

Attachment 2 - Gamma Spectroscopy Reports

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\7-28-14\20140728110525.cnf

Report Generated On : 7/28/2014 1:33:53 PM
Sample Title : U2 Dechlorination Tank Operating House
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 Unit
Sample Taken On : 7/28/2014 10:50:04 AM
Acquisition Started : 7/28/2014 10:50:04 AM
Live Time : 898.1 seconds
Dead Time : 900.0 seconds
Background Time : 0.21 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst M-E
Date 7-28-14

[Signature]
7/29/14F

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Peak Analysis Report

7/28/2014 1:33:53 PM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: U2 Dechlorination Tank Operating House Roof
Peak Analysis Performed on: 7/28/2014 1:33:52 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.37	38.90	1.63	2.78E+003	209.03	1.40E+003
2	1028-	1109	1069.43	799.66	1.13	3.11E+002	189.62	1.11E+003
3	1894-	2002	1948.43	1454.32	15.98	2.20E+003	156.47	5.65E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2014 1:33:53 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: U2 Dechlorination Tank Operating House R
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Unit)	Activity Uncertainty
LaBr3	0.958	34.70*	66.40	3.85620E+001	8.24096E+000
		788.70*	33.60	1.46593E+001	9.10871E+000
		1436.80*	66.40	8.77107E+001	9.37989E+000
K-40	0.988	1460.82*	10.66	5.46340E+002	6.12704E+001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2014 1:33:53 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Unit)	Wt mean Activity Uncertainty
LaBr3	0.958	2.780322E+001	6.111049E+000
K-40	0.988	3.731571E+002	6.973224E+001
X Co-58	0.966		

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/28/2014 1:33:52 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

iclude MDA Report 7/28/2014 1:33:53 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: U2 Dechlorination Tank Operating House R
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
+	LaBr3	34.70*	66.40	4.163E+000	4.16E+000	3.856E+001	2.063E+000
		788.70*	33.60	1.458E+001		1.466E+001	7.227E+000
		1436.80*	66.40	8.298E+000		8.771E+001	4.095E+000
+	K-40	1460.82*	10.66	5.169E+001	5.17E+001	5.463E+002	2.551E+001
	Cr-51	320.08	9.91	1.072E+001	1.07E+001	-4.518E+000	5.258E+000
	Mn-54	834.85	99.98	2.574E+000	2.57E+000	8.188E-001	1.265E+000
	Co-58	810.76*	99.45	4.927E+000	4.93E+000	4.953E+000	2.442E+000
	Co-60	1173.23	99.85	2.454E+000	1.17E+000	1.382E+000	1.197E+000
		1332.49	99.98	1.166E+000		1.707E-002	5.497E-001
	Nb-94	702.65	99.81	1.620E+000	1.62E+000	-2.080E-001	7.906E-001
		871.09	99.89	2.606E+000		-9.499E-001	1.280E+000
	Sn-113	255.13	2.11	5.077E+001	1.77E+000	-1.799E+001	2.499E+001
		391.70	64.97	1.768E+000		8.721E-001	8.662E-001
	Cs-137	661.66	85.10	1.886E+000	1.89E+000	1.972E-001	9.215E-001
	Eu-152	121.78	28.67	5.163E+000	4.29E+000	-4.593E-001	2.556E+000
		244.70	7.61	1.468E+001		6.262E+000	7.234E+000
		295.94	0.45	2.397E+002		4.104E+001	1.178E+002
		344.28	26.60	4.289E+000		2.702E+000	2.106E+000
		367.79	0.86	1.280E+002		-1.175E+001	6.275E+001
		411.12	2.24	5.229E+001		5.226E+001	2.561E+001
		443.96	2.83	4.429E+001		3.746E+001	2.169E+001
		488.68	0.42	3.163E+002		9.951E+001	1.548E+002
		563.99	0.49	2.882E+002		-1.880E+002	1.409E+002
		586.26	0.46	3.350E+002		-1.406E+002	1.640E+002
		678.62	0.47	3.398E+002		2.447E+001	1.660E+002
		688.67	0.86	1.916E+002		-8.551E+001	9.362E+001
		719.35	0.28	5.815E+002		8.139E+001	2.838E+002
		778.90	12.96	1.574E+001		-1.317E+000	7.710E+000
		810.45	0.32	7.802E+002		-7.500E+001	3.833E+002
		867.37	4.26	6.135E+001		-6.565E+000	3.014E+001
		919.33	0.43	6.080E+002		-6.030E+001	2.984E+002
		964.08	14.65	1.684E+001		-1.573E+001	8.246E+000
		1085.87	10.24	2.258E+001		-5.092E-001	1.102E+001
		1089.74	1.73	1.332E+002		-7.132E+001	6.499E+001
		1112.07	13.69	1.705E+001		1.080E+001	8.318E+000
		1212.95	1.43	1.628E+002		-4.200E+001	7.923E+001
		1249.94	0.19	1.079E+003		1.919E+002	5.229E+002
		1299.14	1.63	8.903E+001		6.948E-001	4.251E+001
		1408.01	21.07	1.606E+001		-5.923E+000	7.863E+000
		1457.64	0.50	1.183E+003		6.211E+003	5.845E+002
		1528.10	0.28	2.345E+002		-5.764E+001	1.041E+002
	Eu-154	123.07	40.40	3.636E+000	3.64E+000	-1.923E+000	1.800E+000

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Module MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
	Eu-154	247.93	6.89	1.602E+001	3.64E+000	2.823E-001	7.891E+000
		591.76	4.95	3.193E+001		3.041E+001	1.564E+001
		692.42	1.78	9.301E+001		5.698E+000	4.544E+001
		723.30	20.06	8.149E+000		-8.322E-003	3.976E+000
		756.80	4.52	3.748E+001		-1.329E+001	1.829E+001
		873.18	12.08	2.165E+001		-6.846E+000	1.063E+001
		996.29	10.48	2.249E+001		8.960E+000	1.100E+001
		1004.76	18.01	1.260E+001		1.087E+000	6.155E+000
		1274.43	34.80	4.965E+000		2.836E+000	2.390E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.950E+002	5.88E+000	1.131E+001	9.656E+001
		60.01	1.22	1.956E+002		5.208E+000	9.677E+001
		86.55	30.70	5.875E+000		1.576E+000	2.910E+000
		105.31	21.10	7.628E+000		-3.902E+000	3.778E+000
	Tl-208	583.19	85.00	1.804E+000	1.80E+000	2.163E-001	8.827E-001
	Bi-211	351.07	13.02	8.661E+000	8.66E+000	8.010E+000	4.250E+000
	Pb-211	404.85	3.78	3.052E+001	3.05E+001	-1.077E+001	1.495E+001
		427.09	1.76	6.589E+001		-2.544E+001	3.224E+001
		832.01	3.52	7.259E+001		2.869E+001	3.567E+001
	Bi-212	39.86	1.06	2.596E+002	2.42E+001	2.442E+003	1.286E+002
		727.33	6.67	2.417E+001		-1.847E+001	1.179E+001
		785.37	1.10	1.962E+002		-2.708E+001	9.620E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	2.506E+002	2.59E+000	6.074E+000	1.240E+002
		238.63	43.60	2.590E+000		-4.685E-001	1.277E+000
		300.09	3.30	3.236E+001		2.160E+001	1.589E+001
	Pb212-XR	74.82	10.28	1.989E+001	1.16E+001	7.004E+000	9.853E+000
		77.11	17.10	1.157E+001		4.014E+000	5.728E+000
		87.35	3.97	4.482E+001		-3.393E+001	2.220E+001
		89.78	1.46	1.192E+002		-4.095E+000	5.902E+001
	Bi-214	609.32	45.49	3.446E+000	3.45E+000	2.926E-001	1.686E+000
		768.36	4.89	3.762E+001		-8.906E+000	1.839E+001
		806.18	1.26	1.980E+002		3.567E+002	9.732E+001
		934.06	3.11	8.409E+001		6.306E+001	4.126E+001
		1120.29	14.92	1.570E+001		2.748E+000	7.659E+000
		1155.21	1.63	1.481E+002		6.919E+000	7.224E+001
		1238.12	5.83	3.752E+001		2.298E+001	1.822E+001
		1280.98	1.43	1.128E+002		-1.235E+002	5.417E+001
		1377.67	3.99	3.350E+001		-7.856E+001	1.589E+001
		1385.31	0.79	2.136E+002		-4.429E+002	1.024E+002
		1401.52	1.33	2.123E+002		-1.129E+002	1.035E+002
		1407.99	2.39	1.413E+002		-5.213E+001	6.920E+001
		1509.21	2.13	8.571E+001		-2.209E+001	4.112E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.553E+001	3.17E+000	9.928E+000	7.652E+000
		295.22	18.42	5.813E+000		1.556E+000	2.856E+000
		351.93	35.60	3.171E+000		3.627E+000	1.556E+000

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
Pb-214	785.96	1.06	2.054E+002	3.17E+000	-2.506E+001	1.007E+002
Pb214-XR	74.82	5.80	3.526E+001	2.04E+001	1.241E+001	1.746E+001
	77.11	9.70	2.039E+001		7.077E+000	1.010E+001
	87.35	2.24	7.943E+001		-6.013E+001	3.935E+001
	89.78	0.82	2.122E+002		-7.291E+000	1.051E+002
Ra-226	186.21	3.64	3.427E+001	3.43E+001	1.865E+001	1.694E+001
Ac-228	129.07	2.42	5.898E+001	9.74E+000	-3.712E+001	2.920E+001
	209.25	3.89	3.078E+001		6.620E+000	1.519E+001
	270.24	3.46	3.094E+001		1.757E+000	1.521E+001
	328.00	2.95	3.657E+001		-1.684E-001	1.794E+001
	338.32	11.27	9.739E+000		-4.154E-001	4.778E+000
	409.46	1.92	6.049E+001		1.794E+001	2.962E+001
	463.00	4.40	2.911E+001		-1.257E+001	1.425E+001
	794.95	4.25	5.449E+001		2.476E+001	2.674E+001
	911.20	25.80	1.005E+001		2.205E+000	4.933E+000
	964.77	4.99	4.964E+001		-1.257E+001	2.432E+001
	968.97	15.80	1.546E+001		-8.811E+000	7.569E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.423E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	6.192E+001		-3.962E+001	3.042E+001
	300.07	2.47	4.323E+001		2.885E+001	2.123E+001
	302.65	2.20	4.845E+001		2.858E+001	2.379E+001
	330.06	1.40	7.731E+001		-1.202E+001	3.794E+001
Th-234	92.38	2.13	8.004E+001	8.00E+001	3.260E+001	3.964E+001
	92.80	2.10	8.103E+001		3.300E+001	4.013E+001
	112.81	0.21	7.265E+002		1.165E+002	3.597E+002
U-235	143.76	10.96	1.242E+001	2.19E+000	3.635E+000	6.145E+000
	163.33	5.08	2.532E+001		3.707E+000	1.252E+001
	185.71	57.20	2.187E+000		1.415E+000	1.081E+000
	202.11	1.08	1.091E+002		1.250E+001	5.383E+001
	205.31	5.01	2.401E+001		-1.977E+001	1.185E+001
Am-241	59.54	35.90	6.725E+000	6.73E+000	1.791E-001	3.328E+000

