

ATTACHMENT 1

RECENT GROUNDWATER LAB REPORTS

January 25, 2016

Mr. Greg Miller
ICON Environmental
2049 Commercial Drive
Port Allen, LA 70767

RE: Project: EWL VSSB
Pace Project No.: 30169493

Dear Mr. Miller:

Enclosed are the analytical results for sample(s) received by the laboratory on January 04, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Jacquelyn Collins
jacquelyn.collins@pacelabs.com
Project Manager

Enclosures

cc: Mr. Derek Pourciau



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: EWL VSSB
Pace Project No.: 30169493

Pennsylvania Certification IDs

Georgia Certification #: C040
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
L-A-B DOD-ELAP Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH-0694
Delaware Certification
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana DHH/TNI Certification #: LA140008
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: PA00091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235

Montana Certification #: Cert 0082
Nebraska Certification #: NE-05-29-14
Nevada Certification #: PA014572015-1
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188-14-8
Utah/TNI Certification #: PA014572015-5
USDA Soil Permit #: P330-14-00213
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Certification
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: EWL VSSB
Pace Project No.: 30169493

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30169493001	TBB-2M	Water	12/14/15 12:30	01/04/16 09:35
30169493002	TBB-2D	Water	12/15/15 11:00	01/04/16 09:35
30169493003	TBB-3D	Water	12/15/15 13:30	01/04/16 09:35
30169493004	MC-1	Water	12/16/15 11:30	01/04/16 09:35
30169493005	TBB-1D	Water	12/17/15 13:45	01/04/16 09:35
30169493006	TBB-1S	Water	12/17/15 15:45	01/04/16 09:35
30169493007	TBB-3S	Water	12/18/15 09:30	01/04/16 09:35
30169493008	TBA-1D	Water	12/22/15 10:45	01/04/16 09:35
30169493009	BC-1	Water	12/28/15 16:40	01/04/16 09:35

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: EWL VSSB
Pace Project No.: 30169493

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30169493001	TBB-2M	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493002	TBB-2D	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493003	TBB-3D	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493004	MC-1	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493005	TBB-1D	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493006	TBB-1S	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493007	TBB-3S	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493008	TBA-1D	EPA 903.1	WRR	1
		EPA 904.0	JLW	1
30169493009	BC-1	EPA 903.1	WRR	1
		EPA 904.0	JLW	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: EWL VSSB
Pace Project No.: 30169493

Method: EPA 903.1
Description: 903.1 Radium 226
Client: ICON Environmental
Date: January 25, 2016

General Information:

9 samples were analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: EWL VSSB
Pace Project No.: 30169493

Method: EPA 904.0
Description: 904.0 Radium 228
Client: ICON Environmental
Date: January 25, 2016

General Information:

9 samples were analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: EWL VSSB
Pace Project No.: 30169493

Sample: TBB-2M		Lab ID: 30169493001	Collected: 12/14/15 12:30	Received: 01/04/16 09:35	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	5.92 ± 1.35 (0.534)		pCi/L	01/21/16 12:33	13982-63-3	
		C:NA T:90%					
Radium-228	EPA 904.0	6.40 ± 1.34 (0.658)		pCi/L	01/21/16 12:21	15262-20-1	
		C:82% T:85%					

Sample: TBB-2D		Lab ID: 30169493002	Collected: 12/15/15 11:00	Received: 01/04/16 09:35	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	1.53 ± 0.626 (0.418)		pCi/L	01/21/16 12:45	13982-63-3	
		C:NA T:91%					
Radium-228	EPA 904.0	1.47 ± 0.489 (0.642)		pCi/L	01/21/16 12:22	15262-20-1	
		C:88% T:76%					

Sample: TBB-3D		Lab ID: 30169493003	Collected: 12/15/15 13:30	Received: 01/04/16 09:35	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.918 ± 0.580 (0.762)		pCi/L	01/21/16 12:44	13982-63-3	
		C:NA T:95%					
Radium-228	EPA 904.0	1.36 ± 0.489 (0.720)		pCi/L	01/21/16 12:22	15262-20-1	
		C:78% T:90%					

Sample: MC-1		Lab ID: 30169493004	Collected: 12/16/15 11:30	Received: 01/04/16 09:35	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	2.08 ± 0.776 (0.674)		pCi/L	01/21/16 12:44	13982-63-3	
		C:NA T:92%					
Radium-228	EPA 904.0	2.16 ± 0.621 (0.722)		pCi/L	01/21/16 12:22	15262-20-1	
		C:85% T:78%					

Sample: TBB-1D		Lab ID: 30169493005	Collected: 12/17/15 13:45	Received: 01/04/16 09:35	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	1.67 ± 0.908 (0.997)		pCi/L	01/25/16 09:55	13982-63-3	
		C:NA T:78%					
Radium-228	EPA 904.0	2.95 ± 0.765 (0.795)		pCi/L	01/21/16 12:22	15262-20-1	
		C:89% T:76%					

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: EWL VSSB
Pace Project No.: 30169493

Parameters		Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226		EPA 903.1	16.1 ± 2.63 (0.400) C:NA T:94%	pCi/L	01/21/16 12:56	13982-63-3	
Radium-228		EPA 904.0	16.7 ± 3.16 (0.675) C:91% T:81%	pCi/L	01/21/16 12:22	15262-20-1	

Parameters		Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226		EPA 903.1	0.753 ± 0.404 (0.146) C:NA T:98%	pCi/L	01/21/16 12:54	13982-63-3	
Radium-228		EPA 904.0	0.607 ± 0.346 (0.628) C:89% T:82%	pCi/L	01/21/16 12:22	15262-20-1	

Parameters		Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226		EPA 903.1	1.24 ± 0.586 (0.455) C:NA T:89%	pCi/L	01/21/16 12:55	13982-63-3	
Radium-228		EPA 904.0	0.608 ± 0.339 (0.618) C:91% T:89%	pCi/L	01/21/16 12:22	15262-20-1	

Parameters		Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226		EPA 903.1	0.569 ± 0.377 (0.171) C:NA T:88%	pCi/L	01/21/16 13:06	13982-63-3	
Radium-228		EPA 904.0	0.926 ± 0.398 (0.654) C:89% T:86%	pCi/L	01/21/16 12:23	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL - RADIOCHEMISTRY

Project: EWL VSSB
Pace Project No.: 30169493

QC Batch:	RADC/27500	Analysis Method:	EPA 904.0
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 228
Associated Lab Samples:	30169493001, 30169493002, 30169493003, 30169493004, 30169493005, 30169493006, 30169493007, 30169493008, 30169493009		

METHOD BLANK:	1007391	Matrix:	Water
Associated Lab Samples:	30169493001, 30169493002, 30169493003, 30169493004, 30169493005, 30169493006, 30169493007, 30169493008, 30169493009		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.635 ± 0.382 (0.712) C:92% T:75%	pCi/L	01/21/16 12:21	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: EWL VSSB
Pace Project No.: 30169493

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.



www.pacelabs.com

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: ICON	Report To:	Company Name:	Address:	Company Name:	Address:
Project Name: 209 Commercial Dr.	Copy To:	Address:	Pace Quote Reference:	Address:	Pace Project Manager:
Contact: BOB ALLEN LA 70167	Purchase Order No.:	Project Name: FWL VPSB	Pace Project Reference:	Project Name: FWL VPSB	Pace Project Manager:
Email To: GREG MILLER	Requested Due Date/TAT:	Project Number: 4011-041-0800	Requested Analysis Filtered (Y/N)	Project Number: 4011-041-0800	Requested Analysis Filtered (Y/N)
Phone: 225-344-8190					
Fax:					
Requested Due Date/TAT:					

Page: 1 of 1

1960522

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: LA
 STATE: LA

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	SAMPLE TYPE (G-GRAB C-COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS		
				COMPOSITE START	COMPOSITE END/GRAB											
1	TBB-2M	DW	WT 6	12/14/15 1230		1230	2	Unpreserved	Pace	12/14/15	1230	12/14/15	0935	N/A	M	Y
2	TBB-2D	Water	WT 6	12/15/15 1100			2	H ₂ SO ₄	Pace	12/15/15	1100	12/15/15	0935	N/A	M	Y
3	TBB-3D	Waste Water	WT 6	12/15/15 1330			2	HNO ₃	Pace	12/15/15	1330	12/15/15	0935	N/A	M	Y
4	ML-1	Product	WT 6	12/16/15 1830			2	HCl	Pace	12/16/15	1830	12/16/15	0935	N/A	M	Y
5	TBB-ID	Soil/Solid	WT 6	12/17/15 1345			2	NaOH	Pace	12/17/15	1345	12/17/15	0935	N/A	M	Y
6	TBB-1S	Oil	WT 6	12/17/15 1545			2	Na ₂ O ₂	Pace	12/17/15	1545	12/17/15	0935	N/A	M	Y
7	TBB-3S	Air	WT 6	12/18/15 0930			2	Other	Pace	12/18/15	0930	12/18/15	0935	N/A	M	Y
8	TBA-ID	Wipe	WT 6	12/22/15 1045			2	Other	Pace	12/22/15	1045	12/22/15	0935	N/A	M	Y
9	BC-1	Tissue	WT 6	12/24/15 1640			2	Other	Pace	12/24/15	1640	12/24/15	0935	N/A	M	Y
10		Other														
11																
12																

ADDITIONAL COMMENTS		REQUISITIONED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP IN °C	Received on	Sealed Cooler	Custody	Samples Intact
		Andrew Clark	12-24-15	1030	Pace	12/14/15	0935		N/A	M	Y	Y
SAMPLER NAME AND SIGNATURE												
PRINT Name of SAMPLER: Andrew Clark												
SIGNATURE of SAMPLER: <i>[Signature]</i>												
DATE Signed (MM/DD/YYYY): 12-24-15												

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days

30169493 RTB

Sample Condition Upon Receipt



Client Name: ICON

Project # _____

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: 7753 0814 1558

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no Biological Tissue Is Frozen: Yes No

Packing Material: Bubble Wrap _____ Bubble Bags None _____ Other _____

Thermometer Used N/A Type of Ice: Wet Blue None Samples on Ice, cooling process has begun

Cooler Temp.: Observed Temp.: N/A °C Correction Factor: N/A °C Final Temp: N/A °C

Date and initials of person examining contents: 1/4/16 RTB

Temp should be above freezing to 8°C

Comments:

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	7
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9
-Pace Containers Used:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12
-Includes date/time/ID/Analysis Matrix:	<u>WT</u>	
All containers needing preservation have been checked.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	13. pH < 2
All containers needing preservation are found to be in compliance with EPA recommendation.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
exceptions: VOA, collform, TOC, O&G, Phenols	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed <u>1/4/16</u> Lot # of added preservative <u>RTB</u>
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	16
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: _____ Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [Signature] Date: 1/4/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

MICHAEL PISANI & ASSOCIATES, INC.

New Orleans, LA

07-47

East White Lake Groundwater

**STANDARD LEVEL IV
REPORT OF ANALYSIS**

WORK ORDER #15-12122-OR

January 21, 2016

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

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STANDARD OPERATING PROCEDURE

MP-001, Rev. 15
Effective: 2/2/15
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Sample Receiving

**Eberline Services – Oak Ridge Laboratory
LABORATORY DATA SUPPORT CHECKLIST**

MP-001-3


Eberline Services Work Order # 15 - 12122

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

Date for Partial	Initials	Date	Initials	Checklist Items
		12-30-15	JEB	Sample Log-In
		01/13/16	EJT	Data Compilation
		1-19-16	MT	First Technical Data Review
		1/19/16	M	Second Technical Data Review
		01/20/16	EJT	Data Entry/Electronic Deliverable
		01/20/16	EJT	Case Narrative
		1-24-16	MT	Electronic Deliverable Proof
		1/27/16	M	Samples Analyzed within Holding Time Yes? <input checked="" type="checkbox"/> No? <input type="checkbox"/>
		6/1/16	H	QA/QC Review
		01/14/16	EJT	Client in Possession of Data Electronic or Hard Copy
				Invoiced by Laboratory

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

Date package approved by:


Laboratory Manager

1/21/16
Date

Copy No. _____

Radiochemistry Services

SECTION I
CHAIN OF CUSTODY
&
pH CHECK SHEET

CHAIN OF CUSTODY RECORD

Lab use only

Client Name: _____ Client # _____ Workorder # _____ Due Date _____

Report to:
 Client: Michael Pisani & Associates
 Address: 1100 Poydras Street
 Suite 1430, NOLA 70163
 Contact: Lance Cooper
 Phone: 504-582-2476
 Fax: lcooper@mpisani.com

Bill to:
 Client: _____
 Address: _____
 Contact: _____
 Phone: _____
 Fax: _____

P.O. Number: 7-47
 Project Name/Number: EWL Groundwater Sampling

Sampled By: LRC/DAM/JAM

Matrix	Date	Time (2400)	g o m p	g a s	Sample Description	Preservatives	No. Containers
W	12/15/15	0730	✓		TBB-3S	None	1
W	12/15/15	1345	✓		TBB-1D	None	1
W	12/17/15	1545	✓		TBB-1S	None	1
W	12/22/15	1045	✓		TBA-1D	None	1
W	12/15/15	1330	✓		TBB-3D	None	1
W	12/15/15	1100	✓		TBB-2D	None	1
W	12/15/15	1230	✓		TBB-2M	None	1
W	12/16/15	1130	✓		MC-1	None	1

Analytical Requests & Method

Lab use only:
 Custody Seal used yes no
 in tact yes no
 Temperature °C _____

Remarks: Ra 226 TDS Ra 228

Lab ID: _____

Turn Around Time: 24-48 hrs. 3 days 1 week Standard Other

Received by: (Signature) _____ Date: 12/24/15 Time: 1200
 Fed Ex 752 9178 6642


Reinquisitioned by: (Signature) _____ Date: 12/20/15 Time: 1000

Reinquisitioned by: (Signature) _____ Date: _____ Time: _____

Reinquisitioned by: (Signature) _____ Date: _____ Time: _____

Note: Call Dave Angle regarding turnaround time @ 281-242-3271

By submitting these samples, you agree to the terms and conditions contained in our most recent schedule of services.

 EBERLINE SERVICES Oak Ridge Laboratory	<h1>Internal Chain of Custody</h1>	Work Order #	15-12122
		Lab Deadline	1/11/2016
		Analysis	Ra228 - Level 4
		Sample Matrix	Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	35	PP1.4
	05	37	PP1.4
	06	34	PP1.4
	07	36	PP1.4
	08	34	PP1.4
	09	39	PP1.4
	10	42	PP1.4
	11	36	PP1.4
	12	36	PP1.4

	Location (circle one)						Initials	Date
Received by	<u>Sample Storage</u>	Rough Prep	Prep	Separations	Count Room		JNS/11/4/16 040	
Relinquished by	Sample Storage	Rough Prep	<u>Prep</u>	Separations	Count Room		JNS/11/5/16 069	
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	700 KC	1/5/16	
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	1130 KC	1/7/16	
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		KCS 1/7/16 1139	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room		KCS 1/7/16 1135	
Received by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	700 KC	1/11/16	
Relinquished by	Sample Storage	Rough Prep	Prep	<u>Separations</u>	Count Room	915 KC	1/13/16	
Received by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		0915 1/17/16	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	<u>Count Room</u>		1/17/16 1127	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			



Internal Chain of Custody

Work Order #

15-12122

Lab Deadline

12/31/2015

Analysis


TDS - Level 4

Sample Matrix

Water

Comments	Sample Fraction	HP 210 / 270 Detector Activity	Storage Location
	04	35	PP1.4
	05	37	PP1.4
	06	34	PP1.4
	07	36	PP1.4
	08	34	PP1.4
	09	39	PP1.4
	10	42	PP1.4
	11	36	PP1.4
	12	36	PP1.4

	Location (circle one)						Initials	Date
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room	SW	12/30/15	
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room	MH	31 DEC 15 0340	
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Received by	Sample Storage	Rough Prep	Prep	Separations	Count Room			
Relinquished by	Sample Storage	Rough Prep	Prep	Separations	Count Room			

	Sample Receiving Report (Volumes, pH, & CPM)	Internal Work Order
		15-12122
		Received By JBAILEY

FR	ClientID	# Btls	Comments	Matrix	Storage	Rec Vol Ttl	CPM Max
01	LCS	0		WA	PP1.4		
02	BLANK	0		WA	PP1.4		
03	DUP	0		WA	PP1.4		
04	TBB-3S	1		WA	PP1.4	3.76	35
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	35
05	TBB-1D	1		WA	PP1.4	3.76	37
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	37
06	TBB-1S	1		WA	PP1.4	3.76	34
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	34
07	TBA-1D	1		WA	PP1.4	3.76	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	36
08	TBB-3D	1		WA	PP1.4	3.76	34
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	34
09	TBB-2D	1		WA	PP1.4	3.76	39
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	39
10	TBB-2M	1		WA	PP1.4	3.76	42
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	42
11	MC-1	1		WA	PP1.4	3.76	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	36
12	BC-1	1		WA	PP1.4	3.76	36
			Container Number	pH Orig	pH Final	Volume (L)	CPM
			1	7	7	3.7600	36

*✓
ajf
12/30/15*

Received by: *Jamie Bailey* Date: 123015

SECTION II
SAMPLE ACKNOWLEDGEMENT



STANDARD OPERATING PROCEDURE

Sample Receiving

MP-001, Rev. 15
Effective: 2/2/15
Page 13 of 15

Eberline Services – Oak Ridge Laboratory

SAMPLE RECEIPT CHECKLIST MP-001-2

WORK ORDER # 15-12122

SAMPLE MATRIX/MATRICES:

(CIRCLE ONE OR BOTH)

AQUEOUS NON-AQUEOUS

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

WERE SAMPLES:

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

WERE CHAIN OF CUSTODY SEALS:

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

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

REMARKS: _____

SIGNATURE: *James E. Berkey* DATE: 12/30/15

SECTION III
CASE NARRATIVE



EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-40207

January 21, 2016

Lance Cooper
Michael Pisani & Associates, Inc.
1100 Poydras St, Suite 1430
New Orleans, LA 70163

CASE NARRATIVE
Work Order # 15-12122-OR

SAMPLE RECEIPT

This work order contains nine water samples received 12/30/2015. All samples were analyzed for Radium-226/228 and Total Dissolved Solids.

<u>CLIENT ID</u>	<u>LAB ID</u>	<u>CLIENT ID</u>	<u>LAB ID</u>
TBB-3S	15-12122-04	TBB-2D	15-12122-09
TBB-1D	15-12122-05	TBB-2M	15-12122-10
TBB-1S	15-12122-06	MC-1	15-12122-11
TBA-1D	15-12122-07	BC-1	15-12122-12
TBB-3D	15-12122-08		

ANALYTICAL METHODS

Radium-226 was analyzed using EPA Method 903.0 Modified. Radium-228 was analyzed using EPA Method 904.0. Total Dissolved Solids was performed using Standard Methods 2540C.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

RADIUM-226

Samples were prepared by removing representative aliquots followed by mixed acid digestions as appropriate. This was followed by precipitations of Radium/Barium Sulfate. Precipitates were dissolved in alkaline EDTA. Radium was selectively precipitated and then mounted on micro-porous filter media. Samples were counted by alpha spectroscopy using an energy specific region of interest for Radium-226. The final result was corrected for inherent self-absorption from elemental Barium. Chemical recovery was calculated by the use of a Barium-133 tracer, which was determined by HPGe gamma spectroscopy.

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

ANALYTICAL RESULTS CONTINUED

RADIUM-228

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

Samples demonstrated acceptable results for all Radium-228 analyses. Chemical recovery was acceptable for all samples. The Radium-228 method blank demonstrated an acceptable result. Results for the Radium-228 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Radium-228 laboratory control sample demonstrated an acceptable percent recovery.

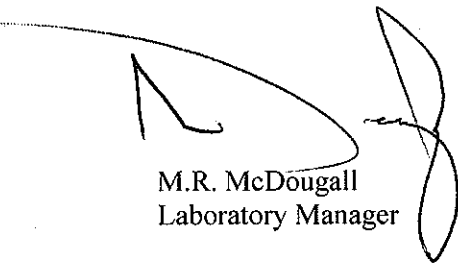
TOTAL DISSOLVED SOLIDS (TDS)

A volumetric aliquot of each sample was taken and filtered through a tared 0.45µm filter media into a tared 250ml beaker. Samples were then dried on a hot plate and were allowed to cool. The TDS content was determined by reweighing tared beakers.

Samples demonstrated Total Dissolved Solids contents that ranged from 584.0 to 26,822.0 mg/L.

CERTIFICATION OF ACCURACY

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



M.R. McDougall
Laboratory Manager

Date: 1/21/2016

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit <http://www.eberlineservices.com/client.htm> to provide us with feedback on our services.

SECTION IV
ANALYTICAL RESULTS SUMMARY

Eberline Analytical

Final Report of Analysis

Lance Cooper
Michael Pisani & Associates
 1100 Poydras St, 1430 Energy Ctr
 New Orleans, LA 70163

Work Order Details:

SDG: 15-12122
Project: 07-47 E White Lake
Analysis Category: ENVIRONMENTAL
Sample Matrix: WA

Report To:

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
15-12122-01	LCS	KNOWN	12/30/15 00:00	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	9.90E+00	4.56E-01			pCi/l
15-12122-01	LCS	SPIKE	12/30/15 00:00	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	1.06E+01	1.38E+00	2.64E+00	4.29E-01	pCi/l
15-12122-02	MBL	BLANK	12/30/15 00:00	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	6.46E-03	9.02E-02	9.02E-02	2.58E-01	pCi/l
15-12122-03	DUP	BC-1	12/28/15 16:40	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	6.75E-01	3.71E-01	4.03E-01	3.43E-01	pCi/l
15-12122-04	TRG	TBB-3S	12/18/15 09:30	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	7.57E-01	5.14E-01	5.33E-01	5.69E-01	pCi/l
15-12122-05	TRG	TBB-1D	12/17/15 13:45	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	1.75E+00	5.91E-01	6.97E-01	3.67E-01	pCi/l
15-12122-06	TRG	TBB-1S	12/17/15 15:45	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	3.85E+00	8.08E-01	1.15E+00	2.40E-01	pCi/l
15-12122-07	TRG	TBA-1D	12/22/15 10:45	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	1.31E+00	4.94E-01	5.66E-01	2.78E-01	pCi/l
15-12122-08	TRG	TBB-3D	12/15/15 13:30	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	1.82E+00	8.64E-01	9.47E-01	6.02E-01	pCi/l
15-12122-09	TRG	TBB-2D	12/15/15 11:00	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	1.75E+00	5.91E-01	6.97E-01	3.00E-01	pCi/l
15-12122-10	TRG	TBB-2M	12/14/15 12:30	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	2.46E+00	7.39E-01	8.98E-01	3.84E-01	pCi/l
15-12122-11	TRG	MC-1	12/16/15 11:30	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	2.03E+00	6.49E-01	7.77E-01	2.76E-01	pCi/l
15-12122-12	DO	BC-1	12/28/15 16:40	12/30/2015	1/17/2016	15-12122	Radium-226	EPA 903.0 Modified	8.34E-01	4.28E-01	4.63E-01	2.35E-01	pCi/l
15-12122-01	LCS	KNOWN	12/30/15 00:00	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	9.03E+00	4.60E-01			pCi/l
15-12122-01	LCS	SPIKE	12/30/15 00:00	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	8.57E+00	7.06E-01	2.06E+00	7.91E-01	pCi/l
15-12122-02	MBL	BLANK	12/30/15 00:00	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	2.36E-01	3.61E-01	3.65E-01	7.47E-01	pCi/l
15-12122-03	DUP	BC-1	12/28/15 16:40	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	7.24E-01	3.93E-01	4.26E-01	7.61E-01	pCi/l
15-12122-04	TRG	TBB-3S	12/18/15 09:30	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	1.41E+00	8.26E-01	8.85E-01	1.60E+00	pCi/l
15-12122-05	TRG	TBB-1D	12/17/15 13:45	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	6.80E-01	5.10E-01	5.33E-01	1.02E+00	pCi/l
15-12122-06	TRG	TBB-1S	12/17/15 15:45	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	8.36E+00	6.78E-01	2.01E+00	7.13E-01	pCi/l
15-12122-07	TRG	TBA-1D	12/22/15 10:45	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	1.20E+00	3.98E-01	4.82E-01	7.12E-01	pCi/l
15-12122-08	TRG	TBB-3D	12/15/15 13:30	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	2.15E+00	1.14E+00	1.24E+00	2.18E+00	pCi/l
15-12122-09	TRG	TBB-2D	12/15/15 11:00	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	1.23E+00	4.94E-01	5.67E-01	9.23E-01	pCi/l
15-12122-10	TRG	TBB-2M	12/14/15 12:30	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	6.18E+00	7.69E-01	1.60E+00	1.09E+00	pCi/l
15-12122-11	TRG	MC-1	12/16/15 11:30	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	1.92E+00	4.86E-01	6.51E-01	8.46E-01	pCi/l
15-12122-12	DO	BC-1	12/28/15 16:40	12/30/2015	1/13/2016	15-12122	Radium-228	EPA 904.0	1.02E+00	4.78E-01	5.31E-01	9.09E-01	pCi/l

CU=Counting Uncertainty; CSU=Combined Standard Uncertainty (2-sigma); MDA=Minimal Detected Activity; LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original



EBERLINE
 SERVICES

EBERLINE ANALYTICAL CORPORATION

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

Eberline Analytical

Final Report of Analysis

Report To:
 Lance Cooper
 Michael Pisani & Associates
 1100 Poydras St, 1430 Energy Ctr
 New Orleans, LA 70163

Work Order Details:
 SDG: 15-12122
 Project: 07-47 E White Lake
 Analysis Category: ENVIRONMENTAL
 Sample Matrix: WA

Lab ID	Sample Type	Client ID	Sample Date	Receipt Date	Analysis Date	Batch ID	Analyte	Method	Result	CU	CSU	MDA	Report Units
15-12122-04	TRG	TBB-3S	12/18/15 09:30	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.91E+03				mg/l
15-12122-05	TRG	TBB-1D	12/17/15 13:45	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.97E+03				mg/l
15-12122-06	TRG	TBB-1S	12/17/15 15:45	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	2.68E+04				mg/l
15-12122-07	TRG	TBA-1D	12/22/15 10:45	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.35E+03				mg/l
15-12122-08	TRG	TBB-3D	12/15/15 13:30	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.43E+03				mg/l
15-12122-09	TRG	TBB-2D	12/15/15 11:00	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.94E+03				mg/l
15-12122-10	TRG	TBB-2M	12/14/15 12:30	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	7.82E+03				mg/l
15-12122-11	TRG	MC-1	12/16/15 11:30	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	1.66E+03				mg/l
15-12122-12	TRG	BC-1	12/28/15 16:40	12/30/2015	12/31/2015	15-12122	TDS	SM 2540C	5.84E+02				mg/l

CU=Counting Uncertainty; CSU=Combined Standard Uncertainty (2-sigma); MDA=Minimal Detected Activity; LCS=Laboratory Control Sample; MBL=Blank; DUP=Duplicate; TRG=Normal Sample; DO=Duplicate Original



EBERLINE
SERVICES

EBERLINE ANALYTICAL CORPORATION

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

SECTION V
ANALYTICAL STANDARDS

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

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

Radionuclide: Ra-226
Half Life: 1600 ± 7 years
Catalog No.: 7226
Source No.: 453-26

Customer: TMA EBERLINE
P.O.No.: VH1888
Reference Date: February 1 1994 12:00 PST.
Contained Radioactivity: (Ra-226) 1.001 μCi.
Contained Radioactivity: (Ra-226) 37.0 kBq.

Description of Solution

- a. Mass of solution: 5.1864 g (in a 5 ml Flame Sealed Ampoule)
- b. Chemical form: Ra(NO₃)₂ in 1 N HNO₃
- c. Carrier content: None added
- d. Density: 1.0318 g/ml @ 20°C.

Radioimpurities: None detected (other than daughters)

Radioactive Daughters

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

Radionuclide Concentration

(Ra-226) 0.1929 μCi/g.

Method of Calibration

Weighed aliquots of the solution were assayed using gamma spectrometry:

Energy peak(s) integrated under: 186 keV.

Branching ratio(s) used: 0.0351 gamma rays per decay.

Uncertainty of Measurement

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

NIST Traceability

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

Leak Test(s)

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

Notes

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



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

Ana H. Kuen
QUALITY CONTROL

Feb. 3, 1994
Date Signed



QUALITY CONTROL PROGRAM
MP 009

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

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

SOLUTION REFERENCE # IPL 453-26 CURRENT DATE 10/27/2015 0:00
SOLUTION # Ra-5

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

Radionuclide ²²⁶Radium Reference Date 2/1/1994 0:00

Certified Activity 1.001E+00 μ Ci
Certified Concentration μ Ci per gram

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

Dilute to a volume of 1000.00 milliliters

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

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

Expiration Date: October 20, 2016

Verified & Approved By [Signature]

Date: 10/27/2015

QC Approval [Signature]

Date: 10/28/15



QUALITY CONTROL PROGRAM
MP 009

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

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

MP 009 Date: 10/27/2015 0:00
Solution Reference # IPL-453-26 Solution # Ra-5b

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

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

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

Dilution Instructions: Dilution Solvent Used 1M HNO₃

SECONDARY VOLUMETRIC DILUTION

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

NOTES:

Expiration Date: October 20, 2016

Verified & Approved By

Date: 10/27/2015 0:00

QC Approval

Date: 10/28/15



CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

62680-416

Ra-228 5 mL Liquid in Flame Sealed Vial

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

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

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

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

*99% Confidence Level

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

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

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

SOURCE PREPARED BY:

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

Q A APPROVED:

PCW 11/7/01

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



QUALITY CONTROL PROGRAM
MP-009

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

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

CURRENT DATE 4/15/2015 0:00

SOLUTION REFERENCE # Analytics 62680-416

SOLUTION # Ra-11

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

Radionuclide ²²⁸Ra Reference Date 11/7/2001 0:00

Certified Activity 6.986E-02 μCi

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

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

Chemical Composition of Standard Solution

²²⁸Ra(NO₃)₂ in 0.5 M HCl

Dilution Instructions: Dilution Solvent Used 0.5 M HCl

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 1.551E+02 dpm/ml

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

Expiration Date: March 4, 2016

Recertified By [Signature]

Date: 4/15/15

QC Approval [Signature]

Date: 4/15/15



National Institute of Standards & Technology

Ba-6
(#6a)

Certificate

Standard Reference Material 4251C Barium-133 Radioactivity Standard

ORIGINAL

ORIGINAL

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

Radiological Hazard

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

Chemical Hazard

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

Storage and Handling

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

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

Preparation

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

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

Gaithersburg, Maryland 20899
October 1994

Thomas E. Gills, Chief
Standard Reference Materials Program



QUALITY CONTROL PROGRAM
QCP-009

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

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

SOLUTION REFERENCE #		NIST SRM4251C	CURRENT DATE	7/2/2015 0:00
SOLUTION #		Ba-6		
Principal Radionuclide	Half Life, Years	Half Life, Days		
¹³³ Barium	1.048E+01	3.828E+03		
Radionuclide	¹³³ Barium	Reference Date	9/1/1993 0:00	
Certified Activity	μCi			
Certified Concentration	1.318E+01 μCi per gram			
Ampoule /Solution Gross	9.3081	Weight, Grams		
Empty Ampoule	4.2582	Weight, Grams		
Solution Net	5.0499	Weight, Grams		
Total Activity in Ampoule	66.5577	μCi		
Chemical Composition of Standard Solution				
¹³³ BaCl ₂ in 1M HCl				

Dilution Instructions: Dilution Solvent Used 1M HCl

Dilute to a volume of 1000.00 milliliters

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

And after dilution the activity of this solution is 1.478E+05 dpm/ml

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

Expiration Date: May 8, 2016

Verified & Approved By [Signature] Date: 7/2/15

QC Approval [Signature] Date: 7-6-15



QUALITY CONTROL PROGRAM
QCP-009

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

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

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

Date 7/2/15
Solution # Ba-6a

Principal Radionuclide

Half Life, Years

Half Life, Days

¹³³Ba

1.048E+01

3.828E+03

Radionuclide of Interest

¹³³Ba

Reference Date

9/1/1993 0:00

Parent Solution Conc. 1.48E+05 dpm/ml

Chemical Composition of Standard Solution

¹³³BaCl₂ in 1M HCl

Dilution Instructions:

Dilution Solvent Used

1M HCl

SECONDARY VOLUMETRIC DILUTION

Vol. Parent Solution: 25.0000 ml

Total Activity: 3.6950E+06 dpm

Final Volume: 1000.00 ml

Final Activity Concentration: 3.6950E+03 dpm/ml

NOTES:

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

Expiration Date: May 8, 2016

Verified & Approved By

Date: 7/2/15

QC Approval

Date: 7-6-15

SECTION VI
QUALITY CONTROL SAMPLE RESULTS SUMMARY

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-12122	Ra226	1	pCi	I	Michael Pisani & Associates, Inc.

Laboratory Control Sample

Analyte	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-226	107.26%	24.82%	100.00%	4.60%	9.90E+00	4.56E-01	1.06E+01	2.64E+00	Ra-5b	4.40E+01	4.60E+00	4.99E-01

Matrix Spike

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

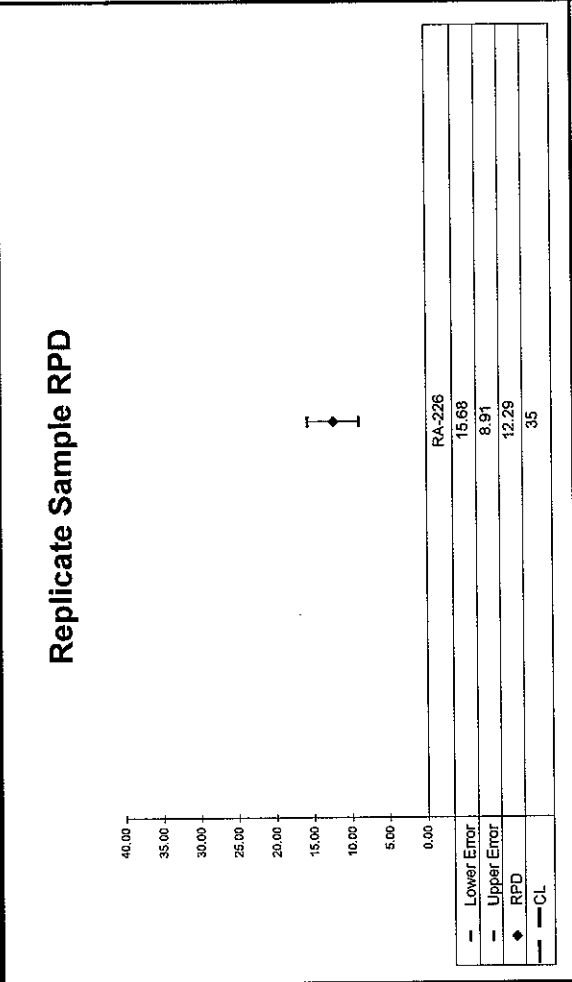
Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS Relative Bias	LCS % R	MS % R	MS ND	Rep RPD	Rep ND
RA-226	0.31	12.29	8.34E-01	4.63E-01	7.37E-01	4.03E-01	1.07	OK			NA	OK

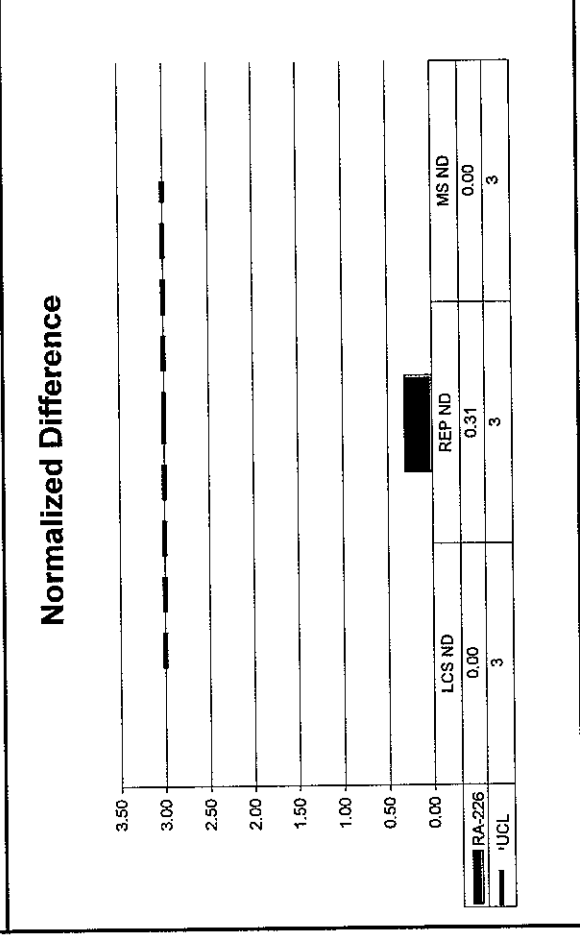
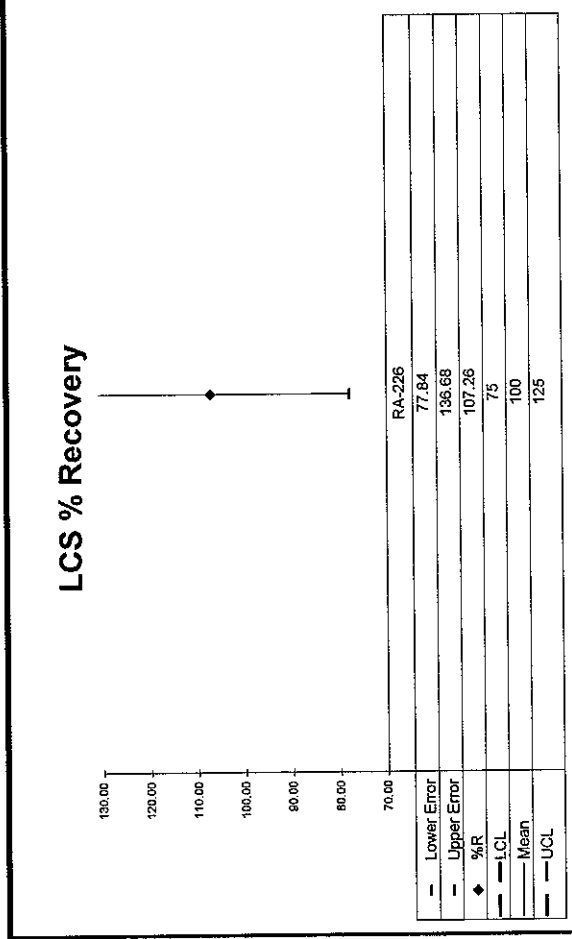
QC Summary

30
00030
out
01/20/16

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-12122	Ra226	1	pCi	1	Michael Pisani & Associates, Inc.



No Matrix Spike



WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-12122	Ra228	1	pCi	1	Michael Pisani & Associates, Inc.

Laboratory Control Sample

Analyte	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
RA-228	94.92%	24.09%	100.00%	5.10%	9.03E+00	4.60E-01	8.57E+00	2.06E+00	Ra-11	2.81E+01	5.10E+00	7.14E-01

Matrix Spike

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

Replicate Sample

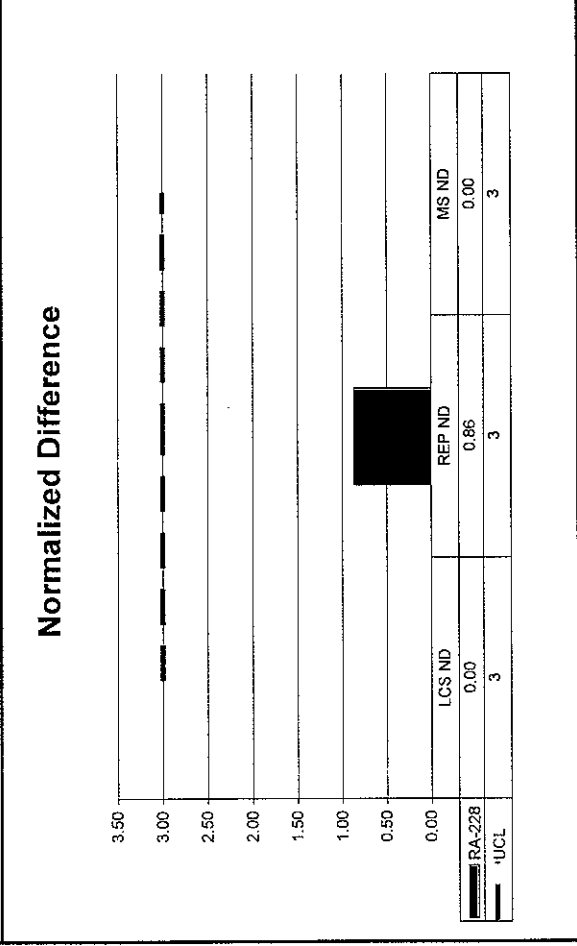
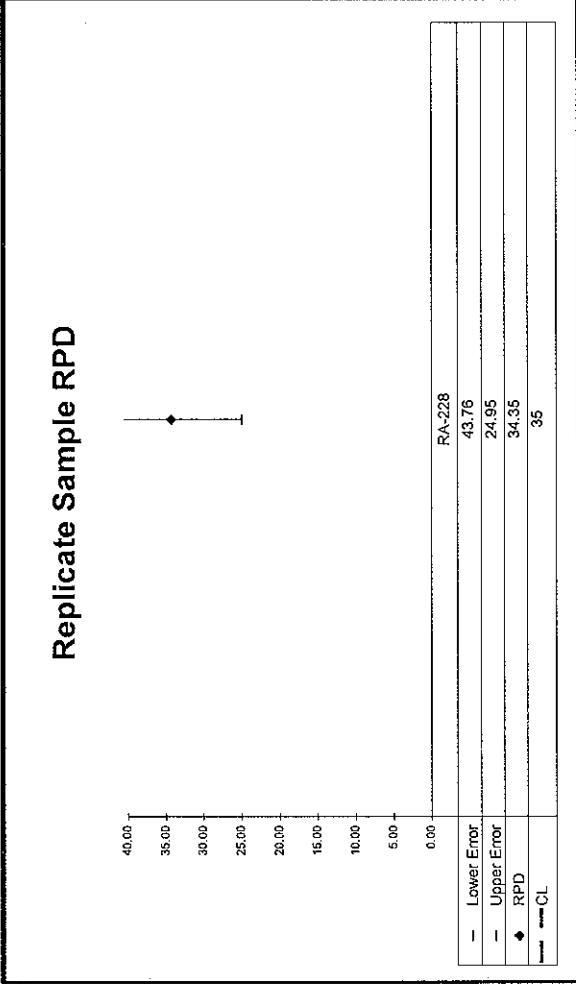
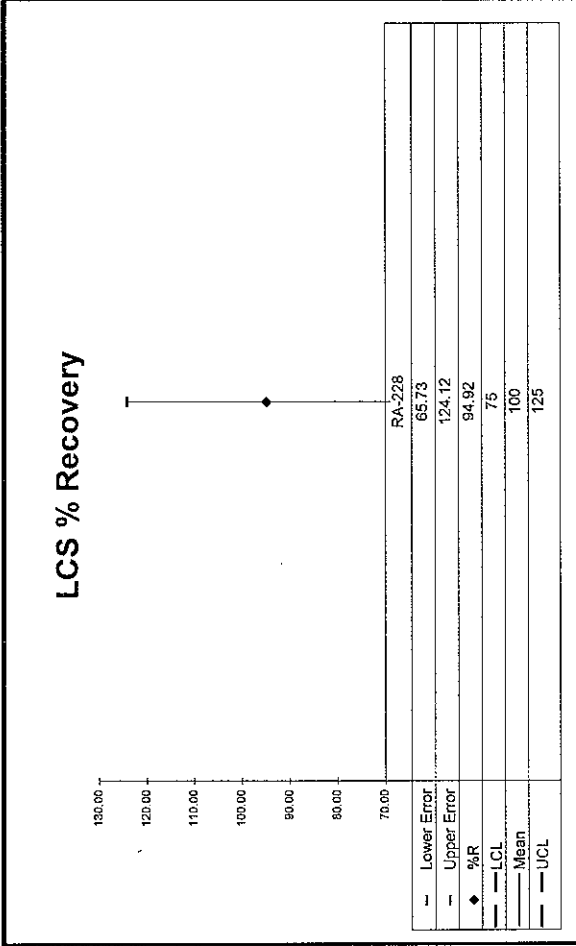
Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU	LCS % R	MS % R	MS ND	Rep RPD	Rep ND
RA-228	0.86	34.35	1.02E+00	5.31E-01	7.24E-01	4.26E-01	OK			NA	OK

QC Summary

LCS Relative Bias	LCS % R	MS % R	MS ND	Rep RPD	Rep ND
0.95	OK			NA	OK

00002


WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
15-12122	Ra228	1	pCi	1	Michael Pisani & Associates, Inc.



