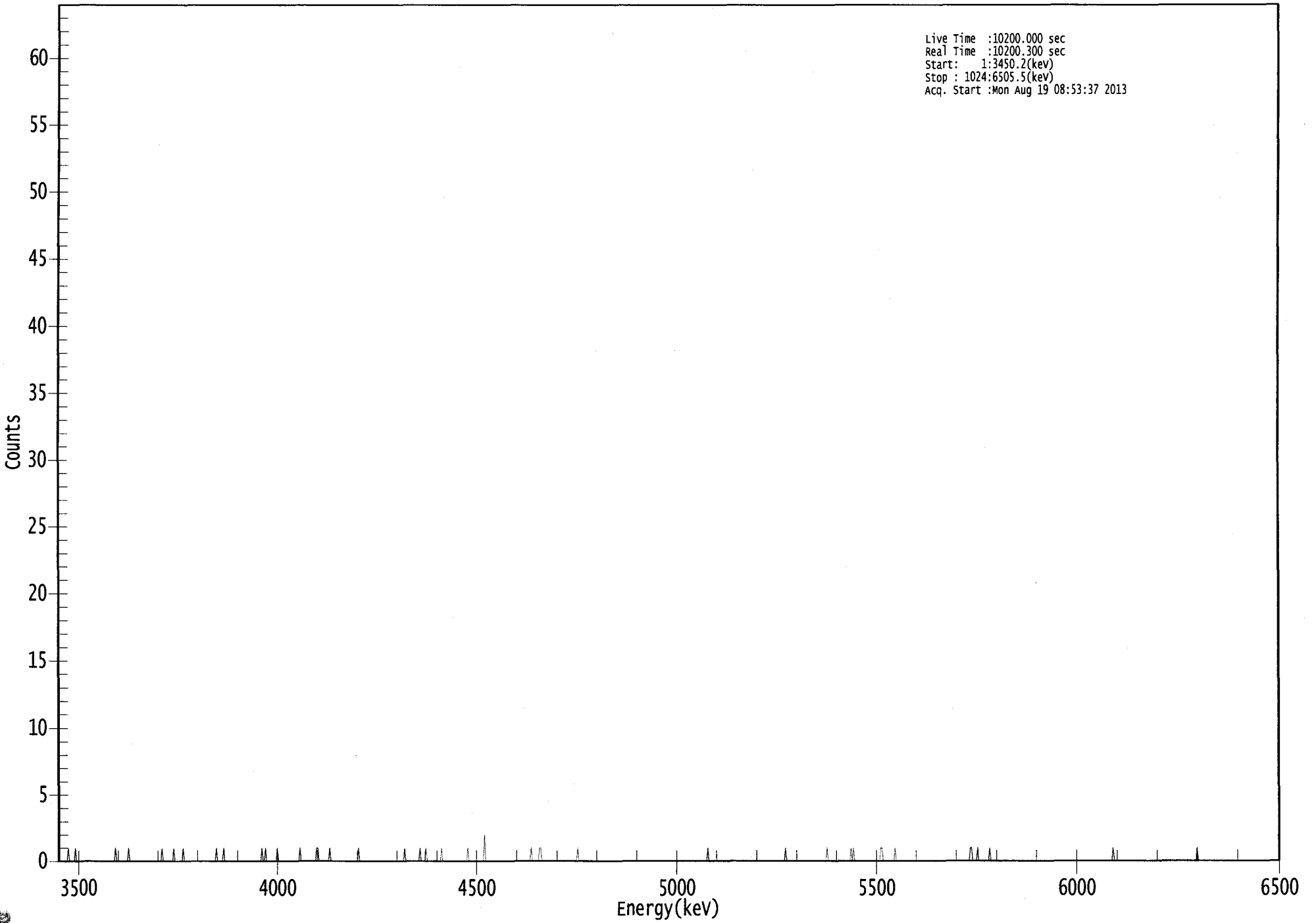
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.942	5685.50*	1.12E+000 +/- 1.14E+000	1.53E+000 +/- 5.26E-002
RA-226	0.934	4785.00*	1.90E+000 +/- 1.30E+000	1.05E+000 +/- 3.57E-002

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 8/19/13

US EPA ARCHIVE DOCUMENT

0000066554.CNF

Live Time :10200.000 sec
Real Time :10200.300 sec
Start: 1:3450.2(kev)
Stop : 1024:6505.5(kev)
Acq. Start :Mon Aug 19 08:53:37 2013



ROI Type: 1

0448

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

369: 0 0 0 0 0 0 0 0

Sample Title: 13

Channel	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0
401:	0	0	0	0	1	1	0
409:	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0
433:	0	0	0	0	1	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	1	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	1	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	1	0
649:	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0
665:	0	1	0	1	0	0	0
673:	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0
689:	0	0	1	1	0	0	0
697:	0	0	0	0	0	0	1
705:	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0
761:	0	0	0	0	0	1	1
769:	0	0	0	1	0	0	0
777:	0	0	0	0	0	1	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: 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	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	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

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8/19/13

Apex-Alpha™

Sample Description: I-73 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000665
 Batch Identification: 1307153B-RA
 Sample Identification: 14
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_043
 Chamber Serial Number: 04026481A
 Detector Serial Number: 91088
 Env. Background: System Bkgd 65401
 Reagent Blank: <not performed>

Sample Size: 2.500E-001 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.860E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 7/19/2013 8:49:33 AM
 Acquisition Date/Time: 8/19/2013 8:53:33 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.2003 +/- 0.0035 on 8/11/2013 2:21:17 PM
 Effective Efficiency: 0.2003 +/- 0.0035

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.580	0.62	583.31	2.38	0.00E+000	3.0
RA-226	4.707	13.83	53.08	0.17	0.00E+000	6.0

 NUCLIDE ANALYSIS RESULTS

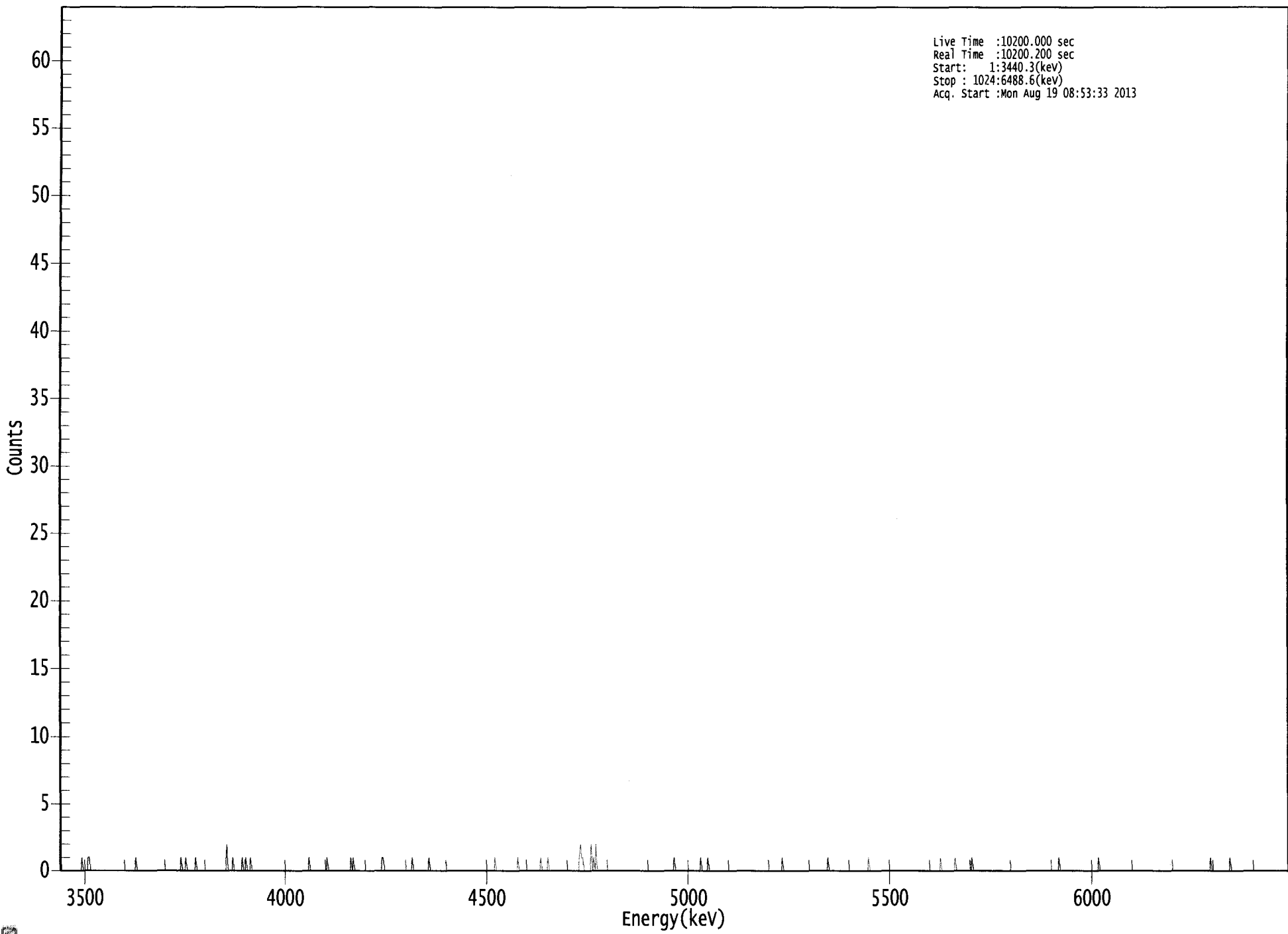
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.986	5685.50*	1.35E-001 +/- 7.85E-001	1.78E+000 +/- 6.06E-002
RA-226	0.992	4785.00*	2.83E+000 +/- 1.50E+000	8.52E-001 +/- 2.89E-002

AG
8/19/13

US EPA ARCHIVE DOCUMENT

0000066557.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start: 1:3440.3(kev)
Stop : 1024:6488.6(kev)
Acq. Start :Mon Aug 19 08:53:33 2013



ROI Type: 1

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

Sample Title: 14

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	1	0	0	0	0	1
25:	1	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	1
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	1	0	0
105:	0	1	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	2	0	0	0	0
145:	1	0	0	0	0	0	0	0
153:	1	0	0	1	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:	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	1
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	1	0	1	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	1	1	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	1	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	1	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	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	1	0	0	0	0

369: 0 0 0 0 0 0 0 0

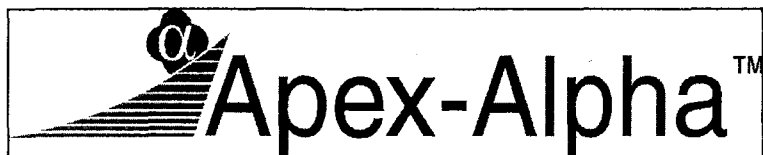
Sample Title: 14

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	1	0	0	0	0	1
409:	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0
433:	0	1	2	1	1	0	0
441:	0	0	0	2	0	1	0
449:	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	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:	1	0	0	0	0	0	0
521:	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	1
537:	0	0	0	0	1	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	1	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:	1	0	0	0	0	0	0
649:	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0
673:	0	0	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	1
737:	0	0	0	0	0	0	0
745:	0	0	1	0	0	0	0
753:	0	0	0	0	0	0	0
761:	1	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: 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:	1	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	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	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	1	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	1	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 8/19/2013
Time : 5:42:49 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/19/2013 5:23:18 AM
Alpha 004	21f	ALL	Passed	8/19/2013 5:23:19 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	8/19/2013 5:23:20 AM
Alpha 011	21f	ALL	Passed	8/19/2013 5:23:21 AM
Alpha 012	21f	ALL	Passed	8/19/2013 5:23:22 AM
Alpha 013	21f	ALL	Passed	8/19/2013 5:23:23 AM
Alpha 014	21f	ALL	Passed	8/19/2013 5:23:24 AM
Alpha 015	21f	Peak Energy	Action	8/19/2013 5:23:25 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Not Done	
Alpha 019	AIM730	ALL	Passed	8/19/2013 5:23:26 AM
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/19/2013 5:23:27 AM
Alpha 023	AIM730	ALL	Passed	8/19/2013 5:23:27 AM
Alpha 024	AIM730	ALL	Passed	8/19/2013 5:23:28 AM
Alpha 025	AIM730	ALL	Passed	8/19/2013 5:23:29 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/19/2013 5:23:30 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/19/2013 5:23:31 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/19/2013 5:23:32 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:33 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:34 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:36 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:38 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:39 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:41 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:43 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:45 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:47 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:49 AM

US EPA ARCHIVE DOCUMENT

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:51 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:53 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:55 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:23:58 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:24:01 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	8/19/2013 5:24:03 AM

APPROVED BY: _____ *C*

APPROVAL DATE: 8/19/13

US EPA ARCHIVE DOCUMENT

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

Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert. (Abs.+--)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION XI
ANALYTICAL DATA (RADIUM-228)

RUN 1

Work Order	13-07153	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra228	01	LCS	LCS		07/24/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		07/24/13 00:00	1.0000E+00
Date Received	7/22/2013	03	DUP	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Lab Deadline	8/13/2013	04	TRG	PZ-104-KS TOT	46	07/18/13 13:01	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-104-KS DIS	46	07/18/13 13:01	1.0000E+00
Project	West Lake OU-1	06	DO	PZ-206-SS TOT	43	07/18/13 13:35	1.0000E+00
Report Level	4	07	TRG	PZ-206-SS DIS	43	07/18/13 13:35	1.0000E+00
Activity Units	pCi	08	TRG	PZ-207-AS TOT	44	07/18/13 14:32	1.0000E+00
Aliquot Units	I	09	TRG	PZ-207-AS DIS	44	07/18/13 14:32	1.0000E+00
Matrix	WA	10	TRG	DUP 07 TOT	43	07/18/13 00:00	1.0000E+00
Method	E904.0	11	TRG	DUP 07 DIS	43	07/18/13 00:00	1.0000E+00
Instrument Type	Alpha/Beta GPC	12	TRG	FB at I-73 TOT	37	07/19/13 08:50	1.0000E+00
Radiometric Tracer	Ba-133	13	TRG	I-73 TOT	44	07/19/13 08:55	1.0000E+00
Radiometric Sol#	Ba-6a	14	TRG	I-73 DIS	44	07/19/13 08:55	1.0000E+00
Tracer Act (dpm/g)	990.402	15	TRG	PZ-103-SS TOT	39	07/19/13 09:45	1.0000E+00
Carrier	Yttrium	16	TRG	PZ-103-SS DIS	39	07/19/13 09:45	1.0000E+00
Carrier Conc (mg/ml)	34	17	TRG	PZ-102R-SS TOT	44	07/19/13 10:15	1.0000E+00
		18	TRG	PZ-102R-SS DIS	44	07/19/13 10:15	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.

5452

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	0.9207	911.9	435.0	105.90	2.000	0.0936	0.1490	0.0554	81.47	86.28	1.00	1.00
02	MBL	0.9170	908.2	398.1	97.31	2.000	0.0936	0.1485	0.0549	80.74	78.56	1.00	1.00
03	DUP	0.9171	908.3	390.3	95.39	2.000					95.39		
04	TRG	0.9150	906.2	399.1	97.77	2.000	0.0935	0.1485	0.0550	80.88	79.08	1.00	1.00
05	TRG	0.9180	909.2	401.1	97.94	2.000	0.0936	0.1459	0.0523	76.91	75.33	1.00	1.00
06	DO	0.9155	906.7	412.3	100.95	2.000	0.0935	0.1497	0.0562	82.65	83.43	1.00	1.00
07	TRG	0.9150	906.2	387.8	95.00	2.000	0.0940	0.1426	0.0486	71.47	67.90	1.00	1.00
08	TRG	0.9149	906.1	378.5	92.73	2.000	0.0938	0.1492	0.0554	81.47	75.55	1.00	1.00
09	TRG	0.9157	906.9	363.6	89.00	2.000	0.0937	0.1486	0.0549	80.74	71.86	1.00	1.00
10	TRG	0.9147	905.9	383.7	94.03	2.000	0.0939	0.1491	0.0552	81.18	76.33	1.00	1.00
11	TRG	0.9131	904.3	389.0	95.49	2.000	0.0936	0.1487	0.0551	81.03	77.38	1.00	1.00
12	TRG	0.9138	905.0	364.6	89.43	2.000	0.0940	0.1489	0.0549	80.74	72.21	1.00	1.00
13	TRG	0.9209	912.1	0.5	0.12	2.000					0.12		
14	TRG	0.9136	904.8	27.8	6.82	2.000					6.82		
15	TRG	0.9128	904.0	405.4	99.55	2.000	0.0937	0.1495	0.0558	82.06	81.69	1.00	1.00
16	TRG	0.9132	904.4	386.2	94.80	2.000	0.0937	0.1493	0.0556	81.76	77.51	1.00	1.00
17	TRG	0.9129	904.1	335.8	82.45	2.000	0.0942	0.1475	0.0533	78.38	64.63	1.00	1.00
18	TRG	0.9137	904.9	404.3	99.18	2.000	0.0939	0.1502	0.0563	82.79	82.12	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			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
02	MBL			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
03	DUP			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
04	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
05	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
06	DO			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
07	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
08	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
09	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
10	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
11	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
12	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
13	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
14	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
15	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
16	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
17	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	TSMITH
18	TRG			08/06/13 19:54	LWALKER	08/09/13 15:38	LWALKER	08/16/13 07:37	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: 13-07153-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	RA-228	LCS	LCS	pCi/l	8.63E+00	9.69E-01	1.21E+00	8.73E+00	98.85	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	5.64E-01	6.33E-01	1.29E+00					OK	OK
04	RA-228	TRG	PZ-104-KS TOT	pCi/l	1.22E-01	6.86E-01	1.46E+00					OK	
05	RA-228	TRG	PZ-104-KS DIS	pCi/l	2.81E-01	7.74E-01	1.62E+00					OK	
06	RA-228	DO	PZ-206-SS TOT	pCi/l	1.63E+00	7.19E-01	1.35E+00					OK	
07	RA-228	TRG	PZ-206-SS DIS	pCi/l	6.34E-01	8.31E-01	1.71E+00					OK	
08	RA-228	TRG	PZ-207-AS TOT	pCi/l	1.88E+00	7.49E-01	1.37E+00					OK	
09	RA-228	TRG	PZ-207-AS DIS	pCi/l	1.30E+00	8.01E-01	1.56E+00					OK	
10	RA-228	TRG	DUP 07 TOT	pCi/l	1.44E+00	7.75E-01	1.49E+00					OK	
11	RA-228	TRG	DUP 07 DIS	pCi/l	5.33E-01	8.78E-01	1.82E+00					OK	
12	RA-228	TRG	FB at I-73 TOT	pCi/l	5.56E-01	7.96E-01	1.64E+00					OK	
15	RA-228	TRG	PZ-103-SS TOT	pCi/l	7.01E+00	1.01E+00	1.48E+00					OK	
16	RA-228	TRG	PZ-103-SS DIS	pCi/l	1.14E+00	8.05E-01	1.59E+00					OK	
17	RA-228	TRG	PZ-102R-SS TOT	pCi/l	1.32E+00	1.01E+00	2.02E+00					INV	
18	RA-228	TRG	PZ-102R-SS DIS	pCi/l	2.25E+00	7.90E-01	1.43E+00					OK	

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-228	LCS	07/24/13 00:00	1.00E+00	105.90	81.47	86.28	1.00	8/9/2013 15:38	8/16/2013 7:37
02	RA-228	MBL	07/24/13 00:00	1.00E+00	97.31	80.74	78.56	1.00	8/9/2013 15:38	8/16/2013 7:37
04	RA-228	TRG	07/18/13 13:01	1.00E+00	97.77	80.88	79.08	1.00	8/9/2013 15:38	8/16/2013 7:37
05	RA-228	TRG	07/18/13 13:01	1.00E+00	97.94	76.91	75.33	1.00	8/9/2013 15:38	8/16/2013 7:37
06	RA-228	DO	07/18/13 13:35	1.00E+00	100.95	82.65	83.43	1.00	8/9/2013 15:38	8/16/2013 7:37
07	RA-228	TRG	07/18/13 13:35	1.00E+00	95.00	71.47	67.90	1.00	8/9/2013 15:38	8/16/2013 7:37
08	RA-228	TRG	07/18/13 14:32	1.00E+00	92.73	81.47	75.55	1.00	8/9/2013 15:38	8/16/2013 7:37
09	RA-228	TRG	07/18/13 14:32	1.00E+00	89.00	80.74	71.86	1.00	8/9/2013 15:38	8/16/2013 7:37
10	RA-228	TRG	07/18/13 00:00	1.00E+00	94.03	81.18	76.33	1.00	8/9/2013 15:38	8/16/2013 7:37
11	RA-228	TRG	07/18/13 00:00	1.00E+00	95.49	81.03	77.38	1.00	8/9/2013 15:38	8/16/2013 7:37
12	RA-228	TRG	07/19/13 08:50	1.00E+00	89.43	80.74	72.21	1.00	8/9/2013 15:38	8/16/2013 7:37
15	RA-228	TRG	07/19/13 09:45	1.00E+00	99.55	82.06	81.69	1.00	8/9/2013 15:38	8/16/2013 7:37
16	RA-228	TRG	07/19/13 09:45	1.00E+00	94.80	81.76	77.51	1.00	8/9/2013 15:38	8/16/2013 7:37
17	RA-228	TRG	07/19/13 10:15	1.00E+00	82.45	78.38	64.63	1.00	8/9/2013 15:38	8/16/2013 7:37
18	RA-228	TRG	07/19/13 10:15	1.00E+00	99.18	82.79	82.12	1.00	8/9/2013 15:38	8/16/2013 7:37

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-07153
Client	Engineering Management Support, Inc.