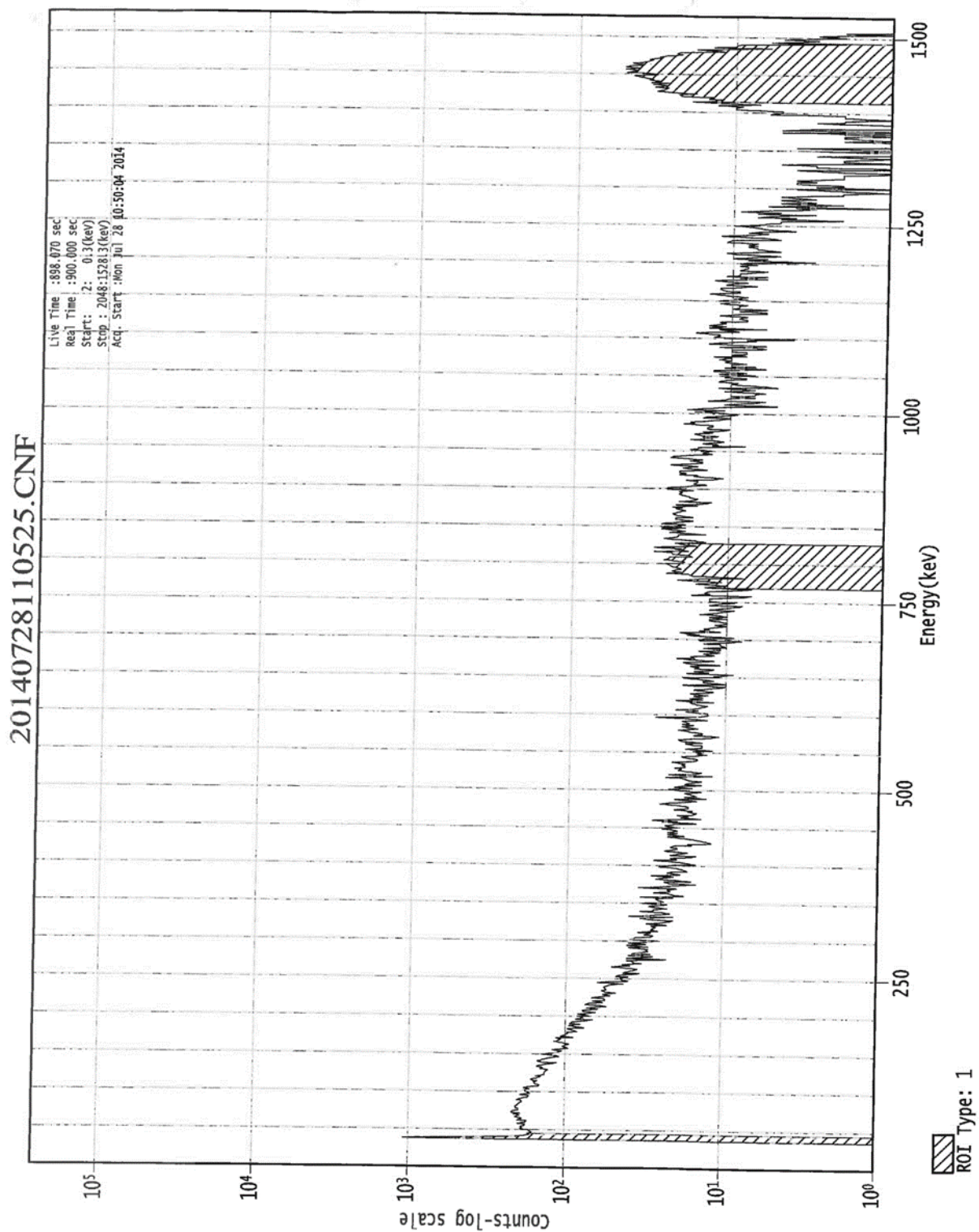
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports



Attachment Figure 2-1 09300 Gamma Spectroscopy Reports



5/15/2014 9:50:17AM

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Analysis Report for 15-May-14-10001
Dechloronization Pump Oil 130G Sample 648.14 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 15-May-14-10001
Sample Description	: Dechloronization Pump Oil 130G Sample 648.14 Grams
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 6.481E+02 grams
Facility	: Default
Sample Taken On	: 5/14/2014 3:00:00PM
Acquisition Started	: 5/15/2014 9:29:16AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 1000.0 seconds
Real Time	: 1000.6 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10378

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5-15-14

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5/19/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 5/15/2014 9:45:59AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 15-May-14-10001

Dechloronization Pump Oil 130G Sample 648.14 Grams

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
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* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma
 Coincidence correction performed.
 free = No coincidence correction required.
 miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
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Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 15-May-14-10001

Dechloronization Pump Oil 130G Sample 648.14 Grams

- ? = 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

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 15-May-14-10001

Dechloronization Pump Oil 130G Sample 648.14 Grams

No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	4.45E-01	8.50E-01	8.50E-01	miss
+	Cr-51	320.08	9.91	8.39E-02	2.88E-01	2.88E-01	free
+	Mn-54	834.85	99.98	6.25E-03	3.78E-02	3.78E-02	miss
+	Co-58	810.76	99.45	6.96E-03	3.23E-02	3.23E-02	1.000
+	Co-60	1173.23	99.85	-2.70E-03	4.79E-02	5.68E-02	0.940
		1332.49	99.98	-1.22E-02		4.79E-02	0.940
+	Nb-94	702.65	99.81	3.88E-03	3.58E-02	3.58E-02	0.937
		871.09	99.89	6.43E-04		3.58E-02	0.937
+	Sn-113	255.13	2.11	-3.04E-01	3.40E-02	1.01E+00	free
		391.70	64.97	-1.90E-03		3.40E-02	free
+	Cs-134	475.36	1.48	2.97E-01	8.42E-03	1.71E+00	miss
		563.25	8.34	-6.51E-02		2.66E-01	0.882
		569.33	15.37	2.80E-02		1.85E-01	0.873
		604.72	97.62	0.00E+00		8.42E-03	0.922
		795.86	85.46	-4.30E-03		3.16E-02	0.924
		801.95	8.69	1.48E-02		3.27E-01	0.884
		1038.61	0.99	0.00E+00		1.20E+00	0.935
		1167.97	1.79	0.00E+00		6.12E-01	1.094
		1365.19	3.02	1.43E-01		1.05E+00	1.146
+	Cs-137	661.66	85.10	-7.01E-04	3.25E-02	3.25E-02	miss
+	Eu-152	121.78	28.67	-8.98E-03	6.65E-02	6.91E-02	0.928
		244.70	7.61	1.04E-03		2.73E-01	0.922
		295.94	0.45	1.39E+00		6.76E+00	miss
		344.28	26.60	3.48E-02		1.03E-01	0.952
		367.79	0.86	1.14E+00		4.13E+00	0.868
		411.12	2.24	-2.54E-01		1.14E+00	0.895
		443.96	2.83	1.63E-01		1.03E+00	0.922
		488.68	0.42	5.71E-02		5.30E+00	miss
		563.99	0.49	-1.29E+00		4.32E+00	0.923
		586.26	0.46	-6.38E-01		5.92E+00	0.933
		678.62	0.47	3.65E+00		1.04E+01	0.870
		688.67	0.86	-9.79E-01		2.70E+00	0.973
		719.35	0.28	0.00E+00		3.07E+00	miss
		778.90	12.96	3.44E-02		2.56E-01	0.937

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 15-May-14-10001
Dechloronization Pump Oil 130G Sample 648.14 Grams

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Eu-152	810.45	0.32	3.35E-01	6.65E-02	9.32E+00	1.066
	867.37	4.26	0.00E+00		2.51E-01	0.911
	919.33	0.43	-2.41E+00		6.64E+00	0.973
	964.08	14.65	4.29E-02		2.39E-01	1.030
	1085.87	10.24	5.36E-02		3.73E-01	1.024
	1089.74	1.73	5.17E-01		2.40E+00	0.944
	1112.07	13.69	0.00E+00		8.58E-02	0.986
	1212.95	1.43	6.65E-01		3.76E+00	0.912
	1249.94	0.19	-1.89E+00		2.05E+01	1.110
	1299.14	1.63	4.03E-01		2.91E+00	0.935
	1408.01	21.07	0.00E+00		6.65E-02	0.976
	1457.64	0.50	-3.81E+00		7.01E+00	1.085
	1528.10	0.28	0.00E+00		5.16E+00	1.003
+ Eu-154	123.07	40.40	-1.41E-02	4.27E-02	4.27E-02	0.927
	247.93	6.89	-1.11E-01		2.52E-01	0.915
	591.76	4.95	1.24E-02		5.74E-01	0.900
	692.42	1.78	2.11E-01		2.25E+00	0.924
	723.30	20.06	2.85E-03		1.59E-01	0.925
	756.80	4.52	0.00E+00		2.18E-01	0.898
	873.18	12.08	3.80E-02		3.03E-01	0.919
	996.29	10.48	6.51E-03		3.63E-01	0.971
	1004.76	18.01	-1.91E-02		1.68E-01	0.971
	1274.43	34.80	1.38E-02		1.02E-01	0.975
	1596.48	1.80	-1.48E-01		1.91E+00	1.196
+ Eu-155	45.30	1.31	-4.61E-01	7.21E-02	5.19E+00	0.998
	60.01	1.22	1.20E+00		5.98E+00	1.000
	86.55	30.70	-3.23E-02		7.21E-02	free
	105.31	21.10	2.35E-02		9.88E-02	1.000
+ Tl-208	583.19	85.00	4.86E-03	4.55E-02	4.55E-02	0.924
+ Bi-211	351.07	13.02	7.22E-02	2.62E-01	2.62E-01	miss
+ Pb-211	404.85	3.78	-1.88E-01	5.14E-01	5.14E-01	miss
+ Bi-212	427.09	1.76	-9.89E-02	5.25E-01	9.10E-01	miss
	832.01	3.52	-6.63E-02		1.07E+00	miss
	39.86	1.06	-5.46E-01		6.02E+00	0.998
	727.33	6.67	-8.13E-03		5.25E-01	0.980
+ Pb-212	785.37	1.10	0.00E+00	5.73E-02	8.81E-01	0.936
	1620.50	1.47	1.14E+00		4.11E+00	1.007
	115.18	0.60	-1.54E-01		3.24E+00	miss
	238.63	43.60	6.42E-03		5.73E-02	free
+ Pb212-XR	300.09	3.30	-1.59E-01	2.17E-01	7.67E-01	free
	74.82	10.28	-6.92E-02		4.07E-01	miss
	77.11	17.10	-6.52E-02		2.17E-01	miss
	87.35	3.97	2.36E-01		6.60E-01	miss
+ Bi-214	89.78	1.46	-4.73E-01	9.87E-02	1.18E+00	miss
	609.32	45.49	1.71E-02		9.87E-02	0.941
	768.36	4.89	2.90E-01		8.70E-01	0.934
	806.18	1.26	5.77E-01		3.19E+00	0.912
	934.06	3.11	-1.09E-01		9.62E-01	0.936
	1120.29	14.92	5.82E-02		3.32E-01	0.936
	1155.21	1.63	0.00E+00		7.78E-01	0.935
	1238.12	5.83	-1.20E-02		6.20E-01	0.936

