

US EPA ARCHIVE DOCUMENT

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

ThISO

Run 1

Work Order	13-04049	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	ThISO	01	LCS	LCS		04/09/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/09/13 00:00	1.0000E+00
Date Received	4/9/2013	03	DUP	PZ-302-AI TOT	39	04/03/13 11:45	1.0000E+00
Lab Deadline	4/30/2013	04	DO	PZ-302-AI TOT	39	04/03/13 11:45	1.0000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-302-AI DIS	39	04/03/13 11:45	1.0000E+00
Project	West Lake OU-1	06	TRG	LR-100 TOT	42	04/03/13 13:27	1.0000E+00
Report Level	4	07	TRG	LR-100 DIS	42	04/03/13 13:27	1.0000E+00
Activity Units	pCi	08	TRG	D-81 TOT	41	04/03/13 13:40	1.0000E+00
Aliquot Units	I	09	TRG	D-81 DIS	41	04/03/13 13:40	1.0000E+00
Matrix	WA	10	TRG	LR-105 TOT	40	04/03/13 14:24	1.0000E+00
Method	NAS NS-3004 Mod	11	TRG	LR-105 DIS	40	04/03/13 14:24	1.0000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-207-AS TOT	45	04/03/13 15:05	1.0000E+00
Radiometric Tracer	Th-229	13	TRG	PZ-207-AS DIS	45	04/03/13 15:05	1.0000E+00
Radiometric Sol#	Th-18a	14	TRG	LR-103 TOT	45	04/03/13 15:30	1.0000E+00
Tracer Act (dpm/g)	22.467	15	TRG	LR-103 DIS	45	04/03/13 15:30	1.0000E+00
Carrier		16	TRG	PZ-110-SS TOT	38	04/04/13 10:27	1.0000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-110-SS DIS	38	04/04/13 10:27	1.0000E+00
		18	TRG	I-62 TOT	46	04/04/13 10:42	1.0000E+00
		19	TRG	I-62 DIS	46	04/04/13 10:42	1.0000E+00

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

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ThISO

Run 1

Internal Fraction	Sample Desc	Tracer Aliquot (g)	Tracer Total ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	Grav Carrier Added (ml)	Grav Filter Tare (g)	Grav Filter Final (g)	Grav Filter Net (g)	Grav % Rec	Mean % Rec	SAF 1*	SAF 2*
01	LCS	0.4724	10.6		0.00								
02	MBL	0.2355	5.3		0.00								
03	DUP	0.2345	5.3		0.00								
04	DO	0.2342	5.3		0.00								
05	TRG	0.2336	5.2		0.00								
06	TRG	0.2327	5.2		0.00								
07	TRG	0.2315	5.2		0.00								
08	TRG	0.2313	5.2		0.00								
09	TRG	0.2321	5.2		0.00								
10	TRG	0.2329	5.2		0.00								
11	TRG	0.2319	5.2		0.00								
12	TRG	0.2312	5.2		0.00								
13	TRG	0.2305	5.2		0.00								
14	TRG	0.2315	5.2		0.00								
15	TRG	0.2302	5.2		0.00								
16	TRG	0.2298	5.2		0.00								
17	TRG	0.2309	5.2		0.00								
18	TRG	0.2306	5.2		0.00								
19	TRG	0.2276	5.1		0.00								

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

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ThISO

Run 1

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			04/11/13 11:01	JBARNARD				
02	MBL			04/11/13 11:01	JBARNARD				
03	DUP			04/11/13 11:01	JBARNARD				
04	DO			04/11/13 11:01	JBARNARD				
05	TRG			04/11/13 11:01	JBARNARD				
06	TRG			04/11/13 11:01	JBARNARD				
07	TRG			04/11/13 11:01	JBARNARD				
08	TRG			04/11/13 11:01	JBARNARD				
09	TRG			04/11/13 11:01	JBARNARD				
10	TRG			04/11/13 11:01	JBARNARD				
11	TRG			04/11/13 11:01	JBARNARD				
12	TRG			04/11/13 11:01	JBARNARD				
13	TRG			04/11/13 11:01	JBARNARD				
14	TRG			04/11/13 11:01	JBARNARD				
15	TRG			04/11/13 11:01	JBARNARD				
16	TRG			04/11/13 11:01	JBARNARD				
17	TRG			04/11/13 11:01	JBARNARD				
18	TRG			04/11/13 11:01	JBARNARD				
19	TRG			04/11/13 11:01	JBARNARD				

\* 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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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	4.98E+00	7.93E-01	1.29E-01	4.82E+00	103.24	OK		OK	
02	TH-228	MBL	BLANK	pCi/l	9.37E-02	8.77E-02	1.26E-01					OK	OK
03	TH-228	DUP	PZ-302-AI TOT	pCi/l	8.90E-02	1.01E-01	1.55E-01				NA	OK	
04	TH-228	DO	PZ-302-AI TOT	pCi/l	-3.74E-02	5.72E-02	2.03E-01					OK	
05	TH-228	TRG	PZ-302-AI DIS	pCi/l	8.33E-02	1.09E-01	1.71E-01					OK	
06	TH-228	TRG	LR-100 TOT	pCi/l	-3.18E-02	3.59E-02	1.21E-01					OK	
07	TH-228	TRG	LR-100 DIS	pCi/l	1.34E-01	2.23E-01	3.85E-01					OK	
08	TH-228	TRG	D-81 TOT	pCi/l	4.43E-02	8.51E-02	1.57E-01					OK	
09	TH-228	TRG	D-81 DIS	pCi/l	2.94E-01	2.28E-01	2.20E-01					OK	
10	TH-228	TRG	LR-105 TOT	pCi/l	4.72E-02	4.90E-02	5.14E-02					OK	
11	TH-228	TRG	LR-105 DIS	pCi/l	-1.27E-02	7.54E-02	1.79E-01					OK	
12	TH-228	TRG	PZ-207-AS TOT	pCi/l	1.16E-01	8.72E-02	8.67E-02					OK	
13	TH-228	TRG	PZ-207-AS DIS	pCi/l	-5.18E-03	6.06E-02	1.27E-01					OK	
14	TH-228	TRG	LR-103 TOT	pCi/l	3.48E-02	4.84E-02	7.32E-02					OK	
15	TH-228	TRG	LR-103 DIS	pCi/l	3.49E-01	3.05E-01	3.37E-01					OK	
16	TH-228	TRG	PZ-110-SS TOT	pCi/l	2.88E-02	4.42E-02	6.57E-02					OK	
17	TH-228	TRG	PZ-110-SS DIS	pCi/l	-3.99E-03	4.67E-02	9.80E-02					OK	
18	TH-228	TRG	I-62 TOT	pCi/l	2.54E-01	1.16E-01	5.09E-02					OK	
19	TH-228	TRG	I-62 DIS	pCi/l	1.21E-02	5.03E-02	1.29E-01					OK	

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-THISO-1**

US EPA ARCHIVE DOCUMENT


  
**1**
  
**THISO**
  
**13-04049**
  
 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-228	LCS	04/09/13 00:00	1.00E+00	103.83	0.00	0.00			
02	TH-228	MBL	04/09/13 00:00	1.00E+00	116.25	0.00	0.00			
03	TH-228	DUP	04/03/13 11:45	1.00E+00	92.28	0.00	0.00			
04	TH-228	DO	04/03/13 11:45	1.00E+00	72.61	0.00	0.00			
05	TH-228	TRG	04/03/13 11:45	1.00E+00	65.43	0.00	0.00			
06	TH-228	TRG	04/03/13 13:27	1.00E+00	99.28	0.00	0.00			
07	TH-228	TRG	04/03/13 13:27	1.00E+00	28.68	0.00	0.00			
08	TH-228	TRG	04/03/13 13:40	1.00E+00	66.42	0.00	0.00			
09	TH-228	TRG	04/03/13 13:40	1.00E+00	40.08	0.00	0.00			
10	TH-228	TRG	04/03/13 14:24	1.00E+00	117.43	0.00	0.00			
11	TH-228	TRG	04/03/13 14:24	1.00E+00	39.37	0.00	0.00			
12	TH-228	TRG	04/03/13 15:05	1.00E+00	104.17	0.00	0.00			
13	TH-228	TRG	04/03/13 15:05	1.00E+00	46.43	0.00	0.00			
14	TH-228	TRG	04/03/13 15:30	1.00E+00	97.27	0.00	0.00			
15	TH-228	TRG	04/03/13 15:30	1.00E+00	28.43	0.00	0.00			
16	TH-228	TRG	04/04/13 10:27	1.00E+00	89.67	0.00	0.00			
17	TH-228	TRG	04/04/13 10:27	1.00E+00	63.90	0.00	0.00			
18	TH-228	TRG	04/04/13 10:42	1.00E+00	120.71	0.00	0.00			
19	TH-228	TRG	04/04/13 10:42	1.00E+00	64.95	0.00	0.00			

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-THISO-1**

	
Client	Engineering Management Support, Inc.
Eberline Services Work Order	13-04049
Analysis Code	THISO
Run	1

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-228	LCS	04/16/13 11:59		A_Spec	Alpha_013	170.02	3.64 E+02	2.10 E-02	18.7
02	TH-228	MBL	04/16/13 11:59		A_Spec	Alpha_014	170	7.58 E+00	2.60 E-02	18.5
03	TH-228	DUP	04/16/13 11:59		A_Spec	Alpha_018	170	5.43 E+00	2.10 E-02	17.8
04	TH-228	DO	04/16/13 11:59		A_Spec	Alpha_022	170.02	-1.55 E+00	1.50 E-02	15.3
05	TH-228	TRG	04/16/13 11:59		A_Spec	Alpha_024	170	3.47 E+00	9.00 E-03	17.1
06	TH-228	TRG	04/16/13 11:59		A_Spec	Alpha_025	170.02	-2.04 E+00	1.20 E-02	17.4
07	TH-228	TRG	04/16/13 11:59		A_Spec	Alpha_027	170	2.47 E+00	9.00 E-03	17.3
08	TH-228	TRG	04/16/13 11:59		A_Spec	Alpha_029	170	2.13 E+00	1.10 E-02	19.5
09	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_033	170	8.00 E+00	0.00 E+00	18.2
10	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_034	170	3.83 E+00	1.00 E-03	18.6
11	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_035	170	-3.40 E-01	2.00 E-03	18.3
12	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_037	170	8.00 E+00	0.00 E+00	17.8
13	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_040	170	-1.70 E-01	1.00 E-03	19
14	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_041	170	2.49 E+00	3.00 E-03	19.8
15	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_042	170	6.81 E+00	7.00 E-03	18.5
16	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_044	170	1.83 E+00	1.00 E-03	19
17	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_046	170	-1.70 E-01	1.00 E-03	17.9
18	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_047	170	2.08 E+01	1.00 E-03	18.2
19	TH-228	TRG	04/16/13 12:00		A_Spec	Alpha_048	170	4.90 E-01	3.00 E-03	16.8



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-THISO-1**

Run	Analysis Code	THISO	1
Client	Engineering Management Support, Inc.		

Lab Fraction	Nuclide	Sample Desc	Client Identification	Activity Units	Results	Error Estimate	MDA	LCS Known	LCS %R	LCS Flag	RPD Flag	MDA Flag	Blank Flag
01	TH-230	LCS	LCS	pCi/l	4.68E+00	7.54E-01	7.72E-02	5.47E+00	85.53	OK		OK	
02	TH-230	MBL	BLANK	pCi/l	1.44E-01	9.47E-02	1.01E-01					OK	OK
03	TH-230	DUP	PZ-302-AI TOT	pCi/l	1.75E-01	1.15E-01	1.07E-01				NA	OK	
04	TH-230	DO	PZ-302-AI TOT	pCi/l	2.46E-01	1.64E-01	1.35E-01					OK	
05	TH-230	TRG	PZ-302-AI DIS	pCi/l	2.60E-01	1.78E-01	1.85E-01					OK	
06	TH-230	TRG	LR-100 TOT	pCi/l	1.41E-01	9.91E-02	9.22E-02					OK	
07	TH-230	TRG	LR-100 DIS	pCi/l	2.76E-01	2.74E-01	3.21E-01					OK	
08	TH-230	TRG	D-81 TOT	pCi/l	1.33E-01	1.10E-01	1.08E-01					OK	
09	TH-230	TRG	D-81 DIS	pCi/l	1.03E-01	1.26E-01	1.51E-01					OK	
10	TH-230	TRG	LR-105 TOT	pCi/l	3.05E-01	1.30E-01	7.30E-02					OK	
11	TH-230	TRG	LR-105 DIS	pCi/l	1.05E-01	1.29E-01	1.54E-01					OK	
12	TH-230	TRG	PZ-207-AS TOT	pCi/l	1.33E-01	9.18E-02	8.06E-02					OK	
13	TH-230	TRG	PZ-207-AS DIS	pCi/l	1.45E-01	1.36E-01	1.26E-01					OK	
14	TH-230	TRG	LR-103 TOT	pCi/l	1.08E-01	8.39E-02	9.09E-02					OK	
15	TH-230	TRG	LR-103 DIS	pCi/l	5.39E-01	3.67E-01	2.42E-01					OK	
16	TH-230	TRG	PZ-110-SS TOT	pCi/l	1.56E-01	1.05E-01	9.33E-02					OK	
17	TH-230	TRG	PZ-110-SS DIS	pCi/l	2.09E-01	1.50E-01	1.39E-01					OK	
18	TH-230	TRG	I-62 TOT	pCi/l	2.13E-01	1.06E-01	5.77E-02					OK	
19	TH-230	TRG	I-62 DIS	pCi/l	2.07E-01	1.50E-01	1.28E-01					OK	

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	04/09/13 00:00	1.00E+00	103.83	0.00	0.00			
02	TH-230	MBL	04/09/13 00:00	1.00E+00	116.25	0.00	0.00			
03	TH-230	DUP	04/03/13 11:45	1.00E+00	92.28	0.00	0.00			
04	TH-230	DO	04/03/13 11:45	1.00E+00	72.61	0.00	0.00			
05	TH-230	TRG	04/03/13 11:45	1.00E+00	65.43	0.00	0.00			
06	TH-230	TRG	04/03/13 13:27	1.00E+00	99.28	0.00	0.00			
07	TH-230	TRG	04/03/13 13:27	1.00E+00	28.68	0.00	0.00			
08	TH-230	TRG	04/03/13 13:40	1.00E+00	66.42	0.00	0.00			
09	TH-230	TRG	04/03/13 13:40	1.00E+00	40.08	0.00	0.00			
10	TH-230	TRG	04/03/13 14:24	1.00E+00	117.43	0.00	0.00			
11	TH-230	TRG	04/03/13 14:24	1.00E+00	39.37	0.00	0.00			
12	TH-230	TRG	04/03/13 15:05	1.00E+00	104.17	0.00	0.00			
13	TH-230	TRG	04/03/13 15:05	1.00E+00	46.43	0.00	0.00			
14	TH-230	TRG	04/03/13 15:30	1.00E+00	97.27	0.00	0.00			
15	TH-230	TRG	04/03/13 15:30	1.00E+00	28.43	0.00	0.00			
16	TH-230	TRG	04/04/13 10:27	1.00E+00	89.67	0.00	0.00			
17	TH-230	TRG	04/04/13 10:27	1.00E+00	63.90	0.00	0.00			
18	TH-230	TRG	04/04/13 10:42	1.00E+00	120.71	0.00	0.00			
19	TH-230	TRG	04/04/13 10:42	1.00E+00	64.95	0.00	0.00			



**Run**  
1

**Analysis Code**  
THISO

**Eberline Services Work Order**  
13-04049

**Client**  
Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-THISO-1**

	
Run	1
Analysis Code	THISO
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	TH-230	LCS	04/16/13 11:59		A_Spec	Alpha_013	170.02	3.42 E+02	4.00 E-03	18.7
02	TH-230	MBL	04/16/13 11:59		A_Spec	Alpha_014	170	1.16 E+01	1.40 E-02	18.5
03	TH-230	DUP	04/16/13 11:59		A_Spec	Alpha_018	170	1.08 E+01	7.00 E-03	17.8
04	TH-230	DO	04/16/13 11:59		A_Spec	Alpha_022	170.02	1.03 E+01	4.00 E-03	15.3
05	TH-230	TRG	04/16/13 11:59		A_Spec	Alpha_024	170	1.10 E+01	1.20 E-02	17.1
06	TH-230	TRG	04/16/13 11:59		A_Spec	Alpha_025	170.02	9.15 E+00	5.00 E-03	17.4
07	TH-230	TRG	04/16/13 11:59		A_Spec	Alpha_027	170	5.15 E+00	5.00 E-03	17.3
08	TH-230	TRG	04/16/13 11:59		A_Spec	Alpha_029	170	6.49 E+00	3.00 E-03	19.5
09	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_033	170	2.83 E+00	1.00 E-03	18.2
10	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_034	170	2.50 E+01	0.00 E+00	18.6
11	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_035	170	2.83 E+00	1.00 E-03	18.3
12	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_037	170	9.32 E+00	4.00 E-03	17.8
13	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_040	170	4.83 E+00	1.00 E-03	19
14	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_041	170	7.81 E+00	7.00 E-03	19.8
15	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_042	170	1.07 E+01	2.00 E-03	18.5
16	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_044	170	1.00 E+01	0.00 E+00	19
17	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_046	170	9.00 E+00	0.00 E+00	17.9
18	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_047	170	1.77 E+01	2.00 E-03	18.2
19	TH-230	TRG	04/16/13 12:00		A_Spec	Alpha_048	170	8.49 E+00	3.00 E-03	16.8

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	4.53E+00	7.34E-01	6.53E-02	4.82E+00	93.88	OK		OK	
02	TH-232	MBL	BLANK	pCi/l	1.63E-02	3.53E-02	6.97E-02					OK	OK
03	TH-232	DUP	PZ-302-AI TOT	pCi/l	3.96E-02	7.42E-02	1.36E-01				NA	OK	
04	TH-232	DO	PZ-302-AI TOT	pCi/l	6.34E-02	8.27E-02	1.14E-01					OK	
05	TH-232	TRG	PZ-302-AI DIS	pCi/l	-4.03E-03	4.71E-02	9.88E-02					OK	
06	TH-232	TRG	LR-100 TOT	pCi/l	2.81E-02	4.32E-02	6.42E-02					OK	
07	TH-232	TRG	LR-100 DIS	pCi/l	-1.93E-02	1.16E-01	3.67E-01					OK	
08	TH-232	TRG	D-81 TOT	pCi/l	2.71E-02	5.87E-02	1.16E-01					OK	
09	TH-232	TRG	D-81 DIS	pCi/l	-1.23E-02	7.31E-02	1.73E-01					OK	
10	TH-232	TRG	LR-105 TOT	pCi/l	2.82E-02	4.23E-02	6.86E-02					OK	
11	TH-232	TRG	LR-105 DIS	pCi/l	-6.27E-03	7.33E-02	1.54E-01					OK	
12	TH-232	TRG	PZ-207-AS TOT	pCi/l	9.42E-03	2.88E-02	6.82E-02					OK	
13	TH-232	TRG	PZ-207-AS DIS	pCi/l	2.49E-02	6.00E-02	1.25E-01					OK	
14	TH-232	TRG	LR-103 TOT	pCi/l	-3.54E-02	3.47E-02	1.30E-01					OK	
15	TH-232	TRG	LR-103 DIS	pCi/l	1.62E-02	1.05E-01	2.85E-01					OK	
16	TH-232	TRG	PZ-110-SS TOT	pCi/l	2.32E-02	4.42E-02	8.15E-02					OK	
17	TH-232	TRG	PZ-110-SS DIS	pCi/l	8.48E-02	9.31E-02	1.11E-01					OK	
18	TH-232	TRG	I-62 TOT	pCi/l	4.82E-02	5.33E-02	7.23E-02					OK	
19	TH-232	TRG	I-62 DIS	pCi/l	2.02E-02	4.85E-02	1.01E-01					OK	

	Run	Analysis Code	THISO	1
Eberline Services Work Order	<b>13-04049</b>			
Client	Engineering Management Support, Inc.			

5120

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-THISO-1**

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	TH-232	LCS	04/09/13 00:00	1.00E+00	103.83	0.00	0.00			
02	TH-232	MBL	04/09/13 00:00	1.00E+00	116.25	0.00	0.00			
03	TH-232	DUP	04/03/13 11:45	1.00E+00	92.28	0.00	0.00			
04	TH-232	DO	04/03/13 11:45	1.00E+00	72.61	0.00	0.00			
05	TH-232	TRG	04/03/13 11:45	1.00E+00	65.43	0.00	0.00			
06	TH-232	TRG	04/03/13 13:27	1.00E+00	99.28	0.00	0.00			
07	TH-232	TRG	04/03/13 13:27	1.00E+00	28.68	0.00	0.00			
08	TH-232	TRG	04/03/13 13:40	1.00E+00	66.42	0.00	0.00			
09	TH-232	TRG	04/03/13 13:40	1.00E+00	40.08	0.00	0.00			
10	TH-232	TRG	04/03/13 14:24	1.00E+00	117.43	0.00	0.00			
11	TH-232	TRG	04/03/13 14:24	1.00E+00	39.37	0.00	0.00			
12	TH-232	TRG	04/03/13 15:05	1.00E+00	104.17	0.00	0.00			
13	TH-232	TRG	04/03/13 15:05	1.00E+00	46.43	0.00	0.00			
14	TH-232	TRG	04/03/13 15:30	1.00E+00	97.27	0.00	0.00			
15	TH-232	TRG	04/03/13 15:30	1.00E+00	28.43	0.00	0.00			
16	TH-232	TRG	04/04/13 10:27	1.00E+00	89.67	0.00	0.00			
17	TH-232	TRG	04/04/13 10:27	1.00E+00	63.90	0.00	0.00			
18	TH-232	TRG	04/04/13 10:42	1.00E+00	120.71	0.00	0.00			
19	TH-232	TRG	04/04/13 10:42	1.00E+00	64.95	0.00	0.00			

Run	1	Analysis Code	THISO
Client	Engineering Management Support, Inc.		

2120

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	04/16/13 11:59		A_Spec	Alpha_013	170.02	3.32 E+02	2.00 E-03	18.7
02	TH-232	MBL	04/16/13 11:59		A_Spec	Alpha_014	170	1.32 E+00	4.00 E-03	18.5
03	TH-232	DUP	04/16/13 11:59		A_Spec	Alpha_018	170	2.45 E+00	1.50 E-02	17.8
04	TH-232	DO	04/16/13 11:59		A_Spec	Alpha_022	170.02	2.66 E+00	2.00 E-03	15.3
05	TH-232	TRG	04/16/13 11:59		A_Spec	Alpha_024	170	-1.70 E-01	1.00 E-03	17.1
06	TH-232	TRG	04/16/13 11:59		A_Spec	Alpha_025	170.02	1.83 E+00	1.00 E-03	17.4
07	TH-232	TRG	04/16/13 11:59		A_Spec	Alpha_027	170	-3.60 E-01	8.00 E-03	17.3
08	TH-232	TRG	04/16/13 11:59		A_Spec	Alpha_029	170	1.32 E+00	4.00 E-03	19.5
09	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_033	170	-3.40 E-01	2.00 E-03	18.2
10	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_034	170	2.32 E+00	4.00 E-03	18.6
11	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_035	170	-1.70 E-01	1.00 E-03	18.3
12	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_037	170	6.60 E-01	2.00 E-03	17.8
13	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_040	170	8.30 E-01	1.00 E-03	19
14	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_041	170	-2.57 E+00	2.10 E-02	19.8
15	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_042	170	3.20 E-01	4.00 E-03	18.5
16	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_044	170	1.49 E+00	3.00 E-03	19
17	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_046	170	3.66 E+00	2.00 E-03	17.9
18	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_047	170	4.00 E+00	0.00 E+00	18.2
19	TH-232	TRG	04/16/13 12:00		A_Spec	Alpha_048	170	8.30 E-01	1.00 E-03	16.8



**Run**  
1

**Analysis Code**  
THISO

**Eberline Services Work Order**  
13-04049

**Client**  
Engineering Management Support, Inc.

*Handwritten signature*

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*
1159	01 17 LCS	LCS	04/09/13 00:00	1.0000	0.4724	10.6134		0.00		
	02 14 MBL	BLANK	04/09/13 00:00	1.0000	0.2355	5.2910		0.00		
	03 18 DUP	PZ-302-AI TOT	04/03/13 11:45	1.0000	0.2345	5.2685		0.00		
	04 DO	PZ-302-AI TOT	04/03/13 11:45	1.0000	0.2342	5.2618		0.00		
1155	05 TRG	PZ-302-AI DIS	04/03/13 11:45	1.0000	0.2336	5.2483		0.00		
	06 TRG	LR-100 TOT	04/03/13 13:27	1.0000	0.2327	5.2281		0.00		
	07 TRG	LR-100 DIS	04/03/13 13:27	1.0000	0.2315	5.2011		0.00		
	08 29 TRG	D-81 TOT	04/03/13 13:40	1.0000	0.2313	5.1966		0.00		
	09 77 TRG	D-81 DIS	04/03/13 13:40	1.0000	0.2321	5.2146		0.00		
	10 TRG	LR-105 TOT	04/03/13 14:24	1.0000	0.2329	5.2326		0.00		
	11 TRG	LR-105 DIS	04/03/13 14:24	1.0000	0.2319	5.2101		0.00		
	12 TRG	PZ-207-AS TOT	04/03/13 15:05	1.0000	0.2312	5.1944		0.00		
1200	13 TRG	PZ-207-AS DIS	04/03/13 15:05	1.0000	0.2305	5.1786		0.00		
	14 TRG	LR-103 TOT	04/03/13 15:30	1.0000	0.2315	5.2011		0.00		
	15 TRG	LR-103 DIS	04/03/13 15:30	1.0000	0.2302	5.1719		0.00		
	16 TRG	PZ-110-SS TOT	04/04/13 10:27	1.0000	0.2298	5.1629		0.00		
	17 TRG	PZ-110-SS DIS	04/04/13 10:27	1.0000	0.2309	5.1876		0.00		
	18 TRG	I-62 TOT	04/04/13 10:42	1.0000	0.2306	5.1809		0.00		
	19 48 TRG	I-62 DIS	04/04/13 10:42	1.0000	0.2276	5.1135		0.00		

### Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code			Date	Technician				Technician Initials		Witness Initials	
<b>13-04049</b>					<b>1</b>	<b>ThISO</b>			<b>4/11/2013 11:00</b>	<b>JBARNARD</b>							
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	4/11/2013	0.100	0.1034				4.82	0.174	0.00	0.000	0.00	0.000	0.00	0.000	
Th-230	Th-1b	23.525	4/11/2013	0.500	0.5166				5.47	0.148	0.00	0.000	0.00	0.000	0.00	0.000	
Th-232	Th-8b	103.560	4/11/2013	0.100	0.1034				4.82	0.174	0.00	0.000	0.00	0.000	0.00	0.000	

Tracers							Balance Printer Tapes									
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Tracer					LCS				
01	Th-229	Th-18a	22.467	4/11/2013	0.4724	0.2200										
02	Th-229	Th-18a	22.467	4/11/2013	0.2355	0.2200	0.4724 g									
03	Th-229	Th-18a	22.467	4/11/2013	0.2345	0.2200	0.2355 g					0.5166 g				
04	Th-229	Th-18a	22.467	4/11/2013	0.2342	0.2200	-0.2345 g					0.1034 g				
05	Th-229	Th-18a	22.467	4/11/2013	0.2336	0.2200	-0.2342 g									
06	Th-229	Th-18a	22.467	4/11/2013	0.2327	0.2200	-0.2336 g									
07	Th-229	Th-18a	22.467	4/11/2013	0.2315	0.2200	-0.2327 g									
08	Th-229	Th-18a	22.467	4/11/2013	0.2313	0.2200										
09	Th-229	Th-18a	22.467	4/11/2013	0.2321	0.2200	-0.2315 g									
10	Th-229	Th-18a	22.467	4/11/2013	0.2329	0.2200	-0.2313 g									
11	Th-229	Th-18a	22.467	4/11/2013	0.2319	0.2200	-0.2321 g									
12	Th-229	Th-18a	22.467	4/11/2013	0.2312	0.2200	-0.2329 g									
13	Th-229	Th-18a	22.467	4/11/2013	0.2305	0.2200	-0.2319 g									
14	Th-229	Th-18a	22.467	4/11/2013	0.2315	0.2200	-0.2312 g									
15	Th-229	Th-18a	22.467	4/11/2013	0.2302	0.2200	-0.2305 g									
16	Th-229	Th-18a	22.467	4/11/2013	0.2298	0.2200	-0.2315 g									
17	Th-229	Th-18a	22.467	4/11/2013	0.2309	0.2200	-0.2298 g									
18	Th-229	Th-18a	22.467	4/11/2013	0.2306	0.2200	-0.2302 g									
19	Th-229	Th-18a	22.467	4/11/2013	0.2276	0.2200	-0.2306 g									
							-0.2276 g									

Matrix Spike

0217



# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-04049</b>	<b>1</b>	<b>ThISO</b>	<b>liters</b>	<b>4/30/2013</b>	<b>JBARNARD</b>

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.0000E+00	1.0000E+00				
03	PZ-302-AI TOT	DUP					1.0000E+00	1.0000E+00				
04	PZ-302-AI TOT	DO					1.0000E+00	1.0000E+00				
05	PZ-302-AI DIS	TRG					1.0000E+00	1.0000E+00				
06	LR-100 TOT	TRG					1.0000E+00	1.0000E+00				
07	LR-100 DIS	TRG					1.0000E+00	1.0000E+00				
08	D-81 TOT	TRG					1.0000E+00	1.0000E+00				
09	D-81 DIS	TRG					1.0000E+00	1.0000E+00				
10	LR-105 TOT	TRG					1.0000E+00	1.0000E+00				
11	LR-105 DIS	TRG					1.0000E+00	1.0000E+00				
12	PZ-207-AS TOT	TRG					1.0000E+00	1.0000E+00				
13	PZ-207-AS DIS	TRG					1.0000E+00	1.0000E+00				
14	LR-103 TOT	TRG					1.0000E+00	1.0000E+00				
15	LR-103 DIS	TRG					1.0000E+00	1.0000E+00				
16	PZ-110-SS TOT	TRG					1.0000E+00	1.0000E+00				
17	PZ-110-SS DIS	TRG					1.0000E+00	1.0000E+00				
18	I-62 TOT	TRG					1.0000E+00	1.0000E+00				
19	I-62 DIS	TRG					1.0000E+00	1.0000E+00				

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

*JB*

Date: \_\_\_\_\_

*4/11/13*

143  
4/16/13



Sample Description: SPIKE  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 01  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_013  
 Chamber Serial Number:  
 Detector Serial Number: 13  
 Env. Background: System Bkgd 54574  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/16/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:01 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.472 mL  
 Effective Efficiency: 0.1941 +/- 0.0120  
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM  
 Chem. Recovery Factor: 1.0383 +/- 0.0670

Control Certificate Name: NatTh\_Th-8  
 Chem. Recov. of Control: TH-232 0.938766 +/- 0.082610  
 Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.800	14.15	53.91	0.85	0.00E+000	7.1
TH-228	5.380	364.43	10.33	3.57	0.00E+000	11.2
TH-229 T	4.879	350.15	10.49	0.85	0.00E+000	15.5
TH-230	4.642	342.32	10.61	0.68	0.00E+000	10.5
TH-232	3.969	331.66	10.77	0.34	0.00E+000	7.1

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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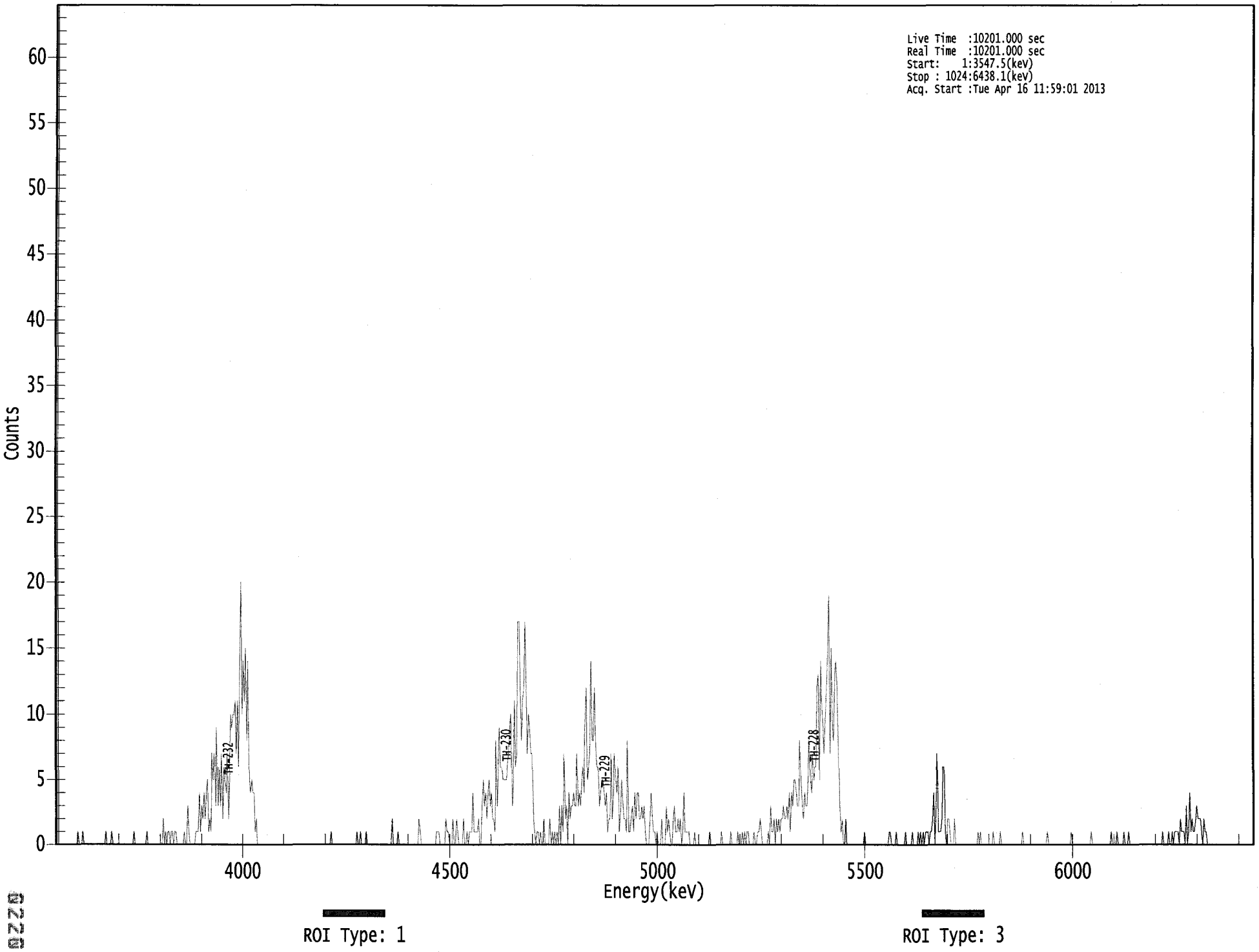
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.987	5850.00*	1.98E-001 +/- 1.09E-001	8.38E-002 +/- 1.02E-002
TH-228	0.998	5400.00*	4.98E+000 +/- 7.93E-001	1.29E-001 +/- 1.56E-002
TH-229	1.000	4872.00*	4.80E+000 +/- 5.82E-001	8.21E-002 +/- 9.96E-003
TH-230	0.995	4672.00*	4.68E+000 +/- 7.54E-001	7.72E-002 +/- 9.35E-003
TH-232	0.996	3997.00*	4.53E+000 +/- 7.34E-001	6.53E-002 +/- 7.91E-003

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

000055573.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3547.5(kev)  
Stop : 1024:6438.1(kev)  
Acq. Start :Tue Apr 16 11:59:01 2013



0220

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

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	1	0	0	0	1
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	1	0	0	0	0
49:	1	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	1	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	2	0	1	0
97:	1	1	0	1	1	0	1	1
105:	0	0	0	0	0	0	1	0
113:	0	3	1	0	0	0	0	0
121:	1	1	1	4	1	3	2	4
129:	2	4	5	1	2	1	7	5
137:	7	3	9	3	6	3	7	2
145:	6	5	4	7	2	5	10	9
153:	10	10	11	7	11	6	14	20
161:	10	14	11	15	8	14	5	4
169:	5	4	4	1	2	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	1	0	0	1	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:	2	0	0	0	0	1	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	2
313:	1	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	1	1
329:	1	0	0	0	0	0	2	1
337:	1	0	0	0	2	0	0	2
345:	1	0	0	0	0	2	0	0
353:	1	0	1	1	1	4	1	1
361:	1	1	2	0	0	3	5	3

369: 4 2 4 5 3 4 2 2

Sample Title: 01

Channel	1	2	3	4	5	6	7	8	9
377:	1	8	3	6	9	6	6	5	
385:	5	5	5	6	7	9	10	3	
393:	5	11	6	7	17	17	12	8	
401:	11	12	17	12	7	10	9	7	
409:	7	2	1	0	1	1	0	1	
417:	0	0	2	0	0	0	0	2	
425:	0	1	0	1	0	1	0	3	
433:	0	3	1	7	2	3	0	4	
441:	2	3	3	4	3	3	7	3	
449:	4	3	5	6	4	9	12	5	
457:	6	7	14	8	8	12	8	6	
465:	6	3	4	5	5	4	3	4	
473:	1	2	2	7	2	4	7	5	
481:	4	6	1	3	5	3	2	2	
489:	1	8	1	1	2	3	1	4	
497:	2	4	4	2	2	3	2	3	
505:	1	0	0	0	2	4	2	1	
513:	1	0	1	0	0	0	2	0	
521:	0	0	3	1	2	1	0	0	
529:	2	3	1	1	2	1	2	0	
537:	1	4	1	1	1	1	0	0	
545:	0	0	1	0	0	0	0	0	
553:	0	0	0	0	0	0	0	1	
561:	0	0	0	0	0	0	0	0	
569:	0	1	0	0	0	0	0	0	
577:	0	1	0	0	0	0	0	1	
585:	0	0	0	1	0	1	0	1	
593:	1	0	0	0	0	1	0	0	
601:	1	1	2	1	0	0	0	0	
609:	0	1	0	3	1	1	2	0	
617:	2	1	2	1	2	2	3	2	
625:	2	3	2	4	1	4	3	5	
633:	5	4	3	3	8	5	3	2	
641:	4	3	3	5	8	5	4	7	
649:	5	6	6	12	13	5	14	11	
657:	9	7	10	12	15	19	7	15	
665:	9	8	13	14	12	8	3	1	
673:	2	0	0	2	0	0	0	0	
681:	0	0	0	0	0	0	0	0	
689:	0	0	0	1	0	0	0	0	
697:	0	0	0	0	0	0	0	0	
705:	0	0	0	0	0	0	0	0	
713:	1	1	0	0	0	0	1	0	
721:	0	0	0	0	0	0	1	0	
729:	0	0	0	0	1	0	0	0	
737:	0	1	0	1	0	1	0	1	
745:	1	1	0	1	1	2	4	0	
753:	3	7	1	1	1	2	6	6	
761:	1	0	2	2	1	0	0	0	
769:	2	0	0	0	0	0	0	0	
777:	0	0	0	0	0	0	0	0	
785:	0	0	0	0	1	0	1	0	
793:	0	0	0	0	0	0	0	0	

801: 0 1 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	1	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	1
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	1	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	1	0	0
905:	0	0	1	0	0	0	0	0
913:	1	0	0	0	1	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	1	0	0	0	0	1	0
953:	0	1	0	1	1	1	1	0
961:	2	1	1	1	0	3	0	1
969:	4	1	2	1	1	2	3	2
977:	2	2	1	0	2	1	1	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KBS  
4/16/13

# Apex-Alpha™

Sample Description: BLANK  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 02  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_014  
 Chamber Serial Number:  
 Detector Serial Number: 14  
 Env. Background: System Bkgd 54575  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/16/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:03 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.235 mL  
 Effective Efficiency: 0.2146 +/- 0.0169  
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM  
 Chem. Recovery Factor: 1.1625 +/- 0.0939

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	5.766	2.64	152.72	1.36	0.00E+000	2.9
TH-228	5.259	7.58	92.33	4.42	0.00E+000	3.7
TH-229 T	4.873	192.98	14.15	1.02	0.00E+000	19.8
TH-230	4.645	11.62	64.02	2.38	0.00E+000	2.9
TH-232	4.006	1.32	215.97	0.68	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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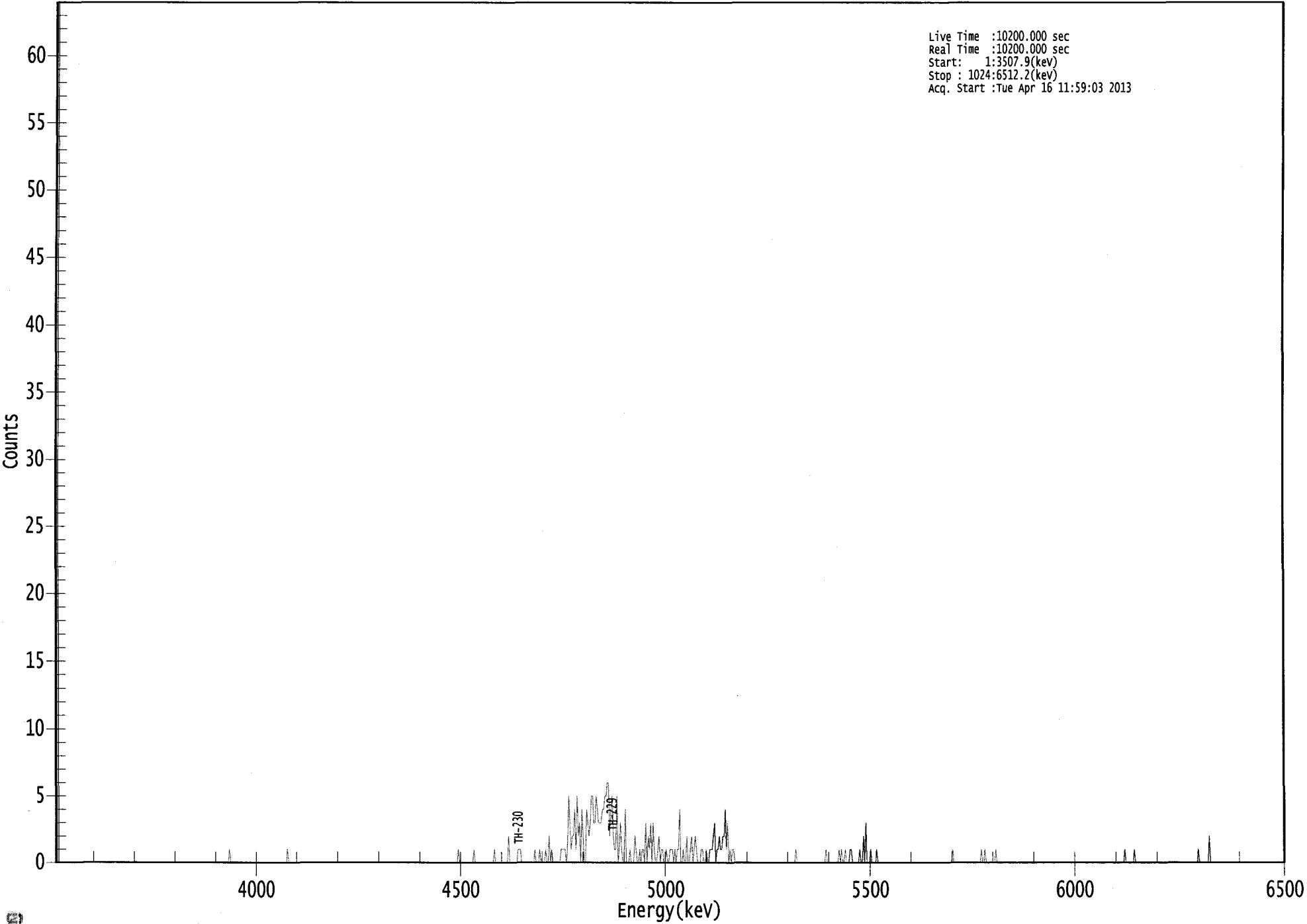
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.963	5850.00*	3.34E-002 +/- 5.13E-002	8.68E-002 +/- 1.34E-002
TH-228	0.901	5400.00*	9.37E-002 +/- 8.77E-002	1.26E-001 +/- 1.94E-002
TH-229	1.000	4872.00*	2.39E+000 +/- 3.69E-001	7.82E-002 +/- 1.20E-002
TH-230	0.996	4672.00*	1.44E-001 +/- 9.47E-002	1.01E-001 +/- 1.56E-002
TH-232	1.000	3997.00*	1.63E-002 +/- 3.53E-002	6.97E-002 +/- 1.07E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055574.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3507.9(kev)  
Stop : 1024:6512.2(kev)  
Acq. Start :Tue Apr 16 11:59:03 2013



5225

ROI Type: 1

ROI Type: 3



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

Sample Title: 02

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	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	1	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	1	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	1	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	1	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 02

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

801: 0 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	1	0	0	0	0	0
897:	0	0	1	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	1
953:	0	0	0	0	0	0	0	0
961:	2	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

7018  
4/16/13

# Apex-Alpha™

Sample Description: PZ-302-AI TOT-DUP  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 03  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_018  
 Chamber Serial Number:  
 Detector Serial Number: 18  
 Env. Background: System Bkgd 54576  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:35 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.235 mL  
 Effective Efficiency: 0.1639 +/- 0.0145  
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM  
 Chem. Recovery Factor: 0.9228 +/- 0.0835

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.788	-0.72	427.17	2.72	0.00E+000	3.1
TH-228	5.334	5.43	111.88	3.57	0.00E+000	4.7
TH-229 T	4.854	146.81	16.25	1.19	0.00E+000	7.8
TH-230	4.661	10.81	63.34	1.19	0.00E+000	3.9
TH-232	4.008	2.45	186.48	2.55	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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

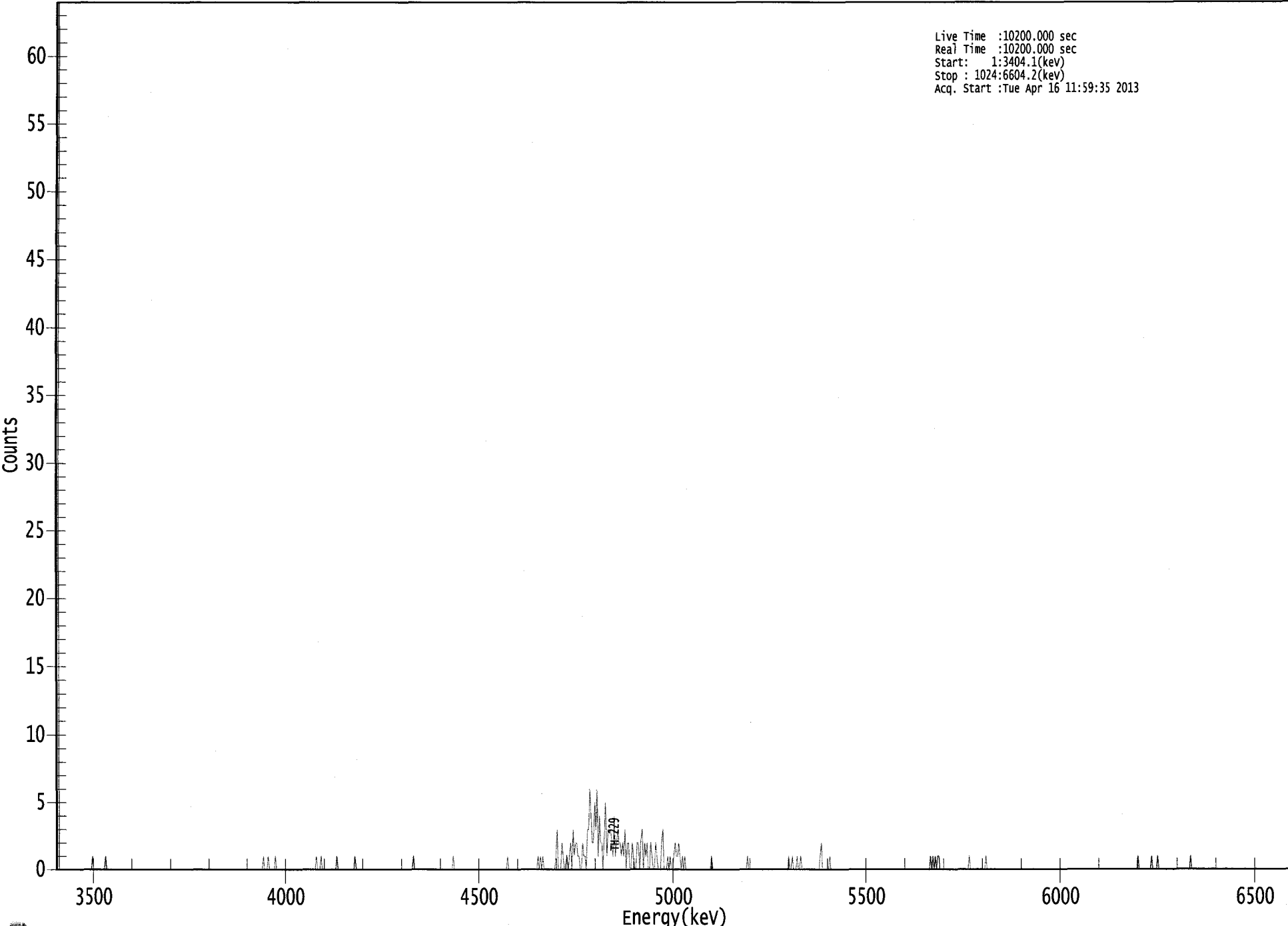
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.980	5850.00*	-1.20E-002 +/- 5.11E-002	1.42E-001 +/- 2.47E-002
TH-228	0.978	5400.00*	8.90E-002 +/- 1.01E-001	1.55E-001 +/- 2.68E-002
TH-229	0.998	4872.00*	2.38E+000 +/- 4.14E-001	1.07E-001 +/- 1.86E-002
TH-230	0.999	4672.00*	1.75E-001 +/- 1.15E-001	1.07E-001 +/- 1.85E-002
TH-232	0.999	3997.00*	3.96E-002 +/- 7.42E-002	1.36E-001 +/- 2.35E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055575.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3404.1(kev)  
Stop : 1024:6604.2(kev)  
Acq. Start :Tue Apr 16 11:59:35 2013