No Matrix Spike

SECTION VII
LABORATORY TECHNICIAN'S NOTES & RUNLOGS

RA-226 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-12122
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	01/04/16 09:13	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

JWOLFE
1/4/16

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-12122
		Analysis Code	Ra226
		Run Number	1

#	Date	Dept	User	Notes
1	01/04/16 09:13	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	01/07/16 10:52	CHEM	KCOULSTON	ADDED EDTA TO SAMPLES AND LET SIT OVERNIGHT. SYRINGE FILTERED SAMPLES, ADDED AMMONIUM SILFIDE AND ACETIC ACID TO SAMPLES. FILTERED ONTO TARRED FILTER PAPERS, LET DRY UNDER HEAT LAMP. REWEIGHED, AND SUBMITTED TO COUNT.

Kristen Coulston 1/7/16



Reagents Used in an Analysis

Internal Work Order

15-12122

Analysis Code

Run

Ra226

1


Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
015857P	Ammonium Hydroxide	Reagent Grade	JWOLFE	1/4/2016
016882D02	Ammonium Sulfate	200 mg/ml	JWOLFE	1/4/2016
016561D07	Barium Carrier	1 mg/ml	JWOLFE	1/4/2016
015956D06	Lead Carrier	166 mg/ml	JWOLFE	1/4/2016
016886P	Nitric Acid	Reagent Grade	JWOLFE	1/4/2016
013820P	Acetic Acid	Reagent Grade	KCOULSTON	1/7/2016
016473S	Ammonium Sulfate	200 mg/ml	KCOULSTON	1/7/2016
016797S	EDTA	0.25M	KCOULSTON	1/7/2016

Alpha # 3

17

Date	Sample #	Client	Lead Time	Condition	Analysis	Reck
11/7	1512077A(1-4)	UCON	0852	2h5	UNIT	—
11/7	1512077A(1-4)	UCON	0852	2h5	UNIT	—
11/7	1512078A(1-4)	UCON	0852	2h5	UNIT	—
11/7	1512078A(1-4)	UCON	0853	2h5	UNIT	—
11/7	1512083A(1-4)	Low Area	0853	2h5	UNIT	—
11/7	1512072A(1-4)	UCON	0854	2h5	P. 750	—
11/7	1512077A(1-2)	UCON	0854	2h5	P. 750	—
1/7/16	1512072A(4)	UCON	1153	2hr50-	TH229	KB
1/7/16	1512077A(1-4)	UCON	1153	2hr50-	Np	KB
1/7/16	1512078A(1-4)	UCON	1154	2hr50-	Np	KB
1/7/16	1512065A(1-6)	Security	1154	2hr50-	ISO-PU	KB
1/7/16	1512077A(1-4)	UCON	1155	2hr50-	TH229	KB
1/7/16	1512108A(1-4)	Access	1156	2hr50-	Rak	KB
1/7/16	1512102A(1-5)	Accutest	1154	2hr50-	Rak	KB
1/7/16	1512105A(1-6)	Tetra Tech	1451	2hr50 mins	Rak	KB
1/7/16	1512122A(1-12)	M.P.A	1453	2hr50 mins	Rak	KB
1/7/16	1512101A(1-4)	Accutest	1454	2hr50-	Rak	KB

RA-228 NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-12122
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	01/04/16 09:13	PREP	JWOLFE	ALIQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS

J Wolfe
 1/4/16

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-12122
		Analysis Code	Ra228
		Run Number	1

#	Date	Dept	User	Notes
1	01/04/16 09:13	PREP	JWOLFE	ALIUQUOTED AND ADDED SPIKES AND TRACERS- PH'D SAMPLES- PRECIPITATED WITH BA AND PB CARRIERS AND AMMONIUM SULFATE- DECANTED SAMPLES AND CENTRIFUGED- SUBMITTED RADIUM PRECIP TO SEPARATIONS
2	01/13/16 07:30	CHEM	KCOULSTON	ADDED FILTER PAPERS FROM COUNT ROOM TO LABELED C-TUBES, FILLED WITH EDTA SOLUTION AND LET SIT OVERNIGHT. REMOVED FILTER FROM EDTA-ADDED 13 DROPS CONC HNO3, 2MLS YTTRIUM 9MG/ML CARRIER, 2MLS 1.5MG/ML PB CARRIER, 0.3 MLS AMMONIUM SULFITE, 25 DROPS OF 10M SODIUM HYDROXIDE, SHAKE SAMPLES, CENTRIFUGE, POUR SUPERNATE INTO CLEAN C-TUBE AND ADD 0.3MLS AMMONIUM SULFITE AND 2MLS 1.5MG/ML PB CARRIER, SHAKE SAMPLES, CENTRIFUGE, RINSE OTHER C-TUBES WITH DI-H2O THEN SYRINGE FILTER SUPERNATE BACK INTO RINSED C-TUBES. ADDED 18N NAOH TO SAMPLES AND RECORDED T1. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 6N HNO3, DI WATER, AND 10N NAOH. HOT BATHED FOR 15 MIN, CENTRIFUGED AND DISCARDED SUPERNANT. ADDED 1N HNO3, DI WATER, AND AMMONIUM OXALATE. FILTERED ONTO TARRD FILTER PAPERS. LET DRY UNDER HEAT LAMP, REWEIGHED AND SUBMITTED TO COUNT.

Kwate Coulston 1/13/16



Reagents Used in an Analysis

Internal Work Order

15-12122

Analysis Code

Run

Ra228

1

Reagent ID	Reagent Name	Reagent Concentration	Analyst ID	Date Recorded
015857P	Ammonium Hydroxide	Reagent Grade	JWOLFE	1/4/2016
016882D02	Ammonium Sulfate	200 mg/ml	JWOLFE	1/4/2016
016561D07	Barium Carrier	1 mg/ml	JWOLFE	1/4/2016
015956D06	Lead Carrier	166 mg/ml	JWOLFE	1/4/2016
016886P	Nitric Acid	Reagent Grade	JWOLFE	1/4/2016
013820P	Acetic Acid	Reagent Grade	KCOULSTON	1/13/2016
016472S	Ammonium Sulfate	200 mg/ml	KCOULSTON	1/13/2016
016083D02	Ammonium Sulfide	2%	KCOULSTON	1/13/2016
016797S	EDTA	0.25M	KCOULSTON	1/13/2016
016459S	Lead Carrier	1.5 mg/ml	KCOULSTON	1/13/2016
016453S	Nitric Acid	1N	KCOULSTON	1/13/2016
016455S	Nitric Acid	6N	KCOULSTON	1/13/2016
016403P	Nitric Acid	Reagent Grade	KCOULSTON	1/13/2016
016448S	Sodium Hydroxide	10M	KCOULSTON	1/13/2016
016445S	Sodium Hydroxide	18M	KCOULSTON	1/13/2016
016916S	Yttrium Carrier	9 mg/ml	KCOULSTON	1/13/2016

Date	Sample	Client	Time	Time Analyzed	Item
117	15120507A(2-9)	Rep. Serv	0929	2h	RTB
117	15120577A(1-4)	UCOR	1244	2h	RTB
117	15120577A(1-4)	UCOR	1244	2h	RTB
112	E7700	LAB	0507	30	LAB
112	Buapoc	LAB	0547	60	LAB
112	15120498A(2-6)	UCOR	0507	2h	SLD
112	151210457A(1)	UCOR	0507	2h	SLD
112	15120577A(1-3)	UCOR	0507	2h	SLD
112	16010110A(1-6)	UCOR	0718	2h	LAB
113	15120577A(2-4)	UCOR	0718	2h	Ph210
112	15120577A(1)	UCOR	0722	2h	Ph210
112	15120857A(1-5)	Energy Trans.	0922	2h	Ph210
1/9/16	Weekly Bkgd.	LAB	1036	12 hr	LAB
111116	E7700	LAB	0506	30	LAB
111116	Buapoc	LAB	0542	60	LAB
111116	16010204A(1-4)	UCOR	0721	2h	LAB
111116	15120498A(1-4)	Rep. Serv	0958	2h	RTB
111116	16010204A(1-5,8)	UCOR	1204	2 hr	LAB
111216	E7700	LAB	0509	30	LAB
111216	Buapoc	LAB	0547	60	LAB
111216	16010257A(1-25-8)	CB services	0722	15	LAB
111216	16010257A(14)	CB services	0745	15	LAB
111216	1512117A(1-4)	TN Dept.	0817	16	LAB
111216	15120477A(1-7)	Accident	0926	2h	RTB
111216	15121047A(2-4)	UCOR	0926	4h	RTB
111316	E7700	LAB	0511	30	LAB
111316	Buapoc	LAB	0552	60	LAB
111716	15121047A(1-4)	UCOR	0708	2h	Ph210
111716	15121117A(1-4)	UCOR	0708	2h	Ph210
111716	15121227A(1-12)	Ph210	0927	2h	RTB
111716	15121227A(1-8)	Ph210	1131	2h	RTB

TDS NOTES

 EBERLINE <small>SERVICES</small> Work Order Analysis Notes	Oak Ridge Laboratory 601 Scarboro Rd. Oak Ridge, TN 37830 Voice: 865.481.0683 www.eberlineservices.com	Internal Work Order	15-12122
		Analysis Code	TDS
		Run Number	1

#	Date	Dept	User	Notes
1	12/31/15 02:05	PREP	MHIGHTOWER	Filtered sample into tared beaker, dried, re-weighed

M4 31DEC15

SECTION VIII
ANALYTICAL DATA (RADIUM-226)

Work Order	15-12122
Analysis Code	Ra226
Run	1
Date Received	12/30/2015
Lab Deadline	1/11/2016
Client	Michael Pisani & Associates, Inc.
Project	07-47 E White Lake
Report Level	4
Activity Units	pCi
Aliquot Units	I
Matrix	WA
Method	EPA 903.0 Modified
Instrument Type	Alpha Spectroscopy
Radiometric Tracer	Ba-133
Radiometric Sol#	Ba-6a
Tracer Act (dpm/g)	844.37
Carrier	
Carrier Conc (mg/ml)	

Internal Fraction	Sample Desc	Client ID	Login CPM	Sample Date	Sample Aliquot
01	LCS	LCS		12/30/15 00:00	1.0000E+00
02	MBL	BLANK		12/30/15 00:00	1.0000E+00
03	DUP	BC-1	36	12/28/15 16:40	1.0000E+00
04	TRG	TBB-3S	35	12/18/15 09:30	1.0000E+00
05	TRG	TBB-1D	37	12/17/15 13:45	1.0000E+00
06	TRG	TBB-1S	34	12/17/15 15:45	1.0000E+00
07	TRG	TBA-1D	36	12/22/15 10:45	1.0000E+00
08	TRG	TBB-3D	34	12/15/15 13:30	1.0000E+00
09	TRG	TBB-2D	39	12/15/15 11:00	1.0000E+00
10	TRG	TBB-2M	42	12/14/15 12:30	1.0000E+00
11	TRG	MC-1	36	12/16/15 11:30	1.0000E+00
12	DO	BC-1	36	12/28/15 16:40	1.0000E+00

* SAF1 is used for Gross Alpha and all other radionuclides. SAF2 is used for Gross Beta only. ^ Indicates estimated SAF value.
** 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	0.9988	843.4	415.0	109.24		0.0227	0.0328	0.0101		109.24	3.00^	1.00
02	MBL	0.9829	829.9	377.0	100.84		0.0228	0.0333	0.0105		100.84	3.00^	1.00
03	DUP	0.9981	842.8	458.0	120.65		0.0228	0.0350	0.0122		110.00	3.00^	1.00
04	TRG	0.9914	837.1	194.0	51.45		0.0226	0.0341	0.0115		51.45	3.00^	1.00
05	TRG	0.9906	836.4	327.0	86.79		0.0228	0.0339	0.0111		86.79	3.00^	1.00
06	TRG	0.9924	838.0	396.0	104.91		0.0229	0.0685	0.0456		104.91	3.00^	1.00
07	TRG	0.9992	843.7	421.0	110.78		0.0228	0.0359	0.0131		110.00	3.00^	1.00
08	TRG	0.9963	841.2	156.0	41.17		0.0227	0.0309	0.0082		41.17	2.82	1.00
09	TRG	0.9918	837.4	352.0	93.31		0.0228	0.0384	0.0156		93.31	3.00^	1.00
10	TRG	0.9727	821.3	310.0	83.79		0.0228	0.0513	0.0285		83.79	3.00^	1.00
11	TRG	0.9913	837.0	413.0	109.54		0.0226	0.0377	0.0151		109.54	3.00^	1.00
12	DO	0.9893	835.3	363.0	96.47		0.0228	0.0358	0.0130		96.47	3.00^	1.00

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

Run	1		Analysis Code	Ra226
			Eberline Services Work Order	15-12122
Client	Michael Pisani & Associates, 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-226	LCS	LCS	pCi/l	1.06E+01	1.38E+00	4.29E-01	9.90E+00	107.26	OK		OK	
02	RA-226	MBL	BLANK	pCi/l	6.46E-03	9.02E-02	2.58E-01					OK	OK
03	RA-226	DUP	BC-1	pCi/l	7.37E-01	3.71E-01	3.43E-01				NA	OK	
04	RA-226	TRG	TBB-3S	pCi/l	6.75E-01	5.14E-01	5.69E-01					OK	
05	RA-226	TRG	TBB-1D	pCi/l	1.75E+00	5.91E-01	3.67E-01					OK	
06	RA-226	TRG	TBB-1S	pCi/l	3.85E+00	8.08E-01	2.40E-01					OK	
07	RA-226	TRG	TBA-1D	pCi/l	1.31E+00	4.94E-01	2.78E-01					OK	
08	RA-226	TRG	TBB-3D	pCi/l	1.82E+00	8.64E-01	6.02E-01					OK	
09	RA-226	TRG	TBB-2D	pCi/l	1.75E+00	5.91E-01	3.00E-01					OK	
10	RA-226	TRG	TBB-2M	pCi/l	2.46E+00	7.33E-01	3.84E-01					OK	
11	RA-226	TRG	MC-1	pCi/l	2.03E+00	6.49E-01	2.76E-01					OK	
12	RA-226	DO	BC-1	pCi/l	8.34E-01	4.28E-01	2.35E-01					OK	OK

Spike and Tracer Worksheet

Internal Work Order		Run	Analysis Code		Date		Technician		Technician Initials		Witness Initials						
15-12122		1	Ra226		1/4/2016 7:57		JWOLFE		[Signature]		[Signature]						
LCS & Matrix Spikes		Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS Volume Used (g)	MS Volume Used (g)	LCSD Volume Used (g)	MSD Volume Used (g)	LCS Known pCi	MS Error Estimate	LCSD Known pCi	MSD Error Estimate			
Ra-226	Ra-5b	44.020	1/4/2016	0.500	0.4994						9.90	0.456	0.00	0.000			
C-99 MS		C-2a	22043.636	7/5/2014	0.1												
Balance Printer Tapes																	
		Tracers					Tracer					LCS					
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	0.9988 g 0.9829 g -0.9981 g -0.9914 g -0.9906 g -0.9924 g -0.9992 g -0.9963 g -0.9918 g -0.9727 g -0.9913 g - 9893 g								Matrix Spike		
01	Ba-133	Ba-6a	844.370	1/4/2016	0.9988	1.2000											
02	Ba-133	Ba-6a	844.370	1/4/2016	0.9829	1.2000											
03	Ba-133	Ba-6a	844.370	1/4/2016	0.9981	1.2000											
04	Ba-133	Ba-6a	844.370	1/4/2016	0.9914	1.2000											
05	Ba-133	Ba-6a	844.370	1/4/2016	0.9906	1.2000											
06	Ba-133	Ba-6a	844.370	1/4/2016	0.9924	1.2000											
07	Ba-133	Ba-6a	844.370	1/4/2016	0.9992	1.2000											
08	Ba-133	Ba-6a	844.370	1/4/2016	0.9963	1.2000											
09	Ba-133	Ba-6a	844.370	1/4/2016	0.9918	1.2000											
10	Ba-133	Ba-6a	844.370	1/4/2016	0.9727	1.2000											
11	Ba-133	Ba-6a	844.370	1/4/2016	0.9913	1.2000											
12	Ba-133	Ba-6a	844.370	1/4/2016	0.9893	1.2000											

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Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
15-12122	1	Ra226	liters	1/11/2016	JWOLFE

Lab Fraction	Michael Pleam & Associates, Inc.		Muffle Data		Dilution Data			Aliquot Data		MS Aliquot Data		H-3 Solids Only	
	Client ID	Type	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	BC-1	DUP					1.0000E+00	1.0000E+00					
04	TBB-3S	TRG					1.0000E+00	1.0000E+00					
05	TBB-1D	TRG					1.0000E+00	1.0000E+00					
06	TBB-1S	TRG					1.0000E+00	1.0000E+00					
07	TBA-1D	TRG					1.0000E+00	1.0000E+00					
08	TBB-3D	TRG					1.0000E+00	1.0000E+00					
09	TBB-2D	TRG					1.0000E+00	1.0000E+00					
10	TBB-2M	TRG					1.0000E+00	1.0000E+00					
11	MC-1	TRG					1.0000E+00	1.0000E+00					
12	BC-1	DO					1.0000E+00	1.0000E+00					

Comments

Technician: *M. Wolfe* Date: 1/14/16

CB
1/7/16

Apex-Alpha™

Sample Description: SPIKE
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 01
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 138673
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 1/7/2016 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:33 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1862 +/- 0.0032 on 12/11/2015 8:20:49 AM
 Effective Efficiency: 0.1862 +/- 0.0032

Control Certificate Name: Ra226_Ra-5b
 Chem. Recov. of Control: RA-226 0.357531 +/- 0.026040
 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	5.467	15.11	55.78	2.89	0.00E+000	3.0
RA-226	4.541	248.75	12.55	4.25	0.00E+000	3.3

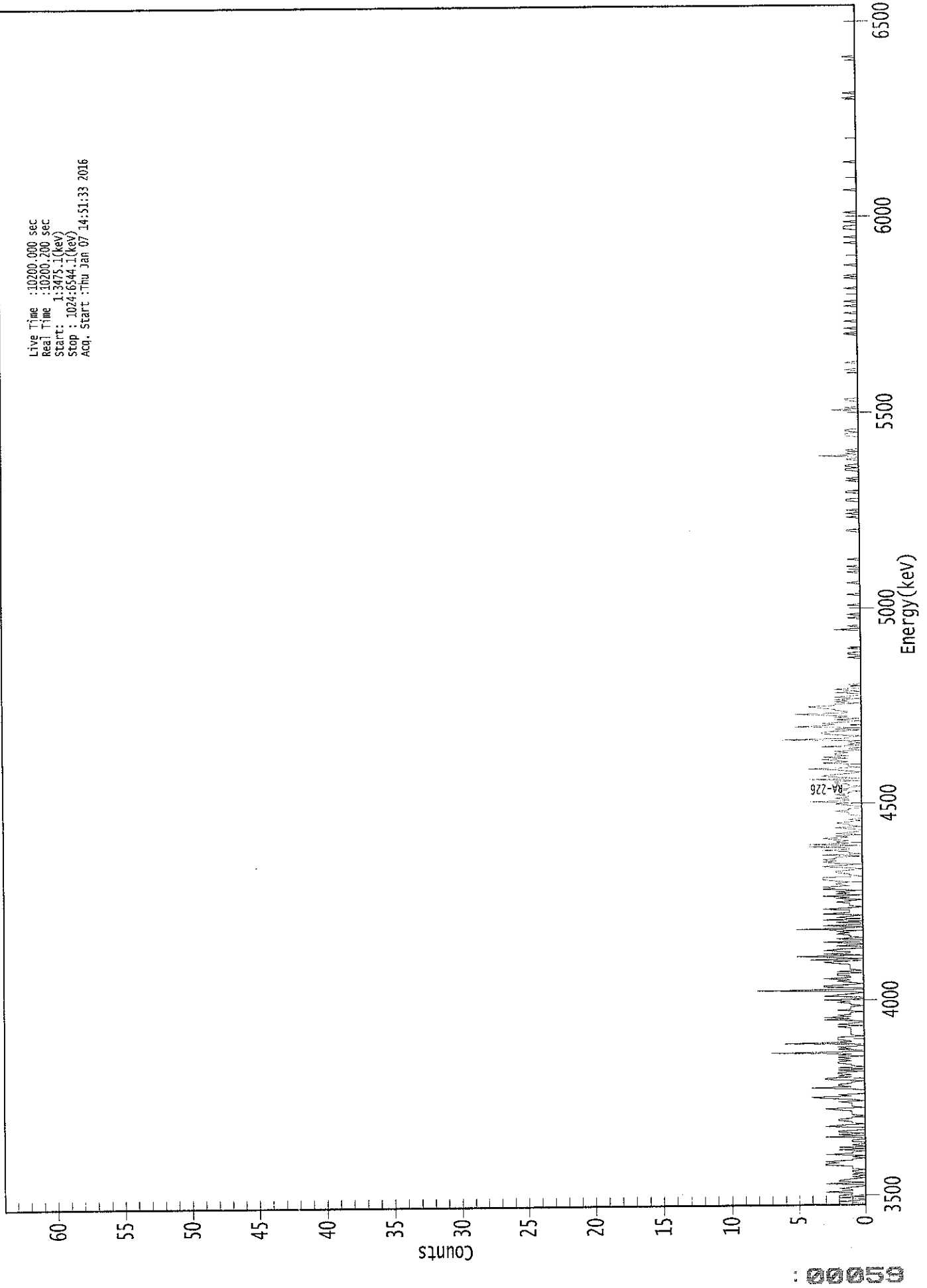
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.940	5685.50*	6.78E-001 +/- 3.79E-001	3.93E-001 +/- 1.34E-002
RA-226	0.925	4785.00*	1.06E+001 +/- 1.38E+000	4.29E-001 +/- 1.47E-002

AG
1/8/16

0000138418.CNF

Live Time : 10200.000 sec
Real Time : 10200.200 sec
Start : 1:3475.1(kev)
Stop : 1024:6544.1(kev)
Acq. Start : Thu Jan 07 14:51:33 2016



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

369: 0 1 2 4 0 1 1 1

Sample Title: 01

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

801: 1 0 0 0 0 0 0 0

Sample Title: 01

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

KS
1/7/16

Apex-Alpha™

Sample Description: BLANK
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 02
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 138674
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 1/7/2016 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:35 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1847 +/- 0.0032 on 12/11/2015 8:20:48 AM
 Effective Efficiency: 0.1847 +/- 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	5.624	0.98	294.85	1.02	0.00E+000	3.0
RA-226	4.510	0.15	1397.8	0.85	0.00E+000	3.0

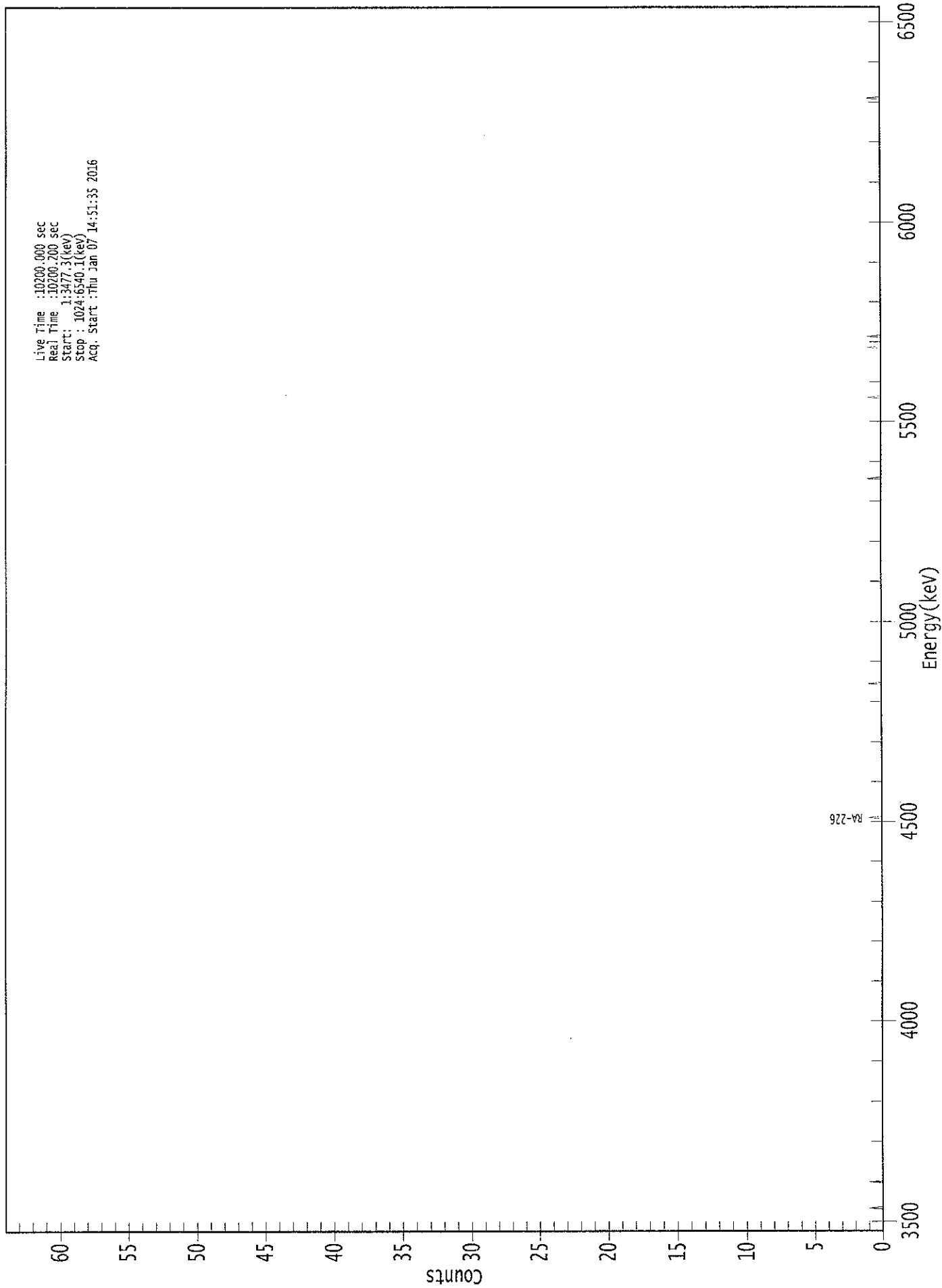
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.995	5685.50*	4.43E-002 +/- 1.31E-001	2.85E-001 +/- 9.73E-003
RA-226	0.906	4785.00*	6.46E-003 +/- 9.02E-002	2.58E-001 +/- 8.80E-003

AG
1/8/16

0000138403.CNF

Live Time : 10200.000 sec
Real Time : 10200.200 sec
Start : 1:3477.3(kev)
Stop : 1024:0540.1(kev)
Acq. Start : Thu Jan 07 14:51:35 2016



ROI Type: 1

369: 0 0 0 0 0 0 0 0

Sample Title: 02

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	0	0	0	0	0
385:	0	0	0	0	0	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	1	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	0	0	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	0	0	0	0	0
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	0	0	0
545:	0	0	0	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	0	0	0	0	0
569:	0	0	0	0	0	0	0	0
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	1	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:	1	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	1	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	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 02

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



Apex-Alpha™

KB
1/7/16

Sample Description: BC-1 DUP
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 03
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_041
 Chamber Serial Number: 05026930A
 Detector Serial Number: 91087
 Env. Background: System Bkgd 138675
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/28/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:37 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/11/2015 8:21:11 AM
 Effective Efficiency: 0.1900 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.577	7.66	72.63	0.34	0.00E+000	3.0
RA-226	4.600	17.62	50.25	2.38	0.00E+000	6.0

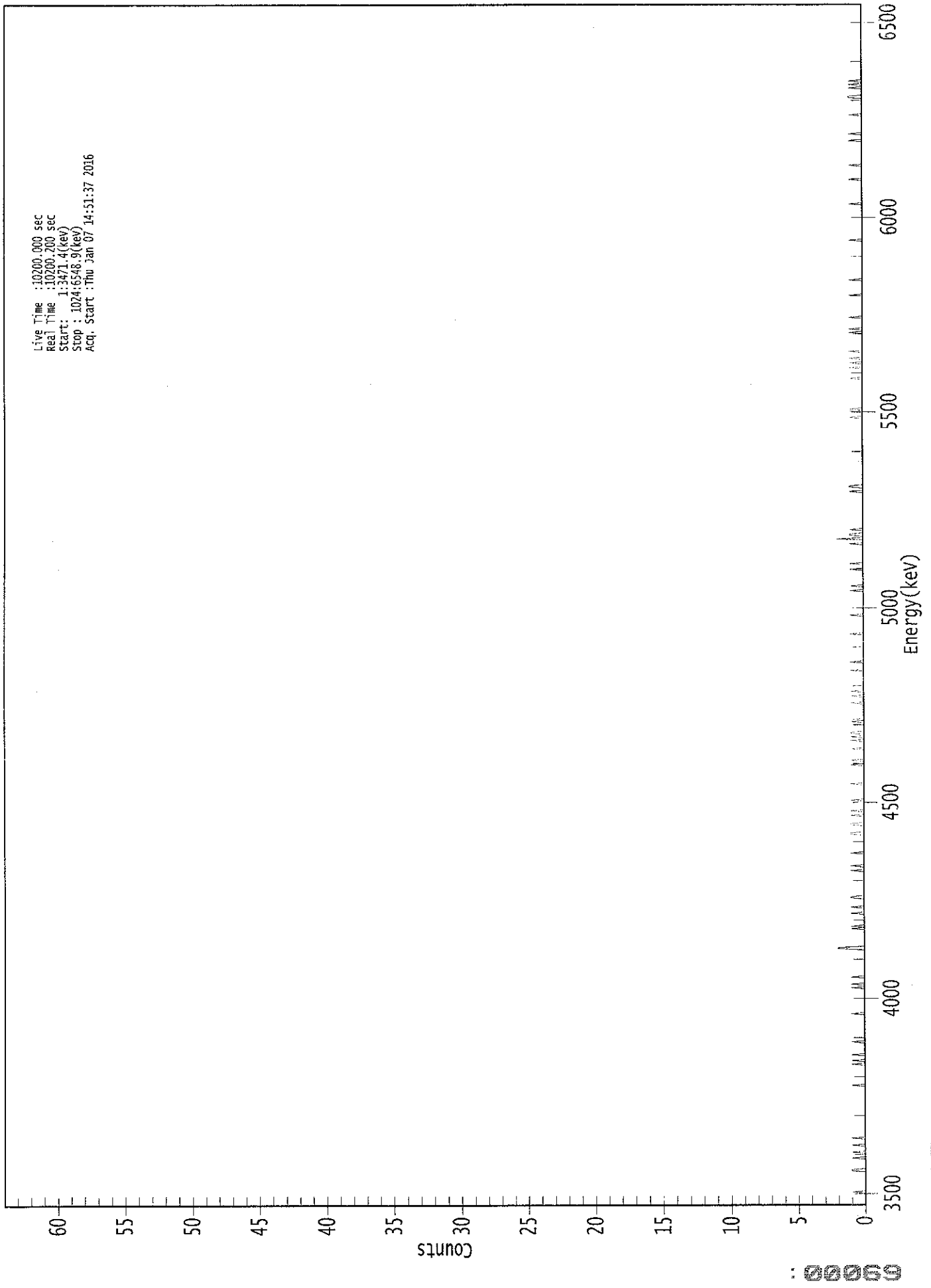
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.985	5685.50*	3.38E-001 +/- 2.46E-001	2.11E-001 +/- 7.18E-003
RA-226	0.956	4785.00*	7.37E-001 +/- 3.71E-001	3.43E-001 +/- 1.17E-002

AG
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0000138409.CNF

Live Time : 10200.000 sec
Real Time : 10200.200 sec
Start : 1:3471.4(kev)
Stop : 1024:6548.9(kev)
Acq. Start : Thu Jan 07 14:51:37 2016



ROI Type: 1

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

Sample Title: 03

Elapsed Live time: 10200
 Elapsed Real Time: 10200

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

369: 0 0 0 0 0 0 0 1 0

Sample Title: 03

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	1	0	0	0	0	0
385:	0	0	0	0	1	0	0	0
393:	0	0	0	1	0	0	1	0
401:	0	1	1	0	0	0	0	0
409:	0	0	0	1	0	1	0	0
417:	0	0	0	0	0	0	0	0
425:	0	0	0	1	0	0	0	0
433:	0	1	0	0	0	1	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	1
457:	0	0	0	0	0	0	1	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	1	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	0
513:	0	0	0	0	0	0	0	0
521:	0	0	0	1	0	0	0	1
529:	0	0	0	0	0	0	0	0
537:	0	0	0	0	0	1	0	0
545:	0	0	1	0	0	0	0	0
553:	0	0	0	0	0	0	0	0
561:	0	0	0	1	0	0	0	2
569:	0	0	1	1	0	0	0	1
577:	0	0	0	0	0	0	0	0
585:	0	0	0	0	0	0	0	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	0	0	1
609:	0	0	0	1	1	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	1	0
673:	0	0	0	1	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	1
705:	0	0	0	0	0	0	0	0
713:	1	0	0	0	1	0	0	0
721:	1	0	0	0	0	0	1	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	1	0
745:	0	1	0	0	0	0	0	0
753:	0	0	0	1	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	1	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: 03

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

LD
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Apex-Alpha™

Sample Description: TBB-3S
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_042
 Chamber Serial Number: 05026930B
 Detector Serial Number: 84185
 Env. Background: System Bkgd 138676
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/18/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:39 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.5145 +/- 0.0000
 Counting Efficiency: 0.1789 +/- 0.0031 on 12/11/2015 8:21:10 AM
 Effective Efficiency: 0.0920 +/- 0.0016

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	5.529	5.32	91.11	0.68	0.00E+000	6.0
RA-226	4.595	7.81	76.13	1.19	0.00E+000	3.0

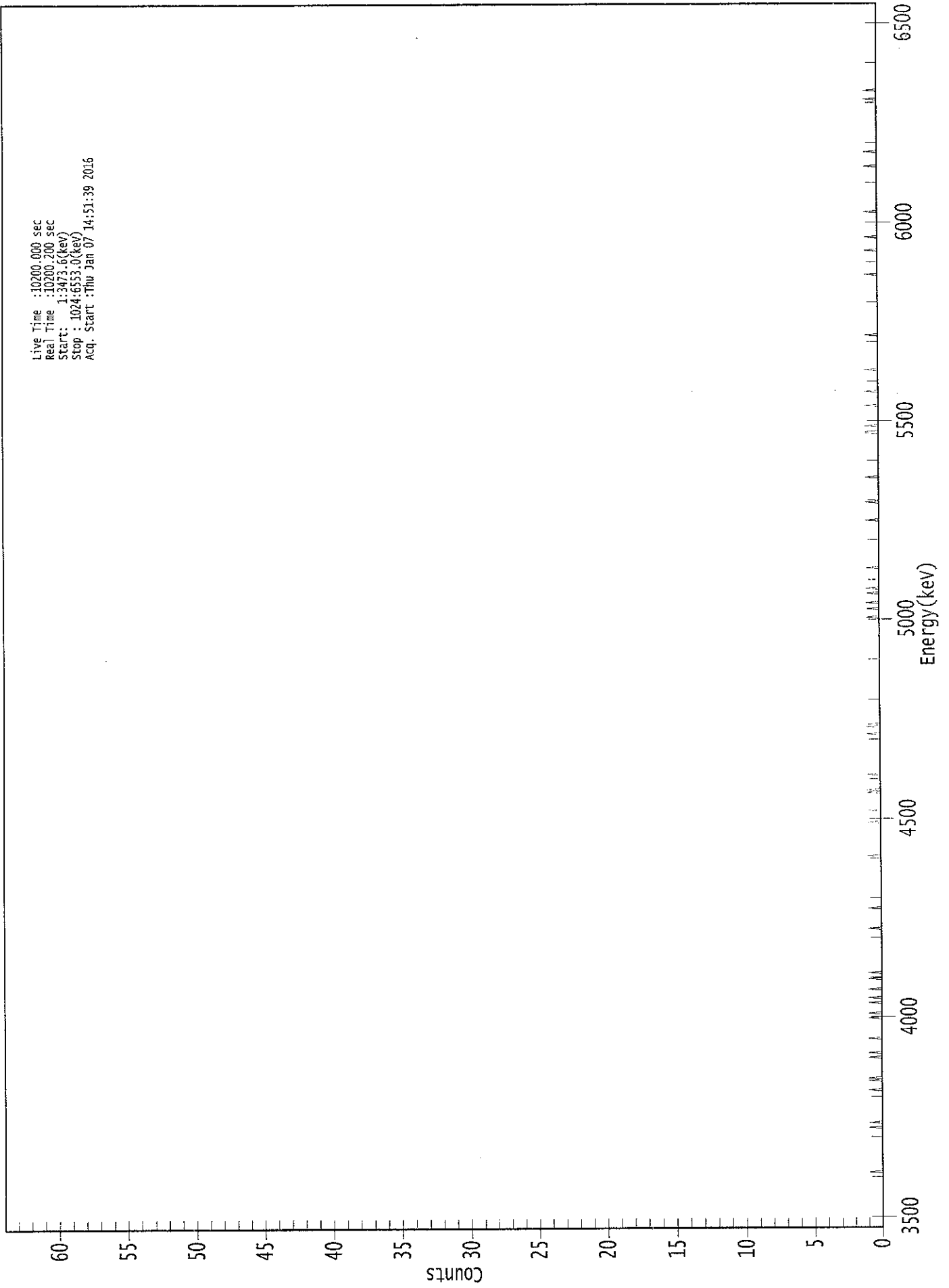
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.968	5685.50*	4.86E-001 +/- 4.43E-001	5.16E-001 +/- 1.77E-002
RA-226	0.954	4785.00*	6.75E-001 +/- 5.14E-001	5.69E-001 +/- 1.95E-002

AG
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0000138405.CNF

Live Time :10200.000 sec
Real Time :10200.200 sec
Start : 1:3473.6(kev)
Stop : 1024:6553.0(kev)
Acq. Start :Thu Jan 07 14:51:39 2016



ROI Type: 1

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

Sample Title: 04

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	1	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	1	0	0	0	0	1
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	1	0	0	0	0	0	0
121:	0	0	1	0	1	0	0	0	0
129:	0	0	0	0	0	0	0	0	0
137:	0	0	0	0	0	1	0	0	0
145:	0	1	0	0	0	0	0	0	0
153:	0	0	0	0	0	1	0	0	0
161:	0	0	0	0	0	0	0	0	0
169:	0	0	0	0	0	0	1	0	0
177:	0	0	1	0	0	0	0	0	0
185:	0	0	0	1	0	0	0	0	1
193:	0	0	0	0	0	0	1	0	0
201:	0	0	0	0	0	0	0	0	1
209:	0	0	0	0	1	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	1	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0	0	0
265:	0	0	1	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	1	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	1	0	0	0	0	0	0
345:	0	0	0	0	1	0	0	0	0
353:	0	0	0	0	0	0	0	0	0
361:	0	0	0	1	0	1	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 04

Channel	-----	-----	-----	-----	-----	-----	-----	-----
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	1	0	0	0
417:	0	0	1	0	1	0	0	0
425:	0	0	0	0	0	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	0
497:	0	0	0	0	0	0	0	0
505:	0	0	0	0	0	1	0	0
513:	0	0	0	0	1	0	0	0
521:	0	1	0	0	0	0	0	0
529:	0	1	0	0	0	1	0	0
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	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	1	0
593:	0	0	0	0	0	0	0	0
601:	0	0	0	0	0	1	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	1	0	0	0	0	0
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	0	0	0	0	0	0
657:	0	0	0	0	0	0	0	1
665:	1	0	0	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	1	0
689:	0	0	0	0	0	0	0	0
697:	0	0	1	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	1	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	0	1	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	1	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 04