Preliminary Data Report & Analytical Calculations
Work Order: 13-07153-Ra228-1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Halflife (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	08/16/13 12:58		LB4110R	A1	120	579	0.983333333	0.4776
02	RA-228	MBL	08/16/13 12:58		LB4110R	A2	120	133	0.883333333	0.4699
04	RA-228	TRG	08/16/13 12:58		LB4110R	A3	120	152	1.216666667	0.4809
05	RA-228	TRG	08/16/13 12:58		LB4110R	A4	120	173	1.333333333	0.4732
06	RA-228	DO	08/16/13 12:58		LB4110R	B1	120	220	1.133333333	0.4754
07	RA-228	TRG	08/16/13 12:58		LB4110R	B2	120	164	1.15	0.4658
08	RA-228	TRG	08/16/13 12:58		LB4110R	B3	120	199	0.933333333	0.4713
09	RA-228	TRG	08/16/13 12:58		LB4110R	B4	120	194	1.133333333	0.4773
10	RA-228	TRG	08/16/13 12:58		LB4110R	C1	120	203	1.133333333	0.4705
11	RA-228	TRG	08/16/13 12:58		LB4110R	C2	120	233	1.733333333	0.4676
12	RA-228	TRG	08/16/13 12:58		LB4110R	C3	120	166	1.183333333	0.4614
15	RA-228	TRG	08/16/13 12:58		LB4110R	C4	120	504	1.283333333	0.4714
16	RA-228	TRG	08/16/13 13:25		LB4110A	C1	120	193	1.183333333	0.4667
17	RA-228	TRG	08/16/13 13:25		LB4110A	C2	120	202	1.283333333	0.4578
18	RA-228	TRG	08/16/13 13:25		LB4110A	C3	120	237	1.083333333	0.4699

Run	1
	1
Analysis Code	Ra228
	Ra228
Eberline Services Work Order	13-07153
	13-07153
Client	Engineering Management Support, Inc.
	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	07/24/13 00:00	1.0000	0.9207	911.8631	435.0000	105.90	1.00	1.00
02	MBL	BLANK	07/24/13 00:00	1.0000	0.9170	908.1986	398.1000	97.31	1.00	1.00
03	DUP	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.9171	908.2977	390.3000	95.39		
04	TRG	PZ-104-KS TOT	07/18/13 13:01	1.0000	0.9150	906.2178	399.1000	97.77	1.00	1.00
05	TRG	PZ-104-KS DIS	07/18/13 13:01	1.0000	0.9180	909.1890	401.1000	97.94	1.00	1.00
06	DO	PZ-206-SS TOT	07/18/13 13:35	1.0000	0.9155	906.7130	412.3000	100.95	1.00	1.00
07	TRG	PZ-206-SS DIS	07/18/13 13:35	1.0000	0.9150	906.2178	387.8000	95.00	1.00	1.00
08	TRG	PZ-207-AS TOT	07/18/13 14:32	1.0000	0.9149	906.1188	378.5000	92.73	1.00	1.00
09	TRG	PZ-207-AS DIS	07/18/13 14:32	1.0000	0.9157	906.9111	363.6000	89.00	1.00	1.00
10	TRG	DUP 07 TOT	07/18/13 00:00	1.0000	0.9147	905.9207	383.7000	94.03	1.00	1.00
11	TRG	DUP 07 DIS	07/18/13 00:00	1.0000	0.9131	904.3361	389.0000	95.49	1.00	1.00
12	TRG	FB at I-73 TOT	07/19/13 08:50	1.0000	0.9138	905.0293	364.6000	89.43	1.00	1.00
13	TRG	I-73 TOT	07/19/13 08:55	1.0000	0.9209	912.0612	0.5066	0.12		
14	TRG	I-73 DIS	07/19/13 08:55	1.0000	0.9136	904.8313	27.8100	6.82		
15	TRG	PZ-103-SS TOT	07/19/13 09:45	1.0000	0.9128	904.0389	405.4000	99.55	1.00	1.00
16	TRG	PZ-103-SS DIS	07/19/13 09:45	1.0000	0.9132	904.4351	386.2000	94.80	1.00	1.00
17	TRG	PZ-102R-SS TOT	07/19/13 10:15	1.0000	0.9129	904.1380	335.8000	82.45	1.00	1.00
18	TRG	PZ-102R-SS DIS	07/19/13 10:15	1.0000	0.9137	904.9303	404.3000	99.18	1.00	1.00

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Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	1	Ra228	liters	8/13/2013	LWALKER

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-206-SS TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-104-KS TOT	TRG					1.0000E+00	1.0000E+00				
05	PZ-104-KS DIS	TRG					1.0000E+00	1.0000E+00				
06	PZ-206-SS TOT	DO					1.0000E+00	1.0000E+00				
07	PZ-206-SS DIS	TRG					1.0000E+00	1.0000E+00				
08	PZ-207-AS TOT	TRG					1.0000E+00	1.0000E+00				
09	PZ-207-AS DIS	TRG					1.0000E+00	1.0000E+00				
10	DUP 07 TOT	TRG					1.0000E+00	1.0000E+00				
11	DUP 07 DIS	TRG					1.0000E+00	1.0000E+00				
12	FB at I-73 TOT	TRG					1.0000E+00	1.0000E+00				
13	I-73 TOT	TRG					1.0000E+00	1.0000E+00				
14	I-73 DIS	TRG					1.0000E+00	1.0000E+00				
15	PZ-103-SS TOT	TRG					1.0000E+00	1.0000E+00				
16	PZ-103-SS DIS	TRG					1.0000E+00	1.0000E+00				
17	PZ-102R-SS TOT	TRG					1.0000E+00	1.0000E+00				
18	PZ-102R-SS DIS	TRG					1.0000E+00	1.0000E+00				

Comments	
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Technician: J. Walker Date: 8, 6, 13

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
13-07153	1	Ra228	Yttrium	34.0000	TSMITH

TRetec Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data		Filter Data		Gravimetric % Recovery
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	
01	LCS	LCS	2.0000	0.0936	0.1490	0.0554	81.47
02	BLANK	MBL	2.0000	0.0936	0.1485	0.0549	80.74
03	DUP	DUP	2.0000				
04	PZ-104-KS TOT	TRG	2.0000	0.0935	0.1485	0.0550	80.88
05	PZ-104-KS DIS	TRG	2.0000	0.0936	0.1459	0.0523	76.91
06	PZ-206-SS TOT	DO	2.0000	0.0935	0.1497	0.0562	82.65
07	PZ-206-SS DIS	TRG	2.0000	0.0940	0.1426	0.0486	71.47
08	PZ-207-AS TOT	TRG	2.0000	0.0938	0.1492	0.0554	81.47
09	PZ-207-AS DIS	TRG	2.0000	0.0937	0.1486	0.0549	80.74
10	DUP 07 TOT	TRG	2.0000	0.0939	0.1491	0.0552	81.18
11	DUP 07 DIS	TRG	2.0000	0.0936	0.1487	0.0551	81.03
12	FB at I-73 TOT	TRG	2.0000	0.0940	0.1489	0.0549	80.74
13	I-73 TOT	TRG	2.0000				
14	I-73 DIS	TRG	2.0000				
15	PZ-103-SS TOT	TRG	2.0000	0.0937	0.1495	0.0558	82.06
16	PZ-103-SS DIS	TRG	2.0000	0.0937	0.1493	0.0556	81.76
17	PZ-102R-SS TOT	TRG	2.0000	0.0942	0.1475	0.0533	78.38
18	PZ-102R-SS DIS	TRG	2.0000	0.0939	0.1502	0.0563	82.79

Technician: *TSMITH*

Date: 8, 16, 13

AG
8/16/13
(A)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307153-16	22	193	120	1400	8/16/13 15:25
C2	1307153-17	15	202	120	1400	8/16/13 15:25
C3	1307153-18	10	237	120	1400	8/16/13 15:25

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AG
8/16/13
(2)

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307153-10	17	203	120	1400	8/16/13 14:58
C2	1307153-11	15	233	120	1400	8/16/13 14:58
C3	1307153-12	13	166	120	1400	8/16/13 14:58
C4	1307153-15	14	504	120	1400	8/16/13 14:58
A1	1307153-01	18	579	120	1400	8/16/13 14:58
A2	1307153-02	8	133	120	1400	8/16/13 14:58
A3	1307153-04	11	152	120	1400	8/16/13 14:58
A4	1307153-05	8	173	120	1400	8/16/13 14:58
B1	1307153-06	5	220	120	1400	8/16/13 14:58
B2	1307153-07	14	164	120	1400	8/16/13 14:58
B3	1307153-08	9	199	120	1400	8/16/13 14:58
B4	1307153-09	5	194	120	1400	8/16/13 14:58

GPC Detector Report
(ALL Backgrounds)

C
8/16/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/16/2013	1.67E-02	P	-2.13E+01	2.82E-01	2.19E+01
LB4110A - A2	Alpha	11/18/2007	8/16/2013	1.00E-01	P	-1.81E+01	2.53E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/16/2013	3.33E-02	P	-1.76E+01	2.16E-01	1.80E+01
LB4110A - A4	Alpha	11/18/2007	8/16/2013	8.33E-02	P	-1.87E+01	2.36E-01	1.92E+01
LB4110A - B1	Alpha	11/18/2007	8/16/2013	1.67E-02	P	-9.69E-02	7.51E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/16/2013	6.67E-02	P	-7.80E-02	7.22E-02	2.22E-01
LB4110A - B3	Alpha	11/18/2007	8/16/2013	5.00E-02	P	-6.29E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/16/2013	1.67E-02	P	-1.40E-01	7.87E-02	2.97E-01
LB4110A - C1	Alpha	11/18/2007	8/16/2013	1.67E-02	P	-1.49E-01	8.86E-02	3.26E-01
LB4110A - C2	Alpha	11/18/2007	8/16/2013	8.33E-02	P	-1.77E-01	8.66E-02	3.50E-01
LB4110A - C3	Alpha	11/18/2007	8/16/2013	5.00E-02	P	-1.72E-01	1.00E-01	3.72E-01
LB4110A - C4	Alpha	11/18/2007	8/16/2013	5.00E-02	P	-6.27E-02	6.83E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/16/2013	3.33E-02	P	-5.36E-02	8.32E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/16/2013	3.33E-02	P	-6.98E-02	6.06E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/16/2013	0.00E+00	P	-4.86E-02	7.06E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/16/2013	5.00E-02	P	-5.72E-02	7.03E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/16/2013	1.67E-02	P	-9.82E-02	1.01E-01	3.00E-01
LB4110R - A2	Alpha	11/24/2006	8/16/2013	5.00E-02	P	-8.91E-02	7.63E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/16/2013	8.33E-02	P	-7.31E-02	7.73E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/16/2013	5.00E-02	P	-5.26E-02	7.09E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/16/2013	3.33E-02	P	-9.42E-02	6.15E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	8/16/2013	5.00E-02	P	-6.93E-02	6.33E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/16/2013	5.00E-02	P	-6.48E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/16/2013	6.67E-02	P	-6.38E-02	7.02E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/16/2013	3.33E-02	P	-7.67E-02	7.35E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/16/2013	1.67E-02	P	-7.55E-02	7.09E-02	2.17E-01
LB4110R - C3	Alpha	11/24/2006	8/16/2013	5.00E-02	P	-8.78E-02	8.43E-02	2.56E-01
LB4110R - C4	Alpha	11/24/2006	8/16/2013	6.67E-02	P	-6.18E-02	8.12E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/16/2013	0.00E+00	P	-1.03E-01	7.01E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/16/2013	0.00E+00	P	-7.80E-02	6.95E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/16/2013	0.00E+00	P	-8.30E-02	6.93E-02	2.22E-01
LB4110R - D4	Alpha	11/24/2006	8/16/2013	0.00E+00	P	-7.55E-02	7.40E-02	2.23E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

C
BALARS

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/16/2013	7.38E+00	P	-2.89E+02	7.63E+00	3.04E+02
LB4110A - A2	Beta	11/18/2007	8/16/2013	4.22E+00	P	-3.03E+01	2.59E+00	3.55E+01
LB4110A - A3	Beta	11/18/2007	8/16/2013	1.17E+00	P	-5.01E+01	2.63E+00	5.54E+01
LB4110A - A4	Beta	11/18/2007	8/16/2013	7.10E+00	P	-3.24E+01	3.22E+00	3.88E+01
LB4110A - B1	Beta	11/18/2007	8/16/2013	1.37E+00	P	-1.04E+01	3.23E+00	1.68E+01
LB4110A - B2	Beta	11/18/2007	8/16/2013	1.15E+00	P	-7.62E+00	1.99E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/16/2013	9.83E-01	P	1.16E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/16/2013	1.10E+00	P	-7.61E+00	1.97E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	8/16/2013	1.18E+00	P	-5.38E+00	2.12E+00	9.61E+00
LB4110A - C2	Beta	11/18/2007	8/16/2013	1.28E+00	P	3.82E-01	1.27E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/16/2013	1.08E+00	P	4.72E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/16/2013	1.02E+00	P	-1.75E+00	2.10E+00	5.95E+00
LB4110A - D1	Beta	11/18/2007	8/16/2013	1.87E+00	P	-2.30E+00	2.56E+00	7.43E+00
LB4110A - D2	Beta	11/18/2007	8/16/2013	1.25E+00	P	-6.39E-01	1.56E+00	3.76E+00
LB4110A - D3	Beta	11/18/2007	8/16/2013	4.07E+00	P	1.29E+00	4.47E+00	7.66E+00
LB4110A - D4	Beta	11/18/2007	8/16/2013	1.17E+00	P	-4.23E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/16/2013	9.83E-01	P	-6.08E+01	3.66E+00	6.81E+01
LB4110R - A2	Beta	11/24/2006	8/16/2013	8.83E-01	P	-4.83E+01	2.01E+00	5.23E+01
LB4110R - A3	Beta	11/24/2006	8/16/2013	1.22E+00	P	-4.47E+01	2.73E+00	5.01E+01
LB4110R - A4	Beta	11/24/2006	8/16/2013	1.33E+00	P	-4.46E+01	1.99E+00	4.85E+01
LB4110R - B1	Beta	11/24/2006	8/16/2013	1.13E+00	P	-4.69E+01	2.02E+00	5.09E+01
LB4110R - B2	Beta	11/24/2006	8/16/2013	1.15E+00	P	-4.69E+01	2.04E+00	5.09E+01
LB4110R - B3	Beta	11/24/2006	8/16/2013	9.33E-01	P	-4.67E+01	2.65E+00	5.19E+01
LB4110R - B4	Beta	11/24/2006	8/16/2013	1.13E+00	P	-4.70E+01	1.92E+00	5.08E+01
LB4110R - C1	Beta	11/24/2006	8/16/2013	1.13E+00	P	-4.68E+01	2.96E+00	5.27E+01
LB4110R - C2	Beta	11/24/2006	8/16/2013	1.73E+00	P	-4.67E+01	2.71E+00	5.22E+01
LB4110R - C3	Beta	11/24/2006	8/16/2013	1.18E+00	P	-4.72E+01	2.51E+00	5.22E+01
LB4110R - C4	Beta	11/24/2006	8/16/2013	1.28E+00	P	-5.33E+01	2.94E+00	5.92E+01
LB4110R - D1	Beta	11/24/2006	8/16/2013	0.00E+00	P	-4.44E+01	5.54E+00	5.55E+01
LB4110R - D2	Beta	11/24/2006	8/16/2013	0.00E+00	P	-4.77E+01	1.87E+00	5.15E+01
LB4110R - D3	Beta	11/24/2006	8/16/2013	0.00E+00	P	-5.11E+01	5.52E+00	6.21E+01
LB4110R - D4	Beta	11/24/2006	8/16/2013	0.00E+00	P	-4.74E+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

0473

GPC Detector Report
(ALL Efficiencies)