0230

ROI Type: 1

ROI Type: 3

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

Sample Title: 03

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	1	0
33:	0	0	0	0	0	0	0	0
41:	0	1	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	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:	1	0	0	0	0	0	1	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	1	0	0	0	1	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:	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	1	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	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: 0 0 0 0 0 0 1 0

Sample Title: 03

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

801: 0 0 0 0 0 0 0 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	1	0
897:	0	0	0	0	0	0	0	0
905:	0	1	0	0	0	0	1	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	1	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  
4/16/13

# Apex-Alpha™

Sample Description: PZ-302-AI TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 04  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_022  
 Chamber Serial Number:  
 Detector Serial Number: 22  
 Env. Background: System Bkgd 54577  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:36 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.234 mL  
 Effective Efficiency: 0.1112 +/- 0.0118  
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM  
 Chem. Recovery Factor: 0.7261 +/- 0.0781

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.796	-1.04	218.68	2.04	0.00E+000	3.1
TH-228	5.310	-1.55	151.38	2.55	0.00E+000	3.1
TH-229 T	4.873	99.47	19.83	1.53	0.00E+000	4.7
TH-230	4.611	10.32	63.32	0.68	0.00E+000	3.1
TH-232	4.016	2.66	128.85	0.34	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

-----  
 NUCLIDE ANALYSIS RESULTS  
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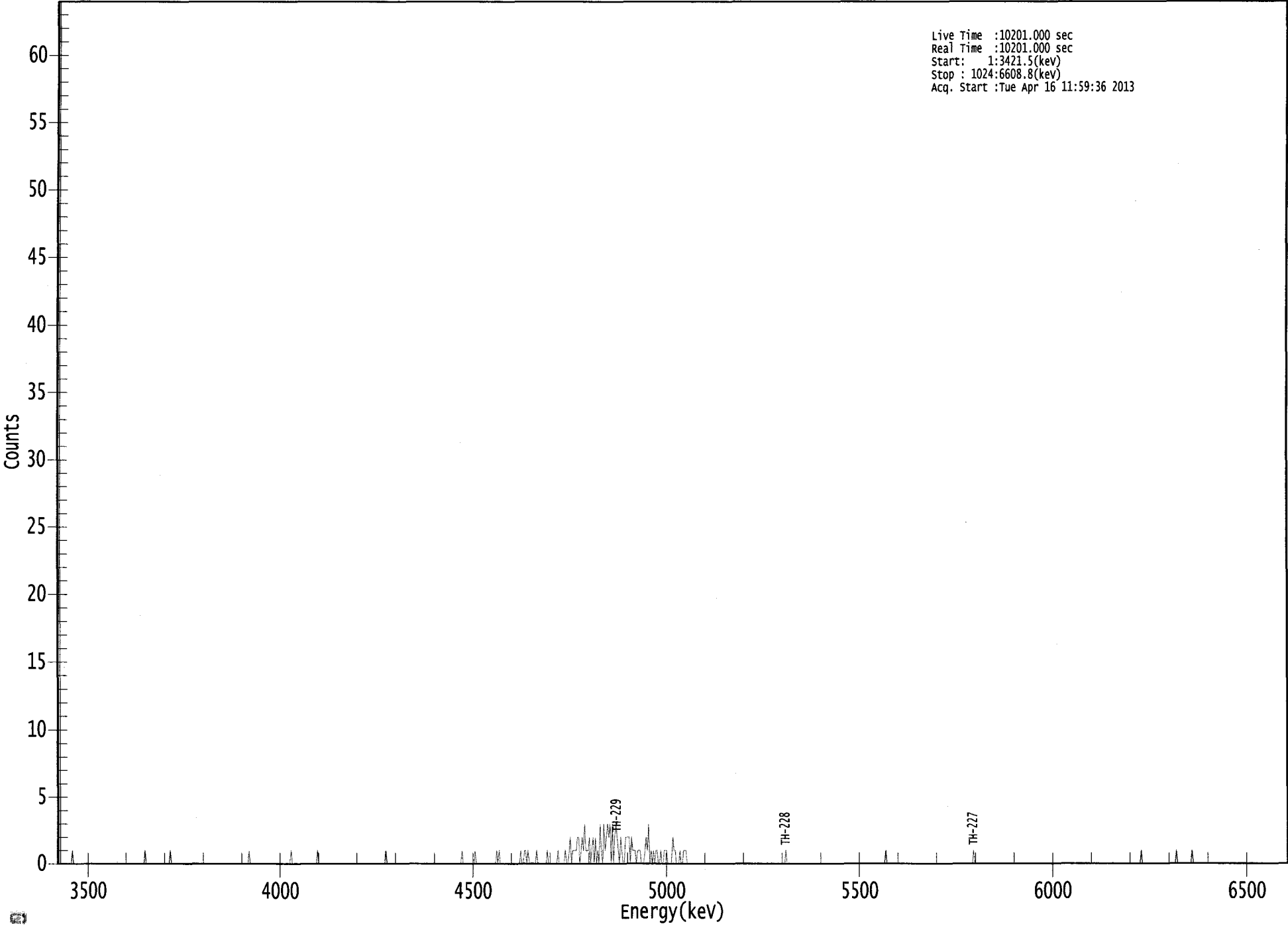
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.985	5850.00*	-2.54E-002 +/- 5.59E-002	1.91E-001 +/- 3.95E-002
TH-228	0.958	5400.00*	-3.74E-002 +/- 5.72E-002	2.03E-001 +/- 4.20E-002
TH-229	1.000	4872.00*	2.38E+000 +/- 4.94E-001	1.70E-001 +/- 3.53E-002
TH-230	0.981	4672.00*	2.46E-001 +/- 1.64E-001	1.35E-001 +/- 2.79E-002
TH-232	0.998	3997.00*	6.34E-002 +/- 8.27E-002	1.14E-001 +/- 2.36E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055576.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start : 1:3421.5(kev)  
Stop : 1024:6608.8(kev)  
Acq. Start :Tue Apr 16 11:59:36 2013



000055576

ROI Type: 1

ROI Type: 3

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

Sample Title: 04

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0	0
9:	0	0	0	0	1	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	1	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	1	0
97:	0	0	0	0	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:	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	1	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	1	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	1	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	1	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0
353:	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	1	0

369: 1 0 0 0 0 0 0 0

Sample Title: 04

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

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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

193  
4/16/13

# Apex-Alpha™

Sample Description: PZ-302-AI DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 05  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_024  
 Chamber Serial Number:  
 Detector Serial Number: 24  
 Env. Background: System Bkgd 54578  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:37 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.234 mL  
 Effective Efficiency: 0.1119 +/- 0.0117  
 Counting Efficiency: 0.1710 +/- 0.0032 on 12/15/2012 2:02:15 PM  
 Chem. Recovery Factor: 0.6543 +/- 0.0697

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	5.986	4.13	119.29	1.87	0.00E+000	3.1
TH-228	5.331	3.47	129.55	1.53	0.00E+000	3.1
TH-229 T	4.844	99.83	19.64	0.17	0.00E+000	3.1
TH-230	4.605	10.96	65.33	2.04	0.00E+000	3.1
TH-232	3.947	-0.17	1169.4	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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

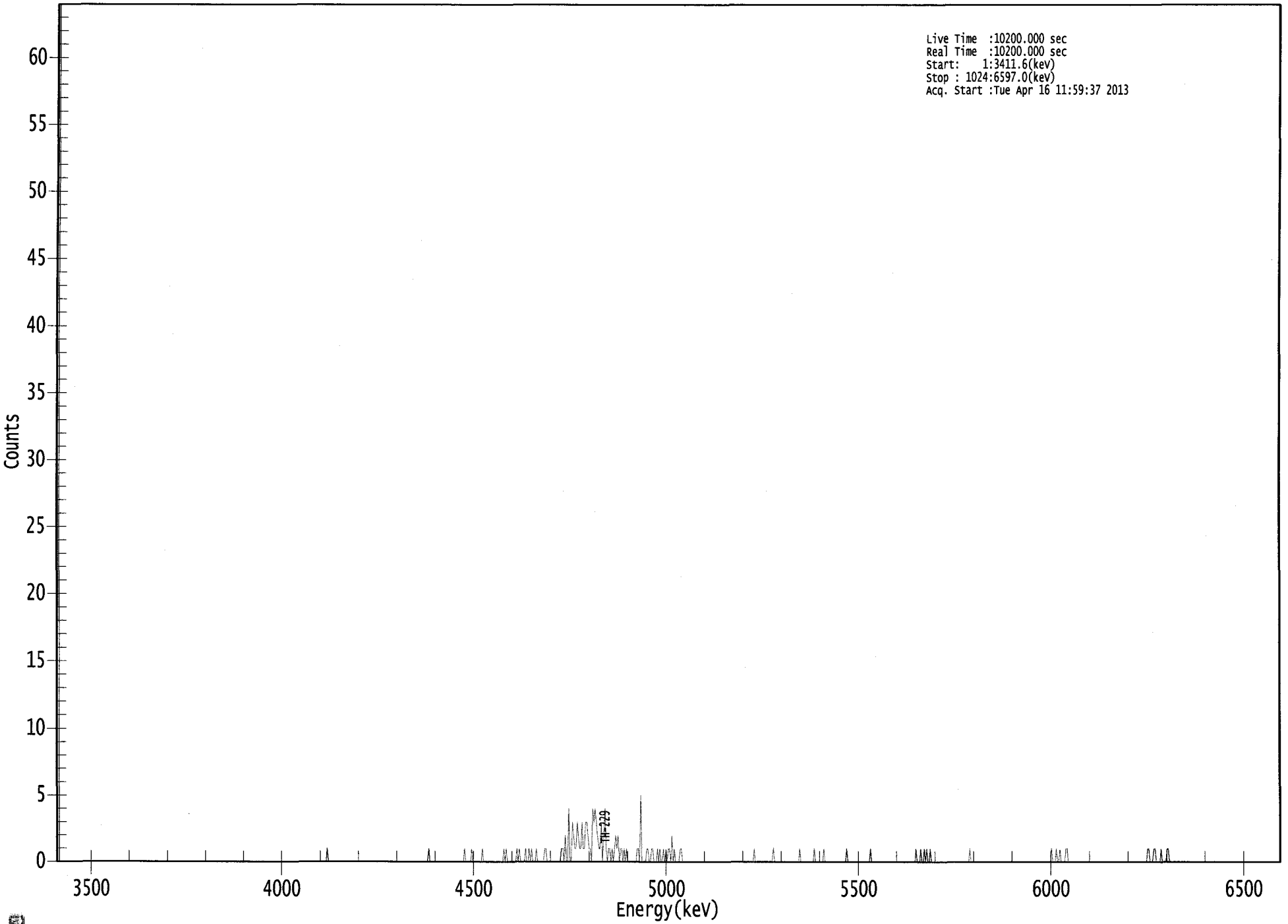
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.908	5850.00*	1.00E-001 +/- 1.22E-001	1.84E-001 +/- 3.78E-002
TH-228	0.975	5400.00*	8.33E-002 +/- 1.09E-001	1.71E-001 +/- 3.51E-002
TH-229	0.996	4872.00*	2.38E+000 +/- 4.88E-001	9.93E-002 +/- 2.04E-002
TH-230	0.977	4672.00*	2.60E-001 +/- 1.78E-001	1.85E-001 +/- 3.80E-002
TH-232	0.987	3997.00*	-4.03E-003 +/- 4.71E-002	9.88E-002 +/- 2.03E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

000055577.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3411.6(kev)  
Stop : 1024:6597.0(kev)  
Acq. Start :Tue Apr 16 11:59:37 2013



0240

ROI Type: 1

ROI Type: 3

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

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



369: 0 0 0 0 0 0 0 0 1

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0

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

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4/16/13

# Apex-Alpha™

Sample Description: LR-100 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 06  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_025  
 Chamber Serial Number:  
 Detector Serial Number: 25  
 Env. Background: System Bkgd 54579  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:38 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.233 mL  
 Effective Efficiency: 0.1723 +/- 0.0150  
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM  
 Chem. Recovery Factor: 0.9928 +/- 0.0881

Peak Match Tolerance: 0.175 MeV

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 -----  
 PEAK AREA REPORT  
 -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.888	1.47	240.77	1.53	0.00E+000	6.3
TH-228	5.298	-2.04	111.49	2.04	0.00E+000	0.0
TH-229 T	4.877	153.15	15.89	0.85	0.00E+000	6.5
TH-230	4.643	9.15	68.23	0.85	0.00E+000	4.7
TH-232	3.869	1.83	152.56	0.17	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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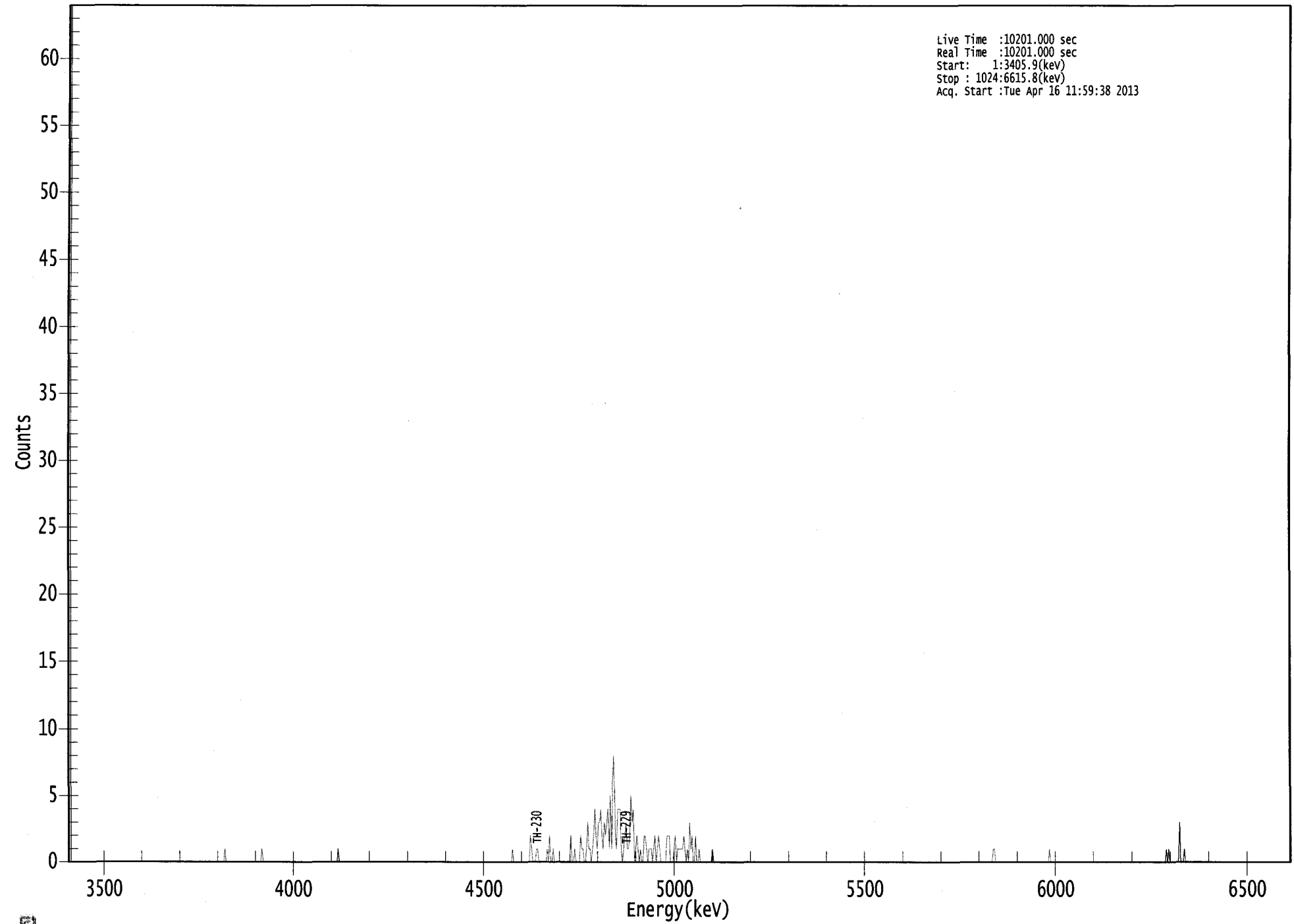
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.993	5850.00*	2.32E-002 +/- 5.60E-002	1.12E-001 +/- 1.91E-002
TH-228	0.947	5400.00*	-3.18E-002 +/- 3.59E-002	1.21E-001 +/- 2.07E-002
TH-229	1.000	4872.00*	2.37E+000 +/- 4.03E-001	9.25E-002 +/- 1.57E-002
TH-230	0.996	4672.00*	1.41E-001 +/- 9.91E-002	9.22E-002 +/- 1.57E-002
TH-232	0.918	3997.00*	2.81E-002 +/- 4.32E-002	6.42E-002 +/- 1.09E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

0000055578.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3405.9(keV)  
Stop : 1024:6615.8(keV)  
Acq. Start :Tue Apr 16 11:59:38 2013



ROI Type: 1

ROI Type: 3

5720

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 06

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 1 0 0

Sample Title: 06

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

801: 0 0 0 0 0 0 0 0

Sample Title: 06

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	1	0
825:	0	0	0	0	0	0	0	0
833:	0	0	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	1
921:	0	1	0	0	0	0	0	0
929:	0	0	3	0	0	0	1	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KS  
4/16/13

# Apex-Alpha™

Sample Description: LR-100 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 07  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_027  
 Chamber Serial Number:  
 Detector Serial Number: 27  
 Env. Background: System Bkgd 54580  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:39 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.0496 +/- 0.0078  
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM  
 Chem. Recovery Factor: 0.2868 +/- 0.0452

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.769	1.96	208.49	2.04	0.00E+000	3.2
TH-228	5.314	2.47	163.78	1.53	0.00E+000	3.2
TH-229 T	4.878	43.81	30.08	1.19	0.00E+000	4.8
TH-230	4.677	5.15	94.34	0.85	0.00E+000	3.2
TH-232	4.039	-0.36	604.11	1.36	0.00E+000	3.2

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.966	5850.00*	1.08E-001 +/- 2.27E-001	4.28E-001 +/- 1.31E-001
TH-228	0.962	5400.00*	1.34E-001 +/- 2.23E-001	3.85E-001 +/- 1.18E-001
TH-229	1.000	4872.00*	2.35E+000 +/- 7.22E-001	3.54E-001 +/- 1.09E-001
TH-230	1.000	4672.00*	2.76E-001 +/- 2.74E-001	3.21E-001 +/- 9.84E-002
TH-232	0.991	3997.00*	-1.93E-002 +/- 1.16E-001	3.67E-001 +/- 1.13E-001

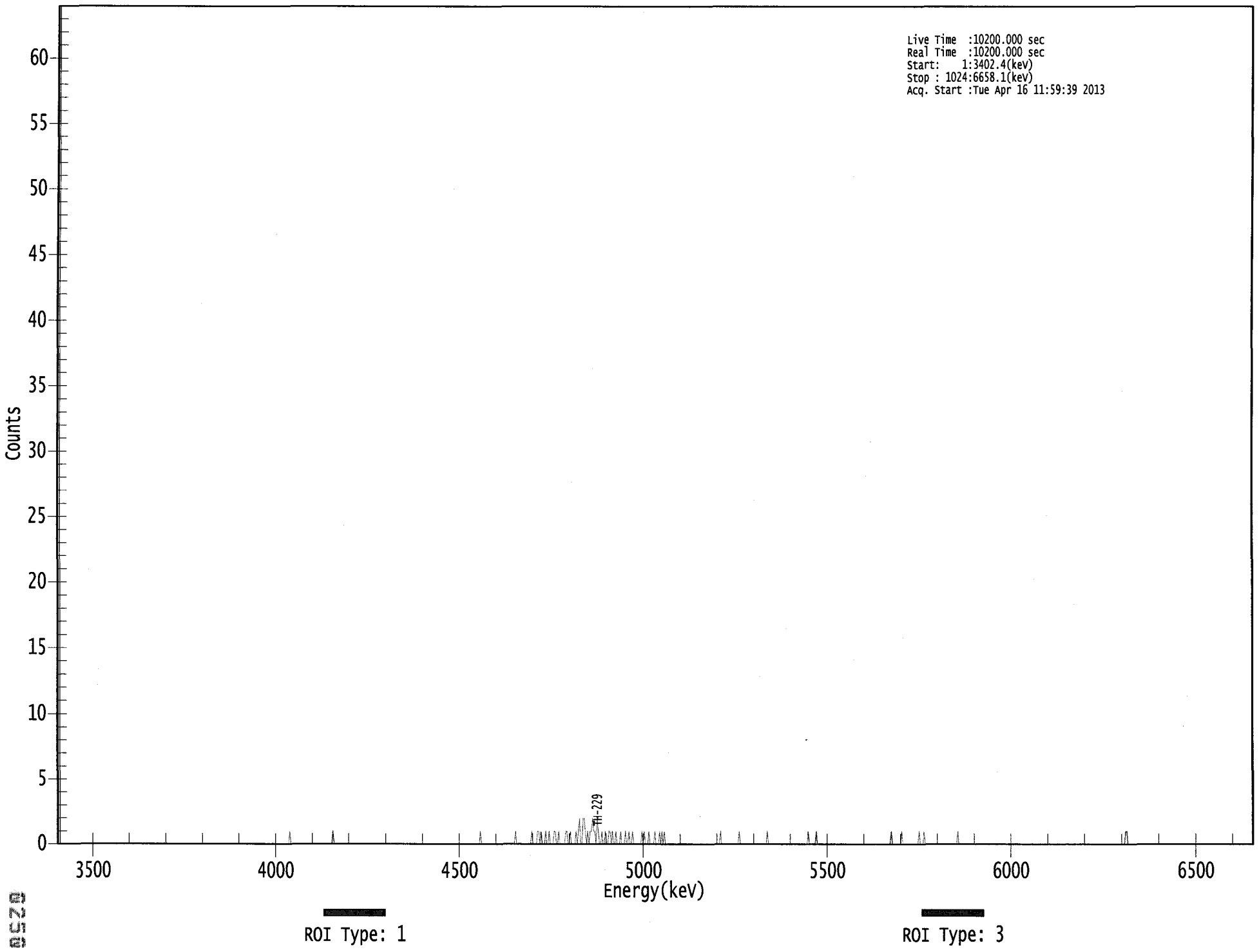
AG  
4/17/13

US EPA ARCHIVE DOCUMENT



000055579.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3402.4(keV)  
Stop : 1024:6658.1(keV)  
Acq. Start :Tue Apr 16 11:59:39 2013



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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0

Sample Title: 07

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

801: 0 0 0 0 0 0 0 0

Sample Title: 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	1	1	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	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

1045  
4/16/13

# Apex-Alpha™

Sample Description: D-81 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 08  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_029  
 Chamber Serial Number:  
 Detector Serial Number: 29  
 Env. Background: System Bkgd 54581  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 11:59:40 AM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.1292 +/- 0.0128  
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM  
 Chem. Recovery Factor: 0.6642 +/- 0.0669

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.802	1.81	193.78	1.19	0.00E+000	3.1
TH-228	5.390	2.13	191.21	1.87	0.00E+000	3.1
TH-229 T	4.870	114.15	18.42	0.85	0.00E+000	4.5
TH-230	4.649	6.49	80.40	0.51	0.00E+000	3.1
TH-232	3.938	1.32	215.97	0.68	0.00E+000	3.1

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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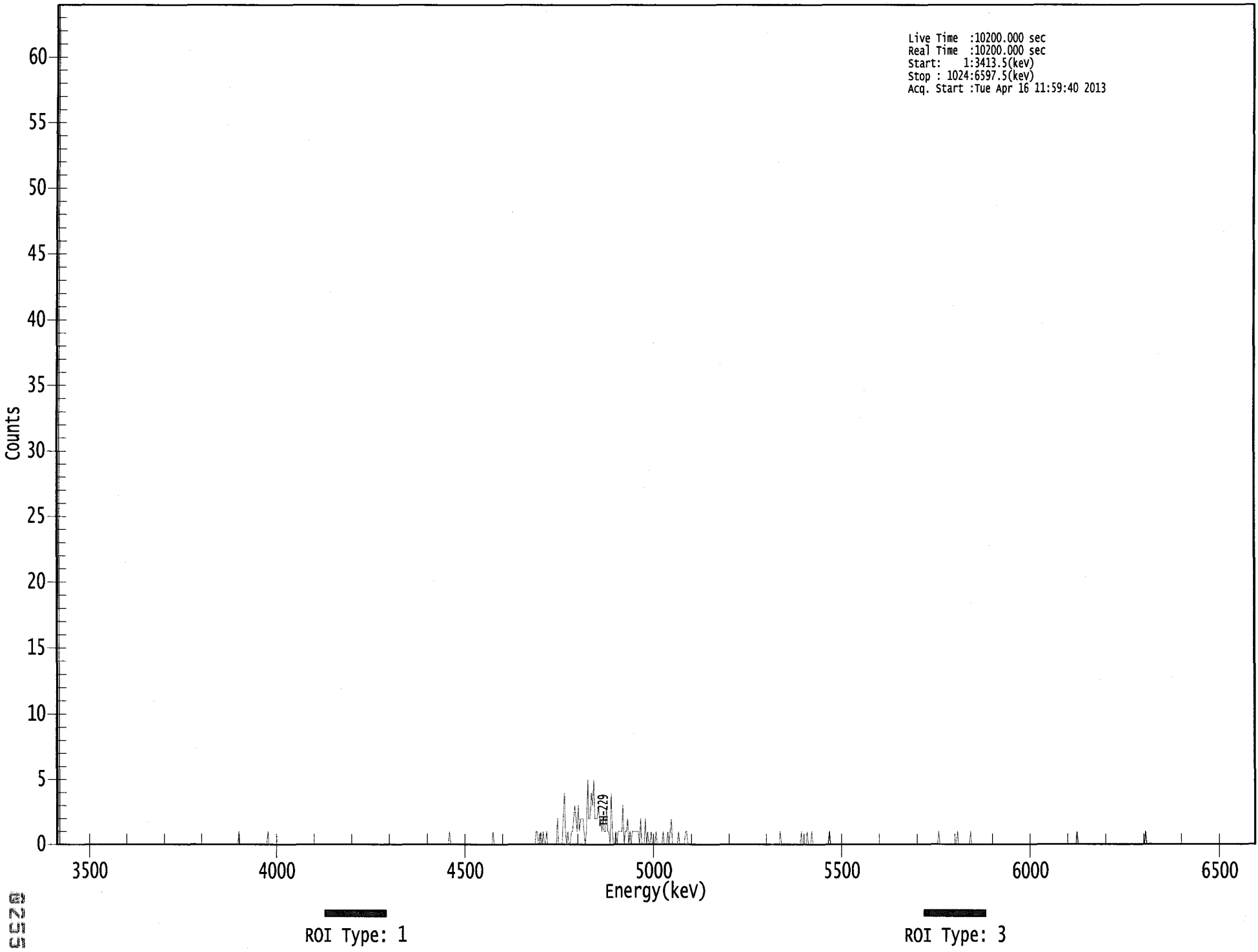
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.988	5850.00*	3.81E-002 +/- 7.42E-002	1.39E-001 +/- 2.69E-002
TH-228	0.999	5400.00*	4.43E-002 +/- 8.51E-002	1.57E-001 +/- 3.05E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 4.56E-001	1.23E-001 +/- 2.39E-002
TH-230	0.997	4672.00*	1.33E-001 +/- 1.10E-001	1.08E-001 +/- 2.09E-002
TH-232	0.982	3997.00*	2.71E-002 +/- 5.87E-002	1.16E-001 +/- 2.24E-002

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4/17/13

US EPA ARCHIVE DOCUMENT

0000055580.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3413.5(kev)  
Stop : 1024:6597.5(kev)  
Acq. Start :Tue Apr 16 11:59:40 2013



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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 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	1	1	0	0	1	0
417:	1	0	0	1	0	0	0	0
425:	0	0	0	0	2	0	0	0
433:	0	2	4	1	0	1	0	0
441:	1	1	2	3	2	1	3	1
449:	2	2	2	1	0	1	5	2
457:	2	4	3	5	2	2	2	3
465:	2	2	1	2	1	1	3	1
473:	1	0	4	1	0	0	1	0
481:	1	1	1	1	3	0	1	1
489:	2	0	1	0	1	1	1	1
497:	1	1	0	2	0	0	0	2
505:	0	1	0	0	1	0	0	0
513:	1	0	0	0	0	0	1	0
521:	0	0	1	0	1	2	0	0
529:	0	0	0	1	0	0	0	0
537:	0	1	1	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	1	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	0	1	0	0	0	1	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	1	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	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	1	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	1	0	0	0	0	0	0
777:	0	0	0	0	1	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0



801: 0 0 0 0 0 0 0 0

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

KCS  
4/16/13

# Apex-Alpha™

Sample Description: D-81 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 09  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_033  
 Chamber Serial Number: 04026479A  
 Detector Serial Number: 91132  
 Env. Background: System Bkgd 54582  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:09 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.232 mL  
 Effective Efficiency: 0.0731 +/- 0.0094  
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM  
 Chem. Recovery Factor: 0.4008 +/- 0.0519

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.790	5.83	82.55	0.17	0.00E+000	3.0
TH-228	5.382	8.00	73.50	0.00	0.00E+000	3.0
TH-229 T	4.872	64.83	24.38	0.17	0.00E+000	3.7
TH-230	4.605	2.83	120.53	0.17	0.00E+000	3.0
TH-232	3.947	-0.34	592.90	0.34	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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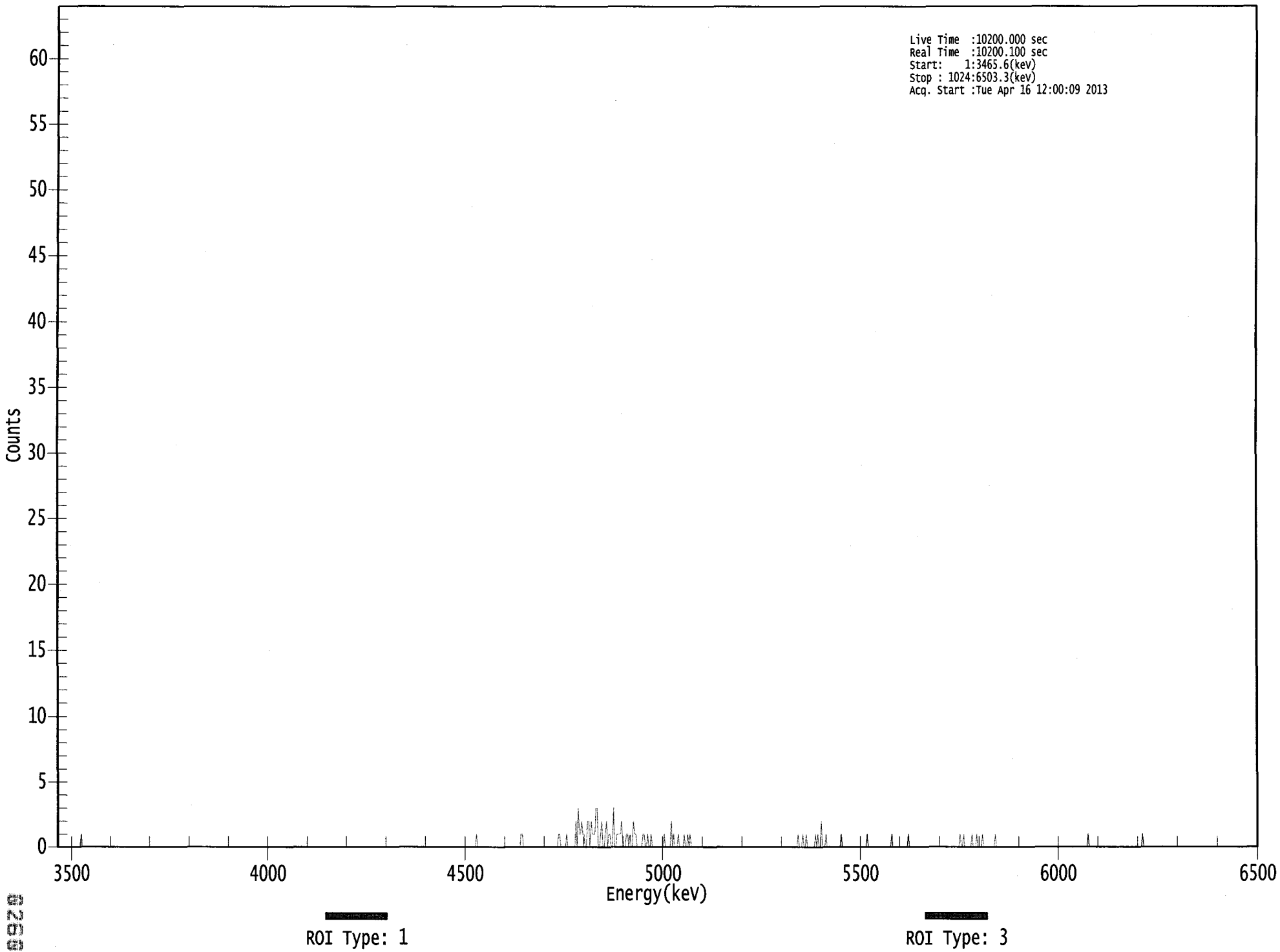
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.981	5850.00*	2.17E-001 +/- 1.87E-001	1.55E-001 +/- 3.90E-002
TH-228	0.998	5400.00*	2.94E-001 +/- 2.28E-001	2.20E-001 +/- 5.53E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 5.93E-001	1.52E-001 +/- 3.82E-002
TH-230	0.977	4672.00*	1.03E-001 +/- 1.26E-001	1.51E-001 +/- 3.81E-002
TH-232	0.987	3997.00*	-1.23E-002 +/- 7.31E-002	1.73E-001 +/- 4.35E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055582.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3465.6(kev)  
Stop : 1024:6503.3(kev)  
Acq. Start :Tue Apr 16 12:00:09 2013



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\*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	1	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	0	0	0	0	0
121:	0	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	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	0	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	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0	0
353:	0	0	0	0	0	0	1	0	0
361:	0	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 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	1	1	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	1	1	0	0
433:	0	0	0	1	0	0	0	0
441:	0	0	0	2	0	3	1	1
449:	2	1	1	0	0	2	2	0
457:	2	1	1	1	3	3	0	0
465:	1	2	0	0	1	2	0	1
473:	1	0	0	3	0	0	1	1
481:	1	1	2	0	0	0	1	1
489:	0	1	0	0	2	1	1	0
497:	0	0	0	0	1	1	0	0
505:	1	0	0	1	0	0	0	0
513:	0	0	0	0	0	0	1	0
521:	0	0	0	0	2	0	1	0
529:	0	0	1	0	0	0	0	1
537:	0	0	1	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	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:	1	0	0	0	1	0	0	1
641:	0	0	0	0	0	0	0	1
649:	0	1	0	0	2	0	0	0
657:	1	0	0	0	0	0	0	0
665:	0	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	1	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	1	0	0	1	0	0
777:	0	0	0	0	1	0	0	0
785:	1	0	0	0	0	1	0	0
793:	0	0	0	0	0	0	0	0

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

1005  
4/16/13

# Apex-Alpha™

Sample Description: LR-105 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 10  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_034  
 Chamber Serial Number: 04026479B  
 Detector Serial Number: 91136  
 Env. Background: System Bkgd 54583  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:11 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.233 mL  
 Effective Efficiency: 0.2179 +/- 0.0171  
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM  
 Chem. Recovery Factor: 1.1743 +/- 0.0942

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.874	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.319	3.83	102.72	0.17	0.00E+000	3.0
TH-229 T	4.856	193.83	14.09	0.17	0.00E+000	7.1
TH-230	4.643	25.00	39.98	0.00	0.00E+000	3.0
TH-232	3.826	2.32	149.12	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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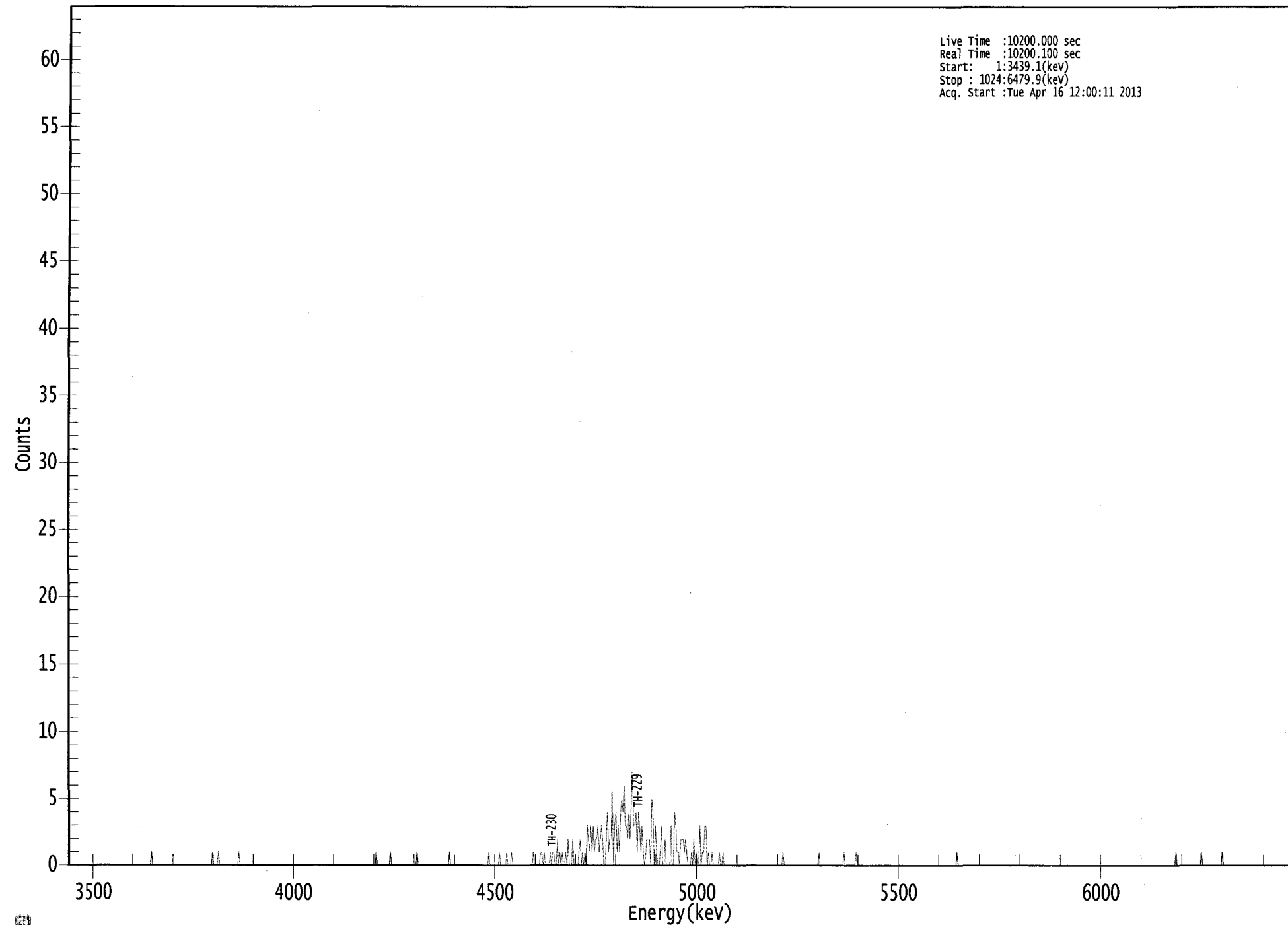
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
TH-227	0.997	5850.00*	-2.12E-003 +/- 2.48E-002	5.21E-002 +/- 7.99E-003
TH-228	0.966	5400.00*	4.72E-002 +/- 4.90E-002	5.14E-002 +/- 7.89E-003
TH-229	0.999	4872.00*	2.37E+000 +/- 3.63E-001	5.10E-002 +/- 7.82E-003
TH-230	0.996	4672.00*	3.05E-001 +/- 1.30E-001	7.30E-002 +/- 1.12E-002
TH-232	0.858	3997.00*	2.82E-002 +/- 4.23E-002	6.86E-002 +/- 1.05E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

0000055583.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3439.1(kev)  
Stop : 1024:6479.9(kev)  
Acq. Start :Tue Apr 16 12:00:11 2013



ROI Type: 1

ROI Type: 3



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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 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	1	0	0
393:	0	0	0	1	1	0	1	0
401:	0	0	0	1	0	1	1	0
409:	0	2	0	1	0	1	0	0
417:	1	0	2	0	0	0	2	0
425:	0	0	0	1	2	0	1	0
433:	1	0	3	2	1	3	1	3
441:	1	2	2	3	1	2	3	2
449:	0	0	2	4	1	2	2	6
457:	0	3	4	1	3	1	4	5
465:	4	6	3	3	2	4	2	5
473:	7	3	3	4	1	4	3	1
481:	3	1	0	1	2	2	2	0
489:	5	4	0	3	1	0	0	1
497:	3	0	0	2	0	0	0	0
505:	3	0	0	4	3	1	1	0
513:	2	2	2	1	2	1	0	0
521:	0	1	0	2	0	1	0	0
529:	3	0	1	1	3	3	0	1
537:	0	0	1	0	0	0	0	0
545:	1	0	0	1	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	1	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	1	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	1	0	0	0	0	0	0	0
657:	0	0	1	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

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



Sample Description: LR-105 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-TH  
 Sample Identification: 11  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_035  
 Chamber Serial Number: 04026477A  
 Detector Serial Number: 58771  
 Env. Background: System Bkgd 54584  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:12 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.232 mL  
 Effective Efficiency: 0.0719 +/- 0.0093  
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM  
 Chem. Recovery Factor: 0.3937 +/- 0.0514

Peak Match Tolerance: 0.175 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.792	1.83	152.56	0.17	0.00E+000	2.9
TH-228	5.341	-0.34	592.90	0.34	0.00E+000	0.0
TH-229 T	4.877	63.66	24.64	0.34	0.00E+000	7.4
TH-230	4.587	2.83	120.53	0.17	0.00E+000	2.9
TH-232	3.949	-0.17	1169.4	0.17	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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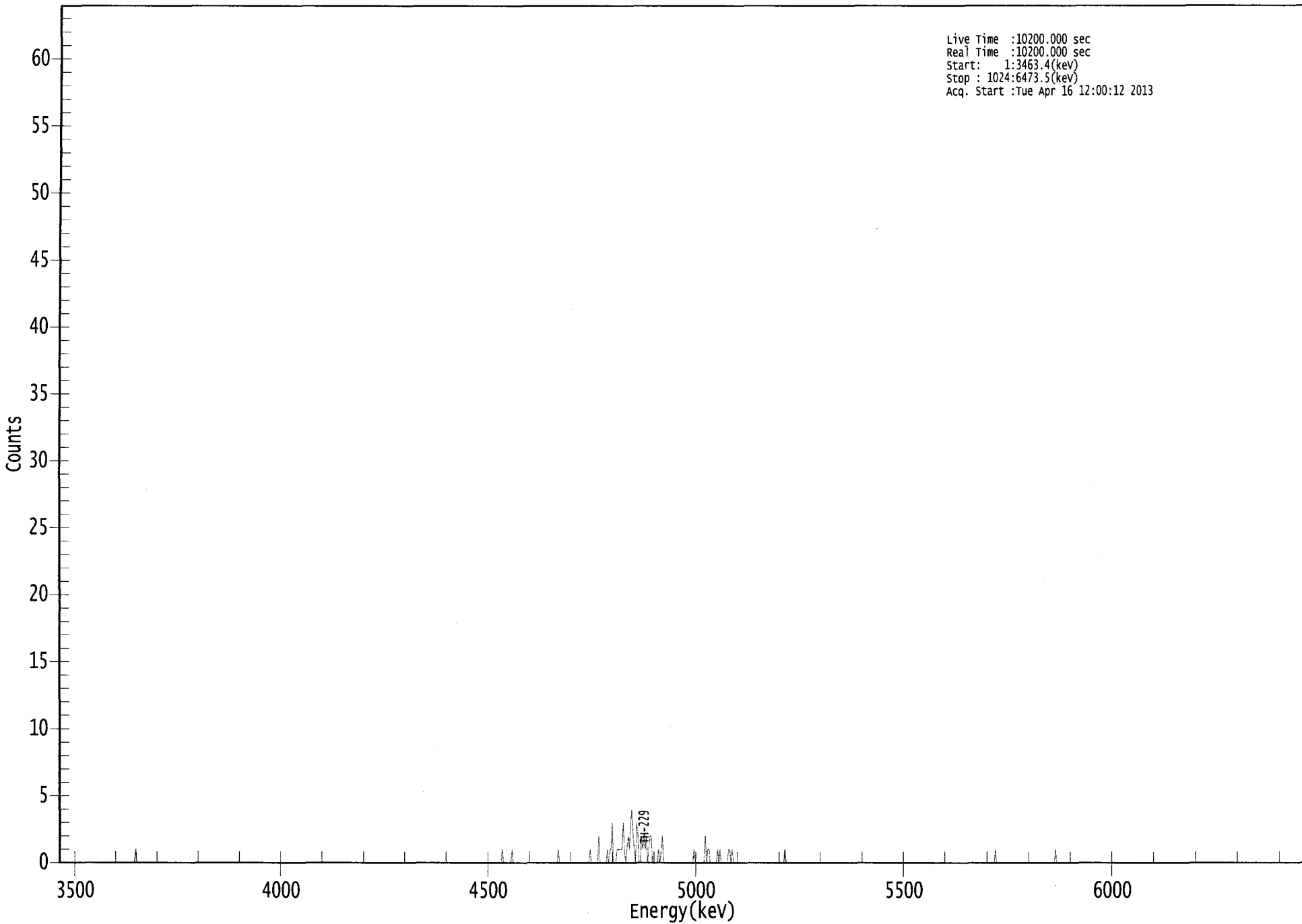
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.983	5850.00*	6.93E-002 +/- 1.07E-001	1.58E-001 +/- 4.01E-002
TH-228	0.982	5400.00*	-1.27E-002 +/- 7.54E-002	1.79E-001 +/- 4.54E-002
TH-229	1.000	4872.00*	2.36E+000 +/- 5.98E-001	1.77E-001 +/- 4.49E-002
TH-230	0.963	4672.00*	1.05E-001 +/- 1.29E-001	1.54E-001 +/- 3.91E-002
TH-232	0.988	3997.00*	-6.27E-003 +/- 7.33E-002	1.54E-001 +/- 3.90E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

0000055643.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3463.4(kev)  
Stop : 1024:6473.5(kev)  
Acq. Start :Tue Apr 16 12:00:12 2013



ROI Type: 1

ROI Type: 3

0220

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

Sample Title: 11

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 1 0 0 0

Sample Title: 11

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	1	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	1	0	0	0
441:	0	0	0	2	0	0	0	0
449:	0	0	1	0	1	1	3	0
457:	0	0	1	1	1	1	1	3
465:	1	0	1	2	1	3	4	2
473:	1	0	3	2	0	0	2	1
481:	2	1	2	0	1	2	2	0
489:	0	0	0	0	1	0	1	2
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	2	0	1	1	0	0
537:	0	0	0	0	1	0	1	0
545:	0	0	0	0	0	1	1	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	1	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	1
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	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:	1	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	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



1013  
4/16/13

# Apex-Alpha™

Sample Description: PZ-207-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 12  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_037  
 Chamber Serial Number: 04026478A  
 Detector Serial Number: 91133  
 Env. Background: System Bkgd 54585  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:14 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.1857 +/- 0.0156  
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM  
 Chem. Recovery Factor: 1.0417 +/- 0.0899

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	5.952	2.00	169.74	0.00	0.00E+000	2.9
TH-228	5.381	8.00	73.50	0.00	0.00E+000	2.9
TH-229 T	4.878	164.00	15.35	0.00	0.00E+000	4.3
TH-230	4.639	9.32	66.89	0.68	0.00E+000	2.9
TH-232	3.851	0.66	305.43	0.34	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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