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



KB
1/7/16

Sample Description: TBB-1D
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_043
 Chamber Serial Number: 04026481A
 Detector Serial Number: 91088
 Env. Background: System Bkgd 138677
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/17/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:41 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8679 +/- 0.0000
 Counting Efficiency: 0.1890 +/- 0.0033 on 12/11/2015 8:21:08 AM
 Effective Efficiency: 0.1640 +/- 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	5.535	31.79	36.15	2.21	0.00E+000	4.5
RA-226	4.591	36.13	33.58	1.87	0.00E+000	4.5

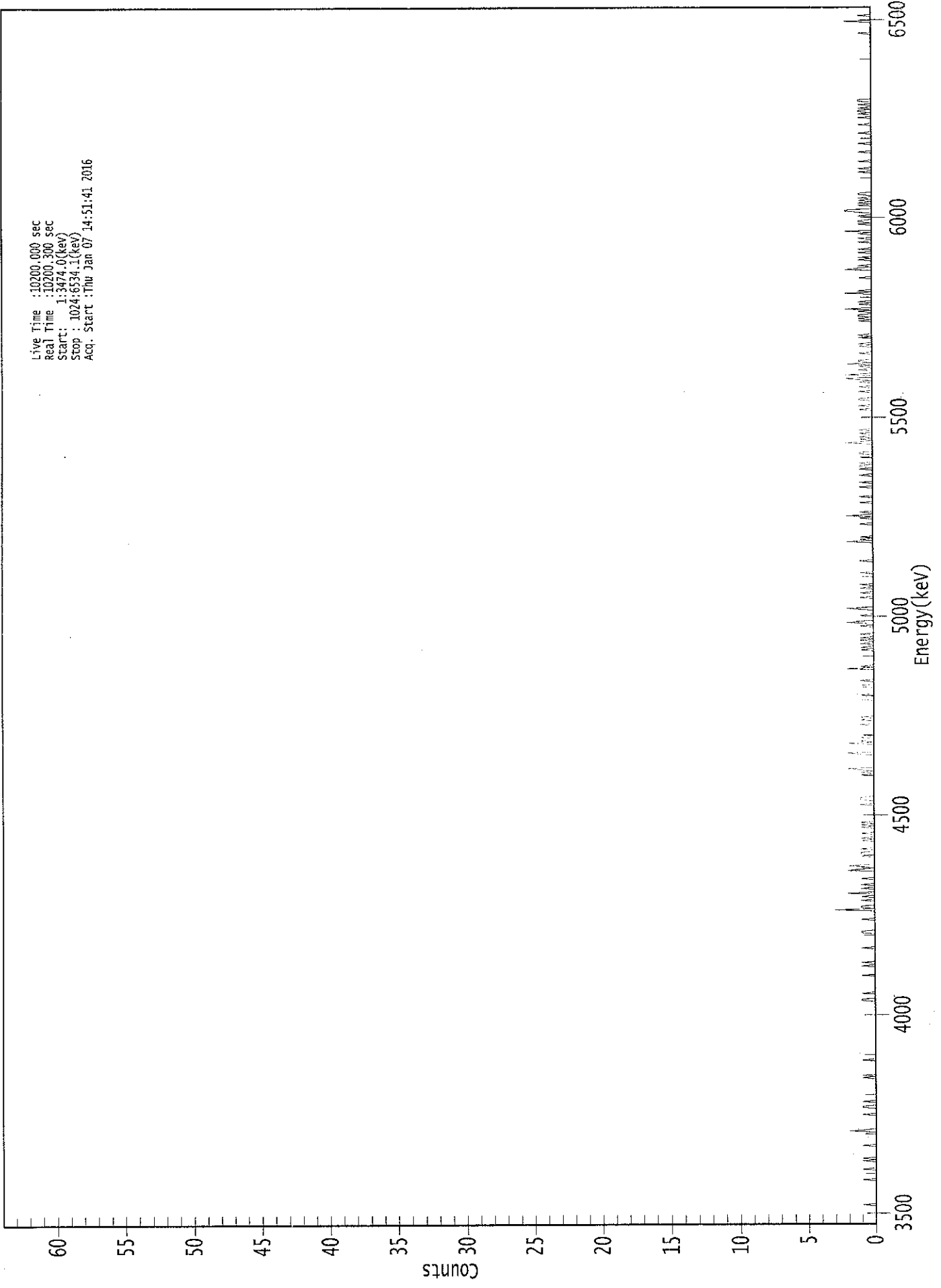
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.971	5685.50*	1.63E+000 +/- 5.92E-001	4.10E-001 +/- 1.40E-002
RA-226	0.952	4785.00*	1.75E+000 +/- 5.91E-001	3.67E-001 +/- 1.25E-002

AG
1/8/16

0000138404.CNF

Live Time : 10200.000 sec
Real Time : 10200.300 sec
Start : 1:3474.0(kev)
Stop : 1024:6534.1(kev)
Acq. Start : Thu Jan 07 14:51:41 2016



ROI Type: 1

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

Sample Title: 05

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	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:	1	0	0	0	0	0	0	0	0
25:	0	0	0	0	0	0	0	0	0
33:	0	0	0	0	0	1	0	0	0
41:	0	0	0	0	0	0	1	0	0
49:	0	0	0	0	0	1	0	1	0
57:	0	0	0	0	0	0	0	0	0
65:	0	0	1	0	0	0	0	0	0
73:	0	0	0	0	0	0	2	1	0
81:	0	0	0	0	0	0	0	0	0
89:	0	0	0	0	1	0	0	0	0
97:	0	0	1	1	0	0	0	1	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	1	0	1	0	0	0
129:	0	0	0	0	0	0	0	0	0
137:	0	0	1	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	1	1	0	0	0
193:	0	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	1	0	0	0	0	0	0	0
217:	0	1	0	0	1	0	0	0	0
225:	0	0	0	0	0	0	0	0	0
233:	1	0	0	0	0	0	0	0	0
241:	0	0	0	0	0	1	1	0	0
249:	0	0	0	0	0	0	0	0	0
257:	1	0	0	0	0	0	0	0	0
265:	3	0	1	1	0	0	0	0	0
273:	1	0	0	1	0	0	2	0	0
281:	0	0	1	0	0	1	0	0	0
289:	0	0	1	0	0	0	0	0	0
297:	0	2	1	0	1	2	0	0	0
305:	0	0	0	0	0	1	0	1	0
313:	1	0	0	1	0	0	0	0	0
321:	0	0	1	0	1	0	0	0	0
329:	1	0	0	0	0	1	0	1	0
337:	0	1	0	0	0	0	0	0	0
345:	0	0	0	0	0	0	0	0	0
353:	1	0	0	0	1	1	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: 05

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

801: 0 2 1 0 1 0 0 0

Sample Title: 05

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

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1/7/16

Apex-Alpha™

Sample Description: TBB-1S
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 06
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_044
 Chamber Serial Number: 04026481B
 Detector Serial Number: 84168
 Env. Background: System Bkgd 138678
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/17/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:43 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1864 +/- 0.0033 on 12/11/2015 8:21:07 AM
 Effective Efficiency: 0.1864 +/- 0.0033

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.540	12.66	55.94	0.34	0.00E+000	3.0
RA-226	4.569	90.32	20.71	0.68	0.00E+000	8.2

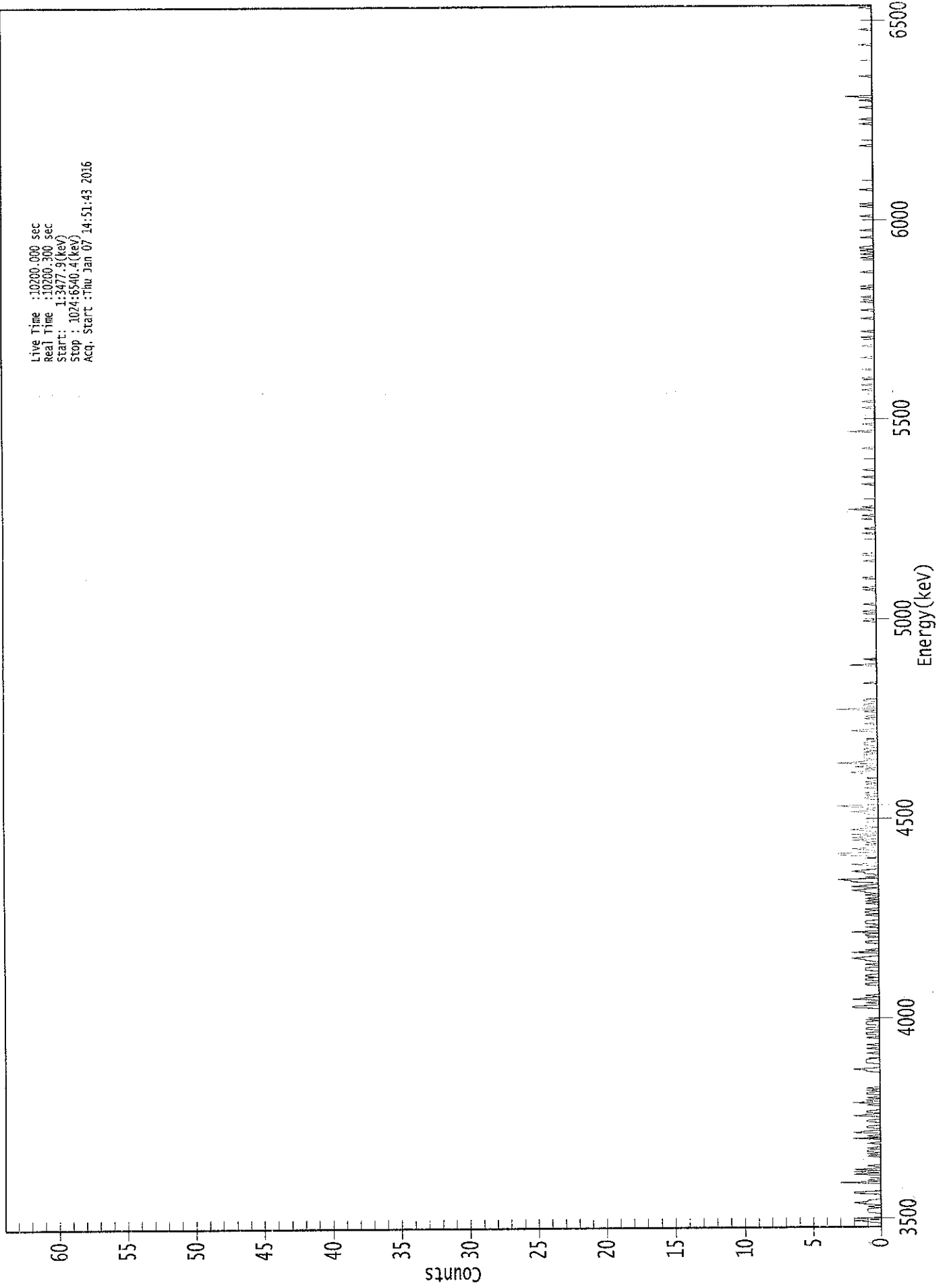
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.973	5685.50*	5.72E-001 +/- 3.20E-001	2.16E-001 +/- 7.41E-003
RA-226	0.941	4785.00*	3.85E+000 +/- 8.08E-001	2.40E-001 +/- 8.23E-003

AG
1/8/16

0000138406.CNF

Live Time : 10200.000 sec
Real Time : 10200.300 sec
Start : 1:3477.9(kev)
Stop : 1024:5540.4(kev)
Acq. Start : Thu Jan 07 14:51:43 2016



ROI Type: 1

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

Sample Title: 06

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 0 1 0 1 0 0 0

Sample Title: 06

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 06

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



ICB
1/7/16

Sample Description: TBA-1D
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_045
 Chamber Serial Number: 04026482A
 Detector Serial Number: 91131
 Env. Background: System Bkgd 138679
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/22/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:45 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1710 +/- 0.0030 on 12/11/2015 8:21:05 AM
 Effective Efficiency: 0.1710 +/- 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	5.518	4.62	115.44	2.38	0.00E+000	3.0
RA-226	4.626	28.15	37.59	0.85	0.00E+000	3.0

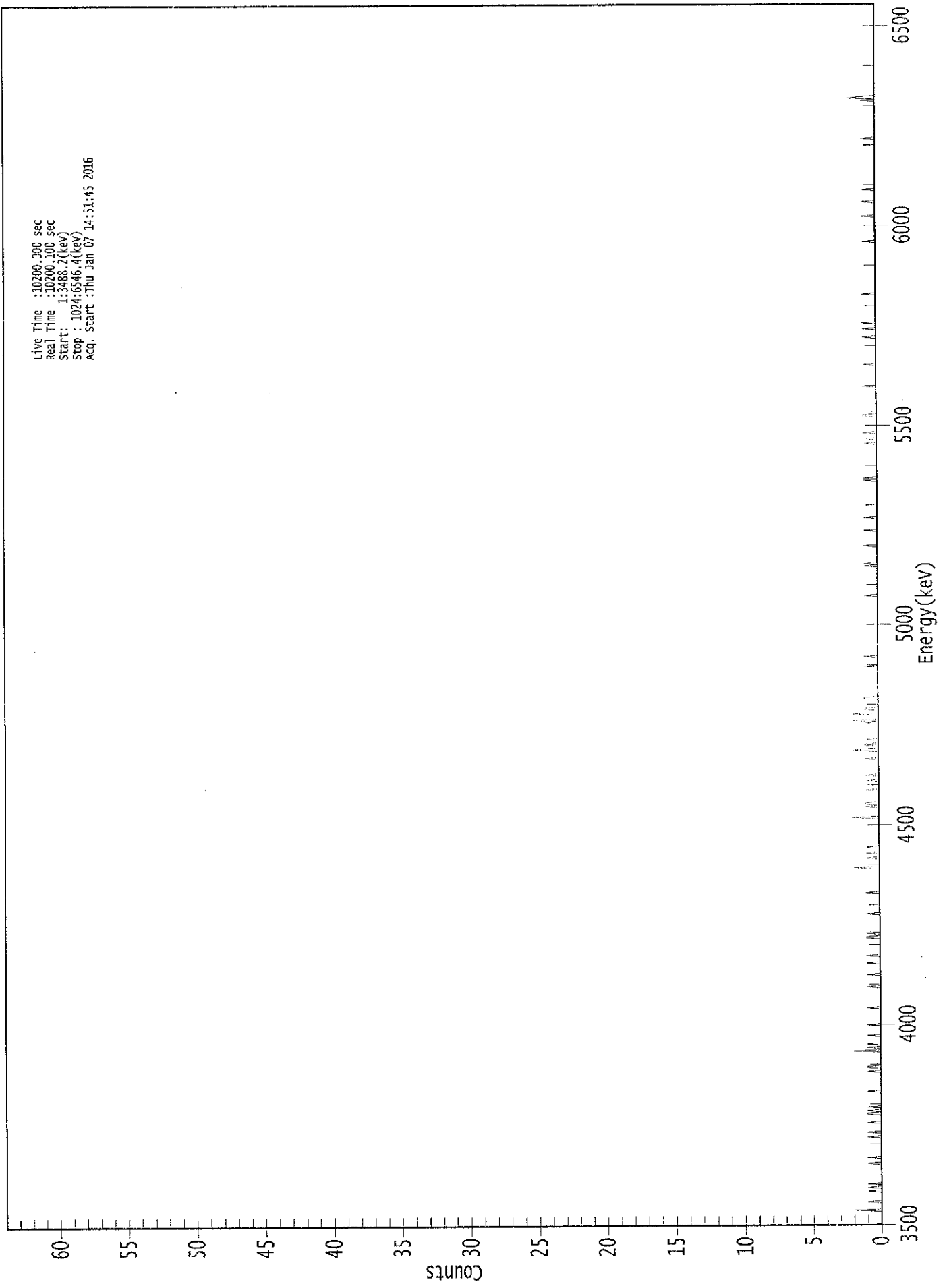
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.964	5685.50*	2.27E-001 +/- 2.62E-001	4.03E-001 +/- 1.40E-002
RA-226	0.967	4785.00*	1.31E+000 +/- 4.94E-001	2.78E-001 +/- 9.64E-003

AG
1/8/16

0000138400.CNF

Live Time : 10200.000 sec
Real Time : 10200.100 sec
Start : 1:3488.2(kev)
Stop : 1024:0546.4(kev)
Acq. Start : Thu Jan 07 14:51:45 2016



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	0	0	0	0	0	0	0
1:	1	0	0	0	0	0	0	0
9:	0	0	0	0	2	0	0	0
17:	0	0	0	1	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	1	0	0	0	0
57:	1	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0	0
73:	0	1	0	0	0	1	0	0
81:	0	0	0	0	0	1	0	0
89:	0	0	0	0	1	1	0	1
97:	0	0	1	0	0	0	0	0
105:	0	0	0	0	0	0	0	1
113:	0	0	0	0	0	0	0	0
121:	0	0	0	0	0	0	0	0
129:	1	0	0	1	1	0	0	0
137:	0	0	0	0	0	0	0	0
145:	0	2	0	0	1	0	0	1
153:	0	0	0	0	0	0	1	0
161:	0	0	0	0	0	0	0	1
169:	0	0	0	0	0	0	0	0
177:	0	0	0	0	0	1	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	1	0	0	0	0	0	0
217:	0	0	0	1	0	0	0	0
225:	0	1	0	0	0	0	0	0
233:	0	0	0	0	0	0	0	0
241:	1	1	0	0	1	0	0	0
249:	0	0	0	0	0	0	0	0
257:	0	0	0	0	1	0	0	0
265:	0	0	0	0	0	0	0	0
273:	0	0	0	0	0	0	1	0
281:	0	0	0	0	0	0	0	0
289:	0	0	0	0	0	0	0	0
297:	0	0	0	2	0	0	0	0
305:	0	0	0	1	0	0	0	1
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	2	0	0
345:	0	0	0	0	0	0	1	0
353:	1	1	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: 07

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 07

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



Apex-Alpha™

KS
11/7/16

Sample Description: TBB-3D
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 08
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_046
 Chamber Serial Number: 04026482B
 Detector Serial Number: 58762
 Env. Background: System Bkgd 138680
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 2.820E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/15/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:48 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.4117 +/- 0.0000
 Counting Efficiency: 0.1806 +/- 0.0032 on 12/11/2015 8:21:03 AM
 Effective Efficiency: 0.0743 +/- 0.0013

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	5.455	1.62	253.92	2.38	0.00E+000	3.0
RA-226	4.601	18.15	47.25	0.85	0.00E+000	3.0

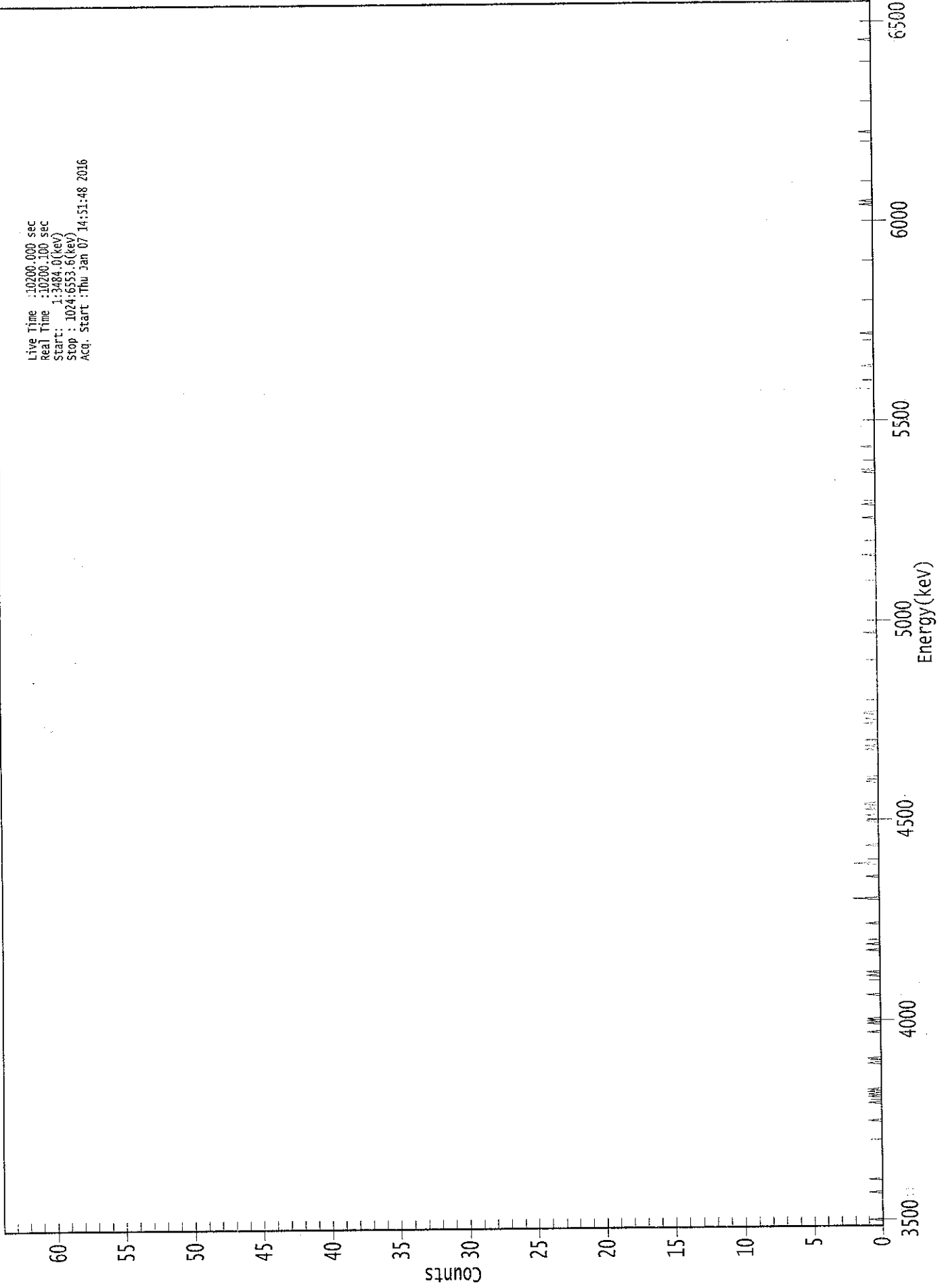
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.933	5685.50*	1.73E-001 +/- 4.38E-001	8.73E-001 +/- 3.01E-002
RA-226	0.957	4785.00*	1.82E+000 +/- 8.64E-001	6.02E-001 +/- 2.07E-002

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0000138401.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:3484.0(kev)
Stop : 1024:0533.6(kev)
Acq. Start :Thu Jan 07 14:51:48 2016



ROI Type: 1

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

Sample Title: 08

Elapsed Live time: 10200

Elapsed Real Time: 10200

Channel	1	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	1	0	0
9:	0	0	0	0	0	0	0	0	0
17:	0	0	0	0	0	0	0	0	0
25:	0	0	0	0	1	0	0	0	0
33:	0	0	0	0	0	0	0	0	1
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:	1	0	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0	0	1
105:	0	0	0	0	1	0	1	0	0
113:	1	0	1	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:	1	0	0	0	1	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	1	0	0	0	0	0	0
169:	0	1	0	1	0	1	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	1	0	0	0	0	0	0	0
201:	0	0	0	0	0	0	0	0	0
209:	0	1	0	0	1	0	0	0	0
217:	0	0	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	1	0	0
233:	0	0	0	1	0	0	0	0	0
241:	0	0	0	0	0	0	0	0	0
249:	0	0	0	0	1	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	2	0	0	0	0	0	0	0
281:	0	0	0	0	0	0	0	0	0
289:	0	0	0	1	0	0	0	0	0
297:	0	0	0	0	0	0	2	0	0
305:	0	0	0	0	0	0	0	0	0
313:	0	0	0	0	0	1	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	1	0	0	0	0	1	0	0
345:	0	0	0	1	0	0	0	0	1
353:	1	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	0	0	0

369: 0 0 1 0 0 1 1 0

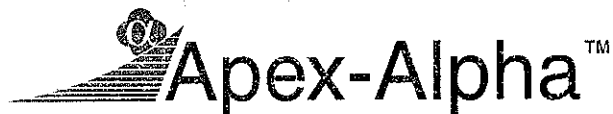
Sample Title: 08

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	1	0	0
401:	1	0	0	0	0	1	1	0
409:	0	0	0	0	0	0	0	0
417:	0	0	0	1	0	0	0	1
425:	0	0	0	1	1	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	0
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	0	0	0	0	0	0	0	0
473:	0	0	0	0	0	0	0	0
481:	0	0	0	0	0	0	0	0
489:	0	0	0	0	0	0	0	1
497:	0	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:	1	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	1
593:	0	0	0	0	0	0	0	0
601:	0	0	1	0	0	0	0	0
609:	0	0	0	0	0	0	0	0
617:	0	0	0	0	0	0	0	0
625:	0	0	0	0	0	1	0	1
633:	0	0	0	0	0	0	0	0
641:	0	0	0	0	0	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	0	0	0	0	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	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	1	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	0
745:	1	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	0	0	0	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0

Sample Title: 08

Channel								
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	1	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	0	0	0	0	0	0
913:	0	1	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	0	0	0	0
977:	0	0	0	0	0	0	0	0
985:	0	0	0	0	0	0	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



VCB
1/7/16

Sample Description: TBB-2D
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 09
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_047
 Chamber Serial Number: 02030596A
 Detector Serial Number: 91086
 Env. Background: System Bkgd 138681
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/15/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:50 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9331 +/- 0.0000
 Counting Efficiency: 0.1705 +/- 0.0030 on 12/11/2015 8:21:02 AM
 Effective Efficiency: 0.1591 +/- 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	5.561	19.00	46.13	0.00	0.00E+000	3.0
RA-226	4.590	35.00	33.60	0.00	0.00E+000	3.0

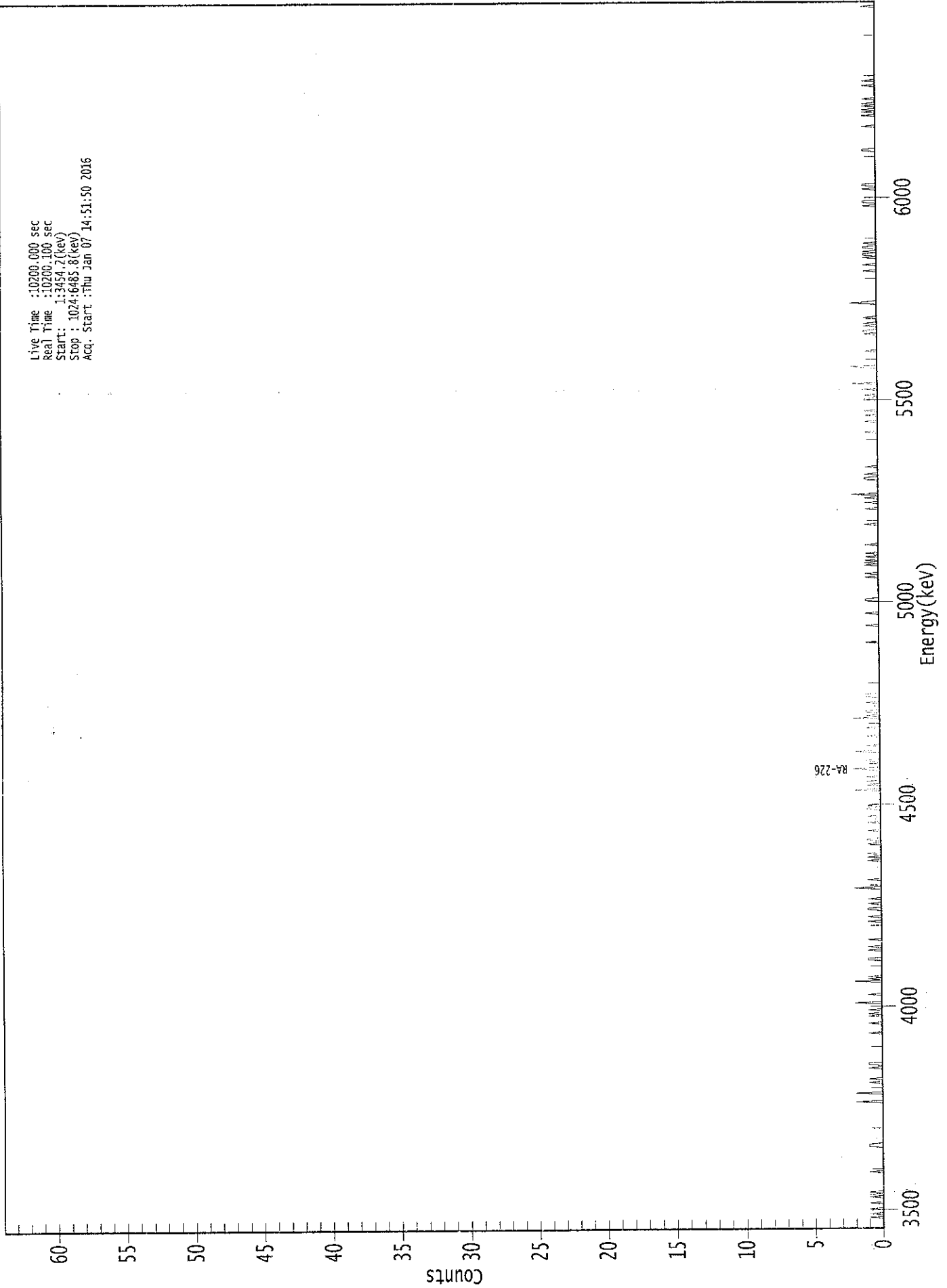
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.980	5685.50*	1.01E+000 +/- 4.65E-001	3.17E-001 +/- 1.10E-002
RA-226	0.952	4785.00*	1.75E+000 +/- 5.91E-001	3.00E-001 +/- 1.04E-002

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0000138407.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start: 1:34:54.2(kev)
Stop : 1024:0485.8(kev)
Acq. Start :Thu Jan 07 14:51:50 2016



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	2	3	4	5	6	7	8	9
1:	0	0	0	0	0	0	0	0	0
9:	0	1	0	0	0	1	0	0	0
17:	1	0	0	0	0	0	1	0	0
25:	0	0	1	0	0	1	0	1	0
33:	0	0	0	0	0	0	0	0	0
41:	0	0	0	0	0	0	0	0	1
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	1	1	1	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	2	0	0	0	0	0	0	0
113:	2	0	0	0	0	0	0	0	0
121:	0	1	0	0	0	1	0	0	0
129:	0	0	0	0	0	0	1	0	0
137:	1	1	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	1	0	0	0	0	0	0
169:	0	0	1	0	0	0	0	0	0
177:	1	0	1	0	0	0	1	0	0
185:	0	0	0	2	0	0	0	0	0
193:	0	0	1	0	0	0	0	0	0
201:	0	0	0	0	0	0	2	0	1
209:	0	1	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0	0	1
225:	1	0	0	0	0	0	0	0	1
233:	0	0	1	0	0	0	0	0	0
241:	1	0	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0	0	1
257:	0	0	0	1	0	0	0	0	0
265:	0	1	1	0	0	0	0	1	0
273:	0	0	1	0	0	0	0	0	0
281:	0	0	0	2	0	0	0	0	0
289:	0	0	1	0	0	0	0	0	0
297:	0	0	0	0	0	0	0	0	0
305:	0	0	1	0	0	0	1	0	0
313:	1	0	0	0	0	0	0	0	0
321:	1	0	0	1	1	1	0	0	0
329:	0	0	0	1	0	0	0	0	0
337:	0	0	1	0	0	0	0	0	1
345:	0	0	0	0	0	0	1	1	0
353:	1	0	0	0	0	0	0	0	0
361:	0	0	0	0	0	0	2	0	0

369: 0 1 0 1 1 0 0 0

Sample Title: 09

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

801: 0 0 0 1 0 0 0 0

Sample Title: 09

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

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Apex-Alpha™

Sample Description: TBB-2M
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 10
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_048
 Chamber Serial Number: 02030596B
 Detector Serial Number: 83111
 Env. Background: System Bkgd 138682
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/14/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:51:53 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.8379 +/- 0.0000
 Counting Efficiency: 0.1756 +/- 0.0031 on 12/11/2015 8:21:00 AM
 Effective Efficiency: 0.1472 +/- 0.0026

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.504	4.98	97.79	1.02	0.00E+000	3.0
RA-226	4.591	45.47	29.63	1.53	0.00E+000	4.5

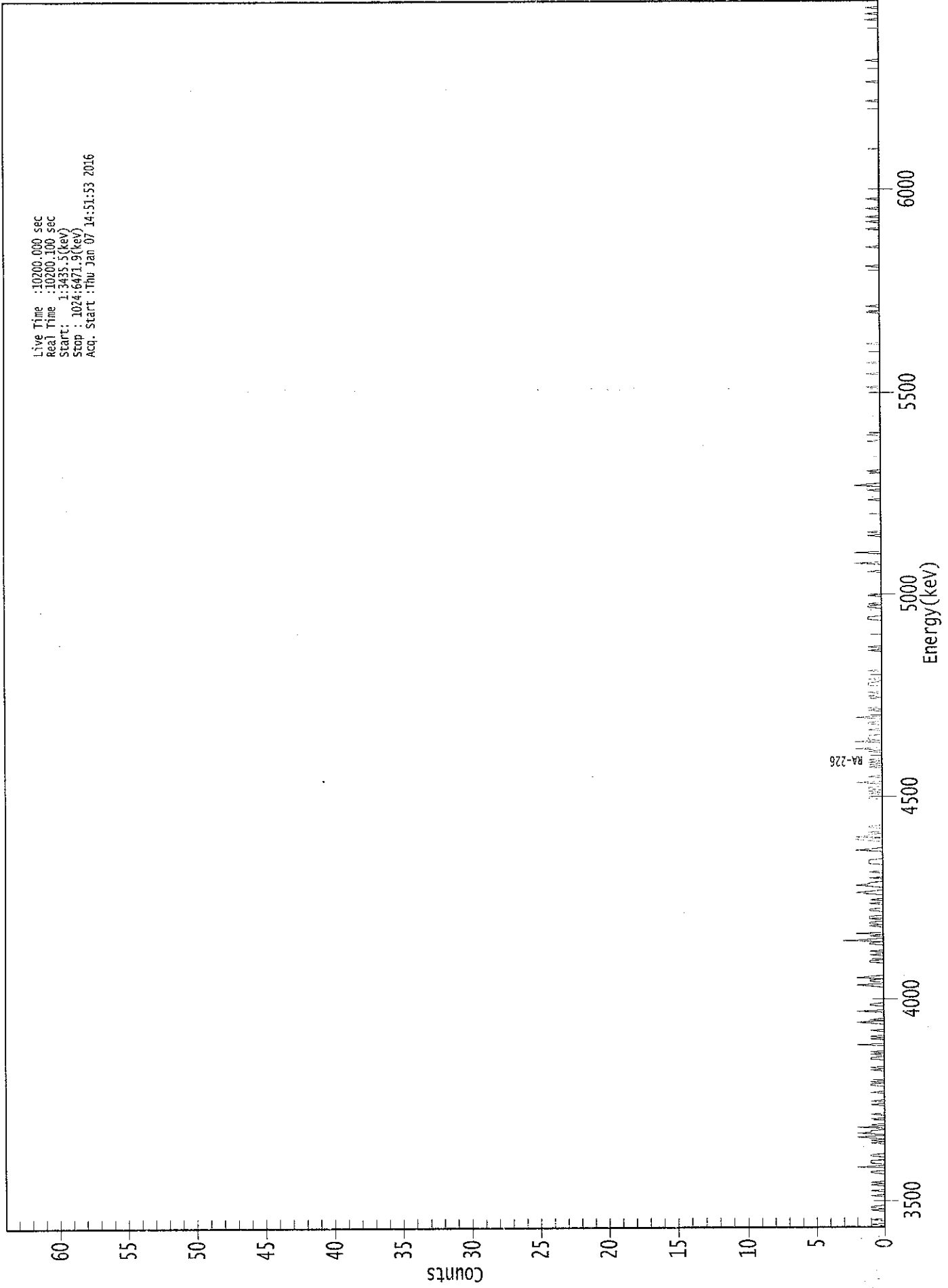
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	2.85E-001 +/- 2.79E-001	3.61E-001 +/- 1.25E-002
RA-226	0.952	4785.00*	2.46E+000 +/- 7.33E-001	3.84E-001 +/- 1.32E-002

AG
 1/8/16

0000138408.CNF

Live Time : 10200.000 sec
Real Time : 10200.100 sec
Start : 1:3435.5(kev)
Stop : 1024:6471.9(kev)
Acq. Start : Thu Jan 07 14:51:53 2016



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

369: 0 0 2 0 0 0 0 0 1

Sample Title: 10

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

Sample Title: 10

Channel	1	2	3	4	5	6	7	8	9
809:	0	0	0	0	0	0	0	0	0
817:	1	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0	1
833:	0	0	0	0	0	1	0	0	0
841:	0	1	0	0	0	0	0	0	0
849:	1	0	0	0	0	0	0	0	0
857:	1	0	0	0	0	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	1	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0	0
953:	0	0	1	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	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	1	0	0
1009:	0	0	0	1	0	0	0	0	0
1017:	1	0	0	0	0	0	0	0	0

KB
12/16

Sample Description: MC-1
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 11
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_049
 Chamber Serial Number: 10006121A
 Detector Serial Number: 49
 Env. Background: System Bkgd 138683
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/16/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:52:55 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 1.0000 +/- 0.0000
 Counting Efficiency: 0.1510 +/- 0.0027 on 12/11/2015 11:36:41 AM
 Effective Efficiency: 0.1510 +/- 0.0027

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.476	6.64	84.69	1.36	0.00E+000	3.0
RA-226	4.605	38.49	31.84	0.51	0.00E+000	3.0

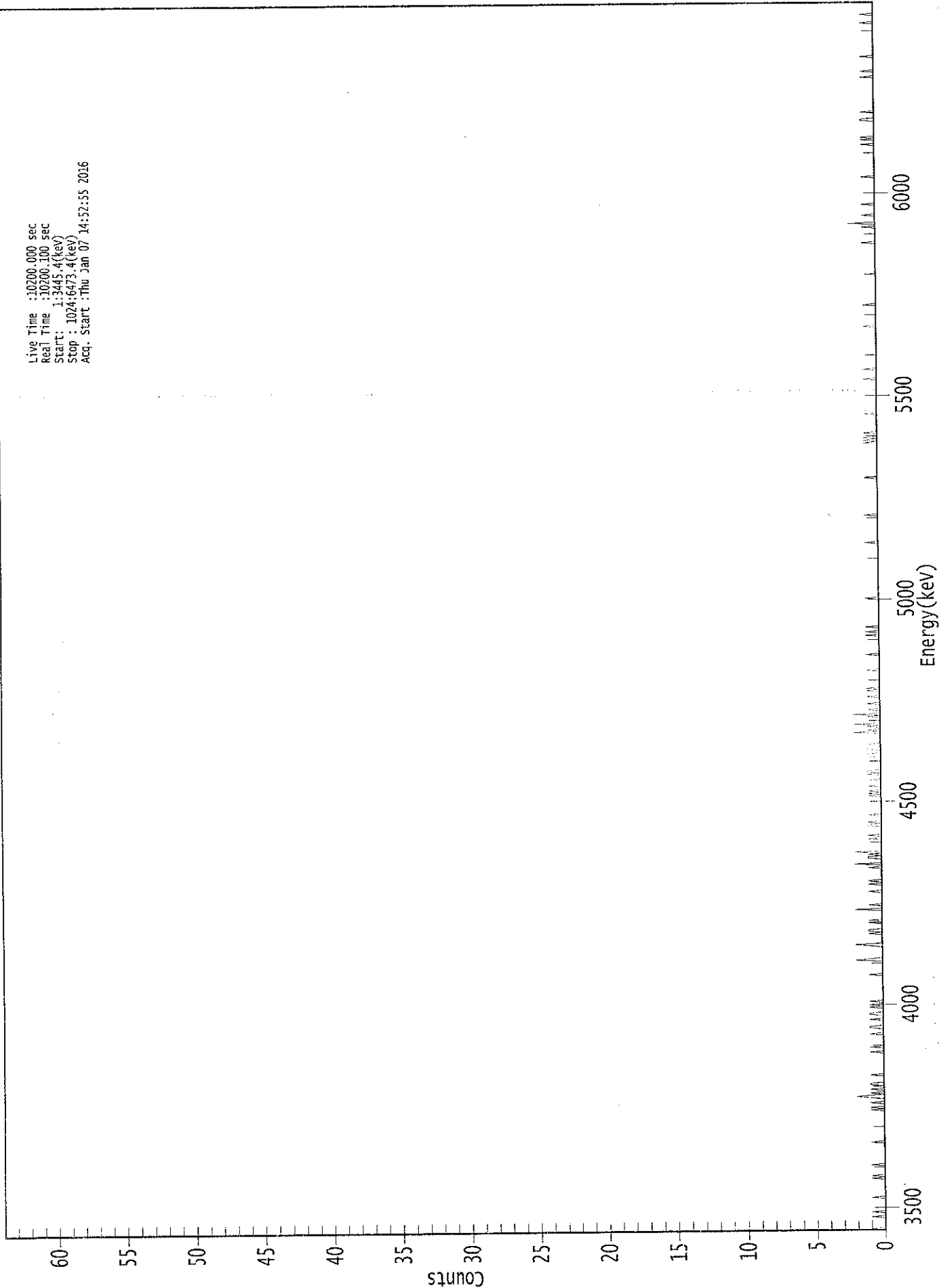
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.944	5685.50*	3.70E-001 +/- 3.14E-001	3.82E-001 +/- 1.35E-002
RA-226	0.959	4785.00*	2.03E+000 +/- 6.49E-001	2.76E-001 +/- 9.76E-003

AG
1/8/16

0000138410.CNF

Live Time :10200.000 sec
Real Time :10200.100 sec
Start : 1:34:5.4(kev)
Stop : 1024:6473.4(kev)
Acq. Start :Thu Jan 07 14:52:55 2016