C
8/16/13

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/16/2013	0.2450	P	-0.0126	0.2160	0.4446
LB4110A - A2	Alpha	11/18/2007	8/16/2013	0.2107	P	-0.0501	0.1742	0.3985
LB4110A - A3	Alpha	11/18/2007	8/16/2013	0.2025	P	-0.0735	0.1634	0.4003
LB4110A - A4	Alpha	11/18/2007	8/16/2013	0.2129	P	-0.0519	0.1821	0.4161
LB4110A - B1	Alpha	11/18/2007	8/16/2013	0.2299	P	0.1943	0.2243	0.2543
LB4110A - B2	Alpha	11/18/2007	8/16/2013	0.2167	P	0.1924	0.2213	0.2502
LB4110A - B3	Alpha	11/18/2007	8/16/2013	0.2350	P	0.1280	0.2323	0.3366
LB4110A - B4	Alpha	11/18/2007	8/16/2013	0.2290	P	0.2088	0.2364	0.2639
LB4110A - C1	Alpha	11/18/2007	8/16/2013	0.2231	P	0.1977	0.2207	0.2438
LB4110A - C2	Alpha	11/18/2007	8/16/2013	0.2252	P	0.1971	0.2252	0.2532
LB4110A - C3	Alpha	11/18/2007	8/16/2013	0.2547	P	0.2234	0.2495	0.2755
LB4110A - C4	Alpha	11/18/2007	8/16/2013	0.2224	P	0.1969	0.2256	0.2543
LB4110A - D1	Alpha	11/18/2007	8/16/2013	0.2230	P	0.2028	0.2328	0.2628
LB4110A - D2	Alpha	11/18/2007	8/16/2013	0.2497	P	0.2276	0.2580	0.2884
LB4110A - D3	Alpha	11/18/2007	8/16/2013	0.2476	P	0.2309	0.2634	0.2958
LB4110A - D4	Alpha	11/18/2007	8/16/2013	0.1838	P	0.1642	0.1992	0.2342
LB4110R - A1	Alpha	11/24/2006	8/16/2013	0.2337	P	0.1983	0.2385	0.2786
LB4110R - A2	Alpha	11/24/2006	8/16/2013	0.2148	P	0.1851	0.2201	0.2551
LB4110R - A3	Alpha	11/24/2006	8/16/2013	0.2144	P	0.1924	0.2243	0.2563
LB4110R - A4	Alpha	11/24/2006	8/16/2013	0.2469	P	0.2118	0.2453	0.2789
LB4110R - B1	Alpha	11/24/2006	8/16/2013	0.2204	P	0.1832	0.2257	0.2681
LB4110R - B2	Alpha	11/24/2006	8/16/2013	0.2100	P	0.1754	0.2169	0.2585
LB4110R - B3	Alpha	11/24/2006	8/16/2013	0.2383	P	0.2016	0.2438	0.2861
LB4110R - B4	Alpha	11/24/2006	8/16/2013	0.2207	P	0.1882	0.2312	0.2742
LB4110R - C1	Alpha	11/24/2006	8/16/2013	0.2125	P	0.1834	0.2150	0.2466
LB4110R - C2	Alpha	11/24/2006	8/16/2013	0.2163	P	0.1932	0.2245	0.2558
LB4110R - C3	Alpha	11/24/2006	8/16/2013	0.2324	P	0.2034	0.2394	0.2754
LB4110R - C4	Alpha	11/24/2006	8/16/2013	0.2061	P	0.1826	0.2222	0.2618
LB4110R - D1	Alpha	11/24/2006	8/16/2013	0.0000	F	0.0027	0.1990	0.3953
LB4110R - D2	Alpha	11/24/2006	8/16/2013	0.0000	F	0.0037	0.2263	0.4488
LB4110R - D3	Alpha	11/24/2006	8/16/2013	0.0000	F	0.0036	0.2223	0.4409
LB4110R - D4	Alpha	11/24/2006	8/16/2013	0.0000	F	0.0015	0.1791	0.3567
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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C
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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/16/2013	0.5561	P	0.2114	0.5625	0.9136
LB4110A - A2	Beta	11/18/2007	8/16/2013	0.5002	P	0.1623	0.4649	0.7674
LB4110A - A3	Beta	11/18/2007	8/16/2013	0.4771	P	0.0904	0.4572	0.8241
LB4110A - A4	Beta	11/18/2007	8/16/2013	0.5227	P	0.1431	0.4893	0.8354
LB4110A - B1	Beta	11/18/2007	8/16/2013	0.5212	P	0.4633	0.5297	0.5960
LB4110A - B2	Beta	11/18/2007	8/16/2013	0.5258	P	0.4632	0.5268	0.5904
LB4110A - B3	Beta	11/18/2007	8/16/2013	0.5352	P	0.3170	0.5314	0.7458
LB4110A - B4	Beta	11/18/2007	8/16/2013	0.5442	P	0.4918	0.5538	0.6158
LB4110A - C1	Beta	11/18/2007	8/16/2013	0.5044	P	0.4511	0.5026	0.5541
LB4110A - C2	Beta	11/18/2007	8/16/2013	0.5030	P	0.4293	0.5010	0.5727
LB4110A - C3	Beta	11/18/2007	8/16/2013	0.6009	P	0.5291	0.5907	0.6522
LB4110A - C4	Beta	11/18/2007	8/16/2013	0.5195	P	0.4578	0.5248	0.5917
LB4110A - D1	Beta	11/18/2007	8/16/2013	0.5270	P	0.4783	0.5529	0.6275
LB4110A - D2	Beta	11/18/2007	8/16/2013	0.5493	P	0.4886	0.5870	0.6855
LB4110A - D3	Beta	11/18/2007	8/16/2013	0.6017	P	0.5375	0.6149	0.6923
LB4110A - D4	Beta	11/18/2007	8/16/2013	0.4345	P	0.3845	0.4718	0.5591
LB4110R - A1	Beta	11/24/2006	8/16/2013	0.5529	P	0.4744	0.5672	0.6600
LB4110R - A2	Beta	11/24/2006	8/16/2013	0.5193	P	0.4158	0.5085	0.6013
LB4110R - A3	Beta	11/24/2006	8/16/2013	0.5099	P	0.4503	0.5384	0.6264
LB4110R - A4	Beta	11/24/2006	8/16/2013	0.5894	P	0.5032	0.5914	0.6796
LB4110R - B1	Beta	11/24/2006	8/16/2013	0.5350	P	0.4464	0.5421	0.6379
LB4110R - B2	Beta	11/24/2006	8/16/2013	0.5012	P	0.4247	0.5195	0.6143
LB4110R - B3	Beta	11/24/2006	8/16/2013	0.6100	P	0.4940	0.5917	0.6895
LB4110R - B4	Beta	11/24/2006	8/16/2013	0.5332	P	0.4540	0.5489	0.6437
LB4110R - C1	Beta	11/24/2006	8/16/2013	0.4647	P	0.4159	0.5015	0.5871
LB4110R - C2	Beta	11/24/2006	8/16/2013	0.5084	P	0.4440	0.5283	0.6126
LB4110R - C3	Beta	11/24/2006	8/16/2013	0.5582	P	0.4755	0.5705	0.6656
LB4110R - C4	Beta	11/24/2006	8/16/2013	0.4964	P	0.4258	0.5249	0.6240
LB4110R - D1	Beta	11/24/2006	8/16/2013	0.0000	F	0.0056	0.4758	0.9460
LB4110R - D2	Beta	11/24/2006	8/16/2013	0.0000	F	0.0069	0.5346	1.0624
LB4110R - D3	Beta	11/24/2006	8/16/2013	0.0000	F	0.0066	0.5193	1.0319
LB4110R - D4	Beta	11/24/2006	8/16/2013	0.0000	F	0.0026	0.4274	0.8523
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

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RUN 2

Work Order	13-07153
Analysis Code	Ra228
Run	2
Date Received	7/22/2013
Lab Deadline	8/13/2013
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	4
Activity Units	pCi
Aliquot Units	I
Matrix	WA
Method	E904.0
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	988.968
Carrier	Yttrium
Carrier Conc (mg/ml)	34

<i>Internal Fraction</i>	<i>Sample Desc</i>	<i>Client ID</i>	<i>Login CPM</i>	<i>Sample Date</i>	<i>Sample Aliquot</i>
01	LCS	LCS		07/24/13 00:00	1.0000E+00
02	MBL	BLANK		07/24/13 00:00	1.0000E+00
03	DUP	I-73 TOT	44	07/19/13 08:55	5.0000E-01
13	DO	I-73 TOT	44	07/19/13 08:55	5.0000E-01
14	TRG	I-73 DIS	44	07/19/13 08:55	5.0000E-01

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

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Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
13-07153	2	Ra228	liters	8/13/2013	JWOLFE

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Allquot	Net Equiv	Allquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	I-73 TOT	DUP					5.0000E-01	5.0000E-01				
13	I-73 TOT	DO					5.0000E-01	5.0000E-01				
14	I-73 DIS	TRG					5.0000E-01	5.0000E-01				

Comments	
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Technician: *J Wolfe* Date: 8/14/13

C
B/m
P

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
B1	1307153-02	13	186	120	1400	8/21/13 9:56
B2	1307153-03	12	239	120	1400	8/21/13 9:56
B3	1307153-13	12	185	120	1400	8/21/13 9:56
B4	1307153-14	20	215	120	1400	8/21/13 9:56

C
Erin
B

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1307153-01	6	162	30	1400	8/21/13 8:25

GPC Detector Report
(ALL Backgrounds)

C
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Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/21/2013	6.67E-02	P	-2.13E+01	2.81E-01	2.18E+01
LB4110A - A2	Alpha	11/18/2007	8/21/2013	1.67E-02	P	-1.80E+01	2.53E-01	1.86E+01
LB4110A - A3	Alpha	11/18/2007	8/21/2013	1.00E-01	P	-1.76E+01	2.16E-01	1.80E+01
LB4110A - A4	Alpha	11/18/2007	8/21/2013	6.67E-02	P	-1.87E+01	2.35E-01	1.91E+01
LB4110A - B1	Alpha	11/18/2007	8/21/2013	1.17E-01	P	-9.66E-02	7.51E-02	2.47E-01
LB4110A - B2	Alpha	11/18/2007	8/21/2013	3.33E-02	P	-7.80E-02	7.20E-02	2.22E-01
LB4110A - B3	Alpha	11/18/2007	8/21/2013	1.33E-01	P	-6.28E-02	5.35E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	8/21/2013	1.50E-01	P	-1.40E-01	7.88E-02	2.97E-01
LB4110A - C1	Alpha	11/18/2007	8/21/2013	1.50E-01	P	-1.48E-01	8.86E-02	3.26E-01
LB4110A - C2	Alpha	11/18/2007	8/21/2013	5.00E-02	P	-1.77E-01	8.64E-02	3.49E-01
LB4110A - C3	Alpha	11/18/2007	8/21/2013	1.00E-01	P	-1.71E-01	1.00E-01	3.72E-01
LB4110A - C4	Alpha	11/18/2007	8/21/2013	1.00E-01	P	-6.25E-02	6.83E-02	1.99E-01
LB4110A - D1	Alpha	11/18/2007	8/21/2013	3.33E-02	P	-5.37E-02	8.30E-02	2.20E-01
LB4110A - D2	Alpha	11/18/2007	8/21/2013	8.33E-02	P	-7.00E-02	6.07E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	8/21/2013	5.00E-02	P	-4.89E-02	7.04E-02	1.90E-01
LB4110A - D4	Alpha	11/18/2007	8/21/2013	1.67E-01	P	-5.72E-02	7.04E-02	1.98E-01
LB4110R - A1	Alpha	11/24/2006	8/21/2013	3.33E-02	P	-9.81E-02	1.01E-01	3.00E-01
LB4110R - A2	Alpha	11/24/2006	8/21/2013	3.33E-02	P	-8.91E-02	7.62E-02	2.42E-01
LB4110R - A3	Alpha	11/24/2006	8/21/2013	3.00E-01	F	-7.35E-02	7.74E-02	2.28E-01
LB4110R - A4	Alpha	11/24/2006	8/21/2013	5.00E-02	P	-5.26E-02	7.08E-02	1.94E-01
LB4110R - B1	Alpha	11/24/2006	8/21/2013	6.67E-02	P	-9.40E-02	6.15E-02	2.17E-01
LB4110R - B2	Alpha	11/24/2006	8/21/2013	1.67E-02	P	-6.93E-02	6.32E-02	1.96E-01
LB4110R - B3	Alpha	11/24/2006	8/21/2013	8.33E-02	P	-6.47E-02	6.99E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	8/21/2013	8.33E-02	P	-6.37E-02	7.02E-02	2.04E-01
LB4110R - C1	Alpha	11/24/2006	8/21/2013	1.33E-01	P	-7.66E-02	7.36E-02	2.24E-01
LB4110R - C2	Alpha	11/24/2006	8/21/2013	3.33E-02	P	-7.55E-02	7.08E-02	2.17E-01
LB4110R - C3	Alpha	11/24/2006	8/21/2013	1.00E-01	P	-8.77E-02	8.43E-02	2.56E-01
LB4110R - C4	Alpha	11/24/2006	8/21/2013	5.00E-02	P	-6.17E-02	8.11E-02	2.24E-01
LB4110R - D1	Alpha	11/24/2006	8/21/2013	0.00E+00	P	-1.03E-01	6.99E-02	2.43E-01
LB4110R - D2	Alpha	11/24/2006	8/21/2013	0.00E+00	P	-7.82E-02	6.94E-02	2.17E-01
LB4110R - D3	Alpha	11/24/2006	8/21/2013	0.00E+00	P	-8.32E-02	6.91E-02	2.21E-01
LB4110R - D4	Alpha	11/24/2006	8/21/2013	0.00E+00	P	-7.57E-02	7.39E-02	2.23E-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
Bru

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/21/2013	7.52E+00	P	-2.88E+02	7.62E+00	3.04E+02
LB4110A - A2	Beta	11/18/2007	8/21/2013	3.58E+00	P	-3.02E+01	2.60E+00	3.54E+01
LB4110A - A3	Beta	11/18/2007	8/21/2013	1.35E+00	P	-5.00E+01	2.62E+00	5.53E+01
LB4110A - A4	Beta	11/18/2007	8/21/2013	6.90E+00	P	-3.23E+01	3.24E+00	3.88E+01
LB4110A - B1	Beta	11/18/2007	8/21/2013	1.58E+00	P	-1.04E+01	3.22E+00	1.68E+01
LB4110A - B2	Beta	11/18/2007	8/21/2013	1.20E+00	P	-7.60E+00	1.99E+00	1.16E+01
LB4110A - B3	Beta	11/18/2007	8/21/2013	1.47E+00	P	1.18E-01	1.36E+00	2.60E+00
LB4110A - B4	Beta	11/18/2007	8/21/2013	1.15E+00	P	-7.59E+00	1.97E+00	1.15E+01
LB4110A - C1	Beta	11/18/2007	8/21/2013	1.22E+00	P	-5.37E+00	2.11E+00	9.59E+00
LB4110A - C2	Beta	11/18/2007	8/21/2013	8.67E-01	P	3.81E-01	1.26E+00	2.15E+00
LB4110A - C3	Beta	11/18/2007	8/21/2013	1.50E+00	P	4.70E-01	1.46E+00	2.45E+00
LB4110A - C4	Beta	11/18/2007	8/21/2013	1.30E+00	P	-1.75E+00	2.09E+00	5.94E+00
LB4110A - D1	Beta	11/18/2007	8/21/2013	2.12E+00	P	-2.30E+00	2.56E+00	7.42E+00
LB4110A - D2	Beta	11/18/2007	8/21/2013	2.28E+00	P	-6.35E-01	1.56E+00	3.75E+00
LB4110A - D3	Beta	11/18/2007	8/21/2013	4.43E+00	P	1.30E+00	4.47E+00	7.65E+00
LB4110A - D4	Beta	11/18/2007	8/21/2013	1.37E+00	P	-4.19E-01	1.37E+00	3.16E+00
LB4110R - A1	Beta	11/24/2006	8/21/2013	9.17E-01	P	-6.07E+01	3.66E+00	6.80E+01
LB4110R - A2	Beta	11/24/2006	8/21/2013	8.33E-01	P	-4.82E+01	2.01E+00	5.22E+01
LB4110R - A3	Beta	11/24/2006	8/21/2013	1.52E+00	P	-4.46E+01	2.73E+00	5.01E+01
LB4110R - A4	Beta	11/24/2006	8/21/2013	1.13E+00	P	-4.45E+01	1.99E+00	4.85E+01
LB4110R - B1	Beta	11/24/2006	8/21/2013	1.42E+00	P	-4.68E+01	2.02E+00	5.09E+01
LB4110R - B2	Beta	11/24/2006	8/21/2013	1.23E+00	P	-4.68E+01	2.04E+00	5.09E+01
LB4110R - B3	Beta	11/24/2006	8/21/2013	1.27E+00	P	-4.66E+01	2.64E+00	5.19E+01
LB4110R - B4	Beta	11/24/2006	8/21/2013	1.22E+00	P	-4.69E+01	1.92E+00	5.08E+01
LB4110R - C1	Beta	11/24/2006	8/21/2013	1.45E+00	P	-4.67E+01	2.96E+00	5.27E+01
LB4110R - C2	Beta	11/24/2006	8/21/2013	1.87E+00	P	-4.67E+01	2.71E+00	5.21E+01
LB4110R - C3	Beta	11/24/2006	8/21/2013	2.50E+00	P	-4.72E+01	2.51E+00	5.22E+01
LB4110R - C4	Beta	11/24/2006	8/21/2013	1.32E+00	P	-5.32E+01	2.94E+00	5.91E+01
LB4110R - D1	Beta	11/24/2006	8/21/2013	0.00E+00	P	-4.44E+01	5.54E+00	5.55E+01
LB4110R - D2	Beta	11/24/2006	8/21/2013	0.00E+00	P	-4.77E+01	1.87E+00	5.14E+01
LB4110R - D3	Beta	11/24/2006	8/21/2013	0.00E+00	P	-5.11E+01	5.51E+00	6.21E+01
LB4110R - D4	Beta	11/24/2006	8/21/2013	0.00E+00	P	-4.74E+01	2.22E+00	5.18E+01
LB5100 - 1	Beta	7/10/2006	10/26/2007	4.52E+00	F	-3.19E-01	1.58E+00	3.48E+00

GPC Detector Report
(ALL Efficiencies)

C
Bru

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	8/21/2013	0.2361	P	-0.0121	0.2161	0.4443
LB4110A - A2	Alpha	11/18/2007	8/21/2013	0.2103	P	-0.0496	0.1743	0.3983
LB4110A - A3	Alpha	11/18/2007	8/21/2013	0.2071	P	-0.0729	0.1636	0.4001
LB4110A - A4	Alpha	11/18/2007	8/21/2013	0.2211	P	-0.0514	0.1822	0.4159
LB4110A - B1	Alpha	11/18/2007	8/21/2013	0.2205	P	0.1943	0.2243	0.2543
LB4110A - B2	Alpha	11/18/2007	8/21/2013	0.2124	P	0.1924	0.2213	0.2502
LB4110A - B3	Alpha	11/18/2007	8/21/2013	0.2300	P	0.1282	0.2323	0.3364
LB4110A - B4	Alpha	11/18/2007	8/21/2013	0.2251	P	0.2088	0.2363	0.2638
LB4110A - C1	Alpha	11/18/2007	8/21/2013	0.2028	W	0.1976	0.2207	0.2438
LB4110A - C2	Alpha	11/18/2007	8/21/2013	0.2125	P	0.1971	0.2251	0.2532
LB4110A - C3	Alpha	11/18/2007	8/21/2013	0.2454	P	0.2234	0.2494	0.2755
LB4110A - C4	Alpha	11/18/2007	8/21/2013	0.2159	P	0.1970	0.2256	0.2543
LB4110A - D1	Alpha	11/18/2007	8/21/2013	0.2208	P	0.2028	0.2328	0.2628
LB4110A - D2	Alpha	11/18/2007	8/21/2013	0.2575	P	0.2277	0.2580	0.2883
LB4110A - D3	Alpha	11/18/2007	8/21/2013	0.2554	P	0.2309	0.2633	0.2957
LB4110A - D4	Alpha	11/18/2007	8/21/2013	0.1848	P	0.1642	0.1991	0.2341
LB4110R - A1	Alpha	11/24/2006	8/21/2013	0.2356	P	0.1983	0.2385	0.2786
LB4110R - A2	Alpha	11/24/2006	8/21/2013	0.2102	P	0.1851	0.2200	0.2550
LB4110R - A3	Alpha	11/24/2006	8/21/2013	0.2126	P	0.1924	0.2243	0.2563
LB4110R - A4	Alpha	11/24/2006	8/21/2013	0.2373	P	0.2119	0.2453	0.2788
LB4110R - B1	Alpha	11/24/2006	8/21/2013	0.2200	P	0.1832	0.2257	0.2681
LB4110R - B2	Alpha	11/24/2006	8/21/2013	0.2027	P	0.1754	0.2169	0.2584
LB4110R - B3	Alpha	11/24/2006	8/21/2013	0.2445	P	0.2016	0.2438	0.2860
LB4110R - B4	Alpha	11/24/2006	8/21/2013	0.2188	P	0.1882	0.2312	0.2742
LB4110R - C1	Alpha	11/24/2006	8/21/2013	0.2072	P	0.1834	0.2150	0.2465
LB4110R - C2	Alpha	11/24/2006	8/21/2013	0.2228	P	0.1932	0.2245	0.2557
LB4110R - C3	Alpha	11/24/2006	8/21/2013	0.2331	P	0.2034	0.2394	0.2753
LB4110R - C4	Alpha	11/24/2006	8/21/2013	0.2104	P	0.1826	0.2222	0.2618
LB4110R - D1	Alpha	11/24/2006	8/21/2013	0.0000	F	0.0014	0.1986	0.3959
LB4110R - D2	Alpha	11/24/2006	8/21/2013	0.0000	F	0.0022	0.2259	0.4496
LB4110R - D3	Alpha	11/24/2006	8/21/2013	0.0000	F	0.0022	0.2219	0.4416
LB4110R - D4	Alpha	11/24/2006	8/21/2013	0.0000	F	0.0004	0.1788	0.3573
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