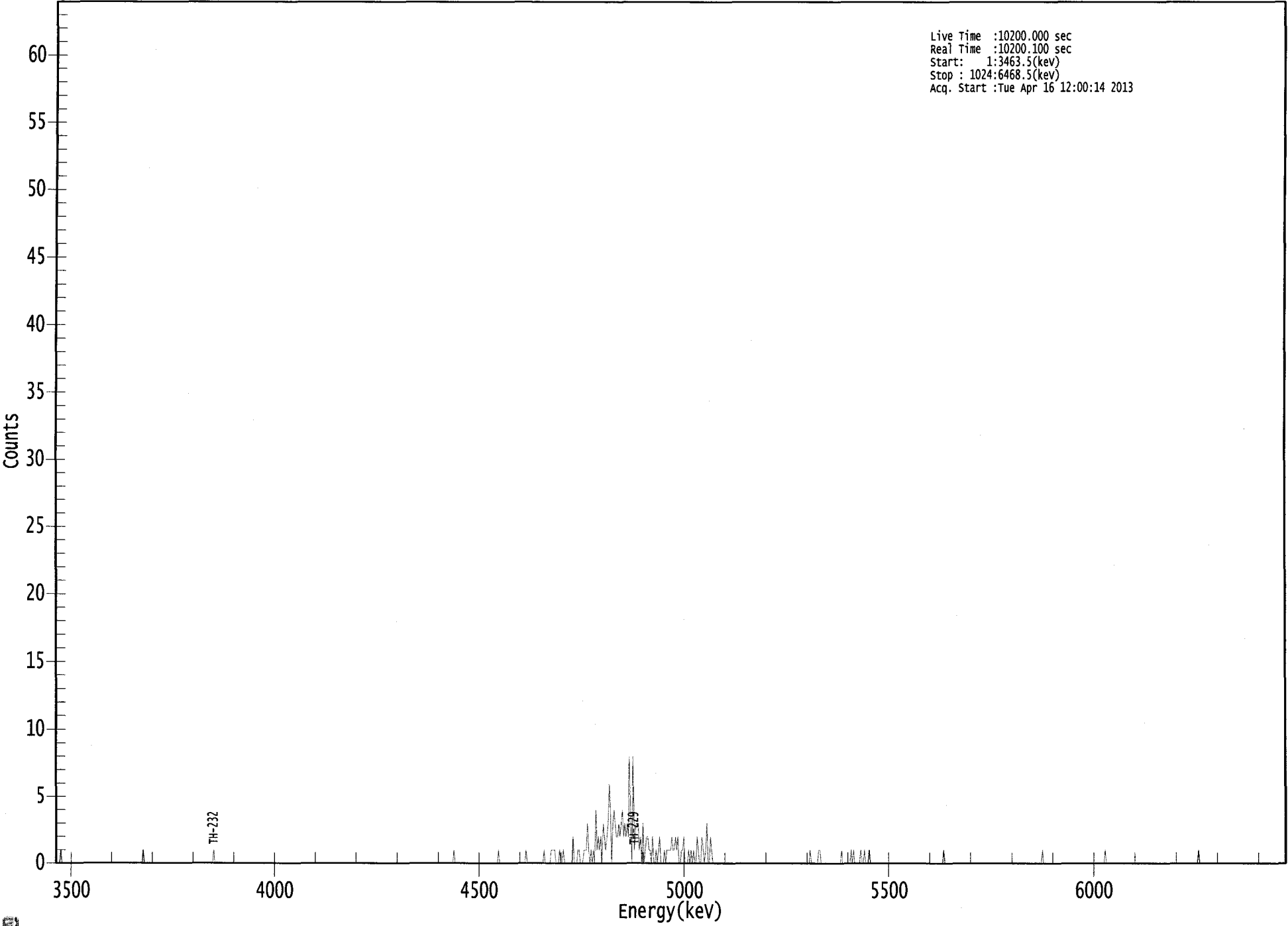
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.948	5850.00*	2.93E-002 +/- 5.00E-002	8.78E-002 +/- 1.45E-002
TH-228	0.998	5400.00*	1.16E-001 +/- 8.72E-002	8.67E-002 +/- 1.43E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 3.88E-001	8.60E-002 +/- 1.42E-002
TH-230	0.994	4672.00*	1.33E-001 +/- 9.18E-002	8.06E-002 +/- 1.33E-002
TH-232	0.895	3997.00*	9.42E-003 +/- 2.88E-002	6.82E-002 +/- 1.13E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055585.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3463.5(kev)  
Stop : 1024:6468.5(kev)  
Acq. Start :Tue Apr 16 12:00:14 2013



ROI Type: 1

ROI Type: 3

0275

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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	1	0	0	0	0	0
81:	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	1	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	1	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 1 0 0 0 0 0 0

Sample Title: 12

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

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

108  
4/16/13

# Apex-Alpha™

Sample Description: PZ-207-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 13  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_040  
 Chamber Serial Number: 06027396B  
 Detector Serial Number: 91135  
 Env. Background: System Bkgd 54586  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:16 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.230 mL  
 Effective Efficiency: 0.0882 +/- 0.0104  
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM  
 Chem. Recovery Factor: 0.4643 +/- 0.0553

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	5.755	1.83	152.56	0.17	0.00E+000	3.0
TH-228	5.297	-0.17	1169.4	0.17	0.00E+000	0.0
TH-229 T	4.839	77.66	22.30	0.34	0.00E+000	3.7
TH-230	4.678	4.83	91.00	0.17	0.00E+000	3.0
TH-232	4.050	0.83	239.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

-----  
 NUCLIDE ANALYSIS RESULTS  
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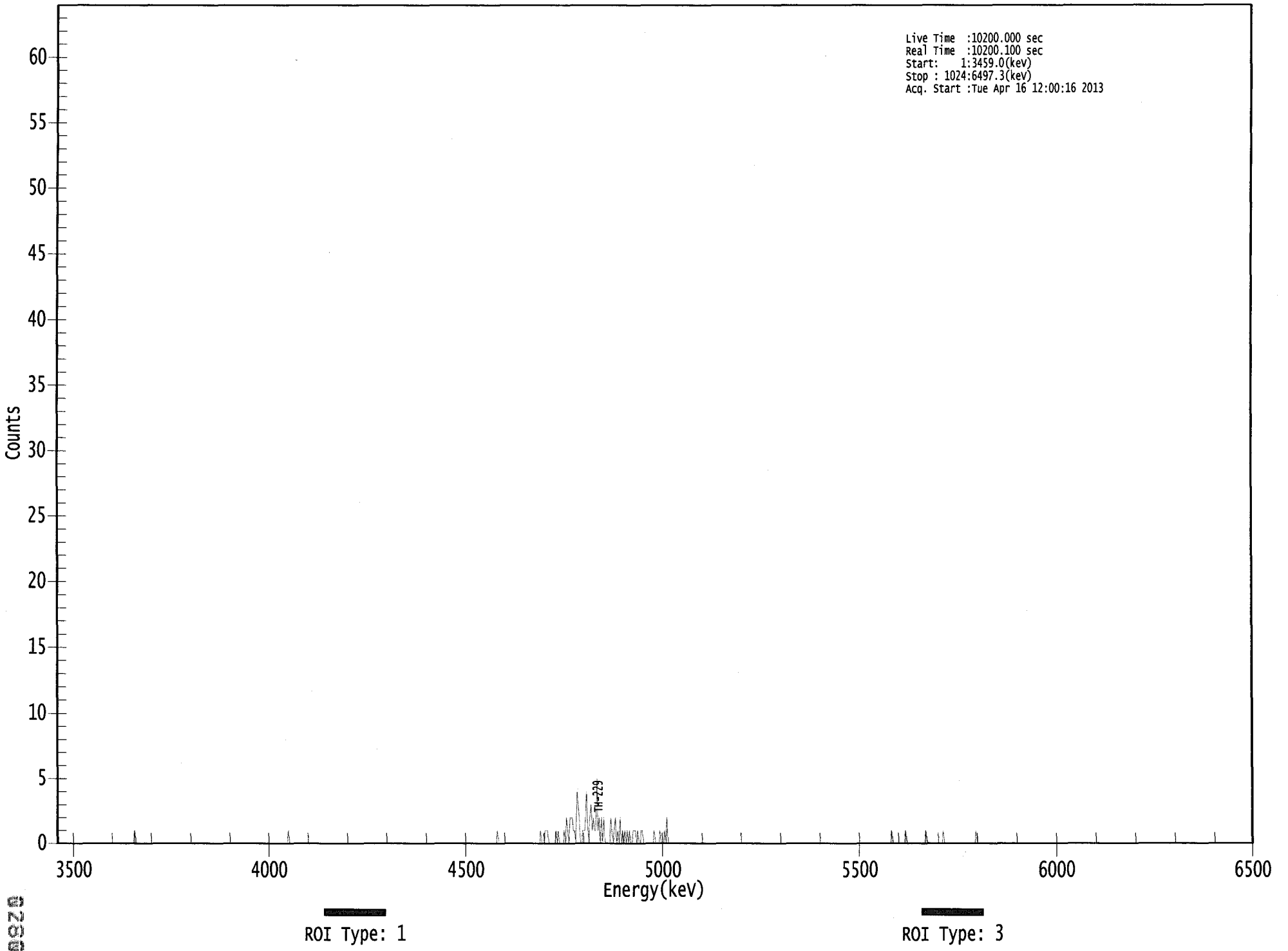
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.954	5850.00*	5.64E-002 +/- 8.71E-002	1.29E-001 +/- 2.97E-002
TH-228	0.947	5400.00*	-5.18E-003 +/- 6.06E-002	1.27E-001 +/- 2.94E-002
TH-229	0.994	4872.00*	2.34E+000 +/- 5.42E-001	1.44E-001 +/- 3.33E-002
TH-230	1.000	4672.00*	1.45E-001 +/- 1.36E-001	1.26E-001 +/- 2.90E-002
TH-232	0.985	3997.00*	2.49E-002 +/- 6.00E-002	1.25E-001 +/- 2.90E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055586.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3459.0(kev)  
Stop : 1024:6497.3(kev)  
Acq. Start :Tue Apr 16 12:00:16 2013



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

Sample Title: 13

Elapsed Live time: 10200

Elapsed Real Time: 10200

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



369: 0 0 0 0 0 0 0 0

Sample Title: 13

Channel	1	2	3	4	5	6	7	8
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	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	1	1	1	0	0
425:	0	0	0	0	1	0	1	0
433:	0	0	0	1	0	2	1	0
441:	2	2	2	1	1	0	4	3
449:	2	0	0	1	1	1	4	2
457:	0	2	3	1	2	1	1	5
465:	1	2	0	2	0	2	0	0
473:	0	0	0	2	1	0	1	2
481:	0	1	0	2	0	1	0	1
489:	0	1	0	1	0	0	1	1
497:	1	0	1	0	0	1	1	0
505:	0	0	0	0	0	0	0	0
513:	1	0	0	0	0	1	0	0
521:	0	1	0	2	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	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	1	0	0	0	0
721:	0	0	0	0	0	0	0	1
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	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	1	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 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

103  
2/16/13

# Apex-Alpha™

Sample Description: LR-103 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 14  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_041  
 Chamber Serial Number: 05026930A  
 Detector Serial Number: 91087  
 Env. Background: System Bkgd 54587  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:18 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.1924 +/- 0.0160  
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM  
 Chem. Recovery Factor: 0.9727 +/- 0.0824

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.719	0.49	416.98	0.51	0.00E+000	3.0
TH-228	5.323	2.49	138.29	0.51	0.00E+000	3.0
TH-229 T	4.869	170.15	15.07	0.85	0.00E+000	6.3
TH-230	4.640	7.81	76.13	1.19	0.00E+000	3.0
TH-232	4.044	-2.57	96.68	3.57	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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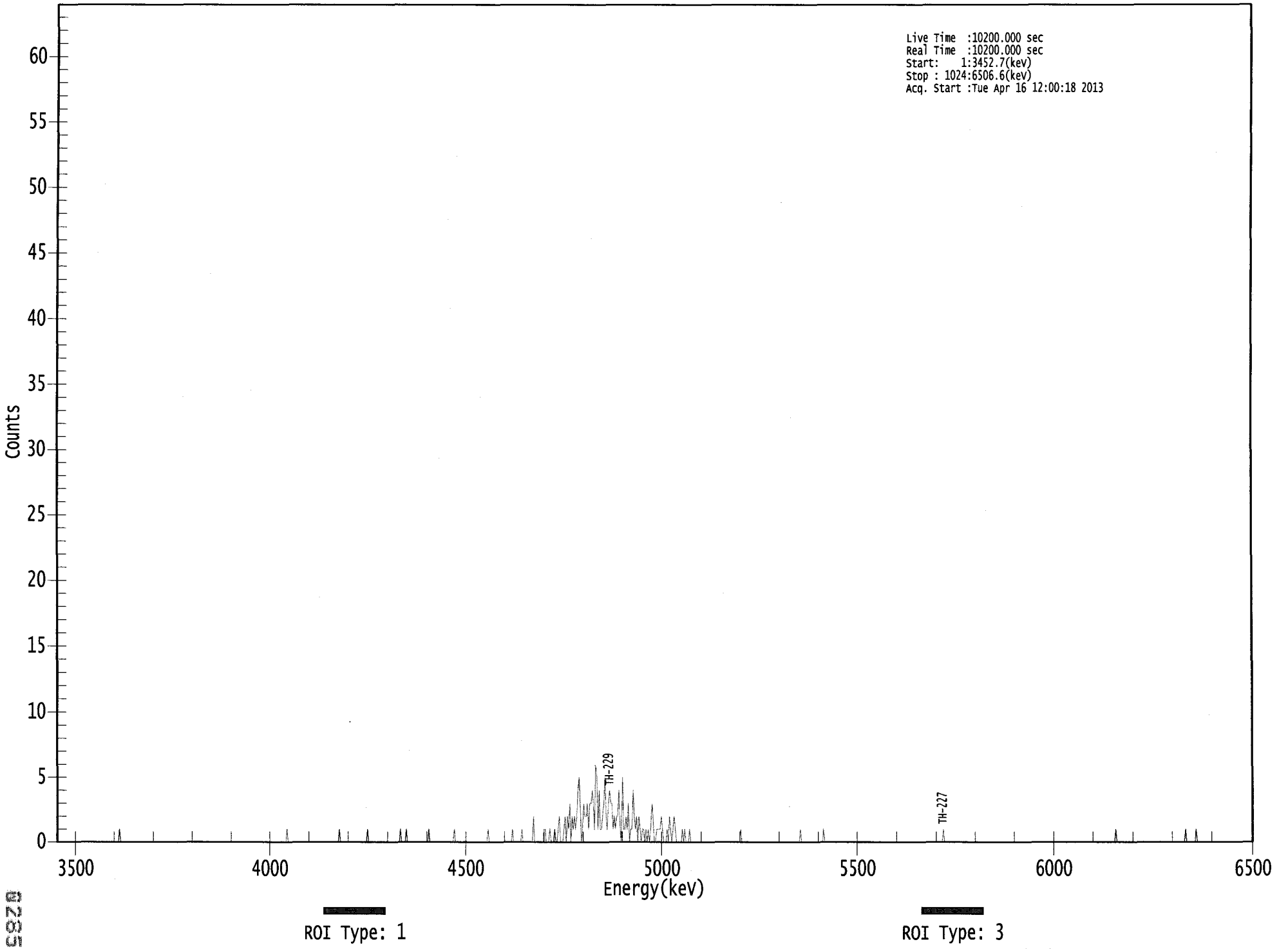
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.914	5850.00*	6.93E-003 +/- 2.89E-002	7.42E-002 +/- 1.21E-002
TH-228	0.970	5400.00*	3.48E-002 +/- 4.84E-002	7.32E-002 +/- 1.19E-002
TH-229	1.000	4872.00*	2.35E+000 +/- 3.82E-001	8.28E-002 +/- 1.35E-002
TH-230	0.995	4672.00*	1.08E-001 +/- 8.39E-002	9.09E-002 +/- 1.48E-002
TH-232	0.989	3997.00*	-3.54E-002 +/- 3.47E-002	1.30E-001 +/- 2.11E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

000055587.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3452.7(kev)  
Stop : 1024:6506.6(kev)  
Acq. Start :Tue Apr 16 12:00:18 2013



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

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	1	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	1	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	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	1	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	1
297:	0	0	0	0	1	0	0	0
305:	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0	1
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	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 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	0	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	0	0	0	0	1
401:	0	0	0	0	0	0	0	0
409:	0	2	0	0	0	0	0	0
417:	0	0	1	1	0	0	0	1
425:	0	0	0	1	0	0	1	2
433:	0	0	0	1	2	0	2	1
441:	3	0	2	1	2	1	2	4
449:	5	3	0	1	3	2	2	3
457:	1	3	3	4	3	1	6	5
465:	1	4	1	1	2	3	5	2
473:	1	3	4	3	3	1	2	1
481:	2	2	4	1	0	5	1	1
489:	2	1	3	0	1	1	4	2
497:	1	2	0	2	1	0	1	1
505:	0	1	0	1	0	1	3	2
513:	0	0	1	1	1	1	2	1
521:	0	0	0	1	0	2	1	0
529:	1	2	1	0	0	0	0	0
537:	1	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	1	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	1	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	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: 14

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

KAS  
4/16/13

# Apex-Alpha™

Sample Description: LR-103 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 15  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 54588  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/3/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:19 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.230 mL  
 Effective Efficiency: 0.0525 +/- 0.0080  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Chem. Recovery Factor: 0.2843 +/- 0.0435

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.789	6.32	82.73	0.68	0.00E+000	3.0
TH-228	5.332	6.81	82.43	1.19	0.00E+000	4.5
TH-229 T	4.877	46.15	29.16	0.85	0.00E+000	3.0
TH-230	4.640	10.66	61.14	0.34	0.00E+000	3.0
TH-232	3.862	0.32	646.93	0.68	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.981	5850.00*	3.28E-001 +/- 2.88E-001	2.92E-001 +/- 8.71E-002
TH-228	0.976	5400.00*	3.49E-001 +/- 3.05E-001	3.37E-001 +/- 1.00E-001
TH-229	1.000	4872.00*	2.34E+000 +/- 6.97E-001	3.04E-001 +/- 9.05E-002
TH-230	0.995	4672.00*	5.39E-001 +/- 3.67E-001	2.42E-001 +/- 7.20E-002
TH-232	0.910	3997.00*	1.62E-002 +/- 1.05E-001	2.85E-001 +/- 8.48E-002

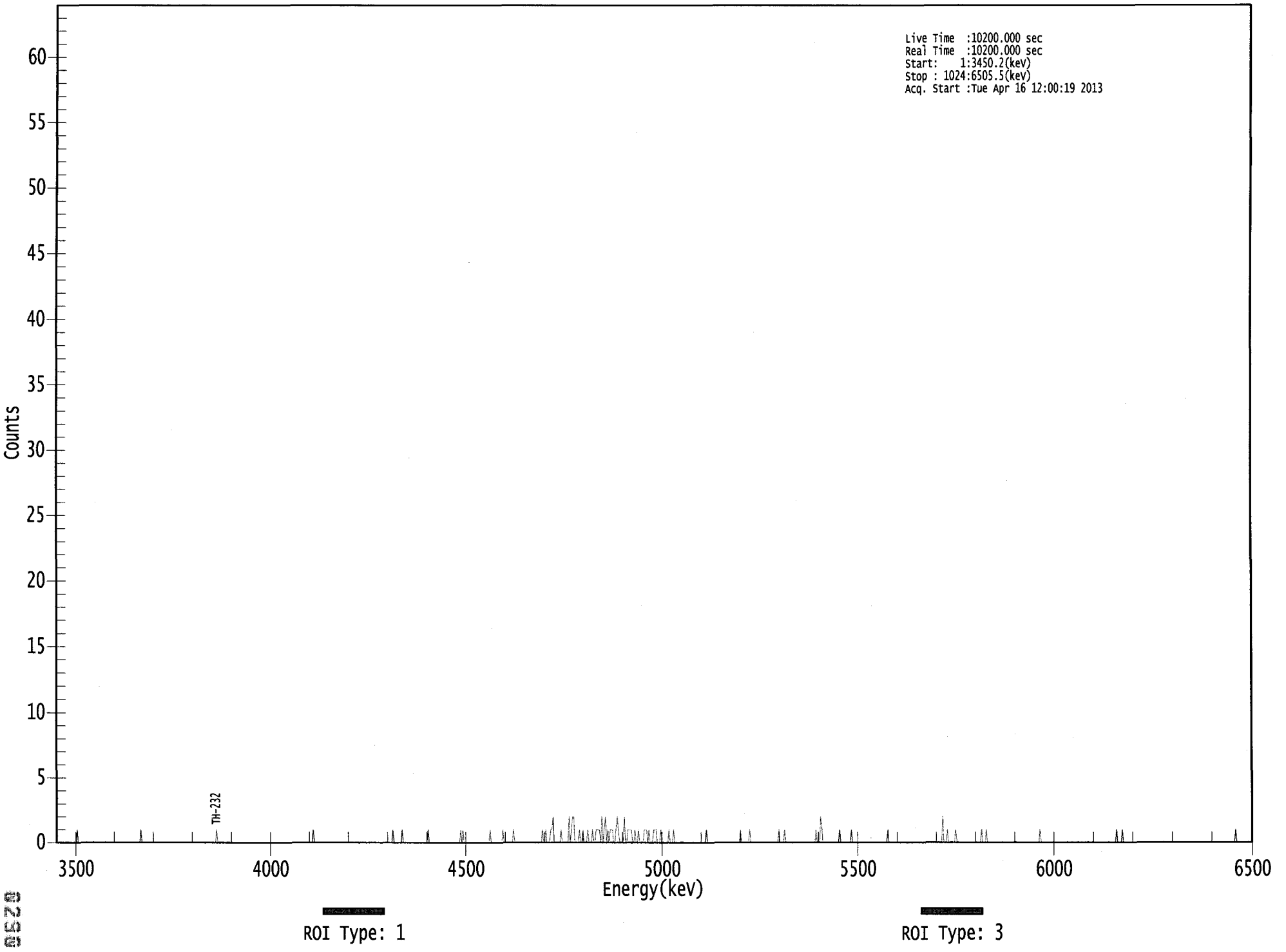
AG  
 4/17/13

US EPA ARCHIVE DOCUMENT



000055588.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Tue Apr 16 12:00:19 2013



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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 15

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

Sample Title: 15

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	1
385:	0	0	0	0	0	0	0	0
393:	1	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	1	0	0	1	0	0	0
425:	1	1	2	0	0	0	0	0
433:	0	1	0	0	0	0	0	0
441:	2	0	1	2	2	0	0	0
449:	0	1	0	0	1	0	0	0
457:	1	0	0	0	1	0	0	1
465:	1	1	1	0	2	0	1	2
473:	0	1	0	1	1	1	0	0
481:	1	2	1	0	0	0	0	2
489:	0	0	1	1	1	1	0	0
497:	1	0	0	1	0	0	0	0
505:	1	1	1	0	1	0	0	0
513:	1	1	1	0	0	0	1	0
521:	0	0	0	0	0	1	0	0
529:	0	1	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	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	1	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	1	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	1	0	0	0	2
657:	1	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	1	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	1	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	1	0	0	0	0
769:	0	0	1	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	1	0	0	0	1	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	1	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	1	0	0	0	0
913:	1	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	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:	1	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

1075  
4/16/13



Sample Description: PZ-110-SS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 16  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_044  
 Chamber Serial Number: 04026481B  
 Detector Serial Number: 84168  
 Env. Background: System Bkgd 54589  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/4/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:21 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.230 mL  
 Effective Efficiency: 0.1705 +/- 0.0149  
 Counting Efficiency: 0.1902 +/- 0.0033 on 12/16/2012 5:49:26 PM  
 Chem. Recovery Factor: 0.8967 +/- 0.0800

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.874	-0.17	1169.4	0.17	0.00E+000	0.0
TH-228	5.319	1.83	152.56	0.17	0.00E+000	3.0
TH-229 T	4.878	149.66	16.04	0.34	0.00E+000	6.2
TH-230	4.636	10.00	65.01	0.00	0.00E+000	3.0
TH-232	4.000	1.49	190.02	0.51	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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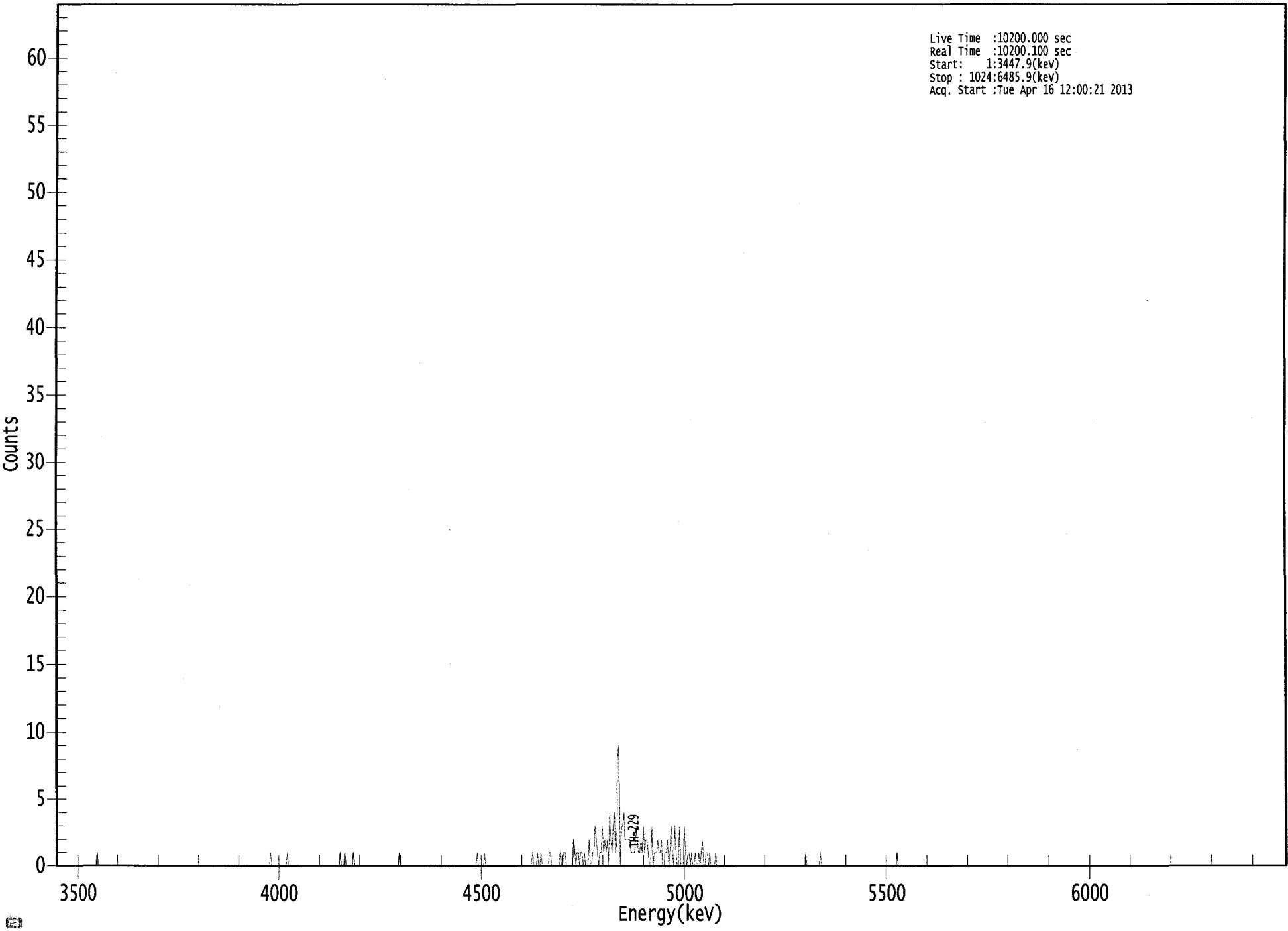
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.997	5850.00*	-2.71E-003 +/- 3.17E-002	6.66E-002 +/- 1.14E-002
TH-228	0.966	5400.00*	2.88E-002 +/- 4.42E-002	6.57E-002 +/- 1.13E-002
TH-229	1.000	4872.00*	2.34E+000 +/- 4.01E-001	7.46E-002 +/- 1.28E-002
TH-230	0.993	4672.00*	1.56E-001 +/- 1.05E-001	9.33E-002 +/- 1.60E-002
TH-232	1.000	3997.00*	2.32E-002 +/- 4.42E-002	8.15E-002 +/- 1.40E-002

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 4/17/13

US EPA ARCHIVE DOCUMENT

000055589.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3447.9(kev)  
Stop : 1024:6485.9(kev)  
Acq. Start :Tue Apr 16 12:00:21 2013



ROI Type: 1

ROI Type: 3

5520

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 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title: 16

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 16

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



801: 0 0 0 0 0 0 0 0

Sample Title: 16

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

106  
4/16/13

# Apex-Alpha™

Sample Description: PZ-110-SS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 17  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_046  
 Chamber Serial Number: 04026482B  
 Detector Serial Number: 58762  
 Env. Background: System Bkgd 54590  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/4/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:23 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.1143 +/- 0.0119  
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/16/2012 5:49:23 PM  
 Chem. Recovery Factor: 0.6390 +/- 0.0676

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.832	2.83	120.53	0.17	0.00E+000	3.0
TH-228	5.297	-0.17	1169.4	0.17	0.00E+000	0.0
TH-229 T	4.856	100.83	19.54	0.17	0.00E+000	10.6
TH-230	4.649	9.00	68.87	0.00	0.00E+000	4.5
TH-232	3.960	3.66	107.87	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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

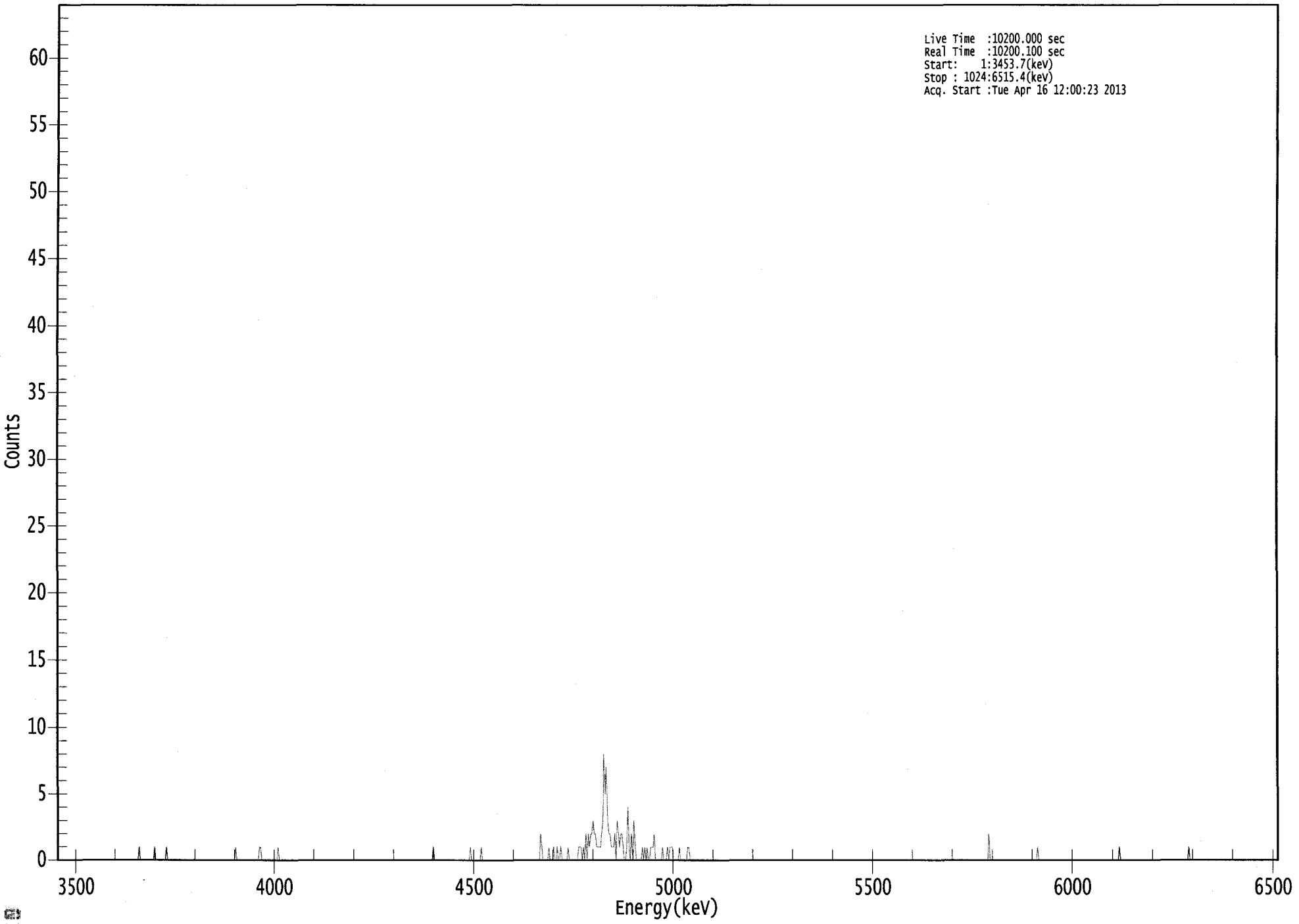
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	6.73E-002 +/- 8.23E-002	9.93E-002 +/- 2.03E-002
TH-228	0.946	5400.00*	-3.99E-003 +/- 4.67E-002	9.80E-002 +/- 2.00E-002
TH-229	0.999	4872.00*	2.35E+000 +/- 4.80E-001	9.72E-002 +/- 1.99E-002
TH-230	0.997	4672.00*	2.09E-001 +/- 1.50E-001	1.39E-001 +/- 2.85E-002
TH-232	0.993	3997.00*	8.48E-002 +/- 9.31E-002	1.11E-001 +/- 2.27E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055581.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3453.7(kev)  
Stop : 1024:6515.4(kev)  
Acq. Start :Tue Apr 16 12:00:23 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0
49:	0	0	0	0	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	1	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	1	0	0	0	0	0
89:	0	0	0	0	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	1	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	1	1	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	1	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	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	1	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	1	0	0	0	0
353:	0	0	0	0	1	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 17

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	2	1
409:	0	0	0	0	0	1	0	0
417:	0	1	0	0	1	0	0	1
425:	0	0	0	0	0	1	0	0
433:	0	0	0	0	0	0	1	1
441:	1	0	1	0	2	0	2	1
449:	2	2	3	2	2	1	1	1
457:	1	2	3	8	5	7	3	2
465:	2	1	1	1	2	0	3	2
473:	1	2	2	1	0	0	1	4
481:	1	0	2	0	3	1	0	0
489:	0	0	0	1	0	1	0	1
497:	0	0	1	1	1	2	0	0
505:	0	0	0	0	1	0	0	0
513:	1	0	1	1	1	0	0	0
521:	0	0	1	0	0	0	0	0
529:	0	1	1	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	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	2	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	1	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	1	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	1	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KCB  
4/14/13

# Apex-Alpha™

Sample Description: I-62 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 18  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_047  
 Chamber Serial Number: 02030596A  
 Detector Serial Number: 91086  
 Env. Background: System Bkgd 54591  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/4/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:25 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.231 mL  
 Effective Efficiency: 0.2199 +/- 0.0172  
 Counting Efficiency: 0.1822 +/- 0.0032 on 12/16/2012 5:49:21 PM  
 Chem. Recovery Factor: 1.2071 +/- 0.0969

Peak Match Tolerance: 0.175 MeV

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 PEAK AREA REPORT  
 -----

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.867	1.83	152.56	0.17	0.00E+000	2.9
TH-228	5.341	20.83	43.15	0.17	0.00E+000	2.9
TH-229 T	4.860	193.66	14.10	0.34	0.00E+000	5.1
TH-230	4.665	17.66	47.16	0.34	0.00E+000	3.7
TH-232	3.902	4.00	109.57	0.00	0.00E+000	2.9

T = Tracer Peak used for Effective Efficiency

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 NUCLIDE ANALYSIS RESULTS  
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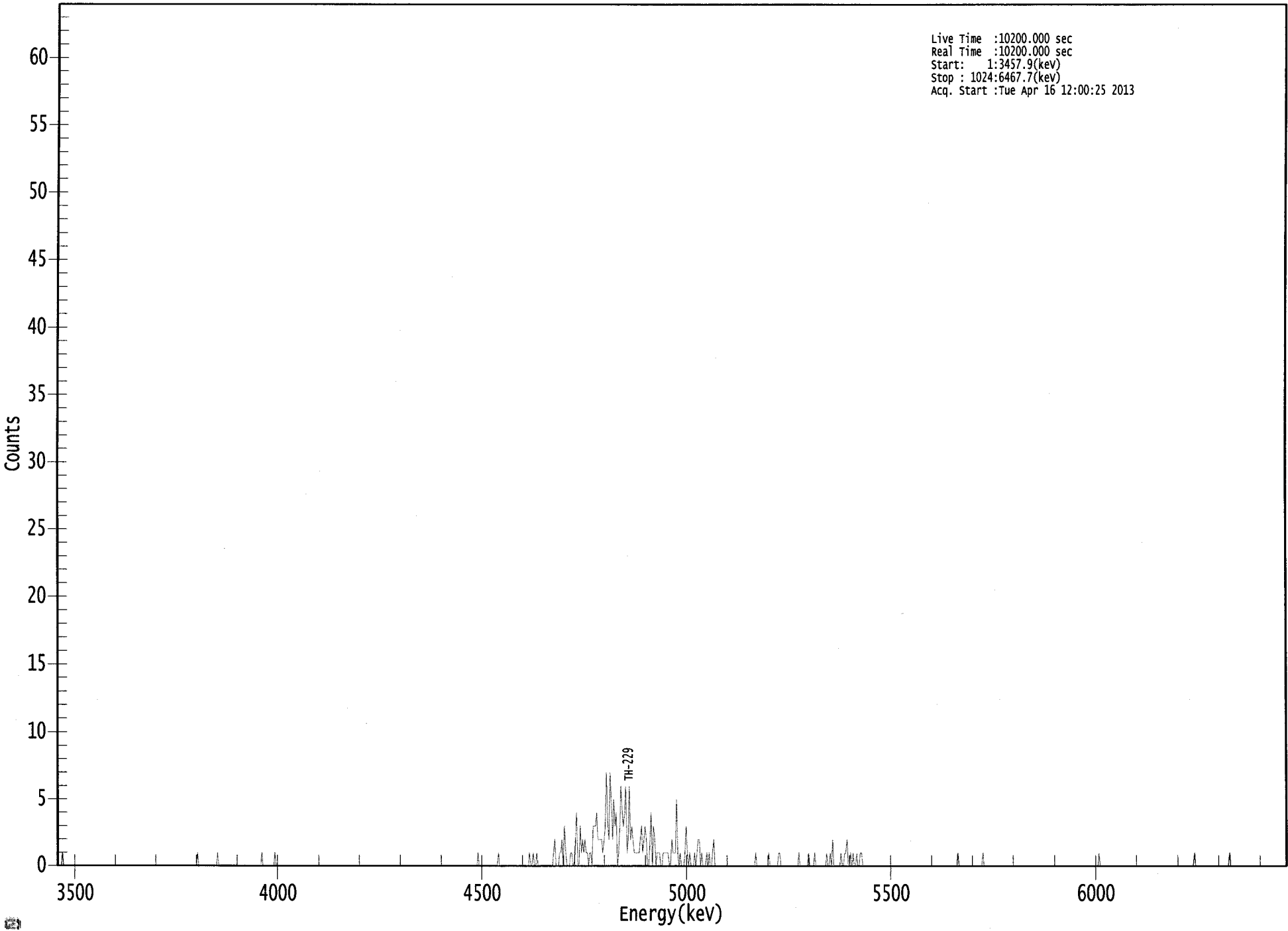
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.998	5850.00*	2.26E-002 +/- 3.47E-002	5.16E-002 +/- 7.93E-003
TH-228	0.982	5400.00*	2.54E-001 +/- 1.16E-001	5.09E-002 +/- 7.82E-003
TH-229	0.999	4872.00*	2.34E+000 +/- 3.60E-001	5.79E-002 +/- 8.89E-003
TH-230	1.000	4672.00*	2.13E-001 +/- 1.06E-001	5.77E-002 +/- 8.86E-003
TH-232	0.954	3997.00*	4.82E-002 +/- 5.33E-002	7.23E-002 +/- 1.11E-002

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055590.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3457.9(kev)  
Stop : 1024:6467.7(kev)  
Acq. Start :Tue Apr 16 12:00:25 2013



ROI Type: 1

ROI Type: 3

55590



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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----
1:	0	0	0	0	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	1	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	1
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	1	0	0	0
177:	0	0	0	0	0	0	1
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0
329:	0	0	0	0	0	0	0
337:	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	1
353:	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0

369: 1 0 0 0 0 0 0 0 0

Sample Title: 18

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	0	0	0
393:	0	0	1	0	0	1	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	1	2
417:	0	0	0	1	1	2	0	3
425:	1	0	0	0	1	1	0	0
433:	2	4	0	0	3	1	2	1
441:	2	1	1	0	1	1	0	3
449:	3	3	4	2	2	2	2	1
457:	2	3	7	3	2	7	5	2
465:	5	3	4	0	1	3	6	4
473:	3	4	6	1	2	6	2	3
481:	2	1	1	1	1	1	2	3
489:	1	2	3	2	0	0	2	4
497:	0	3	2	0	1	1	1	0
505:	0	1	1	1	1	1	0	0
513:	2	1	1	1	5	1	0	1
521:	0	0	0	1	3	1	0	1
529:	0	0	0	1	0	1	2	2
537:	0	1	0	0	0	1	0	1
545:	0	0	1	2	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	1	0
585:	0	0	0	0	0	0	0	0
593:	0	1	0	0	0	0	0	0
601:	0	1	1	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	1	0	0	0	0	1
633:	0	0	0	0	0	0	0	0
641:	0	1	0	0	1	0	2	0
649:	0	0	0	0	0	1	0	0
657:	1	1	2	0	0	1	0	1
665:	0	0	1	0	0	1	1	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	1	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	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: 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	1	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	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	0	0	0	0	1
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0

KS  
4/16/13



Sample Description: I-62 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-TH  
 Sample Identification: 19  
 Sample Geometry: Shelf 2  
 Procedure Description: Th iso

Detector Name: Alpha\_048  
 Chamber Serial Number: 02030596B  
 Detector Serial Number: 83111  
 Env. Background: System Bkgd 54592  
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter  
 Sample Date/Time: 4/4/2013 6:33:30 AM  
 Acquisition Date/Time: 4/16/2013 12:00:26 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: Th229\_TH-18A  
 Tracer Quantity: 0.228 mL  
 Effective Efficiency: 0.1091 +/- 0.0117  
 Counting Efficiency: 0.1680 +/- 0.0030 on 12/16/2012 5:49:20 PM  
 Chem. Recovery Factor: 0.6495 +/- 0.0707

Peak Match Tolerance: 0.175 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
TH-227	5.755	1.00	277.19	0.00	0.00E+000	3.0
TH-228	5.427	0.49	416.98	0.51	0.00E+000	3.0
TH-229 T	4.862	94.83	20.15	0.17	0.00E+000	3.2
TH-230	4.639	8.49	69.59	0.51	0.00E+000	3.0
TH-232	4.096	0.83	239.53	0.17	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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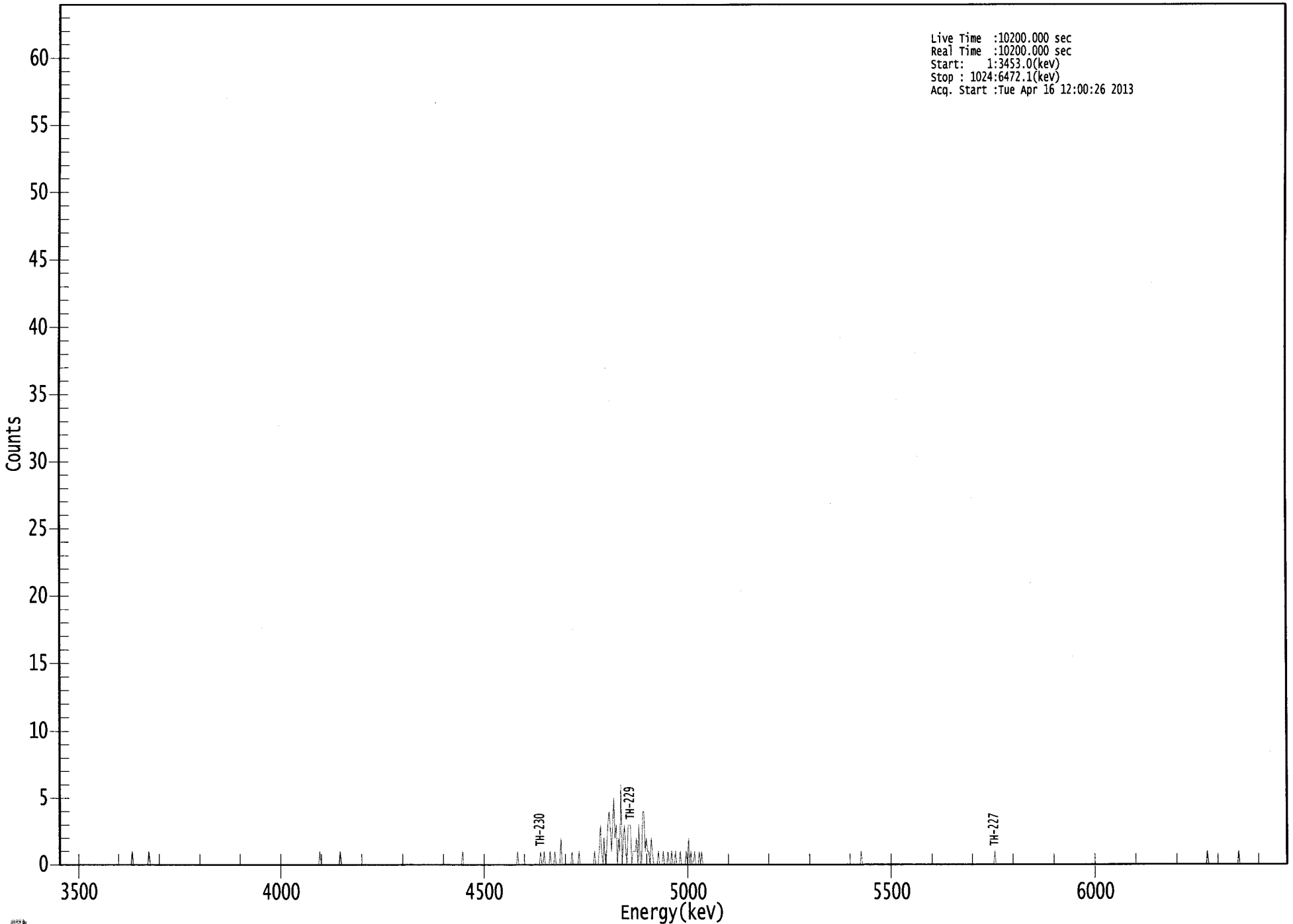
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
TH-227	0.954	5850.00*	2.49E-002 +/- 6.93E-002	1.50E-001 +/- 3.15E-002
TH-228	0.996	5400.00*	1.21E-002 +/- 5.03E-002	1.29E-001 +/- 2.72E-002
TH-229	0.999	4872.00*	2.31E+000 +/- 4.87E-001	1.02E-001 +/- 2.14E-002
TH-230	0.994	4672.00*	2.07E-001 +/- 1.50E-001	1.28E-001 +/- 2.69E-002
TH-232	0.950	3997.00*	2.02E-002 +/- 4.85E-002	1.01E-001 +/- 2.13E-002

AG  
 4/17/13

US EPA ARCHIVE DOCUMENT

0000055591.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3453.0(kev)  
Stop : 1024:6472.1(kev)  
Acq. Start :Tue Apr 16 12:00:26 2013



ROI Type: 1

ROI Type: 3

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

Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 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	1	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	1	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	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	1	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	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	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 0

Sample Title: 19

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	0	0	0
401:	0	0	1	0	0	1	0	0
409:	0	0	1	0	0	0	1	0
417:	0	0	0	2	0	0	0	0
425:	0	0	0	0	1	0	0	0
433:	0	0	1	0	0	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	0	0	1	3	1	0	2
457:	0	1	3	4	3	1	3	5
465:	2	3	0	2	1	6	0	2
473:	3	1	0	3	3	3	0	1
481:	1	1	2	0	3	0	0	4
489:	4	1	2	1	1	0	2	1
497:	0	0	0	0	1	0	0	0
505:	1	0	0	0	1	0	0	1
513:	0	0	1	0	0	0	1	0
521:	0	0	0	1	0	2	0	1
529:	0	0	1	0	0	0	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	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	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	1	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 19

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





## QA SUMMARY REPORT

### Review Of QA Results - Pulser Check

Date : 4/16/2013

Time : 5:57:39 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/16/2013 5:35:47 AM
Alpha 004	21f	ALL	Passed	4/16/2013 5:35:48 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	4/16/2013 5:35:49 AM
Alpha 011	21f	ALL	Passed	4/16/2013 5:35:49 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/16/2013 5:35:50 AM
Alpha 014	21f	ALL	Passed	4/16/2013 5:35:51 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/16/2013 5:35:52 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha 025	AIM730	ALL	Passed	4/16/2013 5:35:54 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/16/2013 5:35:55 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/16/2013 5:35:56 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:57 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:59 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:00 AM
Alpha 036	Alpha Analyst100DC	ALL	Not Done	
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:01 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Not Done	
Alpha 040	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:03 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:04 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:06 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:07 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:10 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:12 AM

APPROVED BY: CAPPROVAL DATE: 4/16/13

\*\*\*\*\*  
 \*\*\*\*\* LIBRARY LISTING REPORT \*\*\*\*\*  
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Nuclide Library Title: Thorium