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

369: 0 1 0 0 0 0 1 0

Sample Title: 11

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

801: 0 0 0 0 0 0 0 0 0

Sample Title: 11

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

100
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Apex-Alpha™

Sample Description: BC-1
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00001384
 Batch Identification: 1512122A-RA
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: Ra

Detector Name: Alpha_050
 Chamber Serial Number: 10006121B
 Detector Serial Number: 50
 Env. Background: System Bkgd 138684
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Generic Mult. Factor: 3.000E+000 Generic Div. Factor: 1.000E+000
 Sample Date/Time: 12/28/2015 12:16:11 PM
 Acquisition Date/Time: 1/7/2016 2:52:57 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Chem. Recovery Factor: 0.9647 +/- 0.0000
 Counting Efficiency: 0.1465 +/- 0.0026 on 12/11/2015 11:36:39 AM
 Effective Efficiency: 0.1414 +/- 0.0025

Peak Match Tolerance: 0.350 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
RA-224	5.503	3.81	117.34	1.19	0.00E+000	3.0
RA-226	4.571	14.83	51.24	0.17	0.00E+000	3.0

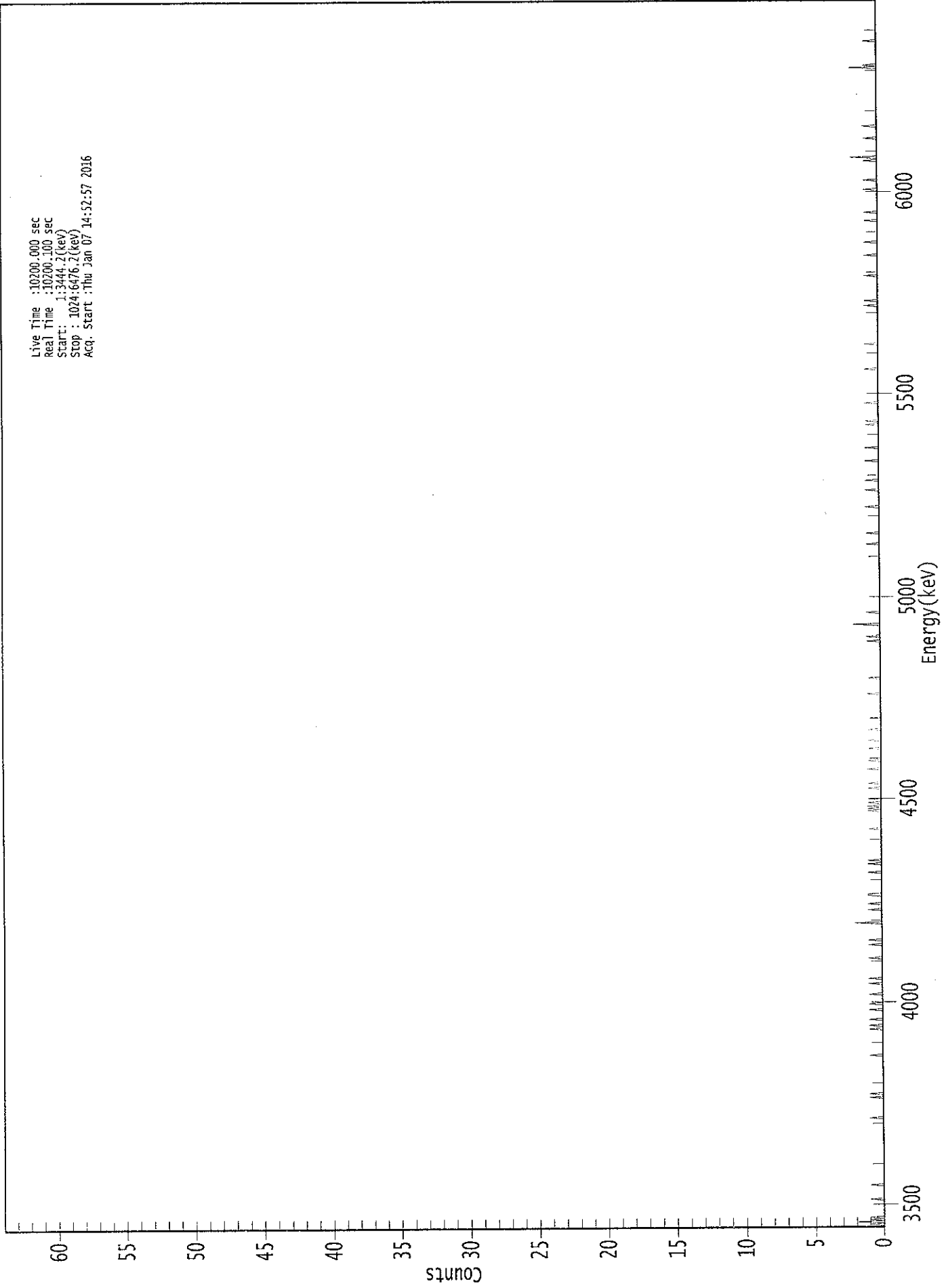
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
RA-224	0.958	5685.50*	2.26E-001 +/- 2.65E-001	3.91E-001 +/- 1.38E-002
RA-226	0.942	4785.00*	8.34E-001 +/- 4.28E-001	2.35E-001 +/- 8.28E-003

AG
1/8/16

0000138411.CNF

Live Time : 10200.000 sec
Real Time : 10200.100 sec
Start : 1:3444.2(kev)
Stop : 1024:6476.2(kev)
Acq. Start : Thu Jan 07 14:52:57 2016



1100

ROI Type: 1

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

Sample Title: 12

Elapsed Live time: 10200

Elapsed Real Time: 10200

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

369: 0 1 0 0 0 0 0 0 0

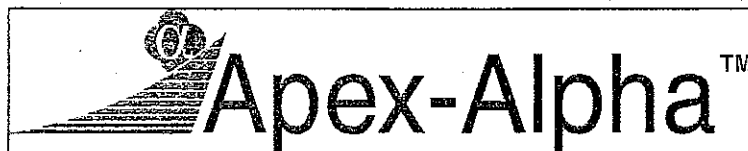
Sample Title: 12

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

801: 0 0 0 0 0 0 0 0

Sample Title: 12

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



QA SUMMARY REPORT

Review Of QA Results - Pulser Check

Date : 1/7/2016
Time : 5:34:38 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	1/7/2016 5:19:45 AM
Alpha 004	21f	ALL	Passed	1/7/2016 5:19:46 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	1/7/2016 5:19:47 AM
Alpha 011	21f	ALL	Passed	1/7/2016 5:19:48 AM
Alpha 012	21f	ALL	Passed	1/7/2016 5:19:49 AM
Alpha 013	21f	ALL	Not Done	
Alpha 014	21f	ALL	Not Done	
Alpha 015	21f	ALL	Passed	1/7/2016 5:19:50 AM
Alpha 016	21f	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:19:51 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:19:53 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:19:54 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:19:56 AM
Alpha 037	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:19:58 AM
Alpha 038	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:00 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:02 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:04 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:06 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:08 AM
Alpha 043	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:11 AM
Alpha 044	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:13 AM
Alpha 045	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:15 AM
Alpha 046	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:17 AM
Alpha 047	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:20 AM
Alpha 048	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:22 AM
Alpha 049	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:25 AM
Alpha 050	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:27 AM
Alpha 051	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:30 AM
Alpha 052	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:33 AM
Alpha 053	Alpha Analyst100DC	Peak FWHM	Action	1/7/2016 5:20:35 AM
Alpha 054	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:38 AM
Alpha 055	Alpha Analyst100DC	Peak FWHM	Action	1/7/2016 5:20:41 AM
Alpha 056	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:44 AM
Alpha 057	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:47 AM
Alpha 058	Alpha Analyst100DC	ALL	Passed	1/7/2016 5:20:49 AM

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

Nuclide Library Title: Radium

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

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

* = key line

TOTALS: 3 Nuclides 3 Energy Lines

SECTION IX
ANALYTICAL DATA (RADIUM-228)

15-12122
Ra228
Run 1

Eberline Services
Oak Ridge Laboratory
Analysis Sheet

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			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
02	MBL			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
03	DUP			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
04	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
05	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
06	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
07	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
08	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
09	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
10	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
11	TRG			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON
12	DO			01/11/16 12:51	KCOULSTON	01/07/16 10:51	KCOULSTON	01/13/16 07:29	KCOULSTON

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

		Client	Michael Pisani & Associates, Inc.
Run	1	Eberline Services Work Order	15-12122
Analysis Code	Ra228		

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	8.57E+00	7.06E-01	7.91E-01	9.03E+00	94.92	OK		OK	
02	RA-228	MBL	BLANK	pCi/l	2.36E-01	3.61E-01	7.47E-01					OK	OK
03	RA-228	DUP	BC-1	pCi/l	7.24E-01	3.93E-01	7.61E-01				NA	OK	
04	RA-228	TRG	TBB-3S	pCi/l	1.41E+00	8.26E-01	1.60E+00					OK	
05	RA-228	TRG	TBB-1D	pCi/l	6.80E-01	5.10E-01	1.02E+00					OK	
06	RA-228	TRG	TBB-1S	pCi/l	8.36E+00	6.78E-01	7.13E-01					OK	
07	RA-228	TRG	TBA-1D	pCi/l	1.20E+00	3.98E-01	7.12E-01					OK	
08	RA-228	TRG	TBB-3D	pCi/l	2.15E+00	1.14E+00	2.18E+00					INV	
09	RA-228	TRG	TBB-2D	pCi/l	1.23E+00	4.94E-01	9.23E-01					OK	
10	RA-228	TRG	TBB-2M	pCi/l	6.18E+00	7.69E-01	1.09E+00					OK	
11	RA-228	TRG	MC-1	pCi/l	1.92E+00	4.86E-01	8.46E-01					OK	
12	RA-228	DO	BC-1	pCi/l	1.02E+00	4.78E-01	9.09E-01					OK	

	Run	1
	Analysis Code	Ra228
Eberline Services Work Order	15-12122	
Client	Michael Pisanl & Associates, Inc.	

Lab Fraction	Nuclide	Sample Desc	Counting Date/Time	Half-life (days)	Detect	Carrier	Count Time	Counts	Bkg CPM	Eff
01	RA-228	LCS	01/13/16 09:27		LB4110A	E1	120	924	1.216666667	0.4776
02	RA-228	MBL	01/13/16 09:27		LB4110A	E2	120	132	0.933333333	0.4699
03	RA-228	DUP	01/13/16 09:27		LB4110A	E3	120	229	1.316666667	0.4809
04	RA-228	TRG	01/13/16 09:27		LB4110A	E4	120	192	1.1	0.4732
05	RA-228	TRG	01/13/16 09:27		LB4110A	F1	120	224	1.433333333	0.4754
06	RA-228	TRG	01/13/16 09:27		LB4110A	F2	120	887	1	0.4658
07	RA-228	TRG	01/13/16 09:27		LB4110A	F3	120	242	1.066666667	0.4713
08	RA-228	TRG	01/13/16 11:31		LB4110A	F4	120	177	0.95	0.4773
09	RA-228	TRG	01/13/16 09:27		LB4110A	G1	120	255	1.3	0.4705
10	RA-228	TRG	01/13/16 09:27		LB4110A	G2	120	621	1.466666667	0.4676
11	RA-228	TRG	01/13/16 09:27		LB4110A	G3	120	351	1.45	0.4614
12	RA-228	DO	01/13/16 09:27		LB4110A	G4	120	237	1.283333333	0.4714

1/13/2016 2:22 PM

Spike and Tracer Worksheet

Internal Work Order 15-12122		Run 1	Analysis Code Ra228		Date 1/4/2016 8:17	Technician JWOLFE	Technician Initials 	Witness Initials				
LCS & Matrix Spikes												
Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS Volume Used (g)	MS Volume Used (g)	LCS Known pCi	MS Added pCi	LCS Error Estimate	MS Error Estimate	Added pCi	Error Estimate
Ra-228	Ra-11	28.140	1/4/2016	0.710	0.0000		0.00	0.00	0.000	0.000	0.00	0.000
IC-99 MS	IC-2a	22043.636	7/5/2014	0.1								
Tracers												
fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition	Balance Printer Tapes Tracer LCS Matrix Spike					
01	Ba-133	Ba-6a	844.370	1/4/2016	0.9988	1.2000						
02	Ba-133	Ba-6a	844.370	1/4/2016	0.9829	1.2000						
03	Ba-133	Ba-6a	844.370	1/4/2016	0.9981	1.2000						
04	Ba-133	Ba-6a	844.370	1/4/2016	0.9914	1.2000						
05	Ba-133	Ba-6a	844.370	1/4/2016	0.9906	1.2000						
06	Ba-133	Ba-6a	844.370	1/4/2016	0.9924	1.2000						
07	Ba-133	Ba-6a	844.370	1/4/2016	0.9992	1.2000						
08	Ba-133	Ba-6a	844.370	1/4/2016	0.9963	1.2000						
09	Ba-133	Ba-6a	844.370	1/4/2016	0.9918	1.2000						
10	Ba-133	Ba-6a	844.370	1/4/2016	0.9727	1.2000						
11	Ba-133	Ba-6a	844.370	1/4/2016	0.9913	1.2000						
12	Ba-133	Ba-6a	844.370	1/4/2016	0.9893	1.2000						

00120

Internal Work Order		Run	Analysis Code		Date	Technician		Technician Initials		Witness Initials	
15-12122		1	Ra228		1/11/2016 12:51	KCOULSTON		KC			

LCS & Matrix Spikes

Isotope	Sol #	Activity dpm/g	Solution Date	Approx Addition	LCS		MS		LCS		MS		LCS		MS				
					Volume Used (g)	Approx Addition	Volume Used (g)	Volume Used (g)	Known pCi	Error Estimate	Added pCi	Error Estimate	Known pCi	Error Estimate	Added pCi	Error Estimate			
Ra-228	Ra-11	28.080	1/11/2016	0.710	0.7137					9.03	0.460			0.00	0.000			0.00	0.000

Tracers

fraction	Isotope	Sol #	Activity dpm/g	Solution Date	Volume Used (g)	Approx Addition
01	Ba-133	Ba-6a	843.300	1/11/2016	0.9988	1.2000
02	Ba-133	Ba-6a	843.300	1/11/2016	0.9829	1.2000
03	Ba-133	Ba-6a	843.300	1/11/2016	0.9981	1.2000
04	Ba-133	Ba-6a	843.300	1/11/2016	0.9914	1.2000
05	Ba-133	Ba-6a	843.300	1/11/2016	0.9906	1.2000
06	Ba-133	Ba-6a	843.300	1/11/2016	0.9924	1.2000
07	Ba-133	Ba-6a	843.300	1/11/2016	0.9992	1.2000
08	Ba-133	Ba-6a	843.300	1/11/2016	0.9963	1.2000
09	Ba-133	Ba-6a	843.300	1/11/2016	0.9918	1.2000
10	Ba-133	Ba-6a	843.300	1/11/2016	0.9727	1.2000
11	Ba-133	Ba-6a	843.300	1/11/2016	0.9913	1.2000
12	Ba-133	Ba-6a	843.300	1/11/2016	0.9893	1.2000

Balance Printer Tapes						
Tracer				LCS		
Matrix Spike						



Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
15-12122	1	Ra228	liters	1/11/2016	JWOLFE

Lab Fraction	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	BC-1	DUP						1.0000E+00	1.0000E+00				
04	TBB-3S	TRG						1.0000E+00	1.0000E+00				
05	TBB-1D	TRG						1.0000E+00	1.0000E+00				
06	TBB-1S	TRG						1.0000E+00	1.0000E+00				
07	TBA-1D	TRG						1.0000E+00	1.0000E+00				
08	TBB-3D	TRG						1.0000E+00	1.0000E+00				
09	TBB-2D	TRG						1.0000E+00	1.0000E+00				
10	TBB-2M	TRG						1.0000E+00	1.0000E+00				
11	MC-1	TRG						1.0000E+00	1.0000E+00				
12	BC-1	DO						1.0000E+00	1.0000E+00				

Comments

Technician: WOLFE Date: 1/4/16

Gravimetric Worksheet

Work Order	Run	Analysis Code	Gravimetric Carrier	Carrier Conc (mg/ml)	Technician
15-12122	1	Ra228	Yttrium	33.2640	KCOULSTON

TRetec Fraction	Client ID	Sample Type	Carrier Data		Filter Data			Gravimetric	
			Carrier Added (ml)	Filter Tare (g)	Filter Final (g)	Filter Net (g)	% Recovery		
01	LCS	LCS	2.4000	0.0929	0.1720	0.0791	99.08		
02	BLANK	MBL	2.0000	0.0946	0.1571	0.0625	93.95		
03	DUP	DUP	2.0000	0.0922	0.1571	0.0649	97.55		
04	TBB-3S	TRG	2.0000	0.0928	0.1541	0.0613	92.14		
05	TBB-1D	TRG	2.0000	0.0943	0.1591	0.0648	97.40		
06	TBB-1S	TRG	2.1000	0.0947	0.1636	0.0689	98.63		
07	TBA-1D	TRG	2.5000	0.0926	0.1726	0.0800	96.20		
08	TBB-3D	TRG	2.0000	0.0904	0.1561	0.0657	98.76		
09	TBB-2D	TRG	2.0000	0.0910	0.1550	0.0640	96.20		
10	TBB-2M	TRG	2.0000	0.0928	0.1570	0.0642	96.50		
11	MC-1	TRG	2.0000	0.0934	0.1573	0.0639	96.05		
12	BC-1	DO	2.0000	0.0911	0.1534	0.0623	93.64		

Technician: *Christen Coulston* Date: 1 / 13 / 16

Ring
1/13/16

Detector ID	Sample ID	Alpha	Beta	Count Time	Voltage	TOD
E1	1512122-01	43	924	120	1410	1/13/2016 9:27:23 AM
E2	1512122-02	11	132	120	1410	1/13/2016 9:27:23 AM
E3	1512122-03	15	229	120	1410	1/13/2016 9:27:23 AM
E4	1512122-04	13	192	120	1410	1/13/2016 9:27:23 AM
F1	1512122-05	22	224	120	1410	1/13/2016 9:27:23 AM
F2	1512122-06	25	887	120	1410	1/13/2016 9:27:23 AM
F3	1512122-07	15	242	120	1410	1/13/2016 9:27:24 AM
F4	1512122-08	23	177	120	1410	1/13/2016 11:31:38 AM
G1	1512122-09	23	255	120	1410	1/13/2016 9:27:24 AM
G2	1512122-10	25	621	120	1410	1/13/2016 9:27:24 AM
G3	1512122-11	12	351	120	1410	1/13/2016 9:27:24 AM
G4	1512122-12	17	237	120	1410	1/13/2016 9:27:24 AM

GPC Detector Report
(ALL Backgrounds)

✓ 1/17/16

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	1/13/2016	8.33E-02	P	-8.81E-02	1.18E-01	3.25E-01
LB4110A - A2	Alpha	10/20/2015	1/13/2016	8.33E-02	P	-6.56E-02	8.44E-02	2.34E-01
LB4110A - A3	Alpha	10/20/2015	1/13/2016	3.33E-02	P	-5.99E-02	1.09E-01	2.78E-01
LB4110A - A4	Alpha	10/20/2015	1/13/2016	6.67E-02	P	-8.60E-02	1.02E-01	2.90E-01
LB4110A - B1	Alpha	10/20/2015	1/13/2016	1.67E-02	P	-9.32E-02	1.43E-01	3.79E-01
LB4110A - B2	Alpha	10/20/2015	1/13/2016	8.33E-02	P	-2.77E-02	1.25E-01	2.78E-01
LB4110A - B3	Alpha	10/20/2015	1/13/2016	8.33E-02	P	-6.31E-02	1.17E-01	2.96E-01
LB4110A - B4	Alpha	10/20/2015	1/13/2016	1.17E-01	P	-6.62E-02	8.87E-02	2.44E-01
LB4110A - C1	Alpha	10/20/2015	1/13/2016	1.50E-01	P	-1.77E-01	1.14E-01	4.04E-01
LB4110A - C2	Alpha	10/20/2015	1/13/2016	5.00E-02	P	-1.08E-01	7.86E-02	2.65E-01
LB4110A - C3	Alpha	10/20/2015	1/13/2016	1.17E-01	P	-1.06E-01	1.13E-01	3.32E-01
LB4110A - C4	Alpha	10/20/2015	1/13/2016	1.50E-01	P	-6.83E-02	9.40E-02	2.56E-01
LB4110A - D1	Alpha	10/20/2015	1/13/2016	3.00E-01	P	-1.81E-02	1.97E-01	4.12E-01
LB4110A - D2	Alpha	10/20/2015	1/13/2016	1.50E-01	P	-4.72E-02	1.84E-01	4.15E-01
LB4110A - D3	Alpha	10/20/2015	1/13/2016	1.00E-01	P	-9.59E-02	8.05E-02	2.57E-01
LB4110A - D4	Alpha	10/20/2015	1/13/2016	1.17E-01	P	-1.02E-02	9.88E-02	2.08E-01
LB4110A - E1	Alpha	10/20/2015	1/13/2016	5.00E-02	P	-2.12E-01	1.87E-01	5.86E-01
LB4110A - E2	Alpha	10/20/2015	1/13/2016	6.67E-02	P	-9.07E-02	7.37E-02	2.38E-01
LB4110A - E3	Alpha	10/20/2015	1/13/2016	1.50E-01	P	-8.97E-02	1.69E-01	4.28E-01
LB4110A - E4	Alpha	10/20/2015	1/13/2016	6.67E-02	P	-6.36E-02	1.01E-01	2.66E-01
LB4110A - F1	Alpha	10/20/2015	1/13/2016	1.00E-01	P	-5.87E-02	1.33E-01	3.25E-01
LB4110A - F2	Alpha	10/20/2015	1/13/2016	3.33E-02	P	-4.74E-01	9.97E-02	6.73E-01
LB4110A - F3	Alpha	10/20/2015	1/13/2016	5.00E-02	P	-7.55E-02	1.81E-01	4.37E-01
LB4110A - F4	Alpha	10/20/2015	1/13/2016	8.33E-02	P	-5.31E-02	9.28E-02	2.39E-01
LB4110A - G1	Alpha	10/20/2015	1/13/2016	1.00E-01	P	-8.62E-02	1.34E-01	3.54E-01
LB4110A - G2	Alpha	10/20/2015	1/13/2016	1.33E-01	P	-1.24E-01	9.63E-02	3.16E-01
LB4110A - G3	Alpha	10/20/2015	1/13/2016	5.00E-02	P	-6.40E-02	1.78E-01	4.20E-01
LB4110A - G4	Alpha	10/20/2015	1/13/2016	3.33E-02	P	-3.03E-02	9.94E-02	2.29E-01

GPC Detector Report
(ALL Backgrounds)

T.M.M.

Detector	Alpha/Beta	Calibration Date	Count Date	Bkg CPM	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	1/13/2016	1.55E+00	P	9.40E-01	1.54E+00	2.15E+00
LB4110A - A2	Beta	10/20/2015	1/13/2016	1.35E+00	P	1.02E+00	1.48E+00	1.93E+00
LB4110A - A3	Beta	10/20/2015	1/13/2016	1.53E+00	P	1.04E+00	1.69E+00	2.33E+00
LB4110A - A4	Beta	10/20/2015	1/13/2016	1.53E+00	P	-1.68E+00	2.13E+00	5.93E+00
LB4110A - B1	Beta	10/20/2015	1/13/2016	1.58E+00	P	1.09E+00	1.71E+00	2.33E+00
LB4110A - B2	Beta	10/20/2015	1/13/2016	1.18E+00	P	9.20E-01	1.55E+00	2.19E+00
LB4110A - B3	Beta	10/20/2015	1/13/2016	1.57E+00	P	9.18E-01	1.51E+00	2.10E+00
LB4110A - B4	Beta	10/20/2015	1/13/2016	1.47E+00	P	8.49E-01	1.52E+00	2.20E+00
LB4110A - C1	Beta	10/20/2015	1/13/2016	1.38E+00	P	9.32E-01	1.43E+00	1.93E+00
LB4110A - C2	Beta	10/20/2015	1/13/2016	1.30E+00	P	7.84E-01	1.21E+00	1.64E+00
LB4110A - C3	Beta	10/20/2015	1/13/2016	1.50E+00	P	7.71E-01	1.76E+00	2.74E+00
LB4110A - C4	Beta	10/20/2015	1/13/2016	1.33E+00	P	7.55E-01	1.32E+00	1.88E+00
LB4110A - D1	Beta	10/20/2015	1/13/2016	5.53E+00	F	1.28E+00	5.20E+00	9.12E+00
LB4110A - D2	Beta	10/20/2015	1/13/2016	4.33E+00	F	4.11E+00	4.90E+00	5.69E+00
LB4110A - D3	Beta	10/20/2015	1/13/2016	2.52E+00	F	1.45E+00	3.56E+00	5.67E+00
LB4110A - D4	Beta	10/20/2015	1/13/2016	4.60E+00	F	1.06E+00	5.09E+00	9.12E+00
LB4110A - E1	Beta	10/20/2015	1/13/2016	1.22E+00	P	8.54E-01	1.50E+00	2.14E+00
LB4110A - E2	Beta	10/20/2015	1/13/2016	9.33E-01	P	4.63E-01	9.46E-01	1.43E+00
LB4110A - E3	Beta	10/20/2015	1/13/2016	1.32E+00	P	6.17E-01	1.30E+00	1.97E+00
LB4110A - E4	Beta	10/20/2015	1/13/2016	1.10E+00	P	6.25E-01	1.07E+00	1.52E+00
LB4110A - F1	Beta	10/20/2015	1/13/2016	1.43E+00	P	1.07E+00	1.58E+00	2.10E+00
LB4110A - F2	Beta	10/20/2015	1/13/2016	1.00E+00	P	-8.92E+02	8.08E+01	1.05E+03
LB4110A - F3	Beta	10/20/2015	1/13/2016	1.07E+00	P	6.39E-01	1.38E+00	2.12E+00
LB4110A - F4	Beta	10/20/2015	1/13/2016	9.50E-01	P	6.74E-01	1.12E+00	1.57E+00
LB4110A - G1	Beta	10/20/2015	1/13/2016	1.30E+00	P	7.44E-01	1.32E+00	1.89E+00
LB4110A - G2	Beta	10/20/2015	1/13/2016	1.47E+00	P	1.12E+00	1.66E+00	2.20E+00
LB4110A - G3	Beta	10/20/2015	1/13/2016	1.45E+00	P	8.25E-01	1.42E+00	2.02E+00
LB4110A - G4	Beta	10/20/2015	1/13/2016	1.28E+00	P	9.19E-01	1.39E+00	1.85E+00

GPC Detector Report
(ALL Efficiencies)

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117116

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Alpha	10/20/2015	1/13/2016	0.2274	P	0.2253	0.2330	0.2407
LB4110A - A2	Alpha	10/20/2015	1/13/2016	0.2074	P	0.2037	0.2112	0.2187
LB4110A - A3	Alpha	10/20/2015	1/13/2016	0.2004	P	0.1925	0.2021	0.2117
LB4110A - A4	Alpha	10/20/2015	1/13/2016	0.2320	P	0.2201	0.2294	0.2388
LB4110A - B1	Alpha	10/20/2015	1/13/2016	0.2166	P	0.1975	0.2099	0.2224
LB4110A - B2	Alpha	10/20/2015	1/13/2016	0.2154	P	0.2021	0.2150	0.2280
LB4110A - B3	Alpha	10/20/2015	1/13/2016	0.2368	P	0.2215	0.2349	0.2483
LB4110A - B4	Alpha	10/20/2015	1/13/2016	0.2308	P	0.2135	0.2246	0.2356
LB4110A - C1	Alpha	10/20/2015	1/13/2016	0.2106	P	0.2040	0.2119	0.2199
LB4110A - C2	Alpha	10/20/2015	1/13/2016	0.2222	P	0.2112	0.2218	0.2324
LB4110A - C3	Alpha	10/20/2015	1/13/2016	0.2531	P	0.2376	0.2478	0.2580
LB4110A - C4	Alpha	10/20/2015	1/13/2016	0.2175	P	0.2124	0.2214	0.2303
LB4110A - D1	Alpha	10/20/2015	1/13/2016	0.2222	P	0.2125	0.2209	0.2293
LB4110A - D2	Alpha	10/20/2015	1/13/2016	0.2484	P	0.2376	0.2478	0.2580
LB4110A - D3	Alpha	10/20/2015	1/13/2016	0.2606	P	0.2453	0.2566	0.2678
LB4110A - D4	Alpha	10/20/2015	1/13/2016	0.1869	P	0.1830	0.1924	0.2019
LB4110A - E1	Alpha	10/20/2015	1/13/2016	0.2341	P	0.2269	0.2366	0.2462
LB4110A - E2	Alpha	10/20/2015	1/13/2016	0.2151	P	0.2038	0.2147	0.2256
LB4110A - E3	Alpha	10/20/2015	1/13/2016	0.2088	P	0.2035	0.2124	0.2213
LB4110A - E4	Alpha	10/20/2015	1/13/2016	0.2475	P	0.2375	0.2462	0.2548
LB4110A - F1	Alpha	10/20/2015	1/13/2016	0.2069	P	0.1276	0.1938	0.2600
LB4110A - F2	Alpha	10/20/2015	1/13/2016	0.2022	P	0.1305	0.1985	0.2664
LB4110A - F3	Alpha	10/20/2015	1/13/2016	0.2359	P	0.1561	0.2374	0.3188
LB4110A - F4	Alpha	10/20/2015	1/13/2016	0.2088	P	0.1406	0.2137	0.2868
LB4110A - G1	Alpha	10/20/2015	1/13/2016	0.2095	P	0.2010	0.2068	0.2125
LB4110A - G2	Alpha	10/20/2015	1/13/2016	0.2105	P	0.2025	0.2101	0.2177
LB4110A - G3	Alpha	10/20/2015	1/13/2016	0.2315	P	0.2255	0.2308	0.2362
LB4110A - G4	Alpha	10/20/2015	1/13/2016	0.2074	P	0.1989	0.2043	0.2096

GPC Detector Report
(ALL Efficiencies)

Detector	Alpha/Beta	Calibration Date	Count Date	Eff	PFW	LCL	Mean	UCL
LB4110A - A1	Beta	10/20/2015	1/13/2016	0.5515	P	0.5337	0.5496	0.5655
LB4110A - A2	Beta	10/20/2015	1/13/2016	0.4738	P	0.4645	0.4793	0.4940
LB4110A - A3	Beta	10/20/2015	1/13/2016	0.4662	P	0.4594	0.4784	0.4974
LB4110A - A4	Beta	10/20/2015	1/13/2016	0.5508	P	0.5338	0.5534	0.5730
LB4110A - B1	Beta	10/20/2015	1/13/2016	0.5337	P	0.5007	0.5242	0.5476
LB4110A - B2	Beta	10/20/2015	1/13/2016	0.5234	P	0.4941	0.5175	0.5408
LB4110A - B3	Beta	10/20/2015	1/13/2016	0.5801	P	0.5560	0.5813	0.6067
LB4110A - B4	Beta	10/20/2015	1/13/2016	0.5538	P	0.5303	0.5521	0.5739
LB4110A - C1	Beta	10/20/2015	1/13/2016	0.4986	P	0.4795	0.4971	0.5148
LB4110A - C2	Beta	10/20/2015	1/13/2016	0.5301	P	0.5099	0.5302	0.5505
LB4110A - C3	Beta	10/20/2015	1/13/2016	0.6294	P	0.5938	0.6175	0.6412
LB4110A - C4	Beta	10/20/2015	1/13/2016	0.5376	P	0.5224	0.5450	0.5676
LB4110A - D1	Beta	10/20/2015	1/13/2016	0.6530	P	0.6305	0.6528	0.6751
LB4110A - D2	Beta	10/20/2015	1/13/2016	0.6391	P	0.6212	0.6402	0.6591
LB4110A - D3	Beta	10/20/2015	1/13/2016	0.6514	P	0.6129	0.6366	0.6604
LB4110A - D4	Beta	10/20/2015	1/13/2016	0.4761	P	0.4607	0.4768	0.4929
LB4110A - E1	Beta	10/20/2015	1/13/2016	0.5681	P	0.5484	0.5635	0.5787
LB4110A - E2	Beta	10/20/2015	1/13/2016	0.5100	P	0.4976	0.5157	0.5337
LB4110A - E3	Beta	10/20/2015	1/13/2016	0.5125	P	0.5031	0.5172	0.5312
LB4110A - E4	Beta	10/20/2015	1/13/2016	0.6128	P	0.5929	0.6110	0.6292
LB4110A - F1	Beta	10/20/2015	1/13/2016	0.5086	P	0.3204	0.4765	0.6326
LB4110A - F2	Beta	10/20/2015	1/13/2016	0.4762	P	0.3107	0.4735	0.6363
LB4110A - F3	Beta	10/20/2015	1/13/2016	0.5961	P	0.3905	0.5938	0.7972
LB4110A - F4	Beta	10/20/2015	1/13/2016	0.4995	P	0.3454	0.5249	0.7045
LB4110A - G1	Beta	10/20/2015	1/13/2016	0.4646	W	0.4620	0.4733	0.4845
LB4110A - G2	Beta	10/20/2015	1/13/2016	0.5047	P	0.4955	0.5068	0.5181
LB4110A - G3	Beta	10/20/2015	1/13/2016	0.5641	P	0.5495	0.5637	0.5779
LB4110A - G4	Beta	10/20/2015	1/13/2016	0.4977	W	0.4953	0.5078	0.5203

SECTION X
BARIUM-133 ANALYTICAL TRACER DATA

KB
1/7/16Analysis Report for 1512122-01
SPIKE

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-01
Sample Description : SPIKE
Sample Type : RA RECOVERY

Sample Size : 1.000E+00 units
Facility : Countroom

Sample Taken On : 1/7/2016 11:40:09AM
Acquisition Started : 1/7/2016 11:44:09AM

Procedure : BAFIL
Operator : Administrator
Detector Name : GE1
Geometry : BAFIL
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 2.50
Peak Locate Range (in channels) : 1 - 4096
Peak Area Range (in channels) : 19 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 10/25/2014
Efficiency Calibration Used Done On : 11/9/2014
Efficiency Calibration Description :

Sample Number : 31487

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 11:59:12AM
Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-01

SPIKE

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	30.78	27 -	40	31.13	1.95E+03	92.35	1.67E+02	1.64
m	2	35.06	27 -	40	35.41	4.33E+02	52.65	1.50E+02	1.66
M	3	61.74	49 -	73	62.09	2.44E+02	40.94	1.06E+02	1.91
m	4	65.94	49 -	73	66.29	1.04E+02	37.79	1.21E+02	1.92
	5	81.20	77 -	87	81.54	7.70E+02	70.99	2.54E+02	1.94
M	6	108.96	107 -	121	109.29	3.05E+01	19.18	6.40E+01	2.58
m	7	112.01	107 -	121	112.34	2.18E+02	37.84	9.60E+01	1.87
m	8	116.08	107 -	121	116.41	6.33E+01	34.87	1.12E+02	2.46
M	9	176.17	172 -	195	176.48	1.91E+01	24.23	9.50E+01	2.14
	10	263.45	260 -	267	263.73	2.02E+01	18.44	4.17E+01	4.23
	11	276.34	272 -	281	276.61	6.42E+01	27.98	7.57E+01	1.70
	12	302.86	298 -	305	303.12	1.22E+02	30.72	7.52E+01	1.47
M	13	333.91	330 -	344	334.16	6.58E+01	20.57	3.25E+01	1.77
m	14	337.69	330 -	344	337.94	2.88E+01	17.18	2.26E+01	1.77
m	15	356.06	351 -	361	356.31	5.15E+02	46.37	2.50E+01	1.82
M	16	383.78	372 -	396	384.01	1.30E+02	24.06	1.18E+01	1.81
m	17	386.93	372 -	396	387.16	1.61E+02	35.20	6.70E+00	1.82
m	18	391.60	372 -	396	391.83	3.92E+01	16.45	1.09E+00	1.82
M	19	414.61	410 -	421	414.83	2.88E+01	17.75	2.50E+01	1.84
m	20	417.94	410 -	421	418.17	1.89E+01	18.73	4.55E+01	1.84
	21	436.92	432 -	441	437.14	1.11E+02	23.47	1.50E+01	1.88
	22	599.91	597 -	602	600.08	1.30E+01	7.21	0.00E+00	1.19
	23	614.55	611 -	618	614.71	1.08E+01	10.58	1.03E+01	4.74
	24	1000.78	998 -	1004	1000.80	1.00E+01	6.32	0.00E+00	2.12

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 11:59:12AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031224.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	30.78	1.95E+03	92.35			1.95E+03	9.23E+01
m	2	35.06	4.33E+02	52.65			4.33E+02	5.27E+01
M	3	61.74	2.44E+02	40.94			2.44E+02	4.09E+01
m	4	65.94	1.04E+02	37.79			1.04E+02	3.78E+01
	5	81.20	7.70E+02	70.99			7.70E+02	7.10E+01

Analysis Report for 1512122-01

SPIKE

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	6	108.96	3.05E+01	19.18			3.05E+01	1.92E+01
m	7	112.01	2.18E+02	37.84			2.18E+02	3.78E+01
m	8	116.08	6.33E+01	34.87			6.33E+01	3.49E+01
M	9	176.17	1.91E+01	24.23			1.91E+01	2.42E+01
	10	263.45	2.02E+01	18.44			2.02E+01	1.84E+01
	11	276.34	6.42E+01	27.98			6.42E+01	2.80E+01
	12	302.86	1.22E+02	30.72			1.22E+02	3.07E+01
M	13	333.91	6.58E+01	20.57			6.58E+01	2.06E+01
m	14	337.69	2.88E+01	17.18	1.33E+00	1.44E+00	2.75E+01	1.72E+01
m	15	356.06	5.15E+02	46.37			5.15E+02	4.64E+01
M	16	383.78	1.30E+02	24.06			1.30E+02	2.41E+01
m	17	386.93	1.61E+02	35.20			1.61E+02	3.52E+01
m	18	391.60	3.92E+01	16.45			3.92E+01	1.65E+01
M	19	414.61	2.88E+01	17.75			2.88E+01	1.77E+01
m	20	417.94	1.89E+01	18.73			1.89E+01	1.87E+01
	21	436.92	1.11E+02	23.47			1.11E+02	2.35E+01
	22	599.91	1.30E+01	7.21			1.30E+01	7.21E+00
	23	614.55	1.08E+01	10.58			1.08E+01	1.06E+01
	24	1000.78	1.00E+01	6.32	7.23E-01	8.49E-01	9.28E+00	6.38E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12	1.93		
		391.69 *	61.90	2.32E+01	9.89E+00
I-125	0.97	35.49 *	6.49	7.59E+00	9.23E-01
		30.80 *	97.60	7.81E-01	3.70E-02
BA-133	1.00	302.84 *	17.80	4.83E+02	1.90E+02
		356.01 *	60.00	4.15E+02	5.41E+01
		9.28	42.00		
PA-231	1.00	10.11	20.20		
		283.67	1.60		
		302.67 *	2.30	3.74E+03	1.47E+03

: 00141

Analysis Report for 1512122-01

SPIKE

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/units)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
	SN-113	0.968	2.32E+01	9.89E+00
	I-125	0.970	7.59E+00	9.23E-01
X	I-129	0.643		
	BA-133	1.000	7.81E-01	3.70E-02
	PA-231	1.000	3.73E+03	1.47E+03

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-01

SPIKE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 11:59:12AM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	3	61.74	2.71309E-01	8.38	Sum
m	4	65.94	1.15377E-01	18.20	Sum
	5	81.20	8.55348E-01	4.61	
M	6	108.96	3.39222E-02	31.42	
m	7	112.01	2.42253E-01	8.68	
m	8	116.08	7.03179E-02	27.55	
M	9	176.17	2.11681E-02	63.59	
	10	263.45	2.23984E-02	45.74	
	11	276.34	7.12908E-02	21.81	
M	13	333.91	7.31184E-02	15.63	Sum
m	14	337.69	3.05365E-02	31.36	Sum
M	16	383.78	1.44053E-01	9.28	
m	17	386.93	1.78656E-01	10.94	Sum
M	19	414.61	3.20087E-02	30.80	
m	20	417.94	2.10469E-02	49.45	
	21	436.92	1.23870E-01	10.53	
	22	599.91	1.44444E-02	27.74	
	23	614.55	1.20486E-02	48.80	
	24	1000.78	1.03073E-02	34.39	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