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Dechloronization Pump Oil 130G Sample 648.14 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-214	1280.98	1.43	-5.52E-01	9.87E-02	2.58E+00	0.936
	1377.67	3.99	1.20E-01		8.86E-01	1.035
	1385.31	0.79	0.00E+00		1.82E+00	0.937
	1401.52	1.33	0.00E+00		1.09E+00	0.937
	1407.99	2.39	0.00E+00		6.10E-01	0.937
	1509.21	2.13	0.00E+00		7.20E-01	0.943
	1661.27	1.05	3.93E-01		4.05E+00	1.001
	1729.59	2.88	0.00E+00		4.92E-01	1.137
	1764.49	15.30	1.58E-01		4.74E-01	1.002
	1847.43	2.03	0.00E+00		7.75E-01	1.073
> Pb-214	2118.51	1.16	0.00E+00	1.03E-01	0.00E+00	1.047
	241.99	7.25	1.30E-01		3.33E-01	0.999
	295.22	18.42	2.85E-02		1.57E-01	1.000
+ Pb-214	351.93	35.60	2.56E-02	3.83E-01	1.03E-01	free
	785.96	1.06	0.00E+00		8.59E-01	0.999
	74.82	5.80	-1.23E-01		7.21E-01	miss
+ Pb214-XR	77.11	9.70	-1.15E-01	5.70E-01	3.83E-01	miss
	87.35	2.24	4.18E-01		1.17E+00	miss
	89.78	0.82	-8.42E-01		2.09E+00	miss
+ Ra-226	186.21	3.64	2.11E-01	1.76E-01	5.70E-01	free
+ Ac-228	129.07	2.42	2.43E-01		8.04E-01	0.937
	209.25	3.89	-2.66E-01		4.22E-01	0.974
	270.24	3.46	-3.57E-02	1.19E-01	5.13E-01	0.950
	328.00	2.95	3.80E-01		1.02E+00	0.949
	338.32	11.27	-5.06E-02		2.31E-01	0.991
	409.46	1.92	2.56E-01		1.56E+00	0.926
	463.00	4.40	2.28E-02		6.84E-01	0.921
	794.95	4.25	1.95E-01		9.20E-01	0.933
	911.20	25.80	3.17E-02		1.76E-01	0.989
	964.77	4.99	0.00E+00		2.16E-01	0.978
	968.97	15.80	2.50E-02		1.84E-01	0.988
	1588.20	3.22	-1.48E-01		1.27E+00	1.003
	27.36	10.30	0.00E+00		1.19E-01	0.997
	283.69	1.70	-1.43E-01		1.03E+00	1.000
	300.07	2.47	1.53E-01		1.08E+00	1.000
	302.65	2.20	5.20E-01		1.28E+00	1.000
+ Th-234	330.06	1.40	-3.29E-01	1.65E+00	2.14E+00	1.001
	92.38	2.13	7.35E-01		1.68E+00	free
	92.80	2.10	8.89E-01		1.65E+00	free
+ U-235	112.81	0.21	-9.55E-01	3.62E-02	1.01E+01	free
	143.76	10.96	5.85E-02		1.90E-01	free
	163.33	5.08	3.57E-02		3.57E-01	free
	185.71	57.20	1.19E-02		3.62E-02	free
	202.11	1.08	-2.11E-01		1.70E+00	miss
	205.31	5.01	8.46E-02		4.38E-01	free
+ Am-241	59.54	35.90	8.37E-02	2.09E-01	2.09E-01	free

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 15-May-14-10001

Dechloronization Pump Oil 130G Sample 648,14 Grams

+ = 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
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports



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Analysis Report for 20-May-14-10001
Water-01 130G 1 Liter of water 841.97 Grams

*WATER FROM NORTH TANK
66*

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 20-May-14-10001
Sample Description	: Water-01 130G 1 Liter of water 841.97 Grams
Sample Type	: 1L 130G Soil Sample
Unit	:
Sample Point	:
Sample Size	: 8.420E+02 grams
Facility	: Default
Sample Taken On	: 5/19/2014 9:00:00AM
Acquisition Started	: 5/20/2014 6:39:16AM
Procedure	: 1L Water 130G
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Water
Live Time	: 7200.0 seconds
Real Time	: 7204.1 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 11/26/2012
Efficiency Calibration Description	:
Sample Number	: 10406

*M-S
5-20-14*

*W. D. N.
5/22/14*

PEAK WITH NID REPORT

Peak Analysis Performed on	: 5/20/2014 8:39:23AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\STDLIB.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 20-May-14-10001

Water-01 130G 1 Liter of water 841.97 Grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M 1	53.58	211 -	219	215.48	2.55E+01	30.91	1.69E+02	..... 607-
M 2	74.93	294 -	315	300.78	1.04E+02	29.91	3.41E+02	PB-212
m 3	77.19	294 -	315	309.80	8.21E+01	26.96	2.91E+02	PB-214
								PB-212
								PB-214
4	92.73	366 -	377	371.91	4.58E+01	42.25	2.66E+02	AC-228
M 5	238.73	952 -	976	955.31	3.72E+01	19.83	1.66E+02	U-235
m 6	242.10	952 -	976	968.77	1.08E+02	27.62	2.04E+02	PB-212
								PB-214
								XE-138
								SR-92
7	295.20	1175 -	1189	1181.02	1.77E+02	47.89	2.75E+02	PB-214
8	351.95	1398 -	1415	1407.87	3.66E+02	48.18	1.53E+02	PB-214
								BI-211
9	609.30	2430 -	2446	2436.82	4.40E+02	47.56	9.12E+01	BI-214
								RU-103
								XE-135
10	664.98	2655 -	2665	2659.53	2.06E+01	14.30	2.88E+01	SB-126
11	768.37	3069 -	3080	3073.09	4.20E+01	19.46	5.19E+01	BI-214
12	1120.41	4472 -	4488	4481.88	8.32E+01	22.25	3.36E+01	SC-46 342
								BI-214
13	1378.56	5510 -	5521	5515.49	2.35E+01	12.13	1.30E+01	BI-214
14	1408.07	5628 -	5639	5633.66	1.06E+01	10.61	1.89E+01	BI-214
								EU-152
15	1460.92	5838 -	5853	5845.36	6.22E+01	19.39	2.97E+01	K-40
16	1764.70	7053 -	7072	7062.48	8.27E+01	21.01	2.47E+01	BI-214

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Colnc Corr
K-40	0.99	1460.82 *	10.66	3.26E-01	1.06E-01	miss
Pb-212	0.99	115.18	0.60			

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

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Analysis Report for 20-May-14-10001

Water-01 130G 1 Liter of water 841.97 Grams

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Pb-212	0.99	238.63 *	43.60	1.32E-02	7.37E-03	free
		300.09	3.30			
Pb212-XR	0.77	74.82 *	10.28	2.63E-01	9.33E-02	miss
		77.11 *	17.10	1.16E-01	4.51E-02	miss
		87.35	3.97			
		89.78	1.46			
Bi-214	0.92	609.32 *	45.49	3.16E-01	5.11E-02	0.941
		768.36 *	4.89	3.34E-01	1.59E-01	0.934
		806.18	1.26			
		934.06	3.11			
		1120.29 *	14.92	2.81E-01	7.85E-02	0.936
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67 *	3.99	3.05E-01	1.59E-01	1.035
		1385.31	0.79			
		1401.52	1.33			
		1407.99 *	2.39	2.61E-01	2.63E-01	0.937
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	3.50E-01	9.33E-02	1.002
		1847.43	2.03			
		2118.51	1.16			
Pb-214	1.00	241.99 *	7.25	2.34E-01	7.05E-02	0.999
		295.22 *	18.42	1.72E-01	5.43E-02	1.000
		351.93 *	35.60	2.09E-01	4.33E-02	free
		785.96	1.06			
Ac228-XR	0.98	89.96	1.90			
		93.35 *	3.10	2.48E-01	2.43E-01	miss
Th-234	1.00	92.38	2.13			
		92.80 *	2.10	3.76E-01	3.63E-01	free
		112.81	0.21			
U235-XR	0.98	89.96	3.47			
		93.35 *	5.60	1.38E-01	1.30E-01	miss
		105.60	1.32			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 20-May-14-10001
Water-01 130G 1 Liter of water 841.97 Grams

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INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	K-40	0.999	3.26E-01	1.06E-01	
X	Bi-211	0.952			
	Pb-212	0.999	1.32E-02	7.37E-03	
	Pb212-XR	0.778	1.44E-01	4.06E-02	
	Bi-214	0.922	3.13E-01	3.64E-02	
	Pb-214	1.000	2.02E-01	3.05E-02	
X	Pb214-XR	0.778			
?	Ac228-XR	0.985	2.48E-01	2.43E-01	
?	Th-234	1.000	3.76E-01	3.63E-01	
?	U235-XR	0.987	1.38E-01	1.30E-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

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 20-May-14-10001
Water-01 130G 1 Liter of water 841.97 Grams

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/20/2014 8:39:23AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	53.58	3.54209E-03	60.60		
10	664.98	2.86111E-03	34.75		