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

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

\* = key line

TOTALS:            5   Nuclides            5   Energy Lines

**SECTION X**  
**ANALYTICAL DATA (RADIUM-226)**

Work Order	13-04049	Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
Analysis Code	Ra226	01	LCS	LCS		04/09/13 00:00	1.0000E+00
Run	1	02	MBL	BLANK		04/09/13 00:00	1.5000E+00
Date Received	4/9/2013	03	DUP	PZ-302-AI TOT	39	04/03/13 11:45	1.5000E+00
Lab Deadline	4/30/2013	04	DO	PZ-302-AI TOT	39	04/03/13 11:45	1.5000E+00
Client	Engineering Management Support, Inc.	05	TRG	PZ-302-AI DIS	39	04/03/13 11:45	1.3500E+00
Project	West Lake OU-1	06	TRG	LR-100 TOT	42	04/03/13 13:27	1.5000E+00
Report Level	4	07	TRG	LR-100 DIS	42	04/03/13 13:27	1.5000E+00
Activity Units	pCi	08	TRG	D-81 TOT	41	04/03/13 13:40	1.5000E+00
Aliquot Units	I	09	TRG	D-81 DIS	41	04/03/13 13:40	1.5000E+00
Matrix	WA	10	TRG	LR-105 TOT	40	04/03/13 14:24	1.5000E+00
Method	EPA 903.0 Modified	11	TRG	LR-105 DIS	40	04/03/13 14:24	1.5000E+00
Instrument Type	Alpha Spectroscopy	12	TRG	PZ-207-AS TOT	45	04/03/13 15:05	1.5000E+00
Radiometric Tracer	Ba-133	13	TRG	PZ-207-AS DIS	45	04/03/13 15:05	1.5000E+00
Radiometric Sol#	Ba-6a	14	TRG	LR-103 TOT	45	04/03/13 15:30	1.5000E+00
Tracer Act (dpm/g)	1011.608	15	TRG	LR-103 DIS	45	04/03/13 15:30	1.5000E+00
Carrier		16	TRG	PZ-110-SS TOT	38	04/04/13 10:27	1.5000E+00
Carrier Conc (mg/ml)		17	TRG	PZ-110-SS DIS	38	04/04/13 10:27	1.5000E+00
		18	TRG	I-62 TOT	46	04/04/13 10:42	1.5000E+00
		19	TRG	I-62 DIS	46	04/04/13 10:42	1.5000E+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	0.9178	928.5	408.1	97.58		0.0226	0.0294	0.0068		97.58	2.44	1.00
02	MBL	0.9053	915.8	373.5	90.54		0.0225	0.0286	0.0061		90.54	2.20	1.00
03	DUP	0.9070	917.5	386.7	93.56		0.0225	0.0299	0.0074		93.56	2.61	1.00
04	DO	0.9068	917.3	393.2	95.16		0.0225	0.0299	0.0074		95.16	2.61	1.00
05	TRG	0.9070	917.5	386.6	93.54		0.0224	0.0296	0.0072		93.54	2.55	1.00
06	TRG	0.9036	914.1	347.4	84.37		0.0222	0.0293	0.0071		84.37	2.53	1.00
07	TRG	0.9046	915.1	375.2	91.02		0.0222	0.0295	0.0073		91.02	2.58	1.00
08	TRG	0.8985	908.9	373.1	91.13		0.0223	0.0299	0.0076		91.13	2.66	1.00
09	TRG	0.8981	908.5	411.7	100.60		0.0222	0.0294	0.0072		100.60	2.55	1.00
10	TRG	0.9000	910.4	390.7	95.27		0.0223	0.0306	0.0083		95.27	2.84	1.00
11	TRG	0.9032	913.7	373.8	90.82		0.0224	0.0303	0.0079		90.82	2.74	1.00
12	TRG	0.9013	911.8	328.8	80.06		0.0223	0.0318	0.0095		80.06	3.14	1.00
13	TRG	0.8921	902.5	415.9	102.31		0.0225	0.0307	0.0082		102.31	2.82	1.00
14	TRG	0.8995	909.9	375.9	91.71		0.0222	0.0316	0.0094		91.71	3.12	1.00
15	TRG	0.9014	911.9	359.6	87.55		0.0222	0.0312	0.0090		87.55	3.01	1.00
16	TRG	0.9001	910.5	400.8	97.72		0.0222	0.0297	0.0075		97.72	2.64	1.00
17	TRG	0.9028	913.3	315.3	76.64		0.0220	0.0294	0.0074		76.64	2.61	1.00
18	TRG	0.9012	911.7	380.8	92.73		0.0222	0.0296	0.0074		92.73	2.61	1.00
19	TRG	0.8998	910.2	378.2	92.24		0.0223	0.0293	0.0070		92.24	2.50	1.00

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

0000

Internal Fraction	Sample Desc	Rough Prep Date	Rough Prep By	Prep Date	Prep By	Sep t0 Date/Time	Sep t0 By	Sep t1 Date/Time	Sep t1 By
01	LCS			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
02	MBL			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
03	DUP			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
04	DO			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
05	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
06	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
07	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
08	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
09	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
10	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
11	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
12	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
13	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
14	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
15	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
16	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
17	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
18	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		
19	TRG			04/11/13 10:48	JBARNARD	04/15/13 13:14	LWALKER		

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

0320

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	1.30E+00	1.99E-01	1.04E+01	102.31	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	-1.33E-03	8.13E-02	1.98E-01					OK	OK
03	RA-226	DUP	PZ-302-AI TOT	pCi/l	7.66E-01	2.90E-01	2.32E-01				NA	OK	
04	RA-226	DO	PZ-302-AI TOT	pCi/l	6.01E-01	2.42E-01	1.29E-01					OK	
05	RA-226	TRG	PZ-302-AI DIS	pCi/l	3.86E-01	2.04E-01	1.62E-01					OK	
06	RA-226	TRG	LR-100 TOT	pCi/l	4.43E-01	2.42E-01	2.41E-01					OK	
07	RA-226	TRG	LR-100 DIS	pCi/l	1.40E-01	1.50E-01	2.20E-01					OK	
08	RA-226	TRG	D-81 TOT	pCi/l	8.69E-01	3.46E-01	2.22E-01					OK	
09	RA-226	TRG	D-81 DIS	pCi/l	1.79E-01	1.58E-01	2.11E-01					OK	
10	RA-226	TRG	LR-105 TOT	pCi/l	6.87E-01	2.94E-01	2.08E-01					OK	
11	RA-226	TRG	LR-105 DIS	pCi/l	1.04E+00	3.61E-01	2.03E-01					OK	
12	RA-226	TRG	PZ-207-AS TOT	pCi/l	1.12E+00	3.97E-01	1.87E-01					OK	
13	RA-226	TRG	PZ-207-AS DIS	pCi/l	4.87E-01	2.28E-01	1.14E-01					OK	
14	RA-226	TRG	LR-103 TOT	pCi/l	9.66E-01	3.49E-01	1.35E-01					OK	
15	RA-226	TRG	LR-103 DIS	pCi/l	5.21E-01	2.62E-01	1.59E-01					OK	
16	RA-226	TRG	PZ-110-SS TOT	pCi/l	4.00E+00	6.59E-01	1.51E-01					OK	
17	RA-226	TRG	PZ-110-SS DIS	pCi/l	3.76E+00	6.89E-01	1.51E-01					OK	
18	RA-226	TRG	I-62 TOT	pCi/l	4.60E-01	2.22E-01	1.85E-01					OK	
19	RA-226	TRG	I-62 DIS	pCi/l	4.02E-01	2.04E-01	1.36E-01					OK	

Run	1
Analysis Code	Ra226
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

1256



Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-Ra226-1**

Lab Fraction	Nuclide	Sample Desc	Sample Date	Sample Aliquot	Radiometric % Rec	Grav % Rec	Mean % Rec	SAF	Sep t0 Date/Time	Sep t1 Date/Time
01	RA-226	LCS	04/09/13 00:00	1.00E+00	97.58	0.00	97.58		4/15/2013 13:14	
02	RA-226	MBL	04/09/13 00:00	1.50E+00	90.54	0.00	90.54		4/15/2013 13:14	
03	RA-226	DUP	04/03/13 11:45	1.50E+00	93.56	0.00	93.56		4/15/2013 13:14	
04	RA-226	DO	04/03/13 11:45	1.50E+00	95.16	0.00	95.16		4/15/2013 13:14	
05	RA-226	TRG	04/03/13 11:45	1.35E+00	93.54	0.00	93.54		4/15/2013 13:14	
06	RA-226	TRG	04/03/13 13:27	1.50E+00	84.37	0.00	84.37		4/15/2013 13:14	
07	RA-226	TRG	04/03/13 13:27	1.50E+00	91.02	0.00	91.02		4/15/2013 13:14	
08	RA-226	TRG	04/03/13 13:40	1.50E+00	91.13	0.00	91.13		4/15/2013 13:14	
09	RA-226	TRG	04/03/13 13:40	1.50E+00	100.00	0.00	100.60		4/15/2013 13:14	
10	RA-226	TRG	04/03/13 14:24	1.50E+00	95.27	0.00	95.27		4/15/2013 13:14	
11	RA-226	TRG	04/03/13 14:24	1.50E+00	90.82	0.00	90.82		4/15/2013 13:14	
12	RA-226	TRG	04/03/13 15:05	1.50E+00	80.06	0.00	80.06		4/15/2013 13:14	
13	RA-226	TRG	04/03/13 15:05	1.50E+00	100.00	0.00	102.31		4/15/2013 13:14	
14	RA-226	TRG	04/03/13 15:30	1.50E+00	91.71	0.00	91.71		4/15/2013 13:14	
15	RA-226	TRG	04/03/13 15:30	1.50E+00	87.55	0.00	87.55		4/15/2013 13:14	
16	RA-226	TRG	04/04/13 10:27	1.50E+00	97.72	0.00	97.72		4/15/2013 13:14	
17	RA-226	TRG	04/04/13 10:27	1.50E+00	76.64	0.00	76.64		4/15/2013 13:14	
18	RA-226	TRG	04/04/13 10:42	1.50E+00	92.73	0.00	92.73		4/15/2013 13:14	
19	RA-226	TRG	04/04/13 10:42	1.50E+00	92.24	0.00	92.24		4/15/2013 13:14	

Run	1	Analysis Code	Ra226	Eberline Services Work Order	13-04049	Client	Engineering Management Support, Inc.

2250

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-Ra226-1**

	
Run	<b>1</b>
Analysis Code	<b>Ra226</b>
Eberline Services Work Order	<b>13-04049</b>
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	04/16/13 16:12		A_Spec	Alpha_003	170	2.79 E+02	3.00 E-03	17.5
02	RA-226	MBL	04/16/13 16:12		A_Spec	Alpha_004	170.02	-6.02 E-02	1.80 E-02	19.4
03	RA-226	DUP	04/16/13 16:11		A_Spec	Alpha_010	170.02	3.06 E+01	2.00 E-02	19.7
04	RA-226	DO	04/16/13 16:12		A_Spec	Alpha_011	170	2.45 E+01	3.00 E-03	19.7
05	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_013	170	1.50 E+01	6.00 E-03	18.7
06	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_014	170	1.54 E+01	1.50 E-02	18.5
07	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_018	170	4.96 E+00	1.20 E-02	17.8
08	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_022	170	2.58 E+01	7.00 E-03	15.3
09	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_024	170	6.79 E+00	1.30 E-02	17.1
10	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_025	170	2.26 E+01	8.00 E-03	17.4
11	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_027	170	3.38 E+01	7.00 E-03	17.3
12	RA-226	TRG	04/16/13 16:12		A_Spec	Alpha_029	170	3.15 E+01	3.00 E-03	19.5
13	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_033	170	1.78 E+01	1.00 E-03	18.2
14	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_034	170	2.98 E+01	1.00 E-03	18.6
15	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_035	170	1.57 E+01	2.00 E-03	18.3
16	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_037	170	1.49 E+02	4.00 E-03	17.8
17	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_040	170	1.19 E+02	2.00 E-03	19
18	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_041	170	1.83 E+01	1.00 E-02	19.8
19	RA-226	TRG	04/16/13 16:13		A_Spec	Alpha_042	170	1.55 E+01	3.00 E-03	18.5

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Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/09/13 00:00	1.0000	0.9178	928.4538	408.1000	97.58	2.44	1.00
02	MBL	BLANK	04/09/13 00:00	1.5000	0.9053	915.8087	373.5000	90.54	2.20	1.00
03	DUP	PZ-302-AI TOT	04/03/13 11:45	1.5000	0.9070	917.5285	386.7000	93.56	2.61	1.00
04	DO	PZ-302-AI TOT	04/03/13 11:45	1.5000	0.9068	917.3261	393.2000	95.16	2.61	1.00
05	TRG	PZ-302-AI DIS	04/03/13 11:45	1.3500	0.9070	917.5285	386.6000	93.54	2.55	1.00
06	TRG	LR-100 TOT	04/03/13 13:27	1.5000	0.9036	914.0890	347.4000	84.37	2.53	1.00
07	TRG	LR-100 DIS	04/03/13 13:27	1.5000	0.9046	915.1006	375.2000	91.02	2.58	1.00
08	TRG	D-81 TOT	04/03/13 13:40	1.5000	0.8985	908.9298	373.1000	91.13	2.66	1.00
09	TRG	D-81 DIS	04/03/13 13:40	1.5000	0.8981	908.5251	411.7000	100.60	2.55	1.00
10	TRG	LR-105 TOT	04/03/13 14:24	1.5000	0.9000	910.4472	390.7000	95.27	2.84	1.00
11	TRG	LR-105 DIS	04/03/13 14:24	1.5000	0.9032	913.6843	373.8000	90.82	2.74	1.00
12	TRG	PZ-207-AS TOT	04/03/13 15:05	1.5000	0.9013	911.7623	328.8000	80.06	3.14	1.00
13	TRG	PZ-207-AS DIS	04/03/13 15:05	1.5000	0.8921	902.4555	415.9000	102.31	2.82	1.00
14	TRG	LR-103 TOT	04/03/13 15:30	1.5000	0.8995	909.9414	375.9000	91.71	3.12	1.00
15	TRG	LR-103 DIS	04/03/13 15:30	1.5000	0.9014	911.8635	359.6000	87.55	3.01	1.00
16	TRG	PZ-110-SS TOT	04/04/13 10:27	1.5000	0.9001	910.5484	400.8000	97.72	2.64	1.00
17	TRG	PZ-110-SS DIS	04/04/13 10:27	1.5000	0.9028	913.2797	315.3000	76.64	2.61	1.00
18	TRG	I-62 TOT	04/04/13 10:42	1.5000	0.9012	911.6611	380.8000	92.73	2.61	1.00
19	TRG	I-62 DIS	04/04/13 10:42	1.5000	0.8998	910.2449	378.2000	92.24	2.50	1.00

### Spike and Tracer Worksheet

Internal Work Order					Run	Analysis Code				Date	Technician			Technician Initials		Witness Initials	
<b>13-04049</b>					<b>1</b>	<b>Ra226</b>				<b>4/11/2013 10:47</b>	<b>JBARNARD</b>						
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	44.072	4/11/2013	0.500	0.5221				10.36	0.477	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	1011.608	4/11/2013	0.9178	1.0000														
02	Ba-133	Ba-6a	1011.608	4/11/2013	0.9053	1.0000														
03	Ba-133	Ba-6a	1011.608	4/11/2013	0.9070	1.0000														
04	Ba-133	Ba-6a	1011.608	4/11/2013	0.9068	1.0000														
05	Ba-133	Ba-6a	1011.608	4/11/2013	0.9070	1.0000														
06	Ba-133	Ba-6a	1011.608	4/11/2013	0.9036	1.0000														
07	Ba-133	Ba-6a	1011.608	4/11/2013	0.9046	1.0000														
08	Ba-133	Ba-6a	1011.608	4/11/2013	0.8985	1.0000														
09	Ba-133	Ba-6a	1011.608	4/11/2013	0.8981	1.0000														
10	Ba-133	Ba-6a	1011.608	4/11/2013	0.9000	1.0000														
11	Ba-133	Ba-6a	1011.608	4/11/2013	0.9032	1.0000														
12	Ba-133	Ba-6a	1011.608	4/11/2013	0.9013	1.0000														
13	Ba-133	Ba-6a	1011.608	4/11/2013	0.8921	1.0000														
14	Ba-133	Ba-6a	1011.608	4/11/2013	0.8995	1.0000														
15	Ba-133	Ba-6a	1011.608	4/11/2013	0.9014	1.0000														
16	Ba-133	Ba-6a	1011.608	4/11/2013	0.9001	1.0000														
17	Ba-133	Ba-6a	1011.608	4/11/2013	0.9028	1.0000														
18	Ba-133	Ba-6a	1011.608	4/11/2013	0.9012	1.0000														
19	Ba-133	Ba-6a	1011.608	4/11/2013	0.8998	1.0000														

0.9178 g  
0.9053 g  
-0.9070 g  
-0.9068 g  
.9070  
-0.9036 g  
-0.9046 g  
-0.8985 g  
-0.8981 g  
-0.9000 g  
-0.9032 g  
-0.9013 g  
-0.8921 g  
-0.8995 g  
-0.9014 g  
-0.9001 g  
-0.9028 g  
-0.9012 g  
-0.9001 g  
-0.9028 g  
-0.9012 g  
-0.8998 g

0.5221 g  
0.5158 g

**Matrix Spike**

# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-04049</b>	<b>1</b>	<b>Ra226</b>	<b>liters</b>	<b>4/30/2013</b>	<b>JBARNARD</b>

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.5000E+00	1.5000E+00				
03	PZ-302-AI TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-302-AI TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-302-AI DIS	TRG					1.3500E+00	1.3500E+00				
06	LR-100 TOT	TRG					1.5000E+00	1.5000E+00				
07	LR-100 DIS	TRG					1.5000E+00	1.5000E+00				
08	D-81 TOT	TRG					1.5000E+00	1.5000E+00				
09	D-81 DIS	TRG					1.5000E+00	1.5000E+00				
10	LR-105 TOT	TRG					1.5000E+00	1.5000E+00				
11	LR-105 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-207-AS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-207-AS DIS	TRG					1.5000E+00	1.5000E+00				
14	LR-103 TOT	TRG					1.5000E+00	1.5000E+00				
15	LR-103 DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-110-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-110-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	I-62 TOT	TRG					1.5000E+00	1.5000E+00				
19	I-62 DIS	TRG					1.5000E+00	1.5000E+00				

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

*JB* Date: 4/11/13

9226

# Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
<b>13-04049</b>	<b>1</b>	<b>Ra226</b>			<b>LWALKER</b>

TRetek Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Carrier Data	Filter Data			Gravimetric
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery
01	LCS	LCS		0.0226	0.0294	0.0068	
02	BLANK	MBL		0.0225	0.0286	0.0061	
03	DUP	DUP		0.0225	0.0299	0.0074	
04	PZ-302-AI TOT	DO		0.0225	0.0299	0.0074	
05	PZ-302-AI DIS	TRG		0.0224	0.0296	0.0072	
06	LR-100 TOT	TRG		0.0222	0.0293	0.0071	
07	LR-100 DIS	TRG		0.0222	0.0295	0.0073	
08	D-81 TOT	TRG		0.0223	0.0299	0.0076	
09	D-81 DIS	TRG		0.0222	0.0294	0.0072	
10	LR-105 TOT	TRG		0.0223	0.0306	0.0083	
11	LR-105 DIS	TRG		0.0224	0.0303	0.0079	
12	PZ-207-AS TOT	TRG		0.0223	0.0318	0.0095	
13	PZ-207-AS DIS	TRG		0.0225	0.0307	0.0082	
14	LR-103 TOT	TRG		0.0222	0.0316	0.0094	
15	LR-103 DIS	TRG		0.0222	0.0312	0.0090	
16	PZ-110-SS TOT	TRG		0.0222	0.0297	0.0075	
17	PZ-110-SS DIS	TRG		0.0220	0.0294	0.0074	
18	I-62 TOT	TRG		0.0222	0.0296	0.0074	
19	I-62 DIS	TRG		0.0223	0.0293	0.0070	

Technician: *L Walker*

Date: *4.15.13*

0327



Sample Description: SPIKE  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 01  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_003  
 Chamber Serial Number:  
 Detector Serial Number: 3  
 Env. Background: System Bkgd 54570  
 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: 4/16/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:04 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9758 +/- 0.0000  
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM  
 Effective Efficiency: 0.1704 +/- 0.0032

Control Certificate Name: Ra226\_Ra-5b  
 Chem. Recov. of Control: RA-226 0.419276 +/- 0.029154  
 Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.535	556.24	8.35	4.76	0.00E+000	4.4
RA-226	4.731	279.49	11.74	0.51	0.00E+000	5.7

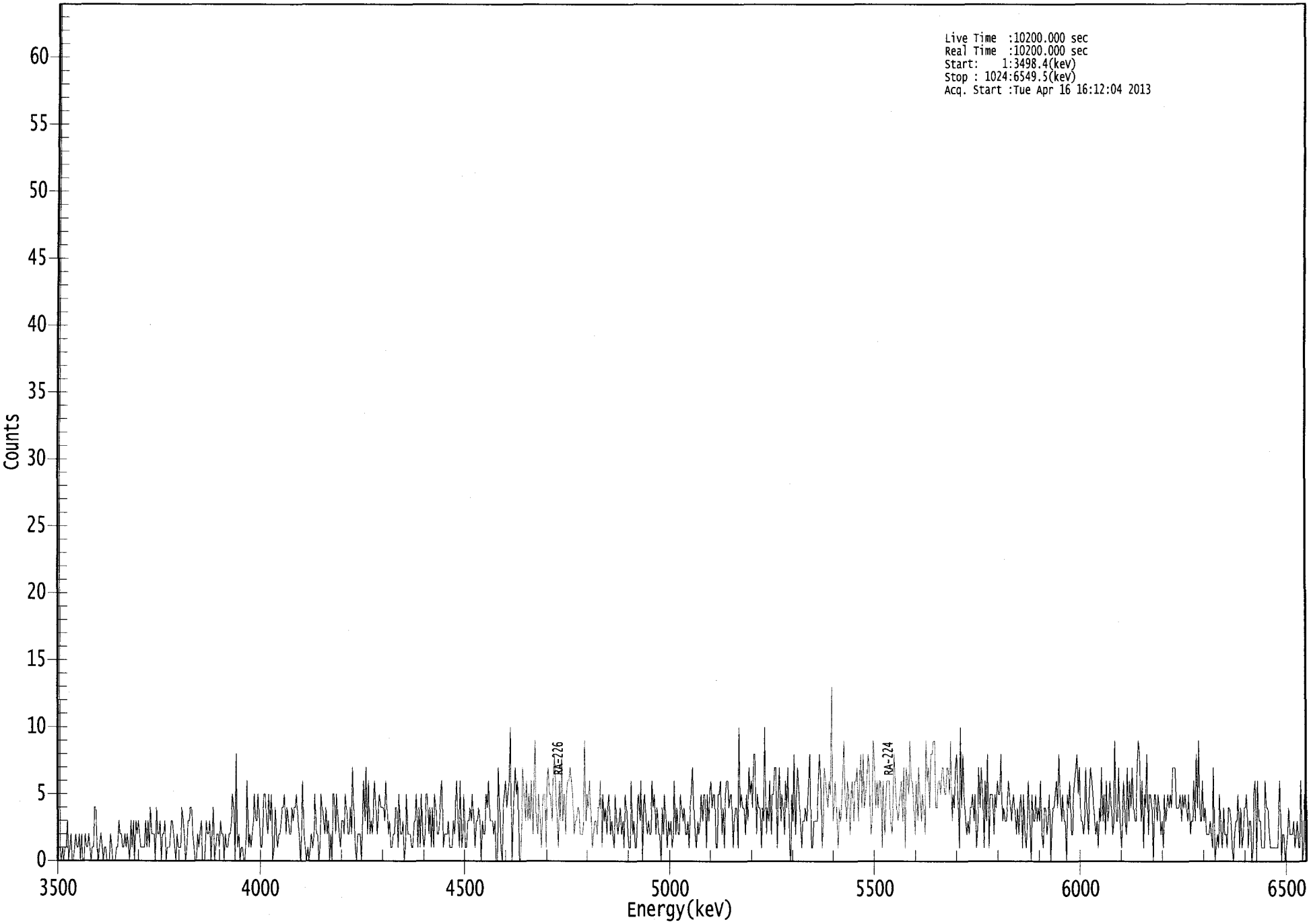
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 ----- NUCLIDE ANALYSIS RESULTS -----  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.971	5685.50*	2.27E+001 +/- 7.28E+002	4.28E-001 +/- 1.37E+001
RA-226	0.996	4785.00*	1.06E+001 +/- 1.30E+000	1.99E-001 +/- 7.29E-003

US EPA ARCHIVE DOCUMENT

000055635.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3498.4(kev)  
Stop : 1024:6549.5(kev)  
Acq. Start :Tue Apr 16 16:12:04 2013



6250  
ROI Type: 1



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

Sample Title: 01

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 5 6 4 5 6 10 0 3

Sample Title: 01

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

801: 3 3 5 3 4 3 6 2

Sample Title: 01

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



C  
4/17/13

Sample Description: BLANK  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 02  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_004  
 Chamber Serial Number:  
 Detector Serial Number: 4  
 Env. Background: System Bkgd 54571  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.200E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/16/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:05 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9054 +/- 0.0000  
 Counting Efficiency: 0.1940 +/- 0.0036 on 12/15/2012 11:26:46 AM  
 Effective Efficiency: 0.1757 +/- 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	5.673	-2.57	96.67	3.57	0.00E+000	2.9
RA-226	4.638	-0.06	6103.7	3.06	0.00E+000	2.9

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

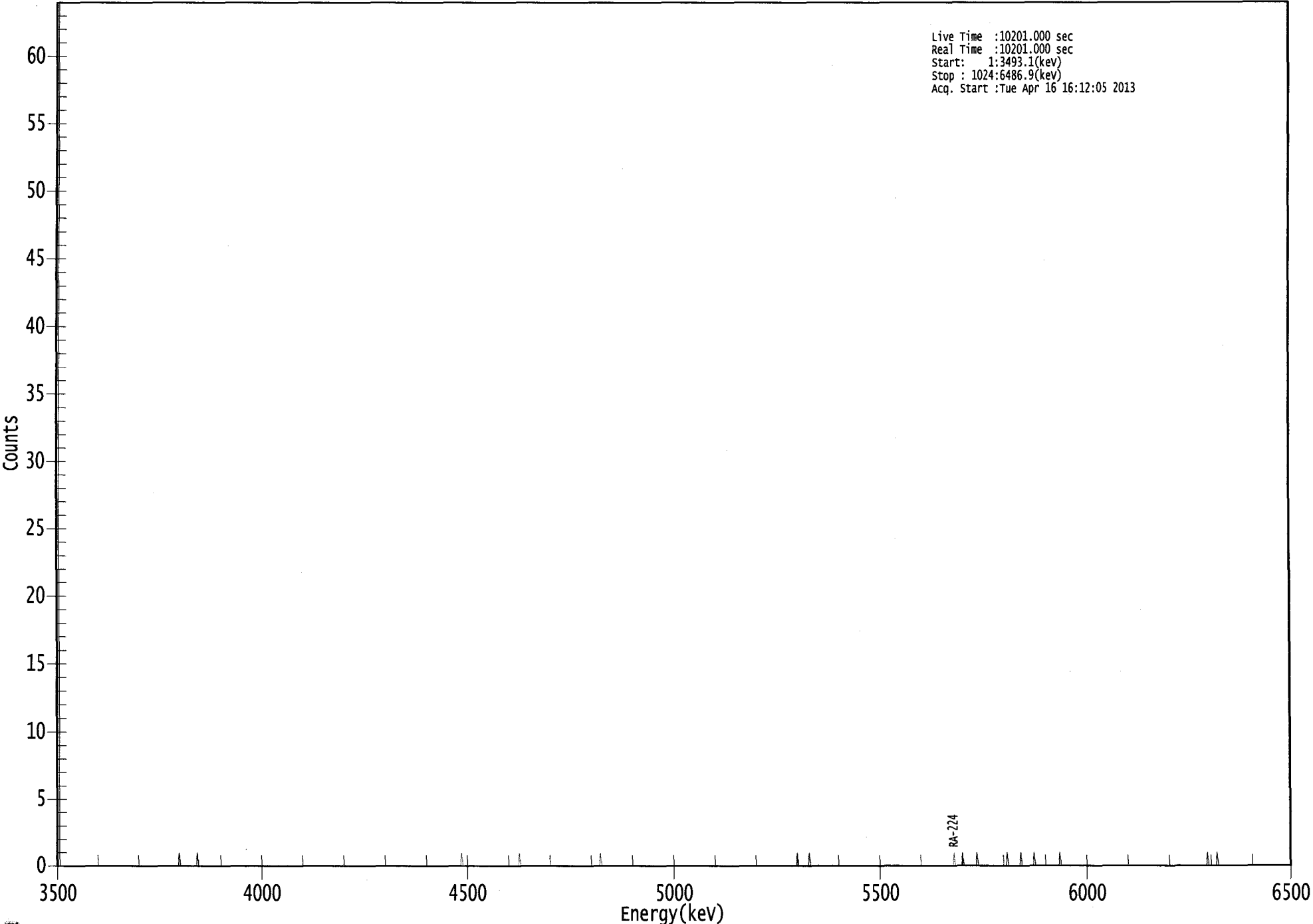
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	1.000	5685.50*	-6.12E-002 +/- 1.96E+000	2.25E-001 +/- 7.19E+000
RA-226	0.972	4785.00*	-1.33E-003 +/- 8.13E-002	1.98E-001 +/- 7.11E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055595.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3493.1(kev)  
Stop : 1024:6486.9(kev)  
Acq. Start :Tue Apr 16 16:12:05 2013



0324  
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: 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	1	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	0	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	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel								
377:	0	0	0	0	0	0	0	0
385:	0	1	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	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	1	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	1
617:	0	0	0	0	0	0	0	0
625:	0	1	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	0	0	0	0	0	0
753:	1	0	0	0	0	0	0	0
761:	0	0	0	0	1	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	1	0	0
793:	0	0	0	0	0	0	0	0

801: 1 0 0 0 0 0 0 0 0

Sample Title: 02

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





C  
4/17/13

Sample Description: PZ-302-AI TOT DUP  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 03  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_010  
 Chamber Serial Number:  
 Detector Serial Number: 10  
 Env. Background: System Bkgd 54572  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:11:59 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9356 +/- 0.0000  
 Counting Efficiency: 0.1967 +/- 0.0036 on 12/15/2012 11:26:40 AM  
 Effective Efficiency: 0.1840 +/- 0.0034

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.550	10.43	71.82	3.57	0.00E+000	4.4
RA-226	4.599	30.60	37.67	3.40	0.00E+000	2.9

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

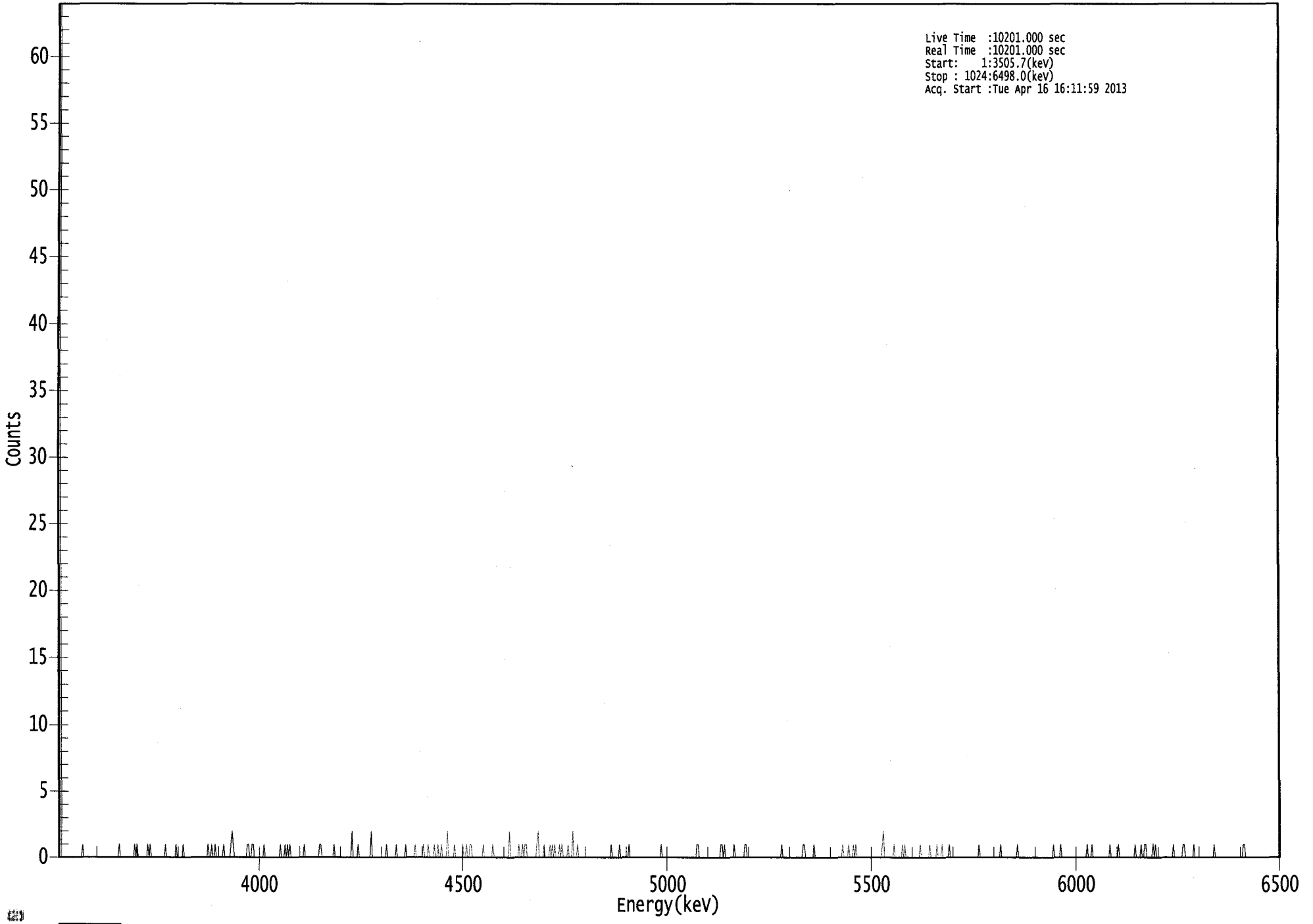
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.976	5685.50*	3.40E-001 +/- 9.90E+001	3.07E-001 +/- 8.95E+001
RA-226	0.956	4785.00*	7.66E-001 +/- 2.90E-001	2.32E-001 +/- 8.30E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055592.CNF

Live Time :10201.000 sec  
Real Time :10201.000 sec  
Start: 1:3505.7(kev)  
Stop : 1024:6498.0(kev)  
Acq. Start :Tue Apr 16 16:11:59 2013



6550  
6550  
6550  
ROI Type: 1

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

Sample Title: 03

Elapsed Live time: 10201

Elapsed Real Time: 10201

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

369: 0 0 0 0 0 0 0 0

Sample Title: 03

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

801: 0 0 0 0 1 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	1	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	1	0
865:	0	0	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	1	0	0	0	0	0	0
889:	1	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	1	0
905:	0	0	0	1	0	0	1	1
913:	0	0	0	0	0	1	0	1
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	1	0
937:	0	0	0	0	0	0	1	1
945:	0	0	0	0	0	0	0	1
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	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:	1	1	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



c  
4/17/13

Sample Description: PZ-302-AI TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 04  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_011  
 Chamber Serial Number:  
 Detector Serial Number: 11  
 Env. Background: System Bkgd 54573  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:01 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9516 +/- 0.0000  
 Counting Efficiency: 0.1973 +/- 0.0042 on 12/15/2012 11:28:06 AM  
 Effective Efficiency: 0.1878 +/- 0.0040

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	5.476	10.43	71.82	3.57	0.00E+000	2.7
RA-226	4.590	24.49	40.09	0.51	0.00E+000	2.7

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

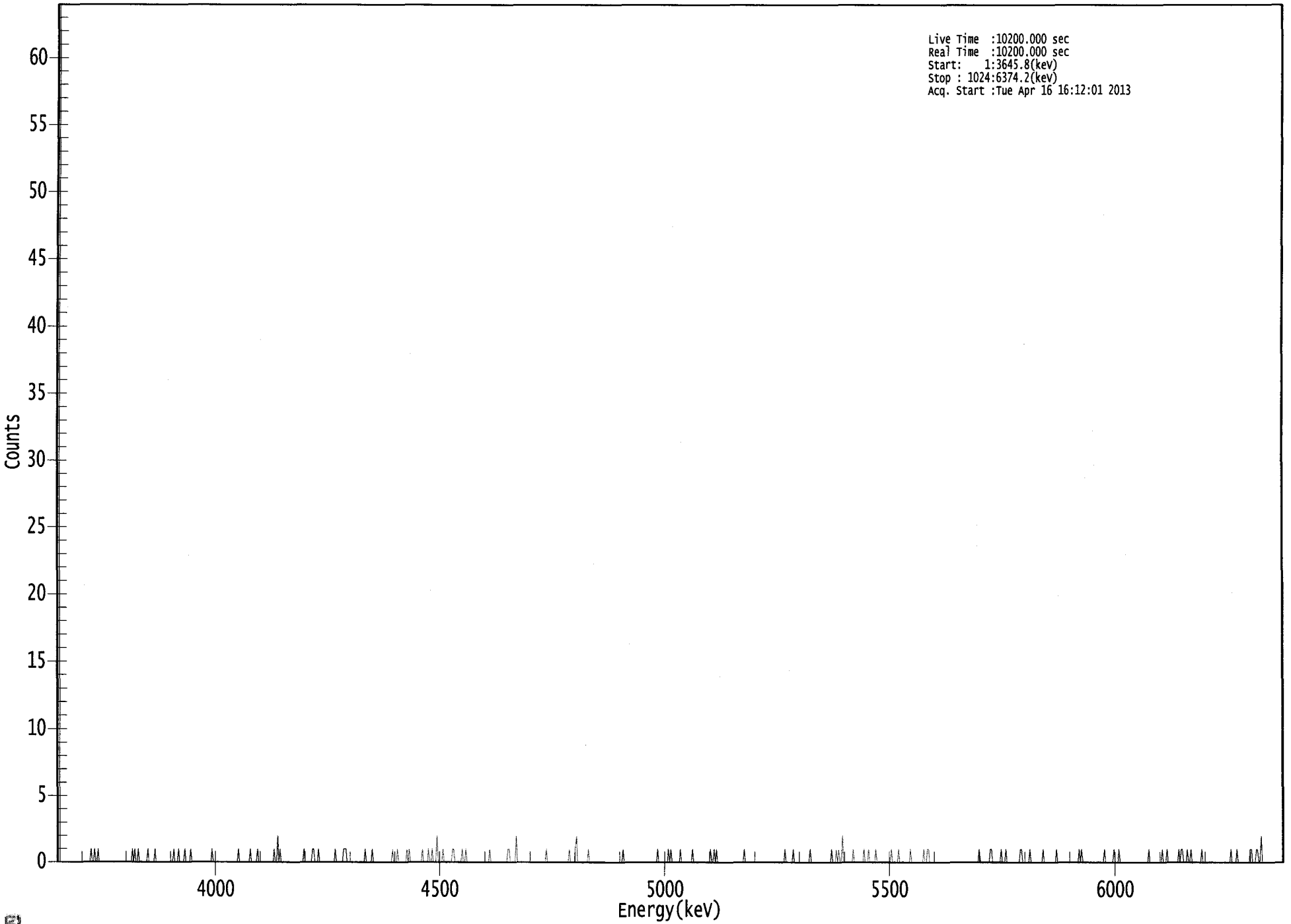
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.944	5685.50*	3.33E-001 +/- 9.71E+001	3.01E-001 +/- 8.77E+001
RA-226	0.952	4785.00*	6.01E-001 +/- 2.42E-001	1.29E-001 +/- 5.32E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055593.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3645.8(kev)  
Stop : 1024:6374.2(kev)  
Acq. Start :Tue Apr 16 16:12:01 2013



PSD  
ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0
25:	0	0	0	0	1	0	0	1
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	1
65:	0	1	0	0	1	0	0	0
73:	0	0	0	0	1	0	0	0
81:	0	0	1	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	1	0	0	0	1	0
105:	0	0	0	1	0	0	0	0
113:	1	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	1	0	0	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	1	0	0	0	0	0	0	0
161:	0	0	1	0	0	0	0	0
169:	1	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	1	0
185:	0	2	0	1	0	0	0	0
193:	0	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	1
209:	0	0	0	0	0	0	1	1
217:	0	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	0	1	0	0	0	0	0	0
241:	1	1	1	0	0	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	1	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	1	0	1
297:	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	0	0	1
313:	0	0	1	0	0	0	2	0
321:	0	0	0	1	0	0	0	0
329:	0	0	0	1	1	0	0	0
337:	0	0	0	1	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	1	0	0	0	0	0



369: 0 0 0 0 0 0 0 0 0

Sample Title: 04

Channel	1	2	3	4	5	6	7	8
377:	0	1	1	0	0	0	0	0
385:	2	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	1	0	0	0
433:	0	1	2	0	0	0	0	0
441:	0	0	0	0	1	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	1	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	1	0
505:	0	0	0	0	0	0	0	1
513:	0	1	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	0	1	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	1	0	0	1	0	1
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	1	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	1
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	1	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	1
649:	0	0	0	1	0	1	0	0
657:	2	0	0	0	0	0	0	0
665:	0	1	0	0	0	0	0	0
673:	0	0	1	0	0	0	1	0
681:	0	0	0	0	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	1	0	0	0	0	0	1
705:	0	0	0	0	0	0	0	0
713:	0	1	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	1
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	1	0	0	0	0	0
777:	0	0	0	1	1	0	0	0
785:	0	0	0	0	1	0	0	0
793:	1	0	0	0	0	0	0	0

801: 0 0 0 0 1 1 0 0

Sample Title: 04

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



*c*  
*2/1/13*

Sample Description: PZ-302-AI DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 05  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_013  
 Chamber Serial Number:  
 Detector Serial Number: 13  
 Env. Background: System Bkgd 54574  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:01 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9354 +/- 0.0000  
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM  
 Effective Efficiency: 0.1748 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.483	8.92	81.31	4.08	0.00E+000	2.8
RA-226	4.606	14.98	52.62	1.02	0.00E+000	2.8

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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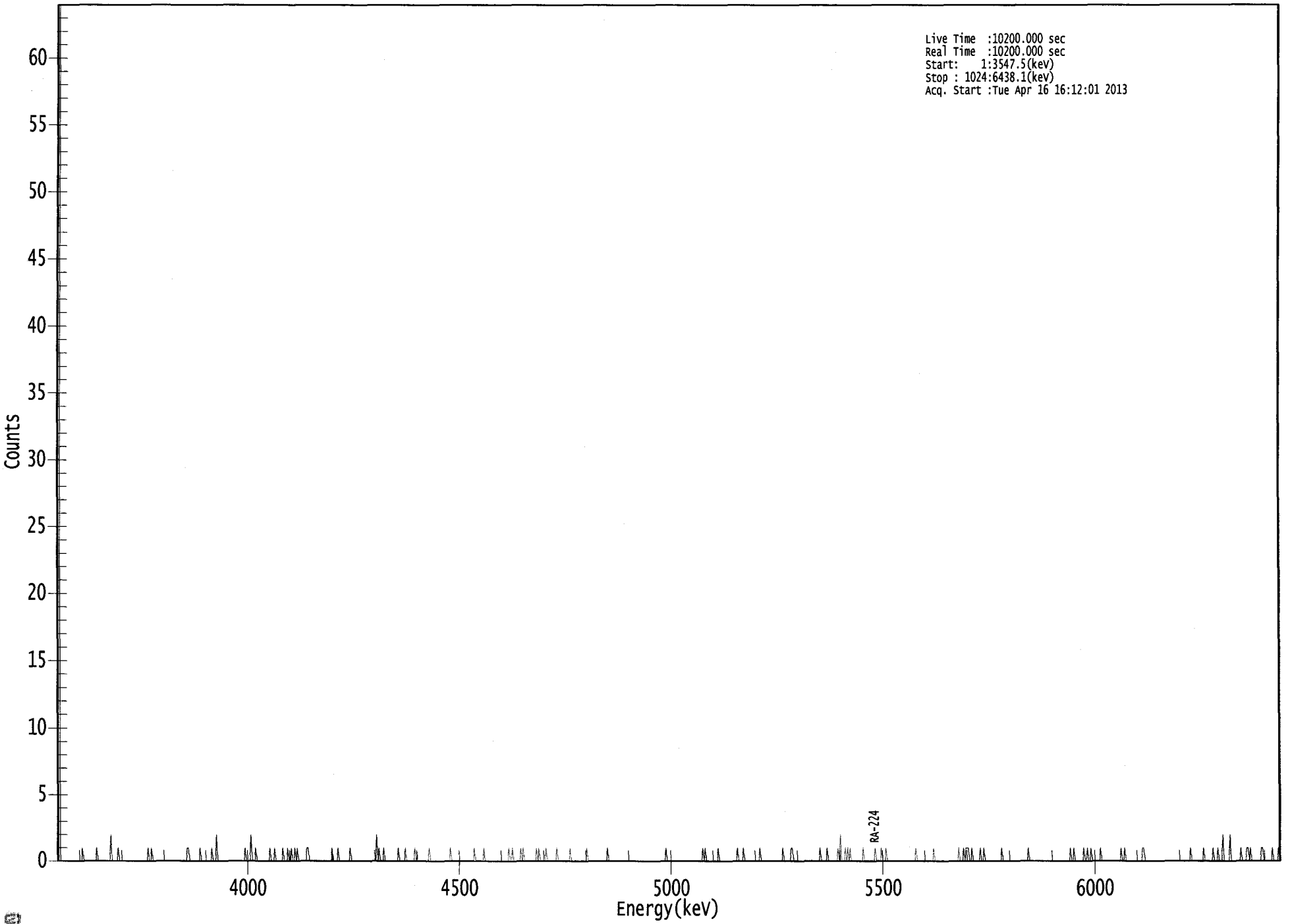
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.947	5685.50*	2.99E-001 +/- 8.71E+001	3.32E-001 +/- 9.66E+001
RA-226	0.959	4785.00*	3.86E-001 +/- 2.04E-001	1.62E-001 +/- 5.88E-003

*AG*  
*4/17/13*

US EPA ARCHIVE DOCUMENT

000055596.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3547.5(kev)  
Stop : 1024:6438.1(kev)  
Acq. Start :Tue Apr 16 16:12:01 2013



5750

ROI Type: 1

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 \*\*\*\*\* S P E C T R A L   D A T A   R E P O R T   \*\*\*\*\*  
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Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	-----	-----	-----	-----	-----	-----	-----	-----
1:	10200	10200	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	1	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	2	0	0
49:	0	0	0	1	0	0	0	0
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	0	0	0	1	0	0	1
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	1	1	0
113:	0	0	0	0	0	0	0	0
121:	1	0	0	0	0	0	0	0
129:	0	0	1	0	0	0	2	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	2	0	0	0	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	1	0	0	0	1
185:	0	0	0	0	0	0	1	0
193:	0	0	1	0	0	1	0	0
201:	1	0	1	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	0	0	0	0	0	0	1
233:	0	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	1	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0
265:	0	0	0	0	2	0	1	0
273:	0	0	1	0	0	0	0	0
281:	0	0	0	0	0	0	1	0
289:	0	0	0	0	1	0	0	0
297:	0	0	0	0	1	0	0	0
305:	0	0	0	0	0	0	0	0
313:	1	0	0	0	0	0	0	0
321:	0	0	0	0	0	0	0	0
329:	0	0	1	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:	0	0	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0

Sample Title: 05

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 05

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



4/17/13

Sample Description: LR-100 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 06  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_014  
 Chamber Serial Number:  
 Detector Serial Number: 14  
 Env. Background: System Bkgd 54575  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.530E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:03 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8437 +/- 0.0000  
 Counting Efficiency: 0.1846 +/- 0.0034 on 12/15/2012 11:26:44 AM  
 Effective Efficiency: 0.1557 +/- 0.0029

Peak Match Tolerance: 0.350 MeV

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 -----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.516	3.77	142.84	3.23	0.00E+000	2.9
RA-226	4.619	15.45	54.47	2.55	0.00E+000	2.9

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 -----  
 NUCLIDE ANALYSIS RESULTS  
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Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.963	5685.50*	1.41E-001 +/- 4.10E+001	3.40E-001 +/- 9.90E+001
RA-226	0.965	4785.00*	4.43E-001 +/- 2.42E-001	2.41E-001 +/- 8.75E-003

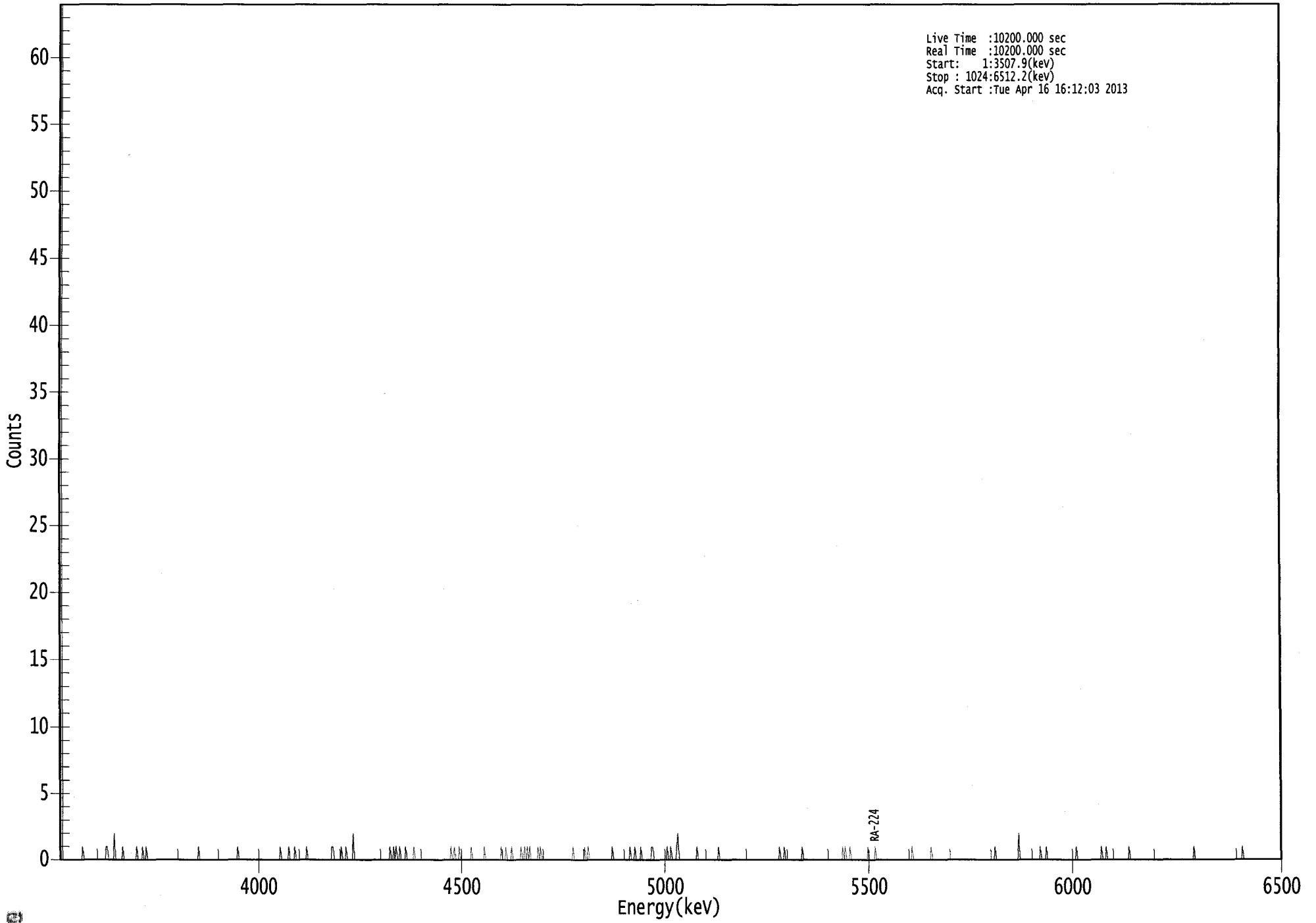
AG  
4/17/13

US EPA ARCHIVE DOCUMENT



0000055597.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3507.9(keV)  
Stop : 1024:6512.2(keV)  
Acq. Start :Tue Apr 16 16:12:03 2013