: 00143

Analysis Report for 1512122-01

SPIKE

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	6.60E-12	6.60E-12	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.69E+01	2.69E+01	-6.85E-01	1.25E+01
	136.48	10.60	2.79E+02		3.66E+01	1.30E+02
NI-59	6.92	29.80	6.80E-11	6.80E-11	0.00E+00	0.00E+00
MO-93	16.59	52.90	3.35E-05	3.35E-05	-3.07E-05	1.46E-05
	18.60	10.00	1.70E-03		8.57E-04	8.07E-04
NB-93M	16.57	9.43	1.85E-04	1.85E-04	-1.70E-04	8.06E-05
CD-109	88.03	3.72	2.55E+02	2.55E+02	2.02E+01	1.19E+02
+ SN-113	255.12	1.93	1.47E+03	2.28E+01	4.14E+02	6.72E+02
	391.69	* 61.90	2.28E+01		2.32E+01	1.06E+01
SN-119M	23.87	16.10	1.88E-02	1.88E-02	1.89E-02	9.08E-03
	25.10	22.70	1.95E-02		1.99E-02	9.37E-03
+ I-125	35.49	* 6.49	1.76E+00	1.76E+00	7.59E+00	8.57E-01
I-129	29.78	* 57.00	6.92E-02	6.92E-02	1.34E+00	3.37E-02
	33.60	13.20	9.40E-01		-6.42E+00	4.62E-01
	39.58	7.52	1.59E+00		2.20E-01	7.43E-01
+ BA-133	30.80	* 97.60	4.04E-02	4.04E-02	7.81E-01	1.97E-02
	302.84	* 17.80	1.49E+02		4.83E+02	6.92E+01
	356.01	* 60.00	2.71E+01		4.15E+02	1.24E+01
CE-139	165.85	80.35	4.77E+01	4.77E+01	1.42E+01	2.22E+01
CE-144	133.54	10.80	2.27E+02	2.27E+02	-1.58E+02	1.04E+02
HG-203	279.19	77.30	4.10E+01	4.10E+01	3.50E+01	1.91E+01
PB-210	46.50	4.25	7.40E+00	7.40E+00	2.46E+00	3.42E+00
+ PA-231	9.28	42.00	3.55E-09	3.55E-09	0.00E+00	0.00E+00
	10.11	20.20	2.40E-08		0.00E+00	0.00E+00
	283.67	1.60	1.26E+03		-2.56E+02	5.63E+02
	302.67	* 2.30	1.15E+03		3.74E+03	5.36E+02
TH-231	25.64	14.70	2.95E-02	2.95E-02	-1.80E-02	1.41E-02
	84.21	6.40	1.41E+02		-1.71E+03	6.65E+01
PA-234M	9.89	89.00	4.04E-09	4.04E-09	0.00E+00	0.00E+00
	21.72	64.90	2.05E-03		4.62E-03	9.91E-04
	37.93	23.75	7.42E-01		9.66E-01	3.59E-01
	131.42	20.40	1.17E+02		-5.04E+01	5.36E+01
TH-234	63.29	3.80	1.29E+02	1.29E+02	1.88E+02	6.23E+01
NP-237	29.37	14.00	3.93E-01	3.93E-01	3.41E+00	1.94E-01
	86.50	12.60	7.20E+01		-2.30E-01	3.36E+01
U-237	97.08	16.30	7.63E+01	5.80E+01	-4.94E+01	3.54E+01
	101.07	26.30	5.80E+01		1.32E+01	2.71E+01
	114.00	12.30	3.42E+02		5.39E+02	1.65E+02
	208.01	22.00	1.38E+02		-2.92E+01	6.23E+01
AM-241	59.54	35.90	8.26E+00	8.26E+00	4.54E+00	3.98E+00
AM-243	74.67	66.00	7.81E+00	7.81E+00	3.31E+00	3.66E+00

+ = Nuclide identified during the nuclide identification

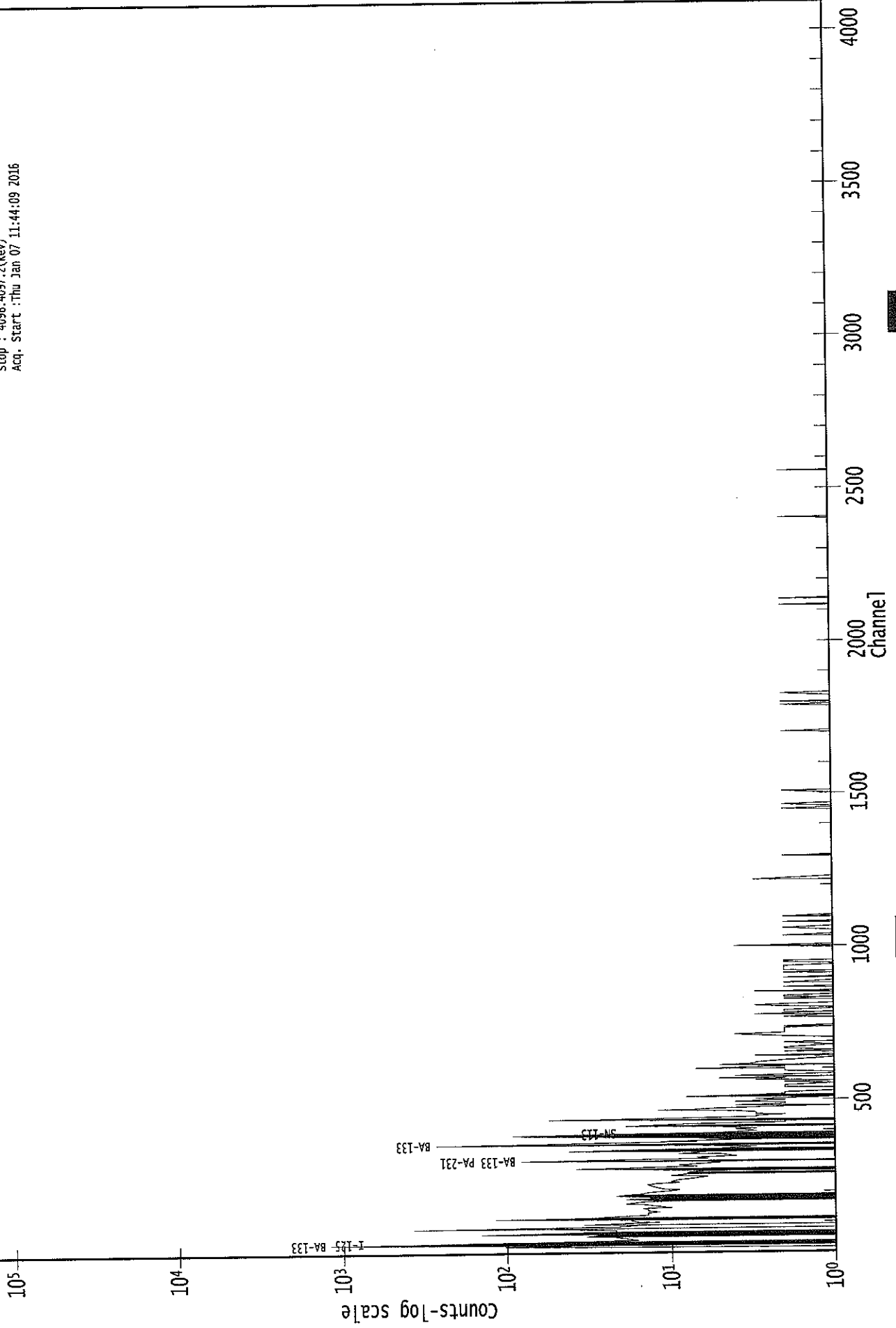
* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

0000031487.CNF

Live Time :900.000 sec
Real Time :900.270 sec
Start: 1: 0.6(keV)
Stop : 4096:4097.2(keV)
Acq. Start :Thu Jan 07 11:44:09 2016



ROI Type: 2

ROI Type: 1

25
1/10/16Analysis Report for 1512122-02
BLANK

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-02
Sample Description : BLANK
Sample Type : RA RECOVERY

Sample Size : 1.000E+00 units
Facility : Countroom

Sample Taken On : 1/7/2016 11:40:17AM
Acquisition Started : 1/7/2016 11:44:18AM

Procedure : BAFIL
Operator : Administrator
Detector Name : GE2
Geometry : BAFIL
Live Time : 900.0 seconds
Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 2.50
Peak Locate Range (in channels) : 1 - 4096
Peak Area Range (in channels) : 5 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/2/2014
Efficiency Calibration Used Done On : 11/9/2014
Efficiency Calibration Description :

Sample Number : 31488

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 11:59:24AM
Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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: 00146

Analysis Report for 1512122-02

BLANK

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.86	18 -	24	20.98	9.46E+01	57.14	5.31E+02	1.39
M	2	30.92	27 -	40	31.03	1.84E+03	92.30	2.47E+02	1.46
m	3	35.12	27 -	40	35.23	3.76E+02	51.30	1.32E+02	1.46
	4	46.84	45 -	49	46.94	2.75E+01	21.40	7.71E+01	1.87
	5	52.96	50 -	56	53.07	3.90E+01	32.62	1.66E+02	2.33
M	6	61.95	58 -	73	62.04	1.96E+02	35.55	1.04E+02	1.61
m	7	66.16	58 -	73	66.25	9.26E+01	28.84	8.36E+01	1.61
	8	81.05	76 -	85	81.14	5.88E+02	56.67	8.53E+01	1.33
M	9	101.45	99 -	119	101.53	1.61E+01	22.09	7.42E+01	1.68
m	10	108.57	99 -	119	108.64	2.01E+01	23.23	8.41E+01	1.70
m	11	111.72	99 -	119	111.79	1.64E+02	34.00	9.80E+01	1.71
m	12	115.81	99 -	119	115.87	2.42E+01	21.73	9.47E+01	1.43
	13	133.37	131 -	137	133.42	3.21E+01	22.01	6.77E+01	3.98
	14	161.83	157 -	167	161.87	4.30E+01	37.00	1.60E+02	4.60
	15	213.71	211 -	216	213.72	2.00E+01	18.49	5.00E+01	2.91
	16	275.96	273 -	278	275.94	5.84E+01	19.97	3.33E+01	1.63
	17	302.77	299 -	305	302.73	1.24E+02	30.08	8.73E+01	1.34
M	18	323.40	319 -	341	323.35	1.20E+01	14.53	1.59E+01	2.05
m	19	333.40	319 -	341	333.35	5.73E+01	21.89	3.34E+01	2.07
	20	356.03	352 -	360	355.96	4.60E+02	48.13	6.67E+01	1.41
	21	364.34	361 -	367	364.27	1.82E+01	13.01	1.77E+01	1.26
M	22	381.08	380 -	393	381.00	6.24E+00	6.24	7.97E+00	1.47
m	23	386.76	380 -	393	386.68	1.75E+02	33.69	2.02E+01	1.96
m	24	390.73	380 -	393	390.64	2.81E+01	18.08	1.83E+01	1.97
M	25	413.10	410 -	429	413.00	1.06E+01	12.69	1.33E+01	1.50
m	26	418.53	410 -	429	418.43	2.26E+01	16.88	1.28E+01	2.43
	27	437.04	433 -	439	436.93	7.82E+01	20.72	2.16E+01	1.47
	28	467.90	464 -	473	467.77	2.21E+01	13.96	1.58E+01	1.95
M	29	508.30	507 -	515	508.16	5.89E+00	6.44	9.00E+00	1.76
	30	660.47	657 -	662	660.25	5.00E+00	7.07	6.00E+00	1.28
	31	827.16	825 -	829	826.87	5.08E+00	5.50	1.83E+00	2.72

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 11:59:24AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031225.CNF

: 00147

Analysis Report for 1512122-02

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	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.86	9.46E+01	57.14			9.46E+01	5.71E+01
M	2	30.92	1.84E+03	92.30			1.84E+03	9.23E+01
m	3	35.12	3.76E+02	51.30			3.76E+02	5.13E+01
	4	46.84	2.75E+01	21.40	9.86E+00	2.37E+00	1.76E+01	2.15E+01
	5	52.96	3.90E+01	32.62	9.74E-01	1.91E+00	3.80E+01	3.27E+01
M	6	61.95	1.96E+02	35.55			1.96E+02	3.55E+01
m	7	66.16	9.26E+01	28.84			9.26E+01	2.88E+01
m	8	81.05	5.88E+02	56.67			5.88E+02	5.67E+01
M	9	101.45	1.61E+01	22.09			1.61E+01	2.21E+01
m	10	108.57	2.01E+01	23.23			2.01E+01	2.32E+01
m	11	111.72	1.64E+02	34.00			1.64E+02	3.40E+01
m	12	115.81	2.42E+01	21.73			2.42E+01	2.17E+01
	13	133.37	3.21E+01	22.01			3.21E+01	2.20E+01
	14	161.83	4.30E+01	37.00			4.30E+01	3.70E+01
	15	213.71	2.00E+01	18.49			2.00E+01	1.85E+01
	16	275.96	5.84E+01	19.97			5.84E+01	2.00E+01
	17	302.77	1.24E+02	30.08			1.24E+02	3.01E+01
M	18	323.40	1.20E+01	14.53			1.20E+01	1.45E+01
m	19	333.40	5.73E+01	21.89			5.73E+01	2.19E+01
	20	356.03	4.60E+02	48.13			4.60E+02	4.81E+01
	21	364.34	1.82E+01	13.01			1.82E+01	1.30E+01
M	22	381.08	6.24E+00	6.24			6.24E+00	6.24E+00
m	23	386.76	1.75E+02	33.69			1.75E+02	3.37E+01
m	24	390.73	2.81E+01	18.08			2.81E+01	1.81E+01
M	25	413.10	1.06E+01	12.69			1.06E+01	1.27E+01
m	26	418.53	2.26E+01	16.88			2.26E+01	1.69E+01
	27	437.04	7.82E+01	20.72			7.82E+01	2.07E+01
	28	467.90	2.21E+01	13.96			2.21E+01	1.40E+01
M	29	508.30	5.89E+00	6.44			5.89E+00	6.44E+00
	30	660.47	5.00E+00	7.07			5.00E+00	7.07E+00
	31	827.16	5.08E+00	5.50			5.08E+00	5.50E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Analysis Report for 1512122-02

BLANK

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.82	255.12	1.93		
		391.69 *	61.90	1.95E+01	1.27E+01
I-125	0.97	35.49 *	6.49	3.98E+01	5.44E+00
BA-133	0.99	30.80 *	97.60	6.67E+00	3.35E-01
		302.84 *	17.80	4.13E+02	1.42E+02
		356.01 *	60.00	3.77E+02	5.40E+01
CE-144	0.99	133.54 *	10.80	1.46E+02	1.05E+02
PB-210	0.98	46.50 *	4.25	1.08E+01	1.33E+01

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.827	1.95E+01	1.27E+01	
I-125	0.978	3.98E+01	5.44E+00	
BA-133	0.999	6.69E+00	3.35E-01	
CE-144	0.995	1.46E+02	1.05E+02	
PB-210	0.982	1.08E+01	1.33E+01	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-02

BLANK

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 11:59:24AM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide	
	1	20.86	1.05060E-01	30.22	Tol.	PA-234M
	5	52.96	4.22328E-02	42.98		
M	6	61.95	2.17872E-01	9.06	Sum	
m	7	66.16	1.02911E-01	15.57	Sum	
m	8	81.05	6.53125E-01	4.82	Sum	
M	9	101.45	1.78909E-02	68.58	Tol.	U-237
m	10	108.57	2.23134E-02	57.84		
m	11	111.72	1.82762E-01	10.33		
m	12	115.81	2.68537E-02	44.95		
	14	161.83	4.77552E-02	43.05		
	15	213.71	2.22222E-02	46.23		
	16	275.96	6.48444E-02	17.11		
M	18	323.40	1.33604E-02	60.40		
m	19	333.40	6.36926E-02	19.09	Sum	
	21	364.34	2.01852E-02	35.81		
M	22	381.08	6.92820E-03	50.08		
m	23	386.76	1.94003E-01	9.65	Sum	
M	25	413.10	1.17996E-02	59.74		
m	26	418.53	2.50638E-02	37.42		
	27	437.04	8.68914E-02	13.25	Sum	
	28	467.90	2.45556E-02	31.59		
M	29	508.30	6.54097E-03	54.72		
	30	660.47	5.55556E-03	70.71		
	31	827.16	5.64815E-03	54.10		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

Analysis Report for 1512122-02

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NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	8.07E-07	8.07E-07	-4.11E-06	3.45E-07
CO-57	122.06	85.51	1.92E+01	1.92E+01	5.43E+00	8.92E+00
	136.48	10.60	1.67E+02		-1.01E+01	7.70E+01
NI-59	6.92	29.80	7.97E-06	7.97E-06	-2.90E-05	3.76E-06
MO-93	16.59	52.90	6.41E-03	6.41E-03	-1.92E-03	3.02E-03
	18.60	10.00	8.67E-02		-1.67E-01	4.12E-02
NB-93M	16.57	9.43	3.57E-02	3.57E-02	-1.07E-02	1.68E-02
CD-109	88.03	3.72	2.18E+02	2.18E+02	3.85E+01	1.01E+02
+ SN-113	255.12	1.93	9.08E+02	2.41E+01	3.43E+01	4.07E+02
	391.69	*	61.90	2.41E+01	1.95E+01	1.11E+01
SN-119M	23.87	16.10	2.65E-01	2.65E-01	-1.68E-01	1.26E-01
	25.10	22.70	2.69E-01		3.29E-02	1.28E-01
+ I-125	35.49	*	6.49	1.35E+01	3.98E+01	6.62E+00
I-129	29.78	57.00	9.68E-01	9.68E-01	5.35E+00	4.77E-01
	33.60	13.20	3.88E+00		-1.90E+01	1.88E+00
	39.58	7.52	5.02E+00		7.06E-01	2.29E+00
+ BA-133	30.80	*	97.60	4.71E-01	6.67E+00	2.31E-01
	302.84	*	17.80		4.13E+02	6.64E+01
	356.01	*	60.00		3.77E+02	1.48E+01
CE-139	165.85	80.35	2.64E+01	2.64E+01	-9.60E+00	1.21E+01
+ CE-144	133.54	*	10.80	1.53E+02	1.46E+02	7.05E+01
HG-203	279.19	77.30	2.53E+01	2.53E+01	3.32E+00	1.15E+01
+ PB-210	46.50	*	4.25	2.18E+01	1.08E+01	1.00E+01
PA-231	9.28	42.00	2.18E-04	2.18E-04	3.91E-04	1.06E-04
	10.11	20.20	1.07E-03		4.22E-03	5.27E-04
	283.67	1.60	9.16E+02		-1.95E+02	4.05E+02
	302.67	2.30	1.56E+03		3.12E+03	7.45E+02
TH-231	25.64	14.70	4.65E-01	4.65E-01	5.76E-02	2.21E-01
	84.21	6.40	1.06E+02		-5.33E+02	4.89E+01
PA-234M	9.89	89.00	2.02E-04	2.02E-04	7.94E-04	9.92E-05
	21.72	64.90	4.62E-02		3.73E-02	2.22E-02
	37.93	23.75	1.75E+00		-2.74E+00	8.18E-01
	131.42	20.40	6.94E+01		4.72E+00	3.15E+01
TH-234	63.29	3.80	1.49E+02	1.49E+02	3.08E+02	7.14E+01
NP-237	29.37	14.00	1.82E+00	1.82E+00	-3.21E+01	8.86E-01
	86.50	12.60	6.52E+01		4.83E+00	3.04E+01
U-237	97.08	16.30	5.41E+01	4.50E+01	-4.69E+00	2.48E+01
	101.07	26.30	4.50E+01		3.62E+01	2.09E+01
	114.00	12.30	2.17E+02		2.78E+02	1.04E+02
	208.01	22.00	9.76E+01		-1.93E+01	4.46E+01
AM-241	59.54	35.90	8.02E+00	8.02E+00	-3.03E+01	3.76E+00
AM-243	74.67	66.00	5.42E+00	5.42E+00	0.00E+00	2.42E+00

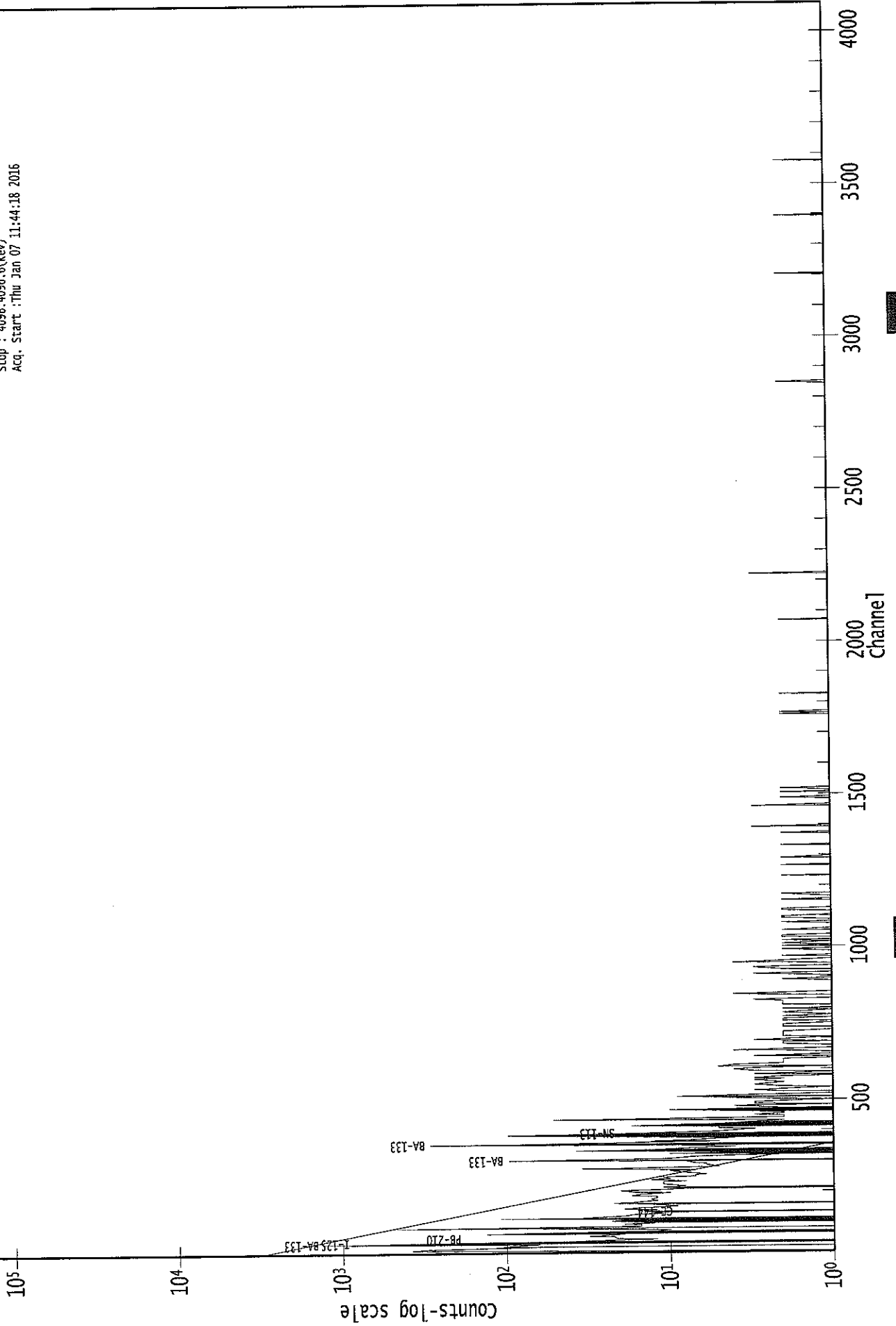
Analysis Report for 1512122-02

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- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031488.CNF

Live Time :900.000 sec
Real Time :900.270 sec
Start: 1: 0.9(keV)
Stop : 4096.4096.6(keV)
Acq. Start :Thu Jan 07 11:44:18 2016



100
1/2/16



Analysis Report for 1512122-03
BC-1

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-03
 Sample Description : BC-1
 Sample Type : RA RECOVERY

Sample Size : 1.000E+00 units
 Facility : Countroom

Sample Taken On : 1/7/2016 11:40:28AM
 Acquisition Started : 1/7/2016 11:44:34AM

Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE3
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 904.2 seconds

Dead Time : 0.46 %

Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 9 - 4096
 Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

Sample Number : 31489

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 11:59:41AM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-03

BC-1

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	21.22	19 -	25	21.47	9.79E+01	46.03	3.12E+02	2.38
M	2	31.04	26 -	39	31.28	1.92E+03	91.98	1.81E+02	1.63
m	3	35.30	26 -	39	35.54	4.64E+02	52.72	1.48E+02	1.68
	4	51.00	44 -	55	51.23	9.90E+01	51.03	2.76E+02	2.96
	5	61.68	58 -	65	61.90	1.29E+02	59.06	4.94E+02	1.30
	6	66.39	65 -	70	66.61	7.68E+01	42.71	2.90E+02	1.79
	7	81.29	77 -	86	81.50	7.98E+02	71.06	2.65E+02	1.90
M	8	112.29	108 -	119	112.49	1.68E+02	34.58	1.13E+02	2.09
m	9	116.46	108 -	119	116.65	5.36E+01	27.35	9.47E+01	2.10
	10	171.41	168 -	174	171.58	3.88E+01	22.37	6.25E+01	1.91
	11	200.04	195 -	207	200.19	3.58E+01	43.63	2.04E+02	9.04
	12	275.64	267 -	280	275.75	3.13E+01	35.52	1.27E+02	1.04
	13	295.98	292 -	300	296.08	2.05E+01	20.07	4.89E+01	5.46
M	14	303.19	300 -	318	303.28	1.40E+02	24.93	1.74E+01	1.75
m	15	307.32	300 -	318	307.41	2.24E+01	20.33	1.36E+01	2.37
M	16	333.98	330 -	342	334.06	6.57E+01	19.60	2.40E+01	1.89
m	17	338.85	330 -	342	338.92	2.34E+01	18.38	2.80E+01	2.45
	18	356.47	354 -	360	356.54	4.71E+02	45.28	2.86E+01	1.95
M	19	384.46	381 -	395	384.51	9.68E+01	33.59	3.30E+01	2.56
m	20	387.54	381 -	395	387.59	1.43E+02	28.52	1.17E+01	1.68
m	21	391.84	381 -	395	391.89	3.67E+01	23.61	3.35E+00	2.47
M	22	415.10	410 -	426	415.14	4.64E+01	14.53	1.28E+01	2.15
m	23	418.94	410 -	426	418.98	3.06E+01	14.86	5.12E+00	2.26
	24	437.44	432 -	440	437.47	8.65E+01	20.11	9.00E+00	2.09
M	25	468.20	464 -	476	468.22	2.67E+01	13.56	1.35E+01	2.03
m	26	472.62	464 -	476	472.63	8.60E+00	12.96	1.00E+01	2.54
	27	491.37	489 -	494	491.38	8.00E+00	5.66	0.00E+00	3.00
	28	571.19	567 -	573	571.15	6.30E+00	8.03	7.40E+00	2.61
	29	662.58	659 -	665	662.50	8.00E+00	5.66	0.00E+00	1.33

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 11:59:41AM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031226.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
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: 00155

Analysis Report for 1512122-03

BC-1

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	21.22	9.79E+01	46.03		9.79E+01	4.60E+01
M	2	31.04	1.92E+03	91.98		1.92E+03	9.20E+01
m	3	35.30	4.64E+02	52.72		4.64E+02	5.27E+01
	4	51.00	9.90E+01	51.03		9.90E+01	5.10E+01
	5	61.68	1.29E+02	59.06		1.29E+02	5.91E+01
	6	66.39	7.68E+01	42.71		7.68E+01	4.27E+01
	7	81.29	7.98E+02	71.06		7.98E+02	7.11E+01
M	8	112.29	1.68E+02	34.58		1.68E+02	3.46E+01
m	9	116.46	5.36E+01	27.35		5.36E+01	2.73E+01
	10	171.41	3.88E+01	22.37		3.88E+01	2.24E+01
	11	200.04	3.58E+01	43.63		3.58E+01	4.36E+01
	12	275.64	3.13E+01	35.52		3.13E+01	3.55E+01
	13	295.98	2.05E+01	20.07	9.13E-01	1.34E+00	1.96E+01
M	14	303.19	1.40E+02	24.93		1.40E+02	2.49E+01
m	15	307.32	2.24E+01	20.33		2.24E+01	2.03E+01
M	16	333.98	6.57E+01	19.60		6.57E+01	1.96E+01
m	17	338.85	2.34E+01	18.38		2.34E+01	1.84E+01
	18	356.47	4.71E+02	45.28		4.71E+02	4.53E+01
M	19	384.46	9.68E+01	33.59		9.68E+01	3.36E+01
m	20	387.54	1.43E+02	28.52		1.43E+02	2.85E+01
m	21	391.84	3.67E+01	23.61		3.67E+01	2.36E+01
M	22	415.10	4.64E+01	14.53		4.64E+01	1.45E+01
m	23	418.94	3.06E+01	14.86		3.06E+01	1.49E+01
	24	437.44	8.65E+01	20.11		8.65E+01	2.01E+01
M	25	468.20	2.67E+01	13.56		2.67E+01	1.36E+01
m	26	472.62	8.60E+00	12.96		8.60E+00	1.30E+01
	27	491.37	8.00E+00	5.66		8.00E+00	5.66E+00
	28	571.19	6.30E+00	8.03		6.30E+00	8.03E+00
	29	662.58	8.00E+00	5.66	1.79E+00	1.01E+00	6.21E+00

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
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Analysis Report for 1512122-03
BC-1

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12	1.93		
		391.69 *	61.90	2.79E+01	1.81E+01
I-125	0.99	35.49 *	6.49	1.44E+01	1.63E+00
BA-133	0.98	30.80 *	97.60	1.56E+00	7.48E-02
		302.84 *	17.80	6.11E+02	2.43E+02
		356.01 *	60.00	4.58E+02	6.41E+01

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.962	2.79E+01	1.81E+01	
I-125	0.994	1.44E+01	1.63E+00	
BA-133	0.981	1.56E+00	7.48E-02	

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity
 Errors quoted at 2.000sigma

Analysis Report for 1512122-03

BC-1

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 11:59:41AM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	21.22	1.08832E-01	23.50		
4	51.00	1.10000E-01	25.77		
5	61.68	1.43295E-01	22.90	Sum	
6	66.39	8.53353E-02	27.80	Sum	
7	81.29	8.86951E-01	4.45		
M	8	112.29	1.86726E-01	10.29	
m	9	116.46	5.95482E-02	25.52	
	10	171.41	4.30794E-02	28.85	
	11	200.04	3.97746E-02	60.95	
	12	275.64	3.47368E-02	56.82	
	13	295.98	2.18128E-02	51.23	
m	15	307.32	2.49281E-02	45.32	
M	16	333.98	7.30059E-02	14.91	Sum
m	17	338.85	2.59750E-02	39.32	Sum
M	19	384.46	1.07588E-01	17.34	
m	20	387.54	1.58816E-01	9.98	Sum
M	22	415.10	5.16101E-02	15.64	
m	23	418.94	3.39997E-02	24.28	
	24	437.44	9.61111E-02	11.63	
M	25	468.20	2.96635E-02	25.40	
m	26	472.62	9.56014E-03	75.32	
	27	491.37	8.88889E-03	35.36	
	28	571.19	7.00000E-03	63.74	
	29	662.58	6.89693E-03	46.29	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

Analysis Report for 1512122-03

BC-1

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	1.53E-10	1.53E-10	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.17E+01	2.17E+01	-7.68E+00	9.94E+00
	136.48	10.60	2.48E+02		-1.17E+01	1.15E+02
NI-59	6.92	29.80	1.64E-08	1.64E-08	-1.02E-07	7.63E-09
MO-93	16.59	52.90	4.29E-04	4.29E-04	-5.27E-05	2.06E-04
	18.60	10.00	6.62E-03		1.09E-03	3.17E-03
NB-93M	16.57	9.43	2.38E-03	2.38E-03	-2.92E-04	1.14E-03
CD-109	88.03	3.72	2.59E+02	2.59E+02	-5.42E+01	1.21E+02
+ SN-113	255.12	1.93	1.27E+03	2.53E+01	3.12E+01	5.67E+02
	391.69	*	61.90	2.53E+01	2.79E+01	1.16E+01
SN-119M	23.87	16.10	3.69E-02	3.52E-02	-5.87E-03	1.76E-02
	25.10	22.70	3.52E-02		-8.23E-02	1.67E-02
+ I-125	35.49	*	6.49	3.22E+00	1.44E+01	1.57E+00
I-129	29.78	57.00	2.13E-01	2.13E-01	1.82E+00	1.05E-01
	33.60	13.20	1.76E+00		-4.98E+00	8.64E-01
	39.58	7.52	2.38E+00		1.00E+00	1.11E+00
+ BA-133	30.80	*	97.60	8.51E-02	1.56E+00	4.14E-02
	302.84	*	17.80	1.84E+02	6.11E+02	8.62E+01
	356.01	*	60.00	2.34E+01	4.58E+02	1.04E+01
CE-139	165.85	80.35	3.76E+01	3.76E+01	7.36E+00	1.73E+01
CE-144	133.54	10.80	2.30E+02	2.30E+02	4.98E+01	1.07E+02
HG-203	279.19	77.30	4.12E+01	4.12E+01	-1.36E+00	1.91E+01
PB-210	46.50	4.25	1.25E+01	1.25E+01	6.35E+00	5.85E+00
PA-231	9.28	42.00	1.65E-06	1.65E-06	6.04E-06	8.10E-07
	10.11	20.20	9.66E-06		3.53E-05	4.73E-06
	283.67	1.60	1.40E+03		2.38E+02	6.29E+02
	302.67	2.30	2.03E+03		3.01E+03	9.68E+02
TH-231	25.64	14.70	6.74E-02	6.74E-02	-7.47E-02	3.21E-02
	84.21	6.40	3.27E+02		1.08E+03	1.59E+02
PA-234M	9.89	89.00	1.69E-06	1.69E-06	6.16E-06	8.26E-07
	21.72	64.90	4.62E-03		7.02E-03	2.22E-03
	37.93	23.75	1.17E+00		1.70E+00	5.65E-01
	131.42	20.40	1.12E+02		3.07E+01	5.16E+01
TH-234	63.29	3.80	1.41E+02	1.41E+02	7.05E+01	6.86E+01
NP-237	29.37	14.00	7.81E-01	7.81E-01	6.66E+00	3.85E-01
	86.50	12.60	8.06E+01		6.67E+00	3.79E+01
U-237	97.08	16.30	7.65E+01	5.69E+01	-1.02E+01	3.56E+01
	101.07	26.30	5.69E+01		3.75E+01	2.66E+01
	114.00	12.30	2.75E+02		3.54E+02	1.32E+02
	208.01	22.00	1.77E+02		-1.07E+01	8.24E+01
AM-241	59.54	35.90	9.50E+00	9.50E+00	8.21E+00	4.58E+00
AM-243	74.67	66.00	8.37E+00	8.37E+00	6.20E-01	3.93E+00

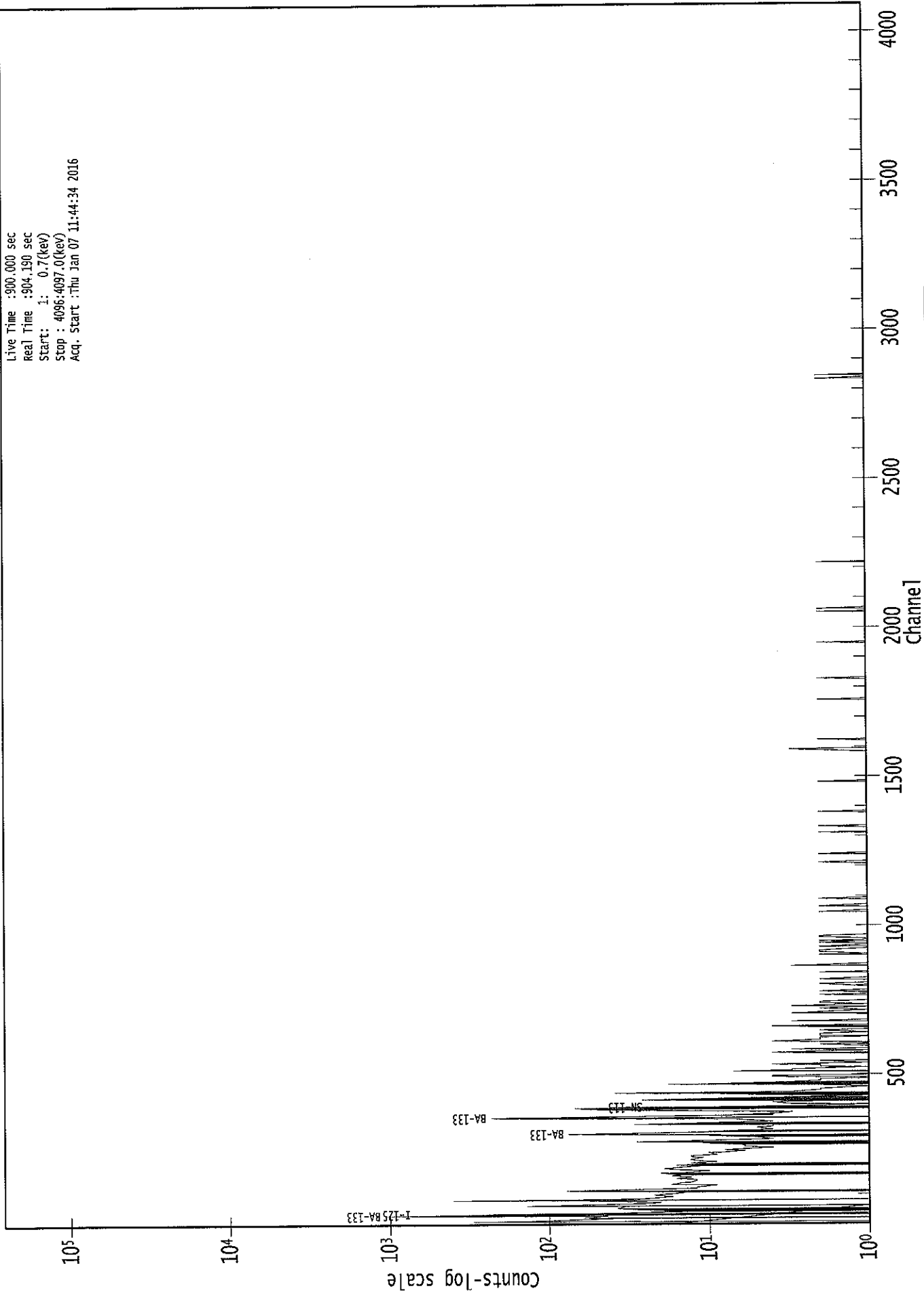
Analysis Report for 1512122-03

BC-1

-
- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031489.CNF

Live Time : 900.000 sec
Real Time : 904.190 sec
Start : 1: 0.7 (keV)
Stop : 4096:4097.0 (keV)
Acq. Start : Thu Jan 07 11:44:34 2016



KB
1/7/16

Analysis Report for 1512122-04
TBB-3S

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-04
 Sample Description : TBB-3S
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 12:16:02PM
 Acquisition Started : 1/7/2016 12:35:57PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE1
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.2 seconds

 Dead Time : 0.02 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 19 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31499

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:51:00PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-04

TBB-3S

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	30.78	27 -	40	31.13	8.24E+02	61.35	1.04E+02	1.58
m	2	35.06	27 -	40	35.41	1.94E+02	36.06	8.54E+01	1.66
M	3	62.14	58 -	70	62.49	1.14E+02	31.65	1.02E+02	1.91
m	4	66.36	58 -	70	66.70	3.86E+01	27.53	1.02E+02	1.92
	5	80.98	76 -	86	81.32	3.71E+02	52.95	1.77E+02	1.87
	6	111.68	108 -	115	112.01	6.98E+01	34.18	1.48E+02	1.30
	7	135.63	133 -	139	135.95	2.56E+01	16.69	2.69E+01	4.58
	8	275.94	272 -	279	276.21	4.32E+01	17.78	2.36E+01	1.39
	9	302.35	292 -	310	302.62	7.80E+01	40.29	1.14E+02	1.72
	10	336.05	328 -	344	336.31	6.00E+01	26.18	4.20E+01	6.73
	11	355.94	351 -	360	356.19	2.41E+02	34.26	3.00E+01	1.76
	12	376.65	373 -	379	376.89	9.76E+00	13.03	2.25E+01	1.34
M	13	383.60	380 -	394	383.84	4.75E+01	16.14	5.00E+00	1.81
m	14	386.92	380 -	394	387.15	6.49E+01	22.01	5.00E+00	1.82
	15	415.88	411 -	420	416.11	2.30E+01	19.29	4.00E+01	5.53
	16	437.01	433 -	440	437.23	4.79E+01	16.25	1.22E+01	1.38
	17	467.77	464 -	471	467.98	1.22E+01	10.95	1.16E+01	2.10
	18	533.10	530 -	536	533.29	5.21E+00	6.34	3.57E+00	1.95
	19	567.41	564 -	571	567.58	7.82E+00	8.72	6.36E+00	1.77
	20	645.28	643 -	647	645.43	7.00E+00	5.29	0.00E+00	1.47

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:51:00PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031224.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	30.78	8.24E+02	61.35			8.24E+02	6.14E+01
m	2	35.06	1.94E+02	36.06			1.94E+02	3.61E+01
M	3	62.14	1.14E+02	31.65			1.14E+02	3.17E+01
m	4	66.36	3.86E+01	27.53			3.86E+01	2.75E+01
	5	80.98	3.71E+02	52.95			3.71E+02	5.30E+01
	6	111.68	6.98E+01	34.18			6.98E+01	3.42E+01
	7	135.63	2.56E+01	16.69			2.56E+01	1.67E+01
	8	275.94	4.32E+01	17.78			4.32E+01	1.78E+01
	9	302.35	7.80E+01	40.29			7.80E+01	4.03E+01

: 00163

Analysis Report for 1512122-04

TBB-3S

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	10	336.05	6.00E+01	26.18		6.00E+01	2.62E+01
	11	355.94	2.41E+02	34.26		2.41E+02	3.43E+01
	12	376.65	9.76E+00	13.03		9.76E+00	1.30E+01
M	13	383.60	4.75E+01	16.14		4.75E+01	1.61E+01
m	14	386.92	6.49E+01	22.01		6.49E+01	2.20E+01
	15	415.88	2.30E+01	19.29		2.30E+01	1.93E+01
	16	437.01	4.79E+01	16.25		4.79E+01	1.62E+01
	17	467.77	1.22E+01	10.95		1.22E+01	1.10E+01
	18	533.10	5.21E+00	6.34		5.21E+00	6.34E+00
	19	567.41	7.82E+00	8.72		7.82E+00	8.72E+00
	20	645.28	7.00E+00	5.29		7.00E+00	5.29E+00

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-125	0.97	35.49 *	6.49	3.40E+00	6.32E-01
BA-133	0.99	30.80 *	97.60	3.30E-01	2.46E-02
		302.84 *	17.80	3.09E+02	1.85E+02
PA-231	0.99	356.01 *	60.00	1.94E+02	3.32E+01
		9.28	42.00		
		10.11	20.20		
		283.67	1.60		
		302.67 *	2.30	2.39E+03	1.43E+03

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

: 00164

Analysis Report for 1512122-04

TBB-3S

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
	I-125	0.970	3.40E+00	6.32E-01	
X	I-129	0.644			
	BA-133	0.996	3.30E-01	2.46E-02	
	PA-231	0.999	2.39E+03	1.43E+03	

- ? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-04

TBB-3S

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:51:00PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	3	62.14	1.26168E-01	13.94	Sum
m	4	66.36	4.28819E-02	35.67	Sum
	5	80.98	4.11813E-01	7.14	
	6	111.68	7.75965E-02	24.47	
	7	135.63	2.83903E-02	32.66	
	8	275.94	4.79798E-02	20.58	
	10	336.05	6.66392E-02	21.82	
	12	376.65	1.08466E-02	66.73	
M	13	383.60	5.28235E-02	16.97	
m	14	386.92	7.21351E-02	16.95	Sum
	15	415.88	2.55556E-02	41.93	
	16	437.01	5.32407E-02	16.95	
	17	467.77	1.35802E-02	44.81	
	18	533.10	5.79365E-03	60.84	
	19	567.41	8.68687E-03	55.75	
	20	645.28	7.77778E-03	37.80	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Analysis Report for 1512122-04

TBB-3S

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	6.60E-12	6.60E-12	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.06E+01	2.06E+01	1.60E+01	9.29E+00
	136.48	10.60	1.97E+02		1.02E+02	8.85E+01
NI-59	6.92	29.80	6.80E-11	6.80E-11	0.00E+00	0.00E+00
MO-93	16.59	52.90	2.56E-05	2.56E-05	-6.47E-06	1.06E-05
	18.60	10.00	1.07E-03		-2.77E-04	4.93E-04
NB-93M	16.57	9.43	1.42E-04	1.42E-04	-3.58E-05	5.89E-05
CD-109	88.03	3.72	2.21E+02	2.21E+02	-1.92E+01	1.02E+02
SN-113	255.12	1.93	1.09E+03	1.30E+01	-1.63E+01	4.82E+02
	391.69	61.90	1.30E+01		-4.41E+00	5.68E+00
SN-119M	23.87	16.10	1.46E-02	1.46E-02	1.89E-02	7.00E-03
	25.10	22.70	1.54E-02		1.61E-02	7.31E-03
+ I-125	35.49	* 6.49	1.39E+00	1.39E+00	3.40E+00	6.73E-01
I-129	29.78	* 57.00	5.50E-02	5.50E-02	5.65E-01	2.66E-02
	33.60	13.20	6.24E-01		-2.91E+00	3.04E-01
	39.58	7.52	1.17E+00		-1.96E-01	5.33E-01
+ BA-133	30.80	* 97.60	3.21E-02	3.21E-02	3.30E-01	1.55E-02
	302.84	* 17.80	2.47E+02		3.09E+02	1.18E+02
	356.01	* 60.00	2.14E+01		1.94E+02	9.61E+00
CE-139	165.85	80.35	4.00E+01	4.00E+01	-1.56E+00	1.84E+01
CE-144	133.54	10.80	2.01E+02	2.01E+02	8.30E+01	9.10E+01
HG-203	279.19	77.30	3.21E+01	3.21E+01	-3.15E+00	1.46E+01
PB-210	46.50	4.25	6.37E+00	6.37E+00	1.25E+00	2.90E+00
+ PA-231	9.28	42.00	3.55E-09	3.55E-09	0.00E+00	0.00E+00
	10.11	20.20	2.40E-08		0.00E+00	0.00E+00
	283.67	1.60	9.94E+02		-1.06E+01	4.30E+02
	302.67	* 2.30	1.91E+03		2.39E+03	9.13E+02
TH-231	25.64	14.70	2.05E-02	2.05E-02	-4.09E-02	9.56E-03
	84.21	6.40	1.26E+02		-6.78E+02	5.88E+01
PA-234M	9.89	89.00	4.04E-09	4.04E-09	0.00E+00	0.00E+00
	21.72	64.90	1.51E-03		3.07E-03	7.22E-04
	37.93	23.75	5.05E-01		3.65E-01	2.40E-01
	131.42	20.40	1.00E+02		1.18E+00	4.53E+01
TH-234	63.29	3.80	9.14E+01	9.14E+01	4.57E+01	4.38E+01
NP-237	29.37	14.00	2.61E-01	2.61E-01	1.47E+00	1.28E-01
	86.50	12.60	6.57E+01		1.54E+01	3.05E+01
U-237	97.08	16.30	6.12E+01	4.48E+01	-5.85E+00	2.78E+01
	101.07	26.30	4.48E+01		-1.41E+01	2.04E+01
	114.00	12.30	2.26E+02		2.25E+02	1.07E+02
	208.01	22.00	1.11E+02		2.05E+01	4.88E+01
AM-241	59.54	35.90	5.58E+00	5.58E+00	-4.05E-01	2.64E+00
AM-243	74.67	66.00	6.18E+00	6.18E+00	1.25E+00	2.84E+00

+ = Nuclide identified during the nuclide identification

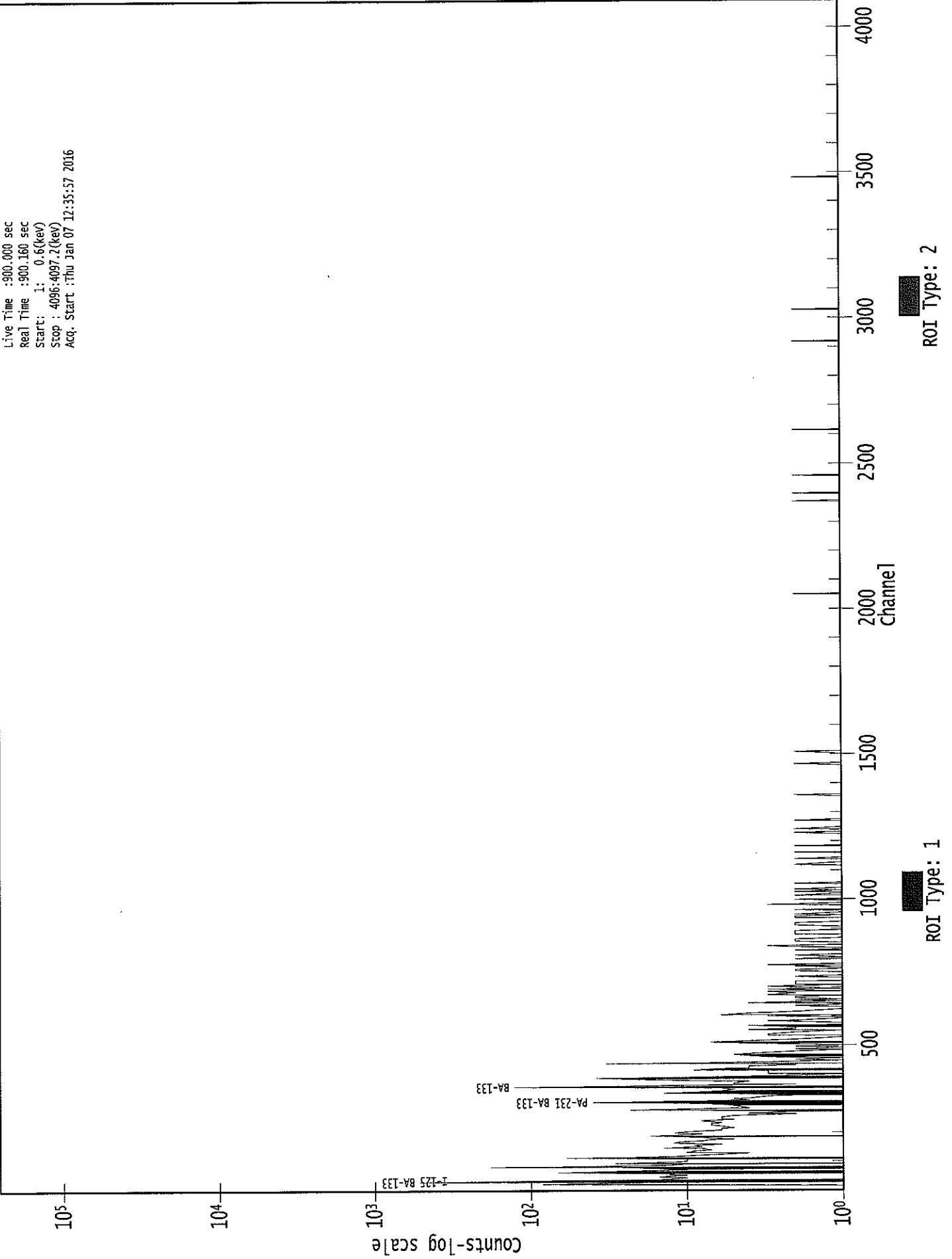
* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

0000031499.CNF

Live Time : 900.000 sec
Real Time : 900.160 sec
Start : 1: 0.6(kev)
Stop : 4096:4097.2(kev)
Acq. Start : Thu Jan 07 12:35:57 2016



80100

KB
1/7/16

Analysis Report for 1512122-05
TBB-1D

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-05
 Sample Description : TBB-1D
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 11:40:50AM
 Acquisition Started : 1/7/2016 12:02:24PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE1
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.2 seconds

 Dead Time : 0.02 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 19 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31491

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:17:27PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-05

TBB-1D

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	30.83	27 -	39	31.18	1.42E+03	79.99	1.63E+02	1.54
m	2	35.06	27 -	39	35.41	3.69E+02	46.32	1.09E+02	1.81
	3	53.17	50 -	56	53.52	5.21E+01	31.73	1.42E+02	3.16
M	4	61.78	58 -	69	62.13	1.09E+02	29.93	8.94E+01	1.43
m	5	65.52	58 -	69	65.87	6.76E+01	27.28	8.05E+01	1.44
	6	81.14	76 -	86	81.48	5.33E+02	64.75	2.75E+02	1.99
M	7	111.86	107 -	120	112.19	1.26E+02	33.35	1.08E+02	1.84
m	8	115.97	107 -	120	116.30	2.14E+01	26.15	1.08E+02	1.85
	9	276.40	273 -	280	276.68	4.23E+01	20.78	4.35E+01	1.32
M	10	302.89	297 -	309	303.16	8.75E+01	21.87	2.46E+01	1.74
m	11	306.84	297 -	309	307.11	1.32E+01	16.32	2.11E+01	1.75
	12	333.43	330 -	337	333.69	3.25E+01	26.15	9.29E+01	1.38
	13	338.07	337 -	341	338.33	1.83E+01	13.06	1.73E+01	1.29
M	14	356.00	350 -	363	356.25	4.06E+02	41.32	1.83E+01	1.68
m	15	360.41	350 -	363	360.66	1.02E+01	14.66	3.53E+01	1.97
M	16	383.73	381 -	390	383.97	8.38E+01	23.89	3.64E+01	1.81
m	17	386.84	381 -	390	387.07	1.44E+02	34.56	7.13E+01	1.82
	18	404.45	402 -	408	404.68	1.35E+01	9.62	7.00E+00	3.22
M	19	414.71	410 -	428	414.94	2.18E+01	14.28	0.00E+00	2.22
m	20	418.22	410 -	428	418.45	1.90E+01	13.56	0.00E+00	2.23
m	21	422.33	410 -	428	422.55	1.21E+01	10.20	0.00E+00	2.23
M	22	432.61	432 -	439	432.83	8.78E+00	4.58	5.62E-02	1.85
m	23	436.91	432 -	439	437.13	7.39E+01	18.28	2.92E+00	1.70
	24	467.24	462 -	473	467.45	1.68E+01	16.12	2.43E+01	2.41
	25	519.84	517 -	523	520.03	6.50E+00	6.65	3.00E+00	2.06
	26	583.65	580 -	587	583.82	8.20E+00	7.48	3.60E+00	1.54
	27	637.54	636 -	640	637.69	5.17E+00	5.50	1.67E+00	1.89
	28	644.25	641 -	647	644.40	6.25E+00	6.65	3.50E+00	2.51

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.00sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:17:27PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031224.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M 1	30.83	1.42E+03	79.99			1.42E+03	8.00E+01

: 00170

Analysis Report for 1512122-05

TBB-1D

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	2	35.06	3.69E+02	46.32			3.69E+02	4.63E+01
	3	53.17	5.21E+01	31.73			5.21E+01	3.17E+01
M	4	61.78	1.09E+02	29.93			1.09E+02	2.99E+01
m	5	65.52	6.76E+01	27.28			6.76E+01	2.73E+01
	6	81.14	5.33E+02	64.75			5.33E+02	6.47E+01
M	7	111.86	1.26E+02	33.35			1.26E+02	3.33E+01
m	8	115.97	2.14E+01	26.15			2.14E+01	2.62E+01
	9	276.40	4.23E+01	20.78			4.23E+01	2.08E+01
M	10	302.89	8.75E+01	21.87			8.75E+01	2.19E+01
m	11	306.84	1.32E+01	16.32			1.32E+01	1.63E+01
	12	333.43	3.25E+01	26.15			3.25E+01	2.62E+01
	13	338.07	1.83E+01	13.06	1.33E+00	1.44E+00	1.70E+01	1.31E+01
M	14	356.00	4.06E+02	41.32			4.06E+02	4.13E+01
m	15	360.41	1.02E+01	14.66			1.02E+01	1.47E+01
M	16	383.73	8.38E+01	23.89			8.38E+01	2.39E+01
m	17	386.84	1.44E+02	34.56			1.44E+02	3.46E+01
	18	404.45	1.35E+01	9.62			1.35E+01	9.62E+00
M	19	414.71	2.18E+01	14.28			2.18E+01	1.43E+01
m	20	418.22	1.90E+01	13.56			1.90E+01	1.36E+01
m	21	422.33	1.21E+01	10.20			1.21E+01	1.02E+01
M	22	432.61	8.78E+00	4.58			8.78E+00	4.58E+00
m	23	436.91	7.39E+01	18.28			7.39E+01	1.83E+01
	24	467.24	1.68E+01	16.12			1.68E+01	1.61E+01
	25	519.84	6.50E+00	6.65			6.50E+00	6.65E+00
	26	583.65	8.20E+00	7.48	8.38E-01	1.08E+00	7.36E+00	7.56E+00
	27	637.54	5.17E+00	5.50			5.17E+00	5.50E+00
	28	644.25	6.25E+00	6.65			6.25E+00	6.65E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-125	0.97	35.49 *	6.49	6.47E+00	8.12E-01
BA-133	1.00	30.80 *	97.60	5.75E-01	3.25E-02

: 00171

Analysis Report for 1512122-05
TBB-1D

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	1.00	302.84 *	17.80	3.45E+02	1.36E+02
		356.01 *	60.00	3.27E+02	4.54E+01
PA-231	1.00	9.28	42.00		
		10.11	20.20		
		283.67	1.60		
		302.67 *	2.30	2.67E+03	1.05E+03

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
I-125	0.971	6.47E+00	8.12E-01	
BA-133	1.000	5.75E-01	3.25E-02	
PA-231	1.000	2.67E+03	1.05E+03	

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity
 Errors quoted at 2.000sigma

Analysis Report for 1512122-05

TBB-1D

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:17:27PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	3	53.17	5.78455E-02	30.47	
M	4	61.78	1.21658E-01	13.67	Sum
m	5	65.52	7.50870E-02	20.18	Sum
	6	81.14	5.91826E-01	6.08	
M	7	111.86	1.40535E-01	13.18	
m	8	115.97	2.37918E-02	61.07	
	9	276.40	4.69531E-02	24.59	
m	11	306.84	1.46834E-02	61.77	
	12	333.43	3.61392E-02	40.20	Sum
	13	338.07	1.88877E-02	38.64	Sum
m	15	360.41	1.13420E-02	71.82	
M	16	383.73	9.30639E-02	14.26	
m	17	386.84	1.60306E-01	11.98	Sum
	18	404.45	1.50000E-02	35.62	
M	19	414.71	2.42580E-02	32.71	
m	20	418.22	2.10706E-02	35.77	
m	21	422.33	1.34001E-02	42.28	
M	22	432.61	9.75845E-03	26.09	
m	23	436.91	8.21612E-02	12.36	
	24	467.24	1.86973E-02	47.91	
	25	519.84	7.22222E-03	51.17	
	26	583.65	8.18036E-03	51.35	
	27	637.54	5.74074E-03	53.23	
	28	644.25	6.94444E-03	53.22	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.00sigma

Analysis Report for 1512122-05

TBB-1D

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)	
FE-55	5.89	24.50	6.60E-12	6.60E-12	0.00E+00	0.00E+00	
CO-57	122.06	85.51	2.29E+01	2.29E+01	-4.54E+00	1.05E+01	
	136.48	10.60	2.12E+02		8.78E+01	9.63E+01	
NI-59	6.92	29.80	6.80E-11	6.80E-11	0.00E+00	0.00E+00	
MO-93	16.59	52.90	2.93E-05	2.93E-05	-1.62E-05	1.25E-05	
	18.60	10.00	1.33E-03		1.32E-05	6.23E-04	
NB-93M	16.57	9.43	1.62E-04	1.62E-04	-8.95E-05	6.90E-05	
CD-109	88.03	3.72	2.36E+02	2.36E+02	2.55E+01	1.09E+02	
SN-113	255.12	1.93	1.30E+03	1.81E+01	5.97E+02	5.85E+02	
	391.69	61.90	1.81E+01		1.53E+01	8.26E+00	
SN-119M	23.87	16.10	1.57E-02	1.57E-02	1.23E-02	7.52E-03	
	25.10	22.70	1.64E-02		7.88E-03	7.81E-03	
+ I-125	35.49	*	6.49	1.59E+00	1.59E+00	6.47E+00	7.74E-01
I-129	29.78	57.00	9.42E-02	9.42E-02	7.07E-01	4.64E-02	
	33.60	13.20	8.25E-01		-4.20E+00	4.04E-01	
	39.58	7.52	1.37E+00		-2.32E-01	6.34E-01	
+ BA-133	30.80	*	97.60	3.76E-02	3.76E-02	5.75E-01	1.83E-02
	302.84	*	17.80	1.52E+02		3.45E+02	7.05E+01
	356.01	*	60.00	2.80E+01		3.27E+02	1.29E+01
CE-139	165.85	80.35	4.18E+01	4.18E+01	1.36E+01	1.92E+01	
CE-144	133.54	10.80	1.95E+02	1.95E+02	-2.77E+01	8.81E+01	
HG-203	279.19	77.30	3.49E+01	3.49E+01	2.50E+01	1.60E+01	
PB-210	46.50	4.25	7.93E+00	7.93E+00	2.60E+00	3.68E+00	
+ PA-231	9.28	42.00	3.55E-09	3.55E-09	0.00E+00	0.00E+00	
	10.11	20.20	2.40E-08		0.00E+00	0.00E+00	
	283.67	1.60	9.94E+02		-2.96E+02	4.30E+02	
	302.67	*	2.30	1.17E+03		2.67E+03	5.46E+02
TH-231	25.64	14.70	2.46E-02	2.46E-02	-4.09E-02	1.16E-02	
	84.21	6.40	1.46E+02		-9.76E+02	6.88E+01	
PA-234M	9.89	89.00	4.04E-09	4.04E-09	0.00E+00	0.00E+00	
	21.72	64.90	1.65E-03		3.54E-03	7.91E-04	
	37.93	23.75	6.28E-01		7.01E-01	3.02E-01	
	131.42	20.40	1.06E+02		-4.01E+01	4.82E+01	
TH-234	63.29	3.80	1.07E+02	1.07E+02	7.24E+01	5.15E+01	
NP-237	29.37	14.00	3.40E-01	3.40E-01	2.55E+00	1.68E-01	
	86.50	12.60	6.46E+01		7.06E+00	2.99E+01	
U-237	97.08	16.30	6.82E+01	4.69E+01	-3.45E+01	3.13E+01	
	101.07	26.30	4.69E+01		3.52E-01	2.15E+01	
	114.00	12.30	2.82E+02		3.80E+02	1.35E+02	
	208.01	22.00	1.55E+02		9.51E+01	7.08E+01	
AM-241	59.54	35.90	6.86E+00	6.86E+00	4.97E+00	3.28E+00	
AM-243	74.67	66.00	7.56E+00	7.56E+00	1.66E-01	3.53E+00	

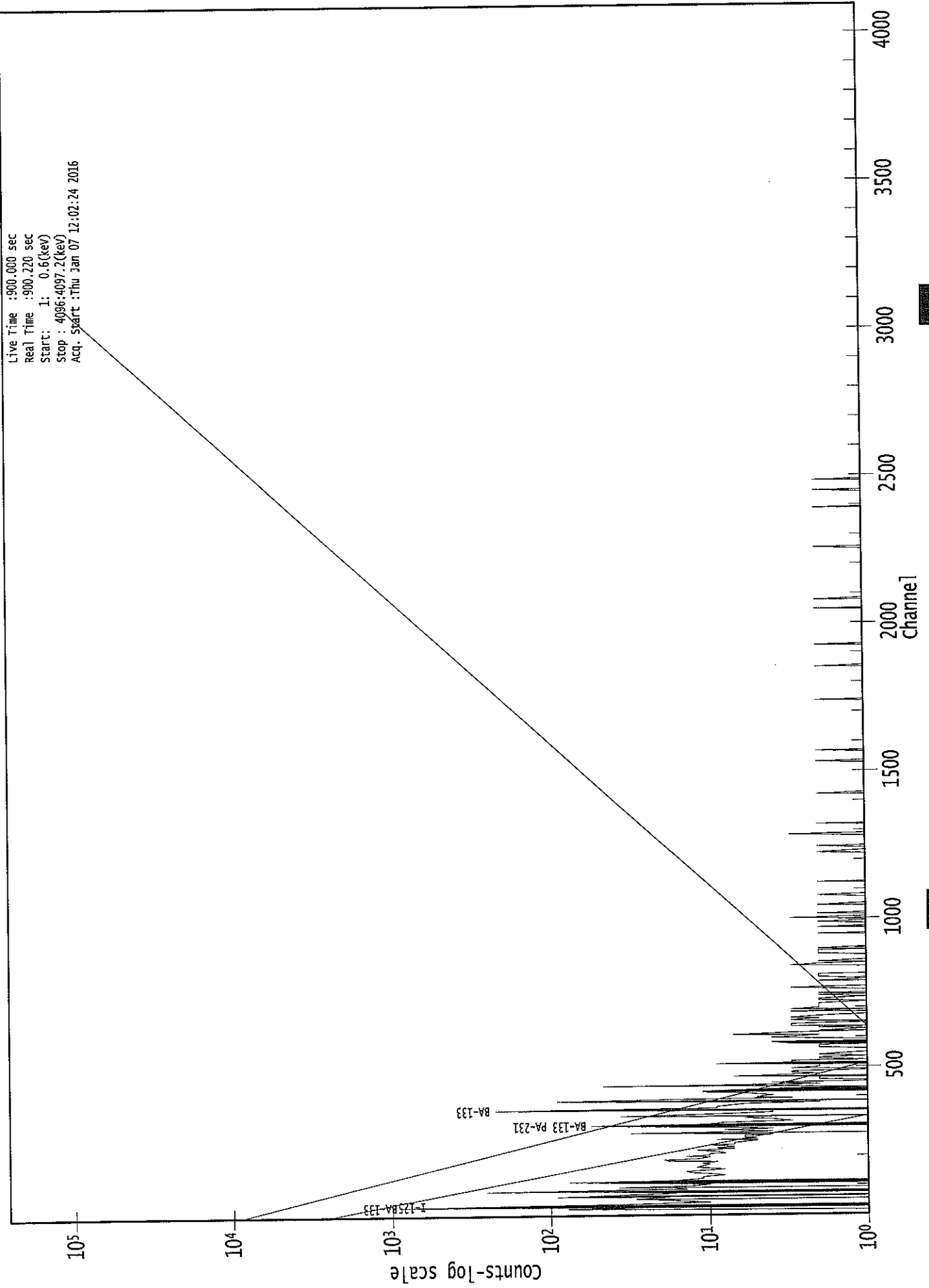
Analysis Report for 1512122-05

TBB-1D

- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031491.CNF

Live Time : 900.000 sec
Real Time : 900.220 sec
Start : 1: 0.6(keV)
Stop : 4096:4097.2(keV)
Acq. Start : Thu Jan 07 12:02:24 2016



: 00176

12/17/16



Analysis Report for 1512122-06
TBB-1S

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-06
 Sample Description : TBB-1S
 Sample Type : RA RECOVERY

Sample Size : 1.000E+00 units
 Facility : Countroom

Sample Taken On : 1/7/2016 11:41:03AM
 Acquisition Started : 1/7/2016 12:02:30PM

Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE2
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.3 seconds

Dead Time : 0.03 %

Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 5 - 4096
 Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 11/2/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

Sample Number : 31492

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:17:39PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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: 00177

Analysis Report for 1512122-06

TBB-1S

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	20.85	19 -	24	20.97	4.44E+01	49.68	4.61E+02	1.94
2	30.95	28 -	33	31.06	1.81E+03	101.05	5.96E+02	1.27
3	35.45	35 -	41	35.57	3.46E+02	77.21	3.04E+02	2.35
4	52.87	50 -	56	52.97	3.69E+01	31.35	1.54E+02	1.90
5	61.68	58 -	64	61.78	1.55E+02	46.20	3.10E+02	1.30
6	66.23	66 -	68	66.32	2.82E+01	25.18	1.44E+02	1.96
7	81.11	77 -	85	81.19	7.38E+02	67.27	2.40E+02	1.46
M 8	112.07	108 -	119	112.13	1.43E+02	33.34	1.17E+02	1.56
m 9	116.32	108 -	119	116.38	2.70E+01	25.91	9.35E+01	1.57
10	187.83	181 -	194	187.86	4.47E+01	46.16	2.17E+02	1.24
11	257.06	251 -	264	257.05	3.03E+01	28.55	7.74E+01	11.88
12	276.69	272 -	282	276.67	7.44E+01	24.24	3.92E+01	1.90
M 13	302.84	299 -	310	302.80	1.42E+02	26.37	3.50E+01	1.55
m 14	307.16	299 -	310	307.12	1.93E+01	15.73	3.50E+01	1.67
M 15	333.93	329 -	346	333.87	5.17E+01	18.49	1.81E+01	1.55
m 16	338.09	329 -	346	338.03	2.00E+01	13.49	2.47E+01	1.56
17	356.04	352 -	360	355.97	4.82E+02	49.69	7.73E+01	1.41
M 18	383.76	380 -	389	383.68	8.77E+01	23.81	2.70E+01	2.15
m 19	386.96	380 -	389	386.87	1.39E+02	31.27	4.42E+01	1.60
20	391.27	390 -	395	391.19	4.98E+01	19.34	2.44E+01	1.62
21	415.18	411 -	419	415.08	1.89E+01	23.32	7.23E+01	1.67
22	436.87	434 -	439	436.76	9.16E+01	20.27	8.72E+00	1.98
23	522.53	519 -	525	522.38	8.00E+00	5.66	0.00E+00	1.16
24	677.62	675 -	680	677.40	5.00E+00	4.47	0.00E+00	1.00
25	690.10	686 -	694	689.87	8.10E+00	7.76	3.80E+00	1.50
26	910.91	907 -	913	910.58	1.20E+01	6.93	0.00E+00	1.50
27	932.12	928 -	934	931.79	5.43E+00	6.34	3.14E+00	1.32

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:17:39PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031225.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
1	20.85	4.44E+01	49.68			4.44E+01	4.97E+01
2	30.95	1.81E+03	101.05			1.81E+03	1.01E+02

: 00178

Analysis Report for 1512122-06

TBB-1S

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	3	3.46E+02	77.21			3.46E+02	7.72E+01
	4	3.69E+01	31.35	9.74E-01	1.91E+00	3.60E+01	3.14E+01
	5	1.55E+02	46.20			1.55E+02	4.62E+01
	6	2.82E+01	25.18			2.82E+01	2.52E+01
	7	7.38E+02	67.27			7.38E+02	6.73E+01
M	8	1.43E+02	33.34			1.43E+02	3.33E+01
m	9	2.70E+01	25.91			2.70E+01	2.59E+01
	10	4.47E+01	46.16			4.47E+01	4.62E+01
	11	3.03E+01	28.55			3.03E+01	2.85E+01
	12	7.44E+01	24.24			7.44E+01	2.42E+01
M	13	1.42E+02	26.37			1.42E+02	2.64E+01
m	14	1.93E+01	15.73			1.93E+01	1.57E+01
M	15	5.17E+01	18.49			5.17E+01	1.85E+01
m	16	2.00E+01	13.49			2.00E+01	1.35E+01
	17	4.82E+02	49.69			4.82E+02	4.97E+01
M	18	8.77E+01	23.81			8.77E+01	2.38E+01
m	19	1.39E+02	31.27			1.39E+02	3.13E+01
	20	4.98E+01	19.34			4.98E+01	1.93E+01
	21	1.89E+01	23.32			1.89E+01	2.33E+01
	22	9.16E+01	20.27			9.16E+01	2.03E+01
	23	8.00E+00	5.66			8.00E+00	5.66E+00
	24	5.00E+00	4.47			5.00E+00	4.47E+00
	25	8.10E+00	7.76			8.10E+00	7.76E+00
	26	1.20E+01	6.93	7.49E-01	8.81E-01	1.13E+01	6.98E+00
	27	5.43E+00	6.34			5.43E+00	6.34E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.93	255.12	1.93		
		391.69 *	61.90	3.45E+01	1.37E+01
I-125	1.00	35.49 *	6.49	3.85E+01	8.59E+00
BA-133	0.99	30.80 *	97.60	6.59E+00	3.69E-01

: 00179

Analysis Report for 1512122-06

TBB-1S

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	0.99	302.84 *	17.80	4.71E+02	1.45E+02
		356.01 *	60.00	3.96E+02	5.62E+01

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.934	3.45E+01	1.37E+01	
I-125	1.000	3.85E+01	8.59E+00	
BA-133	0.998	6.61E+00	3.69E-01	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-06

TBB-1S

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:17:39PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	20.85	4.93455E-02	55.93	Tol.	PA-234M
4	52.87	3.99606E-02	43.66		
5	61.68	1.72479E-01	14.88	Sum	
6	66.23	3.13241E-02	44.66	Sum	
7	81.11	8.19970E-01	4.56		
M	8	112.07	1.59127E-01	11.64	
m	9	116.32	3.00292E-02	47.94	
	10	187.83	4.96805E-02	51.62	
	11	257.06	3.36473E-02	47.14	
	12	276.69	8.26832E-02	16.29	
m	14	307.16	2.14450E-02	40.76	
M	15	333.93	5.74370E-02	17.89	Sum
m	16	338.09	2.22186E-02	33.73	Sum
M	18	383.76	9.74003E-02	13.58	
m	19	386.96	1.54127E-01	11.27	Sum
	21	415.18	2.09596E-02	61.82	
	22	436.87	1.01823E-01	11.06	
	23	522.53	8.88889E-03	35.36	
	24	677.62	5.55556E-03	44.72	
	25	690.10	9.00000E-03	47.91	
	26	910.91	1.25015E-02	31.04	
	27	932.12	6.03175E-03	58.43	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

Analysis Report for 1512122-06

TBB-1S

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	1.01E-06	1.01E-06	-6.03E-06	4.46E-07
CO-57	122.06	85.51	1.83E+01	1.83E+01	8.15E+00	8.45E+00
	136.48	10.60	1.78E+02		-6.49E+01	8.24E+01
NI-59	6.92	29.80	9.71E-06	9.71E-06	-2.98E-05	4.63E-06
MO-93	16.59	52.90	7.40E-03	7.40E-03	2.62E-03	3.52E-03
	18.60	10.00	8.80E-02		-8.42E-02	4.19E-02
NB-93M	16.57	9.43	4.12E-02	4.12E-02	1.45E-02	1.96E-02
CD-109	88.03	3.72	2.03E+02	2.03E+02	-1.98E+02	9.33E+01
+ SN-113	255.12	1.93	8.43E+02	1.69E+01	-4.47E+02	3.75E+02
	391.69	*	61.90		3.45E+01	7.53E+00
SN-119M	23.87	16.10	2.57E-01	2.51E-01	-7.83E-02	1.22E-01
	25.10	22.70	2.51E-01		-5.13E-02	1.19E-01
+ I-125	35.49	*	6.49	1.27E+01	3.85E+01	6.19E+00
I-129	29.78	57.00	9.61E-01	9.61E-01	5.18E+00	4.74E-01
	33.60	13.20	3.73E+00		-2.15E+01	1.81E+00
	39.58	7.52	4.10E+00		-5.70E-01	1.83E+00
+ BA-133	30.80	*	97.60	3.37E-01	6.59E+00	1.64E-01
	302.84	*	17.80		4.71E+02	6.54E+01
	356.01	*	60.00		3.96E+02	1.57E+01
CE-139	165.85	80.35	2.76E+01	2.76E+01	3.76E+00	1.28E+01
CE-144	133.54	10.80	1.79E+02	1.79E+02	1.07E+02	8.34E+01
HG-203	279.19	77.30	2.80E+01	2.80E+01	1.79E+00	1.29E+01
PB-210	46.50	4.25	1.85E+01	1.85E+01	9.56E+00	8.45E+00
PA-231	9.28	42.00	2.22E-04	2.22E-04	3.68E-04	1.09E-04
	10.11	20.20	1.07E-03		3.97E-03	5.24E-04
	283.67	1.60	7.59E+02		1.95E+01	3.27E+02
	302.67	2.30	1.56E+03		3.53E+03	7.45E+02
TH-231	25.64	14.70	4.70E-01	4.70E-01	-2.20E-01	2.24E-01
	84.21	6.40	1.03E+02		-6.62E+02	4.74E+01
PA-234M	9.89	89.00	2.01E-04	2.01E-04	7.48E-04	9.87E-05
	21.72	64.90	4.17E-02		2.83E-02	1.99E-02
	37.93	23.75	1.62E+00		-3.39E+00	7.50E-01
	131.42	20.40	8.47E+01		-2.86E+01	3.92E+01
TH-234	63.29	3.80	1.49E+02	1.49E+02	2.60E+02	7.14E+01
NP-237	29.37	14.00	1.77E+00	1.77E+00	-3.24E+01	8.58E-01
	86.50	12.60	5.84E+01		-6.17E+01	2.69E+01
U-237	97.08	16.30	6.91E+01	5.32E+01	-2.21E+01	3.22E+01
	101.07	26.30	5.32E+01		2.61E+01	2.50E+01
	114.00	12.30	2.20E+02		3.72E+02	1.06E+02
	208.01	22.00	9.77E+01		-7.22E+01	4.46E+01
AM-241	59.54	35.90	9.01E+00	9.01E+00	-2.87E+01	4.25E+00
AM-243	74.67	66.00	6.68E+00	6.68E+00	1.19E+00	3.05E+00

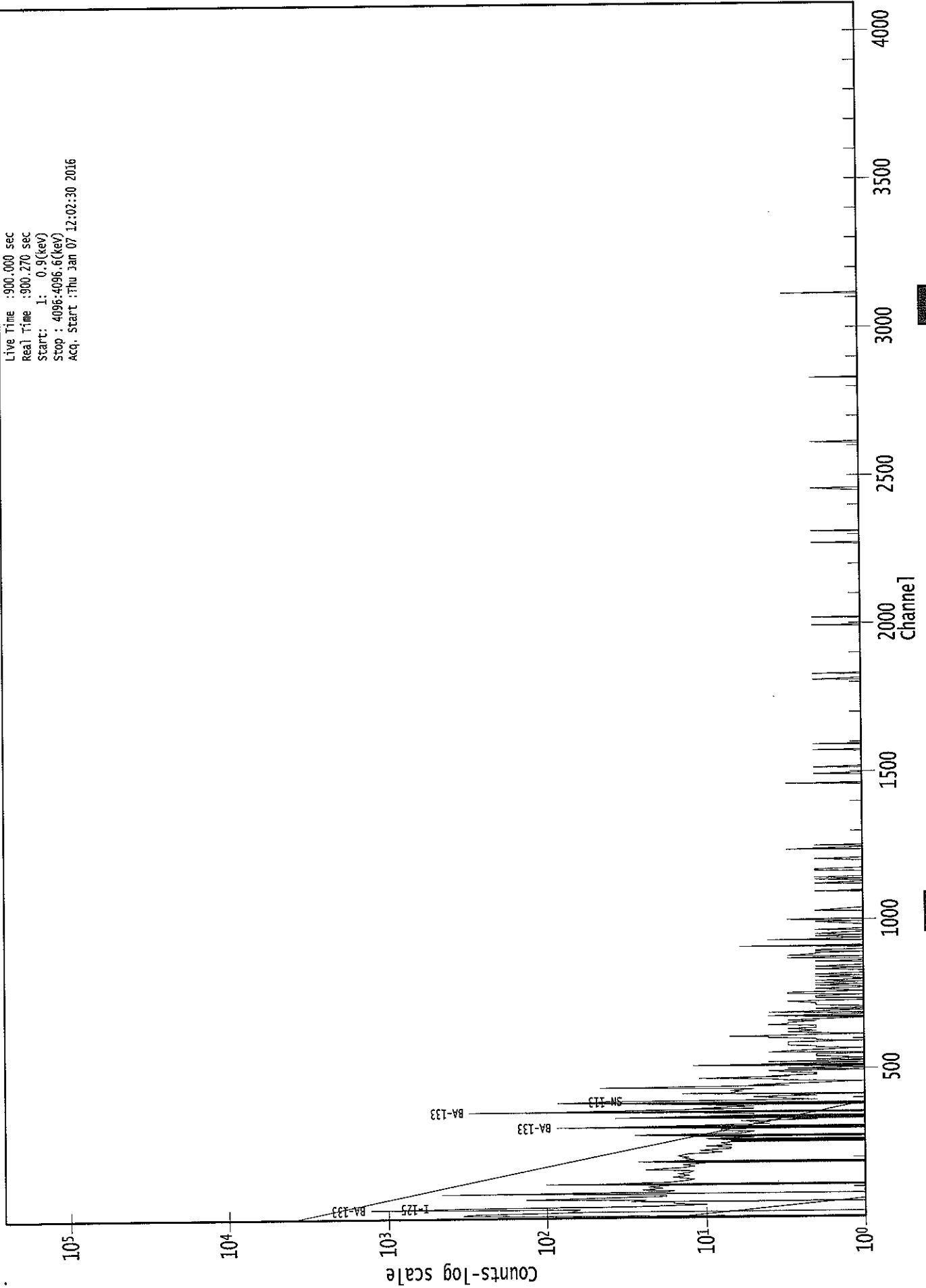
Analysis Report for 1512122-06

TBB-1S

- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031492.CNF

Live Time : 900.000 sec
Real Time : 900.270 sec
Start : 1: 0.9(kev)
Stop : 4096:4096.6(kev)
Acq. Start : Thu Jan 07 12:02:30 2016



18100 :

ROI Type: 1

ROI Type: 2

105
1/7/16

Analysis Report for 1512122-07
TBA-1D

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-07
 Sample Description : TBA-1D
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 11:41:14AM
 Acquisition Started : 1/7/2016 12:02:39PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE3
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 904.3 seconds

 Dead Time : 0.48 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 9 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31493

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:17:49PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-07

TBA-1D

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	21.23	18 -	41	21.47	1.10E+02	34.55	1.65E+02	1.95
m	2	26.41	18 -	41	26.65	5.19E+01	33.50	1.62E+02	2.05
m	3	30.99	18 -	41	31.23	1.89E+03	88.97	1.15E+02	1.65
m	4	35.33	18 -	41	35.56	4.83E+02	49.87	9.58E+01	1.71
M	5	53.06	49 -	70	53.28	4.27E+01	38.44	2.24E+02	2.36
m	6	62.10	49 -	70	62.32	2.34E+02	44.61	2.10E+02	1.91
m	7	66.06	49 -	70	66.28	1.04E+02	45.84	2.64E+02	2.40
	8	81.36	77 -	86	81.57	7.72E+02	68.93	2.31E+02	2.00
M	9	112.09	108 -	122	112.29	1.69E+02	34.29	8.99E+01	1.90
m	10	116.48	108 -	122	116.67	4.30E+01	26.23	7.29E+01	1.91
	11	276.41	273 -	281	276.52	6.28E+01	28.01	8.43E+01	1.51
M	12	303.10	293 -	310	303.20	1.23E+02	24.67	2.91E+01	1.59
m	13	307.28	293 -	310	307.37	1.45E+01	20.17	4.95E+01	2.15
	14	333.45	328 -	336	333.53	7.20E+01	27.50	7.20E+01	1.86
	15	356.34	350 -	361	356.41	4.32E+02	45.43	4.23E+01	1.96
M	16	384.45	381 -	394	384.51	1.13E+02	31.00	1.78E+01	2.47
m	17	387.28	381 -	394	387.33	1.85E+02	34.64	1.14E+01	1.99
m	18	391.64	381 -	394	391.69	3.20E+01	15.62	6.59E+00	2.00
M	19	414.98	411 -	425	415.02	3.65E+01	16.77	1.62E+01	2.26
m	20	418.36	411 -	425	418.39	2.26E+01	17.47	1.84E+01	2.26
	21	437.24	432 -	441	437.26	7.76E+01	20.37	1.48E+01	1.80
	22	468.37	465 -	471	468.38	1.81E+01	13.01	1.79E+01	1.85
	23	593.65	591 -	595	593.60	5.00E+00	4.47	0.00E+00	1.70

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:17:49PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031226.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	21.23	1.10E+02	34.55			1.10E+02	3.46E+01
m	2	26.41	5.19E+01	33.50			5.19E+01	3.35E+01
m	3	30.99	1.89E+03	88.97			1.89E+03	8.90E+01
m	4	35.33	4.83E+02	49.87			4.83E+02	4.99E+01
M	5	53.06	4.27E+01	38.44			4.27E+01	3.84E+01
m	6	62.10	2.34E+02	44.61			2.34E+02	4.46E+01