Ac-232
NAPF

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	* 10.66	3.26E-01	1.11E-01	1.11E-01	miss
+	Cr-51	320.08	9.91	-2.27E-02	6.73E-02	6.73E-02	free
+	Mn-54	834.85	99.98	-5.86E-03	7.84E-03	7.84E-03	miss
+	Co-58	810.76	99.45	-3.34E-03	6.81E-03	6.81E-03	1.000
+	Co-60	1173.23	99.85	-4.43E-03	7.81E-03	9.90E-03	0.940
		1332.49	99.98	-2.43E-03		7.81E-03	0.940
+	Nb-94	702.65	99.81	5.48E-03	9.55E-03	1.07E-02	0.937
		871.09	99.89	1.03E-03		9.55E-03	0.937
+	Sn-113	255.13	2.11	-5.99E-02	1.24E-02	3.20E-01	free
		391.70	64.97	1.99E-03		1.24E-02	free
+	Cs-134	475.36	1.48	1.48E-01	8.38E-03	5.39E-01	miss
		563.25	8.34	-1.34E-02		8.07E-02	0.882
		569.33	15.37	-3.87E-03		4.83E-02	0.873
		604.72	97.62	-6.27E-03		8.38E-03	0.922
		795.86	85.46	-3.86E-05		9.87E-03	0.924
		801.95	8.69	-3.54E-04		1.07E-01	0.885
		1038.61	0.99	-7.13E-02		8.62E-01	0.935

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 20-May-14-10001
Water-01 130G 1 Liter of water 841.97 Grams

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	1167.97	1.79	4.94E-02	8.38E-03	4.24E-01	1.093
	1365.19	3.02	-4.61E-02		2.44E-01	1.145
+ Cs-137	661.66	85.10	3.66E-03	9.26E-03	9.26E-03	miss
+ Eu-152	121.78	28.67	3.12E-03	2.26E-02	2.26E-02	0.928
	244.70	7.61	2.13E-02		8.07E-02	0.923
	295.94	0.45	6.50E+00		3.02E+00	miss
	344.28	26.60	-7.09E-04		2.51E-02	0.952
	367.79	0.86	3.32E-01		1.03E+00	0.869
	411.12	2.24	-1.18E-01		3.58E-01	0.895
	443.96	2.83	-2.43E-02		2.36E-01	0.923
	488.68	0.42	-4.75E-02		1.68E+00	miss
	563.99	0.49	-6.50E-01		1.35E+00	0.923
	586.26	0.46	-1.89E-01		1.65E+00	0.933
	678.62	0.47	-1.52E-01		1.83E+00	0.871
	688.67	0.86	1.32E-02		8.87E-01	0.973
	719.35	0.28	-9.86E-01		2.99E+00	miss
	778.90	12.96	-3.46E-03		6.31E-02	0.937
	810.45	0.32	2.32E-02		2.17E+00	1.066
	867.37	4.26	9.37E-02		2.59E-01	0.911
	919.33	0.43	-2.89E-01		1.95E+00	0.973
	964.08	14.65	3.74E-02		6.65E-02	1.030
	1085.87	10.24	2.85E-02		7.84E-02	1.024
	1089.74	1.73	1.43E-01		4.84E-01	0.944
	1112.07	13.69	1.79E-02		7.27E-02	0.986
	1212.95	1.43	-1.13E-01		6.54E-01	0.912
	1249.94	0.19	5.71E-01		3.12E+00	1.109
	1299.14	1.63	-3.99E-02		5.06E-01	0.935
	1408.01	21.07	2.60E-02		6.21E-02	0.976
	1457.64	0.50	-9.94E-01		1.54E+00	1.084
	1528.10	0.28	-1.48E+00		2.21E+00	1.003
+ Eu-154	123.07	40.40	4.70E-04	1.59E-02	1.59E-02	0.927
	247.93	6.89	-2.32E-02		8.73E-02	0.916
	591.76	4.95	-1.98E-02		1.57E-01	0.901
	692.42	1.78	1.04E-01		4.53E-01	0.924
	723.30	20.06	-6.49E-04		4.87E-02	0.925
	756.80	4.52	-2.13E-02		1.99E-01	0.899
	873.18	12.08	-7.64E-03		7.27E-02	0.919
	996.29	10.48	5.55E-03		8.71E-02	0.971
	1004.76	18.01	-5.33E-03		4.46E-02	0.971
	1274.43	34.80	-2.63E-03		2.99E-02	0.975
	1596.48	1.80	1.14E-03		4.19E-01	1.195
+ Eu-155	45.30	1.31	-1.08E-01	3.05E-02	1.42E+00	0.998
	60.01	1.22	2.00E-02		1.68E+00	1.000
	86.55	30.70	8.90E-03		3.12E-02	free
	105.31	21.10	-6.67E-03		3.05E-02	1.000
+ Tl-208	583.19	85.00	2.24E-03	1.12E-02	1.12E-02	0.924
+ Bi-211	351.07	* 13.02	5.72E-01	7.93E-02	7.93E-02	miss
+ Pb-211	404.85	3.78	1.62E-02	1.76E-01	1.76E-01	miss
	427.09	1.76	-3.80E-02		4.08E-01	miss
	832.01	3.52	7.29E-02		2.88E-01	miss
+ Bi-212	39.86	1.06	3.41E-01	1.18E-01	1.96E+00	0.998

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 20-May-14-10001 5/20/2014 8:44:39AM Page 7 of 8

Water-01 130G 1 Liter of water 841.97 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	727.33	6.67	-2.10E-02	1.18E-01	1.18E-01	0.980
	785.37	1.10	-2.22E-02		7.26E-01	0.936
	1620.50	1.47	3.51E-02		3.81E-01	1.007
+ Pb-212	115.18	0.60	2.20E-01	1.60E-02	1.09E+00	miss
	238.63	* 43.60	1.32E-02		1.60E-02	free
	300.09	3.30	-1.23E-01		1.94E-01	free
+ Pb212-XR	74.82	* 10.28	2.63E-01	8.35E-02	1.61E-01	miss
	77.11	* 17.10	1.16E-01		8.35E-02	miss
	87.35	3.97	2.18E-01		2.45E-01	miss
	89.78	1.46	3.88E-01		5.76E-01	miss
+ Bi-214	609.32	* 45.49	3.16E-01	2.79E-02	2.79E-02	0.941
	768.36	* 4.89	3.34E-01		2.07E-01	0.934
	806.18	1.26	3.52E-01		8.14E-01	0.913
	934.06	3.11	2.41E-01		3.96E-01	0.936
	1120.29	* 14.92	2.81E-01		7.84E-02	0.936
	1155.21	1.63	2.83E-01		7.89E-01	0.935
	1238.12	5.83	2.81E-01		3.01E-01	0.937
	1280.98	1.43	4.13E-01		9.06E-01	0.937
	1377.67	* 3.99	3.05E-01		1.90E-01	1.035
	1385.31	0.79	7.26E-01		1.50E+00	0.937
	1401.52	1.33	1.29E-01		8.46E-01	0.937
	1407.99	* 2.39	2.61E-01		4.00E-01	0.937
	1509.21	2.13	2.87E-01		7.15E-01	0.943
	1661.27	1.05	2.05E-01		1.03E+00	1.001
	1729.59	2.88	2.39E-01		4.49E-01	1.137
	1764.49	* 15.30	3.50E-01		8.48E-02	1.002
	1847.43	2.03	1.73E-01		6.00E-01	1.072
>	2118.51	1.16	0.00E+00		0.00E+00	1.047
+ Pb-214	241.99	* 7.25	2.34E-01	2.90E-02	1.07E-01	0.999
	295.22	* 18.42	1.72E-01		6.66E-02	1.000
	351.93	* 35.60	2.09E-01		2.90E-02	free
	785.96	1.06	-1.61E-02		7.48E-01	0.999
+ Pb214-XR	74.82	* 5.80	4.67E-01	1.47E-01	2.86E-01	miss
	77.11	* 9.70	2.05E-01		1.47E-01	miss
	87.35	2.24	3.87E-01		4.35E-01	miss
	89.78	0.82	6.91E-01		1.02E+00	miss
+ Ra-226	186.21	3.64	9.23E-02	1.83E-01	1.83E-01	free
+ Ac-228	129.07	2.42	-6.42E-03	4.09E-02	2.63E-01	0.937
	209.25	3.89	-1.48E-02		1.60E-01	0.974
	270.24	3.46	-2.46E-02		2.08E-01	0.950
	328.00	2.95	-1.18E-01		2.34E-01	0.949
	338.32	11.27	4.46E-03		6.64E-02	0.991
	409.46	1.92	4.67E-02		4.29E-01	0.927
	463.00	4.40	-3.31E-02		1.65E-01	0.921
	794.95	4.25	3.62E-02		2.11E-01	0.933
	911.20	25.80	1.80E-02		4.09E-02	0.989
	964.77	4.99	7.82E-02		1.97E-01	0.978
	968.97	15.80	-8.95E-03		4.26E-02	0.989
	1588.20	3.22	1.19E-01		3.48E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	1.31E-02	1.31E-02	0.997
	283.69	1.70	1.61E-01		4.17E-01	1.000

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports

Analysis Report for 20-May-14-10001
Water-01 130G 1 Liter of water 841.97 Grams

5/20/2014 8:44:39AM

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	300.07	2.47	-1.45E-01	1.31E-02	2.60E-01	1.000
	302.65	2.20	3.64E-02		3.20E-01	1.000
	330.06	1.40	1.25E-01		5.07E-01	1.001
+ Th-234	92.38	2.13	4.52E-01	4.54E-01	4.54E-01	free
	92.80	*	3.76E-01		5.64E-01	free
	112.81	0.21	2.53E-01		3.14E+00	free
+ U-235	143.76	10.96	4.35E-03	1.18E-02	5.36E-02	free
	163.33	5.08	1.07E-02		1.17E-01	free
	185.71	57.20	8.70E-03		1.18E-02	free
	202.11	1.08	8.66E-02		5.29E-01	miss
	205.31	5.01	4.29E-02		1.29E-01	free
+ Am-241	59.54	35.90	1.79E-02	6.01E-02	6.01E-02	free