0493

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	8/21/2013	0.5590	P	0.2120	0.5624	0.9129
LB4110A - A2	Beta	11/18/2007	8/21/2013	0.4979	P	0.1629	0.4650	0.7670
LB4110A - A3	Beta	11/18/2007	8/21/2013	0.4710	P	0.0911	0.4573	0.8235
LB4110A - A4	Beta	11/18/2007	8/21/2013	0.5298	P	0.1438	0.4894	0.8349
LB4110A - B1	Beta	11/18/2007	8/21/2013	0.5226	P	0.4633	0.5296	0.5959
LB4110A - B2	Beta	11/18/2007	8/21/2013	0.5190	P	0.4632	0.5267	0.5902
LB4110A - B3	Beta	11/18/2007	8/21/2013	0.5349	P	0.3175	0.5314	0.7454
LB4110A - B4	Beta	11/18/2007	8/21/2013	0.5385	P	0.4919	0.5538	0.6157
LB4110A - C1	Beta	11/18/2007	8/21/2013	0.4756	P	0.4510	0.5025	0.5541
LB4110A - C2	Beta	11/18/2007	8/21/2013	0.4749	P	0.4293	0.5010	0.5726
LB4110A - C3	Beta	11/18/2007	8/21/2013	0.5847	P	0.5292	0.5907	0.6522
LB4110A - C4	Beta	11/18/2007	8/21/2013	0.5058	P	0.4579	0.5247	0.5916
LB4110A - D1	Beta	11/18/2007	8/21/2013	0.5243	P	0.4782	0.5528	0.6274
LB4110A - D2	Beta	11/18/2007	8/21/2013	0.5623	P	0.4886	0.5869	0.6853
LB4110A - D3	Beta	11/18/2007	8/21/2013	0.6095	P	0.5375	0.6148	0.6922
LB4110A - D4	Beta	11/18/2007	8/21/2013	0.4351	P	0.3843	0.4717	0.5590
LB4110R - A1	Beta	11/24/2006	8/21/2013	0.5636	P	0.4744	0.5672	0.6600
LB4110R - A2	Beta	11/24/2006	8/21/2013	0.5069	P	0.4159	0.5085	0.6012
LB4110R - A3	Beta	11/24/2006	8/21/2013	0.5184	P	0.4503	0.5383	0.6263
LB4110R - A4	Beta	11/24/2006	8/21/2013	0.5782	P	0.5033	0.5914	0.6795
LB4110R - B1	Beta	11/24/2006	8/21/2013	0.5257	P	0.4464	0.5421	0.6378
LB4110R - B2	Beta	11/24/2006	8/21/2013	0.4999	P	0.4247	0.5195	0.6143
LB4110R - B3	Beta	11/24/2006	8/21/2013	0.6075	P	0.4941	0.5917	0.6894
LB4110R - B4	Beta	11/24/2006	8/21/2013	0.5214	P	0.4540	0.5488	0.6436
LB4110R - C1	Beta	11/24/2006	8/21/2013	0.4621	P	0.4158	0.5014	0.5871
LB4110R - C2	Beta	11/24/2006	8/21/2013	0.5142	P	0.4441	0.5283	0.6125
LB4110R - C3	Beta	11/24/2006	8/21/2013	0.5500	P	0.4756	0.5705	0.6655
LB4110R - C4	Beta	11/24/2006	8/21/2013	0.4959	P	0.4258	0.5248	0.6239
LB4110R - D1	Beta	11/24/2006	8/21/2013	0.0000	F	0.0025	0.4750	0.9475
LB4110R - D2	Beta	11/24/2006	8/21/2013	0.0000	F	0.0034	0.5337	1.0641
LB4110R - D3	Beta	11/24/2006	8/21/2013	0.0000	F	0.0032	0.5184	1.0335
LB4110R - D4	Beta	11/24/2006	8/21/2013	0.0000	W	-0.0002	0.4267	0.8536
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

C
Brown

SECTION XII
BARIUM-133 ANALYTICAL TRACER DATA

RUN 1

VAX/VMS Peak Search Report Generated 12-AUG-2013 08:12:15.22

C
8/12/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715301_GE5_BAFIL_194576.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : SPIKE
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 07:56:57
 Sample ID : 1307153-01 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 00:15:01.16 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	11.21	14	23	1.21	112.96	102	16	1.51E-02	84.7	
2	0	21.31	74	46	0.65	209.85	202	19	8.23E-02	27.4	
3	0	26.13	29	26	1.08	256.09	237	27	3.18E-02	53.9	
4	0	31.01	1995	126	0.75	302.92	290	25	2.22E+00	2.7	
5	2	35.09	371	24	0.66	342.14	333	27	4.13E-01	6.6	6.68E-01
6	2	35.90	123	22	0.69	349.86	333	27	1.36E-01	19.7	
7	0	53.36	49	15	0.58	517.39	510	15	5.44E-02	20.6	
8	0	56.42	19	13	0.29	546.76	538	16	2.10E-02	43.5	
9	0	61.76	247	39	1.06	597.98	585	26	2.75E-01	8.6	
10	5	66.02	93	33	1.06	638.86	626	26	1.03E-01	18.5	1.09E+00
11	5	66.99	25	6	0.43	648.20	626	26	2.74E-02	29.9	
12	1	79.72	51	42	0.76	770.33	762	32	5.72E-02	24.8	2.45E+00
13	1	81.09	862	43	0.71	783.46	762	32	9.57E-01	3.7	
14	0	105.15	11	14	0.19	1014.35	1000	17	1.21E-02	74.4	
15	0	111.95	186	55	0.74	1079.58	1069	22	2.07E-01	11.6	
16	0	116.17	32	35	0.69	1120.16	1110	15	3.56E-02	38.8	
17	0	276.39	34	13	0.57	2657.58	2639	25	3.72E-02	27.5	
18	3	302.49	100	3	1.17	2908.02	2894	26	1.11E-01	11.7	1.85E+00
19	3	302.81	40	1	0.77	2911.06	2894	26	4.45E-02	28.4	
20	0	306.93	38	0	0.98	2950.61	2936	26	4.22E-02	16.2	
21	0	333.29	56	2	0.43	3203.56	3190	24	6.21E-02	14.3	
22	0	355.65	404	21	0.87	3418.09	3401	32	4.49E-01	5.5	
23	0	383.45	63	7	1.04	3684.89	3669	27	7.03E-02	15.1	
24	0	386.51	161	9	1.06	3714.20	3698	29	1.78E-01	8.7	
25	0	414.17	35	0	0.50	3979.69	3963	27	3.89E-02	16.9	

Total number of lines in spectrum 25
 Number of unidentified lines 19
 Number of lines tentatively identified by NID 6 24.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.350E+02	4.350E+02	0.739E+02	16.99	
Total Activity :			4.350E+02	4.350E+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
PA-231	3.28E+04Y	1.00	9.739E-01	9.739E-01	16.50E-01	169.38	
PA-234	4.47E+09Y	1.00	3.429E+00	3.429E+00	1.887E+00	55.02	
TH-234	4.47E+09Y	1.00	2.232E+02	2.232E+02	0.397E+02	17.77	
Total Activity :			2.276E+02	2.276E+02			

Grand Total Activity : 6.625E+02 6.626E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.802E+01	4.350E+02	4.350E+02	16.99	OK
	302.84	17.80	2.575E+00	2.624E+02	2.624E+02	62.61	OK
	356.01	60.00	4.312E+00	4.693E+02	4.693E+02	18.19	OK

Final Mean for 3 Valid Peaks = 4.350E+02+/- 7.389E+01 (16.99%)

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	9.739E-01	9.739E-01	169.38	OK
	10.11	20.20	1.000E+02	2.025E+00	2.025E+00	169.38	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	2.033E+03	2.033E+03	61.81	OK

Final Mean for 3 Valid Peaks = 9.739E-01+/- 1.650E+00 (169.38%)

PA-234	9.89	89.00	1.000E+02	4.596E-01	4.596E-01	169.38	OK
	21.72	64.90*	1.000E+02	3.429E+00	3.429E+00	55.02	OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----	Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 3.429E+00+/- 1.887E+00 (55.02%)

TH-234	63.29	3.80*	8.750E+01	2.232E+02	2.232E+02	17.77	OK
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Final Mean for 1 Valid Peaks = 2.232E+02+/- 3.966E+01 (17.77%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.350E+02	7.389E+01	1.605E+01	2.363E+00	27.100
PA-231	9.739E-01	1.650E+00	1.375E+00	1.548E-02	0.708
PA-234	3.429E+00	1.887E+00	1.091E+00	1.228E-02	3.144
TH-234	2.232E+02	3.966E+01	2.817E+01	3.624E-01	7.922

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	8.596E+00	1.577E+01	3.047E+01	1.033E+01	0.282
CD-109	1.268E+02	1.110E+02	2.241E+02	2.157E+01	0.566
NP-237	-9.106E+00	2.959E+01	5.148E+01	4.541E+00	-0.177
AM-241	3.213E+00	1.457E+00	3.013E+00	3.392E-02	1.066

c
8/12

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715302_GE5_BAFIL_194580.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : BLANK
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:18:40
 Sample ID : 1307153-02 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE5 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.22 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	10.70	8	4	0.29	108.01	103	9	9.07E-03	57.6	
2	0	21.19	74	31	0.69	208.74	200	22	8.20E-02	24.1	
3	0	31.01	1991	111	0.60	302.94	293	21	2.21E+00	2.6	
4	0	35.31	506	60	0.58	344.20	334	25	5.62E-01	6.1	
5	2	52.04	33	14	0.75	504.75	496	28	3.63E-02	28.3	1.86E+00
6	2	53.33	45	4	0.58	517.15	496	28	4.96E-02	19.8	
7	0	61.89	272	35	0.80	599.29	588	31	3.02E-01	8.2	
8	3	65.97	127	36	0.88	638.41	625	29	1.41E-01	14.1	1.61E+00
9	3	66.94	32	22	0.64	647.71	625	29	3.60E-02	30.0	
10	3	79.64	57	24	0.85	769.54	756	36	6.29E-02	29.8	7.72E-01
11	3	81.10	789	18	0.64	783.58	756	36	8.76E-01	3.7	
12	0	111.95	176	55	0.85	1079.65	1069	21	1.95E-01	11.9	
13	0	143.14	11	17	0.28	1378.91	1363	20	1.25E-02	81.5	
14	0	196.25	10	14	0.48	1888.59	1868	23	1.06E-02	84.5	
15	0	276.17	49	0	0.48	2655.45	2643	22	5.44E-02	14.3	
16	0	302.56	138	0	0.86	2908.68	2894	28	1.53E-01	8.5	
17	1	332.46	13	0	1.21	3195.57	3188	27	1.45E-02	40.1	9.61E-01
18	1	333.13	50	2	1.10	3202.00	3188	27	5.51E-02	16.0	
19	0	337.74	23	3	0.56	3246.24	3232	24	2.59E-02	24.1	
20	2	354.81	11	0	1.12	3410.00	3401	32	1.27E-02	131.0	2.82E+00
21	2	355.61	449	3	1.03	3417.76	3401	32	4.99E-01	4.6	
22	4	383.36	68	5	1.16	3684.00	3668	27	7.51E-02	15.2	8.50E-01
23	4	384.15	22	1	0.76	3691.54	3668	27	2.50E-02	21.2	
24	0	386.43	151	5	0.98	3713.44	3699	27	1.67E-01	8.7	
25	1	414.21	68	2	1.19	3980.00	3965	27	7.53E-02	9.4	2.99E+00
26	1	414.73	12	2	1.19	3985.00	3965	27	1.35E-02	45.9	

Summary of Nuclide Activity

Sample ID : 1307153-02

Acquisition date : 12-AUG-2013 08:18:40

Total number of lines in spectrum 26
 Number of unidentified lines 20
 Number of lines tentatively identified by NID 6 23.08%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.981E+02	3.981E+02	0.677E+02	17.00		
Total Activity :			3.981E+02	3.981E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
PA-231	3.28E+04Y	1.00	5.839E-01	5.839E-01	6.731E-01	115.27		
PA-234	4.47E+09Y	1.00	3.414E+00	3.414E+00	1.653E+00	48.42		
TH-234	4.47E+09Y	1.00	2.458E+02	2.458E+02	0.415E+02	16.86		
Total Activity :			2.498E+02	2.498E+02				

Grand Total Activity : 6.479E+02 6.479E+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	%Error	
BA-133	81.00	33.00*	1.802E+01	3.981E+02	3.981E+02	17.00	OK
	302.84	17.80	2.575E+00	9.040E+02	9.041E+02	31.42	OK
	356.01	60.00	4.312E+00	5.210E+02	5.210E+02	17.18	OK

Final Mean for 3 Valid Peaks = 3.981E+02+/- 6.768E+01 (17.00%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	%Error	
PA-231	9.28	42.00*	1.000E+02	5.839E-01	5.839E-01	115.27	OK
	10.11	20.20	1.000E+02	1.214E+00	1.214E+00	115.27	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	7.007E+03	7.007E+03	29.78	OK

Final Mean for 3 Valid Peaks = 5.839E-01+/- 6.731E-01 (115.27%)

PA-234	9.89	89.00	1.000E+02	2.756E-01	2.756E-01	115.27	OK
	21.72	64.90*	1.000E+02	3.414E+00	3.414E+00	48.42	OK
	37.93	23.75	1.000E+02	-----	Line Not Found	-----	Absent
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 3.414E+00+/- 1.653E+00 (48.42%)

TH-234	63.29	3.80*	8.750E+01	2.458E+02	2.458E+02	16.86	OK
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Final Mean for 1 Valid Peaks = 2.458E+02+/- 4.145E+01 (16.86%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.981E+02	6.768E+01	1.405E+01	2.069E+00	28.337
PA-231	5.839E-01	6.731E-01	1.456E+00	1.639E-02	0.401
PA-234	3.414E+00	1.653E+00	1.408E+00	1.585E-02	2.424
TH-234	2.458E+02	4.145E+01	2.063E+01	2.655E-01	11.913

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.930E+00		1.540E+01	2.893E+01	9.807E+00	0.101
CD-109	-2.053E+00		8.781E+01	1.618E+02	1.557E+01	-0.013
NP-237	-7.328E+00		2.437E+01	4.299E+01	3.792E+00	-0.170
AM-241	-4.294E-01		1.628E+00	2.355E+00	2.651E-02	-0.182

C
Blm

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715303_GE5_BAFIL_194584.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-206-SS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:37:42
 Sample ID : 1307153-03 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 00:15:01.19 0.1%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	21.14	99	37	0.71	208.26	197	22	1.09E-01	18.9	
2	0	25.08	29	6	0.42	246.00	239	13	3.20E-02	26.0	
3	0	31.00	1960	115	0.77	302.83	291	23	2.18E+00	2.7	
4	4	35.11	401	38	0.60	342.26	334	24	4.45E-01	6.3	1.19E+00
5	4	35.87	127	16	0.76	349.61	334	24	1.41E-01	17.7	
6	0	53.65	31	37	0.51	520.21	507	17	3.47E-02	42.0	
7	0	61.90	227	70	0.52	599.36	588	25	2.52E-01	10.7	
8	0	66.06	81	48	0.40	639.28	629	21	9.03E-02	21.3	
9	3	79.65	47	20	0.73	769.66	762	33	5.26E-02	21.7	1.71E+00
10	3	81.10	773	20	0.70	783.57	762	33	8.59E-01	3.8	
11	0	111.90	186	52	0.66	1079.11	1066	24	2.06E-01	11.4	
12	0	116.49	47	36	1.59	1123.16	1098	34	5.19E-02	35.5	
13	0	160.95	34	27	0.24	1549.84	1534	27	3.78E-02	36.2	
14	0	198.12	10	11	0.47	1906.53	1898	14	1.06E-02	65.2	
15	0	276.12	44	8	0.37	2654.96	2640	26	4.86E-02	20.9	
16	1	302.07	86	0	1.06	2904.00	2893	29	9.59E-02	11.8	4.74E+00
17	1	302.91	60	0	1.06	2912.00	2893	29	6.66E-02	17.2	
18	0	306.95	25	3	0.75	2950.74	2936	24	2.80E-02	23.0	
19	1	333.44	94	9	1.10	3205.00	3190	27	1.04E-01	10.0	5.13E+00
20	1	334.28	12	2	1.10	3213.00	3190	27	1.34E-02	35.7	
21	0	355.69	353	10	0.85	3418.51	3401	33	3.93E-01	5.6	
22	0	383.52	83	9	0.74	3685.48	3668	29	9.21E-02	13.1	
23	2	385.73	22	3	1.28	3706.74	3699	26	2.45E-02	39.9	5.64E-01
24	2	386.50	126	4	0.94	3714.11	3699	26	1.40E-01	10.0	
25	0	414.23	31	2	0.53	3980.20	3963	27	3.45E-02	20.4	

Summary of Nuclide Activity

Sample ID : 1307153-03

Acquisition date : 12-AUG-2013 08:37:42

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	3.903E+02	3.903E+02	0.665E+02	17.04	
Total Activity :			3.903E+02	3.903E+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	2.047E+02	2.047E+02	0.448E+02	21.88	
Total Activity :			2.047E+02	2.047E+02			

Grand Total Activity : 5.950E+02 5.950E+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	3.903E+02	3.903E+02	17.04	OK
	302.84	17.80	2.575E+00	3.929E+02	3.929E+02	43.31	OK
	356.01	60.00	4.312E+00	4.101E+02	4.101E+02	18.33	OK

Final Mean for 3 Valid Peaks = 3.903E+02+/- 6.653E+01 (17.04%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.047E+02	2.047E+02	21.88	OK

Final Mean for 1 Valid Peaks = 2.047E+02+/- 4.479E+01 (21.88%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.903E+02	6.653E+01	1.188E+01	1.750E+00	32.851
TH-234	2.047E+02	4.479E+01	3.079E+01	3.962E-01	6.647

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.182E+00		1.575E+01	2.629E+01	8.914E+00	-0.311
CD-109	8.559E+01		8.593E+01	1.803E+02	1.735E+01	0.475
PA-231	-9.248E-02		7.976E-01	1.459E+00	1.642E-02	-0.063
PA-234	4.558E+00	+	1.736E+00	2.150E+00	2.420E-02	2.120
NP-237	-2.700E+01		2.387E+01	3.588E+01	3.165E+00	-0.753
AM-241	1.461E+00		1.453E+00	2.617E+00	2.946E-02	0.558

gim

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130715304_GE5_BAFIL_194588.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-KS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:59:01
 Sample ID : 1307153-04 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 00:15:01.21 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	14.41	6	8	0.10	143.68	134	12	6.98E-03	101.9	
2	0	21.27	60	42	0.45	209.53	198	19	6.62E-02	29.3	
3	0	31.02	1894	69	0.80	303.08	291	31	2.10E+00	2.7	
4	1	35.20	410	28	0.61	343.14	334	25	4.56E-01	5.8	1.46E+00
5	1	35.96	82	22	0.62	350.46	334	25	9.09E-02	28.4	
6	0	53.57	33	29	0.45	519.38	509	17	3.72E-02	36.7	
7	0	61.76	223	42	0.93	598.00	586	23	2.48E-01	9.3	
8	0	65.98	114	25	0.67	638.50	625	26	1.27E-01	13.9	
9	3	79.67	40	34	0.86	769.92	759	39	4.46E-02	36.2	8.95E-01
10	3	81.08	790	20	0.69	783.42	759	39	8.78E-01	3.8	
11	0	111.83	194	36	0.75	1078.50	1064	25	2.16E-01	9.9	
12	0	115.87	48	29	1.04	1117.27	1102	26	5.34E-02	30.0	
13	0	276.05	43	11	0.95	2654.26	2641	24	4.72E-02	22.3	
14	2	302.07	11	0	1.06	2904.00	2893	27	1.20E-02	108.9	7.60E-01
15	2	302.60	125	0	0.90	2909.03	2893	27	1.39E-01	9.5	
16	0	307.25	23	5	0.80	2953.64	2935	26	2.53E-02	28.3	
17	2	332.92	11	0	1.10	3200.00	3189	28	1.24E-02	71.6	6.30E-01
18	2	333.39	61	0	1.09	3204.54	3189	28	6.75E-02	13.9	
19	0	355.72	380	13	0.99	3418.74	3402	33	4.22E-01	5.5	
20	2	382.63	12	4	1.16	3677.00	3669	27	1.31E-02	58.6	2.16E+00
21	2	383.40	81	14	0.99	3684.34	3669	27	8.98E-02	13.9	
22	0	386.68	109	23	0.35	3715.87	3702	24	1.22E-01	12.4	

Total number of lines in spectrum 22
 Number of unidentified lines 16
 Number of lines tentatively identified by NID 6 27.27%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.990E+02	3.991E+02	0.680E+02	17.03	
Total Activity :			3.990E+02	3.991E+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	2.013E+02	2.013E+02	0.383E+02	19.01	
Total Activity :			2.013E+02	2.013E+02			

Grand Total Activity : 6.003E+02 6.003E+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	3.990E+02	3.991E+02	17.03	OK
	302.84	17.80	2.575E+00	8.200E+02	8.201E+02	32.51	OK
	356.01	60.00	4.312E+00	4.410E+02	4.410E+02	18.17	OK

Final Mean for 3 Valid Peaks = 3.991E+02+/- 6.796E+01 (17.03%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.013E+02	2.013E+02	19.01	OK

Final Mean for 1 Valid Peaks = 2.013E+02+/- 3.826E+01 (19.01%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.991E+02	6.796E+01	1.289E+01	1.897E+00	30.968
TH-234	2.013E+02	3.826E+01	2.593E+01	3.336E-01	7.763