Analysis Report for 1512122-07

TBA-1D

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
m	7	66.06	1.04E+02	45.84			1.04E+02	4.58E+01
	8	81.36	7.72E+02	68.93			7.72E+02	6.89E+01
M	9	112.09	1.69E+02	34.29			1.69E+02	3.43E+01
m	10	116.48	4.30E+01	26.23			4.30E+01	2.62E+01
	11	276.41	6.28E+01	28.01			6.28E+01	2.80E+01
M	12	303.10	1.23E+02	24.67			1.23E+02	2.47E+01
m	13	307.28	1.45E+01	20.17			1.45E+01	2.02E+01
	14	333.45	7.20E+01	27.50			7.20E+01	2.75E+01
	15	356.34	4.32E+02	45.43			4.32E+02	4.54E+01
M	16	384.45	1.13E+02	31.00			1.13E+02	3.10E+01
m	17	387.28	1.85E+02	34.64			1.85E+02	3.46E+01
m	18	391.64	3.20E+01	15.62			3.20E+01	1.56E+01
M	19	414.98	3.65E+01	16.77			3.65E+01	1.68E+01
m	20	418.36	2.26E+01	17.47			2.26E+01	1.75E+01
	21	437.24	7.76E+01	20.37			7.76E+01	2.04E+01
	22	468.37	1.81E+01	13.01			1.81E+01	1.30E+01
	23	593.65	5.00E+00	4.47			5.00E+00	4.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12	1.93		
		391.69 *	61.90	2.44E+01	1.21E+01
I-125	0.99	35.49 *	6.49	1.50E+01	1.55E+00
		30.80 *	97.60	1.52E+00	7.13E-02
BA-133	0.99	302.84 *	17.80	5.39E+02	2.20E+02
		356.01 *	60.00	4.21E+02	6.15E+01
		25.64 *	14.70	7.92E-02	5.11E-02
TH-231	0.91	84.21	6.40		

: 00187

Analysis Report for 1512122-07

TBA-1D

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/units)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
SN-113	0.965	2.44E+01	1.21E+01	
I-125	0.996	1.50E+01	1.55E+00	
BA-133	0.990	1.52E+00	7.13E-02	
TH-231	0.916	7.92E-02	5.11E-02	

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-07

TBA-1D

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:17:49PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M	1	21.23	1.22681E-01	15.65	
M	5	53.06	4.74050E-02	45.05	Sum
m	6	62.10	2.60047E-01	9.53	Sum
m	7	66.06	1.15091E-01	22.13	Sum
	8	81.36	8.58118E-01	4.46	
M	9	112.09	1.87851E-01	10.14	
m	10	116.48	4.77876E-02	30.49	
	11	276.41	6.98095E-02	22.29	
m	13	307.28	1.61049E-02	69.59	
	14	333.45	8.00000E-02	19.09	Sum
M	16	384.45	1.25636E-01	13.71	
m	17	387.28	2.06050E-01	9.34	Sum
M	19	414.98	4.05361E-02	22.98	
m	20	418.36	2.51640E-02	38.57	Sum
	21	437.24	8.62353E-02	13.12	
	22	468.37	2.00617E-02	36.03	
	23	593.65	5.55556E-03	44.72	

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

: 00189

Analysis Report for 1512122-07

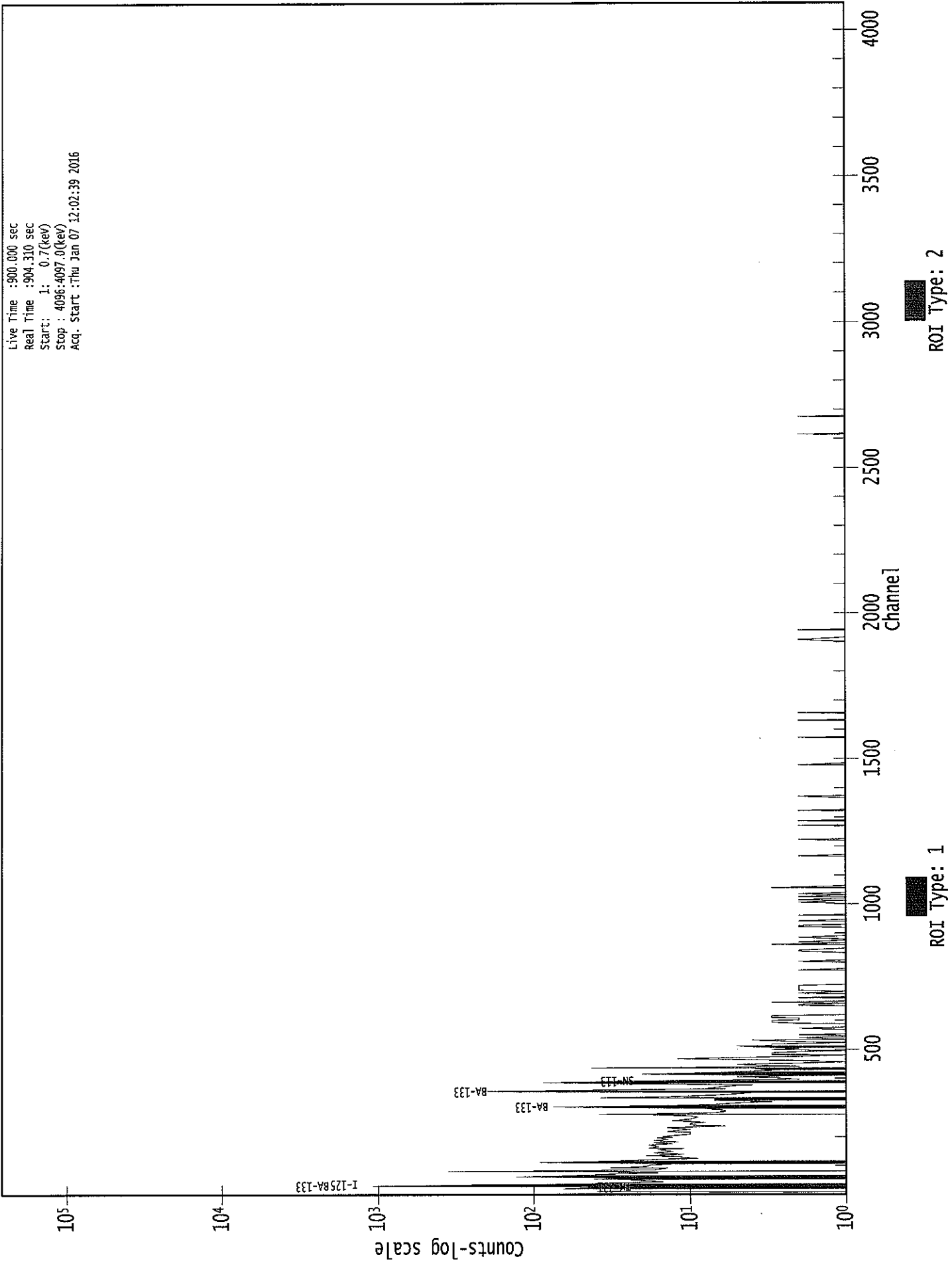
TBA-1D

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	1.53E-10	1.53E-10	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.17E+01	2.17E+01	-9.35E-01	9.94E+00
	136.48	10.60	2.46E+02		-1.28E+01	1.14E+02
NI-59	6.92	29.80	3.11E-09	3.11E-09	-1.61E-08	9.85E-10
MO-93	16.59	52.90	2.62E-04	2.62E-04	4.32E-05	1.22E-04
	18.60	10.00	5.71E-03		-3.01E-03	2.72E-03
NB-93M	16.57	9.43	1.45E-03	1.45E-03	2.40E-04	6.77E-04
CD-109	88.03	3.72	2.21E+02	2.21E+02	-9.68E+00	1.02E+02
+ SN-113	255.12	1.93	1.55E+03	2.02E+01	-8.55E+02	7.08E+02
	391.69	* 61.90	2.02E+01		2.44E+01	9.07E+00
SN-119M	23.87	16.10	3.53E-02	3.34E-02	-2.20E-02	1.69E-02
	25.10	22.70	3.34E-02		-8.06E-02	1.58E-02
+ I-125	35.49	* 6.49	4.31E+00	4.31E+00	1.50E+01	2.11E+00
I-129	29.78	57.00	2.09E-01	2.09E-01	1.80E+00	1.03E-01
	33.60	13.20	1.68E+00		-7.35E+00	8.28E-01
	39.58	7.52	2.36E+00		-2.35E+00	1.10E+00
+ BA-133	30.80	* 97.60	1.11E-01	1.11E-01	1.52E+00	5.46E-02
	302.84	* 17.80	2.33E+02		5.39E+02	1.11E+02
	356.01	* 60.00	3.20E+01		4.21E+02	1.47E+01
CE-139	165.85	80.35	3.96E+01	3.96E+01	-7.33E+00	1.83E+01
CE-144	133.54	10.80	2.26E+02	2.26E+02	2.41E+01	1.05E+02
HG-203	279.19	77.30	5.32E+01	5.32E+01	6.33E+01	2.51E+01
PB-210	46.50	4.25	1.19E+01	1.19E+01	-1.51E+00	5.55E+00
PA-231	9.28	42.00	6.11E-07	6.11E-07	3.94E-07	2.88E-07
	10.11	20.20	3.56E-06		2.30E-06	1.68E-06
	283.67	1.60	1.58E+03		1.53E+02	7.19E+02
	302.67	2.30	1.97E+03		2.75E+03	9.39E+02
+ TH-231	25.64	* 14.70	2.14E-01	2.14E-01	7.92E-02	1.05E-01
	84.21	6.40	3.10E+02		9.64E+02	1.51E+02
PA-234M	9.89	89.00	6.22E-07	6.22E-07	4.01E-07	2.93E-07
	21.72	64.90	4.32E-03		6.94E-03	2.07E-03
	37.93	23.75	1.20E+00		2.40E+00	5.80E-01
	131.42	20.40	1.10E+02		-3.40E+01	5.05E+01
TH-234	63.29	3.80	1.42E+02	1.42E+02	1.29E+02	6.91E+01
NP-237	29.37	14.00	7.66E-01	7.66E-01	6.60E+00	3.78E-01
	86.50	12.60	6.60E+01		1.02E+01	3.06E+01
U-237	97.08	16.30	8.27E+01	5.58E+01	-1.07E+01	3.87E+01
	101.07	26.30	5.58E+01		9.59E-01	2.61E+01
	114.00	12.30	2.87E+02		4.64E+02	1.38E+02
	208.01	22.00	1.72E+02		-3.15E+00	7.96E+01
AM-241	59.54	35.90	9.29E+00	9.29E+00	-3.88E+00	4.47E+00
AM-243	74.67	66.00	8.27E+00	8.27E+00	-2.82E+00	3.88E+00

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction

0000031493.CNF

Live Time : 900.000 sec
Real Time : 904.310 sec
Start : 1: 0.7(kev)
Stop : 4096.4097.0(kev)
Acq. Start : Thu Jan 07 12:02:39 2016



WP
1/7/16

Analysis Report for 1512122-08
TBB-3D

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-08
 Sample Description : TBB-3D
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 12:21:41PM
 Acquisition Started : 1/7/2016 12:36:07PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE2
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.2 seconds

 Dead Time : 0.02 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 7 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 11/2/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31500

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:51:12PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-08

TBB-3D

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.29	18 -	23	20.41	6.36E+01	45.07	3.53E+02	1.29
M	2	31.01	27 -	43	31.12	7.95E+02	63.21	1.96E+02	1.46
m	3	34.82	27 -	43	34.93	1.67E+02	36.99	8.51E+01	1.46
	4	52.95	49 -	58	53.06	4.68E+01	31.42	1.12E+02	3.80
	5	61.81	59 -	64	61.91	8.76E+01	29.36	1.03E+02	1.39
	6	81.17	77 -	85	81.26	3.16E+02	47.80	1.56E+02	1.49
	7	112.16	107 -	118	112.22	8.53E+01	40.45	1.61E+02	1.29
	8	160.03	157 -	162	160.07	2.56E+01	16.34	3.28E+01	1.03
	9	240.83	237 -	243	240.82	1.69E+01	16.58	3.63E+01	1.88
	10	275.84	272 -	280	275.82	5.13E+01	19.43	2.53E+01	2.35
M	11	303.01	299 -	309	302.97	6.71E+01	18.86	1.67E+01	1.51
m	12	306.92	299 -	309	306.88	8.62E+00	9.79	1.07E+01	1.51
	13	333.92	330 -	338	333.87	2.42E+01	19.76	4.56E+01	1.64
	14	356.08	352 -	359	356.02	1.90E+02	32.68	5.07E+01	1.39
	15	385.25	380 -	390	385.17	9.77E+01	31.17	7.87E+01	4.49
M	16	414.78	412 -	420	414.68	1.06E+01	10.16	1.35E+01	1.82
m	17	418.18	412 -	420	418.08	7.73E+00	10.92	1.13E+01	1.83
	18	436.71	432 -	440	436.60	2.76E+01	19.35	4.08E+01	1.44
	19	450.19	447 -	452	450.08	9.50E+00	7.28	3.00E+00	1.77
	20	457.92	456 -	460	457.80	5.43E+00	5.85	3.14E+00	2.72
	21	466.97	463 -	470	466.85	9.14E+00	7.75	3.73E+00	4.72
	22	474.13	471 -	476	474.00	1.00E+01	6.32	0.00E+00	1.77
	23	559.18	556 -	561	559.01	7.61E+00	6.71	2.78E+00	1.74
	24	569.06	566 -	572	568.89	1.10E+01	8.02	4.00E+00	1.93
	25	776.64	773 -	779	776.38	8.00E+00	5.66	0.00E+00	3.31
	26	910.53	907 -	913	910.20	7.44E+00	6.95	3.11E+00	2.49

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:51:12PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031225.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.29	6.36E+01	45.07			6.36E+01	4.51E+01
M	2	31.01	7.95E+02	63.21			7.95E+02	6.32E+01
m	3	34.82	1.67E+02	36.99			1.67E+02	3.70E+01

: 00153

Analysis Report for 1512122-08

TBB-3D

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
4	52.95	4.68E+01	31.42	9.74E-01	1.91E+00	4.59E+01	3.15E+01
5	61.81	8.76E+01	29.36			8.76E+01	2.94E+01
6	81.17	3.16E+02	47.80			3.16E+02	4.78E+01
7	112.16	8.53E+01	40.45			8.53E+01	4.04E+01
8	160.03	2.56E+01	16.34			2.56E+01	1.63E+01
9	240.83	1.69E+01	16.58			1.69E+01	1.66E+01
10	275.84	5.13E+01	19.43			5.13E+01	1.94E+01
M 11	303.01	6.71E+01	18.86			6.71E+01	1.89E+01
m 12	306.92	8.62E+00	9.79			8.62E+00	9.79E+00
13	333.92	2.42E+01	19.76			2.42E+01	1.98E+01
14	356.08	1.90E+02	32.68			1.90E+02	3.27E+01
15	385.25	9.77E+01	31.17			9.77E+01	3.12E+01
M 16	414.78	1.06E+01	10.16			1.06E+01	1.02E+01
m 17	418.18	7.73E+00	10.92			7.73E+00	1.09E+01
18	436.71	2.76E+01	19.35			2.76E+01	1.93E+01
19	450.19	9.50E+00	7.28			9.50E+00	7.28E+00
20	457.92	5.43E+00	5.85			5.43E+00	5.85E+00
21	466.97	9.14E+00	7.75			9.14E+00	7.75E+00
22	474.13	1.00E+01	6.32			1.00E+01	6.32E+00
23	559.18	7.61E+00	6.71			7.61E+00	6.71E+00
24	569.06	1.10E+01	8.02			1.10E+01	8.02E+00
25	776.64	8.00E+00	5.66			8.00E+00	5.66E+00
26	910.53	7.44E+00	6.95	7.49E-01	8.81E-01	6.70E+00	7.00E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
I-125	0.93	35.49 *	6.49	1.70E+01	3.76E+00
BA-133	0.99	30.80 *	97.60	2.93E+00	2.33E-01
		302.84 *	17.80	2.23E+02	8.29E+01
		356.01 *	60.00	1.56E+02	3.08E+01

: 00194

Analysis Report for 1512122-08

TBB-3D

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
I-125	0.931	1.70E+01	3.76E+00	
BA-133	0.995	2.94E+00	2.33E-01	

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-08
TBB-3D

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:51:12PM
Peak Locate From Channel : 1
Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	20.29	7.07153E-02	35.41		
4	52.95	5.09457E-02	34.32		
5	61.81	9.73861E-02	16.75	Sum	
6	81.17	3.51230E-01	7.56		
7	112.16	9.47925E-02	23.71		
8	160.03	2.84524E-02	31.91		
9	240.83	1.87302E-02	49.16		
10	275.84	5.70486E-02	18.92		
m 12	306.92	9.57618E-03	56.77		
13	333.92	2.69031E-02	40.81	Sum	
15	385.25	1.08508E-01	15.96		
M 16	414.78	1.17686E-02	47.97		
m 17	418.18	8.59309E-03	70.60		
18	436.71	3.06597E-02	35.05		
19	450.19	1.05556E-02	38.32		
20	457.92	6.03175E-03	53.90		
21	466.97	1.01515E-02	42.39		
22	474.13	1.11111E-02	31.62		
23	559.18	8.45679E-03	44.07		
24	569.06	1.22222E-02	36.43		
25	776.64	8.88889E-03	35.36		
26	910.53	7.43974E-03	52.29		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

Analysis Report for 1512122-08

TBB-3D

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	8.07E-07	8.07E-07	-4.11E-06	3.45E-07
CO-57	122.06	85.51	1.26E+01	1.26E+01	-3.50E+00	5.62E+00
	136.48	10.60	1.17E+02		-7.64E+01	5.21E+01
NI-59	6.92	29.80	9.09E-06	9.09E-06	-2.44E-05	4.32E-06
MO-93	16.59	52.90	6.34E-03	6.34E-03	-2.70E-03	2.99E-03
	18.60	10.00	8.43E-02		-6.04E-02	4.00E-02
NB-93M	16.57	9.43	3.53E-02	3.53E-02	-1.50E-02	1.66E-02
CD-109	88.03	3.72	1.72E+02	1.72E+02	-8.62E+01	7.79E+01
SN-113	255.12	1.93	7.12E+02	1.43E+01	-3.43E+02	3.09E+02
	391.69	61.90	1.43E+01		8.24E+00	6.22E+00
SN-119M	23.87	16.10	2.39E-01	2.39E-01	-8.26E-03	1.13E-01
	25.10	22.70	2.48E-01		1.09E-01	1.18E-01
+ I-125	35.49	* 6.49	1.37E+01	1.37E+01	1.70E+01	6.71E+00
I-129	29.78	57.00	6.52E-01	6.52E-01	2.28E+00	3.19E-01
	33.60	13.20	2.79E+00		-6.92E+00	1.34E+00
	39.58	7.52	3.68E+00		-4.92E-01	1.62E+00
+ BA-133	30.80	* 97.60	5.05E-01	5.05E-01	2.93E+00	2.48E-01
	302.84	* 17.80	9.45E+01		2.23E+02	4.27E+01
	356.01	* 60.00	2.60E+01		1.56E+02	1.19E+01
CE-139	165.85	80.35	2.14E+01	2.14E+01	-1.56E+00	9.64E+00
CE-144	133.54	10.80	1.20E+02	1.20E+02	6.88E+01	5.40E+01
HG-203	279.19	77.30	2.04E+01	2.04E+01	-1.31E+01	9.10E+00
PB-210	46.50	4.25	1.55E+01	1.55E+01	3.49E+00	6.95E+00
PA-231	9.28	42.00	2.16E-04	2.16E-04	3.98E-04	1.06E-04
	10.11	20.20	1.04E-03		3.95E-03	5.07E-04
	283.67	1.60	8.08E+02		1.95E+02	3.51E+02
	302.67	2.30	1.13E+03		1.57E+03	5.28E+02
TH-231	25.64	14.70	4.37E-01	4.37E-01	1.21E-01	2.07E-01
	84.21	6.40	8.52E+01		-2.89E+02	3.84E+01
PA-234M	9.89	89.00	1.95E-04	1.95E-04	7.44E-04	9.55E-05
	21.72	64.90	3.75E-02		1.75E-02	1.78E-02
	37.93	23.75	1.33E+00		-6.40E-01	6.07E-01
	131.42	20.40	6.34E+01		7.42E+00	2.85E+01
TH-234	63.29	3.80	1.08E+02	1.08E+02	1.31E+02	5.13E+01
NP-237	29.37	14.00	1.31E+00	1.31E+00	-1.38E+01	6.29E-01
	86.50	12.60	5.12E+01		-1.62E+01	2.33E+01
U-237	97.08	16.30	4.35E+01	3.87E+01	-4.13E+01	1.94E+01
	101.07	26.30	3.87E+01		3.99E+01	1.78E+01
	114.00	12.30	1.57E+02		1.68E+02	7.41E+01
	208.01	22.00	9.28E+01		2.57E+01	4.22E+01
AM-241	59.54	35.90	5.78E+00	5.78E+00	-1.26E+01	2.64E+00
AM-243	74.67	66.00	6.26E+00	6.26E+00	1.68E+00	2.84E+00

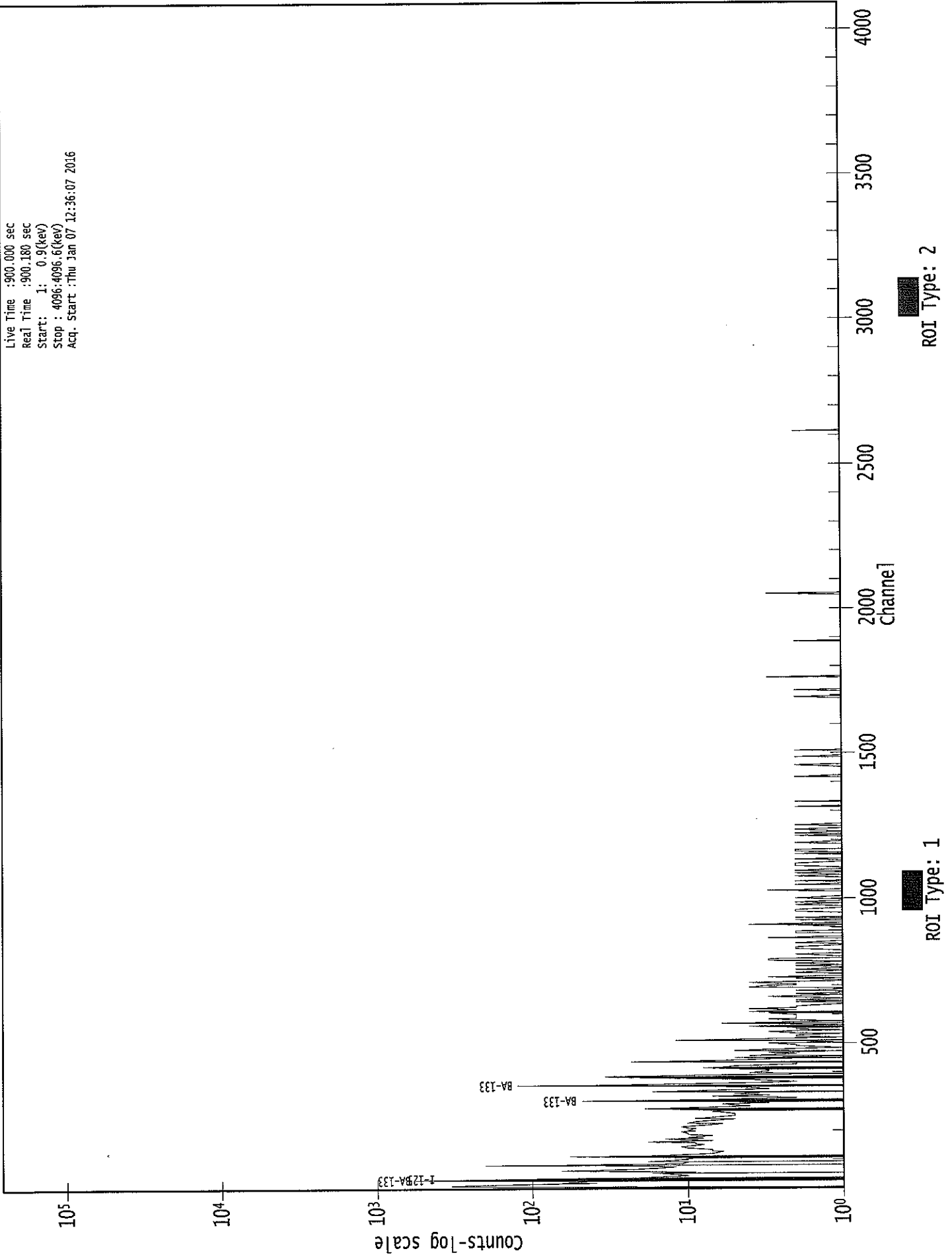
Analysis Report for 1512122-08

TBB-3D

- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031500.CNF

Live Time : 900.000 sec
Real Time : 900.180 sec
Start : 1: 0.9(keV)
Stop : 4096.4096.6(keV)
Acq. Start : Thu Jan 07 12:36:07 2016



*KS
1/7/16*

Analysis Report for 1512122-09
TBB-2D

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-09
 Sample Description : TBB-2D
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 11:58:50AM
 Acquisition Started : 1/7/2016 12:19:07PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE1
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.2 seconds

 Dead Time : 0.03 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 19 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31495

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:34:11PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-09

TBB-2D

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	30.79	26 -	39	31.14	1.59E+03	84.20	1.37E+02	1.64
m	2	35.03	26 -	39	35.39	3.62E+02	48.72	1.16E+02	1.66
	3	52.52	50 -	55	52.87	4.36E+01	27.07	1.13E+02	1.39
M	4	61.89	58 -	74	62.24	2.11E+02	40.82	1.67E+02	1.91
m	5	65.76	58 -	74	66.10	8.35E+01	38.13	1.58E+02	1.92
m	6	69.73	58 -	74	70.08	2.87E+01	32.47	1.53E+02	1.93
	7	81.11	76 -	87	81.45	6.71E+02	69.20	2.60E+02	1.95
M	8	111.85	108 -	120	112.18	1.50E+02	33.83	1.23E+02	1.71
m	9	116.21	108 -	120	116.54	2.47E+01	29.56	1.62E+02	1.85
	10	142.61	139 -	146	142.93	2.45E+01	31.05	1.45E+02	4.11
	11	223.14	220 -	228	223.43	2.54E+01	26.25	9.13E+01	3.68
	12	276.33	273 -	279	276.61	5.00E+01	20.76	4.20E+01	1.21
M	13	302.83	299 -	310	303.09	1.14E+02	24.99	4.66E+01	1.61
m	14	306.66	299 -	310	306.93	3.44E+01	20.31	3.57E+01	1.75
M	15	331.74	328 -	344	332.00	1.58E+01	17.87	1.62E+01	1.61
m	16	337.44	328 -	344	337.70	2.23E+01	14.73	9.21E+00	1.95
	17	356.14	352 -	361	356.38	4.37E+02	48.34	8.18E+01	1.97
	18	369.49	367 -	374	369.73	1.53E+01	14.42	2.54E+01	1.52
M	19	383.96	380 -	394	384.20	1.00E+02	31.57	1.22E+01	2.40
m	20	386.88	380 -	394	387.11	1.85E+02	33.09	8.65E+00	1.99
m	21	391.19	380 -	394	391.43	4.81E+01	20.61	7.54E+00	2.30
M	22	414.88	409 -	425	415.11	3.60E+01	16.88	2.93E+01	2.02
m	23	421.42	409 -	425	421.65	8.61E+00	13.75	1.95E+01	2.03
	24	437.12	434 -	441	437.34	1.04E+02	20.40	0.00E+00	1.49
	25	468.33	464 -	474	468.54	3.35E+01	14.71	1.10E+01	1.94
	26	494.74	492 -	497	494.94	5.50E+00	6.08	3.00E+00	2.37
	27	584.00	580 -	587	584.17	1.20E+01	6.93	0.00E+00	2.48

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:34:11PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031224.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	30.79	1.59E+03	84.20			1.59E+03	8.42E+01
m	2	35.03	3.62E+02	48.72			3.62E+02	4.87E+01

: 00201

Analysis Report for 1512122-09

TBB-2D

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	3	52.52	4.36E+01	27.07		4.36E+01	2.71E+01
M	4	61.89	2.11E+02	40.82		2.11E+02	4.08E+01
m	5	65.76	8.35E+01	38.13		8.35E+01	3.81E+01
m	6	69.73	2.87E+01	32.47		2.87E+01	3.25E+01
	7	81.11	6.71E+02	69.20		6.71E+02	6.92E+01
M	8	111.85	1.50E+02	33.83		1.50E+02	3.38E+01
m	9	116.21	2.47E+01	29.56		2.47E+01	2.96E+01
	10	142.61	2.45E+01	31.05		2.45E+01	3.10E+01
	11	223.14	2.54E+01	26.25		2.54E+01	2.62E+01
	12	276.33	5.00E+01	20.76		5.00E+01	2.08E+01
M	13	302.83	1.14E+02	24.99		1.14E+02	2.50E+01
m	14	306.66	3.44E+01	20.31		3.44E+01	2.03E+01
M	15	331.74	1.58E+01	17.87		1.58E+01	1.79E+01
m	16	337.44	2.23E+01	14.73		2.23E+01	1.47E+01
	17	356.14	4.37E+02	48.34		4.37E+02	4.83E+01
	18	369.49	1.53E+01	14.42		1.53E+01	1.44E+01
M	19	383.96	1.00E+02	31.57		1.00E+02	3.16E+01
m	20	386.88	1.85E+02	33.09		1.85E+02	3.31E+01
m	21	391.19	4.81E+01	20.61		4.81E+01	2.06E+01
M	22	414.88	3.60E+01	16.88		3.60E+01	1.69E+01
m	23	421.42	8.61E+00	13.75		8.61E+00	1.37E+01
	24	437.12	1.04E+02	20.40		1.04E+02	2.04E+01
	25	468.33	3.35E+01	14.71		3.35E+01	1.47E+01
	26	494.74	5.50E+00	6.08		5.50E+00	6.08E+00
	27	584.00	1.20E+01	6.93	8.38E-01 1.08E+00	1.12E+01	7.01E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.93	255.12	1.93		
		391.69 *	61.90	2.86E+01	1.24E+01
I-125	0.96	35.49 *	6.49	6.31E+00	8.49E-01
BA-133	0.99	30.80 *	97.60	6.37E-01	3.38E-02

: 00202

Analysis Report for 1512122-09

TBB-2D

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	0.99	302.84 *		17.80	4.52E+02	1.69E+02
		356.01 *		60.00	3.52E+02	5.12E+01
PA-231	1.00	9.28		42.00		
		10.11		20.20		
		283.67		1.60		
		302.67 *		2.30	3.50E+03	1.31E+03

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.932	2.86E+01	1.24E+01	
I-125	0.967	6.31E+00	8.49E-01	
BA-133	0.999	6.37E-01	3.38E-02	
PA-231	1.000	3.49E+03	1.31E+03	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-09

TBB-2D

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:34:11PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
	3	52.52	4.84667E-02		
M	4	61.89	2.34899E-01		
m	5	65.76	9.27423E-02		Sum
m	6	69.73	3.19182E-02		Sum
	7	81.11	7.45406E-01		
M	8	111.85	1.67178E-01		
m	9	116.21	2.74261E-02		
	10	142.61	2.72509E-02		
	11	223.14	2.81768E-02		
	12	276.33	5.55556E-02		
m	14	306.66	3.82622E-02		
M	15	331.74	1.75643E-02		
m	16	337.44	2.48178E-02		Sum
	18	369.49	1.70238E-02		
M	19	383.96	1.11401E-01		
m	20	386.88	2.05083E-01		Sum
M	22	414.88	3.99957E-02		
m	23	421.42	9.56166E-03		Sum
	24	437.12	1.15556E-01		
	25	468.33	3.72222E-02		
	26	494.74	6.11111E-03		
	27	584.00	1.24026E-02		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

Analysis Report for 1512122-09

TBB-2D

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	6.60E-12	6.60E-12	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.71E+01	2.71E+01	-6.32E+00	1.26E+01
	136.48	10.60	2.58E+02		2.05E+01	1.19E+02
NI-59	6.92	29.80	6.80E-11	6.80E-11	0.00E+00	0.00E+00
MO-93	16.59	52.90	2.56E-05	2.56E-05	-3.56E-05	1.06E-05
	18.60	10.00	1.45E-03		9.54E-05	6.83E-04
NB-93M	16.57	9.43	1.42E-04	1.42E-04	-1.97E-04	5.89E-05
CD-109	88.03	3.72	2.46E+02	2.46E+02	6.30E+01	1.14E+02
+ SN-113	255.12	1.93	1.28E+03	1.49E+01	-1.87E+02	5.75E+02
	391.69	*	61.90	1.49E+01	2.86E+01	6.63E+00
SN-119M	23.87	16.10	1.64E-02	1.64E-02	1.82E-02	7.87E-03
	25.10	22.70	1.67E-02		1.39E-02	7.96E-03
+ I-125	35.49	*	6.49	1.58E+00	6.31E+00	7.68E-01
I-129	29.78	57.00	9.95E-02	9.95E-02	7.78E-01	4.91E-02
	33.60	13.20	8.69E-01		-5.04E+00	4.26E-01
	39.58	7.52	1.47E+00		3.39E-01	6.82E-01
+ BA-133	30.80	*	97.60	3.68E-02	6.37E-01	1.78E-02
	302.84	*	17.80	1.88E+02	4.52E+02	8.84E+01
	356.01	*	60.00	3.43E+01	3.52E+02	1.61E+01
CE-139	165.85	80.35	4.55E+01	4.55E+01	9.95E+00	2.11E+01
CE-144	133.54	10.80	2.57E+02	2.57E+02	9.60E+01	1.19E+02
HG-203	279.19	77.30	3.74E+01	3.74E+01	-1.57E+00	1.73E+01
PB-210	46.50	4.25	9.05E+00	9.05E+00	8.88E+00	4.25E+00
+ PA-231	9.28	42.00	3.55E-09	3.55E-09	0.00E+00	0.00E+00
	10.11	20.20	2.40E-08		0.00E+00	0.00E+00
	283.67	1.60	1.28E+03		5.65E+02	5.75E+02
	302.67	*	2.30	1.45E+03	3.50E+03	6.84E+02
TH-231	25.64	14.70	2.52E-02	2.52E-02	-2.06E-02	1.19E-02
	84.21	6.40	1.41E+02		-1.25E+03	6.61E+01
PA-234M	9.89	89.00	4.04E-09	4.04E-09	0.00E+00	0.00E+00
	21.72	64.90	1.80E-03		4.46E-03	8.68E-04
	37.93	23.75	6.70E-01		7.94E-01	3.23E-01
	131.42	20.40	1.19E+02		-7.88E+01	5.48E+01
TH-234	63.29	3.80	1.22E+02	1.22E+02	1.52E+02	5.88E+01
NP-237	29.37	14.00	3.59E-01	3.59E-01	2.81E+00	1.77E-01
	86.50	12.60	7.15E+01		8.83E+00	3.34E+01
U-237	97.08	16.30	7.89E+01	5.93E+01	-1.88E+01	3.67E+01
	101.07	26.30	5.93E+01		3.63E+01	2.77E+01
	114.00	12.30	3.00E+02		1.90E+02	1.44E+02
	208.01	22.00	1.62E+02		7.22E+00	7.43E+01
AM-241	59.54	35.90	7.65E+00	7.65E+00	3.33E+00	3.68E+00
AM-243	74.67	66.00	7.08E+00	7.08E+00	-5.74E+00	3.29E+00

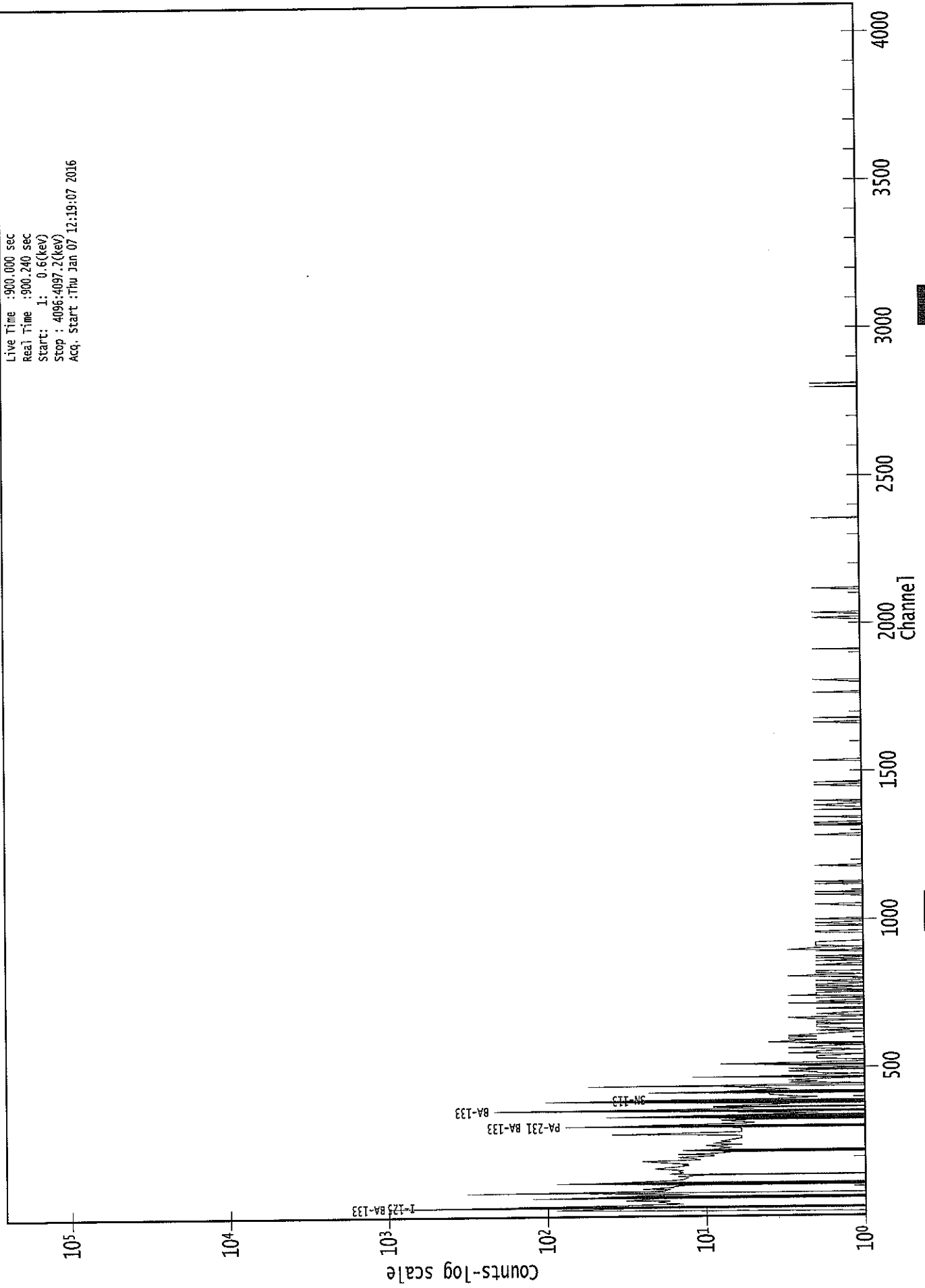
Analysis Report for 1512122-09

TBB-2D

- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031495.CNF

Live Time :900.000 sec
Real Time :900.240 sec
Start: 1: 0.6(kev)
Stop : 4096:4097.2(kev)
Acq. Start :Thu Jan 07 12:19:07 2016



CB
1/7/16

Analysis Report for 1512122-10
TBB-2M

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-10
 Sample Description : TBB-2M
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 11:59:03AM
 Acquisition Started : 1/7/2016 12:19:18PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE2
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 900.2 seconds

 Dead Time : 0.03 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 5 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 11/2/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31496

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:34:23PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-10

TBB-2M

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
	1	20.96	18 -	23	21.08	8.74E+01	45.98	3.51E+02	2.09
M	2	30.96	27 -	39	31.07	1.44E+03	80.47	2.08E+02	1.45
m	3	35.19	27 -	39	35.30	4.00E+02	51.48	1.60E+02	1.61
	4	53.34	51 -	56	53.44	3.45E+01	27.20	1.21E+02	1.79
	5	62.01	58 -	64	62.11	8.08E+01	42.20	3.06E+02	1.26
	6	66.33	66 -	69	66.42	3.56E+01	26.53	1.05E+02	1.95
	7	81.11	77 -	84	81.20	6.16E+02	60.73	2.03E+02	1.57
	8	111.81	109 -	114	111.88	1.01E+02	33.33	1.41E+02	1.25
	9	116.92	116 -	120	116.98	2.19E+01	24.84	1.02E+02	2.57
	10	160.59	157 -	164	160.63	2.53E+01	27.35	1.07E+02	1.30
	11	239.84	238 -	242	239.84	1.15E+01	14.27	3.50E+01	2.66
	12	276.18	272 -	280	276.16	5.09E+01	24.15	5.81E+01	1.52
	13	289.40	285 -	292	289.37	1.39E+01	16.37	3.42E+01	3.96
	14	302.86	299 -	305	302.82	1.32E+02	26.50	3.13E+01	1.34
	15	334.73	330 -	340	334.68	6.06E+01	24.74	4.88E+01	1.93
	16	356.06	352 -	359	355.99	3.77E+02	44.54	7.73E+01	1.40
M	17	384.23	380 -	395	384.15	7.61E+01	23.52	1.21E+01	1.62
m	18	390.94	380 -	395	390.85	2.86E+01	14.46	5.94E+00	1.63
	19	415.75	412 -	421	415.66	2.96E+01	21.00	4.89E+01	2.15
	20	437.13	434 -	441	437.02	8.70E+01	19.80	5.91E+00	1.66
	21	570.52	568 -	572	570.34	4.83E+00	5.50	2.33E+00	1.44
	22	623.40	620 -	627	623.20	6.00E+00	8.49	8.00E+00	2.81
	23	1391.30	1387 -	1393	1390.80	5.00E+00	4.47	0.00E+00	2.75

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:34:23PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031225.CNF

	Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
	1	20.96	8.74E+01	45.98			8.74E+01	4.60E+01
M	2	30.96	1.44E+03	80.47			1.44E+03	8.05E+01
m	3	35.19	4.00E+02	51.48			4.00E+02	5.15E+01
	4	53.34	3.45E+01	27.20	9.74E-01	1.91E+00	3.35E+01	2.73E+01
	5	62.01	8.08E+01	42.20			8.08E+01	4.22E+01
	6	66.33	3.56E+01	26.53			3.56E+01	2.65E+01