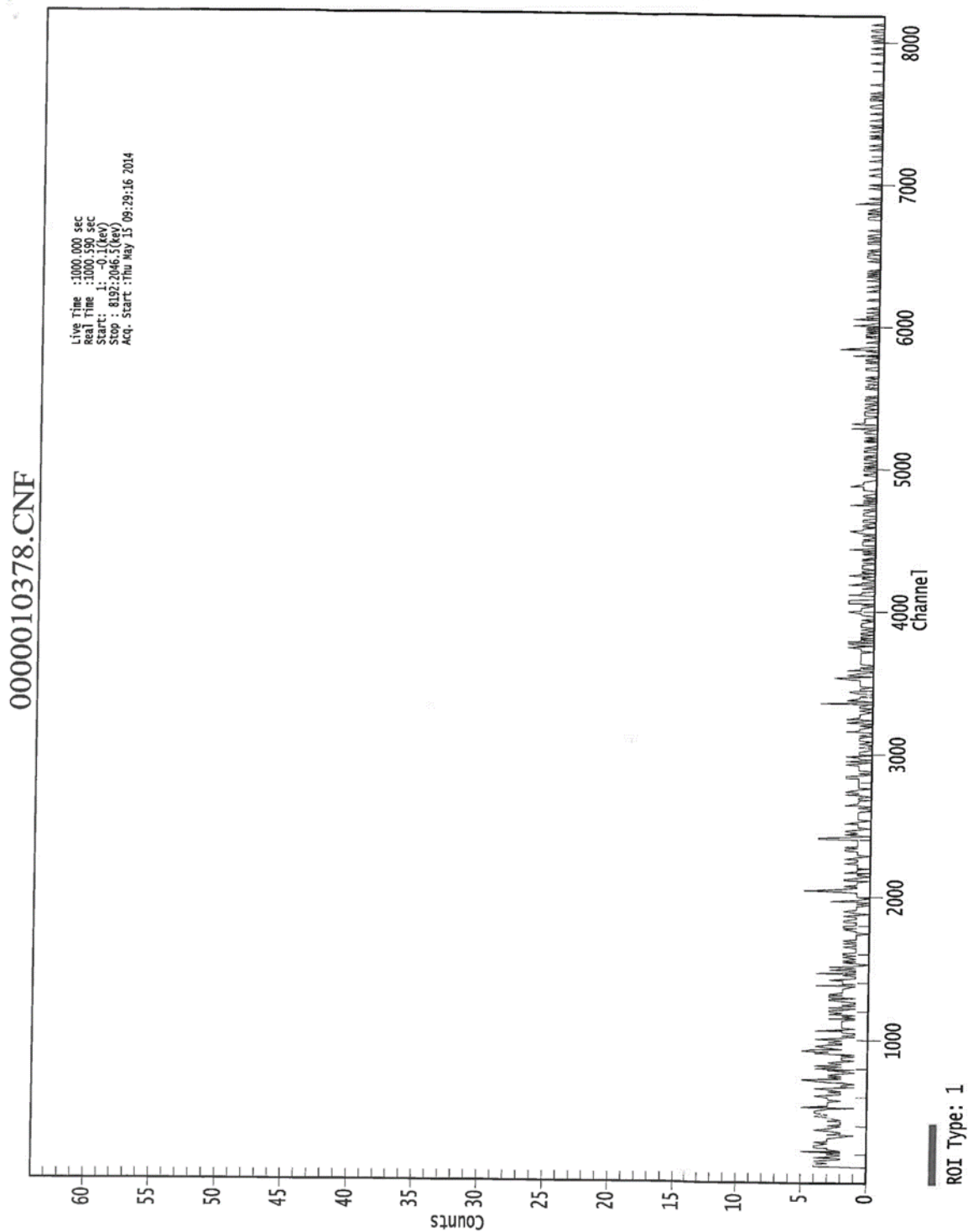
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-1 09300 Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



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Analysis Report for 11-Jun-14-10006

CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Jun-14-10006
Sample Description	: CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.510E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 9:56:38AM
Acquisition Started	: 6/11/2014 3:29:52PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 2000.0 seconds
Real Time	: 2001.4 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10595

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6-16-14

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6/16/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/11/2014 4:03:18PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 11-Jun-14-10006

CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
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* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
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Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 11-Jun-14-10006

CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55

? = 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

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10006

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CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55

No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Colinc Corr
+	K-40	1460.82	10.66	2.59E-01	4.27E-01	4.27E-01	miss
+	Cr-51	320.08	9.91	-2.08E-02	8.93E-02	8.93E-02	free
+	Mn-54	834.85	99.98	5.79E-03	2.12E-02	2.12E-02	miss
+	Co-58	810.76	99.45	-3.74E-03	9.71E-03	9.71E-03	1.000
		1674.73	0.52	4.16E-01		3.06E+00	1.027
+	Co-60	1173.23	99.85	0.00E+00	4.87E-03	4.87E-03	0.940
		1332.49	99.98	-1.68E-03		1.44E-02	0.940
+	Nb-94	702.65	99.81	4.69E-04	1.77E-02	2.11E-02	0.937
		871.09	99.89	-4.10E-03		1.77E-02	0.937
+	Sn-113	255.13	2.11	2.84E-02	1.80E-02	4.93E-01	free
		391.70	64.97	1.75E-03		1.80E-02	free
+	Cs-134	475.36	1.48	6.28E-02	2.06E-02	1.10E+00	miss
		563.25	8.34	-9.64E-03		1.28E-01	0.882
		569.33	15.37	-3.50E-02		1.14E-01	0.873
		604.72	97.62	9.95E-03		2.06E-02	0.922
		795.86	85.46	-6.93E-03		2.15E-02	0.924
		801.95	8.69	4.83E-03		2.54E-01	0.884
		1038.61	0.99	1.68E-01		2.02E+00	0.935
		1167.97	1.79	9.84E-02		9.27E-01	1.094
		1365.19	3.02	-6.73E-02		5.85E-01	1.146
+	Cs-137	661.66	85.10	-3.47E-03	1.44E-02	1.44E-02	miss
+	Eu-152	121.78	28.67	-7.01E-03	3.83E-02	3.83E-02	0.928
		244.70	7.61	-2.08E-02		1.38E-01	0.922
		295.94	0.45	1.21E+00		3.10E+00	miss
		344.28	26.60	0.00E+00		4.65E-02	0.952
		367.79	0.86	6.49E-01		1.80E+00	0.868
		411.12	2.24	-1.21E-01		5.28E-01	0.895
		443.96	2.83	-1.09E-02		5.44E-01	0.922
		488.68	0.42	-6.87E-01		2.85E+00	miss
		563.99	0.49	2.68E-01		2.41E+00	0.923
		586.26	0.46	7.77E-01		2.92E+00	0.933
		678.62	0.47	6.75E-02		3.69E+00	0.870
		688.67	0.86	6.60E-01		1.97E+00	0.973
		719.35	0.28	-2.01E+00		4.01E+00	miss

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10006
CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55
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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Eu-152	778.90	12.96	1.29E-02	3.83E-02	1.37E-01	0.937
	810.45	0.32	9.55E-02		3.55E+00	1.066
	867.37	4.26	1.47E-01		4.98E-01	0.911
	919.33	0.43	0.00E+00		9.30E-01	0.973
	964.08	14.65	8.17E-03		1.18E-01	1.030
	1085.87	10.24	-7.65E-03		1.84E-01	1.024
	1089.74	1.73	-1.48E-01		1.18E+00	0.944
	1112.07	13.69	-2.82E-02		1.12E-01	0.986
	1212.95	1.43	-2.09E-01		9.79E-01	0.912
	1249.94	0.19	1.68E+00		7.82E+00	1.110
	1299.14	1.63	1.36E-01		1.28E+00	0.935
	1408.01	21.07	-3.08E-02		6.89E-02	0.976
	1457.64	0.50	-3.99E+00		3.37E+00	1.085
	1528.10	0.28	-9.34E-01		5.34E+00	1.003
	+ Eu-154 123.07	40.40	-6.66E-03	1.43E-02	2.71E-02	0.927
	247.93	6.89	6.11E-02		1.73E-01	0.915
	591.76	4.95	-1.53E-02		2.83E-01	0.900
	692.42	1.78	-7.73E-02		6.63E-01	0.924
	723.30	20.06	-2.82E-02		6.05E-02	0.925
	756.80	4.52	4.61E-02		4.61E-01	0.898
	873.18	12.08	1.48E-02		1.75E-01	0.919
	996.29	10.48	-9.91E-03		1.60E-01	0.971
	1004.76	18.01	-1.09E-02		8.09E-02	0.971
	1274.43	34.80	0.00E+00		1.43E-02	0.975
	+ Eu-155 1596.48	1.80	-1.27E-01	5.03E-02	7.28E-01	1.196
	45.30	1.31	-9.69E-01		2.39E+00	0.998
	60.01	1.22	5.57E-02		3.07E+00	1.000
	86.55	30.70	9.31E-04		5.03E-02	free
	+ Tl-208 105.31	21.10	-8.35E-04	1.86E-02	5.34E-02	1.000
	583.19	85.00	6.96E-03		1.86E-02	0.924
	+ Bi-211 351.07	13.02	5.53E-02	1.35E-01	1.35E-01	miss
	+ Pb-211 404.85	3.78	-3.09E-02	3.51E-01	3.51E-01	miss
	427.09	1.76	1.34E-02	2.43E-01	7.07E-01	miss
	832.01	3.52	1.04E-01		6.00E-01	miss
	+ Bi-212 39.86	1.06	7.41E-01		3.65E+00	0.998
	727.33	6.67	-4.33E-02		2.43E-01	0.980
	785.37	1.10	2.07E-02	3.01E-02	1.15E+00	0.936
	1620.50	1.47	1.45E-01		1.07E+00	1.007
	+ Pb-212 115.18	0.60	-3.87E-01		1.70E+00	miss
	238.63	43.60	7.27E-03	8.28E-02	3.01E-02	free
	300.09	3.30	-1.36E-01		3.39E-01	free
	+ Pb212-XR 74.82	10.28	1.31E-01		2.58E-01	miss
	77.11	17.10	-8.00E-02		8.28E-02	miss
	87.35	3.97	-7.83E-02	5.33E-02	3.56E-01	miss
	89.78	1.46	-2.20E-01		8.86E-01	miss
	+ Bi-214 609.32	45.49	2.80E-02		5.33E-02	0.941
	768.36	4.89	9.85E-03		4.14E-01	0.934
	806.18	1.26	1.58E-01		1.48E+00	0.912
	934.06	3.11	4.15E-02	1.18E+00	5.36E-01	0.936
	1120.29	14.92	1.17E-02		1.65E-01	0.936
	1155.21	1.63	1.25E-01		1.18E+00	0.935