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-7.060E+00		1.620E+01	2.751E+01	9.325E+00	-0.257
CD-109	2.543E+01		8.758E+01	1.685E+02	1.622E+01	0.151
PA-231	4.639E-02		7.948E-01	1.497E+00	1.685E-02	0.031
PA-234	2.756E+00	+	1.620E+00	2.099E+00	2.363E-02	1.313
NP-237	-1.774E+01		2.462E+01	4.041E+01	3.565E+00	-0.439
AM-241	1.973E+00		1.358E+00	2.635E+00	2.966E-02	0.749

c
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Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715305_GE5_BAFIL_194592.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-104-KS DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 09:23:01
 Sample ID : 1307153-05 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	9.78	9	10	0.31	99.22	95	10	1.00E-02	73.7	
2	2	20.60	19	9	0.41	203.03	201	18	2.08E-02	29.3	2.18E+00
3	2	21.17	71	27	0.61	208.49	201	18	7.86E-02	21.5	
4	0	31.02	2037	42	0.79	303.03	291	26	2.26E+00	2.4	
5	4	35.13	446	11	0.78	342.51	330	29	4.96E-01	5.3	9.00E-01
6	4	36.11	82	7	0.54	351.91	330	29	9.11E-02	18.1	
7	0	52.08	19	7	0.20	505.08	499	13	2.06E-02	36.7	
8	0	53.38	46	11	0.50	517.58	511	13	5.14E-02	19.4	
9	0	61.82	197	52	0.52	598.55	588	24	2.19E-01	10.8	
10	0	66.16	114	36	1.08	640.22	624	31	1.27E-01	16.1	
11	0	81.08	794	70	0.57	783.43	772	22	8.83E-01	4.2	
12	0	111.86	234	35	0.84	1078.72	1063	31	2.60E-01	9.1	
13	0	116.27	26	25	0.44	1121.04	1113	14	2.84E-02	41.2	
14	0	160.79	12	17	0.30	1548.26	1539	14	1.29E-02	66.7	
15	2	276.12	75	3	1.03	2655.00	2642	25	8.30E-02	10.3	2.60E+00
16	2	276.86	15	0	1.20	2662.07	2642	25	1.70E-02	28.8	
17	1	302.39	91	9	1.06	2907.00	2893	26	1.01E-01	12.5	4.02E+00
18	1	303.01	35	6	1.06	2913.00	2893	26	3.89E-02	23.7	
19	0	333.49	67	11	0.87	3205.45	3188	27	7.47E-02	15.4	
20	0	355.67	395	3	1.17	3418.31	3402	29	4.39E-01	5.1	
21	1	383.15	72	8	1.16	3682.00	3671	29	8.03E-02	14.2	2.44E+00
22	1	383.78	40	17	1.16	3688.00	3671	29	4.48E-02	28.0	
23	6	386.07	196	13	1.16	3710.00	3699	28	2.18E-01	6.5	9.11E+00
24	6	386.62	18	8	0.62	3715.23	3699	28	2.05E-02	70.7	
25	6	387.38	48	2	0.85	3722.56	3699	28	5.30E-02	14.2	
26	0	414.45	18	4	0.61	3982.33	3971	19	2.00E-02	30.0	

Total number of lines in spectrum 26
 Number of unidentified lines 18
 Number of lines tentatively identified by NID 8 30.77%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.011E+02	4.011E+02	0.699E+02	17.43	
Total Activity :			4.011E+02	4.011E+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	6.435E-01	6.435E-01	9.489E-01	147.46	
PA-234	4.47E+09Y	1.00	3.274E+00	3.274E+00	1.416E+00	43.25	
TH-234	4.47E+09Y	1.00	1.784E+02	1.784E+02	0.393E+02	22.05	
Total Activity :			1.823E+02	1.823E+02			

Grand Total Activity : 5.834E+02 5.834E+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	4.011E+02	4.011E+02	17.43	OK
	302.84	17.80	2.575E+00	2.295E+02	2.295E+02	54.22	OK
	356.01	60.00	4.312E+00	4.591E+02	4.591E+02	17.69	OK

Final Mean for 3 Valid Peaks = 4.011E+02+/- 6.990E+01 (17.43%)

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	6.435E-01	6.435E-01	147.46	OK
	10.11	20.20	1.000E+02	1.338E+00	1.338E+00	147.46	OK
	283.67	1.60	2.191E+00	-----	Line Not Found	-----	Absent
	302.67	2.30	2.572E+00	4.604E+03	4.604E+03	34.94	OK

Final Mean for 3 Valid Peaks = 6.435E-01+/- 9.489E-01 (147.46%)

PA-234	9.89	89.00	1.000E+02	3.037E-01	3.037E-01	147.46	OK
	21.72	64.90*	1.000E+02	3.274E+00	3.274E+00	43.25	OK
	37.93	23.75	1.000E+02	1.037E+01	1.037E+01	36.46	OK
	131.42	20.40	2.473E+00	-----	Line Not Found	-----	Absent

Final Mean for 3 Valid Peaks = 3.274E+00+/- 1.416E+00 (43.25%)

TH-234	63.29	3.80*	8.750E+01	1.784E+02	1.784E+02	22.05	OK
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Final Mean for 1 Valid Peaks = 1.784E+02+/- 3.934E+01 (22.05%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.011E+02	6.990E+01	1.642E+01	2.418E+00	24.422
PA-231	6.435E-01	9.489E-01	1.533E+00	1.726E-02	0.420
PA-234	3.274E+00	1.416E+00	9.485E-01	1.068E-02	3.452
TH-234	1.784E+02	3.934E+01	3.395E+01	4.368E-01	5.253

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.355E+00	1.532E+01	2.749E+01	9.317E+00	-0.086
CD-109	-1.346E+01	9.715E+01	1.743E+02	1.677E+01	-0.077
NP-237	-1.540E+01	2.612E+01	4.383E+01	3.866E+00	-0.351
AM-241	-8.498E-01	1.719E+00	2.373E+00	2.671E-02	-0.358

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Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130715306_GE3_BAFIL_194579.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-206-SS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:18:02
 Sample ID : 1307153-06 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.67 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.75	1952	76	1.48	31.07	27	16	2.17E+00	2.3	1.48E+01
2	3	35.03	539	65	1.67	35.35	27	16	5.99E-01	5.0	
3	0	52.68	75	129	2.27	53.00	50	8	8.39E-02	28.3	
4	3	58.97	21	54	1.65	59.29	58	12	2.28E-02	49.9	1.17E+01
5	3	61.80	246	91	1.82	62.12	58	12	2.73E-01	8.6	
6	3	65.67	117	110	1.83	65.98	58	12	1.30E-01	18.1	
7	0	80.96	860	101	1.81	81.27	77	10	9.56E-01	4.0	
8	0	94.53	30	100	1.71	94.85	90	9	3.28E-02	65.5	
9	0	111.94	204	93	1.73	112.26	108	7	2.26E-01	10.5	
10	0	165.61	17	126	3.56	165.92	157	11	1.84E-02	135.8	
11	0	276.86	46	46	1.38	277.17	273	9	5.09E-02	30.4	
12	2	302.96	158	22	1.60	303.27	298	19	1.76E-01	9.0	1.20E+00
13	2	307.35	23	23	1.99	307.66	298	19	2.51E-02	42.9	
14	2	311.90	14	22	1.99	312.21	298	19	1.60E-02	60.4	
15	3	333.84	59	17	1.92	334.15	329	15	6.59E-02	17.3	1.06E+00
16	3	338.25	22	18	2.22	338.55	329	15	2.41E-02	45.4	
17	0	356.32	470	45	1.96	356.63	352	11	5.22E-01	5.4	
18	3	377.14	16	14	2.26	377.44	372	24	1.74E-02	49.1	3.89E+00
19	3	384.26	143	14	2.26	384.56	372	24	1.59E-01	12.5	
20	3	386.96	237	10	1.70	387.26	372	24	2.64E-01	7.4	
21	3	391.13	33	12	2.15	391.44	372	24	3.69E-02	37.4	
22	0	406.30	17	5	4.71	406.61	402	9	1.83E-02	33.8	
23	0	415.65	21	29	1.27	415.95	412	6	2.36E-02	45.8	
24	5	433.52	6	2	2.79	433.83	432	9	6.78E-03	46.3	1.43E+00
25	5	437.25	91	3	2.06	437.56	432	9	1.01E-01	11.2	
26	0	469.47	31	11	1.95	469.77	464	12	3.42E-02	28.7	
27	0	511.23	14	2	3.26	511.52	507	9	1.55E-02	33.0	

Summary of Nuclide Activity

Sample ID : 1307153-06

Acquisition date : 12-AUG-2013 08:18:02

Total number of lines in spectrum 27
 Number of unidentified lines 22
 Number of lines tentatively identified by NID 5 18.52%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.123E+02	4.123E+02	0.732E+02	17.76		
Total Activity :			4.123E+02	4.123E+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	7.330E+02	7.330E+02	1.358E+02	18.53		
AM-241	432.20Y	1.00	5.934E+00	5.934E+00	5.940E+00	100.10		
Total Activity :			7.389E+02	7.389E+02				

Grand Total Activity : 1.151E+03 1.151E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.123E+02	4.123E+02	17.76	OK
	302.84	17.80	6.222E+00	4.289E+02	4.289E+02	27.29	OK
	356.01	60.00	5.860E+00	4.011E+02	4.012E+02	17.40	OK

Final Mean for 3 Valid Peaks = 4.123E+02 +/- 7.322E+01 (17.76%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.330E+02	7.330E+02	18.53	OK

Final Mean for 1 Valid Peaks = 7.330E+02 +/- 1.358E+02 (18.53%)

AM-241	59.54	35.90*	2.893E+01	5.934E+00	5.934E+00	100.10	OK
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Final Mean for 1 Valid Peaks = 5.934E+00 +/- 5.940E+00 (100.10%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.123E+02	7.322E+01	1.646E+01	2.517E+00	25.053
TH-234	7.330E+02	1.358E+02	1.287E+02	6.912E+00	5.696
AM-241	5.934E+00	5.940E+00	1.244E+01	6.116E-01	0.477

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.416E+00	6.341E+00	9.786E+00	1.118E+00	-0.656
CD-109	-4.207E+01	1.322E+02	1.781E+02	1.468E+01	-0.236
PA-231	1.601E+00	1.560E+00	3.023E+00	4.300E-02	0.530
PA-234	4.036E+00	1.476E+00	2.937E+00	4.177E-02	1.374
NP-237	-3.263E+01	3.805E+01	4.661E+01	3.768E+00	-0.700

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715307_GE3_BAFIL_194583.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-206-SS DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:37:03
 Sample ID : 1307153-07 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.21 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	5	30.75	1960	99	1.51	31.07	27	14	2.18E+00	2.4	7.05E+00
2	5	35.09	523	76	1.89	35.41	27	14	5.81E-01	5.4	
3	0	53.59	26	140	2.10	53.90	49	8	2.92E-02	80.3	
4	2	61.72	267	78	1.66	62.03	57	16	2.97E-01	8.0	1.81E+00
5	2	65.74	118	71	1.67	66.06	57	16	1.31E-01	14.5	
6	0	81.04	809	101	1.82	81.36	77	10	8.99E-01	4.2	
7	1	88.54	18	27	1.56	88.86	88	9	1.96E-02	45.3	6.24E+00
8	1	92.54	41	51	1.56	92.86	88	9	4.57E-02	29.1	
9	2	111.86	220	53	1.63	112.18	108	16	2.44E-01	8.4	4.25E+00
10	2	115.69	58	51	1.76	116.01	108	16	6.47E-02	26.8	
11	0	141.30	21	80	1.68	141.61	139	8	2.37E-02	75.3	
12	0	159.79	57	55	1.48	160.10	156	8	6.30E-02	26.4	
13	0	197.12	48	179	7.33	197.43	188	18	5.38E-02	66.5	
14	0	258.80	18	15	2.75	259.10	257	5	2.03E-02	39.9	
15	0	276.99	50	38	1.64	277.30	273	8	5.57E-02	25.6	
16	0	302.85	111	59	1.76	303.16	299	8	1.23E-01	15.3	
17	0	312.09	21	12	1.17	312.39	311	5	2.36E-02	33.9	
18	0	325.24	16	9	2.16	325.55	322	7	1.72E-02	40.5	
19	0	334.32	47	65	1.45	334.62	330	9	5.24E-02	33.8	
20	3	352.70	14	6	1.68	353.00	351	11	1.59E-02	33.8	1.41E+00
21	3	356.25	517	7	1.60	356.55	351	11	5.75E-01	4.5	
22	0	364.62	21	22	2.97	364.93	362	7	2.28E-02	43.4	
23	1	383.81	111	20	1.87	384.11	381	10	1.23E-01	13.1	1.01E+01
24	1	386.87	206	46	1.87	387.17	381	10	2.29E-01	9.6	
25	0	391.74	26	29	1.52	392.04	391	6	2.93E-02	41.6	
26	4	415.02	42	9	2.52	415.32	411	11	4.65E-02	23.1	2.56E+00
27	4	418.49	27	10	2.13	418.79	411	11	2.96E-02	29.1	
28	0	437.13	101	3	1.96	437.43	432	9	1.13E-01	10.3	
29	2	468.07	38	2	2.13	468.37	465	11	4.21E-02	17.2	9.97E-01
30	2	472.33	7	0	2.13	472.63	465	11	8.11E-03	71.5	

Summary of Nuclide Activity

Sample ID : 1307153-07

Acquisition date : 12-AUG-2013 08:37:03

Total number of lines in spectrum 30
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 5 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
CD-109	464.00D	1.00	8.324E+01	8.328E+01	7.583E+01	91.05		
BA-133	10.50Y	1.00	3.878E+02	3.878E+02	0.695E+02	17.92		
Total Activity :			4.710E+02	4.711E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.975E+02	7.975E+02	1.382E+02	17.33		
Total Activity :			7.975E+02	7.975E+02				

Grand Total Activity : 1.268E+03 1.269E+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
CD-109	88.03	3.72*	1.712E+01	8.324E+01	8.328E+01	91.05	OK

Final Mean for 1 Valid Peaks = 8.328E+01 +/- 7.583E+01 (91.05%)

BA-133	81.00	33.00*	1.899E+01	3.878E+02	3.878E+02	17.92	OK
	302.84	17.80	6.222E+00	3.008E+02	3.008E+02	36.97	OK
	356.01	60.00	5.860E+00	4.418E+02	4.418E+02	16.31	OK

Final Mean for 3 Valid Peaks = 3.878E+02 +/- 6.950E+01 (17.92%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.975E+02	7.975E+02	17.33	OK

Final Mean for 1 Valid Peaks = 7.975E+02 +/- 1.382E+02 (17.33%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	8.328E+01	7.583E+01	1.234E+02	1.017E+01	0.675
BA-133	3.878E+02	6.950E+01	1.599E+01	2.446E+00	24.250
TH-234	7.975E+02	1.382E+02	1.207E+02	6.485E+00	6.605

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.489E+00		6.560E+00	9.082E+00	1.038E+00	-0.714
PA-231	1.014E+00		1.644E+00	3.079E+00	4.380E-02	0.329
PA-234	2.851E+00		1.506E+00	2.884E+00	4.102E-02	0.989
NP-237	3.477E+01		2.806E+01	4.890E+01	3.953E+00	0.711
AM-241	3.472E+01		9.846E+00	1.910E+01	9.393E-01	1.817

8/12

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715308_GE3_BAFIL_194587.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-207-AS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 08:58:22
 Sample ID : 1307153-08 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.19 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	1863	99	1.38	31.11	26	17	2.07E+00	2.4	1.98E+00
2	3	35.04	478	85	1.60	35.36	26	17	5.31E-01	5.5	
3	0	52.49	87	114	1.62	52.81	49	8	9.61E-02	23.9	
4	0	61.59	257	160	1.42	61.91	58	7	2.86E-01	10.3	
5	0	66.08	98	99	1.37	66.40	65	5	1.09E-01	18.9	
6	2	77.57	16	43	1.69	77.89	76	13	1.74E-02	56.5	1.10E+01
7	2	80.98	790	59	1.55	81.29	76	13	8.78E-01	3.8	
8	2	84.68	21	39	1.41	85.00	76	13	2.38E-02	49.2	
9	0	92.30	33	91	2.24	92.62	89	8	3.66E-02	52.9	
10	0	111.54	202	86	1.38	111.86	108	7	2.25E-01	10.4	
11	0	162.13	27	91	2.46	162.44	157	10	3.00E-02	69.3	
12	0	186.30	30	82	3.85	186.61	180	10	3.30E-02	60.0	
13	0	277.80	74	35	2.30	278.11	273	12	8.21E-02	19.9	
14	1	302.86	149	11	1.76	303.16	291	27	1.66E-01	8.9	1.81E+00
15	1	307.53	32	7	1.81	307.84	291	27	3.57E-02	24.1	
16	1	310.86	14	6	1.81	311.16	291	27	1.50E-02	56.9	
17	1	333.72	68	14	1.76	334.03	329	13	7.56E-02	14.6	6.90E-01
18	1	338.53	18	15	1.83	338.83	329	13	2.03E-02	42.9	
19	5	352.05	15	3	2.03	352.35	351	10	1.64E-02	24.1	2.67E+00
20	5	356.25	485	9	1.54	356.55	351	10	5.39E-01	4.6	
21	4	383.65	79	27	1.91	383.95	381	10	8.82E-02	18.1	3.17E+01
22	4	387.08	203	46	1.73	387.39	381	10	2.26E-01	8.8	
23	0	391.63	34	20	2.72	391.94	391	6	3.81E-02	31.2	
24	1	414.78	30	8	1.89	415.08	412	17	3.36E-02	22.9	3.19E+00
25	1	417.87	24	6	1.90	418.17	412	17	2.63E-02	35.9	
26	1	421.87	11	4	1.90	422.17	412	17	1.28E-02	55.1	
27	0	437.47	85	12	1.99	437.77	434	7	9.41E-02	12.8	
28	0	467.86	20	8	2.03	468.16	465	7	2.24E-02	31.5	
29	0	511.50	10	4	1.45	511.80	508	8	1.11E-02	46.9	
30	0	608.37	9	0	2.94	608.67	606	6	1.00E-02	33.3	

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 Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.785E+02	3.785E+02		0.664E+02	17.53	
NP-237	2.14E+06Y	1.00	2.915E+01	2.915E+01		2.883E+01	98.90	
Total Activity :			4.077E+02	4.077E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.675E+02	7.675E+02		1.666E+02	21.71	
Total Activity :			7.675E+02	7.675E+02				

Grand Total Activity : 1.175E+03 1.175E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.785E+02	3.785E+02	17.53	OK
	302.84	17.80	6.222E+00	4.044E+02	4.044E+02	27.22	OK
	356.01	60.00	5.860E+00	4.146E+02	4.146E+02	16.49	OK

Final Mean for 3 Valid Peaks = 3.785E+02+/- 6.635E+01 (17.53%)

NP-237	86.50	12.60*	1.749E+01	2.915E+01	2.915E+01	98.90	OK
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Final Mean for 1 Valid Peaks = 2.915E+01+/- 2.883E+01 (98.90%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.675E+02	7.675E+02	21.71	OK

Final Mean for 1 Valid Peaks = 7.675E+02+/- 1.666E+02 (21.71%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.785E+02	6.635E+01	1.799E+01	2.751E+00	21.041
TH-234	7.675E+02	1.666E+02	1.674E+02	8.992E+00	4.584
NP-237	2.915E+01	2.883E+01	4.386E+01	3.546E+00	0.665

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-8.324E-01	6.182E+00	1.059E+01	1.209E+00	-0.079
CD-109	2.416E+01	1.079E+02	1.606E+02	1.324E+01	0.150
PA-231	2.534E+00	1.531E+00	3.096E+00	4.403E-02	0.818
PA-234	3.493E+00	1.539E+00	2.869E+00	4.080E-02	1.218
AM-241	3.112E+01	1.167E+01	1.989E+01	9.779E-01	1.565