7550

ROI Type: 1

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\*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 0 0 0 1

Sample Title: 06

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

801: 0 0 0 0 2 0 0 0

Sample Title: 06

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



*C*  
*YHJ*

Sample Description: LR-100 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 07  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_018  
 Chamber Serial Number:  
 Detector Serial Number: 18  
 Env. Background: System Bkgd 54576  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.580E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:33 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9102 +/- 0.0000  
 Counting Efficiency: 0.1776 +/- 0.0033 on 12/15/2012 1:57:26 PM  
 Effective Efficiency: 0.1617 +/- 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	5.472	1.94	237.37	3.06	0.00E+000	3.1
RA-226	4.596	4.96	107.11	2.04	0.00E+000	3.1

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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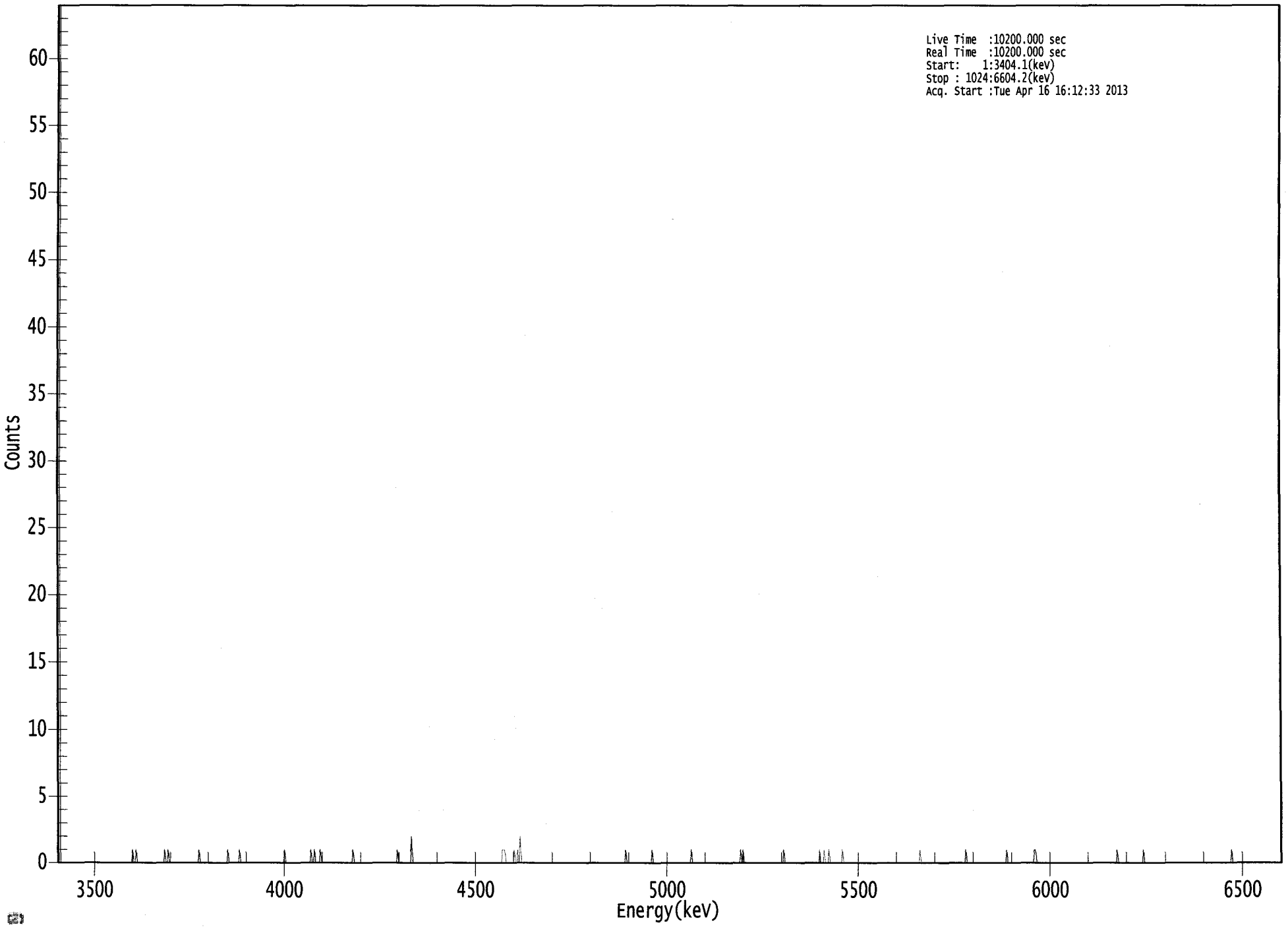
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.942	5685.50*	7.11E-002 +/- 2.07E+001	3.28E-001 +/- 9.54E+001
RA-226	0.954	4785.00*	1.40E-001 +/- 1.50E-001	2.20E-001 +/- 8.00E-003

*AG*  
*4/17/13*

US EPA ARCHIVE DOCUMENT

000055598.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3404.1(kev)  
Stop : 1024:6604.2(kev)  
Acq. Start :Tue Apr 16 16:12:33 2013



ROI Type: 1

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

Sample Title: 07

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 1 1 1

Sample Title: 07

Channel	1	2	3	4	5	6	7	8
377:	0	0	0	0	0	0	0	1
385:	0	0	1	0	2	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	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	1	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	1	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	1	0	1	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	1	0
641:	0	0	1	0	0	0	1	0
649:	0	0	0	0	0	0	0	0
657:	0	1	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	1	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	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	1	0	0	0	0	0



801: 0 0 0 0 0 0 0 0 0

Sample Title: 07

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	1	1	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	1	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	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	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	1	0	0
985:	0	0	0	0	0	0	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  
4/17/13

Sample Description: D-81 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000555  
 Batch Identification: 1304049A-RA  
 Sample Identification: 08  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_022  
 Chamber Serial Number:  
 Detector Serial Number: 22  
 Env. Background: System Bkgd 54577  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.660E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:34 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9113 +/- 0.0000  
 Counting Efficiency: 0.1531 +/- 0.0029 on 12/15/2012 1:57:26 PM  
 Effective Efficiency: 0.1396 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.509	20.45	46.40	2.55	0.00E+000	3.1
RA-226	4.600	25.81	39.61	1.19	0.00E+000	3.1

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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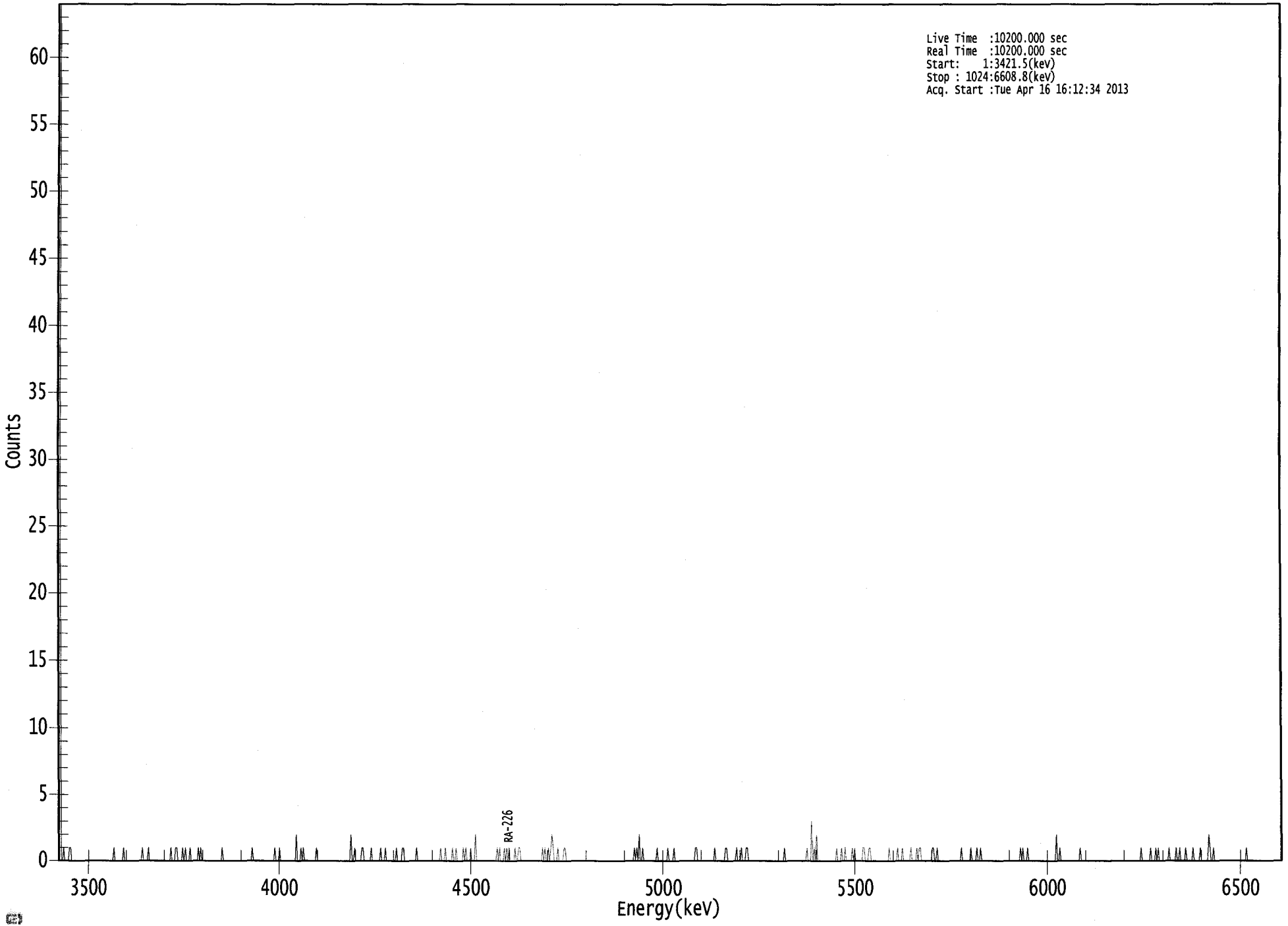
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.960	5685.50*	8.96E-001 +/- 2.61E+002	3.67E-001 +/- 1.07E+002
RA-226	0.956	4785.00*	8.69E-001 +/- 3.46E-001	2.22E-001 +/- 8.28E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055599.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3421.5(kev)  
Stop : 1024:6608.8(kev)  
Acq. Start :Tue Apr 16 16:12:34 2013



0364

ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 0 1 0 0 0 1 0

Sample Title: 08

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

Sample Title: 08

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



C  
4/17/13

Sample Description: D-81 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 09  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_024  
 Chamber Serial Number:  
 Detector Serial Number: 24  
 Env. Background: System Bkgd 54578  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.550E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:35 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

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

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.520	8.79	75.21	2.21	0.00E+000	3.1
RA-226	4.580	6.79	88.39	2.21	0.00E+000	6.2

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

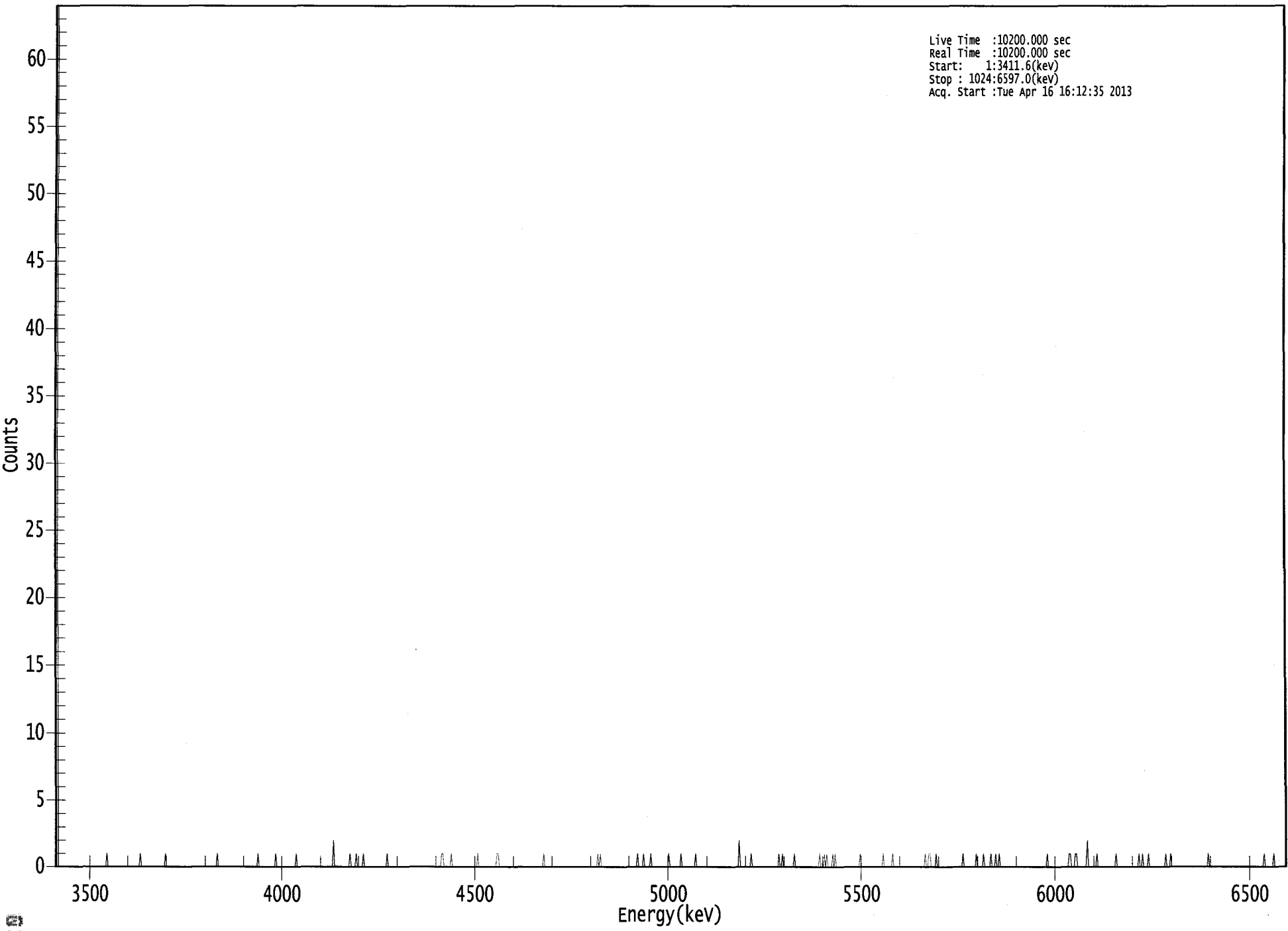
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.964	5685.50*	3.01E-001 +/- 8.78E+001	2.74E-001 +/- 7.98E+001
RA-226	0.947	4785.00*	1.79E-001 +/- 1.58E-001	2.11E-001 +/- 7.71E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055600.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3411.6(kev)  
Stop : 1024:6597.0(kev)  
Acq. Start :Tue Apr 16 16:12:35 2013



5560  
ROI Type: 1



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

Sample Title: 09

Elapsed Live time: 10200

Elapsed Real Time: 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	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	1
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	1	0	0	0
97:	0	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0	0
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0	1
137:	0	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0	0
161:	0	0	0	0	0	0	0	0
169:	0	1	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	1	0	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0	0
233:	2	0	0	0	0	0	0	0
241:	0	0	0	0	0	0	1	0
249:	0	0	0	1	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	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	1	1	0	0	0	0
329:	0	0	1	0	0	0	0	0
337:	0	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0
353:	1	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0

369: 1 1 0 0 0 0 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	1
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	1	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	0	0	0	1	0	0
489:	0	0	1	0	0	0	0	0
497:	1	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	1
513:	0	0	0	0	0	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	0	0	0	0	1	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	2	0	0	0	0	0	0
577:	0	0	0	1	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	1	0	0	1	0	0
609:	0	0	0	0	0	0	0	1
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	1	0	0	0
641:	1	0	1	0	0	0	0	1
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	1	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	1	0	0	0	0	0	0
697:	0	1	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	1	0	0	1
729:	1	0	0	0	0	1	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	1	0
769:	0	0	0	0	1	0	0	0
777:	0	0	1	0	0	0	1	0
785:	0	1	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 09

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	1	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	1	1	0	0	0
849:	1	1	0	0	0	0	0	0
857:	0	0	2	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	1	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	1	0	0
905:	1	0	0	0	0	1	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	1	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	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	1	0	0	0
1009:	0	0	0	0	1	0	0	0
1017:	0	0	0	0	0	0	0	0



4/17/13

Sample Description: LR-105 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 10  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_025  
 Chamber Serial Number:  
 Detector Serial Number: 25  
 Env. Background: System Bkgd 54579  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.840E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:36 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9527 +/- 0.0000  
 Counting Efficiency: 0.1736 +/- 0.0032 on 12/15/2012 1:57:27 PM  
 Effective Efficiency: 0.1653 +/- 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	5.568	17.47	49.24	1.53	0.00E+000	3.1
RA-226	4.576	22.64	42.62	1.36	0.00E+000	4.7

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

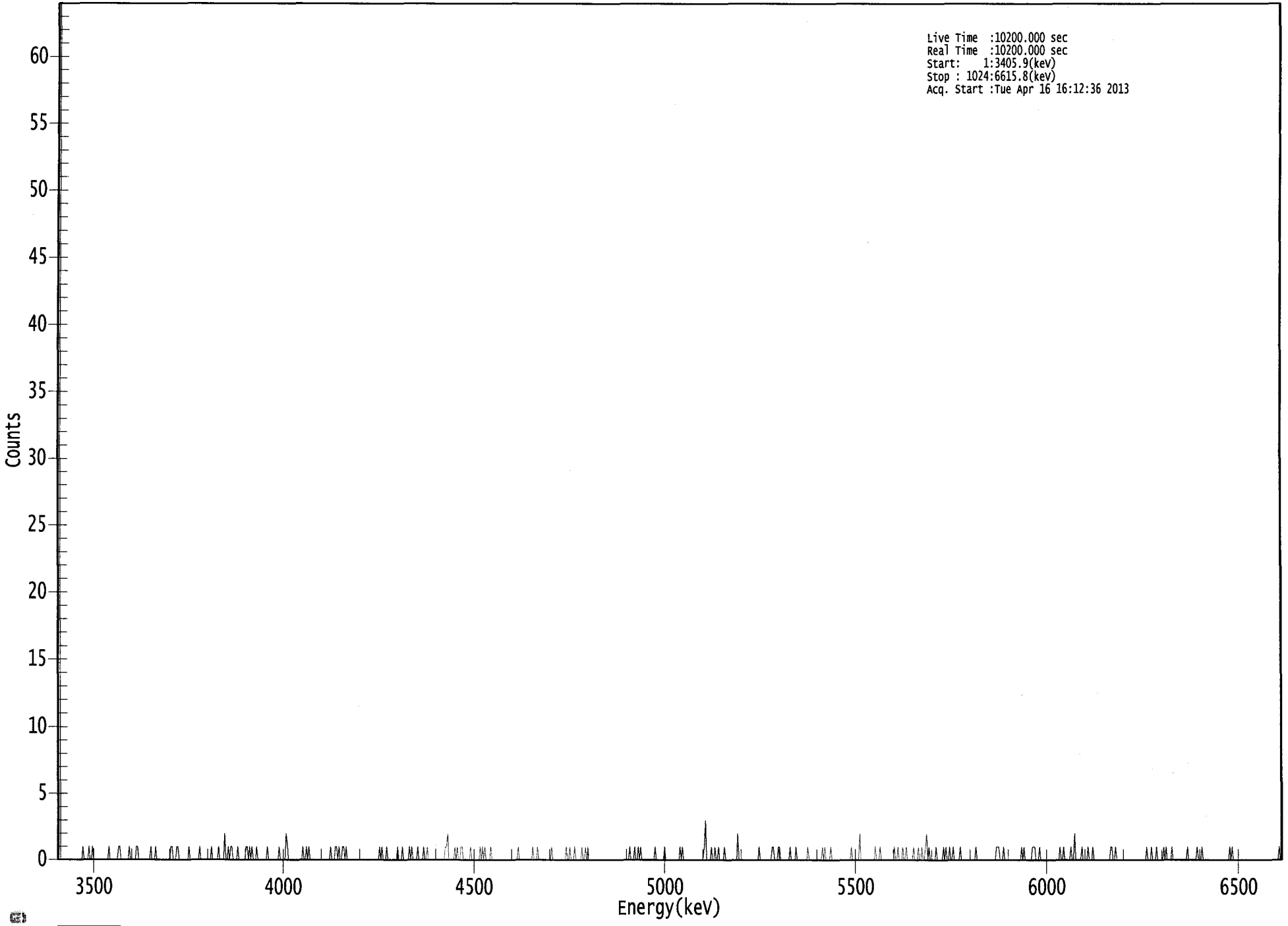
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.982	5685.50*	6.90E-001 +/- 2.01E+002	2.81E-001 +/- 8.18E+001
RA-226	0.945	4785.00*	6.87E-001 +/- 2.94E-001	2.08E-001 +/- 7.60E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055601.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3405.9(keV)  
Stop : 1024:6615.8(keV)  
Acq. Start :Tue Apr 16 16:12:36 2013



5374

ROI Type: 1

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

Sample Title: 10

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 0

Sample Title: 10

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

801: 0 0 0 0 0 0 1 0

Sample Title: 10

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





C  
4/17/13

Sample Description: LR-105 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 11  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_027  
 Chamber Serial Number:  
 Detector Serial Number: 27  
 Env. Background: System Bkgd 54580  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.740E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:37 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9082 +/- 0.0000  
 Counting Efficiency: 0.1728 +/- 0.0032 on 12/15/2012 2:27:41 PM  
 Effective Efficiency: 0.1569 +/- 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	5.508	9.47	69.45	1.53	0.00E+000	3.2
RA-226	4.602	33.81	34.40	1.19	0.00E+000	4.8

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

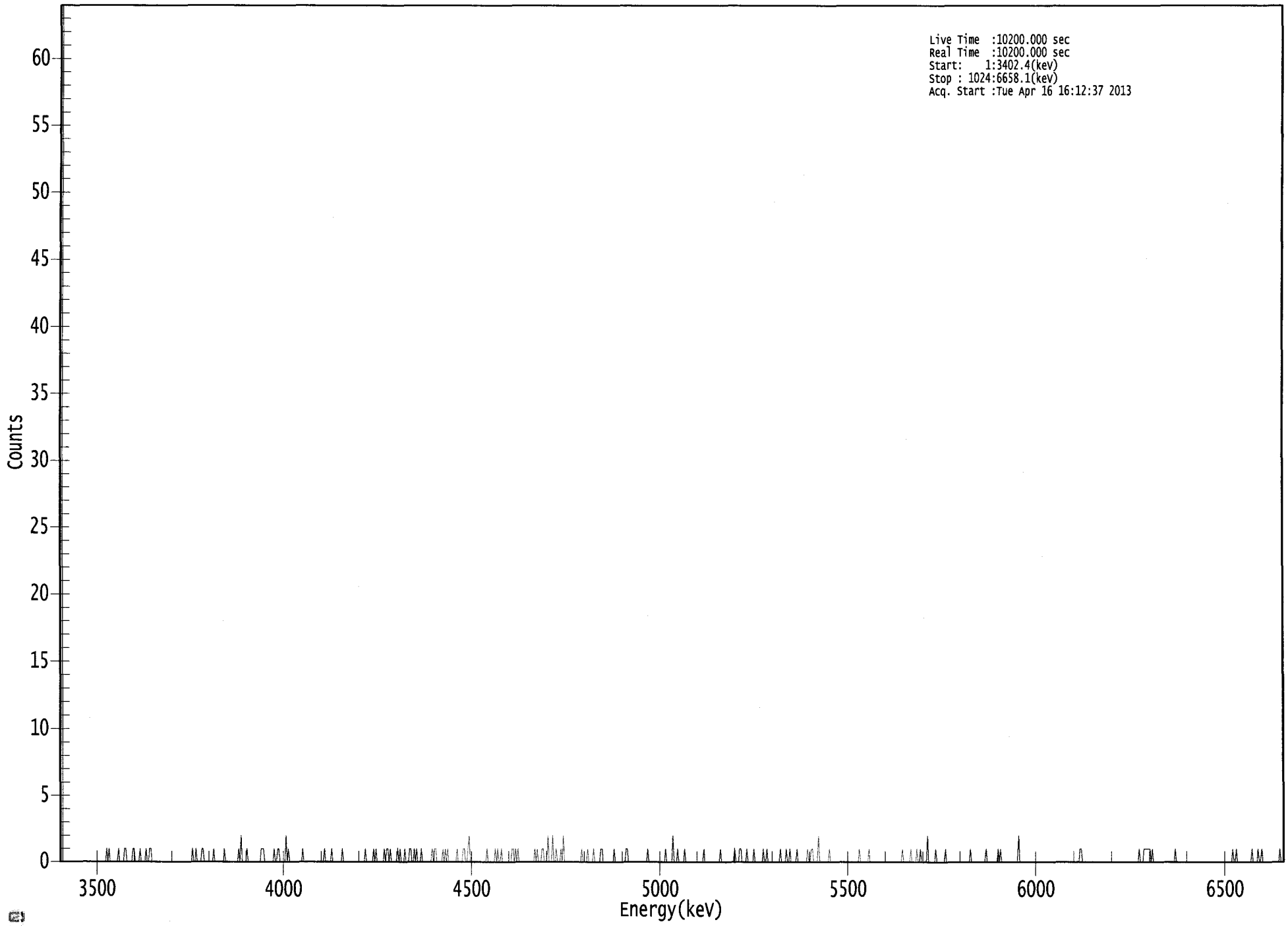
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.959	5685.50*	3.80E-001 +/- 1.11E+002	2.85E-001 +/- 8.31E+001
RA-226	0.957	4785.00*	1.04E+000 +/- 3.61E-001	2.03E-001 +/- 7.47E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

0000055602.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3402.4(kev)  
Stop : 1024:6658.1(kev)  
Acq. Start :Tue Apr 16 16:12:37 2013



0379  
6250

ROI Type: 1

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

Sample Title: 11

Elapsed Live time: 10200

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

369: 0 0 1 0 0 0 0 0

Sample Title: 11

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

801: 0 0 2 0 0 0 0 0

Sample Title: 11

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



# Apex-Alpha™

c  
4/17/13

Sample Description: PZ-207-AS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 12  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_029  
 Chamber Serial Number:  
 Detector Serial Number: 29  
 Env. Background: System Bkgd 54581  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 3.140E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:12:38 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8006 +/- 0.0000  
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM  
 Effective Efficiency: 0.1557 +/- 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	5.526	19.64	45.98	1.36	0.00E+000	3.1
RA-226	4.573	31.49	35.26	0.51	0.00E+000	6.2

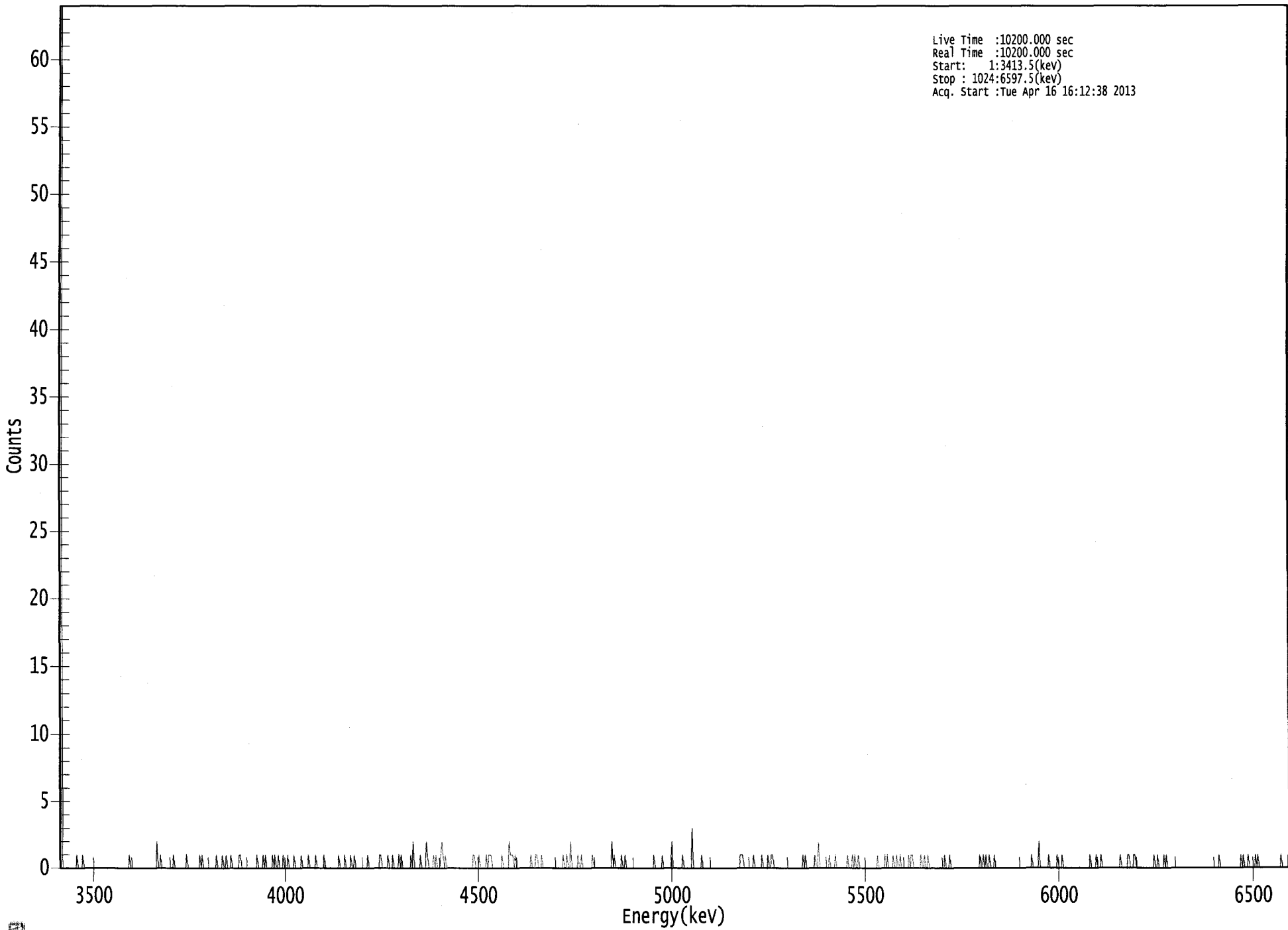
-----  
 NUCLIDE ANALYSIS RESULTS  
 -----

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.967	5685.50*	9.10E-001 +/- 2.65E+002	3.18E-001 +/- 9.26E+001
RA-226	0.943	4785.00*	1.12E+000 +/- 3.97E-001	1.87E-001 +/- 6.73E-003

AG  
4/17/13

000055603.CNF

Live Time :10200.000 sec  
Real Time :10200.000 sec  
Start: 1:3413.5(kev)  
Stop : 1024:6597.5(kev)  
Acq. Start :Tue Apr 16 16:12:38 2013



0504

ROI Type: 1

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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



369: 0 1 0 0 0 0 0 2

Sample Title: 12

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	1	0	0	0	0	0	2
817:	0	0	0	0	0	0	0	1
825:	0	0	0	0	0	0	1	0
833:	0	0	1	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	1	0	0	0	0	1	0
865:	0	0	1	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	1	0	0	0	0	0
889:	1	1	0	0	0	1	1	0
897:	0	0	0	0	0	0	0	0
905:	0	0	0	0	0	0	1	0
913:	0	1	0	0	0	0	1	0
921:	1	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	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	1	0
985:	1	0	0	0	1	0	0	0
993:	0	0	1	0	1	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	1	0	0



C  
4/17/13

Sample Description: PZ-207-AS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 13  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_033  
 Chamber Serial Number: 04026479A  
 Detector Serial Number: 91132  
 Env. Background: System Bkgd 54582  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.820E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:16 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000  
 Counting Efficiency: 0.1825 +/- 0.0032 on 12/16/2012 5:49:18 PM  
 Effective Efficiency: 0.1825 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.529	14.32	53.21	0.68	0.00E+000	3.0
RA-226	4.578	17.83	46.68	0.17	0.00E+000	3.0

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

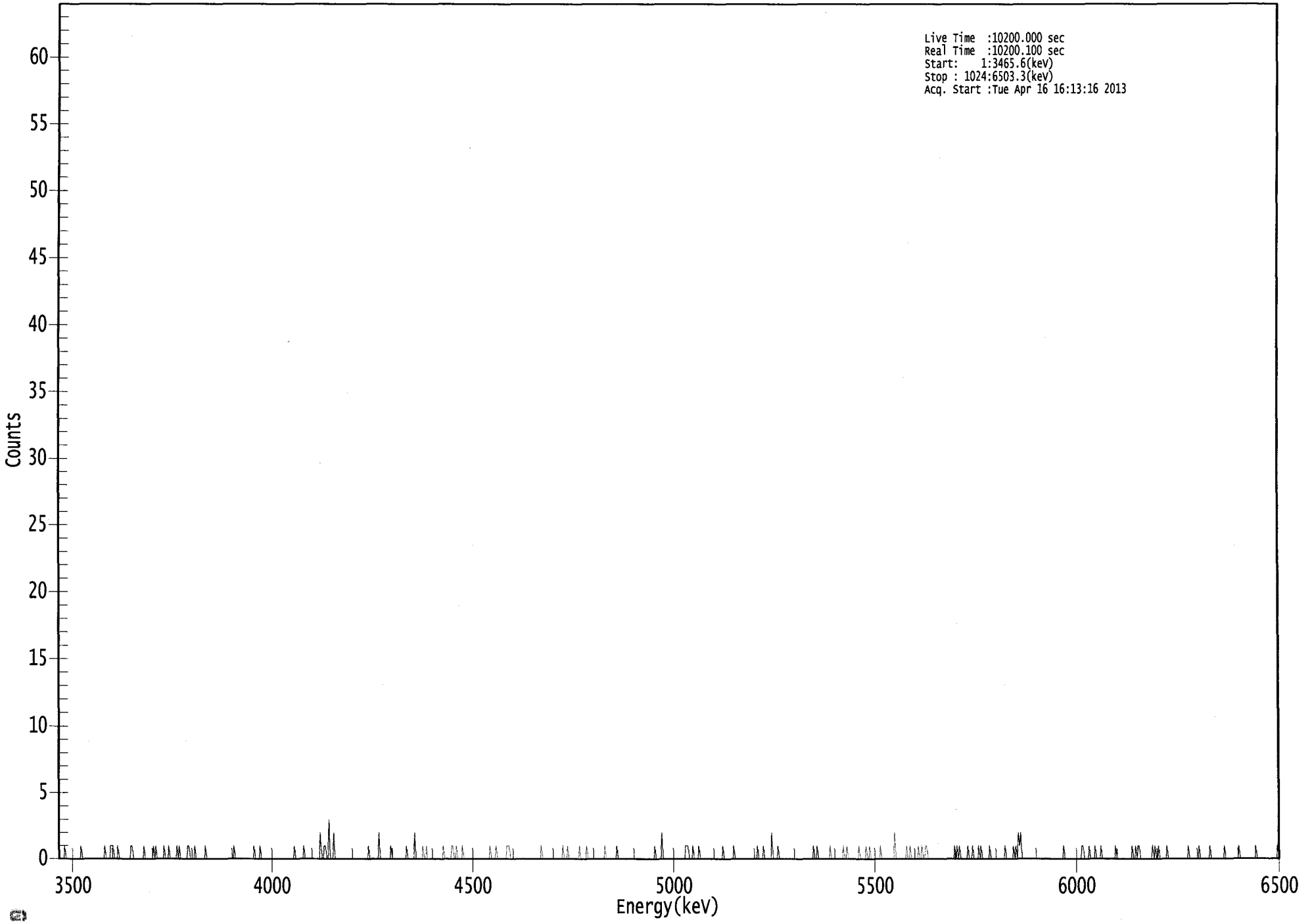
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.968	5685.50*	5.09E-001 +/- 1.48E+002	2.00E-001 +/- 5.84E+001
RA-226	0.946	4785.00*	4.87E-001 +/- 2.28E-001	1.14E-001 +/- 3.92E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055605.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3465.6(keV)  
Stop : 1024:6503.3(keV)  
Acq. Start :Tue Apr 16 16:13:16 2013



6000  
6000  
ROI Type: 1

\*\*\*\*\*  
 \*\*\*\*\* SPECTRAL DATA REPORT \*\*\*\*\*  
 \*\*\*\*\*

Sample Title: 13

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

369: 1 0 0 0 0 0 0 0

Sample Title: 13

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

801: 0 1 0 1 0 2 1 2

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	1	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	1	1	0	0	0	0
865:	1	0	0	0	0	1	0	0
873:	0	0	1	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	1	0	0	1
905:	0	1	1	0	0	0	0	0
913:	0	0	0	0	0	1	0	1
921:	0	0	1	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	1	0	0	0	0
953:	0	0	0	0	1	0	0	0
961:	0	0	0	0	0	1	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	1	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	1	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	1	0	0



C  
4/17/13

Sample Description: LR-103 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 14  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_034  
 Chamber Serial Number: 04026479B  
 Detector Serial Number: 91136  
 Env. Background: System Bkgd 54583  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 3.120E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:17 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9171 +/- 0.0000  
 Counting Efficiency: 0.1856 +/- 0.0032 on 12/16/2012 5:49:43 PM  
 Effective Efficiency: 0.1702 +/- 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	5.530	19.00	46.13	0.00	0.00E+000	0.0
RA-226	4.569	29.83	36.01	0.17	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*	8.01E-001 +/- 2.33E+002	2.53E-001 +/- 7.37E+001
RA-226	0.941	4785.00*	9.66E-001 +/- 3.49E-001	1.35E-001 +/- 4.61E-003

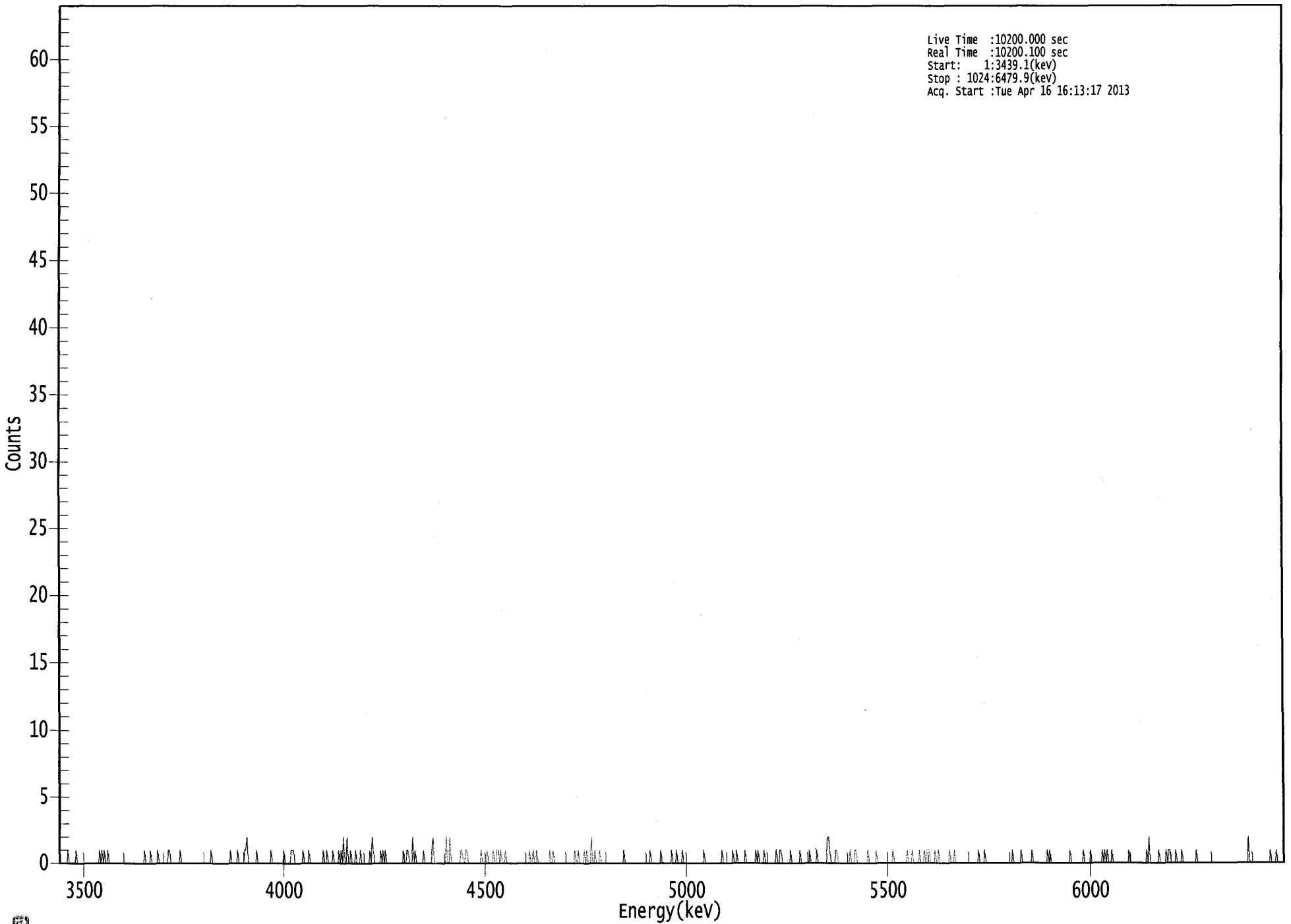
AG  
4/17/13

US EPA ARCHIVE DOCUMENT



000055606.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3439.1(kev)  
Stop : 1024:6479.9(kev)  
Acq. Start :Tue Apr 16 16:13:17 2013



000055606

ROI Type: 1

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

Sample Title: 14

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

369: 1 0 1 0 0 0 1 0

Sample Title: 14

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	1	0	0	1	0	0
401:	1	0	0	0	0	0	0	0
409:	0	0	0	1	0	0	1	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	0	0	0
433:	1	0	0	1	0	0	0	0
441:	1	0	1	0	0	0	2	0
449:	0	1	0	0	0	1	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	1	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:	1	0	0	0	0	0	0	0
513:	0	1	0	0	0	1	0	0
521:	0	0	1	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	0	0	0	0
561:	0	0	0	0	1	0	0	1
569:	0	0	0	0	0	0	1	0
577:	0	0	0	0	0	0	0	1
585:	0	1	0	0	0	0	1	0
593:	0	0	0	0	0	0	0	0
601:	1	0	0	1	1	0	0	0
609:	0	0	0	0	1	0	0	0
617:	0	0	0	0	1	0	0	0
625:	0	0	0	0	1	0	0	0
633:	0	0	1	0	0	0	0	0
641:	0	0	0	2	2	1	0	0
649:	0	0	1	1	0	0	0	0
657:	0	0	0	0	0	0	1	0
665:	0	0	1	1	0	0	0	0
673:	0	0	0	0	0	1	0	0
681:	0	0	0	0	1	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	0	0	0	0	0
705:	0	0	0	0	0	0	1	0
713:	0	0	1	0	0	0	0	0
721:	1	0	0	0	1	0	1	1
729:	1	0	0	0	0	1	0	0
737:	1	0	0	0	0	0	0	0
745:	0	1	0	0	0	1	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	1	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	1	0	0

801: 0 0 0 0 1 0 0 0

Sample Title: 14

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



*C*  
*4/17/13*

Sample Description: LR-103 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 15  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_035  
 Chamber Serial Number: 04026477A  
 Detector Serial Number: 58771  
 Env. Background: System Bkgd 54584  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 3.010E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:13 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8755 +/- 0.0000  
 Counting Efficiency: 0.1826 +/- 0.0032 on 12/16/2012 5:49:42 PM  
 Effective Efficiency: 0.1598 +/- 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	5.536	3.32	119.77	0.68	0.00E+000	2.9
RA-226	4.543	15.66	50.15	0.34	0.00E+000	2.9

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

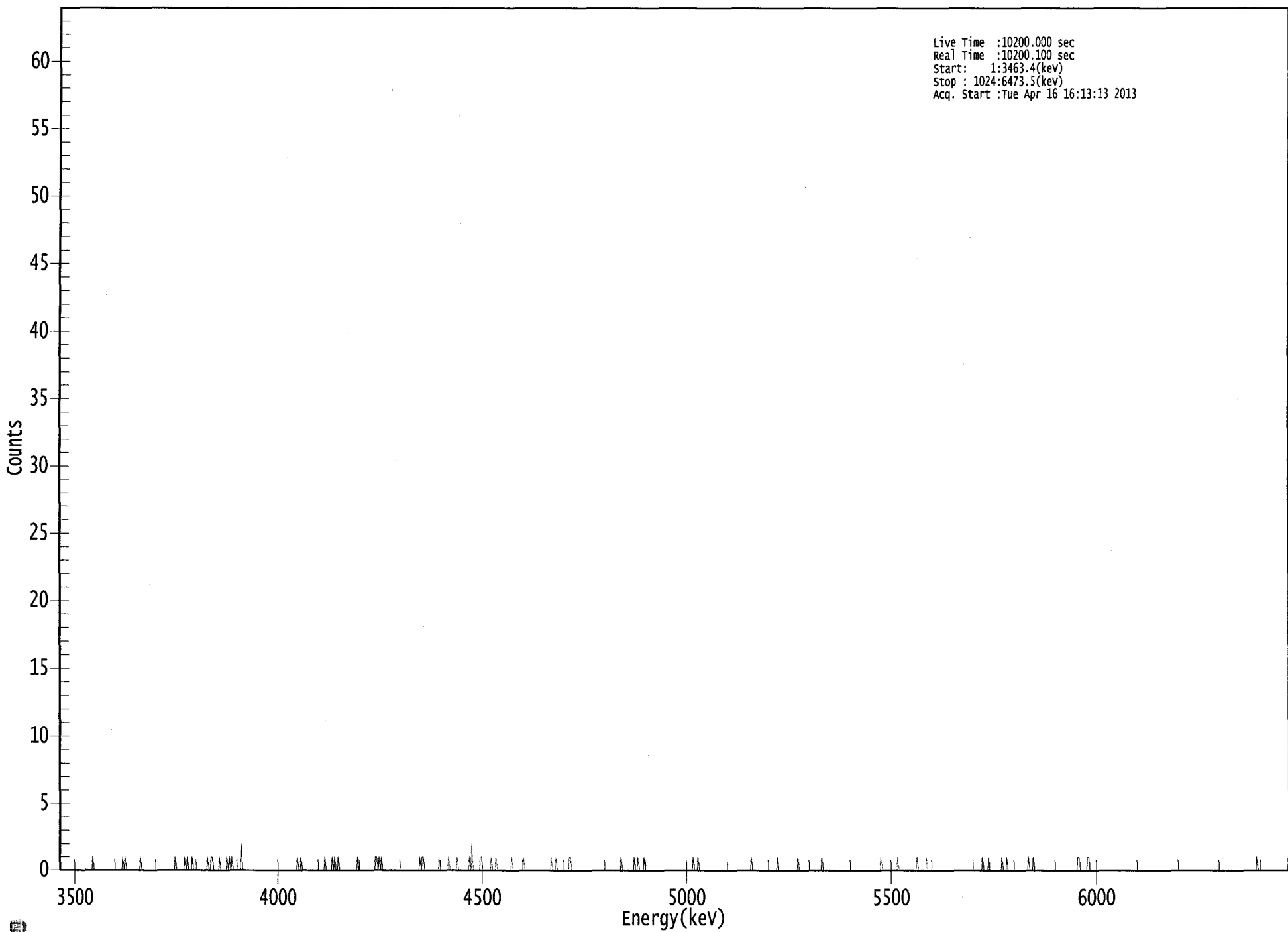
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.971	5685.50*	1.44E-001 +/- 4.19E+001	2.44E-001 +/- 7.12E+001
RA-226	0.926	4785.00*	5.21E-001 +/- 2.62E-001	1.59E-001 +/- 5.45E-003

*AG*  
*4/17/13*

US EPA ARCHIVE DOCUMENT

000055607.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3463.4(kev)  
Stop : 1024:6473.5(kev)  
Acq. Start :Tue Apr 16 16:13:13 2013