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10006
CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55
6/11/2014 4:07:36PM Page 6 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-214	1238.12	5.83	8.41E-02	5.33E-02	4.53E-01	0.936
	1280.98	1.43	2.39E-01		1.24E+00	0.936
	1377.67	3.99	9.83E-02		5.51E-01	1.035
	1385.31	0.79	-1.83E-01		1.88E+00	0.937
	1401.52	1.33	1.87E-01		1.43E+00	0.937
	1407.99	2.39	-2.82E-01		6.32E-01	0.937
	1509.21	2.13	5.79E-02		1.09E+00	0.943
	1661.27	1.05	-5.68E-01		1.94E+00	1.001
	1729.59	2.88	0.00E+00		1.87E-01	1.137
	1764.49	15.30	5.35E-02		2.12E-01	1.002
	1847.43	2.03	9.55E-02		8.03E-01	1.073
	2118.51	1.16	0.00E+00		0.00E+00	1.047
	241.99	7.25	-2.67E-02	5.59E-02	1.43E-01	0.999
	295.22	18.42	3.46E-02		8.09E-02	1.000
Pb-214	351.93	35.60	4.24E-02		5.59E-02	free
	785.96	1.06	0.00E+00		3.27E-01	0.999
Pb214-XR	74.82	5.80	2.31E-01	1.46E-01	4.57E-01	miss
	77.11	9.70	-1.41E-01		1.46E-01	miss
	87.35	2.24	-1.39E-01		6.30E-01	miss
	89.78	0.82	-3.92E-01		1.58E+00	miss
Ra-226	186.21	3.64	1.41E-01	3.32E-01	3.32E-01	free
Ac-228	129.07	2.42	-9.30E-02	6.70E-02	3.23E-01	0.937
	209.25	3.89	3.09E-02		2.85E-01	0.974
	270.24	3.46	-2.27E-03		3.87E-01	0.950
	328.00	2.95	-1.58E-01		4.25E-01	0.949
	338.32	11.27	4.60E-02		1.22E-01	0.991
	409.46	1.92	-2.02E-01		5.92E-01	0.926
	463.00	4.40	-8.35E-02		2.60E-01	0.921
	794.95	4.25	9.36E-02		5.16E-01	0.933
	911.20	25.80	-3.25E-03		6.70E-02	0.989
	964.77	4.99	2.36E-02		3.27E-01	0.978
	968.97	15.80	2.28E-02		1.25E-01	0.988
	1588.20	3.22	5.15E-02		6.09E-01	1.003
	27.36	10.30	0.00E+00	4.53E-02	4.53E-02	0.997
	283.69	1.70	9.47E-02		7.74E-01	1.000
Pa-231	300.07	2.47	-1.45E-01		4.71E-01	1.000
	302.65	2.20	-2.62E-01		4.14E-01	1.000
	330.06	1.40	2.10E-01		9.22E-01	1.001
Th-234	92.38	2.13	1.77E-01	7.08E-01	7.27E-01	free
	92.80	2.10	-2.30E-02		7.08E-01	free
	112.81	0.21	2.61E-01		5.74E+00	free
U-235	143.76	10.96	2.78E-02	2.19E-02	1.06E-01	free
	163.33	5.08	-4.53E-02		1.64E-01	free
	185.71	57.20	1.05E-02		2.19E-02	free
	202.11	1.08	-3.02E-01		7.30E-01	miss
Am-241	205.31	5.01	-4.77E-03	1.07E-01	1.81E-01	free
	59.54	35.90	1.91E-02		1.07E-01	free

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10006 6/11/2014 4:07:36PM Page 7 of 7
CH-TRVSC-2A-oil 851.00 grams 06/11/14 09:55

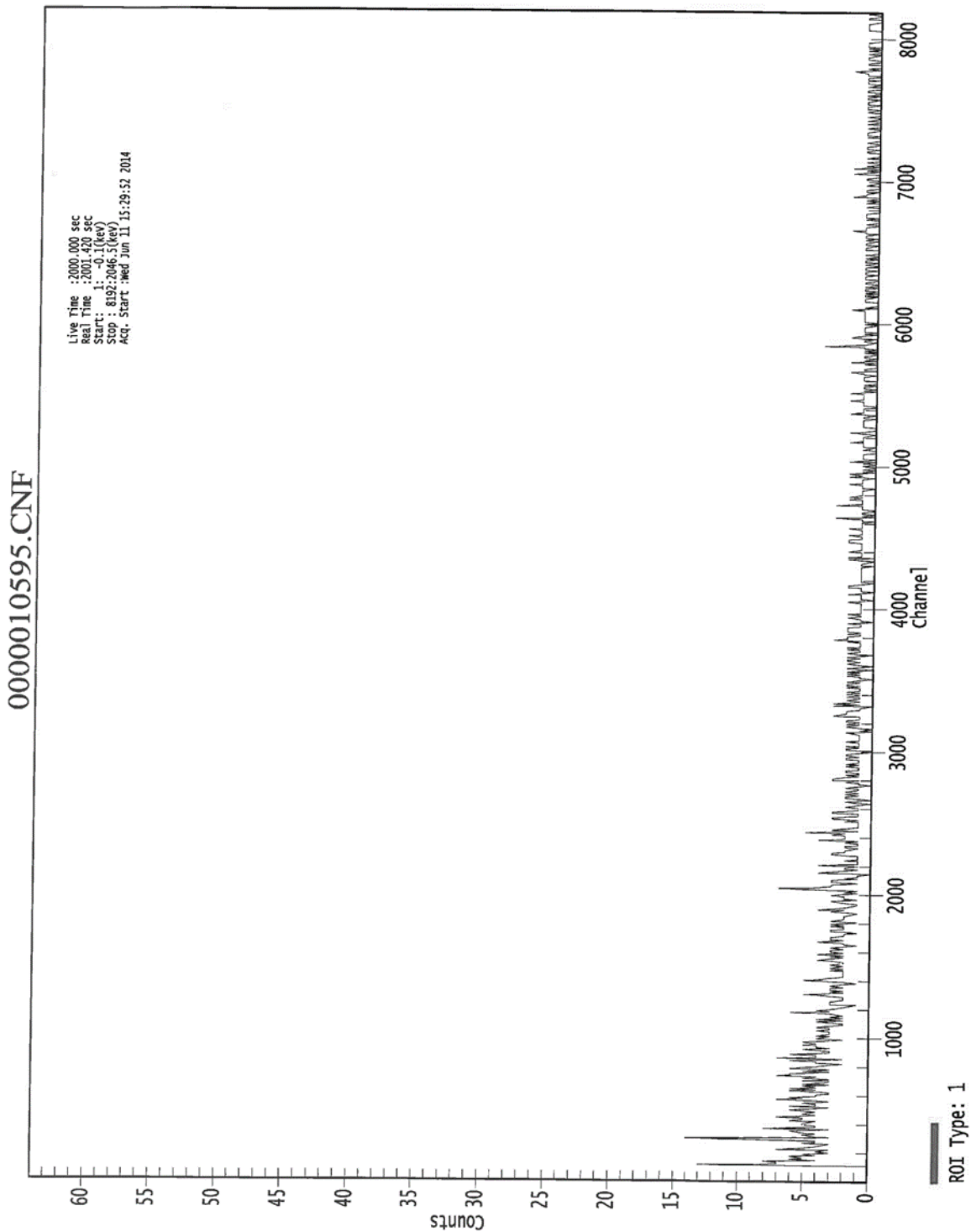
-
- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
 - ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



6/17/2014 11:44:47AM

Page 1 of 7

Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 17-Jun-14-10001
Sample Description	: CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.788E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 10:05:40AM
Acquisition Started	: 6/17/2014 10:40:24AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 3600.0 seconds
Real Time	: 3602.2 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10627

[Signature]
6-17-14

[Signature]
6/18/2014

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/17/2014 11:40:30AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

6/17/2014 11:44:47AM Page 2 of 7

Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	455.41	1818 -	1825	1821.49	7.23E+00	10.00	1.75E+01	..... 677

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	CoInc Corr
--------------	---------------	--------------	----------	----------------------	----------------------	------------

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
<hr/>				
<p>? = nuclide is part of an undetermined solution X = nuclide rejected by the interference analysis @ = nuclide contains energy lines not used in Weighted Mean Activity</p>				
<p>Errors quoted at 2.000sigma</p>				

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

6/17/2014 11:44:47AM

Page 4 of 7

Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

UNIDENTIFIED PEAKS

Peak Locate Performed on : 6/17/2014 11:40:30AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	455.41	2.00694E-03	69.19		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	2.22E-01	2.78E-01	2.78E-01	miss
+	Cr-51	320.08	9.91	1.16E-02	8.52E-02	8.52E-02	free
+	Mn-54	834.85	99.98	3.73E-03	1.16E-02	1.16E-02	miss
+	Co-58	810.76	99.45	-2.54E-03	8.08E-03	8.08E-03	1.000
		1674.73	0.52	-5.33E-01		1.74E+00	1.027
+	Co-60	1173.23	99.85	1.97E-03	7.79E-03	1.27E-02	0.940
		1332.49	99.98	-3.02E-03		7.79E-03	0.940
+	Nb-94	702.65	99.81	4.11E-03	9.50E-03	1.24E-02	0.937
		871.09	99.89	4.28E-04		9.50E-03	0.937
+	Sn-113	255.13	2.11	1.57E-01	1.38E-02	4.33E-01	free
		391.70	64.97	4.26E-03		1.38E-02	free
+	Cs-134	475.36	1.48	5.57E-02	1.07E-02	6.60E-01	miss
		563.25	8.34	-5.66E-02		9.76E-02	0.882
		569.33	15.37	2.82E-02		8.01E-02	0.873
		604.72	97.62	1.28E-04		1.07E-02	0.922
		795.86	85.46	3.43E-03		1.67E-02	0.924
		801.95	8.69	-1.14E-02		1.45E-01	0.884
		1038.61	0.99	8.34E-02		8.45E-01	0.935