: 00209

Analysis Report for 1512122-10

TBB-2M

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
7	81.11	6.16E+02	60.73			6.16E+02	6.07E+01
8	111.81	1.01E+02	33.33			1.01E+02	3.33E+01
9	116.92	2.19E+01	24.84			2.19E+01	2.48E+01
10	160.59	2.53E+01	27.35			2.53E+01	2.73E+01
11	239.84	1.15E+01	14.27			1.15E+01	1.43E+01
12	276.18	5.09E+01	24.15			5.09E+01	2.42E+01
13	289.40	1.39E+01	16.37			1.39E+01	1.64E+01
14	302.86	1.32E+02	26.50			1.32E+02	2.65E+01
15	334.73	6.06E+01	24.74			6.06E+01	2.47E+01
16	356.06	3.77E+02	44.54			3.77E+02	4.45E+01
M	17	384.23	7.61E+01	23.52		7.61E+01	2.35E+01
m	18	390.94	2.86E+01	14.46		2.86E+01	1.45E+01
	19	415.75	2.96E+01	21.00		2.96E+01	2.10E+01
	20	437.13	8.70E+01	19.80		8.70E+01	1.98E+01
	21	570.52	4.83E+00	5.50		4.83E+00	5.50E+00
	22	623.40	6.00E+00	8.49		6.00E+00	8.49E+00
	23	1391.30	5.00E+00	4.47		5.00E+00	4.47E+00

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.00sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.87	255.12	1.93		
		391.69	*	61.90	1.98E+01
I-125	0.98	35.49	*	6.49	5.51E+00
BA-133	0.99	30.80	*	97.60	2.94E-01
		302.84	*	17.80	4.40E+02
		356.01	*	60.00	3.10E+02
					4.75E+01

Analysis Report for 1512122-10

TBB-2M

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 keV
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/units)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
SN-113	0.877	1.98E+01	1.02E+01	
I-125	0.986	4.28E+01	5.51E+00	
BA-133	0.998	5.27E+00	2.94E-01	

? = nuclide is part of an undetermined solution
 X = nuclide rejected by the interference analysis
 @ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-10

TBB-2M

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:34:23PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	20.96	9.70596E-02	26.32		
4	53.34	3.72101E-02	40.71		
5	62.01	8.97531E-02	26.12	Sum	
6	66.33	3.95960E-02	37.23	Sum	
7	81.11	6.84948E-01	4.93		
8	111.81	1.12655E-01	16.44		
9	116.92	2.43227E-02	56.74		
10	160.59	2.80661E-02	54.14		
11	239.84	1.27778E-02	62.02		
12	276.18	5.66042E-02	23.70		
13	289.40	1.54301E-02	58.94		
15	334.73	6.73137E-02	20.42	Sum	
M 17	384.23	8.46044E-02	15.44		
19	415.75	3.28395E-02	35.53		
20	437.13	9.67161E-02	11.37		
21	570.52	5.37037E-03	56.90		
22	623.40	6.66667E-03	70.71		
23	1391.30	5.55556E-03	44.72		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

: 00212

Analysis Report for 1512122-10

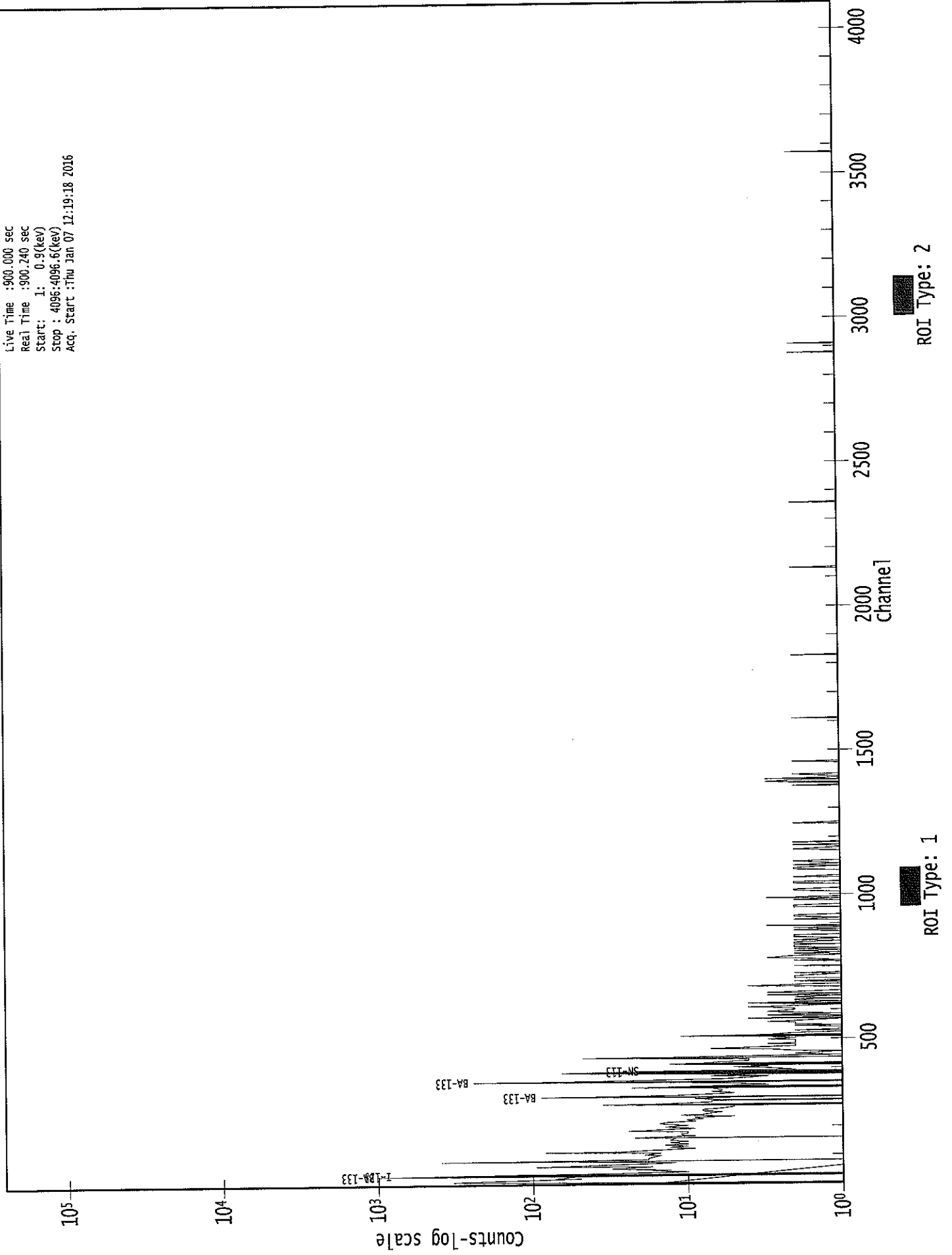
TBB-2M

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	1.01E-06	1.01E-06	-5.38E-06	4.46E-07
CO-57	122.06	85.51	1.56E+01	1.56E+01	1.01E+00	7.12E+00
	136.48	10.60	1.68E+02		6.09E+01	7.77E+01
NI-59	6.92	29.80	9.12E-06	9.12E-06	-1.98E-05	4.33E-06
MO-93	16.59	52.90	6.21E-03	6.21E-03	4.35E-04	2.92E-03
	18.60	10.00	8.22E-02		-9.94E-02	3.89E-02
NB-93M	16.57	9.43	3.45E-02	3.45E-02	2.42E-03	1.62E-02
CD-109	88.03	3.72	2.48E+02	2.48E+02	1.82E+01	1.16E+02
+ SN-113	255.12	1.93	8.92E+02	2.05E+01	-2.29E+02	4.00E+02
	391.69	* 61.90	2.05E+01		1.98E+01	9.33E+00
SN-119M	23.87	16.10	2.49E-01	2.46E-01	7.37E-02	1.18E-01
	25.10	22.70	2.46E-01		6.38E-02	1.17E-01
+ I-125	35.49	* 6.49	1.19E+01	1.19E+01	4.28E+01	5.80E+00
I-129	29.78	57.00	8.40E-01	8.40E-01	3.90E+00	4.13E-01
	33.60	13.20	3.60E+00		-1.53E+01	1.74E+00
	39.58	7.52	4.95E+00		-1.11E+00	2.26E+00
+ BA-133	30.80	* 97.60	4.10E-01	4.10E-01	5.25E+00	2.00E-01
	302.84	* 17.80	8.08E+01		4.40E+02	3.59E+01
	356.01	* 60.00	3.16E+01		3.10E+02	1.47E+01
CE-139	165.85	80.35	2.33E+01	2.33E+01	-1.88E+00	1.06E+01
CE-144	133.54	10.80	1.64E+02	1.64E+02	6.31E+01	7.56E+01
HG-203	279.19	77.30	2.33E+01	2.33E+01	-9.79E+00	1.06E+01
PB-210	46.50	4.25	1.94E+01	1.94E+01	5.30E+00	8.90E+00
PA-231	9.28	42.00	2.08E-04	2.08E-04	3.03E-04	1.02E-04
	10.11	20.20	1.01E-03		3.35E-03	4.95E-04
	283.67	1.60	8.96E+02		3.69E+02	3.95E+02
	302.67	2.30	1.49E+03		3.06E+03	7.10E+02
TH-231	25.64	14.70	4.44E-01	4.44E-01	1.24E-01	2.11E-01
	84.21	6.40	1.03E+02		-5.96E+02	4.74E+01
PA-234M	9.89	89.00	1.90E-04	1.90E-04	6.32E-04	9.32E-05
	21.72	64.90	4.14E-02		3.78E-02	1.98E-02
	37.93	23.75	1.79E+00		-2.67E+00	8.36E-01
	131.42	20.40	8.00E+01		-1.31E+00	3.68E+01
TH-234	63.29	3.80	1.34E+02	1.34E+02	1.73E+02	6.38E+01
NP-237	29.37	14.00	1.56E+00	1.56E+00	-2.49E+01	7.56E-01
	86.50	12.60	7.00E+01		-8.68E+00	3.28E+01
U-237	97.08	16.30	5.90E+01	4.44E+01	-4.44E+01	2.72E+01
	101.07	26.30	4.44E+01		-5.65E+00	2.06E+01
	114.00	12.30	1.91E+02		1.71E+02	9.13E+01
	208.01	22.00	1.10E+02		1.25E+01	5.07E+01
AM-241	59.54	35.90	7.23E+00	7.23E+00	-2.45E+01	3.36E+00
AM-243	74.67	66.00	5.91E+00	5.91E+00	3.01E-01	2.67E+00

- + = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction

0000031496.CNF

Live Time :900.000 sec
Real Time :900.240 sec
Start : 1: 0.9(kev)
stop : 4096:4096.6(kev)
Acq. Start :Thu Jan 07 12:19:18 2016



1/7/16

Analysis Report for 1512122-11
MC-1

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-11
 Sample Description : MC-1
 Sample Type : RA RECOVERY

 Sample Size : 1.000E+00 units
 Facility : Countroom

 Sample Taken On : 1/7/2016 11:59:14AM
 Acquisition Started : 1/7/2016 12:19:28PM

 Procedure : BAFIL
 Operator : Administrator
 Detector Name : GE3
 Geometry : BAFIL
 Live Time : 900.0 seconds
 Real Time : 904.1 seconds

 Dead Time : 0.46 %

 Peak Locate Threshold : 2.50
 Peak Locate Range (in channels) : 1 - 4096
 Peak Area Range (in channels) : 9 - 4096
 Identification Energy Tolerance : 1.000 keV

 Energy Calibration Used Done On : 10/25/2014
 Efficiency Calibration Used Done On : 11/9/2014
 Efficiency Calibration Description :

 Sample Number : 31497

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:34:34PM
 Peak Analysis From Channel : 1
 Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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Analysis Report for 1512122-11

MC-1

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
M	1	21.07	18 -	40	21.31	1.20E+02	34.51	1.50E+02	1.84
m	2	24.76	18 -	40	25.00	1.99E+01	23.07	1.00E+02	1.40
m	3	30.98	18 -	40	31.22	1.85E+03	88.96	1.27E+02	1.61
m	4	35.30	18 -	40	35.54	4.68E+02	50.54	1.29E+02	1.72
	5	53.13	50 -	57	53.35	5.10E+01	43.59	2.80E+02	2.39
M	6	62.07	58 -	75	62.29	2.48E+02	43.14	1.80E+02	2.08
m	7	66.19	58 -	75	66.41	1.03E+02	43.66	1.91E+02	2.18
	8	81.18	76 -	86	81.40	7.88E+02	72.49	2.81E+02	1.96
m	9	98.64	90 -	104	98.85	2.14E+01	22.27	7.88E+01	1.70
M	10	112.02	109 -	127	112.22	2.29E+02	37.04	1.05E+02	2.05
m	11	116.27	109 -	127	116.46	5.86E+01	32.06	8.62E+01	2.09
	12	142.69	139 -	147	142.87	4.95E+01	33.22	1.39E+02	2.12
	13	208.76	204 -	213	208.90	4.20E+01	32.14	1.20E+02	3.82
	14	276.80	273 -	280	276.91	5.21E+01	24.33	6.37E+01	1.24
M	15	303.14	297 -	315	303.23	1.36E+02	26.15	4.26E+01	1.60
m	16	307.53	297 -	315	307.63	2.96E+01	22.54	3.87E+01	2.16
m	17	311.28	297 -	315	311.37	1.53E+01	18.65	3.34E+01	2.16
M	18	334.04	331 -	341	334.12	5.65E+01	19.16	3.00E+01	1.78
m	19	338.30	331 -	341	338.38	1.69E+01	19.47	4.20E+01	2.19
m	20	356.45	350 -	361	356.52	4.25E+02	42.48	2.73E+01	1.75
M	21	384.27	381 -	395	384.32	1.20E+02	30.36	2.90E+01	2.35
m	22	387.39	381 -	395	387.44	1.89E+02	30.88	1.33E+01	1.80
m	23	391.64	381 -	395	391.69	5.01E+01	24.85	9.33E+00	2.39
M	24	415.13	411 -	425	415.17	3.67E+01	17.97	2.71E+01	2.41
m	25	418.91	411 -	425	418.95	2.04E+01	16.58	3.77E+01	2.06
	26	437.18	432 -	442	437.21	1.11E+02	23.81	1.67E+01	2.04
	27	467.62	464 -	471	467.63	1.07E+01	13.71	2.46E+01	1.30
	28	551.83	550 -	554	551.80	5.00E+00	4.47	0.00E+00	2.75
	29	609.78	606 -	613	609.72	1.09E+01	8.25	4.15E+00	2.65

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:34:34PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031226.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
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: 00216

Analysis Report for 1512122-11

MC-1

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
M	1	21.07	1.20E+02	34.51		1.20E+02	3.45E+01
m	2	24.76	1.99E+01	23.07		1.99E+01	2.31E+01
m	3	30.98	1.85E+03	88.96		1.85E+03	8.90E+01
m	4	35.30	4.68E+02	50.54		4.68E+02	5.05E+01
	5	53.13	5.10E+01	43.59		5.10E+01	4.36E+01
M	6	62.07	2.48E+02	43.14		2.48E+02	4.31E+01
m	7	66.19	1.03E+02	43.66		1.03E+02	4.37E+01
	8	81.18	7.88E+02	72.49		7.88E+02	7.25E+01
m	9	98.64	2.14E+01	22.27		2.14E+01	2.23E+01
M	10	112.02	2.29E+02	37.04		2.29E+02	3.70E+01
m	11	116.27	5.86E+01	32.06		5.86E+01	3.21E+01
	12	142.69	4.95E+01	33.22		4.95E+01	3.32E+01
	13	208.76	4.20E+01	32.14		4.20E+01	3.21E+01
	14	276.80	5.21E+01	24.33		5.21E+01	2.43E+01
M	15	303.14	1.36E+02	26.15		1.36E+02	2.62E+01
m	16	307.53	2.96E+01	22.54		2.96E+01	2.25E+01
m	17	311.28	1.53E+01	18.65		1.53E+01	1.87E+01
M	18	334.04	5.65E+01	19.16		5.65E+01	1.92E+01
m	19	338.30	1.69E+01	19.47		1.69E+01	1.95E+01
m	20	356.45	4.25E+02	42.48		4.25E+02	4.25E+01
M	21	384.27	1.20E+02	30.36		1.20E+02	3.04E+01
m	22	387.39	1.89E+02	30.88		1.89E+02	3.09E+01
m	23	391.64	5.01E+01	24.85		5.01E+01	2.48E+01
M	24	415.13	3.67E+01	17.97		3.67E+01	1.80E+01
m	25	418.91	2.04E+01	16.58		2.04E+01	1.66E+01
	26	437.18	1.11E+02	23.81		1.11E+02	2.38E+01
	27	467.62	1.07E+01	13.71		1.07E+01	1.37E+01
	28	551.83	5.00E+00	4.47		5.00E+00	4.47E+00
	29	609.78	1.09E+01	8.25	2.45E+00	1.20E+00	8.47E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
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: 00217

Analysis Report for 1512122-11

MC-1

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
SN-113	0.96	255.12	1.93		
		391.69 *	61.90	3.82E+01	1.92E+01
I-125	0.99	35.49 *	6.49	1.45E+01	1.57E+00
BA-133	0.98	30.80 *	97.60	1.48E+00	7.12E-02
		302.84 *	17.80	5.94E+02	2.41E+02
		356.01 *	60.00	4.13E+02	5.89E+01
TH-231	0.89	25.64 *	14.70	1.79E-02	2.07E-02
		84.21	6.40		

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
SN-113	0.965	3.82E+01	1.92E+01	
I-125	0.994	1.45E+01	1.57E+00	
BA-133	0.985	1.48E+00	7.12E-02	
TH-231	0.896	1.79E-02	2.07E-02	

? = nuclide is part of an undetermined solution

X = nuclide rejected by the interference analysis

@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-11

MC-1

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:34:34PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide	
M	1	21.07	1.33158E-01	14.40	Tol.	PA-234M
	5	53.13	5.66230E-02	42.77		
M	6	62.07	2.75343E-01	8.70	Sum	
m	7	66.19	1.14573E-01	21.17	Sum	
	8	81.18	8.75188E-01	4.60		
m	9	98.64	2.38183E-02	51.95		
M	10	112.02	2.53970E-01	8.10		
m	11	116.27	6.50680E-02	27.38		
	12	142.69	5.50467E-02	33.53		
	13	208.76	4.66340E-02	38.29	Tol.	U-237
	14	276.80	5.79365E-02	23.33		
m	16	307.53	3.29195E-02	38.04		
m	17	311.28	1.70152E-02	60.91		
M	18	334.04	6.27240E-02	16.97	Sum	
m	19	338.30	1.87674E-02	57.63	Sum	
M	21	384.27	1.33766E-01	12.61		
m	22	387.39	2.09871E-01	8.17	Sum	
M	24	415.13	4.07671E-02	24.48		
m	25	418.91	2.26448E-02	40.68		
	26	437.18	1.22918E-01	10.76		
	27	467.62	1.18841E-02	64.10		
	28	551.83	5.55556E-03	44.72		
	29	609.78	9.41053E-03	49.20		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

Analysis Report for 1512122-11

MC-1

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	1.53E-10	1.53E-10	0.00E+00	0.00E+00
CO-57	122.06	85.51	2.40E+01	2.40E+01	8.23E+00	1.11E+01
	136.48	10.60	2.48E+02		6.59E+00	1.15E+02
NI-59	6.92	29.80	3.11E-09	3.11E-09	-1.23E-08	9.85E-10
MO-93	16.59	52.90	2.62E-04	2.62E-04	3.53E-05	1.22E-04
	18.60	10.00	5.88E-03		3.03E-03	2.80E-03
NB-93M	16.57	9.43	1.45E-03	1.45E-03	1.96E-04	6.77E-04
CD-109	88.03	3.72	2.24E+02	2.24E+02	2.01E+01	1.03E+02
+ SN-113	255.12	1.93	1.43E+03	2.57E+01	-1.78E+02	6.51E+02
	391.69	*	61.90	2.57E+01	3.82E+01	1.18E+01
SN-119M	23.87	16.10	3.15E-02	3.15E-02	-7.43E-02	1.49E-02
	25.10	22.70	3.40E-02		-4.18E-02	1.61E-02
+ I-125	35.49	*	6.49	4.35E+00	1.45E+01	2.13E+00
I-129	29.78	57.00	2.09E-01	2.09E-01	1.75E+00	1.03E-01
	33.60	13.20	1.67E+00		-7.87E+00	8.20E-01
	39.58	7.52	2.36E+00		3.13E-01	1.10E+00
+ BA-133	30.80	*	97.60	1.12E-01	1.48E+00	5.50E-02
	302.84	*	17.80	2.93E+02	5.94E+02	1.40E+02
	356.01	*	60.00	3.66E+01	4.13E+02	1.70E+01
CE-139	165.85	80.35	4.28E+01	4.28E+01	-1.16E+01	1.99E+01
CE-144	133.54	10.80	2.46E+02	2.46E+02	2.20E+01	1.14E+02
HG-203	279.19	77.30	5.04E+01	5.04E+01	-3.21E+00	2.37E+01
PB-210	46.50	4.25	1.44E+01	1.44E+01	4.10E+00	6.82E+00
PA-231	9.28	42.00	6.55E-07	6.55E-07	6.71E-07	3.10E-07
	10.11	20.20	3.83E-06		3.92E-06	1.81E-06
	283.67	1.60	1.49E+03		-4.08E+02	6.75E+02
	302.67	2.30	2.05E+03		2.76E+03	9.81E+02
+ TH-231	25.64	*	14.70	1.25E-01	1.79E-02	6.15E-02
	84.21	6.40	3.14E+02		9.97E+02	1.53E+02
PA-234M	9.89	89.00	6.68E-07	6.68E-07	6.84E-07	3.16E-07
	21.72	64.90	4.19E-03		4.45E-03	2.01E-03
	37.93	23.75	1.16E+00		1.73E+00	5.63E-01
	131.42	20.40	1.25E+02		1.65E+01	5.83E+01
TH-234	63.29	3.80	1.41E+02	1.41E+02	1.34E+02	6.85E+01
NP-237	29.37	14.00	7.63E-01	7.63E-01	6.39E+00	3.77E-01
	86.50	12.60	6.90E+01		5.58E+00	3.22E+01
U-237	97.08	16.30	8.32E+01	6.02E+01	-2.11E+01	3.90E+01
	101.07	26.30	6.02E+01		4.19E+01	2.83E+01
	114.00	12.30	3.10E+02		6.14E+02	1.50E+02
	208.01	22.00	2.07E+02		1.64E+02	9.72E+01
AM-241	59.54	35.90	9.13E+00	9.13E+00	-8.59E-01	4.40E+00
AM-243	74.67	66.00	8.85E+00	8.85E+00	-3.04E+00	4.17E+00

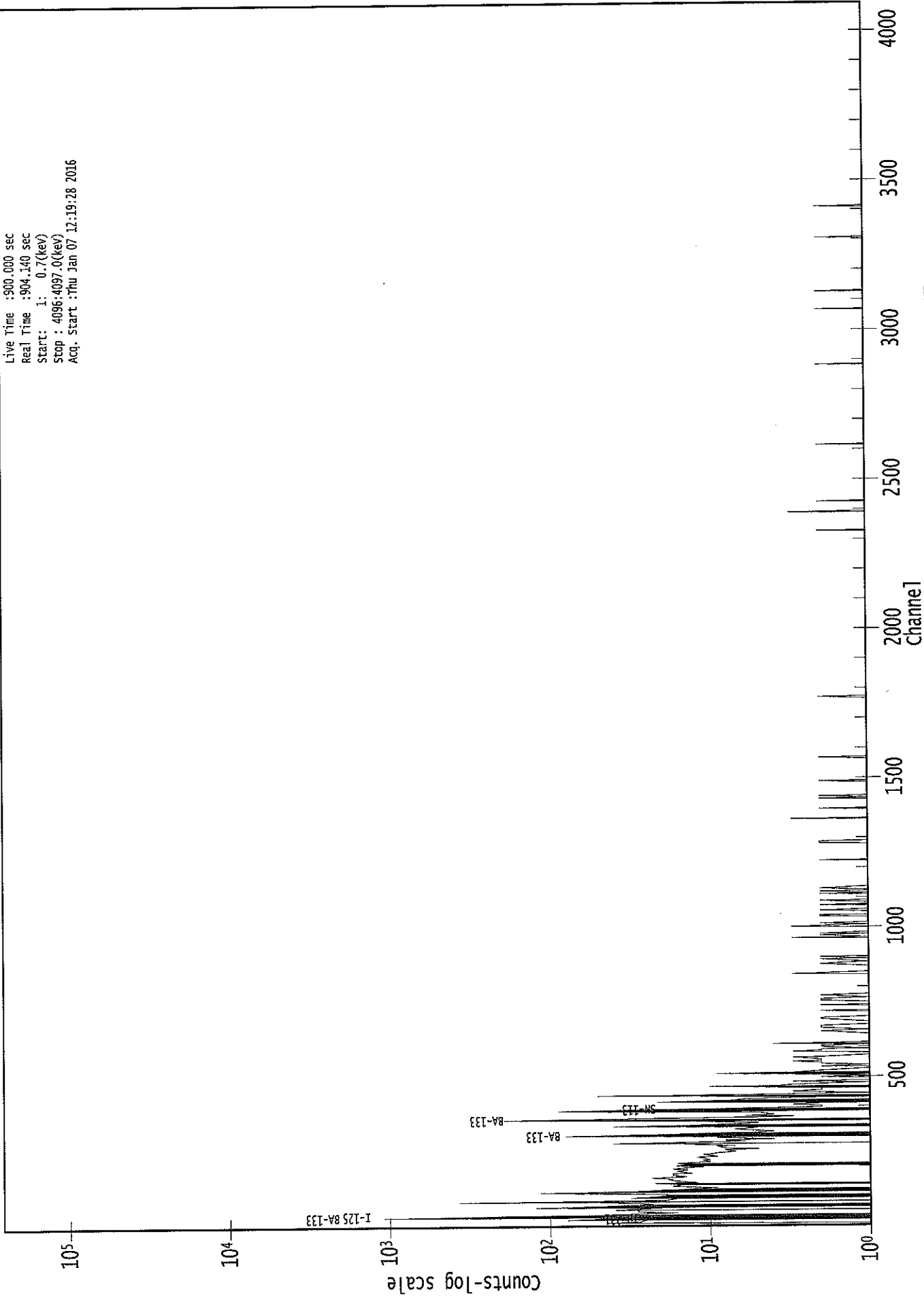
Analysis Report for 1512122-11

MC-1

- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
-

0000031497.CNF

Live Time : 900.000 sec
Real Time : 904.140 sec
Start : 1: 0.7(keV)
Stop : 4096:4097.0(keV)
Acq. Start : Thu Jan 07 12:19:28 2016



ROI Type: 1

ROI Type: 2

: 00222

KCB
1/7/16Analysis Report for 1512122-12
BC-1

GAMMA SPECTRUM ANALYSIS

Sample Identification : 1512122-12
Sample Description : BC-1
Sample Type : RA RECOVERY

Sample Size : 1.000E+00 units
Facility : Countroom

Sample Taken On : 1/7/2016 11:59:24AM
Acquisition Started : 1/7/2016 12:19:37PM

Procedure : BAFIL
Operator : Administrator
Detector Name : GE4
Geometry : BAFIL
Live Time : 900.0 seconds
Real Time : 944.1 seconds

Dead Time : 4.67 %

Peak Locate Threshold : 2.50
Peak Locate Range (in channels) : 1 - 4096
Peak Area Range (in channels) : 15 - 4096
Identification Energy Tolerance : 1.000 keV

Energy Calibration Used Done On : 10/25/2014
Efficiency Calibration Used Done On : 11/9/2014
Efficiency Calibration Description :

Sample Number : 31498

PEAK ANALYSIS REPORT

Peak Analysis Performed on : 1/7/2016 12:35:23PM

Peak Analysis From Channel : 1
Peak Analysis To Channel : 4096

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
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: 00223

Analysis Report for 1512122-12

BC-1

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	FWHM (keV)
1	31.55	24 -	37	30.80	1.80E+03	105.39	4.32E+02	2.27
2	53.43	51 -	55	52.69	1.99E+01	20.73	7.82E+01	1.98
3	62.89	56 -	68	62.15	1.58E+02	52.28	2.49E+02	7.19
4	80.94	74 -	83	80.21	5.45E+02	60.51	2.15E+02	2.27
5	112.01	103 -	118	111.29	1.44E+02	43.08	1.28E+02	3.10
6	266.74	263 -	270	266.09	1.20E+01	14.00	2.59E+01	4.86
7	276.69	271 -	282	276.05	5.75E+01	25.69	5.30E+01	2.74
8	303.25	300 -	305	302.61	9.38E+01	22.65	2.85E+01	1.63
9	356.39	350 -	361	355.78	2.31E+02	35.50	4.17E+01	2.18
10	387.11	379 -	396	386.52	1.03E+02	30.08	4.35E+01	8.68
11	406.75	401 -	410	406.16	9.68E+00	11.96	1.46E+01	1.05
12	415.59	411 -	418	415.01	1.81E+01	9.80	3.85E+00	1.51
13	422.42	419 -	424	421.83	6.00E+00	4.90	0.00E+00	1.98
14	437.18	431 -	441	436.61	2.25E+01	14.52	1.50E+01	2.23
15	511.17	506 -	515	510.63	2.40E+01	9.80	0.00E+00	3.89
16	525.33	522 -	527	524.80	5.00E+00	4.47	0.00E+00	1.16
17	671.16	667 -	675	670.70	1.22E+01	8.73	3.57E+00	1.38

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

BACKGROUND SUBTRACT REPORT

Peak Analysis Performed on : 1/7/2016 12:35:23PM

Env. Background File : \\OR-GAMMA1\ApexRoot\Countroom\Data\0000031227.CNF

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
1	31.55	1.80E+03	105.39			1.80E+03	1.05E+02
2	53.43	1.99E+01	20.73			1.99E+01	2.07E+01
3	62.89	1.58E+02	52.28	1.02E+01	1.97E+00	1.47E+02	5.23E+01
4	80.94	5.45E+02	60.51			5.45E+02	6.05E+01
5	112.01	1.44E+02	43.08			1.44E+02	4.31E+01
6	266.74	1.20E+01	14.00			1.20E+01	1.40E+01
7	276.69	5.75E+01	25.69			5.75E+01	2.57E+01
8	303.25	9.38E+01	22.65			9.38E+01	2.26E+01
9	356.39	2.31E+02	35.50			2.31E+02	3.55E+01
10	387.11	1.03E+02	30.08			1.03E+02	3.01E+01
11	406.75	9.68E+00	11.96			9.68E+00	1.20E+01
12	415.59	1.81E+01	9.80			1.81E+01	9.80E+00

Analysis Report for 1512122-12

BC-1

Peak No.	Energy (keV)	Original Area	Orig. Area Uncertainty	Ambient Background	Backgr. Uncert.	Subtracted Area	Subtracted Uncert.
13	422.42	6.00E+00	4.90			6.00E+00	4.90E+00
14	437.18	2.25E+01	14.52			2.25E+01	1.45E+01
15	511.17	2.40E+01	9.80	1.17E+01	1.51E+00	1.23E+01	9.91E+00
16	525.33	5.00E+00	4.47			5.00E+00	4.47E+00
17	671.16	1.22E+01	8.73			1.22E+01	8.73E+00

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet
Errors quoted at 2.000sigma

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/units)	Activity Uncertainty
BA-133	0.94	30.80 *	97.60	8.49E+01	5.24E+00
		302.84 *	17.80	4.62E+02	1.81E+02
		356.01 *	60.00	3.63E+02	7.31E+01
PA-231	0.99	9.28	42.00		
		10.11	20.20		
		283.67	1.60		
TH-234	0.97	302.67 *	2.30	3.58E+03	1.40E+03
		63.29 *	3.80	6.45E+02	2.33E+02

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 keV

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Analysis Report for 1512122-12

BC-1

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/units)	Wt mean Activity Uncertainty	Comments
BA-133	0.941	8.63E+01	5.23E+00	
PA-231	0.996	2.91E+03	1.40E+03	
TH-234	0.974	6.45E+02	2.33E+02	

- ? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis
@ = nuclide contains energy lines not used in Weighted Mean Activity

Errors quoted at 2.000sigma

Analysis Report for 1512122-12

BC-1

UNIDENTIFIED PEAKS

Peak Locate Performed on : 1/7/2016 12:35:23PM
 Peak Locate From Channel : 1
 Peak Locate To Channel : 4096

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	53.43	2.21186E-02	52.07		
4	80.94	6.05959E-01	5.55		
5	112.01	1.60102E-01	14.95		
6	266.74	1.33778E-02	58.14		
7	276.69	6.38624E-02	22.35		
10	387.11	1.14720E-01	14.57	Sum	
11	406.75	1.07516E-02	61.79		
12	415.59	2.00833E-02	27.10		
13	422.42	6.66667E-03	40.82		
14	437.18	2.50000E-02	32.26		
15	511.17	1.36159E-02	40.45		
16	525.33	5.55556E-03	44.72		
17	671.16	1.35714E-02	35.75		

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet
 Errors quoted at 2.000sigma

NUCLIDE MDA REPORT

Nuclide Library Used : \\OR-GAMMA1\ApexRoot\Countroom\Library\WSRC.NLB

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
FE-55	5.89	24.50	5.43E-03	5.43E-03	0.00E+00	0.00E+00
CO-57	122.06	85.51	1.60E+01	1.60E+01	-1.25E+01	7.32E+00
	136.48	10.60	1.68E+02		-2.15E+01	7.78E+01

: 00227

Analysis Report for 1512122-12

BC-1

Nuclide Name	Energy (keV)	Yield(%)	Line MDA (pCi/units)	Nuclide MDA (pCi/units)	Activity (pCi/units)	Dec. Level (pCi/units)
NI-59	6.92	29.80	7.53E-03	7.53E-03	0.00E+00	0.00E+00
MO-93	16.59	52.90	1.08E+00	1.08E+00	1.53E+00	5.14E-01
	18.60	10.00	8.69E+00		1.33E+01	4.16E+00
NB-93M	16.57	9.43	6.04E+00	6.04E+00	8.57E+00	2.87E+00
CD-109	88.03	3.72	3.18E+02	3.18E+02	-1.52E+03	1.49E+02
SN-113	255.12	1.93	1.13E+03	5.85E+01	-1.24E+02	5.08E+02
	391.69	61.90	5.85E+01		1.12E+01	2.71E+01
SN-119M	23.87	16.10	1.16E+01	1.02E+01	1.96E+00	5.59E+00
	25.10	22.70	1.02E+01		-1.18E+00	4.95E+00
I-125	35.49	6.49	1.32E+02	1.32E+02	-8.94E+00	6.46E+01
I-129	29.78	57.00	1.38E+01	1.38E+01	8.48E+01	6.81E+00
	33.60	13.20	7.96E+01		6.39E+02	3.93E+01
	39.58	7.52	7.24E+01		-1.23E+02	3.49E+01
+ BA-133	30.80	* 97.60	4.97E+00	4.97E+00	8.49E+01	2.42E+00
	302.84	* 17.80	1.09E+02		4.62E+02	4.76E+01
	356.01	* 60.00	5.15E+01		3.63E+02	2.36E+01
CE-139	165.85	80.35	3.15E+01	3.15E+01	2.23E+01	1.48E+01
CE-144	133.54	10.80	1.73E+02	1.73E+02	3.60E+01	8.09E+01
HG-203	279.19	77.30	4.55E+01	4.55E+01	4.05E+01	2.13E+01
PB-210	46.50	4.25	1.09E+02	1.09E+02	-1.96E+01	5.13E+01
+ PA-231	9.28	42.00	1.32E-02	1.32E-02	0.00E+00	0.00E+00
	10.11	20.20	3.53E-02		0.00E+00	0.00E+00
	283.67	1.60	1.51E+03		4.16E+02	6.86E+02
	302.67	* 2.30	8.40E+02		3.58E+03	3.68E+02
TH-231	25.64	14.70	2.23E+01	2.23E+01	-4.66E+00	1.09E+01
	84.21	6.40	4.75E+02		-3.35E+02	2.32E+02
PA-234M	9.89	89.00	7.52E-03	7.52E-03	0.00E+00	0.00E+00
	21.72	64.90	2.12E+00		1.20E+00	1.02E+00
	37.93	23.75	2.80E+01		-1.70E+01	1.36E+01
	131.42	20.40	9.33E+01		4.08E+01	4.36E+01
+ TH-234	63.29	* 3.80	3.45E+02	3.45E+02	6.45E+02	1.67E+02
NP-237	29.37	14.00	5.45E+01	5.45E+01	3.35E+02	2.69E+01
	86.50	12.60	1.19E+02		-3.73E+02	5.67E+01
U-237	97.08	16.30	7.92E+01	4.72E+01	3.79E+01	3.70E+01
	101.07	26.30	4.72E+01		-6.48E+00	2.19E+01
	114.00	12.30	1.91E+02		3.39E+02	9.13E+01
	208.01	22.00	1.21E+02		2.26E+01	5.62E+01
AM-241	59.54	35.90	2.81E+01	2.81E+01	6.87E+00	1.35E+01
AM-243	74.67	66.00	1.92E+01	1.92E+01	1.42E+00	9.18E+00

+ = Nuclide identified during the nuclide identification

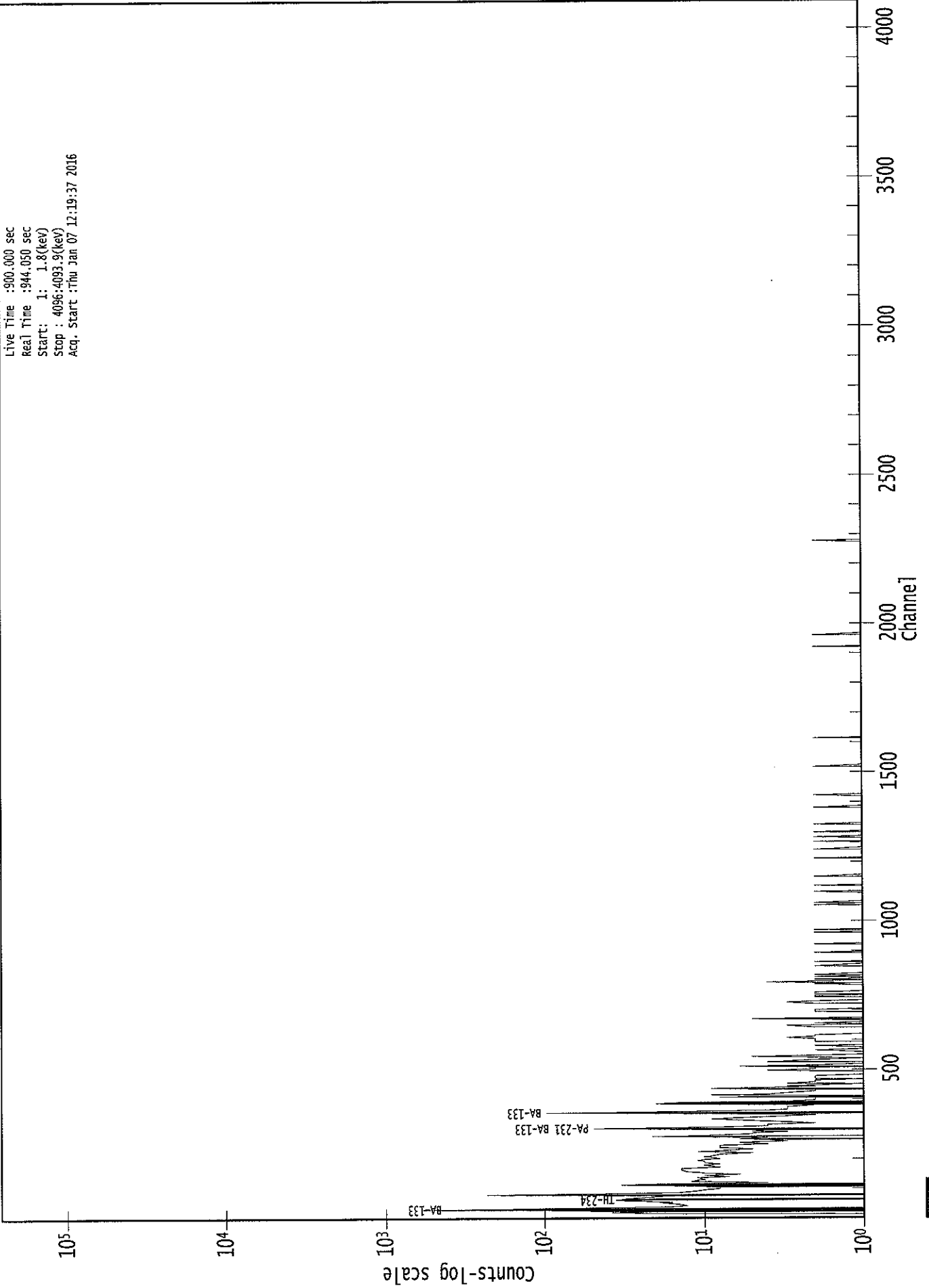
* = Energy line found in the spectrum

> = MDA value not calculated

@ = Half-life too short to be able to perform the decay correction

0000031498.CNF

Live Time : 900.000 sec
Real Time : 944.050 sec
Start: 1: 1.8(keV)
Stop : 4096:4093.9(keV)
Acq. Start : Thu Jan 07 12:19:37 2016



ROI Type: 1

SECTION XI
ANALYTICAL DATA (TOTAL DISSOLVED SOLIDS)

Aliquot Worksheet

Work Order	Run	Analysis Code	Rpt Units	Lab Deadline	Technician
15-12122	1	TDS	liters	1/13/2016	JPACHELLA

Lab Fraction	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	TBB-3S	DUP						1.0000E-01	1.0000E-01				
04	TBB-3S	DO						1.0000E-01	1.0000E-01				
05	TBB-1D	TRG						1.0000E-01	1.0000E-01				
06	TBB-1S	TRG						1.0000E-01	1.0000E-01				
07	TBA-1D	TRG						1.0000E-01	1.0000E-01				
08	TBB-3D	TRG						1.0000E-01	1.0000E-01				
09	TBB-2D	TRG						1.0000E-01	1.0000E-01				
10	TBB-2M	TRG						1.0000E-01	1.0000E-01				
11	MC-1	TRG						1.0000E-01	1.0000E-01				
12	BC-1	TRG						1.0000E-01	1.0000E-01				

Comments

Technician: JPACHELLA Date: 12/30/15