650  
650  
650

ROI Type: 1

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

Sample Title: 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	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	1	0	1
57:	0	0	0	0	0	0	0	0
65:	0	0	0	0	1	0	0	0
73:	0	0	0	0	0	0	0	0
81:	0	0	0	0	0	0	0	0
89:	0	0	0	0	0	0	0	0
97:	0	1	0	0	0	0	0	0
105:	0	1	0	1	0	0	0	1
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	1	0	0	1
129:	1	0	0	0	0	0	1	0
137:	0	0	0	0	1	0	1	0
145:	1	0	0	0	0	0	0	0
153:	2	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	1
201:	0	0	1	0	0	0	0	0
209:	0	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	1	0
225:	0	0	0	0	1	0	1	0
233:	0	1	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	1	0	1	0	1	0	0
273:	0	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	0	0	1	0	1
305:	1	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	0	0
321:	0	0	0	0	0	1	0	0
329:	0	0	0	0	1	0	0	0
337:	0	0	0	0	0	0	1	0
345:	2	0	0	0	0	0	0	1
353:	1	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 0

Sample Title: 15

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



801: 0 0 0 0 0 0 1 0

Sample Title: 15

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	1
849:	1	0	0	0	0	0	0	1
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	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	0	0
993:	0	0	0	1	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	1	0	0



C  
4/17/13

Sample Description: PZ-110-SS TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 16  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_037  
 Chamber Serial Number: 04026478A  
 Detector Serial Number: 91133  
 Env. Background: System Bkgd 54585  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.640E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:14 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9772 +/- 0.0000  
 Counting Efficiency: 0.1783 +/- 0.0033 on 1/26/2013 3:28:25 PM  
 Effective Efficiency: 0.1742 +/- 0.0032

Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.516	40.83	30.75	0.17	0.00E+000	2.9
RA-226	4.584	149.32	16.08	0.68	0.00E+000	2.9

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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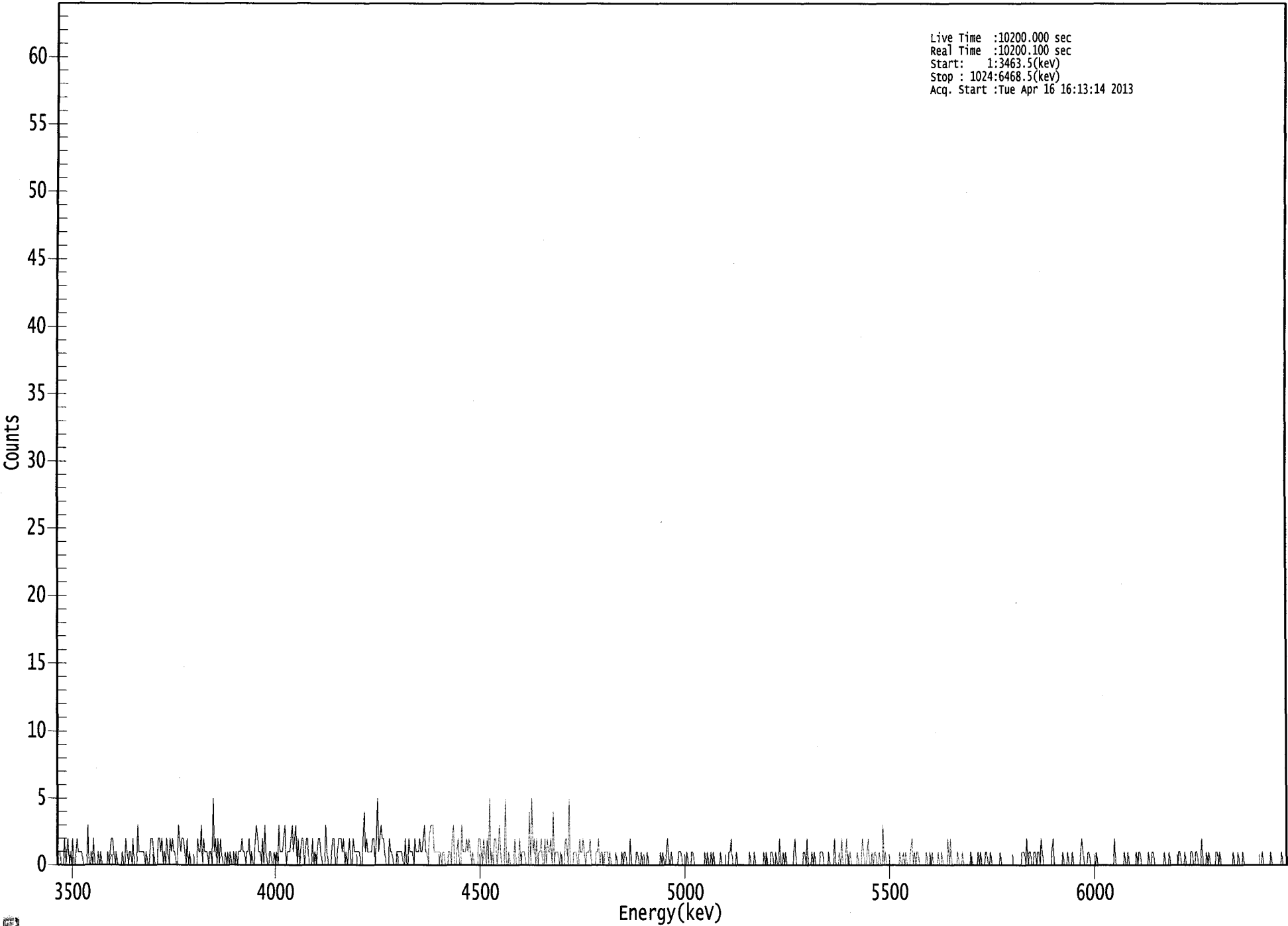
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.963	5685.50*	1.42E+000 +/- 4.15E+002	1.45E-001 +/- 4.24E+001
RA-226	0.949	4785.00*	4.00E+000 +/- 6.59E-001	1.51E-001 +/- 5.50E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055604.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3463.5(kev)  
Stop : 1024:6468.5(kev)  
Acq. Start :Tue Apr 16 16:13:14 2013



7070  
ROI Type: 1

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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 16

Elapsed Live time: 10200  
 Elapsed Real Time: 10200

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

369: 1 3 1 0 0 0 5 0

Sample Title: 16

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

801: 0 0 0 1 1 1 0 2

Sample Title: 16

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



C  
4/17/13

Sample Description: PZ-110-SS DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 17  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_040  
 Chamber Serial Number: 06027396B  
 Detector Serial Number: 91135  
 Env. Background: System Bkgd 54586  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:22 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.7664 +/- 0.0000  
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM  
 Effective Efficiency: 0.1456 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

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 ----- PEAK AREA REPORT -----  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.526	39.83	31.13	0.17	0.00E+000	3.0
RA-226	4.588	118.66	18.02	0.34	0.00E+000	3.5

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 ----- NUCLIDE ANALYSIS RESULTS -----  
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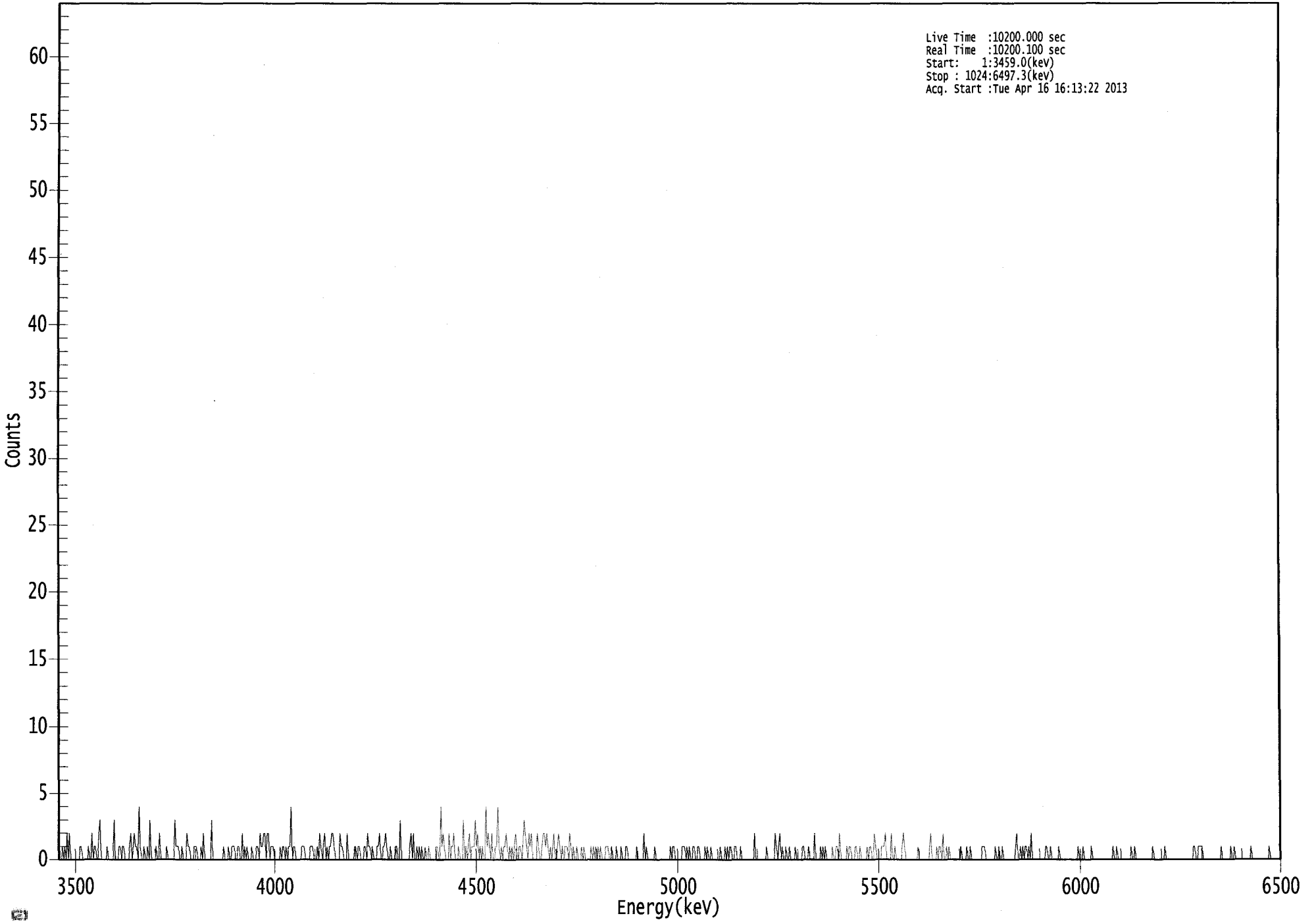
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.967	5685.50*	1.64E+000 +/- 4.78E+002	1.72E-001 +/- 5.01E+001
RA-226	0.950	4785.00*	3.76E+000 +/- 6.89E-001	1.51E-001 +/- 5.15E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055608.CNF

Live Time :10200.000 sec  
Real Time :10200.100 sec  
Start: 1:3459.0(keV)  
Stop : 1024:6497.3(keV)  
Acq. Start :Tue Apr 16 16:13:22 2013



6499  
6498  
6497

ROI Type: 1



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 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 17

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 1 4 1 0 1 0 1 1

Sample Title: 17

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

801: 0 0 1 2 0 0 1 0

Sample Title: 17

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



C  
4/17/13

Sample Description: I-62 TOT  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 18  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_041  
 Chamber Serial Number: 05026930A  
 Detector Serial Number: 91087  
 Env. Background: System Bkgd 54587  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.610E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:19 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9273 +/- 0.0000  
 Counting Efficiency: 0.1978 +/- 0.0034 on 12/16/2012 5:49:31 PM  
 Effective Efficiency: 0.1835 +/- 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	5.531	16.66	48.59	0.34	0.00E+000	3.0
RA-226	4.592	18.30	48.24	1.70	0.00E+000	3.0

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

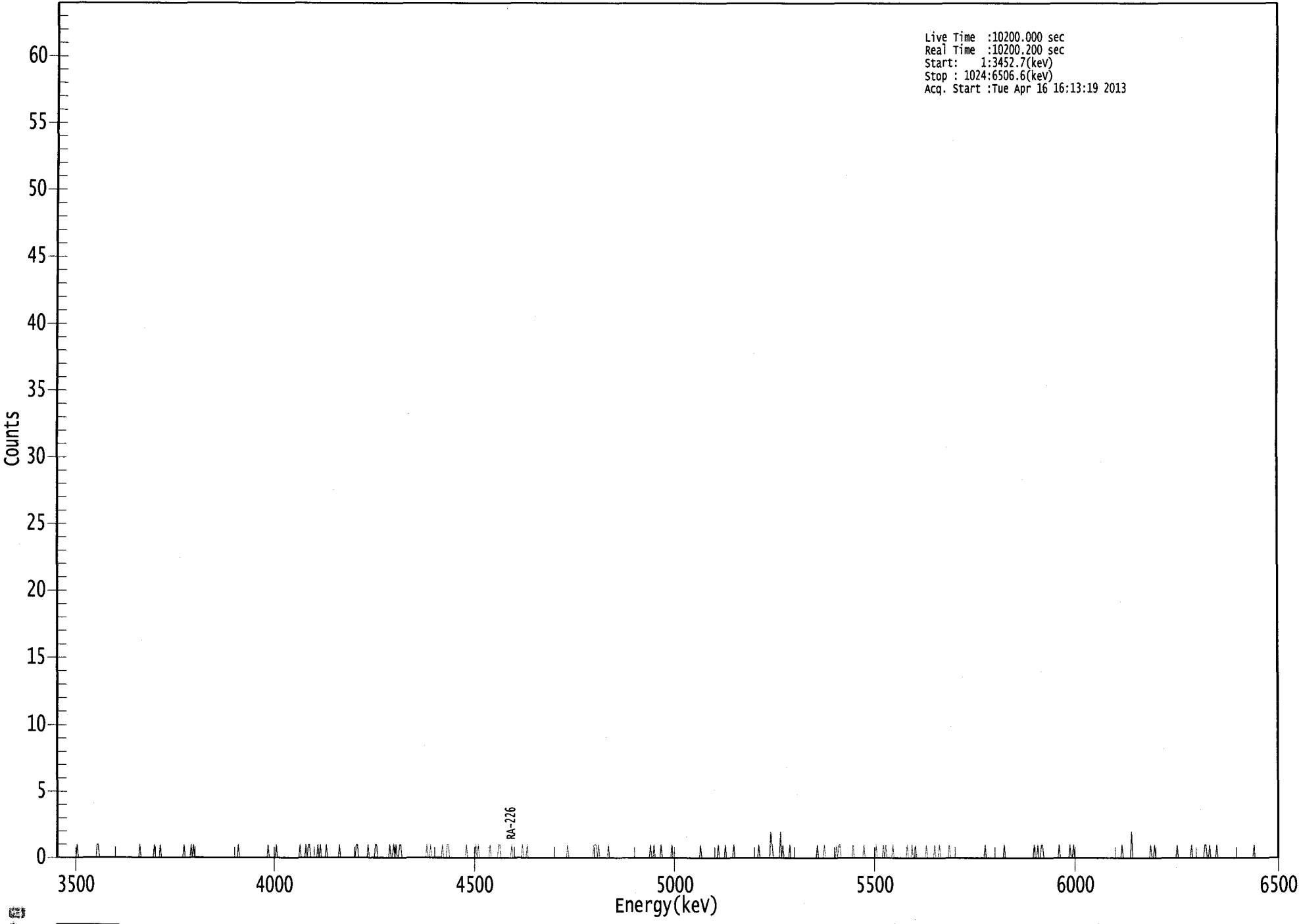
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.969	5685.50*	5.45E-001 +/- 1.59E+002	1.56E-001 +/- 4.56E+001
RA-226	0.953	4785.00*	4.60E-001 +/- 2.22E-001	1.85E-001 +/- 6.25E-003

AG  
4/17/13

US EPA ARCHIVE DOCUMENT

000055609.CNF

Live Time :10200.000 sec  
Real Time :10200.200 sec  
Start: 1:3452.7(kev)  
Stop : 1024:6506.6(kev)  
Acq. Start :Tue Apr 16 16:13:19 2013



0414  
0170  
ROI Type: 1

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

Sample Title: 18

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 1 1 0 0 0

Sample Title: 18

Channel								
377:	0	0	0	0	0	0	1	0
385:	0	0	0	0	0	0	0	1
393:	0	0	0	1	0	0	0	0
401:	0	0	0	0	0	0	0	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	0	0	1	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	1	1	1	0	1
457:	0	0	0	0	0	0	0	1
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	1	0	0	1	0	0
505:	0	0	0	1	0	0	0	0
513:	0	0	0	0	1	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	1	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	0	0	0	0
561:	0	1	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	1	0	0
593:	0	0	0	0	0	0	0	2
601:	1	0	0	0	0	0	0	2
609:	0	1	0	0	0	0	0	1
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	1	0
641:	0	0	0	0	1	0	0	0
649:	0	0	0	0	0	0	1	0
657:	1	1	0	0	0	0	0	0
665:	0	0	0	0	1	0	0	0
673:	0	0	0	0	0	1	0	0
681:	0	0	0	0	0	0	0	1
689:	0	0	0	0	0	1	0	1
697:	0	0	0	0	0	1	0	0
705:	0	0	0	0	0	0	0	0
713:	0	1	0	0	0	1	0	0
721:	1	0	0	0	0	0	0	0
729:	0	1	0	0	0	0	0	0
737:	1	0	0	0	1	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	1	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: 18

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	1	0	0	1	0
825:	0	1	1	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	1	0	0	1	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	1	0	0	0
897:	0	0	0	0	2	0	0	0
905:	0	0	0	0	0	0	0	0
913:	0	0	0	0	1	0	0	1
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	1	0	0	0	0	0
945:	0	0	0	0	0	0	1	0
953:	0	0	0	0	0	0	0	0
961:	0	1	1	0	0	1	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	1	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0





*WJM*

Sample Description: I-62 DIS  
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000556  
 Batch Identification: 1304049A-RA  
 Sample Identification: 19  
 Sample Geometry: Shelf 2  
 Procedure Description: Ra

Detector Name: Alpha\_042  
 Chamber Serial Number: 05026930B  
 Detector Serial Number: 84185  
 Env. Background: System Bkgd 54588  
 Reagent Blank: <not performed>

Sample Size: 1.500E+000 +/- 0.000E+000 liter  
 Generic Mult. Factor: 2.500E+000 Generic Div. Factor: 1.000E+000  
 Sample Date/Time: 4/15/2013 1:14:12 PM  
 Acquisition Date/Time: 4/16/2013 4:13:20 PM  
 Acquisition Live Time: 170.0 minutes  
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9224 +/- 0.0000  
 Counting Efficiency: 0.1846 +/- 0.0032 on 12/16/2012 5:49:29 PM  
 Effective Efficiency: 0.1703 +/- 0.0030

Peak Match Tolerance: 0.350 MeV

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 -----  
 PEAK AREA REPORT  
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Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.589	10.98	62.28	1.02	0.00E+000	3.0
RA-226	4.571	15.49	50.75	0.51	0.00E+000	3.0

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

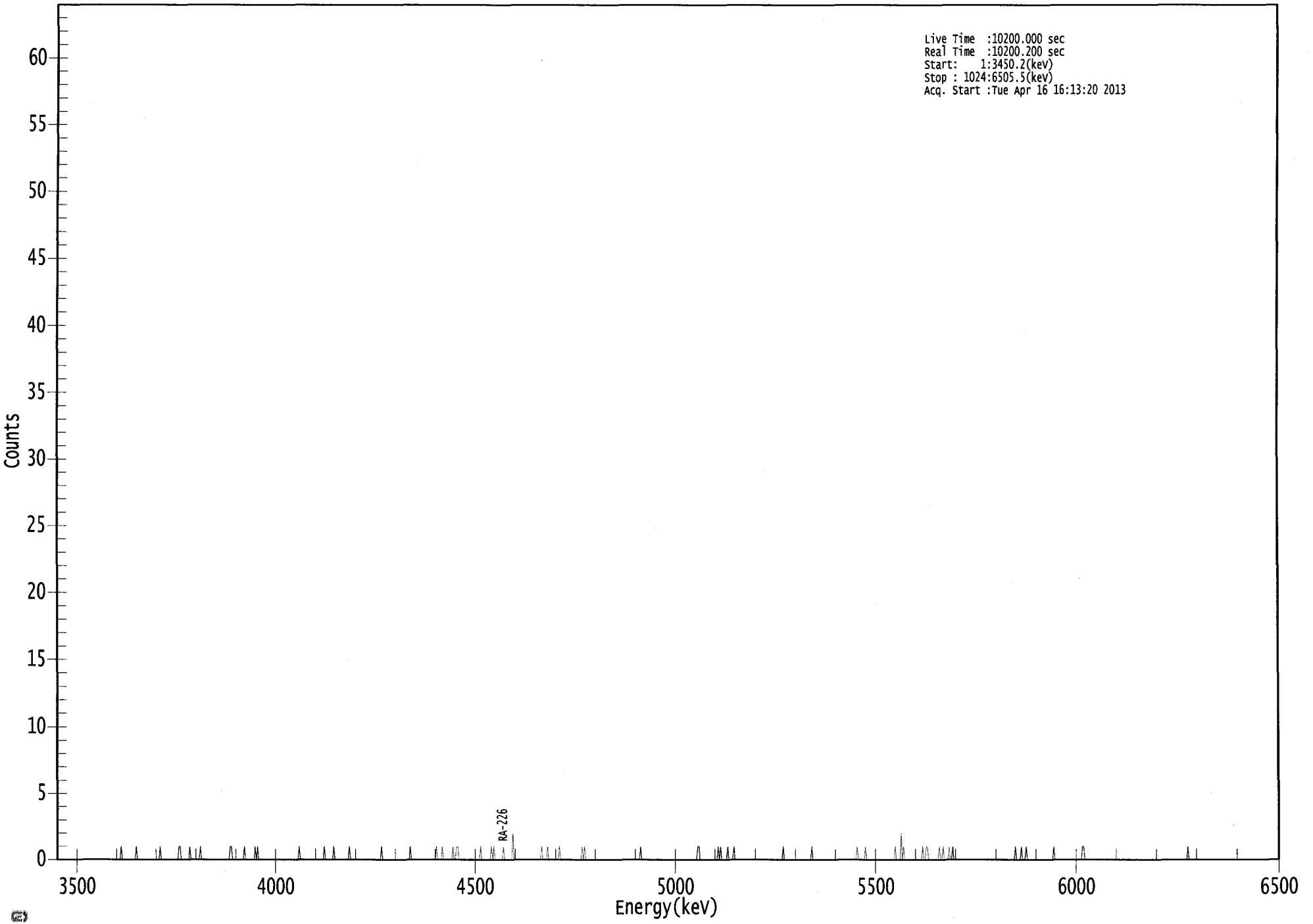
Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter )	MDA (pCi/liter )
RA-224	0.987	5685.50*	3.70E-001 +/- 1.08E+002	2.13E-001 +/- 6.20E+001
RA-226	0.942	4785.00*	4.02E-001 +/- 2.04E-001	1.36E-001 +/- 4.64E-003

*AG*  
*4/17/13*

US EPA ARCHIVE DOCUMENT

000055610.CNF

Live Time :10200.000 sec  
Real Time :10200.200 sec  
Start: 1:3450.2(kev)  
Stop : 1024:6505.5(kev)  
Acq. Start :Tue Apr 16 16:13:20 2013



6179  
ROI Type: 1

\*\*\*\*\*  
 \*\*\*\*\* S P E C T R A L D A T A R E P O R T \*\*\*\*\*  
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Sample Title: 19

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 0 1

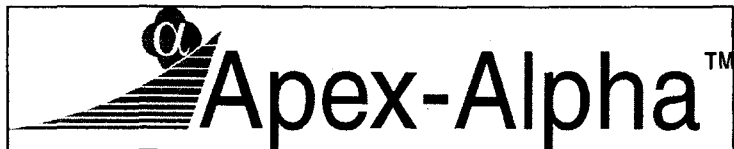
Sample Title: 19

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	2
385:	0	0	0	0	0	0	0	0
393:	0	0	0	0	0	0	0	0
401:	0	0	0	0	0	0	0	1
409:	0	0	0	0	1	0	0	0
417:	0	0	0	0	0	0	1	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	1	0	1	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	1	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	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	1	1	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	1	0	1	0	0
561:	0	0	0	1	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	1	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	1	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	1
673:	0	0	0	0	0	0	1	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	1
705:	0	0	0	0	2	0	1	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	1	0
729:	0	1	1	0	0	0	0	0
737:	0	0	0	0	1	0	0	1
745:	0	0	0	0	1	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 1 0 0 0 0

Sample Title: 19

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



QA SUMMARY REPORT  
Review Of QA Results - Pulser Check

Date : 4/16/2013  
Time : 5:57:39 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	4/16/2013 5:35:47 AM
Alpha 004	21f	ALL	Passed	4/16/2013 5:35:48 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	4/16/2013 5:35:49 AM
Alpha 011	21f	ALL	Passed	4/16/2013 5:35:49 AM
Alpha 012	21f	ALL	Not Done	
Alpha 013	21f	ALL	Passed	4/16/2013 5:35:50 AM
Alpha 014	21f	ALL	Passed	4/16/2013 5:35:51 AM
Alpha 015	21f	ALL	Not Done	
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	4/16/2013 5:35:52 AM
Alpha 019	AIM730	ALL	Not Done	
Alpha 020	AIM730	ALL	Not Done	
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha 023	AIM730	ALL	Not Done	
Alpha 024	AIM730	ALL	Passed	4/16/2013 5:35:53 AM
Alpha 025	AIM730	ALL	Passed	4/16/2013 5:35:54 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	4/16/2013 5:35:55 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	4/16/2013 5:35:56 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Not Done	
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:57 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:35:59 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:00 AM
Alpha 036	Alpha Analyst100DC	ALL	Not Done	
Alpha 037	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:01 AM
Alpha 038	Alpha Analyst100DC	ALL	Not Done	
Alpha 039	Alpha Analyst100DC	ALL	Not Done	
Alpha 040	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:03 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:04 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:06 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 043	Alpha Analyst100DC	ALL	Not Done	
Alpha 044	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:07 AM
Alpha 045	Alpha Analyst100DC	ALL	Not Done	
Alpha 046	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:09 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:10 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	4/16/2013 5:36:12 AM

APPROVED BY: C

APPROVAL DATE: 4/16/13

US EPA ARCHIVE DOCUMENT

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\*\*\*\*\* LIBRARY LISTING REPORT \*\*\*\*\*  
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Nuclide Library Title: Radium

Nuclide Library Description: Ra-226, Po-218, Rn-222

Nuclide Name	Half-Life (Seconds)	Energy (keV )	Energy Uncert. (keV )	Yield (%)	Yield Uncert. (Abs.+ -)
PO-218	5.049E+010	6003.000*	0.000	99.9800	0.0000
RN-222	5.049E+010	5490.000*	0.000	99.9200	0.0000
RA-226	5.049E+010	4785.000*	0.000	100.0000	0.0000

\* = key line

TOTALS:           3   Nuclides           3   Energy Lines



**SECTION XI  
ANALYTICAL DATA (RADIUM-228)**

Work Order	<b>13-04049</b>
Analysis Code	<b>Ra228</b>
Run	<b>1</b>
Date Received	<b>4/9/2013</b>
Lab Deadline	<b>4/30/2013</b>
Client	Engineering Management Support, Inc.
Project	West Lake OU-1
Report Level	<b>4</b>
Activity Units	pCi
Aliquot Units	I
Matrix	WA
Method	EPA 904.0 Modified
Instrument Type	Alpha/Beta GPC
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	1011.608
Carrier	Yttrium
Carrier Conc (mg/ml)	34

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		04/09/13 00:00	1.0000E+00
02	MBL	BLANK		04/09/13 00:00	1.5000E+00
03	DUP	PZ-302-AI TOT	39	04/03/13 11:45	1.5000E+00
04	DO	PZ-302-AI TOT	39	04/03/13 11:45	1.5000E+00
05	TRG	PZ-302-AI DIS	39	04/03/13 11:45	1.3500E+00
06	TRG	LR-100 TOT	42	04/03/13 13:27	1.5000E+00
07	TRG	LR-100 DIS	42	04/03/13 13:27	1.5000E+00
08	TRG	D-81 TOT	41	04/03/13 13:40	1.5000E+00
09	TRG	D-81 DIS	41	04/03/13 13:40	1.5000E+00
10	TRG	LR-105 TOT	40	04/03/13 14:24	1.5000E+00
11	TRG	LR-105 DIS	40	04/03/13 14:24	1.5000E+00
12	TRG	PZ-207-AS TOT	45	04/03/13 15:05	1.5000E+00
13	TRG	PZ-207-AS DIS	45	04/03/13 15:05	1.5000E+00
14	TRG	LR-103 TOT	45	04/03/13 15:30	1.5000E+00
15	TRG	LR-103 DIS	45	04/03/13 15:30	1.5000E+00
16	TRG	PZ-110-SS TOT	38	04/04/13 10:27	1.5000E+00
17	TRG	PZ-110-SS DIS	38	04/04/13 10:27	1.5000E+00
18	TRG	I-62 TOT	46	04/04/13 10:42	1.5000E+00
19	TRG	I-62 DIS	46	04/04/13 10:42	1.5000E+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.

0427

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	0.9178	928.5	408.1	97.58	2.000	0.0908	0.1475	0.0567	83.38	81.36	1.00	1.00
02	MBL	0.9053	915.8	373.5	90.54	2.000	0.0908	0.1467	0.0559	82.21	74.43	1.00	1.00
03	DUP	0.9070	917.5	386.7	93.56	2.000	0.0905	0.1478	0.0573	84.26	78.84	1.00	1.00
04	DO	0.9068	917.3	393.2	95.16	2.000	0.0908	0.1457	0.0549	80.74	76.83	1.00	1.00
05	TRG	0.9070	917.5	386.6	93.54	2.000	0.0905	0.1473	0.0568	83.53	78.13	1.00	1.00
06	TRG	0.9036	914.1	347.4	84.37	2.000	0.0904	0.1482	0.0578	85.00	71.72	1.00	1.00
07	TRG	0.9046	915.1	375.2	91.02	2.000	0.0907	0.1474	0.0567	83.38	75.90	1.00	1.00
08	TRG	0.8985	908.9	373.1	91.13	2.000	0.0904	0.1478	0.0574	84.41	76.92	1.00	1.00
09	TRG	0.8981	908.5	411.7	100.60	2.000	0.0905	0.1484	0.0579	85.15	85.66	1.00	1.00
10	TRG	0.9000	910.4	390.7	95.27	2.000	0.0897	0.1489	0.0592	87.06	82.94	1.00	1.00
11	TRG	0.9032	913.7	373.8	90.82	2.000	0.0899	0.1469	0.0570	83.82	76.13	1.00	1.00
12	TRG	0.9013	911.8	328.8	80.06	2.000	0.0918	0.1487	0.0569	83.68	66.99	1.00	1.00
13	TRG	0.8921	902.5	415.9	102.31	2.000	0.0896	0.1448	0.0552	81.18	83.05	1.00	1.00
14	TRG	0.8995	909.9	375.9	91.71	2.000	0.0900	0.1473	0.0573	84.26	77.28	1.00	1.00
15	TRG	0.9014	911.9	359.6	87.55	2.000	0.0917	0.1474	0.0557	81.91	71.71	1.00	1.00
16	TRG	0.9001	910.5	400.8	97.72	2.000	0.0901	0.1461	0.0560	82.35	80.47	1.00	1.00
17	TRG	0.9028	913.3	315.3	76.64	2.000	0.0902	0.1484	0.0582	85.59	65.60	1.00	1.00
18	TRG	0.9012	911.7	380.8	92.73	2.000	0.0922	0.1486	0.0564	82.94	76.91	1.00	1.00
19	TRG	0.8998	910.2	378.2	92.24	2.000	0.0897	0.1478	0.0581	85.44	78.81	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			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
02	MBL			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
03	DUP			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
04	DO			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
05	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
06	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
07	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
08	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
09	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
10	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
11	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
12	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
13	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
14	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
15	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
16	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
17	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
18	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH
19	TRG			04/11/13 10:50	JBARNARD	04/15/13 13:15	LWALKER	04/25/13 05:22	TSMITH

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

0429

Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-Ra228-1**

	
Run	1
Analysis Code	Ra228
Eberline Services Work Order	13-04049
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	RA-228	LCS	LCS	pCi/l	8.43E+00	1.03E+00	1.46E+00	9.09E+00	92.79	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	4.99E-01	4.86E-01	9.82E-01					OK	OK
03	RA-228	DUP	PZ-302-AI TOT	pCi/l	1.21E+00	4.79E-01	8.85E-01				NA	OK	
04	RA-228	DO	PZ-302-AI TOT	pCi/l	1.20E+00	4.59E-01	8.36E-01					OK	
05	RA-228	TRG	PZ-302-AI DIS	pCi/l	8.56E-01	5.24E-01	1.02E+00					OK	
06	RA-228	TRG	LR-100 TOT	pCi/l	3.69E-01	5.41E-01	1.12E+00					OK	
07	RA-228	TRG	LR-100 DIS	pCi/l	6.80E-01	4.84E-01	9.57E-01					OK	
08	RA-228	TRG	D-81 TOT	pCi/l	1.59E+00	5.40E-01	9.83E-01					OK	
09	RA-228	TRG	D-81 DIS	pCi/l	8.63E-01	4.79E-01	9.32E-01					OK	
10	RA-228	TRG	LR-105 TOT	pCi/l	5.50E-01	5.15E-01	1.04E+00					OK	
11	RA-228	TRG	LR-105 DIS	pCi/l	9.48E-01	6.04E-01	1.18E+00					OK	
12	RA-228	TRG	PZ-207-AS TOT	pCi/l	6.76E-01	7.33E-01	1.49E+00					OK	
13	RA-228	TRG	PZ-207-AS DIS	pCi/l	1.16E+00	5.82E-01	1.11E+00					OK	
14	RA-228	TRG	LR-103 TOT	pCi/l	5.94E-01	6.34E-01	1.29E+00					OK	
15	RA-228	TRG	LR-103 DIS	pCi/l	1.62E+00	6.87E-01	1.29E+00					OK	
16	RA-228	TRG	PZ-110-SS TOT	pCi/l	1.15E+00	5.75E-01	1.09E+00					OK	
17	RA-228	TRG	PZ-110-SS DIS	pCi/l	1.70E+00	6.75E-01	1.24E+00					OK	
18	RA-228	TRG	I-62 TOT	pCi/l	1.27E+00	6.19E-01	1.18E+00					OK	
19	RA-228	TRG	I-62 DIS	pCi/l	1.01E+00	6.50E-01	1.28E+00					OK	

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-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	04/09/13 00:00	1.00E+00	97.58	83.38	81.36	1.00	4/15/2013 13:15	4/25/2013 5:22
02	RA-228	MBL	04/09/13 00:00	1.50E+00	90.54	82.21	74.43	1.00	4/15/2013 13:15	4/25/2013 5:22
03	RA-228	DUP	04/03/13 11:45	1.50E+00	93.56	84.26	78.84	1.00	4/15/2013 13:15	4/25/2013 5:22
04	RA-228	DO	04/03/13 11:45	1.50E+00	95.16	80.74	76.83	1.00	4/15/2013 13:15	4/25/2013 5:22
05	RA-228	TRG	04/03/13 11:45	1.35E+00	93.54	83.53	78.13	1.00	4/15/2013 13:15	4/25/2013 5:22
06	RA-228	TRG	04/03/13 13:27	1.50E+00	84.37	85.00	71.72	1.00	4/15/2013 13:15	4/25/2013 5:22
07	RA-228	TRG	04/03/13 13:27	1.50E+00	91.02	83.38	75.90	1.00	4/15/2013 13:15	4/25/2013 5:22
08	RA-228	TRG	04/03/13 13:40	1.50E+00	91.13	84.41	76.92	1.00	4/15/2013 13:15	4/25/2013 5:22
09	RA-228	TRG	04/03/13 13:40	1.50E+00	100.60	85.15	85.66	1.00	4/15/2013 13:15	4/25/2013 5:22
10	RA-228	TRG	04/03/13 14:24	1.50E+00	95.27	87.06	82.94	1.00	4/15/2013 13:15	4/25/2013 5:22
11	RA-228	TRG	04/03/13 14:24	1.50E+00	90.82	83.82	76.13	1.00	4/15/2013 13:15	4/25/2013 5:22
12	RA-228	TRG	04/03/13 15:05	1.50E+00	80.06	83.68	66.99	1.00	4/15/2013 13:15	4/25/2013 5:22
13	RA-228	TRG	04/03/13 15:05	1.50E+00	102.31	81.18	83.05	1.00	4/15/2013 13:15	4/25/2013 5:22
14	RA-228	TRG	04/03/13 15:30	1.50E+00	91.71	84.26	77.28	1.00	4/15/2013 13:15	4/25/2013 5:22
15	RA-228	TRG	04/03/13 15:30	1.50E+00	87.55	81.91	71.71	1.00	4/15/2013 13:15	4/25/2013 5:22
16	RA-228	TRG	04/04/13 10:27	1.50E+00	97.72	82.35	80.47	1.00	4/15/2013 13:15	4/25/2013 5:22
17	RA-228	TRG	04/04/13 10:27	1.50E+00	76.64	85.59	65.60	1.00	4/15/2013 13:15	4/25/2013 5:22
18	RA-228	TRG	04/04/13 10:42	1.50E+00	92.73	82.94	76.91	1.00	4/15/2013 13:15	4/25/2013 5:22
19	RA-228	TRG	04/04/13 10:42	1.50E+00	92.24	85.44	78.81	1.00	4/15/2013 13:15	4/25/2013 5:22

Run	1
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

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Preliminary Data Report & Analytical Calculations  
**Work Order: 13-04049-Ra228-1**

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	04/25/13 10:06		LB4110R	B1	120	627	1.45	0.4754
02	RA-228	MBL	04/25/13 10:06		LB4110R	B2	120	178	1.183333333	0.4658
03	RA-228	DUP	04/25/13 10:06		LB4110R	B3	120	226	1.1	0.4713
04	RA-228	DO	04/25/13 10:06		LB4110R	B4	120	206	0.95	0.4773
05	RA-228	TRG	04/25/13 10:06		LB4110R	C1	120	199	1.166666667	0.4705
06	RA-228	TRG	04/25/13 10:06		LB4110R	C4	120	202	1.466666667	0.4714
07	RA-228	TRG	04/25/13 10:08		LB4110A	C2	120	183	1.116666667	0.4578
08	RA-228	TRG	04/25/13 10:08		LB4110A	C3	120	273	1.283333333	0.4699
09	RA-228	TRG	04/25/13 10:08		LB4110A	C4	120	244	1.433333333	0.4692
10	RA-228	TRG	04/25/13 12:09		LB4110R	A1	120	166	1.083333333	0.4776
11	RA-228	TRG	04/25/13 12:09		LB4110R	A2	120	194	1.15	0.4699
12	RA-228	TRG	04/25/13 12:09		LB4110R	A3	120	216	1.5	0.4809
13	RA-228	TRG	04/25/13 12:09		LB4110R	A4	120	223	1.233333333	0.4732
14	RA-228	TRG	04/25/13 12:10		LB4110R	B1	120	210	1.45	0.4754
15	RA-228	TRG	04/25/13 12:10		LB4110R	B2	120	231	1.183333333	0.4658
16	RA-228	TRG	04/25/13 12:10		LB4110R	B3	120	204	1.1	0.4713
17	RA-228	TRG	04/25/13 12:10		LB4110R	B4	120	202	0.95	0.4773
18	RA-228	TRG	04/25/13 12:09		LB4110R	C1	120	216	1.166666667	0.4705
19	RA-228	TRG	04/25/13 12:09		LB4110R	C4	120	238	1.466666667	0.4714

Run	1
Eberline Services Work Order	13-04049
Client	Engineering Management Support, Inc.

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Internal Fraction	Sample Desc	Client ID	Sample Date	Sample Aliquot	Tracer Aliquot (g)	Tracer ACT (dpm)	Radiometric Tracer (pCi)	Radiometric % Rec	SAF 1*	SAF 2*
01	LCS	LCS	04/09/13 00:00	1.0000	0.9178	928.4538	408.1000	97.58	1.00	1.00
02	MBL	BLANK	04/09/13 00:00	1.5000	0.9053	915.8087	373.5000	90.54	1.00	1.00
03	DUP	PZ-302-AI TOT	04/03/13 11:45	1.5000	0.9070	917.5285	386.7000	93.56	1.00	1.00
04	DO	PZ-302-AI TOT	04/03/13 11:45	1.5000	0.9068	917.3261	393.2000	95.16	1.00	1.00
05	TRG	PZ-302-AI DIS	04/03/13 11:45	1.3500	0.9070	917.5285	386.6000	93.54	1.00	1.00
06	TRG	LR-100 TOT	04/03/13 13:27	1.5000	0.9036	914.0890	347.4000	84.37	1.00	1.00
07	TRG	LR-100 DIS	04/03/13 13:27	1.5000	0.9046	915.1006	375.2000	91.02	1.00	1.00
08	TRG	D-81 TOT	04/03/13 13:40	1.5000	0.8985	908.9298	373.1000	91.13	1.00	1.00
09	TRG	D-81 DIS	04/03/13 13:40	1.5000	0.8981	908.5251	411.7000	100.60	1.00	1.00
10	TRG	LR-105 TOT	04/03/13 14:24	1.5000	0.9000	910.4472	390.7000	95.27	1.00	1.00
11	TRG	LR-105 DIS	04/03/13 14:24	1.5000	0.9032	913.6843	373.8000	90.82	1.00	1.00
12	TRG	PZ-207-AS TOT	04/03/13 15:05	1.5000	0.9013	911.7623	328.8000	80.06	1.00	1.00
13	TRG	PZ-207-AS DIS	04/03/13 15:05	1.5000	0.8921	902.4555	415.9000	102.31	1.00	1.00
14	TRG	LR-103 TOT	04/03/13 15:30	1.5000	0.8995	909.9414	375.9000	91.71	1.00	1.00
15	TRG	LR-103 DIS	04/03/13 15:30	1.5000	0.9014	911.8635	359.6000	87.55	1.00	1.00
16	TRG	PZ-110-SS TOT	04/04/13 10:27	1.5000	0.9001	910.5484	400.8000	97.72	1.00	1.00
17	TRG	PZ-110-SS DIS	04/04/13 10:27	1.5000	0.9028	913.2797	315.3000	76.64	1.00	1.00
18	TRG	I-62 TOT	04/04/13 10:42	1.5000	0.9012	911.6611	380.8000	92.73	1.00	1.00
19	TRG	I-62 DIS	04/04/13 10:42	1.5000	0.8998	910.2449	378.2000	92.24	1.00	1.00




# Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
<b>13-04049</b>	<b>1</b>	<b>Ra228</b>	<b>liters</b>	<b>4/30/2013</b>	<b>JBARNARD</b>

Lab Fraction	Engineering Management Support, Inc. Client ID	Sample Type	Muffle Data	Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
			Ratio Post/Pre	No of Dils	Dil Factor	Ratio	Aliquot	Net Equiv	Aliquot	Net Equiv	Water Added (ml)	H3 Dist Aliq
01	LCS	LCS					1.0000E+00	1.0000E+00				
02	BLANK	MBL					1.5000E+00	1.5000E+00				
03	PZ-302-AI TOT	DUP					1.5000E+00	1.5000E+00				
04	PZ-302-AI TOT	DO					1.5000E+00	1.5000E+00				
05	PZ-302-AI DIS	TRG					1.3500E+00	1.3500E+00				
06	LR-100 TOT	TRG					1.5000E+00	1.5000E+00				
07	LR-100 DIS	TRG					1.5000E+00	1.5000E+00				
08	D-81 TOT	TRG					1.5000E+00	1.5000E+00				
09	D-81 DIS	TRG					1.5000E+00	1.5000E+00				
10	LR-105 TOT	TRG					1.5000E+00	1.5000E+00				
11	LR-105 DIS	TRG					1.5000E+00	1.5000E+00				
12	PZ-207-AS TOT	TRG					1.5000E+00	1.5000E+00				
13	PZ-207-AS DIS	TRG					1.5000E+00	1.5000E+00				
14	LR-103 TOT	TRG					1.5000E+00	1.5000E+00				
15	LR-103 DIS	TRG					1.5000E+00	1.5000E+00				
16	PZ-110-SS TOT	TRG					1.5000E+00	1.5000E+00				
17	PZ-110-SS DIS	TRG					1.5000E+00	1.5000E+00				
18	I-62 TOT	TRG					1.5000E+00	1.5000E+00				
19	I-62 DIS	TRG					1.5000E+00	1.5000E+00				

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

 Date: 4/11/13

0434

# Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
<b>13-04049</b>	<b>1</b>	<b>Ra228</b>	<b>Yttirum</b>	<b>34.0000</b>	<b>TSMITH</b>

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	2.0000	0.0908	0.1475	0.0567	83.38
02	BLANK	MBL	2.0000	0.0908	0.1467	0.0559	82.21
03	DUP	DUP	2.0000	0.0905	0.1478	0.0573	84.26
04	PZ-302-AI TOT	DO	2.0000	0.0908	0.1457	0.0549	80.74
05	PZ-302-AI DIS	TRG	2.0000	0.0905	0.1473	0.0568	83.53
06	LR-100 TOT	TRG	2.0000	0.0904	0.1482	0.0578	85.00
07	LR-100 DIS	TRG	2.0000	0.0907	0.1474	0.0567	83.38
08	D-81 TOT	TRG	2.0000	0.0904	0.1478	0.0574	84.41
09	D-81 DIS	TRG	2.0000	0.0905	0.1484	0.0579	85.15
10	LR-105 TOT	TRG	2.0000	0.0897	0.1489	0.0592	87.06
11	LR-105 DIS	TRG	2.0000	0.0899	0.1469	0.0570	83.82
12	PZ-207-AS TOT	TRG	2.0000	0.0918	0.1487	0.0569	83.68
13	PZ-207-AS DIS	TRG	2.0000	0.0896	0.1448	0.0552	81.18
14	LR-103 TOT	TRG	2.0000	0.0900	0.1473	0.0573	84.26
15	LR-103 DIS	TRG	2.0000	0.0917	0.1474	0.0557	81.91
16	PZ-110-SS TOT	TRG	2.0000	0.0901	0.1461	0.0560	82.35
17	PZ-110-SS DIS	TRG	2.0000	0.0902	0.1484	0.0582	85.59
18	I-62 TOT	TRG	2.0000	0.0922	0.1486	0.0564	82.94
19	I-62 DIS	TRG	2.0000	0.0897	0.1478	0.0581	85.44

Technician: *TSMITH*

Date: 4/25/13

0435

(A)  
4/25/13  
LCB

Detector ID	Sample ID	Alpha	Beta	Count	Time	Voltage	TOD
C2	1304049-07	14	183	120		1400	4/25/13 12:08
C3	1304049-08	22	273	120		1400	4/25/13 12:08
C4	1304049-09	14	244	120		1400	4/25/13 12:08

②  
4/25/13  
KB

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304049-18	15	216	120	1400	4/25/13 14:09
C4	1304049-19	21	238	120	1400	4/25/13 14:09
A1	1304049-10	26	166	120	1400	4/25/13 14:09
A2	1304049-11	5	194	120	1400	4/25/13 14:09
A3	1304049-12	17	216	120	1400	4/25/13 14:09
A4	1304049-13	12	223	120	1400	4/25/13 14:09
B1	1304049-14	14	210	120	1400	4/25/13 14:10
B2	1304049-15	13	231	120	1400	4/25/13 14:10
B3	1304049-16	10	204	120	1400	4/25/13 14:10
B4	1304049-17	12	202	120	1400	4/25/13 14:10

②  
4/25/13  
10B

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
C1	1304049-05	10	199	120	1400	4/25/13 12:06
C4	1304049-06	8	202	120	1400	4/25/13 12:06
B1	1304049-01	12	627	120	1400	4/25/13 12:06
B2	1304049-02	17	178	120	1400	4/25/13 12:06
B3	1304049-03	18	226	120	1400	4/25/13 12:06
B4	1304049-04	13	206	120	1400	4/25/13 12:06

GPC Detector Report  
(ALL Backgrounds)