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Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715309_GE3_BAFIL_194591.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-207-AS DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 09:22:23
 Sample ID : 1307153-09 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.39 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.77	1827	113	1.52	31.09	26	25	2.03E+00	2.5	2.99E+00
2	4	35.11	453	90	1.61	35.43	26	25	5.03E-01	5.8	
3	0	52.78	102	99	3.01	53.10	50	8	1.13E-01	19.7	
4	1	61.82	241	68	1.51	62.14	58	12	2.68E-01	8.9	9.85E+00
5	1	65.54	113	77	1.52	65.86	58	12	1.26E-01	15.1	
6	2	80.98	759	57	1.70	81.29	76	14	8.43E-01	4.0	4.85E+00
7	2	83.68	19	44	1.41	84.00	76	14	2.14E-02	105.8	
8	1	111.80	203	43	1.59	112.12	107	19	2.26E-01	8.9	1.47E+00
9	1	115.74	47	46	1.60	116.05	107	19	5.23E-02	26.2	
10	7	160.26	38	50	2.94	160.57	156	22	4.17E-02	41.5	1.23E+00
11	7	165.76	19	63	2.95	166.08	156	22	2.12E-02	81.6	
12	2	276.45	47	15	1.96	276.76	273	11	5.20E-02	20.9	3.24E+00
13	2	280.69	9	8	1.62	281.00	273	11	1.04E-02	64.9	
14	3	302.94	128	22	1.64	303.24	300	11	1.42E-01	10.1	3.68E+00
15	3	307.15	19	23	2.19	307.46	300	11	2.10E-02	63.5	
16	0	313.11	17	14	2.53	313.42	311	7	1.86E-02	45.6	
17	3	333.85	52	21	1.78	334.16	330	12	5.82E-02	19.1	2.62E+00
18	3	338.14	23	15	2.22	338.45	330	12	2.60E-02	43.8	
19	0	356.35	424	37	1.93	356.65	353	7	4.71E-01	5.4	
20	0	377.11	19	13	1.26	377.42	374	7	2.12E-02	39.3	
21	3	384.14	109	8	2.26	384.44	381	15	1.21E-01	13.8	3.09E+00
22	3	387.24	172	6	1.76	387.55	381	15	1.91E-01	9.2	
23	3	391.25	39	9	2.04	391.56	381	15	4.38E-02	32.1	
24	3	414.86	38	7	2.29	415.16	411	17	4.25E-02	23.9	5.34E-01
25	3	418.27	32	7	2.30	418.57	411	17	3.58E-02	29.3	
26	3	422.27	13	7	2.30	422.57	411	17	1.49E-02	54.4	
27	0	437.43	96	20	1.92	437.73	433	11	1.06E-01	13.6	
28	0	469.78	9	16	2.06	470.08	464	9	1.00E-02	86.0	
29	0	511.48	11	14	1.52	511.78	508	8	1.27E-02	63.5	

Total number of lines in spectrum 29
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 4 13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.636E+02	3.636E+02	0.644E+02	17.71		
Total Activity :			3.636E+02	3.636E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	7.207E+02	7.207E+02	1.365E+02	18.94		
Total Activity :			7.207E+02	7.207E+02				

Grand Total Activity : 1.084E+03 1.084E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.636E+02	3.636E+02	17.71	OK
	302.84	17.80	6.222E+00	3.465E+02	3.465E+02	28.81	OK
	356.01	60.00	5.860E+00	3.623E+02	3.623E+02	17.41	OK

Final Mean for 3 Valid Peaks = 3.636E+02+/- 6.439E+01 (17.71%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.207E+02	7.207E+02	18.94	OK

Final Mean for 1 Valid Peaks = 7.207E+02+/- 1.365E+02 (18.94%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.636E+02	6.439E+01	1.746E+01	2.670E+00	20.824
TH-234	7.207E+02	1.365E+02	1.265E+02	6.793E+00	5.699

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	2.294E+00		5.965E+00	1.076E+01	1.229E+00	0.213
CD-109	-1.872E+01		1.114E+02	1.760E+02	1.451E+01	-0.106
PA-231	5.379E+00		2.175E+00	4.332E+00	6.161E-02	1.242
PA-234	3.330E+00		1.593E+00	2.925E+00	4.160E-02	1.138
NP-237	9.487E+00		2.935E+01	5.271E+01	4.261E+00	0.180
AM-241	2.980E+01		9.766E+00	1.859E+01	9.143E-01	1.603

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Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715310_GE3_BAFIL_194596.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 07 TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 09:55:16
 Sample ID : 1307153-10 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.09 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.82	1965	82	1.42	31.14	27	15	2.18E+00	2.3	2.27E+00
2	3	35.08	499	68	1.66	35.40	27	15	5.55E-01	5.3	
3	4	53.05	78	64	1.99	53.37	49	25	8.72E-02	21.2	4.35E+00
4	4	61.69	298	69	2.01	62.01	49	25	3.31E-01	7.4	
5	4	65.80	132	72	2.02	66.12	49	25	1.47E-01	14.8	
6	4	69.82	20	62	1.52	70.14	49	25	2.20E-02	66.5	
7	0	81.08	801	137	1.84	81.40	78	9	8.90E-01	4.5	
8	0	92.75	58	83	1.42	93.07	90	8	6.40E-02	30.3	
9	4	111.93	225	60	1.73	112.24	108	13	2.50E-01	8.4	1.25E+00
10	4	116.17	41	64	2.13	116.48	108	13	4.54E-02	42.2	
11	0	276.80	54	35	1.23	277.11	275	7	6.00E-02	22.7	
12	0	303.13	137	34	1.63	303.44	298	8	1.52E-01	11.3	
13	0	309.11	25	41	4.63	309.42	307	7	2.74E-02	48.5	
14	4	333.81	78	6	2.43	334.12	329	16	8.64E-02	12.9	1.98E+00
15	4	338.44	33	4	1.97	338.75	329	16	3.61E-02	21.9	
16	0	356.19	529	22	1.95	356.49	351	11	5.88E-01	4.7	
17	0	365.17	17	15	2.63	365.47	362	6	1.89E-02	43.4	
18	3	383.98	99	16	1.75	384.28	382	13	1.10E-01	12.2	2.97E+00
19	3	387.12	232	11	1.82	387.43	382	13	2.57E-01	7.4	
20	3	391.53	58	6	1.74	391.84	382	13	6.46E-02	17.1	
21	2	414.98	43	13	2.08	415.28	410	16	4.80E-02	19.9	1.34E+00
22	2	418.68	29	11	2.09	418.98	410	16	3.24E-02	32.0	
23	0	437.24	111	2	1.96	437.54	434	8	1.24E-01	9.7	
24	3	463.70	5	0	1.75	464.00	463	9	6.01E-03	6.5	2.80E+00
25	3	468.12	23	4	2.34	468.42	463	9	2.51E-02	26.6	
26	0	472.91	9	3	1.25	473.21	472	5	9.91E-03	45.8	
27	0	511.43	15	4	1.08	511.73	508	8	1.63E-02	35.4	
28	0	527.74	6	2	2.71	528.04	525	6	7.15E-03	49.7	

Total number of lines in spectrum 28
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 4 14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.837E+02	3.837E+02	0.696E+02	18.15		
Total Activity :			3.837E+02	3.837E+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	8.879E+02	8.879E+02	1.443E+02	16.26		
Total Activity :			8.879E+02	8.879E+02				

Grand Total Activity : 1.272E+03 1.272E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.837E+02	3.837E+02	18.15	OK
	302.84	17.80	6.222E+00	3.702E+02	3.702E+02	30.61	OK
	356.01	60.00	5.860E+00	4.518E+02	4.518E+02	16.54	OK

Final Mean for 3 Valid Peaks = 3.837E+02+/- 6.963E+01 (18.15%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	8.879E+02	8.879E+02	16.26	OK

Final Mean for 1 Valid Peaks = 8.879E+02+/- 1.443E+02 (16.26%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.837E+02	6.963E+01	2.042E+01	3.123E+00	18.790
TH-234	8.879E+02	1.443E+02	1.116E+02	5.992E+00	7.959

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.702E+00	6.567E+00	1.019E+01	1.164E+00	-0.167
CD-109	-6.255E+01	1.215E+02	1.583E+02	1.305E+01	-0.395
PA-231	1.733E+00	1.584E+00	3.077E+00	4.376E-02	0.563
PA-234	2.313E+00	1.438E+00	2.734E+00	3.888E-02	0.846
NP-237	8.630E+00	3.281E+01	4.884E+01	3.948E+00	0.177
AM-241	3.865E+01	9.392E+00	1.927E+01	9.474E-01	2.006

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Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130715311_GE1_BAFIL_194589.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : DUP 07 DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 09:21:05
 Sample ID : 1307153-11 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	27.90	36	59	1.51	28.14	27	13	4.04E-02	32.4	4.00E+01
2	3	30.90	1987	65	1.35	31.13	27	13	2.21E+00	2.3	
3	3	34.99	541	70	1.85	35.22	27	13	6.01E-01	6.1	
4	0	52.63	63	101	1.98	52.86	50	8	6.96E-02	30.4	
5	1	61.91	228	69	1.58	62.14	58	12	2.53E-01	9.0	1.17E+01
6	1	65.63	122	71	1.58	65.86	58	12	1.35E-01	15.3	
7	3	81.23	839	53	1.55	81.46	76	14	9.32E-01	3.6	8.07E+00
8	3	85.24	46	50	1.95	85.47	76	14	5.10E-02	31.4	
9	0	92.97	33	45	1.47	93.20	91	5	3.62E-02	35.6	
10	2	108.09	19	45	1.80	108.31	106	15	2.07E-02	61.5	4.77E+00
11	2	112.09	192	44	1.81	112.31	106	15	2.13E-01	9.5	
12	2	116.61	39	43	1.82	116.83	106	15	4.38E-02	32.7	
13	0	156.05	25	47	2.24	156.28	154	6	2.80E-02	47.2	
14	0	162.06	17	68	1.00	162.29	159	7	1.89E-02	84.0	
15	0	235.68	12	58	1.42	235.90	231	8	1.36E-02	111.1	
16	0	277.21	43	41	1.30	277.42	273	7	4.73E-02	29.5	
17	2	303.11	185	11	1.62	303.33	300	15	2.06E-01	7.7	6.87E+00
18	2	307.88	55	8	2.01	308.10	300	15	6.09E-02	15.8	
19	0	334.35	69	52	1.58	334.57	330	8	7.64E-02	21.8	
20	5	352.35	9	6	2.24	352.56	351	10	9.65E-03	45.1	2.89E+00
21	5	356.46	603	8	1.58	356.68	351	10	6.70E-01	4.1	
22	0	364.50	20	19	3.28	364.71	362	8	2.27E-02	42.4	
23	1	377.69	10	20	1.87	377.90	372	23	1.12E-02	65.9	2.26E+01
24	1	384.96	145	17	1.88	385.17	372	23	1.61E-01	10.9	
25	1	391.62	50	7	1.88	391.83	372	23	5.57E-02	19.8	
26	3	415.28	55	14	2.29	415.48	412	15	6.10E-02	19.2	2.24E+00
27	3	418.36	32	10	2.30	418.57	412	15	3.58E-02	35.5	
28	0	437.42	105	6	1.87	437.63	435	6	1.17E-01	10.4	
29	0	468.87	15	9	2.14	469.07	465	7	1.69E-02	41.3	
30	0	511.83	24	7	1.75	512.03	507	9	2.71E-02	27.8	

Total number of lines in spectrum 30
 Number of unidentified lines 25
 Number of lines tentatively identified by NID 5 16.67%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.890E+02	3.890E+02	0.716E+02	18.40	
NP-237	2.14E+06Y	1.00	7.143E+01	7.143E+01	4.584E+01	64.17	
Total Activity :			4.604E+02	4.604E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	3.067E+02	3.067E+02	0.572E+02	18.65	
Total Activity :			3.067E+02	3.067E+02			

Grand Total Activity : 7.671E+02 7.671E+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	3.890E+02	3.890E+02	18.40	OK
	302.84	17.80	4.915E+00	6.358E+02	6.359E+02	33.01	OK
	356.01	60.00	6.963E+00	4.336E+02	4.337E+02	17.25	OK

Final Mean for 3 Valid Peaks = 3.890E+02+/- 7.157E+01 (18.40%)

NP-237	86.50	12.60*	1.532E+01	7.143E+01	7.143E+01	64.17	OK
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Final Mean for 1 Valid Peaks = 7.143E+01+/- 4.584E+01 (64.17%)

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	3.067E+02	3.067E+02	18.65	OK

Final Mean for 1 Valid Peaks = 3.067E+02+/- 5.720E+01 (18.65%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.890E+02	7.157E+01	1.853E+01	3.042E+00	20.994
TH-234	3.067E+02	5.720E+01	5.828E+01	1.867E+00	5.262
NP-237	7.143E+01	4.584E+01	6.228E+01	7.583E+00	1.147

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.311E+01	1.305E+01	2.254E+01	7.037E+00	0.582
CD-109	1.173E+02	1.341E+02	2.145E+02	2.774E+01	0.547
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.755E+00	1.776E+00	3.713E+00	6.977E-02	2.627
AM-241	8.604E+00	3.432E+00	6.389E+00	1.499E-01	1.347

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715312_GE1_BAFIL_194595.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : FB AT I-73 TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 09:54:21
 Sample ID : 1307153-12 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 00:15:00.27 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	27.90	24	77	1.51	28.14	27	13	2.63E-02	49.3	2.40E+01
2	2	30.88	2005	74	1.34	31.11	27	13	2.23E+00	2.3	
3	2	35.03	492	45	1.68	35.26	27	13	5.47E-01	5.3	
4	0	52.41	58	79	1.97	52.64	49	8	6.44E-02	29.5	
5	4	61.67	239	76	2.10	61.90	57	19	2.66E-01	9.2	3.96E+00
6	4	65.67	129	80	2.11	65.90	57	19	1.43E-01	15.2	
7	0	81.25	786	95	1.95	81.48	77	10	8.74E-01	4.3	
8	0	92.49	20	85	1.22	92.72	90	7	2.23E-02	79.1	
9	4	112.07	199	47	1.66	112.29	106	15	2.21E-01	8.7	7.94E-01
10	4	116.08	47	48	2.20	116.30	106	15	5.25E-02	36.0	
11	0	159.70	37	63	1.40	159.92	156	8	4.13E-02	40.3	
12	0	186.82	54	116	4.06	187.04	182	13	6.01E-02	43.4	
13	0	276.78	76	23	1.16	277.00	274	7	8.39E-02	15.6	
14	0	283.12	19	14	1.68	283.34	281	6	2.13E-02	39.7	
15	3	303.27	157	23	1.89	303.48	299	19	1.74E-01	9.0	7.14E+00
16	3	307.64	35	22	2.12	307.85	299	19	3.90E-02	25.8	
17	6	334.02	88	16	1.79	334.23	330	17	9.77E-02	13.0	1.17E+00
18	6	338.67	22	19	2.97	338.89	330	17	2.45E-02	62.7	
19	0	356.46	533	38	1.84	356.67	353	10	5.92E-01	4.8	
20	4	384.21	123	34	1.84	384.42	381	10	1.37E-01	13.7	1.40E+01
21	4	387.40	178	39	1.67	387.61	381	10	1.98E-01	9.7	
22	0	391.68	34	22	1.35	391.89	391	5	3.79E-02	28.5	
23	3	415.11	43	12	2.29	415.31	411	15	4.73E-02	22.0	1.67E+00
24	3	418.02	26	9	2.08	418.23	411	15	2.88E-02	36.4	
25	3	422.01	16	8	2.30	422.22	411	15	1.76E-02	47.4	
26	0	437.59	99	12	1.69	437.79	434	8	1.10E-01	11.7	
27	0	467.45	29	10	2.39	467.66	462	10	3.22E-02	27.6	
28	0	512.10	19	6	2.62	512.30	508	8	2.13E-02	31.8	
29	0	576.81	7	2	1.61	577.00	572	8	7.72E-03	51.9	
30	0	609.81	10	0	2.67	610.00	607	6	1.11E-02	31.6	

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		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.645E+02	3.646E+02	0.690E+02	18.93	
Total Activity :			3.645E+02	3.646E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
PA-231	3.28E+04Y	1.00	4.169E+03	4.169E+03	1.370E+03	32.86	
TH-234	4.47E+09Y	1.00	3.221E+02	3.221E+02	0.613E+02	19.04	
Total Activity :			4.491E+03	4.491E+03			

Grand Total Activity : 4.855E+03 4.855E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.963E+01	3.645E+02	3.646E+02	18.93	OK
	302.84	17.80	4.915E+00	5.381E+02	5.382E+02	34.35	OK
	356.01	60.00	6.963E+00	3.830E+02	3.830E+02	17.98	OK

Final Mean for 3 Valid Peaks = 3.646E+02 +/- 6.900E+01 (18.93%)

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	8.154E+02	8.154E+02	85.41	OK
	302.67	2.30	4.910E+00	4.169E+03	4.169E+03	32.86	OK

Final Mean for 2 Valid Peaks = 4.169E+03 +/- 1.370E+03 (32.86%)

TH-234	63.29	3.80*	5.865E+01	3.221E+02	3.221E+02	19.04	OK
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Final Mean for 1 Valid Peaks = 3.221E+02 +/- 6.131E+01 (19.04%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.646E+02	6.900E+01	1.621E+01	2.662E+00	22.483
PA-231	4.169E+03	1.370E+03	1.933E-01	3.632E-03	21571.479
TH-234	3.221E+02	6.131E+01	5.051E+01	1.618E+00	6.376

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.785E+00	1.206E+01	1.895E+01	5.918E+00	-0.094
CD-109	-5.308E+01	1.420E+02	1.870E+02	2.420E+01	-0.284
PA-234	9.984E+00	1.765E+00	3.712E+00	6.976E-02	2.690
NP-237	1.527E+01	3.446E+01	5.272E+01	6.418E+00	0.290
AM-241	1.432E+01	3.750E+00	7.025E+00	1.648E-01	2.038

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Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715315_GE3_BAFIL_194598.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-103-SS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 10:12:13
 Sample ID : 1307153-15 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.06 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.07	50	120	1.73	28.39	26	14	5.61E-02	42.3	2.49E+01
2	3	30.82	1866	82	1.39	31.14	26	14	2.07E+00	2.4	
3	3	34.85	468	78	1.75	35.17	26	14	5.20E-01	5.6	
4	0	53.36	50	131	2.32	53.68	50	8	5.54E-02	42.2	
5	1	61.78	235	92	1.51	62.09	57	16	2.61E-01	9.0	2.58E+00
6	1	65.73	102	74	1.52	66.04	57	16	1.13E-01	17.2	
7	0	81.08	846	128	1.77	81.40	76	10	9.40E-01	4.3	
8	0	92.99	29	92	1.38	93.30	89	8	3.26E-02	59.5	
9	2	111.86	206	54	1.75	112.18	108	14	2.29E-01	8.8	9.05E-01
10	2	116.55	36	55	1.76	116.87	108	14	4.01E-02	36.0	
11	3	213.79	12	16	2.08	214.10	213	9	1.32E-02	47.4	4.46E+00
12	3	217.21	18	38	2.08	217.52	213	9	1.96E-02	63.0	
13	0	239.81	12	36	1.14	240.12	236	6	1.38E-02	81.3	
14	0	276.97	56	23	1.36	277.28	274	7	6.19E-02	19.8	
15	3	302.99	132	23	1.64	303.30	300	12	1.46E-01	10.1	3.36E+00
16	3	307.34	12	45	2.19	307.65	300	12	1.37E-02	102.5	
17	3	333.79	72	11	2.21	334.10	328	15	7.99E-02	14.6	2.22E+00
18	3	338.25	31	8	2.21	338.55	328	15	3.44E-02	30.4	
19	0	356.33	469	5	1.88	356.63	354	8	5.21E-01	4.7	
20	0	365.26	12	15	1.22	365.56	363	6	1.36E-02	56.3	
21	3	384.20	60	26	2.09	384.50	382	9	6.67E-02	18.1	1.12E+01
22	3	387.21	182	46	1.74	387.51	382	9	2.02E-01	9.5	
23	3	414.51	33	11	2.29	414.81	411	20	3.64E-02	24.9	6.17E-01
24	3	418.60	24	11	2.30	418.90	411	20	2.67E-02	38.1	
25	3	422.77	10	11	2.30	423.07	411	20	1.09E-02	70.4	
26	0	437.47	89	21	1.92	437.77	434	8	9.86E-02	14.0	
27	0	468.99	21	3	2.20	469.29	466	9	2.35E-02	25.4	
28	0	512.79	23	6	2.31	513.09	508	11	2.50E-02	29.2	

Summary of Nuclide Activity

Sample ID : 1307153-15

Acquisition date : 12-AUG-2013 10:12:13

Total number of lines in spectrum 28
 Number of unidentified lines 24
 Number of lines tentatively identified by NID 4 14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.054E+02	4.054E+02	0.728E+02	17.95		
Total Activity :			4.054E+02	4.054E+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	7.023E+02	7.023E+02	1.355E+02	19.30		
Total Activity :			7.023E+02	7.023E+02				