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

6/17/2014 11:44:47AM

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Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	1167.97	1.79	-1.33E-02	1.07E-02	5.59E-01	1.094
	1365.19	3.02	-2.10E-02		3.53E-01	1.146
+ Cs-137	661.66	85.10	-1.29E-03	9.42E-03	9.42E-03	miss
+ Eu-152	121.78	28.67	-1.28E-04	2.53E-02	2.53E-02	0.928
	244.70	7.61	-1.85E-02		9.57E-02	0.922
	295.94	0.45	8.81E-01		2.12E+00	miss
	344.28	26.60	-1.03E-02		3.37E-02	0.952
	367.79	0.86	-1.21E-02		1.11E+00	0.868
	411.12	2.24	-9.73E-02		3.93E-01	0.895
	443.96	2.83	3.87E-02		3.31E-01	0.922
	488.68	0.42	-6.03E-01		1.86E+00	miss
	563.99	0.49	-7.13E-01		1.58E+00	0.923
	586.26	0.46	7.32E-01		2.37E+00	0.933
	678.62	0.47	-3.12E-01		2.64E+00	0.870
	688.67	0.86	-6.27E-03		1.06E+00	0.973
	719.35	0.28	1.68E+00		4.37E+00	miss
	778.90	12.96	1.61E-02		8.95E-02	0.937
	810.45	0.32	4.80E-01		2.90E+00	1.066
	867.37	4.26	7.90E-02		3.45E-01	0.911
	919.33	0.43	1.03E+00		3.22E+00	0.973
	964.08	14.65	-1.14E-02		7.92E-02	1.030
	1085.87	10.24	8.24E-03		1.31E-01	1.024
	1089.74	1.73	-4.42E-01		3.90E-01	0.944
	1112.07	13.69	-2.08E-02		8.52E-02	0.986
	1212.95	1.43	2.56E-02		8.60E-01	0.912
	1249.94	0.19	-3.30E+00		5.44E+00	1.110
	1299.14	1.63	0.00E+00		1.74E-01	0.935
	1408.01	21.07	-1.37E-02		3.71E-02	0.976
	1457.64	0.50	-3.24E-01		3.10E+00	1.085
	1528.10	0.28	1.23E+00		5.13E+00	1.003
+ Eu-154	123.07	40.40	-9.69E-03	1.64E-02	1.64E-02	0.927
	247.93	6.89	-1.80E-02		1.10E-01	0.915
	591.76	4.95	-4.08E-02		2.21E-01	0.900
	692.42	1.78	-1.36E-02		6.10E-01	0.924
	723.30	20.06	8.85E-03		5.27E-02	0.925
	756.80	4.52	1.10E-01		3.33E-01	0.898
	873.18	12.08	-3.01E-02		6.21E-02	0.919
	996.29	10.48	1.84E-02		1.05E-01	0.971
	1004.76	18.01	-3.91E-04		4.36E-02	0.971
	1274.43	34.80	4.12E-03		4.27E-02	0.975
	1596.48	1.80	2.13E-01		6.40E-01	1.196
+ Eu-155	45.30	1.31	4.68E-01	2.83E-02	1.94E+00	0.998
	60.01	1.22	2.97E-01		1.91E+00	1.000
	86.55	30.70	-1.55E-02		2.83E-02	free
	105.31	21.10	1.96E-03		3.51E-02	1.000
+ Tl-208	583.19	85.00	4.13E-03	1.39E-02	1.39E-02	0.924
+ Bi-211	351.07	13.02	4.42E-02	8.59E-02	8.59E-02	miss
+ Pb-211	404.85	3.78	-9.07E-03	1.89E-01	2.06E-01	miss
	427.09	1.76	-9.79E-02		4.77E-01	miss
	832.01	3.52	-1.05E-01		1.89E-01	miss
+ Bi-212	39.86	1.06	2.15E-01	1.58E-01	2.23E+00	0.998

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	727.33	6.67	3.60E-02	1.58E-01	1.58E-01	0.980
	785.37	1.10	2.61E-01		9.41E-01	0.936
	1620.50	1.47	-2.23E-02		5.75E-01	1.007
+ Pb-212	115.18	0.60	2.73E-01	2.09E-02	1.28E+00	miss
	238.63	43.60	1.20E-02		2.09E-02	free
	300.09	3.30	1.16E-02		2.35E-01	free
+ Pb212-XR	74.82	10.28	1.91E-01	7.65E-02	1.99E-01	miss
	77.11	17.10	8.54E-03		7.65E-02	miss
	87.35	3.97	-3.58E-03		2.29E-01	miss
+ Bi-214	89.78	1.46	-3.73E-02	3.62E-02	6.40E-01	miss
	609.32	45.49	2.37E-02		3.62E-02	0.941
	768.36	4.89	-4.95E-02		1.94E-01	0.934
	806.18	1.26	-4.05E-02		9.65E-01	0.912
	934.06	3.11	-2.01E-01		2.49E-01	0.936
	1120.29	14.92	2.84E-02		1.14E-01	0.936
	1155.21	1.63	-9.82E-02		8.31E-01	0.935
	1238.12	5.83	-8.96E-02		1.86E-01	0.936
	1280.98	1.43	5.95E-01		1.20E+00	0.936
	1377.67	3.99	1.41E-02		2.29E-01	1.035
	1385.31	0.79	-1.84E-01		1.48E+00	0.937
	1401.52	1.33	-2.25E-01		6.10E-01	0.937
	1407.99	2.39	-1.25E-01		3.40E-01	0.937
	1509.21	2.13	3.11E-02		5.06E-01	0.943
	1661.27	1.05	1.49E-01		1.35E+00	1.001
	1729.59	2.88	1.49E-01		4.47E-01	1.137
	1764.49	15.30	3.43E-02		1.28E-01	1.002
	1847.43	2.03	9.17E-02		5.45E-01	1.073
> Pb-214	2118.51	1.16	0.00E+00	2.81E-02	0.00E+00	1.047
	241.99	7.25	-1.08E-02		1.00E-01	0.999
	295.22	18.42	4.37E-03		4.81E-02	1.000
+ Pb214-XR	351.93	35.60	-9.45E-04	1.35E-01	2.81E-02	free
	785.96	1.06	5.42E-02		8.52E-01	0.999
	74.82	5.80	3.38E-01		3.53E-01	miss
	77.11	9.70	1.50E-02		1.35E-01	miss
	87.35	2.24	-6.34E-03		4.06E-01	miss
	89.78	0.82	-6.64E-02		1.14E+00	miss
+ Ra-226	186.21	3.64	1.49E-01	2.25E-01	2.25E-01	free
+ Ac-228	129.07	2.42	-5.04E-03	4.23E-02	3.14E-01	0.937
	209.25	3.89	-1.31E-01		1.45E-01	0.974
	270.24	3.46	1.11E-01		2.67E-01	0.950
	328.00	2.95	7.90E-03		3.22E-01	0.949
	338.32	11.27	2.83E-02		9.03E-02	0.991
	409.46	1.92	-5.66E-02		4.89E-01	0.926
	463.00	4.40	7.08E-02		2.42E-01	0.921
	794.95	4.25	6.30E-02		3.05E-01	0.933
	911.20	25.80	9.08E-03		4.23E-02	0.989
	964.77	4.99	8.86E-02		2.72E-01	0.978
	968.97	15.80	2.07E-03		7.68E-02	0.988
	1588.20	3.22	-7.22E-02		3.80E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	2.44E-02	2.44E-02	0.997
	283.69	1.70	-1.89E-01		4.16E-01	1.000

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 17-Jun-14-10001

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	300.07	2.47	2.72E-03	2.44E-02	3.14E-01	1.000
	302.65	2.20	-1.30E-01		3.07E-01	1.000
	330.06	1.40	3.25E-01		7.42E-01	1.001
+ Th-234	92.38	2.13	-1.57E-01	5.52E-01	5.52E-01	free
	92.80	2.10	2.44E-01		6.03E-01	free
	112.81	0.21	1.97E+00		4.40E+00	free
+ U-235	143.76	10.96	-1.42E-02	1.41E-02	5.26E-02	free
	163.33	5.08	-7.31E-03		1.37E-01	free
	185.71	57.20	5.97E-03		1.41E-02	free
	202.11	1.08	2.47E-01		6.87E-01	miss
	205.31	5.01	1.83E-02		1.45E-01	free
+ Am-241	59.54	35.90	1.29E-03	6.56E-02	6.56E-02	free

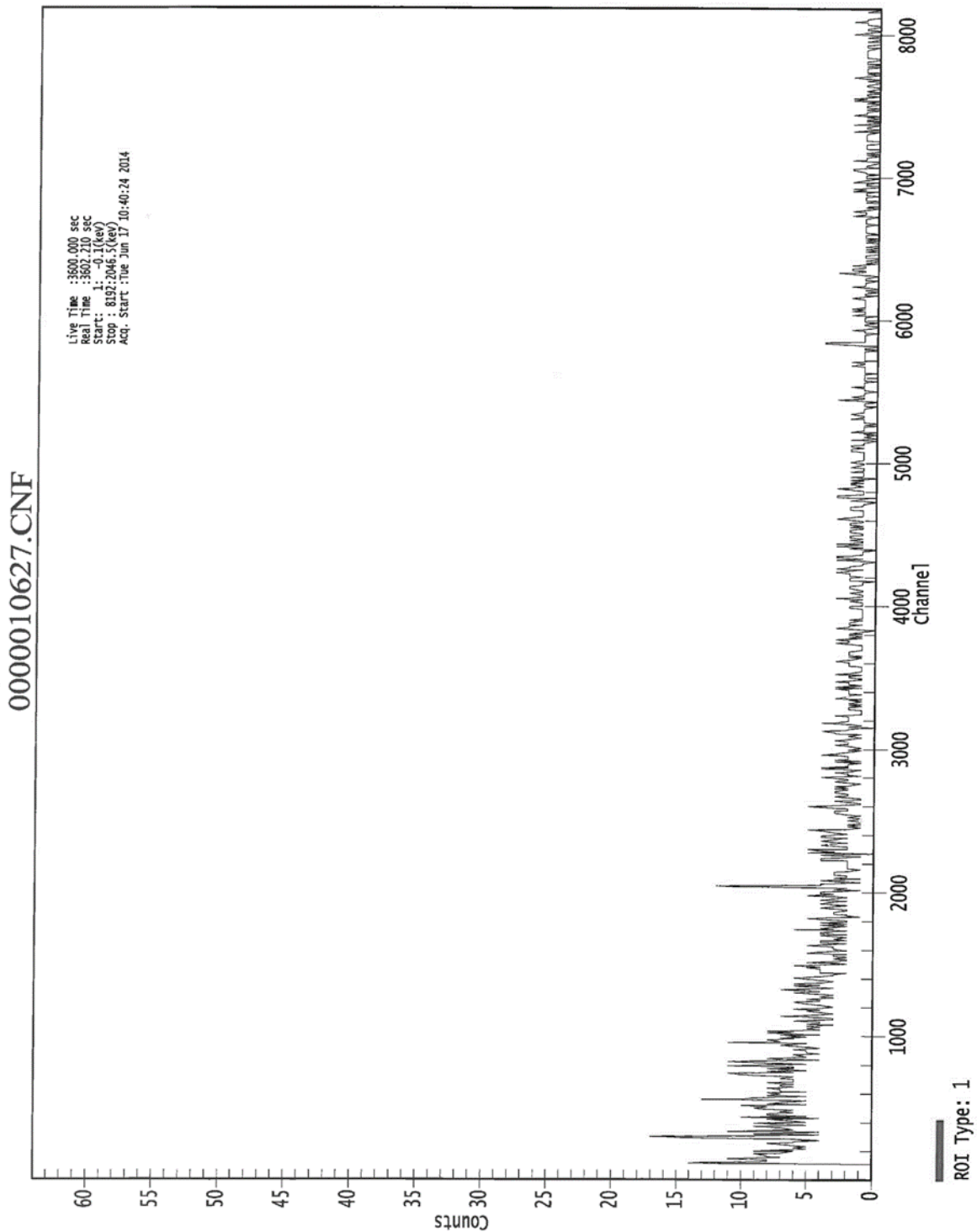
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