C  
4/25/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	4/25/2013	6.67E-02	P	-2.19E+01	2.95E-01	2.25E+01
LB4110A - A2	Alpha	11/18/2007	4/25/2013	1.00E-01	P	-1.86E+01	2.63E-01	1.91E+01
LB4110A - A3	Alpha	11/18/2007	4/25/2013	5.00E-02	P	-1.81E+01	2.25E-01	1.85E+01
LB4110A - A4	Alpha	11/18/2007	4/25/2013	3.33E-02	P	-1.92E+01	2.46E-01	1.97E+01
LB4110A - B1	Alpha	11/18/2007	4/25/2013	8.33E-02	P	-9.91E-02	7.52E-02	2.49E-01
LB4110A - B2	Alpha	11/18/2007	4/25/2013	1.17E-01	P	-7.96E-02	7.27E-02	2.25E-01
LB4110A - B3	Alpha	11/18/2007	4/25/2013	8.33E-02	P	-6.40E-02	5.32E-02	1.70E-01
LB4110A - B4	Alpha	11/18/2007	4/25/2013	3.33E-02	P	-1.44E-01	7.91E-02	3.02E-01
LB4110A - C1	Alpha	11/18/2007	4/25/2013	1.50E-01	P	-1.53E-01	8.92E-02	3.32E-01
LB4110A - C2	Alpha	11/18/2007	4/25/2013	5.00E-02	P	-1.80E-01	8.85E-02	3.57E-01
LB4110A - C3	Alpha	11/18/2007	4/25/2013	3.33E-02	P	-1.77E-01	1.01E-01	3.79E-01
LB4110A - C4	Alpha	11/18/2007	4/25/2013	1.33E-01	P	-6.29E-02	6.89E-02	2.01E-01
LB4110A - D1	Alpha	11/18/2007	4/25/2013	8.33E-02	P	-5.35E-02	8.43E-02	2.22E-01
LB4110A - D2	Alpha	11/18/2007	4/25/2013	1.17E-01	P	-7.04E-02	6.03E-02	1.91E-01
LB4110A - D3	Alpha	11/18/2007	4/25/2013	1.67E-01	W	-4.74E-02	7.20E-02	1.91E-01
LB4110A - D4	Alpha	11/18/2007	4/25/2013	5.00E-02	P	-5.74E-02	7.09E-02	1.99E-01
LB4110R - A1	Alpha	11/24/2006	4/25/2013	1.17E-01	P	-1.01E-01	1.01E-01	3.03E-01
LB4110R - A2	Alpha	11/24/2006	4/25/2013	5.00E-02	P	-9.05E-02	7.74E-02	2.45E-01
LB4110R - A3	Alpha	11/24/2006	4/25/2013	1.17E-01	P	-7.39E-02	7.68E-02	2.27E-01
LB4110R - A4	Alpha	11/24/2006	4/25/2013	3.33E-02	P	-5.31E-02	7.18E-02	1.97E-01
LB4110R - B1	Alpha	11/24/2006	4/25/2013	3.33E-02	P	-9.61E-02	6.21E-02	2.20E-01
LB4110R - B2	Alpha	11/24/2006	4/25/2013	3.33E-02	P	-6.96E-02	6.44E-02	1.98E-01
LB4110R - B3	Alpha	11/24/2006	4/25/2013	5.00E-02	P	-6.55E-02	7.00E-02	2.05E-01
LB4110R - B4	Alpha	11/24/2006	4/25/2013	1.67E-02	P	-6.47E-02	7.08E-02	2.06E-01
LB4110R - C1	Alpha	11/24/2006	4/25/2013	3.33E-02	P	-7.81E-02	7.44E-02	2.27E-01
LB4110R - C2	Alpha	11/24/2006	4/25/2013	1.67E-02	P	-7.53E-02	7.24E-02	2.20E-01
LB4110R - C3	Alpha	11/24/2006	4/25/2013	1.67E-02	P	-8.93E-02	8.48E-02	2.59E-01
LB4110R - C4	Alpha	11/24/2006	4/25/2013	0.00E+00	P	-6.22E-02	8.22E-02	2.27E-01
LB4110R - D1	Alpha	11/24/2006	4/25/2013	0.00E+00	P	-9.88E-02	7.34E-02	2.46E-01
LB4110R - D2	Alpha	11/24/2006	4/25/2013	0.00E+00	P	-7.27E-02	7.28E-02	2.18E-01
LB4110R - D3	Alpha	11/24/2006	4/25/2013	0.00E+00	P	-7.81E-02	7.26E-02	2.23E-01
LB4110R - D4	Alpha	11/24/2006	4/25/2013	0.00E+00	P	-6.93E-02	7.76E-02	2.24E-01
LB5100 - 1	Alpha	7/10/2006	10/26/2007	5.00E-02	P	-1.56E-02	9.58E-02	2.07E-01

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GPC Detector Report  
(ALL Backgrounds)

C  
4/25/13

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	4/25/2013	8.73E+00	P	-2.97E+02	7.62E+00	3.12E+02
LB4110A - A2	Beta	11/18/2007	4/25/2013	3.93E+00	P	-3.12E+01	2.53E+00	3.63E+01
LB4110A - A3	Beta	11/18/2007	4/25/2013	1.47E+00	P	-5.15E+01	2.66E+00	5.68E+01
LB4110A - A4	Beta	11/18/2007	4/25/2013	8.55E+00	P	-3.35E+01	2.99E+00	3.95E+01
LB4110A - B1	Beta	11/18/2007	4/25/2013	2.77E+00	P	-9.49E+00	3.21E+00	1.59E+01
LB4110A - B2	Beta	11/18/2007	4/25/2013	2.32E+00	P	-7.57E+00	1.98E+00	1.15E+01
LB4110A - B3	Beta	11/18/2007	4/25/2013	1.57E+00	P	1.84E-01	1.36E+00	2.53E+00
LB4110A - B4	Beta	11/18/2007	4/25/2013	1.30E+00	P	-7.63E+00	1.97E+00	1.16E+01
LB4110A - C1	Beta	11/18/2007	4/25/2013	2.57E+00	P	-5.52E+00	2.16E+00	9.84E+00
LB4110A - C2	Beta	11/18/2007	4/25/2013	1.12E+00	P	3.80E-01	1.27E+00	2.16E+00
LB4110A - C3	Beta	11/18/2007	4/25/2013	1.28E+00	P	4.68E-01	1.47E+00	2.47E+00
LB4110A - C4	Beta	11/18/2007	4/25/2013	1.43E+00	P	-1.78E+00	2.14E+00	6.06E+00
LB4110A - D1	Beta	11/18/2007	4/25/2013	2.92E+00	P	-2.39E+00	2.58E+00	7.55E+00
LB4110A - D2	Beta	11/18/2007	4/25/2013	1.55E+00	P	-6.51E-01	1.56E+00	3.78E+00
LB4110A - D3	Beta	11/18/2007	4/25/2013	4.93E+00	P	1.22E+00	4.47E+00	7.72E+00
LB4110A - D4	Beta	11/18/2007	4/25/2013	1.05E+00	P	-4.30E-01	1.37E+00	3.18E+00
LB4110R - A1	Beta	11/24/2006	4/25/2013	1.08E+00	P	-6.22E+01	3.79E+00	6.97E+01
LB4110R - A2	Beta	11/24/2006	4/25/2013	1.15E+00	P	-4.94E+01	2.06E+00	5.35E+01
LB4110R - A3	Beta	11/24/2006	4/25/2013	1.50E+00	P	-4.57E+01	2.81E+00	5.13E+01
LB4110R - A4	Beta	11/24/2006	4/25/2013	1.23E+00	P	-4.56E+01	2.03E+00	4.97E+01
LB4110R - B1	Beta	11/24/2006	4/25/2013	1.45E+00	P	-4.80E+01	2.05E+00	5.21E+01
LB4110R - B2	Beta	11/24/2006	4/25/2013	1.18E+00	P	-4.80E+01	2.09E+00	5.21E+01
LB4110R - B3	Beta	11/24/2006	4/25/2013	1.10E+00	P	-4.77E+01	2.71E+00	5.32E+01
LB4110R - B4	Beta	11/24/2006	4/25/2013	9.50E-01	P	-4.81E+01	1.96E+00	5.20E+01
LB4110R - C1	Beta	11/24/2006	4/25/2013	1.17E+00	P	-4.79E+01	3.04E+00	5.40E+01
LB4110R - C2	Beta	11/24/2006	4/25/2013	1.77E+00	P	-4.79E+01	2.76E+00	5.34E+01
LB4110R - C3	Beta	11/24/2006	4/25/2013	2.22E+00	P	-4.84E+01	2.56E+00	5.35E+01
LB4110R - C4	Beta	11/24/2006	4/25/2013	1.47E+00	P	-5.45E+01	2.99E+00	6.05E+01
LB4110R - D1	Beta	11/24/2006	4/25/2013	0.00E+00	P	-4.52E+01	5.81E+00	5.69E+01
LB4110R - D2	Beta	11/24/2006	4/25/2013	0.00E+00	P	-4.88E+01	1.96E+00	5.27E+01
LB4110R - D3	Beta	11/24/2006	4/25/2013	0.00E+00	P	-5.21E+01	5.78E+00	6.37E+01
LB4110R - D4	Beta	11/24/2006	4/25/2013	0.00E+00	P	-4.85E+01	2.34E+00	5.31E+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)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	11/18/2007	4/25/2013	0.2476	P	-0.0197	0.2145	0.4487
LB4110A - A2	Alpha	11/18/2007	4/25/2013	0.2108	P	-0.0571	0.1723	0.4018
LB4110A - A3	Alpha	11/18/2007	4/25/2013	0.2100	P	-0.0808	0.1611	0.4030
LB4110A - A4	Alpha	11/18/2007	4/25/2013	0.2191	P	-0.0592	0.1801	0.4194
LB4110A - B1	Alpha	11/18/2007	4/25/2013	0.2104	P	0.1943	0.2247	0.2551
LB4110A - B2	Alpha	11/18/2007	4/25/2013	0.2096	P	0.1930	0.2219	0.2507
LB4110A - B3	Alpha	11/18/2007	4/25/2013	0.2405	P	0.1289	0.2326	0.3362
LB4110A - B4	Alpha	11/18/2007	4/25/2013	0.2279	P	0.2090	0.2368	0.2645
LB4110A - C1	Alpha	11/18/2007	4/25/2013	0.2173	P	0.1973	0.2209	0.2444
LB4110A - C2	Alpha	11/18/2007	4/25/2013	0.2222	P	0.1965	0.2252	0.2539
LB4110A - C3	Alpha	11/18/2007	4/25/2013	0.2567	P	0.2227	0.2494	0.2760
LB4110A - C4	Alpha	11/18/2007	4/25/2013	0.2254	P	0.1965	0.2258	0.2551
LB4110A - D1	Alpha	11/18/2007	4/25/2013	0.2225	P	0.2037	0.2335	0.2633
LB4110A - D2	Alpha	11/18/2007	4/25/2013	0.2448	P	0.2279	0.2585	0.2891
LB4110A - D3	Alpha	11/18/2007	4/25/2013	0.2523	P	0.2315	0.2640	0.2964
LB4110A - D4	Alpha	11/18/2007	4/25/2013	0.1772	P	0.1653	0.2000	0.2347
LB4110R - A1	Alpha	11/24/2006	4/25/2013	0.2426	P	0.2030	0.2389	0.2748
LB4110R - A2	Alpha	11/24/2006	4/25/2013	0.2132	P	0.1899	0.2207	0.2515
LB4110R - A3	Alpha	11/24/2006	4/25/2013	0.2206	P	0.1963	0.2249	0.2535
LB4110R - A4	Alpha	11/24/2006	4/25/2013	0.2407	P	0.2159	0.2457	0.2756
LB4110R - B1	Alpha	11/24/2006	4/25/2013	0.2226	P	0.1877	0.2261	0.2646
LB4110R - B2	Alpha	11/24/2006	4/25/2013	0.2126	P	0.1801	0.2176	0.2551
LB4110R - B3	Alpha	11/24/2006	4/25/2013	0.2472	P	0.2066	0.2440	0.2814
LB4110R - B4	Alpha	11/24/2006	4/25/2013	0.2220	P	0.1938	0.2321	0.2703
LB4110R - C1	Alpha	11/24/2006	4/25/2013	0.2118	P	0.1861	0.2153	0.2446
LB4110R - C2	Alpha	11/24/2006	4/25/2013	0.2187	P	0.1963	0.2249	0.2534
LB4110R - C3	Alpha	11/24/2006	4/25/2013	0.2369	P	0.2063	0.2398	0.2732
LB4110R - C4	Alpha	11/24/2006	4/25/2013	0.2092	P	0.1860	0.2230	0.2601
LB4110R - D1	Alpha	11/24/2006	4/25/2013	0.0000	F	0.0441	0.2086	0.3730
LB4110R - D2	Alpha	11/24/2006	4/25/2013	0.0000	F	0.0510	0.2372	0.4234
LB4110R - D3	Alpha	11/24/2006	4/25/2013	0.0000	F	0.0501	0.2330	0.4159
LB4110R - D4	Alpha	11/24/2006	4/25/2013	0.0000	F	0.0386	0.1878	0.3369
LB5100 - 1	Alpha	7/10/2006	10/26/2007	0.3368	P	0.3332	0.3455	0.3578

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GPC Detector Report  
(ALL Efficiencies)

C  
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Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	11/18/2007	4/25/2013	0.5511	P	0.2023	0.5629	0.9235
LB4110A - A2	Beta	11/18/2007	4/25/2013	0.4824	P	0.1530	0.4631	0.7732
LB4110A - A3	Beta	11/18/2007	4/25/2013	0.4760	P	0.0802	0.4569	0.8337
LB4110A - A4	Beta	11/18/2007	4/25/2013	0.5219	P	0.1325	0.4875	0.8425
LB4110A - B1	Beta	11/18/2007	4/25/2013	0.5007	P	0.4643	0.5308	0.5973
LB4110A - B2	Beta	11/18/2007	4/25/2013	0.5128	P	0.4639	0.5277	0.5916
LB4110A - B3	Beta	11/18/2007	4/25/2013	0.5346	P	0.3183	0.5321	0.7458
LB4110A - B4	Beta	11/18/2007	4/25/2013	0.5370	P	0.4922	0.5547	0.6173
LB4110A - C1	Beta	11/18/2007	4/25/2013	0.5074	P	0.4500	0.5027	0.5554
LB4110A - C2	Beta	11/18/2007	4/25/2013	0.4904	P	0.4277	0.5012	0.5746
LB4110A - C3	Beta	11/18/2007	4/25/2013	0.5969	P	0.5274	0.5901	0.6527
LB4110A - C4	Beta	11/18/2007	4/25/2013	0.5253	P	0.4567	0.5251	0.5936
LB4110A - D1	Beta	11/18/2007	4/25/2013	0.5206	P	0.4801	0.5545	0.6289
LB4110A - D2	Beta	11/18/2007	4/25/2013	0.5481	P	0.4909	0.5891	0.6873
LB4110A - D3	Beta	11/18/2007	4/25/2013	0.5883	P	0.5367	0.6156	0.6946
LB4110A - D4	Beta	11/18/2007	4/25/2013	0.4297	P	0.3868	0.4737	0.5607
LB4110R - A1	Beta	11/24/2006	4/25/2013	0.5592	P	0.4811	0.5680	0.6549
LB4110R - A2	Beta	11/24/2006	4/25/2013	0.5119	P	0.4206	0.5089	0.5972
LB4110R - A3	Beta	11/24/2006	4/25/2013	0.5265	P	0.4579	0.5399	0.6218
LB4110R - A4	Beta	11/24/2006	4/25/2013	0.5968	P	0.5097	0.5917	0.6737
LB4110R - B1	Beta	11/24/2006	4/25/2013	0.5224	P	0.4533	0.5428	0.6324
LB4110R - B2	Beta	11/24/2006	4/25/2013	0.5145	P	0.4311	0.5203	0.6096
LB4110R - B3	Beta	11/24/2006	4/25/2013	0.5983	P	0.5013	0.5912	0.6812
LB4110R - B4	Beta	11/24/2006	4/25/2013	0.5266	P	0.4624	0.5502	0.6380
LB4110R - C1	Beta	11/24/2006	4/25/2013	0.4667	P	0.4245	0.5035	0.5825
LB4110R - C2	Beta	11/24/2006	4/25/2013	0.5114	P	0.4502	0.5293	0.6085
LB4110R - C3	Beta	11/24/2006	4/25/2013	0.5552	P	0.4812	0.5714	0.6616
LB4110R - C4	Beta	11/24/2006	4/25/2013	0.4960	P	0.4326	0.5267	0.6209
LB4110R - D1	Beta	11/24/2006	4/25/2013	0.0000	F	0.1045	0.4988	0.8930
LB4110R - D2	Beta	11/24/2006	4/25/2013	0.0000	F	0.1182	0.5605	1.0027
LB4110R - D3	Beta	11/24/2006	4/25/2013	0.0000	F	0.1148	0.5443	0.9739
LB4110R - D4	Beta	11/24/2006	4/25/2013	0.0000	F	0.0908	0.4481	0.8053
LB5100 - 1	Beta	7/10/2006	10/26/2007	0.4428	F	0.4555	0.4731	0.4906

**SECTION XII**

**BARIUM-133 ANALYTICAL TRACER DATA**

C  
4/16/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404901\_GE1\_BAFIL\_190504.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : SPIKE  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 07:22:23  
 Sample ID : 1304049-01 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 00:15:00.29 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.20	72	106	1.83	28.43	26	15	8.05E-02	28.8	3.42E+01
2	3	30.96	2164	76	1.37	31.20	26	15	2.40E+00	2.2	
3	3	34.90	493	95	1.85	35.13	26	15	5.48E-01	7.3	
4	0	54.24	57	160	2.29	54.47	48	10	6.37E-02	43.3	
5	3	61.94	303	74	1.77	62.17	58	12	3.37E-01	7.1	1.54E+00
6	3	65.91	114	89	1.91	66.14	58	12	1.27E-01	18.0	
7	0	81.29	880	164	1.92	81.52	76	11	9.78E-01	4.4	
8	0	92.41	59	112	1.57	92.64	89	9	6.57E-02	34.6	
9	2	111.97	255	59	1.62	112.20	108	13	2.84E-01	7.7	5.87E-01
10	2	116.04	62	56	1.81	116.27	108	13	6.94E-02	22.6	
11	0	161.00	24	70	2.67	161.22	158	7	2.62E-02	62.4	
12	3	239.31	26	27	2.14	239.53	237	10	2.90E-02	34.1	2.25E+00
13	3	241.78	22	30	1.61	242.00	237	10	2.49E-02	46.5	
14	1	276.62	67	13	1.80	276.84	274	12	7.48E-02	14.9	1.63E+00
15	1	279.95	16	14	1.80	280.16	274	12	1.74E-02	60.8	
16	2	303.04	167	20	1.61	303.25	299	13	1.85E-01	8.6	1.96E+00
17	2	307.48	41	26	2.01	307.70	299	13	4.57E-02	25.7	
18	2	334.04	112	12	2.03	334.25	330	15	1.24E-01	10.7	3.06E+00
19	2	338.44	31	8	2.03	338.65	330	15	3.45E-02	28.2	
20	0	356.22	601	20	1.97	356.43	351	9	6.68E-01	4.3	
21	3	383.85	160	7	2.27	384.06	380	16	1.78E-01	10.5	1.13E+01
22	3	387.24	229	5	1.71	387.45	380	16	2.55E-01	7.3	
23	3	391.12	44	6	1.99	391.33	380	16	4.92E-02	29.8	
24	2	414.81	45	18	2.08	415.02	411	16	5.00E-02	19.4	3.70E+00
25	2	418.16	35	15	2.09	418.36	411	16	3.92E-02	29.5	
26	2	421.94	17	11	2.09	422.15	411	16	1.85E-02	49.3	
27	0	437.41	133	2	1.89	437.62	433	9	1.47E-01	8.9	
28	3	464.38	11	1	2.33	464.58	462	12	1.18E-02	42.3	1.41E+00
29	3	468.22	26	8	2.33	468.42	462	12	2.87E-02	29.1	
30	0	510.80	31	6	3.34	511.00	507	8	3.43E-02	22.7	
31	0	609.77	9	1	1.41	609.96	607	6	9.61E-03	40.5	
32	0	697.81	8	4	5.39	698.00	693	8	8.89E-03	55.9	

Total number of lines in spectrum 32  
 Number of unidentified lines 28  
 Number of lines tentatively identified by NID 4 12.50%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.081E+02	4.081E+02	0.777E+02	19.05	
Total Activity :			4.081E+02	4.081E+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	4.083E+02	4.083E+02	0.620E+02	15.19	
Total Activity :			4.083E+02	4.083E+02			

Grand Total Activity : 8.164E+02 8.164E+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	4.081E+02	4.081E+02	19.05	OK
	302.84	17.80	4.915E+00	5.719E+02	5.719E+02	33.94	OK
	356.01	60.00	6.963E+00	4.321E+02	4.321E+02	17.42	OK

Final Mean for 3 Valid Peaks = 4.081E+02 +/- 7.774E+01 ( 19.05%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	4.083E+02	4.083E+02	15.19	OK

Final Mean for 1 Valid Peaks = 4.083E+02 +/- 6.201E+01 ( 15.19%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.081E+02	7.774E+01	1.985E+01	3.259E+00	20.558
TH-234	4.083E+02	6.201E+01	5.930E+01	1.900E+00	6.886

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.578E+00		1.426E+01	2.229E+01	6.960E+00	-0.071
CD-109	-3.482E+01		1.523E+02	2.055E+02	2.659E+01	-0.169
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.370E+00		1.693E+00	3.527E+00	6.629E-02	2.656
NP-237	-6.464E-01		4.282E+01	5.973E+01	7.272E+00	-0.011
AM-241	1.024E+01		3.582E+00	6.737E+00	1.580E-01	1.520

c  
4/16/13

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404902\_GE1\_BAFIL\_190507.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : BLANK  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 07:38:16  
 Sample ID : 1304049-02 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.88	2038	61	1.48	31.11	27	14	2.26E+00	2.3	1.43E+01
2	3	35.13	518	44	1.58	35.36	27	14	5.76E-01	4.9	
3	1	46.77	37	64	1.55	47.00	44	13	4.13E-02	34.4	3.58E+00
4	1	52.82	52	71	1.56	53.05	44	13	5.73E-02	28.4	
5	3	61.95	261	71	1.91	62.18	58	16	2.90E-01	8.3	4.08E+00
6	3	66.40	110	66	1.92	66.64	58	16	1.22E-01	16.4	
7	0	81.18	805	148	1.90	81.41	76	10	8.95E-01	4.5	
8	0	92.74	26	92	1.23	92.97	90	7	2.85E-02	65.0	
9	2	111.99	203	52	1.81	112.22	107	14	2.25E-01	8.9	1.39E+00
10	2	116.49	58	46	1.82	116.72	107	14	6.45E-02	23.5	
11	0	161.82	27	71	1.20	162.04	158	8	3.03E-02	57.1	
12	0	185.10	40	85	3.30	185.32	180	10	4.42E-02	46.1	
13	0	234.74	22	38	3.23	234.95	231	7	2.39E-02	52.3	
14	0	276.94	66	37	1.31	277.16	273	8	7.30E-02	20.4	
15	2	303.09	155	28	1.69	303.30	299	13	1.72E-01	9.3	6.73E+00
16	2	307.68	35	38	2.01	307.90	299	13	3.94E-02	30.1	
17	2	333.90	81	22	1.80	334.11	330	16	9.03E-02	13.8	8.92E-01
18	2	338.59	29	13	2.03	338.80	330	16	3.18E-02	31.4	
19	0	356.28	567	36	1.94	356.49	352	9	6.30E-01	4.6	
20	1	376.96	13	17	1.87	377.17	373	22	1.42E-02	57.0	1.54E+01
21	1	383.96	129	15	1.88	384.17	373	22	1.43E-01	10.1	
22	1	386.96	221	10	1.88	387.17	373	22	2.46E-01	8.7	
23	1	390.96	58	4	1.88	391.17	373	22	6.44E-02	23.0	
24	1	414.97	35	16	1.89	415.17	413	10	3.93E-02	22.4	8.00E+00
25	1	417.97	28	32	1.90	418.17	413	10	3.08E-02	40.8	
26	0	437.05	136	2	1.88	437.25	431	11	1.51E-01	8.9	
27	0	468.17	25	1	1.85	468.37	465	6	2.74E-02	21.6	
28	0	511.35	38	0	2.63	511.55	508	8	4.22E-02	16.2	
29	0	584.40	6	6	1.41	584.60	580	8	6.53E-03	83.4	

Total number of lines in spectrum 29  
 Number of unidentified lines 25  
 Number of lines tentatively identified by NID 4 13.79%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.735E+02	3.735E+02	0.716E+02	19.17		
Total Activity :			3.735E+02	3.735E+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	3.513E+02	3.513E+02	0.612E+02	17.41		
Total Activity :			3.513E+02	3.513E+02				

Grand Total Activity : 7.248E+02 7.248E+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	3.735E+02	3.735E+02	19.17	OK
	302.84	17.80	4.915E+00	5.312E+02	5.312E+02	34.70	OK
	356.01	60.00	6.963E+00	4.076E+02	4.077E+02	17.74	OK

Final Mean for 3 Valid Peaks = 3.735E+02+/- 7.159E+01 ( 19.17%)

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	3.513E+02	3.513E+02	17.41	OK

Final Mean for 1 Valid Peaks = 3.513E+02+/- 6.116E+01 ( 17.41%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.735E+02	7.159E+01	1.638E+01	2.689E+00	22.798
TH-234	3.513E+02	6.116E+01	4.929E+01	1.579E+00	7.126

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.860E+00		1.383E+01	2.159E+01	6.740E+00	-0.086
CD-109	-1.307E+02		1.687E+02	2.065E+02	2.671E+01	-0.633
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.651E+00		1.575E+00	3.319E+00	6.237E-02	2.305
NP-237	2.265E+01		4.222E+01	6.355E+01	7.737E+00	0.356
AM-241	1.230E+01		3.326E+00	6.625E+00	1.554E-01	1.856

*e*  
*4/16/13*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404903\_GE1\_BAFIL\_190510.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-302-AI TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 07:58:14  
 Sample ID : 1304049-03 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.91	2173	67	1.39	31.15	26	16	2.41E+00	2.2	8.64E+00
2	2	35.05	482	56	1.68	35.28	26	16	5.36E-01	5.3	
3	0	52.64	48	88	2.12	52.87	50	7	5.28E-02	35.7	
4	5	61.79	293	98	2.16	62.02	57	14	3.26E-01	8.1	4.99E+00
5	5	65.99	108	126	1.90	66.22	57	14	1.20E-01	20.1	
6	0	81.26	834	111	1.95	81.49	77	10	9.27E-01	4.2	
7	0	92.98	56	75	1.62	93.21	90	7	6.17E-02	29.2	
8	5	112.00	206	51	1.66	112.23	109	13	2.29E-01	8.6	3.11E+00
9	5	116.06	55	78	2.20	116.29	109	13	6.12E-02	33.1	
10	0	161.54	23	74	1.75	161.77	159	7	2.55E-02	65.3	
11	0	186.97	25	80	3.39	187.20	183	7	2.79E-02	62.5	
12	0	276.84	74	54	1.85	277.05	271	12	8.18E-02	23.1	
13	0	303.35	135	39	1.77	303.57	300	6	1.50E-01	11.3	
14	3	333.81	72	22	1.85	334.03	330	16	8.01E-02	16.3	3.64E+00
15	3	338.76	27	22	2.23	338.97	330	16	3.04E-02	35.8	
16	0	356.26	613	30	1.86	356.47	351	11	6.81E-01	4.4	
17	0	377.22	16	16	1.81	377.43	374	7	1.77E-02	48.3	
18	2	384.06	151	17	2.06	384.27	381	17	1.68E-01	9.2	4.35E+00
19	2	387.14	229	11	1.74	387.35	381	17	2.54E-01	7.7	
20	2	391.53	56	10	2.04	391.74	381	17	6.21E-02	18.0	
21	3	415.30	57	7	2.29	415.51	411	15	6.30E-02	17.3	3.10E+00
22	3	418.26	30	7	2.30	418.47	411	15	3.37E-02	34.0	
23	3	422.79	9	5	2.30	423.00	411	15	9.87E-03	46.8	
24	0	437.23	126	5	1.85	437.44	433	9	1.39E-01	9.4	
25	0	468.06	33	5	1.94	468.26	465	6	3.72E-02	20.0	
26	0	511.38	19	2	1.26	511.58	508	7	2.14E-02	25.5	
27	0	611.67	4	6	1.56	611.86	607	6	4.78E-03	101.4	
28	0	623.92	9	0	3.16	624.11	621	7	1.00E-02	33.3	

Total number of lines in spectrum 28  
 Number of unidentified lines 24  
 Number of lines tentatively identified by NID 4 14.29%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.867E+02	3.867E+02	0.730E+02	18.87	
Total Activity :			3.867E+02	3.867E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.949E+02	3.949E+02	0.673E+02	17.05	
Total Activity :			3.949E+02	3.949E+02			

Grand Total Activity : 7.816E+02 7.816E+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	3.867E+02	3.867E+02	18.87	OK
	302.84	17.80	4.915E+00	4.645E+02	4.645E+02	36.92	OK
	356.01	60.00	6.963E+00	4.406E+02	4.407E+02	17.52	OK

Final Mean for 3 Valid Peaks = 3.867E+02 +/- 7.296E+01 ( 18.87%)

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	3.949E+02	3.949E+02	17.05	OK

Final Mean for 1 Valid Peaks = 3.949E+02 +/- 6.734E+01 ( 17.05%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.867E+02	7.296E+01	1.872E+01	3.074E+00	20.652
TH-234	3.949E+02	6.734E+01	6.080E+01	1.948E+00	6.496

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.789E+00		1.341E+01	2.098E+01	6.551E+00	-0.085
CD-109	-2.320E+01		1.442E+02	1.973E+02	2.552E+01	-0.118
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	9.033E+00		1.638E+00	3.440E+00	6.464E-02	2.626
NP-237	8.555E+00		4.024E+01	5.836E+01	7.105E+00	0.147
AM-241	1.070E+01		3.674E+00	6.893E+00	1.617E-01	1.552

*C*  
*4116117*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404904\_GE1\_BAFIL\_190512.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-302-AI TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 08:13:58  
 Sample ID : 1304049-04 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	28.22	76	52	1.83	28.45	27	16	8.48E-02	16.1	2.32E+01
2	3	30.93	2069	61	1.36	31.16	27	16	2.30E+00	2.3	
3	3	34.95	514	74	1.85	35.18	27	16	5.72E-01	6.6	
4	0	52.26	41	139	2.58	52.50	49	9	4.55E-02	54.8	
5	1	57.91	24	30	1.57	58.14	57	16	2.66E-02	34.2	1.89E+01
6	1	61.74	258	47	1.58	61.97	57	16	2.87E-01	7.8	
7	1	65.63	118	45	1.58	65.86	57	16	1.31E-01	14.7	
8	1	69.63	32	43	1.59	69.86	57	16	3.61E-02	41.6	
9	0	81.33	848	138	1.89	81.56	77	11	9.42E-01	4.4	
10	0	92.95	34	67	1.48	93.18	90	6	3.73E-02	43.0	
11	1	111.92	201	51	1.64	112.15	107	14	2.24E-01	9.1	2.22E+00
12	1	115.83	46	45	1.65	116.06	107	14	5.14E-02	27.7	
13	0	162.05	28	75	1.02	162.28	159	7	3.06E-02	56.3	
14	0	185.43	33	68	3.20	185.65	182	8	3.67E-02	46.7	
15	0	270.44	24	12	3.07	270.65	267	7	2.65E-02	31.8	
16	0	276.72	59	20	1.34	276.94	274	7	6.51E-02	18.1	
17	3	303.00	178	22	1.73	303.22	298	14	1.97E-01	8.1	1.14E+01
18	3	307.36	31	35	2.15	307.58	298	14	3.46E-02	42.1	
19	3	333.88	73	19	1.78	334.09	329	16	8.08E-02	15.6	3.68E+00
20	3	338.34	27	17	2.23	338.55	329	16	2.98E-02	39.8	
21	7	352.74	16	8	2.69	352.95	351	10	1.72E-02	36.5	3.65E+00
22	7	356.27	590	14	1.53	356.48	351	10	6.55E-01	4.2	
23	0	364.93	15	22	2.67	365.14	362	6	1.61E-02	54.7	
24	2	383.72	93	42	1.99	383.93	381	10	1.04E-01	16.4	2.95E+01
25	2	387.15	214	55	1.74	387.36	381	10	2.38E-01	8.7	
26	0	391.82	39	23	2.75	392.03	391	6	4.38E-02	28.8	
27	0	409.12	14	7	2.34	409.32	405	7	1.56E-02	41.1	
28	2	414.78	47	3	2.08	414.98	412	19	5.27E-02	15.6	2.72E+00
29	2	418.16	31	3	2.09	418.36	412	19	3.42E-02	29.0	
30	2	421.79	19	3	1.73	422.00	412	19	2.14E-02	35.3	
31	0	437.41	103	8	1.93	437.61	433	8	1.14E-01	11.0	
32	0	445.31	8	7	2.93	445.51	443	8	8.89E-03	65.0	
33	0	468.44	23	10	1.22	468.65	465	6	2.54E-02	30.5	
34	0	473.61	11	3	3.11	473.82	472	5	1.21E-02	41.4	
35	0	511.13	33	8	1.98	511.33	507	10	3.63E-02	23.7	
36	0	611.16	11	3	1.89	611.35	608	8	1.23E-02	42.4	
37	0	636.31	11	2	1.04	636.50	632	9	1.22E-02	38.6	
38	0	1460.62	8	0	1.47	1460.75	1457	7	8.89E-03	35.4	

Summary of Nuclide Activity

Sample ID : 1304049-04

Acquisition date : 16-APR-2013 08:13:58

Total number of lines in spectrum 38  
 Number of unidentified lines 33  
 Number of lines tentatively identified by NID 5 13.16%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.932E+02	3.932E+02	0.748E+02	19.02	
Total Activity :			3.932E+02	3.932E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.478E+02	3.478E+02	0.569E+02	16.38	
AM-241	432.20Y	1.00	2.497E+00	2.497E+00	1.711E+00	68.52	
Total Activity :			3.503E+02	3.503E+02			

Grand Total Activity : 7.435E+02 7.435E+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	3.932E+02	3.932E+02	19.02	OK
	302.84	17.80	4.915E+00	6.099E+02	6.100E+02	33.47	OK
	356.01	60.00	6.963E+00	4.238E+02	4.238E+02	17.36	OK

Final Mean for 3 Valid Peaks = 3.932E+02+/- 7.479E+01 ( 19.02%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.478E+02	3.478E+02	16.38	OK

Final Mean for 1 Valid Peaks = 3.478E+02+/- 5.695E+01 ( 16.38%)

AM-241	59.54	35.90*	8.010E+01	2.497E+00	2.497E+00	68.52	OK
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Final Mean for 1 Valid Peaks = 2.497E+00+/- 1.711E+00 ( 68.52%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.932E+02	7.479E+01	1.958E+01	3.214E+00	20.087
TH-234	3.478E+02	5.695E+01	4.675E+01	1.498E+00	7.438
AM-241	2.497E+00	1.711E+00	3.617E+00	8.485E-02	0.690

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-6.171E-01		1.308E+01	2.074E+01	6.476E+00	-0.030
CD-109	-2.089E+01		1.590E+02	2.175E+02	2.813E+01	-0.096
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.243E+00		1.581E+00	3.299E+00	6.200E-02	2.195
NP-237	-8.876E-01		4.436E+01	6.169E+01	7.511E+00	-0.014

*C*  
*411617*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404905\_GE1\_BAFIL\_190514.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-302-AI DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 08:29:42  
 Sample ID : 1304049-05 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	2	30.88	1951	57	1.48	31.12	26	16	2.17E+00	2.3	1.96E+01
2	2	35.06	492	56	1.68	35.29	26	16	5.47E-01	5.2	
3	0	52.42	58	96	1.91	52.66	50	8	6.44E-02	32.1	
4	2	61.86	258	62	1.73	62.09	58	14	2.87E-01	7.7	2.33E+00
5	2	65.88	121	66	1.74	66.12	58	14	1.35E-01	13.9	
6	0	81.23	834	137	1.92	81.46	76	11	9.26E-01	4.4	
7	0	92.94	47	98	1.32	93.17	89	8	5.24E-02	39.2	
8	2	111.91	205	43	1.81	112.14	106	20	2.28E-01	8.8	2.74E+00
9	2	116.46	51	41	1.82	116.68	106	20	5.69E-02	26.1	
10	0	185.98	41	71	2.96	186.20	182	8	4.59E-02	38.7	
11	0	277.09	59	30	1.20	277.31	274	7	6.57E-02	20.1	
12	2	303.12	149	15	1.68	303.33	300	11	1.65E-01	8.8	3.65E+00
13	2	307.52	40	21	2.01	307.74	300	11	4.47E-02	22.4	
14	0	334.47	61	47	1.37	334.69	331	7	6.76E-02	22.5	
15	0	338.80	16	24	2.52	339.01	338	5	1.81E-02	54.5	
16	0	356.34	516	40	1.89	356.55	353	7	5.73E-01	4.9	
17	0	365.14	11	32	1.14	365.35	363	7	1.23E-02	88.1	
18	3	384.09	149	20	2.27	384.30	380	16	1.65E-01	11.9	5.59E+00
19	3	387.19	249	9	1.85	387.40	380	16	2.76E-01	7.3	
20	3	391.32	57	5	2.25	391.53	380	16	6.32E-02	24.1	
21	3	415.08	41	7	2.29	415.29	412	14	4.53E-02	20.9	5.52E+00
22	3	418.36	27	7	2.30	418.57	412	14	3.02E-02	35.2	
23	3	421.78	18	7	2.30	421.99	412	14	1.97E-02	41.1	
24	0	437.15	110	2	1.94	437.35	434	7	1.23E-01	9.7	
25	5	467.93	23	3	2.09	468.14	465	11	2.54E-02	24.1	2.01E+00
26	5	472.54	14	3	2.82	472.75	465	11	1.52E-02	33.1	
27	0	511.68	18	9	2.63	511.88	507	10	1.99E-02	40.3	

Total number of lines in spectrum 27  
 Number of unidentified lines 23  
 Number of lines tentatively identified by NID 4 14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.865E+02	3.866E+02	0.737E+02	19.06	
Total Activity :			3.865E+02	3.866E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.478E+02	3.478E+02	0.565E+02	16.24	
Total Activity :			3.478E+02	3.478E+02			

Grand Total Activity : 7.343E+02 7.343E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.963E+01	3.865E+02	3.866E+02	19.06	OK		
	302.84	17.80	4.915E+00	5.100E+02	5.100E+02	34.16	OK		
	356.01	60.00	6.963E+00	3.708E+02	3.708E+02	17.99	OK		

Final Mean for 3 Valid Peaks = 3.866E+02 +/- 7.366E+01 ( 19.06%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	5.865E+01	3.478E+02	3.478E+02	16.24	OK		

Final Mean for 1 Valid Peaks = 3.478E+02 +/- 5.649E+01 ( 16.24%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.866E+02	7.366E+01	1.798E+01	2.952E+00	21.499
TH-234	3.478E+02	5.649E+01	5.051E+01	1.618E+00	6.885

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.456E-01		1.162E+01	2.013E+01	6.286E+00	-0.012
CD-109	2.033E-01		1.519E+02	2.126E+02	2.751E+01	0.001
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.717E+00		1.530E+00	3.214E+00	6.041E-02	2.401
NP-237	-2.277E+00		4.190E+01	5.818E+01	7.083E+00	-0.039
AM-241	1.123E+01		3.296E+00	6.486E+00	1.522E-01	1.731

*Handwritten:* 446611

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404906\_GE1\_BAFIL\_190516.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-100 TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 08:45:19  
 Sample ID : 1304049-06 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.87	1982	79	1.40	31.10	26	25	2.20E+00	2.3	5.35E+00
2	3	35.10	434	61	1.50	35.34	26	25	4.82E-01	5.4	
3	3	46.65	18	82	1.88	46.88	26	25	1.99E-02	89.0	
4	0	53.16	68	93	2.69	53.39	50	8	7.56E-02	27.3	
5	5	61.77	269	88	2.13	62.00	58	14	2.98E-01	8.4	7.64E+00
6	5	65.90	127	106	2.00	66.13	58	14	1.41E-01	16.4	
7	0	81.35	749	127	1.92	81.58	77	10	8.32E-01	4.6	
8	0	93.33	38	48	2.17	93.55	91	6	4.25E-02	32.6	
9	3	111.79	243	72	1.95	112.02	107	14	2.70E-01	8.4	4.51E+00
10	3	116.28	35	79	2.00	116.50	107	14	3.91E-02	43.7	
11	0	162.69	84	63	6.48	162.92	157	12	9.32E-02	21.9	
12	0	185.92	20	69	2.24	186.14	183	7	2.20E-02	72.9	
13	0	276.91	70	23	1.30	277.12	275	6	7.79E-02	16.1	
14	2	303.02	160	14	1.54	303.23	298	16	1.78E-01	8.5	2.21E+00
15	2	307.86	46	14	2.01	308.08	298	16	5.14E-02	20.4	
16	5	332.81	41	4	2.69	333.02	331	15	4.60E-02	20.6	1.07E+01
17	5	338.35	29	8	2.70	338.56	331	15	3.19E-02	33.7	
18	0	356.38	537	23	1.96	356.59	353	9	5.96E-01	4.6	
19	0	366.69	6	28	1.58	366.89	362	7	6.21E-03	160.0	
20	0	377.00	16	8	2.72	377.21	375	5	1.81E-02	35.6	
21	1	383.93	137	23	1.88	384.14	381	10	1.52E-01	11.1	1.34E+01
22	1	386.96	212	40	1.88	387.17	381	10	2.35E-01	9.6	
23	0	391.73	32	17	1.20	391.93	391	5	3.56E-02	28.5	
24	1	414.67	45	19	1.89	414.88	411	11	4.97E-02	20.2	6.15E+00
25	1	417.97	8	20	1.90	418.17	411	11	9.24E-03	114.8	
26	0	437.57	92	23	1.74	437.78	433	10	1.03E-01	14.2	
27	2	467.84	30	3	2.12	468.05	463	17	3.34E-02	19.3	1.66E+00
28	2	471.17	6	3	2.12	471.37	463	17	7.07E-03	92.3	
29	0	511.84	26	3	3.12	512.04	509	9	2.90E-02	22.4	
30	0	616.78	5	4	1.26	616.97	613	6	5.74E-03	76.8	

Total number of lines in spectrum 30  
 Number of unidentified lines 26  
 Number of lines tentatively identified by NID 4 13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.474E+02	3.474E+02	0.669E+02	19.26		
Total Activity :			3.474E+02	3.474E+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	3.619E+02	3.619E+02	0.636E+02	17.56		
Total Activity :			3.619E+02	3.619E+02				

Grand Total Activity : 7.093E+02 7.093E+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	3.474E+02	3.474E+02	19.26	OK
	302.84	17.80	4.915E+00	5.494E+02	5.495E+02	33.78	OK
	356.01	60.00	6.963E+00	3.857E+02	3.858E+02	17.75	OK

Final Mean for 3 Valid Peaks = 3.474E+02 +/- 6.692E+01 ( 19.26%)

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	3.619E+02	3.619E+02	17.56	OK

Final Mean for 1 Valid Peaks = 3.619E+02 +/- 6.357E+01 ( 17.56%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.474E+02	6.692E+01	1.944E+01	3.191E+00	17.874
TH-234	3.619E+02	6.357E+01	5.776E+01	1.851E+00	6.266

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.520E+00		1.505E+01	2.348E+01	7.332E+00	-0.065
CD-109	6.821E+01		1.327E+02	2.029E+02	2.625E+01	0.336
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.391E+00		1.488E+00	3.140E+00	5.901E-02	2.353
NP-237	2.918E+01		4.031E+01	6.248E+01	7.607E+00	0.467
AM-241	9.469E+00		3.467E+00	6.519E+00	1.529E-01	1.452

411667

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404907\_GE1\_BAFIL\_190518.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-100 DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:06:48  
 Sample ID : 1304049-07 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	32	62	1.51	28.14	27	13	3.60E-02	35.9	7.42E+01
2	3	30.92	1923	66	1.37	31.15	27	13	2.14E+00	2.4	
3	3	34.95	540	66	1.85	35.18	27	13	6.01E-01	6.2	
4	0	53.05	46	111	2.32	53.28	50	8	5.09E-02	42.4	
5	3	61.94	250	92	1.91	62.17	58	12	2.78E-01	8.8	2.11E+00
6	3	65.81	109	95	1.91	66.04	58	12	1.22E-01	18.8	
7	0	81.27	809	141	1.93	81.50	77	10	8.99E-01	4.5	
8	0	92.81	36	79	1.03	93.04	90	6	4.01E-02	42.4	
9	1	111.92	171	54	1.64	112.15	108	12	1.90E-01	10.1	3.62E+00
10	1	115.92	39	55	1.65	116.15	108	12	4.38E-02	33.3	
11	0	143.63	20	65	1.76	143.85	141	7	2.21E-02	70.8	
12	0	162.18	39	111	4.97	162.40	157	12	4.38E-02	55.7	
13	0	276.65	74	24	1.47	276.87	272	10	8.22E-02	17.1	
14	3	303.05	158	19	1.62	303.27	299	19	1.75E-01	8.9	1.67E+00
15	3	307.70	44	26	1.86	307.91	299	19	4.91E-02	23.5	
16	1	333.85	76	12	1.84	334.06	328	18	8.39E-02	13.9	1.15E+00
17	1	338.62	31	12	1.84	338.83	328	18	3.41E-02	27.4	
18	0	356.25	572	30	1.92	356.47	352	10	6.36E-01	4.5	
19	1	383.89	102	14	1.81	384.10	381	16	1.13E-01	11.6	2.51E+01
20	1	386.88	250	12	1.88	387.09	381	16	2.78E-01	7.8	
21	1	390.96	46	7	1.88	391.17	381	16	5.15E-02	29.1	
22	4	411.86	8	2	2.08	412.06	410	21	8.93E-03	43.1	8.54E-01
23	4	414.92	42	4	2.52	415.13	410	21	4.67E-02	21.8	
24	4	418.17	31	4	2.52	418.38	410	21	3.43E-02	29.9	
25	4	422.98	14	4	2.53	423.19	410	21	1.55E-02	48.0	
26	0	437.32	145	17	1.88	437.53	433	11	1.61E-01	10.0	
27	0	467.72	29	2	2.18	467.93	463	8	3.18E-02	20.7	
28	1	508.98	5	0	1.95	509.18	508	9	6.07E-03	33.0	8.92E-01
29	1	511.62	18	2	1.95	511.82	508	9	1.99E-02	28.7	
30	0	608.81	12	0	4.88	609.00	605	9	1.33E-02	28.9	
31	0	705.76	9	1	1.90	705.94	703	6	9.61E-03	40.5	

Total number of lines in spectrum 31  
 Number of unidentified lines 27  
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.752E+02	3.752E+02	0.717E+02	19.12		
Total Activity :			3.752E+02	3.752E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	3.365E+02	3.365E+02	0.617E+02	18.34		
Total Activity :			3.365E+02	3.365E+02				

Grand Total Activity : 7.117E+02 7.117E+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	3.752E+02	3.752E+02	19.12	OK
	302.84	17.80	4.915E+00	5.407E+02	5.407E+02	34.22	OK
	356.01	60.00	6.963E+00	4.111E+02	4.112E+02	17.68	OK

Final Mean for 3 Valid Peaks = 3.752E+02 +/- 7.175E+01 ( 19.12%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.365E+02	3.365E+02	18.34	OK

Final Mean for 1 Valid Peaks = 3.365E+02 +/- 6.172E+01 ( 18.34%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.752E+02	7.175E+01	1.887E+01	3.097E+00	19.884
TH-234	3.365E+02	6.172E+01	6.030E+01	1.932E+00	5.581

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	9.626E+00		1.263E+01	2.170E+01	6.776E+00	0.444
CD-109	3.432E+01		1.545E+02	2.229E+02	2.883E+01	0.154
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	6.065E+00		1.506E+00	3.116E+00	5.855E-02	1.946
NP-237	2.487E+01		4.240E+01	6.417E+01	7.813E+00	0.388
AM-241	8.398E+00		3.506E+00	6.460E+00	1.516E-01	1.300

*Y11615*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404908\_GE5\_BAFIL\_190519.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : D-81 TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:07:25  
 Sample ID : 1304049-08 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.17 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	20.15	17	24	0.12	198.73	187	15	1.90E-02	69.2	
2	7	20.94	64	15	0.54	206.33	202	15	7.13E-02	17.4	2.44E+00
3	7	21.48	35	7	0.45	211.52	202	15	3.88E-02	32.4	
4	0	25.34	17	9	0.34	248.53	244	9	1.89E-02	40.0	
5	0	31.01	1919	108	0.83	302.90	294	21	2.13E+00	2.7	
6	3	35.12	408	39	0.72	342.39	331	33	4.54E-01	6.4	6.06E-01
7	3	36.02	74	19	0.57	351.00	331	33	8.23E-02	27.3	
8	0	55.73	28	10	1.42	540.12	528	20	3.15E-02	29.7	
9	0	61.80	257	17	0.89	598.38	587	26	2.85E-01	7.3	
10	0	66.13	99	42	0.60	639.97	628	23	1.10E-01	17.6	
11	0	81.09	739	81	0.72	783.53	772	22	8.21E-01	4.5	
12	0	111.96	188	57	0.72	1079.68	1062	31	2.09E-01	12.4	
13	0	276.18	38	8	1.02	2655.57	2643	22	4.18E-02	22.0	
14	0	302.43	113	5	0.55	2907.39	2893	26	1.26E-01	10.1	
15	2	332.81	18	0	1.33	3198.89	3187	32	1.98E-02	45.3	2.15E+00
16	2	333.44	93	0	1.10	3205.00	3187	32	1.04E-01	8.9	
17	0	355.57	351	8	0.85	3417.34	3401	29	3.90E-01	5.6	
18	1	382.94	12	8	1.16	3680.00	3668	30	1.31E-02	91.4	6.19E+00
19	1	383.46	178	13	1.16	3685.00	3668	30	1.97E-01	6.5	
20	0	386.38	137	14	1.02	3712.94	3698	27	1.52E-01	10.0	

Total number of lines in spectrum 20  
 Number of unidentified lines 14  
 Number of lines tentatively identified by NID 6 30.00%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.731E+02	3.731E+02	0.662E+02	17.73	
Total Activity :			3.731E+02	3.731E+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	2.318E+02	2.318E+02	0.351E+02	15.15	
Total Activity :			2.318E+02	2.318E+02			

Grand Total Activity : 6.049E+02 6.049E+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	3.731E+02	3.731E+02	17.73	OK
	302.84	17.80	2.575E+00	7.428E+02	7.429E+02	33.26	OK
	356.01	60.00	4.312E+00	4.070E+02	4.071E+02	18.28	OK

Final Mean for 3 Valid Peaks = 3.731E+02+/- 6.617E+01 ( 17.73%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.318E+02	2.318E+02	15.15	OK

Final Mean for 1 Valid Peaks = 2.318E+02+/- 3.513E+01 ( 15.15%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.731E+02	6.617E+01	1.783E+01	2.625E+00	20.929
TH-234	2.318E+02	3.513E+01	2.345E+01	3.017E-01	9.886

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	4.445E-01	1.461E+01	2.709E+01	9.183E+00	0.016
CD-109	1.823E+00	1.053E+02	1.913E+02	1.841E+01	0.010
PA-231	-7.966E-01	8.631E-01	1.346E+00	1.515E-02	-0.592
PA-234	1.616E+00 +	1.048E+00	2.044E+00	2.300E-02	0.791
NP-237	5.052E-01	2.880E+01	5.231E+01	4.614E+00	0.010
AM-241	2.639E+00	1.218E+00	2.653E+00	2.986E-02	0.995