Grand Total Activity : 1.108E+03 1.108E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.054E+02	4.054E+02	17.95	OK
	302.84	17.80	6.222E+00	3.571E+02	3.571E+02	28.90	OK
	356.01	60.00	5.860E+00	4.004E+02	4.004E+02	16.60	OK

Final Mean for 3 Valid Peaks = 4.054E+02 +/- 7.277E+01 (17.95%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	7.023E+02	7.023E+02	19.30	OK

Final Mean for 1 Valid Peaks = 7.023E+02 +/- 1.355E+02 (19.30%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.054E+02	7.277E+01	1.730E+01	2.645E+00	23.438
TH-234	7.023E+02	1.355E+02	1.309E+02	7.028E+00	5.367

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.690E+00		6.294E+00	1.046E+01	1.195E+00	0.162
CD-109	-1.096E+02		1.366E+02	1.694E+02	1.397E+01	-0.647
PA-231	2.767E+00		1.505E+00	3.087E+00	4.391E-02	0.896
PA-234	5.173E+00		1.519E+00	2.999E+00	4.265E-02	1.725
NP-237	3.365E+01		2.964E+01	5.039E+01	4.073E+00	0.668
AM-241	3.300E+01		1.021E+01	1.942E+01	9.546E-01	1.700

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8/12/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715316_GE3_BAFIL_194600.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-103-SS DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 10:33:35
 Sample ID : 1307153-16 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.63 0.5%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	1943	74	1.44	31.11	26	19	2.16E+00	2.3	3.88E+00
2	3	35.03	514	67	1.68	35.34	26	19	5.71E-01	5.1	
3	0	52.45	78	111	2.74	52.77	49	8	8.68E-02	26.2	
4	1	61.82	218	64	1.51	62.14	57	15	2.43E-01	9.3	4.22E+00
5	1	65.54	119	71	1.52	65.86	57	15	1.33E-01	14.7	
6	0	81.02	806	153	1.77	81.33	76	10	8.95E-01	4.5	
7	0	92.98	49	58	2.03	93.30	90	7	5.40E-02	29.9	
8	3	111.81	225	67	1.93	112.13	107	22	2.51E-01	8.8	1.19E+00
9	3	116.20	37	57	1.93	116.52	107	22	4.10E-02	38.9	
10	1	133.83	14	36	1.62	134.15	131	9	1.53E-02	73.2	4.68E-01
11	1	136.54	21	34	1.63	136.85	131	9	2.30E-02	51.4	
12	0	160.96	12	93	1.15	161.27	157	8	1.37E-02	138.4	
13	0	223.02	28	50	2.34	223.33	220	8	3.14E-02	47.1	
14	1	276.53	42	15	1.78	276.84	271	19	4.66E-02	22.8	1.69E+00
15	1	281.85	16	18	1.78	282.16	271	19	1.77E-02	44.1	
16	3	295.16	14	8	2.17	295.47	293	19	1.55E-02	46.7	2.57E+00
17	3	303.04	127	14	1.79	303.34	293	19	1.41E-01	10.1	
18	3	307.47	37	28	2.19	307.78	293	19	4.07E-02	33.2	
19	0	334.55	57	51	1.47	334.86	330	8	6.37E-02	25.2	
20	0	356.19	494	36	1.97	356.49	352	9	5.49E-01	5.0	
21	3	384.18	123	4	2.26	384.48	380	17	1.37E-01	13.1	3.32E+00
22	3	387.16	194	4	1.76	387.46	380	17	2.16E-01	8.4	
23	3	391.34	48	6	2.11	391.65	380	17	5.34E-02	25.6	
24	3	414.92	51	12	2.29	415.23	410	19	5.68E-02	19.9	1.84E+00
25	3	417.82	37	10	2.29	418.12	410	19	4.08E-02	27.9	
26	3	421.90	10	8	2.30	422.20	410	19	1.16E-02	68.4	
27	0	437.22	124	7	1.96	437.52	433	10	1.38E-01	9.9	
28	0	469.25	16	18	2.10	469.55	465	11	1.77E-02	55.9	
29	0	510.81	18	0	2.04	511.11	508	7	2.00E-02	23.6	

Total number of lines in spectrum 29
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 6 20.69%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.862E+02	3.862E+02	0.704E+02	18.23	
Total Activity :			3.862E+02	3.862E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	2.661E+03	2.661E+03	0.718E+03	27.00	
TH-234	4.47E+09Y	1.00	6.519E+02	6.519E+02	1.290E+02	19.79	
Total Activity :			3.313E+03	3.313E+03			

Grand Total Activity : 3.699E+03 3.699E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	3.862E+02	3.862E+02	18.23	OK
	302.84	17.80	6.222E+00	3.439E+02	3.439E+02	28.83	OK
	356.01	60.00	5.860E+00	4.220E+02	4.220E+02	16.92	OK

Final Mean for 3 Valid Peaks = 3.862E+02+/- 7.042E+01 (18.23%)

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	6.406E+00	4.670E+02	4.670E+02	89.93	OK
	302.67	2.30	6.224E+00	2.661E+03	2.661E+03	27.00	OK

Final Mean for 2 Valid Peaks = 2.661E+03+/- 7.185E+02 (27.00%)

TH-234	63.29	3.80*	2.648E+01	6.519E+02	6.519E+02	19.79	OK
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Final Mean for 1 Valid Peaks = 6.519E+02+/- 1.290E+02 (19.79%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.862E+02	7.042E+01	1.871E+01	2.861E+00	20.647
PA-231	2.661E+03	7.185E+02	3.079E+00	4.380E-02	864.110
TH-234	6.519E+02	1.290E+02	1.122E+02	6.027E+00	5.810

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.031E+00	5.553E+00	9.906E+00	1.132E+00	0.104
CD-109	-8.819E+00	1.182E+02	1.663E+02	1.372E+01	-0.053
PA-234	3.987E+00	1.522E+00	2.894E+00	4.116E-02	1.378
NP-237	1.612E+01	3.271E+01	5.031E+01	4.067E+00	0.320
AM-241	3.438E+01	9.427E+00	1.857E+01	9.128E-01	1.852

105
9/12/13

VAX/VMS Peak Search Report Generated 12-AUG-2013 11:04:26.24

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715317_GE1_BAFIL_194602.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-102R-SS TOT
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 10:49:06
 Sample ID : 1307153-17 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE1 , Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.26 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	27.90	23	59	1.51	28.14	27	13	2.60E-02	45.3	4.25E+01
2	3	30.91	1857	62	1.32	31.15	27	13	2.06E+00	2.4	
3	3	34.95	528	60	1.85	35.18	27	13	5.86E-01	6.2	
4	0	53.16	72	80	2.31	53.39	50	8	8.01E-02	24.3	
5	5	61.90	243	82	2.01	62.13	58	14	2.70E-01	8.6	4.20E+00
6	5	66.09	137	87	2.06	66.32	58	14	1.52E-01	14.7	
7	0	81.25	724	93	1.95	81.48	79	7	8.05E-01	4.3	
8	0	93.10	47	85	1.14	93.33	90	7	5.26E-02	35.3	
9	3	108.59	14	49	1.99	108.82	106	15	1.51E-02	90.5	3.14E+00
10	3	112.00	211	36	1.81	112.23	106	15	2.35E-01	8.0	
11	3	115.99	60	36	2.00	116.22	106	15	6.70E-02	24.8	
12	0	185.71	30	59	1.17	185.93	183	7	3.33E-02	46.1	
13	0	207.86	15	62	1.36	208.09	204	7	1.61E-02	94.3	
14	0	276.64	38	34	1.38	276.86	275	6	4.25E-02	28.6	
15	2	303.11	167	9	1.60	303.33	300	11	1.85E-01	7.9	1.59E+01
16	2	307.44	31	17	2.01	307.65	300	11	3.46E-02	27.1	
17	2	334.01	67	16	2.03	334.22	329	16	7.46E-02	16.4	2.37E+00
18	2	338.14	17	9	2.03	338.35	329	16	1.94E-02	54.4	
19	0	356.47	540	27	1.83	356.68	354	9	6.00E-01	4.7	
20	2	384.14	121	16	1.83	384.35	380	17	1.34E-01	12.6	9.15E+00
21	2	387.45	174	12	1.85	387.66	380	17	1.93E-01	9.5	
22	2	391.74	56	8	1.78	391.94	380	17	6.27E-02	16.6	
23	4	415.25	52	13	2.52	415.45	411	15	5.83E-02	20.8	2.22E+00
24	4	418.25	21	18	2.17	418.46	411	15	2.34E-02	49.8	
25	0	426.60	11	3	1.26	426.81	425	5	1.17E-02	38.2	
26	0	437.81	95	14	1.50	438.01	434	9	1.06E-01	12.6	
27	0	469.88	9	16	1.10	470.08	466	6	9.71E-03	80.7	
28	0	510.53	30	0	1.96	510.73	505	11	3.33E-02	18.3	
29	0	602.27	7	2	1.37	602.46	599	6	7.22E-03	49.3	
30	0	610.47	9	0	3.00	610.67	608	6	1.00E-02	33.3	
31	0	1461.44	7	0	1.77	1461.57	1458	6	7.78E-03	37.8	

Total number of lines in spectrum 31
 Number of unidentified lines 27
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.358E+02	3.358E+02	0.637E+02	18.97	
Total Activity :			3.358E+02	3.358E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	3.270E+02	3.270E+02	0.589E+02	18.01	
Total Activity :			3.270E+02	3.270E+02			

Grand Total Activity : 6.627E+02 6.628E+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	3.358E+02	3.358E+02	18.97	OK
	302.84	17.80	4.915E+00	5.731E+02	5.731E+02	33.22	OK
	356.01	60.00	6.963E+00	3.884E+02	3.885E+02	17.79	OK

Final Mean for 3 Valid Peaks = 3.358E+02+/- 6.370E+01 (18.97%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.270E+02	3.270E+02	18.01	OK

Final Mean for 1 Valid Peaks = 3.270E+02+/- 5.890E+01 (18.01%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.358E+02	6.370E+01	1.916E+01	3.145E+00	17.529
TH-234	3.270E+02	5.890E+01	5.111E+01	1.638E+00	6.398

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.018E+01		1.387E+01	1.930E+01	6.026E+00	-0.527
CD-109	2.060E+00		1.462E+02	2.055E+02	2.659E+01	0.010
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.467E+00		1.689E+00	3.522E+00	6.618E-02	2.404
NP-237	2.149E-01		4.208E+01	5.895E+01	7.177E+00	0.004
AM-241	8.853E+00		3.150E+00	6.067E+00	1.423E-01	1.459

4/12/13

VAX/VMS Peak Search Report Generated 12-AUG-2013 11:05:06.25

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715318_GE3_BAFIL_194603.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : PZ-102R-SS DIS
 Deposition Date :
 Sample Date : 12-AUG-2013 00:00:00 Acquisition date : 12-AUG-2013 10:49:46
 Sample ID : 1307153-18 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE3 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:05.15 0.6%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.79	1896	105	1.52	31.11	26	15	2.11E+00	2.4	6.17E+00
2	3	34.99	449	83	1.61	35.31	26	15	4.98E-01	5.8	
3	0	53.15	89	117	3.69	53.47	49	9	9.87E-02	24.5	
4	1	61.74	229	49	1.51	62.06	58	16	2.55E-01	8.6	8.60E+00
5	1	65.54	115	44	1.52	65.86	58	16	1.27E-01	13.9	
6	0	81.05	844	112	1.81	81.37	76	11	9.37E-01	4.2	
7	0	92.72	41	56	1.25	93.04	90	7	4.55E-02	34.4	
8	7	111.82	225	42	1.80	112.14	107	15	2.50E-01	7.7	3.03E+00
9	7	116.60	89	40	2.75	116.92	107	15	9.94E-02	19.7	
10	0	159.94	20	86	1.60	160.25	157	8	2.19E-02	84.5	
11	0	205.79	29	77	3.35	206.10	201	11	3.22E-02	61.5	
12	0	276.71	60	29	1.45	277.02	273	9	6.68E-02	21.0	
13	3	303.03	149	15	1.69	303.33	299	16	1.65E-01	8.9	6.44E+00
14	3	307.24	33	19	2.19	307.54	299	16	3.63E-02	37.9	
15	3	311.68	9	13	2.19	311.99	299	16	1.03E-02	62.6	
16	0	324.69	21	15	4.18	324.99	321	9	2.29E-02	41.0	
17	3	333.61	74	15	1.90	333.92	329	14	8.25E-02	14.9	2.86E+00
18	3	338.12	25	23	2.22	338.42	329	14	2.74E-02	41.1	
19	0	356.26	488	33	1.87	356.56	351	12	5.42E-01	5.1	
20	0	366.49	26	34	2.01	366.79	362	11	2.94E-02	46.5	
21	4	383.95	114	15	2.35	384.25	381	20	1.27E-01	14.3	2.99E+00
22	4	387.11	235	8	1.83	387.41	381	20	2.62E-01	7.5	
23	4	391.18	51	5	2.34	391.48	381	20	5.65E-02	26.3	
24	3	414.92	47	9	2.29	415.23	412	14	5.25E-02	19.2	5.02E+00
25	3	418.27	23	8	2.29	418.57	412	14	2.56E-02	43.0	
26	3	421.20	12	8	2.30	421.50	412	14	1.37E-02	68.4	
27	0	437.09	94	3	2.10	437.39	432	9	1.05E-01	10.7	
28	0	468.51	25	6	1.97	468.81	464	8	2.76E-02	26.4	
29	1	511.88	11	6	1.96	512.18	509	10	1.26E-02	41.9	2.05E+00
30	1	515.88	11	2	1.97	516.18	509	10	1.21E-02	43.6	
31	0	531.70	6	0	2.88	532.00	529	6	6.67E-03	40.8	
32	0	584.09	9	2	2.89	584.39	581	6	9.44E-03	41.2	

Summary of Nuclide Activity

Sample ID : 1307153-18

Acquisition date : 12-AUG-2013 10:49:46

Total number of lines in spectrum 32
 Number of unidentified lines 28
 Number of lines tentatively identified by NID 4 12.50%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.043E+02	4.043E+02	0.724E+02	17.92	
Total Activity :			4.043E+02	4.043E+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	6.840E+02	6.840E+02	1.268E+02	18.54	
Total Activity :			6.840E+02	6.840E+02			

Grand Total Activity : 1.088E+03 1.088E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.899E+01	4.043E+02	4.043E+02	17.92	OK
	302.84	17.80	6.222E+00	4.033E+02	4.033E+02	27.27	OK
	356.01	60.00	5.860E+00	4.166E+02	4.166E+02	17.04	OK

Final Mean for 3 Valid Peaks = 4.043E+02+/- 7.244E+01 (17.92%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.648E+01	6.840E+02	6.840E+02	18.54	OK

Final Mean for 1 Valid Peaks = 6.840E+02+/- 1.268E+02 (18.54%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.043E+02	7.244E+01	1.557E+01	2.381E+00	25.965
TH-234	6.840E+02	1.268E+02	1.001E+02	5.375E+00	6.836

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.388E+00		5.687E+00	8.661E+00	9.894E-01	-0.276
CD-109	2.289E+01		1.051E+02	1.566E+02	1.292E+01	0.146
PA-231	2.284E+00		1.623E+00	3.204E+00	4.556E-02	0.713
PA-234	3.769E+00		1.449E+00	2.777E+00	3.950E-02	1.357
NP-237	2.887E+01		2.999E+01	4.978E+01	4.025E+00	0.580
AM-241	3.465E+01		8.918E+00	1.798E+01	8.840E-01	1.927

RUN 2

8119117

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715301_GE2_BAFIL_194811.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : SPIKE
 Deposition Date :
 Sample Date : 19-AUG-2013 00:00:00 Acquisition date : 19-AUG-2013 07:08:08
 Sample ID : 1307153-01 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 00:15:00.30 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	30.99	2045	108	1.42	31.10	26	14	2.27E+00	2.3	9.07E+00
2	3	35.20	434	110	1.68	35.31	26	14	4.83E-01	6.3	
3	0	52.81	58	99	1.27	52.92	49	8	6.43E-02	32.7	
4	1	61.75	228	51	1.46	61.87	57	14	2.53E-01	8.2	1.75E+00
5	1	65.88	73	56	1.47	65.99	57	14	8.09E-02	19.0	
6	0	81.11	773	124	1.48	81.22	76	8	8.59E-01	4.4	
7	0	93.38	30	104	2.25	93.49	89	8	3.28E-02	63.0	
8	4	111.89	229	46	1.74	112.00	107	16	2.54E-01	8.0	1.37E+00
9	4	116.23	54	56	2.07	116.35	107	16	5.95E-02	29.4	
10	0	160.49	23	72	1.06	160.61	157	7	2.61E-02	63.3	
11	0	186.94	25	80	1.16	187.05	183	8	2.74E-02	66.9	
12	0	240.31	16	64	1.63	240.42	236	9	1.81E-02	92.6	
13	0	277.00	55	42	1.30	277.11	273	8	6.13E-02	24.4	
14	0	302.57	128	57	1.32	302.68	299	7	1.42E-01	12.0	
15	4	333.89	68	22	2.41	333.99	329	13	7.58E-02	17.0	2.58E+00
16	4	338.03	15	9	2.42	338.14	329	13	1.67E-02	58.6	
17	0	356.18	533	48	1.54	356.29	352	9	5.92E-01	4.9	
18	1	383.72	95	43	1.86	383.83	381	10	1.05E-01	16.0	3.63E+01
19	1	387.06	178	64	1.80	387.17	381	10	1.98E-01	10.4	
20	0	391.25	43	15	1.40	391.35	390	6	4.75E-02	23.2	
21	0	415.83	45	38	4.17	415.93	409	13	5.01E-02	32.1	
22	0	437.28	97	10	1.75	437.38	433	7	1.08E-01	11.4	
23	6	459.51	6	4	3.09	459.62	457	9	6.27E-03	65.6	1.42E+00
24	6	463.37	10	4	2.01	463.48	457	9	1.10E-02	46.2	
25	0	468.25	14	1	1.55	468.35	466	5	1.54E-02	29.3	
26	0	510.97	32	4	3.28	511.07	506	9	3.55E-02	21.2	
27	0	583.62	13	5	2.73	583.72	581	9	1.39E-02	41.7	
28	0	728.40	6	0	1.88	728.50	726	5	6.67E-03	40.8	
29	0	768.22	6	3	2.09	768.32	764	6	6.54E-03	62.4	
30	0	911.91	9	0	1.67	912.00	910	5	1.00E-02	33.3	

Total number of lines in spectrum 30
 Number of unidentified lines 26
 Number of lines tentatively identified by NID 4 13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	3.911E+02	3.911E+02	0.765E+02	19.56	
Total Activity :			3.911E+02	3.911E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.814E+02	7.814E+02	1.472E+02	18.83	
Total Activity :			7.814E+02	7.814E+02			

Grand Total Activity : 1.173E+03 1.173E+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	3.911E+02	3.911E+02	19.56	OK
	302.84	17.80	7.560E+00	2.849E+02	2.849E+02	38.32	OK
	356.01	60.00	7.170E+00	3.722E+02	3.723E+02	18.08	OK

Final Mean for 3 Valid Peaks = 3.911E+02+/- 7.650E+01 (19.56%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.814E+02	7.814E+02	18.83	OK

Final Mean for 1 Valid Peaks = 7.814E+02+/- 1.472E+02 (18.83%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.911E+02	7.650E+01	2.096E+01	3.569E+00	18.658
TH-234	7.814E+02	1.472E+02	1.325E+02	1.095E+01	5.897

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.506E+00		5.989E+00	8.932E+00	1.372E+00	-0.393
CD-109	-3.251E+01		1.250E+02	1.965E+02	2.256E+01	-0.165
PA-231	2.285E+01		3.902E+00	7.766E+00	1.479E-01	2.943
PA-234	3.113E+00		1.786E+00	3.228E+00	6.657E-02	0.964
NP-237	-5.597E+00		4.139E+01	5.782E+01	6.528E+00	-0.097
AM-241	2.988E+01		1.054E+01	2.010E+01	1.556E+00	1.486

8/19/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE]SMP_130715302_GE2_BAFIL_194814.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : BLANK
 Deposition Date :
 Sample Date : 19-AUG-2013 00:00:00 Acquisition date : 19-AUG-2013 07:29:34
 Sample ID : 1307153-02 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 00:15:00.26 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	30.96	1659	85	1.41	31.07	26	15	1.84E+00	2.6	4.48E+00
2	4	35.24	422	85	1.68	35.35	26	15	4.69E-01	6.0	
3	0	53.24	44	64	1.44	53.35	49	7	4.87E-02	33.9	
4	1	58.89	13	54	1.32	59.00	57	12	1.49E-02	77.7	1.21E+01
5	1	62.00	148	52	1.46	62.11	57	12	1.64E-01	11.3	
6	1	65.75	96	51	1.47	65.87	57	12	1.07E-01	14.4	
7	0	81.11	602	126	1.50	81.23	77	9	6.69E-01	5.3	
8	0	93.25	26	56	1.35	93.36	90	6	2.89E-02	50.1	
9	0	111.61	152	67	1.21	111.72	108	7	1.69E-01	12.1	
10	0	116.56	38	52	2.05	116.68	115	5	4.25E-02	32.9	
11	0	186.18	47	47	1.70	186.30	182	8	5.23E-02	29.3	
12	1	276.84	48	17	1.76	276.95	272	16	5.30E-02	19.1	3.59E+00
13	1	282.73	10	19	1.76	282.84	272	16	1.15E-02	71.1	
14	3	303.04	141	12	1.72	303.15	299	15	1.56E-01	9.1	1.09E+00
15	3	307.46	25	10	2.16	307.57	299	15	2.73E-02	39.6	
16	0	333.72	37	42	1.42	333.83	331	8	4.14E-02	33.4	
17	0	356.09	467	14	1.49	356.20	351	9	5.19E-01	4.8	
18	3	383.83	93	17	2.25	383.94	380	16	1.03E-01	16.9	5.34E+00
19	3	387.04	159	13	1.91	387.14	380	16	1.76E-01	10.1	
20	3	391.45	31	14	2.17	391.56	380	16	3.41E-02	34.1	
21	3	414.33	25	15	2.28	414.43	411	10	2.77E-02	35.8	1.01E+00
22	3	417.89	8	21	2.28	418.00	411	10	8.96E-03	83.4	
23	2	436.91	77	1	2.09	437.02	434	9	8.52E-02	12.0	2.98E+00
24	2	440.07	6	3	1.90	440.17	434	9	7.06E-03	134.7	
25	0	469.46	21	9	2.18	469.56	464	12	2.37E-02	35.4	
26	0	509.96	26	7	3.68	510.06	504	10	2.87E-02	27.9	
27	0	582.23	9	0	3.70	582.33	579	7	1.00E-02	33.3	
28	0	610.52	11	5	4.86	610.62	605	10	1.27E-02	46.7	
29	0	723.59	6	1	0.93	723.69	721	5	6.35E-03	51.2	

Summary of Nuclide Activity

Sample ID : 1307153-02

Acquisition date : 19-AUG-2013 07:29:34

Total number of lines in spectrum 29
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 6 20.69%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.048E+02	3.048E+02	0.623E+02	20.43	
Total Activity :			3.048E+02	3.048E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
PA-231	3.28E+04Y	1.00	2.429E+03	2.429E+03	0.813E+03	33.48	
TH-234	4.47E+09Y	1.00	5.062E+02	5.062E+02	1.234E+02	24.38	
AM-241	432.20Y	1.00	4.566E+00	4.566E+00	7.109E+00	155.71	
Total Activity :			2.940E+03	2.940E+03			

Grand Total Activity : 3.245E+03 3.245E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	3.048E+02	3.048E+02	20.43	OK
	302.84	17.80	7.560E+00	3.139E+02	3.140E+02	34.98	OK
	356.01	60.00	7.170E+00	3.259E+02	3.259E+02	17.98	OK

Final Mean for 3 Valid Peaks = 3.048E+02+/- 6.227E+01 (20.43%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
PA-231	9.28	42.00*	1.000E+02	-----	Line Out Of Range	----	Absent
	10.11	20.20	1.000E+02	-----	Line Out Of Range	----	Absent
	283.67	1.60	7.750E+00	2.501E+02	2.501E+02	144.75	OK
	302.67	2.30	7.562E+00	2.429E+03	2.429E+03	33.48	OK

Final Mean for 2 Valid Peaks = 2.429E+03+/- 8.133E+02 (33.48%)

TH-234	63.29	3.80*	2.305E+01	5.062E+02	5.062E+02	24.38	OK
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Final Mean for 1 Valid Peaks = 5.062E+02+/- 1.234E+02 (24.38%)

AM-241	59.54	35.90*	2.461E+01	4.566E+00	4.566E+00	155.71	OK
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Final Mean for 1 Valid Peaks = 4.566E+00+/- 7.109E+00 (155.71%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.048E+02	6.227E+01	1.883E+01	3.206E+00	16.185
PA-231	2.429E+03	8.133E+02	7.927E+00	1.510E-01	306.428
TH-234	5.062E+02	1.234E+02	1.352E+02	1.117E+01	3.744
AM-241	4.566E+00	7.109E+00	1.337E+01	1.035E+00	0.341

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.655E-01	5.207E+00	8.396E+00	1.289E+00	-0.067
CD-109	-3.648E+01	1.189E+02	1.627E+02	1.868E+01	-0.224
PA-234	3.729E+00	1.633E+00	3.074E+00	6.340E-02	1.213
NP-237	-1.119E+01	3.514E+01	4.800E+01	5.419E+00	-0.233

C
B/19C

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP_130715303_GE2_BAFIL_194818.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : I-73 TOT
 Deposition Date :
 Sample Date : 19-AUG-2013 00:00:00 Acquisition date : 19-AUG-2013 07:50:47
 Sample ID : 1307153-03 Sample Quantity : 1.00000E+00 filter
 Sample type : FILTER Sample Geometry : 0
 Detector name : GE2 Detector Geometry: BAFIL
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.29 0.0%
 Start channel : 25 End channel : 4096
 Sensitivity : 3.00000 Gaussian : 10.00000
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	4	28.07	38	78	1.82	28.19	26	15	4.18E-02	32.5	8.38E+00
2	4	31.00	2082	95	1.40	31.12	26	15	2.31E+00	2.3	
3	4	35.18	492	126	1.85	35.29	26	15	5.47E-01	5.8	
4	0	52.79	36	107	1.40	52.91	50	7	3.99E-02	50.3	
5	2	61.79	238	64	1.46	61.90	58	13	2.64E-01	8.0	2.25E+00
6	2	66.10	106	80	1.61	66.21	58	13	1.18E-01	15.8	
7	0	81.08	825	145	1.42	81.19	76	10	9.17E-01	4.4	
8	5	112.01	242	59	1.94	112.12	107	17	2.69E-01	8.1	2.46E+00
9	5	116.27	52	51	2.28	116.39	107	17	5.74E-02	33.4	
10	5	121.15	19	31	2.29	121.26	107	17	2.07E-02	57.0	
11	0	142.11	21	83	1.41	142.23	139	8	2.37E-02	76.9	
12	0	161.77	24	93	2.05	161.88	158	9	2.65E-02	76.1	
13	0	173.72	31	66	3.29	173.83	170	8	3.42E-02	49.2	
14	0	185.74	14	127	1.28	185.85	183	9	1.53E-02	150.4	
15	0	244.05	28	51	1.81	244.16	238	11	3.10E-02	53.4	
16	0	276.80	48	36	1.89	276.90	273	8	5.38E-02	25.8	
17	0	303.17	122	51	1.24	303.28	300	7	1.36E-01	13.4	
18	0	307.54	27	14	1.79	307.65	306	4	2.98E-02	27.9	
19	2	333.85	74	16	1.82	333.96	328	17	8.25E-02	14.3	1.55E+00
20	2	338.55	21	12	2.00	338.65	328	17	2.33E-02	39.5	
21	1	352.03	15	7	1.83	352.14	350	11	1.66E-02	29.0	1.80E+00
22	1	356.06	602	5	1.52	356.16	350	11	6.69E-01	4.1	
23	0	364.03	17	7	2.08	364.14	361	7	1.90E-02	35.2	
24	0	376.43	20	20	4.75	376.54	371	11	2.27E-02	47.1	
25	1	383.99	117	11	1.86	384.09	381	9	1.30E-01	11.8	7.52E+00
26	1	386.88	189	17	1.73	386.99	381	9	2.10E-01	9.3	
27	0	391.48	47	10	1.40	391.59	390	6	5.26E-02	19.1	
28	2	414.53	42	12	2.02	414.64	410	16	4.61E-02	19.7	2.91E+00
29	2	418.12	16	12	2.08	418.22	410	16	1.78E-02	54.0	
30	0	436.95	86	8	1.34	437.06	433	8	9.56E-02	12.2	
31	1	464.07	7	0	1.92	464.17	463	8	8.03E-03	28.5	2.03E-01
32	1	467.91	23	2	1.93	468.02	463	8	2.57E-02	23.4	
33	0	496.41	8	3	0.99	496.51	493	7	9.09E-03	50.6	
34	0	511.05	19	11	1.32	511.15	508	7	2.14E-02	36.1	
35	0	583.57	6	0	1.47	583.67	581	5	6.67E-03	40.8	
36	0	596.26	9	1	2.73	596.36	594	5	9.56E-03	39.5	
37	5	603.90	6	0	1.84	604.00	602	14	6.40E-03	42.5	1.41E+00
38	5	610.00	8	3	2.97	610.10	602	14	9.28E-03	63.5	
39	0	661.50	7	2	1.88	661.60	658	7	8.02E-03	48.1	

Total number of lines in spectrum 39
 Number of unidentified lines 34
 Number of lines tentatively identified by NID 5 12.82%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
CO-57	270.90D	1.00	5.167E+00	5.171E+00	5.947E+00	115.00	
BA-133	10.50Y	1.00	4.174E+02	4.174E+02	0.818E+02	19.60	
Total Activity :			4.225E+02	4.226E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	8.161E+02	8.161E+02	1.503E+02	18.42	
Total Activity :			8.161E+02	8.161E+02			

Grand Total Activity : 1.239E+03 1.239E+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	5.167E+00	5.171E+00	115.00	OK
	136.48	10.60	1.164E+01	-----	Line Not Found	-----	Absent

Final Mean for 1 Valid Peaks = 5.171E+00+/- 5.947E+00 (115.00%)

BA-133	81.00	33.00*	1.799E+01	4.174E+02	4.174E+02	19.60	OK
	302.84	17.80	7.560E+00	2.723E+02	2.724E+02	40.17	OK
	356.01	60.00	7.170E+00	4.200E+02	4.200E+02	17.25	OK

Final Mean for 3 Valid Peaks = 4.174E+02+/- 8.182E+01 (19.60%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	8.161E+02	8.161E+02	18.42	OK

Final Mean for 1 Valid Peaks = 8.161E+02+/- 1.503E+02 (18.42%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.171E+00	5.947E+00	9.199E+00	1.413E+00	0.562
BA-133	4.174E+02	8.182E+01	2.038E+01	3.470E+00	20.481
TH-234	8.161E+02	1.503E+02	1.339E+02	1.106E+01	6.096

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CD-109	-4.203E+01	1.154E+02	1.796E+02	2.063E+01	-0.234
PA-231	2.719E+01	4.068E+00	8.136E+00	1.549E-01	3.342
PA-234	4.509E+00	1.786E+00	3.351E+00	6.913E-02	1.345
NP-237	-1.643E+01	3.351E+01	5.138E+01	5.802E+00	-0.320
AM-241	2.709E+01	1.037E+01	1.965E+01	1.521E+00	1.379

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8/19/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715313_GE2_BAFIL_194822.CN
 Analyses by : PEAK V16.9 PEAKEFF V2.2
 Client ID : I-73 TOT
 Deposition Date :
 Sample Date : 19-AUG-2013 00:00:00 Acquisition date : 19-AUG-2013 08:08:34
 Sample ID : 1307153-13 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 00:15:00.30 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	30.98	2041	127	1.35	31.09	26	14	2.27E+00	2.3	5.18E+00
2	2	35.14	496	117	1.53	35.26	26	14	5.51E-01	5.7	
3	0	52.60	106	93	1.92	52.72	49	9	1.18E-01	18.9	
4	0	61.54	221	111	1.41	61.65	58	7	2.46E-01	10.4	
5	0	66.06	86	87	1.59	66.17	65	5	9.60E-02	19.7	
6	0	81.06	806	144	1.56	81.18	76	8	8.96E-01	4.4	
7	0	97.04	29	132	6.12	97.16	89	11	3.17E-02	81.4	
8	0	111.83	189	110	1.25	111.94	108	7	2.10E-01	11.7	
9	0	116.66	54	54	2.67	116.78	115	5	6.05E-02	25.0	
10	0	184.61	27	74	1.94	184.73	182	7	2.95E-02	57.1	
11	0	276.65	67	28	1.73	276.76	273	8	7.44E-02	18.3	
12	3	302.95	141	23	1.50	303.06	300	11	1.57E-01	9.7	3.61E+00
13	3	307.35	27	34	2.16	307.46	300	11	2.99E-02	42.2	
14	0	332.72	57	50	1.81	332.83	329	9	6.36E-02	26.1	
15	0	356.10	536	33	1.52	356.20	352	9	5.95E-01	4.7	
16	0	365.87	11	20	1.56	365.98	362	7	1.23E-02	72.7	
17	2	383.80	127	24	1.90	383.91	381	10	1.41E-01	12.6	5.45E+01
18	2	387.03	215	58	1.81	387.13	381	10	2.39E-01	9.1	
19	0	391.34	47	12	1.33	391.45	390	5	5.24E-02	19.1	
20	3	415.12	41	11	2.28	415.22	409	16	4.52E-02	22.2	1.39E+00
21	3	418.46	22	9	2.28	418.57	409	16	2.46E-02	42.4	
22	0	437.18	90	19	1.73	437.28	433	9	9.95E-02	13.9	
23	0	469.40	35	10	2.01	469.50	464	11	3.83E-02	25.0	
24	0	511.74	22	8	1.68	511.84	507	10	2.44E-02	33.8	
25	0	755.12	6	2	2.86	755.22	752	6	6.11E-03	55.3	

Total number of lines in spectrum 25
 Number of unidentified lines 21
 Number of lines tentatively identified by NID 4 16.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.078E+02	4.078E+02	0.797E+02	19.55	
Total Activity :			4.078E+02	4.078E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	7.584E+02	7.584E+02	1.723E+02	22.72	
AM-241	432.20Y	1.00	7.518E+01	7.518E+01	1.694E+01	22.53	
Total Activity :			8.335E+02	8.335E+02			

Grand Total Activity : 1.241E+03 1.241E+03

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	4.078E+02	4.078E+02	19.55	OK
	302.84	17.80	7.560E+00	3.152E+02	3.152E+02	35.70	OK
	356.01	60.00	7.170E+00	3.740E+02	3.740E+02	17.87	OK

Final Mean for 3 Valid Peaks = 4.078E+02+/- 7.973E+01 (19.55%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.584E+02	7.584E+02	22.72	OK

Final Mean for 1 Valid Peaks = 7.584E+02+/- 1.723E+02 (22.72%)

AM-241	59.54	35.90*	2.461E+01	7.518E+01	7.518E+01	22.53	OK
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Final Mean for 1 Valid Peaks = 7.518E+01+/- 1.694E+01 (22.53%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.078E+02	7.973E+01	2.139E+01	3.642E+00	19.065
TH-234	7.584E+02	1.723E+02	1.568E+02	1.296E+01	4.836
AM-241	7.518E+01	1.694E+01	1.350E+01	1.045E+00	5.568

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.204E+00	5.040E+00	7.723E+00	1.186E+00	-0.285
CD-109	-1.402E+02	1.311E+02	1.864E+02	2.140E+01	-0.752
PA-231	2.517E+01	3.984E+00	7.956E+00	1.515E-01	3.164
PA-234	1.393E+00	1.739E+00	2.993E+00	6.173E-02	0.466
NP-237	-3.862E+01	4.524E+01	5.666E+01	6.397E+00	-0.682

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Configuration      : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP_130715314_GE2_BAFIL_194825.CN
Analyses by       : PEAK V16.9  PEAKEFF V2.2
Client ID        : I-73 DIS
Deposition Date   :
Sample Date      : 19-AUG-2013 00:00:00 Acquisition date : 19-AUG-2013 08:25:19
Sample ID       : 1307153-14 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 00:15:00.31 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	30.95	2280	95	1.38	31.06	27	15	2.53E+00	2.2	4.43E+00
2	3	35.20	520	91	1.68	35.32	27	15	5.78E-01	5.3	
3	0	52.90	71	88	1.57	53.02	50	7	7.89E-02	24.9	
4	3	61.77	219	64	1.76	61.89	57	17	2.43E-01	8.8	3.35E+00
5	3	65.87	123	63	1.77	65.99	57	17	1.36E-01	14.3	
6	3	70.33	22	63	1.78	70.44	57	17	2.39E-02	61.0	
7	0	81.13	873	123	1.45	81.24	77	9	9.70E-01	4.1	
8	0	91.58	22	90	1.10	91.70	90	7	2.41E-02	75.4	
9	0	101.61	40	48	3.78	101.72	99	7	4.49E-02	32.6	
10	0	111.69	224	85	1.40	111.80	107	8	2.49E-01	9.7	
11	0	116.31	37	85	2.55	116.43	116	7	4.12E-02	48.8	
12	0	133.62	23	52	2.08	133.74	131	6	2.58E-02	53.4	
13	1	186.04	27	48	1.65	186.15	183	22	3.04E-02	43.7	2.05E+00
14	1	198.04	18	44	1.67	198.15	183	22	1.97E-02	61.7	
15	0	277.00	76	28	1.92	277.11	274	9	8.47E-02	16.6	
16	0	294.90	38	15	1.67	295.01	290	10	4.22E-02	25.0	
17	2	302.84	172	19	1.44	302.95	299	12	1.91E-01	8.4	1.78E+00
18	2	307.23	29	30	1.97	307.34	299	12	3.20E-02	38.2	
19	3	333.70	51	23	2.19	333.81	329	17	5.65E-02	21.9	1.16E+00
20	3	338.37	33	14	2.00	338.48	329	17	3.62E-02	29.1	
21	0	356.17	574	42	1.55	356.28	352	9	6.38E-01	4.6	
22	1	383.78	134	10	1.86	383.89	380	17	1.48E-01	10.1	3.76E+00
23	1	387.04	215	7	1.86	387.15	380	17	2.39E-01	8.3	
24	1	391.06	60	4	1.86	391.17	380	17	6.61E-02	19.2	
25	0	416.35	51	36	1.88	416.45	412	12	5.67E-02	27.4	
26	0	437.18	76	16	1.30	437.28	433	8	8.45E-02	14.6	
27	0	468.27	20	15	1.63	468.37	465	8	2.26E-02	39.1	
28	0	510.60	22	6	4.17	510.70	505	12	2.44E-02	30.8	
29	0	574.37	5	4	2.66	574.47	569	7	5.00E-03	83.5	

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 Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.419E+02	4.419E+02	0.853E+02	19.31	
Total Activity :			4.419E+02	4.419E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	7.502E+02	7.502E+02	1.494E+02	19.91	
Total Activity :			7.502E+02	7.502E+02			

Grand Total Activity : 1.192E+03 1.192E+03

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
BA-133	81.00	33.00*	1.799E+01	4.419E+02	4.419E+02	19.31	OK
	302.84	17.80	7.560E+00	3.832E+02	3.832E+02	34.26	OK
	356.01	60.00	7.170E+00	4.008E+02	4.008E+02	17.77	OK

Final Mean for 3 Valid Peaks = 4.419E+02+/- 8.532E+01 (19.31%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	2.305E+01	7.502E+02	7.502E+02	19.91	OK

Final Mean for 1 Valid Peaks = 7.502E+02+/- 1.494E+02 (19.91%)

Flag: "*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.419E+02	8.532E+01	1.883E+01	3.206E+00	23.469
TH-234	7.502E+02	1.494E+02	1.366E+02	1.128E+01	5.494

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.078E+00	5.467E+00	8.184E+00	1.257E+00	-0.376
CD-109	-4.524E+01	1.182E+02	1.596E+02	1.832E+01	-0.283
PA-231	2.678E+01	4.148E+00	8.243E+00	1.570E-01	3.249
PA-234	3.757E+00	1.625E+00	3.187E+00	6.573E-02	1.179
NP-237	-4.148E+00	3.351E+01	4.743E+01	5.355E+00	-0.087
AM-241	2.766E+01	1.055E+01	1.993E+01	1.543E+00	1.387