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411417

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404909\_GE5\_BAFIL\_190521.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : D-81 DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:24:32  
 Sample ID : 1304049-09 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.19 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	4	20.03	16	9	0.43	197.59	194	24	1.82E-02	34.7	1.27E+00
2	4	21.10	67	25	0.74	207.82	194	24	7.49E-02	23.9	
3	0	24.54	18	13	0.21	240.89	232	17	2.02E-02	50.8	
4	0	31.01	1979	148	0.83	302.93	292	25	2.20E+00	2.8	
5	1	35.13	336	28	0.62	342.48	332	28	3.73E-01	7.2	1.70E+00
6	1	36.02	92	18	0.57	351.00	332	28	1.02E-01	21.6	
7	0	43.86	11	3	0.22	426.21	420	11	1.26E-02	41.0	
8	0	53.45	41	14	0.57	518.24	510	14	4.53E-02	23.0	
9	0	61.76	235	19	0.87	598.04	586	23	2.61E-01	7.7	
10	1	64.86	23	1	0.71	627.73	627	26	2.58E-02	10.1	3.12E+00
11	1	65.41	40	7	0.66	633.00	627	26	4.40E-02	26.0	
12	1	66.08	77	15	0.59	639.43	627	26	8.59E-02	16.9	
13	2	79.46	69	21	0.84	767.83	757	38	7.71E-02	19.5	6.30E-01
14	2	81.06	815	13	0.74	783.23	757	38	9.06E-01	3.6	
15	0	93.03	11	12	0.46	898.11	888	14	1.27E-02	62.2	
16	0	111.93	189	38	0.72	1079.46	1064	27	2.11E-01	10.4	
17	0	116.39	51	25	2.00	1122.23	1108	25	5.72E-02	26.1	
18	1	275.71	39	8	1.03	2651.00	2640	25	4.39E-02	22.9	1.56E+00
19	1	276.44	38	6	1.03	2658.00	2640	25	4.18E-02	19.6	
20	1	301.76	12	1	1.06	2901.00	2892	26	1.35E-02	79.0	1.40E+00
21	1	302.49	114	2	1.06	2908.00	2892	26	1.27E-01	9.5	
22	0	333.27	59	9	0.85	3203.34	3187	26	6.53E-02	16.6	
23	0	355.57	385	3	0.89	3417.35	3400	32	4.28E-01	5.2	
24	1	383.05	46	8	1.16	3681.00	3666	31	5.11E-02	25.5	3.06E+00
25	1	383.88	91	6	1.16	3689.00	3666	31	1.01E-01	11.1	
26	2	385.33	48	8	1.04	3702.89	3698	28	5.30E-02	11.7	1.19E+00
27	2	386.28	46	17	1.16	3712.00	3698	28	5.12E-02	30.9	
28	2	386.67	59	12	0.94	3715.72	3698	28	6.52E-02	22.5	

Summary of Nuclide Activity

Sample ID : 1304049-09

Acquisition date : 16-APR-2013 09:24:32

Total number of lines in spectrum 28  
 Number of unidentified lines 22  
 Number of lines tentatively identified by NID 6 21.43%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	4.116E+02	4.117E+02	0.696E+02	16.91		
Total Activity :			4.116E+02	4.117E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
TH-234	4.47E+09Y	1.00	2.122E+02	2.122E+02	0.339E+02	15.96		
Total Activity :			2.122E+02	2.122E+02				

Grand Total Activity : 6.239E+02 6.239E+02

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

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

Nuclide Type: FISSION

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
BA-133	81.00	33.00*	1.802E+01	4.116E+02	4.117E+02	4.117E+02	16.91	OK	
	302.84	17.80	2.575E+00	7.477E+02	7.478E+02	7.478E+02	32.48	OK	
	356.01	60.00	4.312E+00	4.470E+02	4.470E+02	4.470E+02	17.79	OK	

Final Mean for 3 Valid Peaks = 4.117E+02+/- 6.961E+01 ( 16.91%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected		Decay Corr		2-Sigma	Status
				pCi/filter	pCi/filter	pCi/filter	pCi/filter		
TH-234	63.29	3.80*	8.750E+01	2.122E+02	2.122E+02	2.122E+02	15.96	OK	

Final Mean for 1 Valid Peaks = 2.122E+02+/- 3.388E+01 ( 15.96%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.117E+02	6.961E+01	1.359E+01	2.000E+00	30.303
TH-234	2.122E+02	3.388E+01	1.871E+01	2.408E-01	11.341

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.557E+00		1.478E+01	2.848E+01	9.653E+00	0.195
CD-109	5.990E+01		8.386E+01	1.714E+02	1.649E+01	0.349
PA-231	4.076E-01		8.313E-01	1.657E+00	1.865E-02	0.246
PA-234	3.121E+00	+	1.500E+00	1.885E+00	2.122E-02	1.656
NP-237	-7.152E+00		2.316E+01	4.095E+01	3.612E+00	-0.175
AM-241	-1.326E-02		1.327E+00	2.051E+00	2.308E-02	-0.006

✓  
4/16/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404910\_GE5\_BAFIL\_190523.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-105 TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:40:35  
 Sample ID : 1304049-10 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.19 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	4.06	29	30	0.73	44.37	39	14	3.17E-02	51.8	
2	0	21.07	90	18	0.68	207.61	200	15	9.98E-02	14.9	
3	0	30.99	1891	82	0.86	302.79	290	29	2.10E+00	2.7	
4	0	35.28	440	48	0.64	343.94	332	28	4.89E-01	6.6	
5	0	61.71	258	28	0.72	597.57	585	27	2.87E-01	7.8	
6	4	65.30	33	21	0.80	631.94	625	32	3.64E-02	31.4	1.72E+00
7	4	65.93	53	20	0.45	638.07	625	32	5.85E-02	24.1	
8	4	66.55	28	27	0.66	644.00	625	32	3.10E-02	52.9	
9	0	69.96	11	11	0.31	676.70	670	11	1.22E-02	59.4	
10	5	79.51	52	46	1.12	768.30	758	34	5.74E-02	28.6	1.43E+00
11	5	81.05	774	32	0.70	783.09	758	34	8.60E-01	3.9	
12	0	84.11	29	8	0.83	812.45	803	17	3.18E-02	27.3	
13	0	111.85	165	48	0.94	1078.68	1067	23	1.83E-01	12.2	
14	0	276.10	47	4	0.46	2654.74	2639	25	5.25E-02	16.5	
15	1	301.97	88	8	1.06	2903.00	2891	27	9.72E-02	13.0	3.56E+00
16	1	302.60	72	5	1.06	2909.00	2891	27	7.96E-02	14.9	
17	0	307.01	15	5	0.57	2951.40	2940	18	1.61E-02	37.6	
18	1	332.50	11	8	1.10	3196.00	3185	27	1.24E-02	67.3	1.06E+00
19	1	333.13	49	6	1.10	3202.00	3185	27	5.44E-02	15.7	
20	0	355.46	360	6	0.77	3416.24	3399	33	4.00E-01	5.5	
21	0	383.19	73	10	0.57	3682.38	3665	28	8.07E-02	15.2	
22	1	385.65	12	16	1.16	3706.00	3697	30	1.31E-02	97.6	1.33E+00
23	1	386.19	107	18	1.20	3711.11	3697	30	1.19E-01	13.8	

Summary of Nuclide Activity

Sample ID : 1304049-10

Acquisition date : 16-APR-2013 09:40:35

Total number of lines in spectrum 23  
 Number of unidentified lines 18  
 Number of lines tentatively identified by NID 5 21.74%

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	3.907E+02	3.907E+02	0.669E+02	17.12		
Total Activity :			3.907E+02	3.907E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	2.330E+02	2.330E+02	0.378E+02	16.20		
Total Activity :			2.330E+02	2.330E+02				

Grand Total Activity : 6.237E+02 6.237E+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	3.907E+02	3.907E+02	17.12	OK
	302.84	17.80	2.575E+00	4.696E+02	4.696E+02	39.77	OK
	356.01	60.00	4.312E+00	4.176E+02	4.176E+02	18.14	OK

Final Mean for 3 Valid Peaks = 3.907E+02+/- 6.691E+01 ( 17.12%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.330E+02	2.330E+02	16.20	OK

Final Mean for 1 Valid Peaks = 2.330E+02+/- 3.776E+01 ( 16.20%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.907E+02	6.691E+01	1.289E+01	1.897E+00	30.320
TH-234	2.330E+02	3.776E+01	2.817E+01	3.624E-01	8.271

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	9.297E+00		1.483E+01	2.914E+01	9.878E+00	0.319
CD-109	7.063E+01		9.479E+01	1.899E+02	1.828E+01	0.372
PA-231	2.774E-02		7.914E-01	1.486E+00	1.673E-02	0.019
PA-234	4.156E+00	+	1.248E+00	1.889E+00	2.127E-02	2.200
NP-237	-2.133E+01		2.843E+01	4.166E+01	3.675E+00	-0.512
AM-241	3.524E-01		1.525E+00	2.423E+00	2.728E-02	0.145

*4/16/13*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404911\_GE5\_BAFIL\_190526.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-105 DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:56:37  
 Sample ID : 1304049-11 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.16 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	20.98	91	18	0.72	206.70	197	18	1.01E-01	15.2	
2	0	24.99	22	8	0.32	245.18	237	16	2.44E-02	35.8	
3	0	30.97	2053	89	0.79	302.55	291	32	2.28E+00	2.7	
4	1	35.01	342	76	0.62	341.37	332	24	3.80E-01	8.7	2.60E+00
5	1	35.91	71	77	0.57	350.00	332	24	7.90E-02	28.4	
6	0	36.66	14	9	0.12	357.12	355	7	1.57E-02	53.2	
7	0	53.34	37	11	0.81	517.22	509	14	4.15E-02	24.7	
8	7	61.45	139	10	0.88	595.04	586	22	1.55E-01	11.3	1.19E+00
9	7	61.97	60	13	0.56	600.02	586	22	6.71E-02	25.8	
10	2	65.84	109	23	0.80	637.21	627	28	1.21E-01	13.3	1.61E+00
11	2	66.51	28	15	0.73	643.63	627	28	3.14E-02	51.5	
12	0	80.95	740	105	0.69	782.20	770	25	8.23E-01	4.9	
13	0	84.09	15	10	0.29	812.31	804	15	1.67E-02	47.1	
14	0	111.75	205	33	0.68	1077.69	1066	23	2.28E-01	9.4	
15	0	115.83	54	22	1.13	1116.83	1105	22	6.00E-02	23.2	
16	1	275.40	10	9	1.03	2648.00	2639	23	1.16E-02	79.1	1.19E+00
17	1	275.92	57	5	1.03	2653.00	2639	23	6.31E-02	14.7	
18	2	301.55	144	4	1.06	2899.00	2889	26	1.60E-01	7.2	1.24E+01
19	2	302.17	28	4	0.86	2904.93	2889	26	3.10E-02	37.7	
20	0	332.76	55	6	1.20	3198.42	3184	23	6.06E-02	16.1	
21	0	355.01	416	3	1.08	3411.91	3395	33	4.62E-01	5.0	
22	2	382.41	50	15	1.40	3674.89	3665	28	5.58E-02	22.8	3.41E+00
23	2	382.94	87	30	1.16	3680.00	3665	28	9.67E-02	15.5	
24	0	385.80	111	34	0.88	3707.40	3692	28	1.24E-01	13.9	

Total number of lines in spectrum 24  
 Number of unidentified lines 17  
 Number of lines tentatively identified by NID 7 29.17%

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	3.738E+02	3.738E+02	0.676E+02	18.09		
Total Activity :			3.738E+02	3.738E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	5.455E+01	5.455E+01	2.828E+01	51.84		
AM-241	432.20Y	1.00	1.163E+01	1.163E+01	0.266E+01	22.90		
Total Activity :			6.618E+01	6.618E+01				

Grand Total Activity : 4.400E+02 4.400E+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	3.738E+02	3.738E+02	18.09	OK
	302.84	17.80	2.575E+00	1.830E+02	1.831E+02	79.97	OK
	356.01	60.00	4.312E+00	4.825E+02	4.825E+02	17.57	OK

Final Mean for 3 Valid Peaks = 3.738E+02 +/- 6.763E+01 ( 18.09%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	5.455E+01	5.455E+01	51.84	OK

Final Mean for 1 Valid Peaks = 5.455E+01 +/- 2.828E+01 ( 51.84%)

AM-241	59.54	35.90*	1.000E+02	1.163E+01	1.163E+01	22.90	OK
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Final Mean for 1 Valid Peaks = 1.163E+01 +/- 2.663E+00 ( 22.90%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.738E+02	6.763E+01	1.893E+01	2.787E+00	19.745
TH-234	5.455E+01	2.828E+01	2.545E+01	3.275E-01	2.143
AM-241	1.163E+01	2.663E+00	2.340E+00	2.634E-02	4.970

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.063E+00	1.229E+01	2.284E+01	7.741E+00	-0.047
CD-109	-4.318E+00	1.025E+02	1.853E+02	1.784E+01	-0.023
PA-231	-7.240E-01	1.037E+00	1.695E+00	1.908E-02	-0.427
PA-234	4.206E+00 +	1.288E+00	1.845E+00	2.077E-02	2.279
NP-237	-8.296E+00	2.772E+01	4.551E+01	4.014E+00	-0.182

VAX/VMS Peak Search Report Generated 16-APR-2013 10:27:51.39

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404912\_GE5\_BAFIL\_190528.CN *04/16/13*  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-207-AS TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 10:12:24  
 Sample ID : 1304049-12 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.11 0.1%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	14.79	14	6	0.23	147.30	142	11	1.50E-02	43.3	
2	1	19.79	23	7	0.55	195.26	188	30	2.51E-02	31.8	1.58E+00
3	1	20.49	27	7	0.50	202.00	188	30	3.05E-02	34.3	
4	1	21.12	49	8	0.51	208.00	188	30	5.39E-02	20.6	
5	0	27.76	12	9	0.45	271.79	268	8	1.38E-02	48.9	
6	0	30.92	1589	82	0.87	302.08	289	30	1.77E+00	3.0	
7	2	34.99	286	41	0.64	341.11	333	26	3.17E-01	7.9	3.28E+00
8	2	35.96	49	25	0.62	350.46	333	26	5.48E-02	41.9	
9	0	53.06	34	10	0.70	514.50	507	14	3.73E-02	26.8	
10	1	61.24	106	31	0.65	593.00	584	25	1.18E-01	16.2	6.37E+00
11	1	62.07	110	18	0.65	601.00	584	25	1.23E-01	13.1	
12	5	65.20	35	29	0.66	631.00	622	35	3.93E-02	36.9	2.16E+00
13	5	66.16	65	25	1.06	640.21	622	35	7.17E-02	27.5	
14	0	80.82	651	78	0.78	780.89	768	26	7.24E-01	5.1	
15	0	111.61	162	47	0.81	1076.31	1060	29	1.80E-01	13.0	
16	1	115.04	15	2	0.70	1109.26	1106	20	1.61E-02	26.7	5.17E+00
17	1	115.74	62	14	0.77	1116.00	1106	20	6.89E-02	16.0	
18	0	160.00	15	10	0.44	1540.69	1529	20	1.68E-02	46.8	
19	0	274.85	32	7	0.58	2642.73	2628	24	3.56E-02	25.4	
20	5	301.49	90	5	1.24	2898.41	2882	28	1.00E-01	11.0	4.52E+00
21	5	302.24	26	4	0.77	2905.61	2882	28	2.91E-02	21.3	
22	1	354.09	158	6	1.24	3403.15	3387	37	1.75E-01	11.1	1.21E+00
23	1	354.81	109	6	1.12	3410.00	3387	37	1.21E-01	16.0	

Summary of Nuclide Activity

Sample ID : 1304049-12

Acquisition date : 16-APR-2013 10:12:24

Total number of lines in spectrum 23  
 Number of unidentified lines 16  
 Number of lines tentatively identified by NID 7 30.43%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
BA-133	10.50Y	1.00	3.287E+02	3.288E+02	0.602E+02	18.31		
Total Activity :			3.287E+02	3.288E+02				

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected	Decay Corr				
TH-234	4.47E+09Y	1.00	9.977E+01	9.977E+01	2.653E+01	26.59		
AM-241	432.20Y	1.00	8.860E+00	8.860E+00	2.893E+00	32.65		
Total Activity :			1.086E+02	1.086E+02				

Grand Total Activity : 4.374E+02 4.374E+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	3.287E+02	3.288E+02	18.31	OK
	302.84	17.80	2.575E+00	1.716E+02	1.716E+02	50.05	OK
	356.01	60.00	4.312E+00	1.260E+02	1.260E+02	35.03	OK

Final Mean for 3 Valid Peaks = 3.288E+02+/- 6.019E+01 ( 18.31%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	9.977E+01	9.977E+01	26.59	OK

Final Mean for 1 Valid Peaks = 9.977E+01+/- 2.653E+01 ( 26.59%)

AM-241	59.54	35.90*	1.000E+02	8.860E+00	8.860E+00	32.65	OK
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Final Mean for 1 Valid Peaks = 8.860E+00+/- 2.893E+00 ( 32.65%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.288E+02	6.019E+01	1.661E+01	2.445E+00	19.798
TH-234	9.977E+01	2.653E+01	2.063E+01	2.655E-01	4.835
AM-241	8.860E+00	2.893E+00	1.979E+00	2.228E-02	4.477

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.880E+00	1.240E+01	2.392E+01	8.108E+00	0.079
CD-109	-1.076E+00	8.070E+01	1.504E+02	1.447E+01	-0.007
PA-231	-2.820E-01	8.453E-01	1.481E+00	1.667E-02	-0.190
PA-234	2.245E+00 +	9.307E-01	1.578E+00	1.776E-02	1.422
NP-237	7.276E+00	2.164E+01	4.253E+01	3.752E+00	0.171

*C*  
*411647*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404913\_GE5\_BAFIL\_190530.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-207-AS DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 10:28:39  
 Sample ID : 1304049-13 Sample Quantity : 1.000000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE5 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.15 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	20.98	111	65	1.84	206.74	190	35	1.23E-01	24.1	
2	0	25.22	22	6	0.10	247.36	239	14	2.45E-02	32.8	
3	0	31.02	2109	94	0.76	303.05	291	31	2.34E+00	2.6	
4	1	35.13	308	29	0.62	342.46	331	34	3.42E-01	8.0	2.03E+00
5	1	35.91	88	9	0.57	350.00	331	34	9.74E-02	24.4	
6	0	53.48	37	40	0.80	518.60	504	19	4.16E-02	42.8	
7	0	61.89	250	43	1.00	599.29	586	28	2.78E-01	9.0	
8	1	65.41	40	20	0.66	633.00	626	32	4.48E-02	30.3	1.96E+00
9	1	65.96	29	28	0.72	638.28	626	32	3.25E-02	53.0	
10	1	79.77	57	8	0.76	770.84	758	37	6.28E-02	32.1	6.73E-01
11	1	81.08	824	14	0.70	783.41	758	37	9.15E-01	3.6	
12	0	84.09	22	19	1.42	812.26	800	19	2.45E-02	45.6	
13	0	111.95	205	28	0.89	1079.58	1070	21	2.27E-01	9.1	
14	0	116.16	38	20	1.02	1120.00	1107	20	4.22E-02	29.4	
15	0	276.34	37	11	0.34	2657.04	2640	30	4.08E-02	25.9	
16	5	301.79	15	5	0.86	2901.27	2893	27	1.71E-02	61.8	1.19E+00
17	5	302.53	79	10	0.63	2908.35	2893	27	8.82E-02	14.7	
18	5	303.19	15	10	0.86	2914.75	2893	27	1.69E-02	53.5	
19	1	332.82	97	3	1.10	3199.00	3187	30	1.08E-01	8.3	5.61E+00
20	1	333.34	11	2	1.10	3204.00	3187	30	1.24E-02	75.8	
21	3	355.64	400	9	1.07	3418.01	3401	36	4.44E-01	5.3	3.13E+00
22	3	356.26	92	7	1.13	3424.00	3401	36	1.02E-01	22.3	
23	1	383.05	12	13	1.16	3681.00	3668	29	1.31E-02	95.3	8.80E+00
24	1	383.46	143	15	1.16	3685.00	3668	29	1.59E-01	8.1	
25	4	386.14	88	18	1.17	3710.70	3699	27	9.81E-02	16.3	3.44E+00
26	4	386.80	110	11	1.16	3717.00	3699	27	1.22E-01	11.9	

Summary of Nuclide Activity

Sample ID : 1304049-13

Acquisition date : 16-APR-2013 10:28:39

Total number of lines in spectrum 26  
 Number of unidentified lines 21  
 Number of lines tentatively identified by NID 5 19.23%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BA-133	10.50Y	1.00	4.159E+02	4.159E+02	0.703E+02	16.90	
Total Activity :			4.159E+02	4.159E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean Uncorrected pCi/filter	Wtd Mean Decay Corr pCi/filter	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TH-234	4.47E+09Y	1.00	2.261E+02	2.261E+02	0.419E+02	18.54	
Total Activity :			2.261E+02	2.261E+02			

Grand Total Activity : 6.420E+02 6.420E+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	4.159E+02	4.159E+02	16.90	OK
	302.84	17.80	2.575E+00	5.202E+02	5.202E+02	39.53	OK
	356.01	60.00	4.312E+00	1.070E+02	1.070E+02	46.87	OK

Final Mean for 3 Valid Peaks = 4.159E+02+/- 7.029E+01 ( 16.90%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	8.750E+01	2.261E+02	2.261E+02	18.54	OK

Final Mean for 1 Valid Peaks = 2.261E+02+/- 4.192E+01 ( 18.54%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.159E+02	7.029E+01	1.381E+01	2.033E+00	30.119
TH-234	2.261E+02	4.192E+01	2.817E+01	3.624E-01	8.025

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	1.402E+01		1.487E+01	2.969E+01	1.006E+01	0.472
CD-109	5.019E+01		8.461E+01	1.702E+02	1.638E+01	0.295
PA-231	1.280E-01		8.622E-01	1.628E+00	1.833E-02	0.079
PA-234	5.127E+00	+	2.478E+00	2.195E+00	2.471E-02	2.336
NP-237	-5.147E+00		2.330E+01	3.930E+01	3.467E+00	-0.131
AM-241	8.642E-01		1.484E+00	2.505E+00	2.820E-02	0.345

*411617*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404914\_GE1\_BAFIL\_190520.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-103 TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:23:37  
 Sample ID : 1304049-14 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	28.06	28	100	1.83	28.29	26	17	3.09E-02	67.7	9.76E+00
2	3	30.91	1854	64	1.33	31.14	26	17	2.06E+00	2.4	
3	3	35.08	511	58	1.85	35.32	26	17	5.67E-01	5.1	
4	0	52.99	42	96	2.34	53.22	49	7	4.67E-02	41.7	
5	3	61.84	251	76	1.91	62.07	58	12	2.79E-01	8.6	3.14E+00
6	3	65.91	106	90	1.91	66.14	58	12	1.18E-01	18.5	
7	0	81.34	811	114	1.93	81.57	76	11	9.01E-01	4.3	
8	0	93.19	40	90	1.97	93.42	89	8	4.43E-02	44.1	
9	3	111.88	199	54	1.99	112.11	109	17	2.22E-01	9.4	2.34E+00
10	3	115.70	40	61	2.00	115.92	109	17	4.41E-02	41.0	
11	1	219.78	15	31	1.59	220.00	215	27	1.65E-02	67.2	1.79E+00
12	1	225.78	12	30	1.76	226.00	215	27	1.32E-02	73.3	
13	0	276.66	59	36	1.32	276.87	274	7	6.51E-02	21.5	
14	0	302.98	133	22	1.57	303.20	300	6	1.48E-01	10.3	
15	0	307.93	22	38	1.19	308.15	307	5	2.46E-02	48.1	
16	3	333.89	73	15	1.69	334.11	331	20	8.10E-02	14.6	2.32E+00
17	3	338.20	28	21	2.23	338.41	331	20	3.07E-02	37.5	
18	0	356.35	542	29	1.90	356.56	353	8	6.03E-01	4.6	
19	3	383.84	122	19	2.12	384.05	381	14	1.36E-01	10.5	2.26E+01
20	3	386.98	241	15	1.86	387.18	381	14	2.68E-01	7.7	
21	3	391.36	52	12	2.26	391.57	381	14	5.75E-02	24.5	
22	1	411.68	12	3	1.89	411.89	409	17	1.29E-02	42.8	1.83E+00
23	1	414.97	35	4	1.89	415.17	409	17	3.88E-02	21.6	
24	1	417.97	20	5	1.90	418.17	409	17	2.24E-02	41.1	
25	1	422.62	9	6	1.90	422.83	409	17	1.01E-02	59.0	
26	2	437.48	105	3	1.81	437.69	433	17	1.17E-01	10.4	2.18E+00
27	2	443.16	11	1	2.10	443.37	433	17	1.19E-02	40.2	
28	0	468.34	19	13	1.48	468.54	465	8	2.12E-02	39.1	
29	0	511.56	33	5	3.81	511.76	506	11	3.63E-02	22.3	
30	0	584.19	11	4	1.38	584.39	581	6	1.21E-02	42.8	

Total number of lines in spectrum 30  
 Number of unidentified lines 26  
 Number of lines tentatively identified by NID 4 13.33%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma Error	2-Sigma	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter				
BA-133	10.50Y	1.00	3.758E+02	3.759E+02	0.714E+02	19.00		
Total Activity :			3.758E+02	3.759E+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	3.378E+02	3.378E+02	0.604E+02	17.87		
Total Activity :			3.378E+02	3.378E+02				

Grand Total Activity : 7.136E+02 7.136E+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	3.758E+02	3.759E+02	19.00	OK
	302.84	17.80	4.915E+00	4.562E+02	4.563E+02	35.81	OK
	356.01	60.00	6.963E+00	3.898E+02	3.898E+02	17.76	OK

Final Mean for 3 Valid Peaks = 3.759E+02+/- 7.142E+01 ( 19.00%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.378E+02	3.378E+02	17.87	OK

Final Mean for 1 Valid Peaks = 3.378E+02+/- 6.037E+01 ( 17.87%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.759E+02	7.142E+01	1.798E+01	2.952E+00	20.903
TH-234	3.378E+02	6.037E+01	5.724E+01	1.834E+00	5.902

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-2.299E+00		1.264E+01	2.137E+01	6.671E+00	-0.108
CD-109	-3.868E+01		1.334E+02	1.788E+02	2.314E+01	-0.216
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.094E+00		1.522E+00	3.154E+00	5.926E-02	2.249
NP-237	1.012E+01		3.865E+01	5.669E+01	6.902E+00	0.178
AM-241	9.328E+00		3.267E+00	6.467E+00	1.517E-01	1.443

C  
4/16/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404915\_GE1\_BAFIL\_190522.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : LR-103 DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:39:26  
 Sample ID : 1304049-15 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	30	72	1.51	28.14	27	18	3.30E-02	40.8	1.51E+01
2	3	30.88	2009	75	1.35	31.11	27	18	2.23E+00	2.3	
3	3	35.01	566	70	1.85	35.24	27	18	6.29E-01	6.0	
4	0	52.31	65	74	2.62	52.54	49	7	7.17E-02	25.3	
5	2	61.88	241	68	1.73	62.11	57	17	2.67E-01	8.5	2.30E+00
6	2	65.85	93	63	1.74	66.08	57	17	1.04E-01	19.4	
7	0	81.19	775	138	1.93	81.42	76	11	8.62E-01	4.6	
8	0	93.11	12	104	1.12	93.34	90	7	1.35E-02	141.9	
9	4	111.90	225	62	1.93	112.13	107	15	2.50E-01	8.6	1.24E+00
10	4	116.47	80	64	2.20	116.70	107	15	8.85E-02	23.0	
11	0	276.66	57	24	1.31	276.88	274	7	6.38E-02	19.1	
12	2	302.94	173	21	1.80	303.15	299	12	1.92E-01	8.2	1.36E+01
13	2	307.13	41	17	2.00	307.35	299	12	4.57E-02	29.9	
14	2	333.67	82	13	1.91	333.88	328	18	9.10E-02	13.5	1.37E+00
15	2	338.14	28	18	2.03	338.35	328	18	3.09E-02	34.8	
16	0	356.31	631	28	1.97	356.52	351	11	7.01E-01	4.3	
17	0	376.96	17	11	1.42	377.17	374	7	1.90E-02	39.9	
18	4	383.78	86	10	1.80	383.98	381	14	9.53E-02	13.3	1.40E+01
19	4	387.07	244	10	2.04	387.28	381	14	2.71E-01	7.7	
20	4	391.46	61	9	1.96	391.67	381	14	6.83E-02	16.3	
21	1	415.79	25	12	1.72	416.00	411	15	2.78E-02	31.0	6.45E+00
22	1	422.63	11	12	1.90	422.84	411	15	1.21E-02	62.0	
23	0	437.30	102	9	1.93	437.51	434	7	1.14E-01	11.0	
24	0	468.05	21	13	1.43	468.25	465	8	2.33E-02	36.4	
25	0	511.57	33	7	2.82	511.77	508	11	3.63E-02	24.3	
26	0	579.31	6	0	1.16	579.50	576	6	6.67E-03	40.8	
27	0	609.86	9	4	1.58	610.05	607	7	1.03E-02	50.6	

Total number of lines in spectrum 27  
 Number of unidentified lines 23  
 Number of lines tentatively identified by NID 4 14.81%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	3.595E+02	3.596E+02	0.693E+02	19.27	
Total Activity :			3.595E+02	3.596E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.243E+02	3.243E+02	0.576E+02	17.76	
Total Activity :			3.243E+02	3.243E+02			

Grand Total Activity : 6.838E+02 6.839E+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	3.595E+02	3.596E+02	19.27	OK
	302.84	17.80	4.915E+00	5.930E+02	5.930E+02	33.48	OK
	356.01	60.00	6.963E+00	4.532E+02	4.532E+02	17.42	OK

Final Mean for 3 Valid Peaks = 3.596E+02 +/- 6.929E+01 ( 19.27%)

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	3.243E+02	3.243E+02	17.76	OK

Final Mean for 1 Valid Peaks = 3.243E+02 +/- 5.760E+01 ( 17.76%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.596E+02	6.929E+01	1.736E+01	2.850E+00	20.711
TH-234	3.243E+02	5.760E+01	5.170E+01	1.656E+00	6.274

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	5.495E+00		1.244E+01	2.093E+01	6.535E+00	0.262
CD-109	6.964E+00		1.553E+02	2.185E+02	2.826E+01	0.032
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	6.077E+00		1.519E+00	3.134E+00	5.889E-02	1.939
NP-237	1.088E+01		4.208E+01	6.113E+01	7.443E+00	0.178
AM-241	1.111E+01		3.333E+00	6.518E+00	1.529E-01	1.704

*C*  
*4/16/13*

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404916\_GE1\_BAFIL\_190525.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-110-SS TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 09:55:12  
 Sample ID : 1304049-16 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.85	2058	83	1.50	31.08	26	17	2.29E+00	2.3	2.39E+01
2	3	35.11	496	45	1.56	35.34	26	17	5.51E-01	5.1	
3	0	53.32	75	102	2.25	53.55	50	9	8.38E-02	26.7	
4	3	61.95	292	62	1.80	62.18	58	16	3.24E-01	6.9	1.84E+00
5	3	65.97	121	56	1.91	66.20	58	16	1.35E-01	15.6	
6	3	70.50	25	47	1.92	70.73	58	16	2.82E-02	53.1	
7	0	81.26	864	113	1.95	81.49	76	11	9.60E-01	4.2	
8	0	93.16	20	63	1.04	93.39	90	6	2.17E-02	68.6	
9	0	104.95	14	111	2.92	105.17	98	10	1.61E-02	136.1	
10	2	111.97	201	43	1.81	112.20	107	15	2.23E-01	8.8	1.95E+00
11	2	116.09	70	44	1.81	116.31	107	15	7.77E-02	19.4	
12	0	161.94	17	83	1.14	162.16	158	7	1.92E-02	90.7	
13	0	186.08	20	60	2.61	186.30	184	7	2.27E-02	65.9	
14	0	277.34	50	29	1.42	277.55	274	9	5.59E-02	23.9	
15	2	303.03	187	19	1.61	303.24	299	16	2.08E-01	8.1	7.55E-01
16	2	307.44	26	24	2.01	307.65	299	16	2.91E-02	37.1	
17	3	334.12	90	11	1.94	334.33	331	11	1.00E-01	12.4	2.01E+00
18	3	338.34	36	11	2.23	338.55	331	11	3.96E-02	28.2	
19	0	356.35	537	33	1.87	356.56	353	7	5.97E-01	4.7	
20	1	364.83	18	17	1.86	365.04	362	13	2.01E-02	41.7	1.52E+00
21	1	368.62	11	16	1.87	368.83	362	13	1.26E-02	65.8	
22	6	383.80	77	14	1.81	384.01	381	16	8.60E-02	15.0	1.04E+01
23	6	387.12	242	11	1.81	387.33	381	16	2.69E-01	7.1	
24	6	391.54	47	10	1.94	391.75	381	16	5.22E-02	19.8	
25	1	414.86	41	13	1.89	415.07	411	15	4.58E-02	21.2	1.38E+00
26	1	418.62	17	14	1.90	418.83	411	15	1.94E-02	47.4	
27	1	421.97	10	15	1.90	422.17	411	15	1.12E-02	74.6	
28	0	437.42	125	8	1.85	437.62	432	9	1.39E-01	9.7	
29	0	468.75	17	12	1.22	468.96	465	7	1.84E-02	42.8	
30	0	488.05	8	0	1.47	488.25	485	7	8.89E-03	35.4	
31	0	511.77	18	10	2.01	511.97	508	9	2.05E-02	39.7	

Summary of Nuclide Activity

Sample ID : 1304049-16

Acquisition date : 16-APR-2013 09:55:12

Total number of lines in spectrum 31  
 Number of unidentified lines 27  
 Number of lines tentatively identified by NID 4 12.90%

Nuclide Type : FISSION

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
BA-133	10.50Y	1.00	4.008E+02	4.008E+02	0.755E+02	18.82	
Total Activity :			4.008E+02	4.008E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr	2-Sigma	Flags
			Uncorrected	Decay Corr			
TH-234	4.47E+09Y	1.00	3.930E+02	3.930E+02	0.575E+02	14.64	
Total Activity :			3.930E+02	3.930E+02			

Grand Total Activity : 7.938E+02 7.938E+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	4.008E+02	4.008E+02	18.82	OK
	302.84	17.80	4.915E+00	6.429E+02	6.429E+02	33.38	OK
	356.01	60.00	6.963E+00	3.861E+02	3.861E+02	17.80	OK

Final Mean for 3 Valid Peaks = 4.008E+02+/- 7.546E+01 ( 18.82%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.930E+02	3.930E+02	14.64	OK

Final Mean for 1 Valid Peaks = 3.930E+02+/- 5.755E+01 ( 14.64%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	4.008E+02	7.546E+01	1.570E+01	2.577E+00	25.539
TH-234	3.930E+02	5.755E+01	4.867E+01	1.559E+00	8.075

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.014E+00		1.298E+01	1.949E+01	6.086E+00	-0.257
CD-109	-6.005E+01		1.506E+02	1.974E+02	2.553E+01	-0.304
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.981E+00		1.609E+00	3.326E+00	6.251E-02	2.399
NP-237	1.642E+01		3.919E+01	5.867E+01	7.143E+00	0.280
AM-241	1.239E+01		3.193E+00	6.480E+00	1.520E-01	1.912

VAX/VMS Peak Search Report Generated 16-APR-2013 10:26:18.01

C  
4/11/13

Configuration : DKA100: [GAMMA.SCUSR.ARCHIVE] SMP\_130404917\_GE1\_BAFIL\_190527.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : PZ-110-SS DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 10:11:02  
 Sample ID : 1304049-17 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 00:15:00.25 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	27.99	45	60	1.83	28.22	26	15	5.04E-02	24.2	2.79E+01
2	3	30.91	1758	70	1.35	31.15	26	15	1.95E+00	2.5	
3	3	34.95	495	86	1.85	35.18	26	15	5.49E-01	6.6	
4	1	52.80	41	68	1.56	53.03	48	26	4.55E-02	35.3	4.93E+00
5	1	61.91	232	68	1.58	62.14	48	26	2.58E-01	8.7	
6	1	65.63	118	68	1.58	65.86	48	26	1.31E-01	15.5	
7	0	81.27	680	152	1.91	81.50	77	10	7.55E-01	5.1	
8	1	92.92	45	49	1.62	93.15	91	14	5.01E-02	26.8	2.61E+00
9	1	96.92	14	49	1.63	97.15	91	14	1.60E-02	76.7	
10	1	108.92	15	25	1.64	109.15	108	14	1.67E-02	48.7	6.58E+00
11	1	111.92	194	38	1.64	112.15	108	14	2.16E-01	8.7	
12	1	115.62	38	35	1.65	115.85	108	14	4.23E-02	37.1	
13	0	161.25	30	65	1.11	161.47	157	8	3.31E-02	50.5	
14	0	188.72	56	89	6.59	188.94	183	12	6.17E-02	36.7	
15	0	277.10	47	25	1.26	277.31	273	8	5.18E-02	23.9	
16	3	303.02	177	10	1.60	303.23	299	22	1.97E-01	7.8	2.44E+00
17	3	307.32	21	12	2.21	307.54	299	22	2.37E-02	52.3	
18	4	333.93	73	11	2.03	334.14	329	15	8.12E-02	13.9	1.04E+00
19	4	338.57	41	11	2.22	338.78	329	15	4.58E-02	24.8	
20	0	356.31	505	21	1.94	356.52	353	9	5.61E-01	4.8	
21	0	377.68	11	20	1.55	377.89	374	7	1.26E-02	70.9	
22	1	383.80	93	18	1.87	384.01	381	16	1.03E-01	13.3	1.75E+01
23	1	386.93	204	12	1.88	387.14	381	16	2.27E-01	8.9	
24	1	391.62	48	4	1.85	391.83	381	16	5.39E-02	18.8	
25	1	411.78	8	7	1.89	411.98	410	12	8.47E-03	62.9	4.75E+00
26	1	414.97	32	14	1.89	415.17	410	12	3.51E-02	28.1	
27	1	417.85	23	20	1.90	418.05	410	12	2.51E-02	43.6	
28	0	437.27	99	5	1.72	437.48	435	6	1.10E-01	10.8	
29	0	469.76	7	15	1.52	469.97	465	7	7.22E-03	107.2	
30	0	510.76	23	5	2.93	510.96	507	9	2.59E-02	26.5	
31	0	610.92	5	7	1.09	611.12	607	6	5.97E-03	89.7	

Summary of Nuclide Activity

Sample ID : 1304049-17

Acquisition date : 16-APR-2013 10:11:02

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	3.152E+02	3.153E+02	0.623E+02	19.77	
Total Activity :			3.152E+02	3.153E+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	3.129E+02	3.129E+02	0.570E+02	18.22	
Total Activity :			3.129E+02	3.129E+02			

Grand Total Activity : 6.282E+02 6.282E+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	3.152E+02	3.153E+02	19.77	OK
	302.84	17.80	4.915E+00	6.082E+02	6.082E+02	33.17	OK
	356.01	60.00	6.963E+00	3.629E+02	3.629E+02	17.91	OK

Final Mean for 3 Valid Peaks = 3.153E+02+/- 6.234E+01 ( 19.77%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	3.129E+02	3.129E+02	18.22	OK

Final Mean for 1 Valid Peaks = 3.129E+02+/- 5.703E+01 ( 18.22%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.153E+02	6.234E+01	1.901E+01	3.121E+00	16.581
TH-234	3.129E+02	5.703E+01	5.140E+01	1.647E+00	6.088

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-1.860E+00		1.132E+01	1.781E+01	5.561E+00	-0.104
CD-109	2.688E+01		1.540E+02	2.207E+02	2.855E+01	0.122
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	7.918E+00		1.508E+00	3.206E+00	6.025E-02	2.470
NP-237	1.720E+01		4.337E+01	6.394E+01	7.784E+00	0.269
AM-241	1.155E+01		3.216E+00	6.585E+00	1.545E-01	1.754

VAX/VMS Peak Search Report Generated 16-APR-2013 10:43:10.15

*C*  
*4/16/13*

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404918\_GE1\_BAFIL\_190529.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-62 TOT  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 10:27:40  
 Sample ID : 1304049-18 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.28 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	30.88	2049	66	1.43	31.11	26	16	2.28E+00	2.3	1.02E+01
2	2	35.05	494	56	1.68	35.28	26	16	5.49E-01	5.1	
3	0	53.09	71	92	2.68	53.32	50	8	7.85E-02	26.5	
4	5	61.98	298	69	1.90	62.21	58	18	3.31E-01	7.2	2.57E+00
5	5	66.09	123	90	2.29	66.32	58	18	1.37E-01	17.1	
6	3	81.21	821	57	1.54	81.44	76	12	9.12E-01	3.7	5.43E+00
7	3	84.97	30	46	1.77	85.20	76	12	3.36E-02	40.2	
8	0	94.46	66	102	1.44	94.69	90	10	7.32E-02	31.3	
9	1	111.87	201	49	1.64	112.09	108	15	2.23E-01	9.1	2.22E+00
10	1	116.62	36	56	1.65	116.85	108	15	3.95E-02	36.7	
11	0	185.45	26	80	1.14	185.67	183	7	2.90E-02	60.1	
12	0	277.09	54	42	1.21	277.30	273	8	6.04E-02	24.7	
13	3	303.21	165	17	1.70	303.42	300	24	1.84E-01	8.4	2.18E+00
14	3	307.24	44	22	2.21	307.46	300	24	4.90E-02	30.1	
15	3	311.76	12	22	2.21	311.97	300	24	1.32E-02	70.1	
16	0	333.58	66	54	1.29	333.80	331	6	7.32E-02	19.9	
17	0	356.32	601	16	1.94	356.53	351	11	6.67E-01	4.3	
18	0	365.79	34	10	2.02	366.00	362	10	3.78E-02	24.4	
19	3	383.93	147	19	2.15	384.13	380	17	1.63E-01	9.1	7.92E+00
20	3	387.24	245	12	1.72	387.45	380	17	2.72E-01	7.2	
21	3	391.59	63	10	2.01	391.80	380	17	6.99E-02	16.7	
22	0	415.13	39	34	1.08	415.33	411	8	4.39E-02	30.1	
23	0	437.28	117	17	1.97	437.49	432	11	1.30E-01	11.4	
24	0	468.22	18	16	1.51	468.43	464	9	1.98E-02	46.7	
25	0	583.21	6	6	1.10	583.40	581	7	6.53E-03	78.3	

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		Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.808E+02	3.808E+02	0.704E+02	18.47	
NP-237	2.14E+06Y	1.00	4.709E+01	4.709E+01	3.830E+01	81.34	
Total Activity :			4.279E+02	4.279E+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	4.012E+02	4.012E+02	0.617E+02	15.37	
Total Activity :			4.012E+02	4.012E+02			

Grand Total Activity : 8.291E+02 8.291E+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	3.808E+02	3.808E+02	18.47	OK
	302.84	17.80	4.915E+00	5.680E+02	5.681E+02	33.77	OK
	356.01	60.00	6.963E+00	4.316E+02	4.317E+02	17.41	OK

Final Mean for 3 Valid Peaks = 3.808E+02+/- 7.035E+01 ( 18.47%)

NP-237	86.50	12.60*	1.532E+01	4.709E+01	4.709E+01	81.34	OK
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Final Mean for 1 Valid Peaks = 4.709E+01+/- 3.830E+01 ( 81.34%)

Nuclide Type: NATURAL

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/filter	Decay Corr pCi/filter	2-Sigma %Error	Status
TH-234	63.29	3.80*	5.865E+01	4.012E+02	4.012E+02	15.37	OK

Final Mean for 1 Valid Peaks = 4.012E+02+/- 6.166E+01 ( 15.37%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.808E+02	7.035E+01	1.710E+01	2.806E+00	22.276
TH-234	4.012E+02	6.166E+01	4.772E+01	1.529E+00	8.408
NP-237	4.709E+01	3.830E+01	5.450E+01	6.635E+00	0.864

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

Nuclide	Key-Line Activity K.L. (pCi/filter) Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-3.869E-01	1.514E+01	2.383E+01	7.441E+00	-0.016
CD-109	-4.020E+01	1.398E+02	1.872E+02	2.422E+01	-0.215
PA-231	0.000E+00	0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.305E+00	1.647E+00	3.396E+00	6.382E-02	2.446
AM-241	1.068E+01	3.387E+00	6.262E+00	1.469E-01	1.706

C  
Y116112

Configuration : DKA100:[GAMMA.SCUSR.ARCHIVE]SMP\_130404919\_GE1\_BAFIL\_190531.CN  
 Analyses by : PEAK V16.9 PEAKEFF V2.2  
 Client ID : I-62 DIS  
 Deposition Date :  
 Sample Date : 16-APR-2013 00:00:00 Acquisition date : 16-APR-2013 10:46:07  
 Sample ID : 1304049-19 Sample Quantity : 1.00000E+00 filter  
 Sample type : FILTER Sample Geometry : 0  
 Detector name : GE1 Detector Geometry: BAFIL  
 Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:00.27 0.0%  
 Start channel : 25 End channel : 4096  
 Sensitivity : 3.00000 Gaussian : 10.00000  
 Critical level : No

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	30.89	2014	72	1.37	31.12	26	15	2.24E+00	2.3	8.80E+00
2	3	35.12	505	61	1.54	35.35	26	15	5.61E-01	5.1	
3	0	52.80	85	95	3.02	53.03	50	8	9.40E-02	22.5	
4	2	61.94	253	69	1.73	62.17	58	18	2.82E-01	8.0	3.67E+00
5	2	65.92	115	63	1.74	66.15	58	18	1.28E-01	14.9	
6	2	70.47	21	60	1.75	70.70	58	18	2.38E-02	63.6	
7	0	81.25	816	112	1.95	81.48	76	11	9.06E-01	4.3	
8	0	92.30	17	106	1.51	92.53	89	8	1.86E-02	109.2	
9	0	111.96	165	114	1.78	112.19	108	8	1.83E-01	13.7	
10	0	161.51	28	51	1.68	161.74	158	7	3.10E-02	46.4	
11	0	276.95	55	30	1.26	277.17	273	7	6.13E-02	21.2	
12	2	303.04	154	27	1.58	303.26	300	12	1.71E-01	9.3	5.84E+00
13	2	307.62	23	49	2.01	307.83	300	12	2.57E-02	46.3	
14	0	334.97	47	65	1.70	335.18	330	8	5.25E-02	32.8	
15	0	338.41	25	21	2.05	338.62	337	6	2.79E-02	35.5	
16	3	356.24	566	11	1.51	356.45	351	18	6.29E-01	4.3	1.49E+00
17	3	364.08	13	17	2.25	364.29	351	18	1.45E-02	58.5	
18	2	376.43	14	17	2.06	376.64	372	24	1.60E-02	46.0	6.82E+00
19	2	384.08	142	15	2.06	384.29	372	24	1.57E-01	9.4	
20	2	387.12	216	8	1.85	387.33	372	24	2.40E-01	7.8	
21	2	391.98	43	4	2.07	392.19	372	24	4.82E-02	21.7	
22	1	411.78	9	14	1.89	411.99	409	16	9.46E-03	68.0	9.10E+00
23	1	414.97	44	11	1.89	415.17	409	16	4.88E-02	18.6	
24	1	417.97	39	8	1.90	418.17	409	16	4.38E-02	24.9	
25	0	437.30	119	2	1.93	437.50	434	8	1.32E-01	9.4	
26	0	468.32	21	10	1.83	468.52	465	8	2.37E-02	33.5	
27	0	510.48	23	5	2.21	510.68	505	9	2.50E-02	29.2	
28	0	554.35	6	2	2.55	554.55	550	7	6.81E-03	54.3	
29	0	574.80	7	1	2.40	574.99	572	6	7.43E-03	47.9	

Summary of Nuclide Activity

Sample ID : 1304049-19

Acquisition date : 16-APR-2013 10:46:07

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 %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
BA-133	10.50Y	1.00	3.782E+02	3.782E+02	0.717E+02	18.97	
Total Activity :			3.782E+02	3.782E+02			

Nuclide Type : NATURAL

Nuclide	Hlife	Decay	Wtd Mean	Wtd Mean	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
			Uncorrected pCi/filter	Decay Corr pCi/filter			
TH-234	4.47E+09Y	1.00	3.415E+02	3.415E+02	0.576E+02	16.87	
Total Activity :			3.415E+02	3.415E+02			

Grand Total Activity : 7.196E+02 7.197E+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	3.782E+02	3.782E+02	18.97	OK
	302.84	17.80	4.915E+00	5.279E+02	5.280E+02	34.70	OK
	356.01	60.00	6.963E+00	4.072E+02	4.072E+02	17.38	OK

Final Mean for 3 Valid Peaks = 3.782E+02+/- 7.175E+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	3.415E+02	3.415E+02	16.87	OK

Final Mean for 1 Valid Peaks = 3.415E+02+/- 5.761E+01 ( 16.87%)

Flag: "\*" = Keyline

---- Identified Nuclides ----

Nuclide	Activity (pCi/filter)	Act error	MDA (pCi/filter)	MDA error	Act/MDA
BA-133	3.782E+02	7.175E+01	1.599E+01	2.624E+00	23.657
TH-234	3.415E+02	5.761E+01	5.051E+01	1.618E+00	6.761

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

Nuclide	Key-Line Activity (pCi/filter)	K.L. Ided	Act error	MDA (pCi/filter)	MDA error	Act/MDA
CO-57	-5.733E+00		1.256E+01	2.042E+01	6.376E+00	-0.281
CD-109	3.933E+01		1.334E+02	1.975E+02	2.555E+01	0.199
PA-231	0.000E+00		0.000E+00	1.933E-01	3.632E-03	0.000
PA-234	8.124E+00		1.558E+00	3.280E+00	6.163E-02	2.477
NP-237	2.352E+01		3.806E+01	5.876E+01	7.153E+00	0.400
AM-241	1.068E+01		3.514E+00	6.387E+00	1.498E-01	1.673