6/17/2014 12:51:08PM

Page 1 of 7

Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 17-Jun-14-10002
Sample Description	: CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.592E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 9:50:01AM
Acquisition Started	: 6/17/2014 11:46:45AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 3600.0 seconds
Real Time	: 3602.4 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10630

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6-17-14
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6/18/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/17/2014 12:46:51PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
-----------------	------------------	-----------------	----------	-------------------------	-------------------------	---------------

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
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Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

6/17/2014 12:51:08PM Page 3 of 7

Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

? = 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

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

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No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	2.28E-01	2.75E-01	2.75E-01	miss
+	Cr-51	320.08	9.91	-3.17E-02	8.17E-02	8.17E-02	free
+	Mn-54	834.85	99.98	-2.36E-03	8.02E-03	8.02E-03	miss
+	Co-58	810.76	99.45	4.23E-03	1.39E-02	1.39E-02	1.000
		1674.73	0.52	-4.54E-01		1.78E+00	1.027
+	Co-60	1173.23	99.85	-4.08E-03	1.16E-02	1.19E-02	0.940
		1332.49	99.98	2.47E-03		1.16E-02	0.940
+	Nb-94	702.65	99.81	-1.06E-04	9.72E-03	1.26E-02	0.937
		871.09	99.89	-4.79E-03		9.72E-03	0.937
+	Sn-113	255.13	2.11	7.94E-02	1.42E-02	4.50E-01	free
		391.70	64.97	-1.55E-04		1.42E-02	free
+	Cs-134	475.36	1.48	-8.20E-03	1.04E-02	5.59E-01	miss
		563.25	8.34	2.47E-02		1.58E-01	0.882
		569.33	15.37	0.00E+00		7.01E-02	0.873
		604.72	97.62	-2.57E-03		1.04E-02	0.922
		795.86	85.46	-1.32E-04		1.44E-02	0.924
		801.95	8.69	2.49E-02		1.76E-01	0.884
		1038.61	0.99	6.49E-01		1.48E+00	0.935
		1167.97	1.79	1.16E-01		7.56E-01	1.094
		1365.19	3.02	-6.01E-02		3.24E-01	1.146
+	Cs-137	661.66	85.10	4.94E-03	1.33E-02	1.33E-02	miss
+	Eu-152	121.78	28.67	1.54E-02	2.99E-02	2.99E-02	0.928
		244.70	7.61	-1.08E-02		9.55E-02	0.922
		295.94	0.45	6.27E-01		2.17E+00	miss
		344.28	26.60	3.95E-03		3.36E-02	0.952
		367.79	0.86	9.76E-02		1.19E+00	0.868
		411.12	2.24	-6.56E-02		3.86E-01	0.895
		443.96	2.83	-1.08E-02		2.85E-01	0.922
		488.68	0.42	9.58E-02		1.90E+00	miss
		563.99	0.49	1.18E+00		2.70E+00	0.923
		586.26	0.46	-7.38E-01		1.75E+00	0.933
		678.62	0.47	6.87E-01		2.81E+00	0.870
		688.67	0.86	-1.50E-01		1.28E+00	0.973
		719.35	0.28	8.40E-01		4.14E+00	miss

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
6/17/2014 12:51:08PM Page 5 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Eu-152	778.90	12.96	1.12E-02	2.99E-02	1.05E-01	0.937
	810.45	0.32	9.34E-01		3.82E+00	1.066
	867.37	4.26	-4.86E-02		2.74E-01	0.911
	919.33	0.43	-2.15E-01		2.48E+00	0.973
	964.08	14.65	4.63E-03		8.11E-02	1.030
	1085.87	10.24	-2.81E-03		1.01E-01	1.024
	1089.74	1.73	2.35E-01		8.60E-01	0.944
	1112.07	13.69	7.39E-03		9.38E-02	0.986
	1212.95	1.43	1.61E-01		1.10E+00	0.912
	1249.94	0.19	1.39E+00		4.99E+00	1.110
	1299.14	1.63	1.28E-01		7.07E-01	0.935
	1408.01	21.07	8.47E-03		6.19E-02	0.976
	1457.64	0.50	-1.24E+00		3.00E+00	1.085
	1528.10	0.28	-9.33E-01		4.30E+00	1.003
+ Eu-154	123.07	40.40	-7.12E-03	1.74E-02	1.74E-02	0.927
	247.93	6.89	2.45E-03		1.05E-01	0.915
	591.76	4.95	-5.71E-02		1.20E-01	0.900
	692.42	1.78	0.00E+00		7.13E-01	0.924
	723.30	20.06	-1.91E-02		5.06E-02	0.925
	756.80	4.52	-7.33E-02		2.03E-01	0.898
	873.18	12.08	1.55E-02		1.03E-01	0.919
	996.29	10.48	3.87E-02		1.16E-01	0.971
	1004.76	18.01	-2.86E-03		7.20E-02	0.971
	1274.43	34.80	9.55E-03		4.10E-02	0.975
	1596.48	1.80	1.17E-01		6.55E-01	1.196
	45.30	1.31	6.05E-02	3.26E-02	1.71E+00	0.998
+ Eu-155	60.01	1.22	1.85E-01		2.06E+00	1.000
	86.55	30.70	-9.73E-03		3.26E-02	free
	105.31	21.10	9.94E-03		4.07E-02	1.000
+ Tl-208	583.19	85.00	6.80E-03	1.51E-02	1.51E-02	0.924
+ Bi-211	351.07	13.02	4.63E-03	7.57E-02	7.57E-02	miss
+ Pb-211	404.85	3.78	-6.73E-02	2.02E-01	2.02E-01	miss
	427.09	1.76	1.67E-01		5.05E-01	miss
	832.01	3.52	8.68E-03		2.94E-01	miss
+ Bi-212	39.86	1.06	1.09E+00	1.44E-01	2.48E+00	0.998
	727.33	6.67	-5.70E-02		1.44E-01	0.980
	785.37	1.10	7.15E-02		1.02E+00	0.936
	1620.50	1.47	1.14E-02		7.42E-01	1.007
+ Pb-212	115.18	0.60	-6.59E-02	2.27E-02	1.25E+00	miss
	238.63	43.60	1.12E-02		2.27E-02	free
	300.09	3.30	-5.62E-02		2.22E-01	free
+ Pb212-XR	74.82	10.28	9.37E-02	7.71E-02	1.62E-01	miss
	77.11	17.10	1.08E-02		7.71E-02	miss
	87.35	3.97	8.14E-02		2.64E-01	miss
	89.78	1.46	-1.68E-01		6.15E-01	miss
+ Bi-214	609.32	45.49	3.48E-02	4.37E-02	4.37E-02	0.941
	768.36	4.89	4.81E-02		2.28E-01	0.934
	806.18	1.26	-2.16E-01		9.34E-01	0.912
	934.06	3.11	-4.11E-02		3.29E-01	0.936
	1120.29	14.92	1.72E-02		1.02E-01	0.936
	1155.21	1.63	-5.17E-03		7.90E-01	0.935

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 17-Jun-14-10002
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
6/17/2014 12:51:08PM Page 6 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-214	1238.12	5.83	-4.54E-02	4.37E-02	2.12E-01	0.936
	1280.98	1.43	-1.40E-02		7.92E-01	0.936
	1377.67	3.99	-2.88E-02		1.86E-01	1.035
	1385.31	0.79	4.02E-02		1.69E+00	0.937
	1401.52	1.33	2.06E-01		1.11E+00	0.937
	1407.99	2.39	7.76E-02		5.67E-01	0.937
	1509.21	2.13	5.31E-03		6.00E-01	0.943
	1661.27	1.05	-9.87E-02		8.48E-01	1.001
	1729.59	2.88	-1.71E-02		4.99E-01	1.137
	1764.49	15.30	4.53E-02		1.50E-01	1.002
	1847.43	2.03	6.00E-02		4.42E-01	1.073
	2118.51	1.16	0.00E+00		0.00E+00	1.047
	241.99	7.25	5.16E-02	3.08E-02	1.22E-01	0.999
	295.22	18.42	2.83E-02		5.65E-02	1.000
	351.93	35.60	2.05E-02		3.08E-02	free
Pb-214	785.96	1.06	-2.37E-01	1.36E-01	8.72E-01	0.999
	74.82	5.80	1.66E-01		2.88E-01	miss
	77.11	9.70	1.90E-02		1.36E-01	miss
	87.35	2.24	1.44E-01		4.67E-01	miss
Ra-226	89.78	0.82	-2.99E-01	2.30E-01	1.10E+00	miss
	186.21	3.64	1.34E-01		2.30E-01	free
Ac-228	129.07	2.42	-1.80E-01	4.87E-02	2.64E-01	0.937
	209.25	3.89	1.82E-02		1.88E-01	0.974
	270.24	3.46	4.90E-02		2.29E-01	0.950
	328.00	2.95	-8.15E-02		2.86E-01	0.949
	338.32	11.27	1.15E-03		7.71E-02	0.991
	409.46	1.92	-1.84E-01		3.51E-01	0.926
	463.00	4.40	-7.40E-02		2.08E-01	0.921
	794.95	4.25	-2.09E-02		2.84E-01	0.933
	911.20	25.80	2.30E-03		4.87E-02	0.989
	964.77	4.99	6.75E-02		2.65E-01	0.978
	968.97	15.80	1.73E-02		7.85E-02	0.988
	1588.20	3.22	1.13E-01		4.73E-01	1.003
	27.36	10.30	0.00E+00	2.49E-02	2.49E-02	0.997
	283.69	1.70	7.96E-02		4.14E-01	1.000
Pa-231	300.07	2.47	-3.31E-02		2.96E-01	1.000
	302.65	2.20	-5.65E-02		3.62E-01	1.000
	330.06	1.40	2.42E-01		7.24E-01	1.001
Th-234	92.38	2.13	2.25E-01	6.61E-01	6.61E-01	free
	92.80	2.10	4.30E-01		6.91E-01	free
	112.81	0.21	5.63E-01		4.31E+00	free
U-235	143.76	10.96	-9.27E-03	1.53E-02	5.95E-02	free
	163.33	5.08	7.28E-02		1.45E-01	free
	185.71	57.20	1.16E-02		1.53E-02	free
	202.11	1.08	-2.58E-01		5.54E-01	miss
Am-241	205.31	5.01	6.25E-03	7.42E-02	1.45E-01	free
	59.54	35.90	4.24E-03		7.42E-02	free

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 17-Jun-14-10002

CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

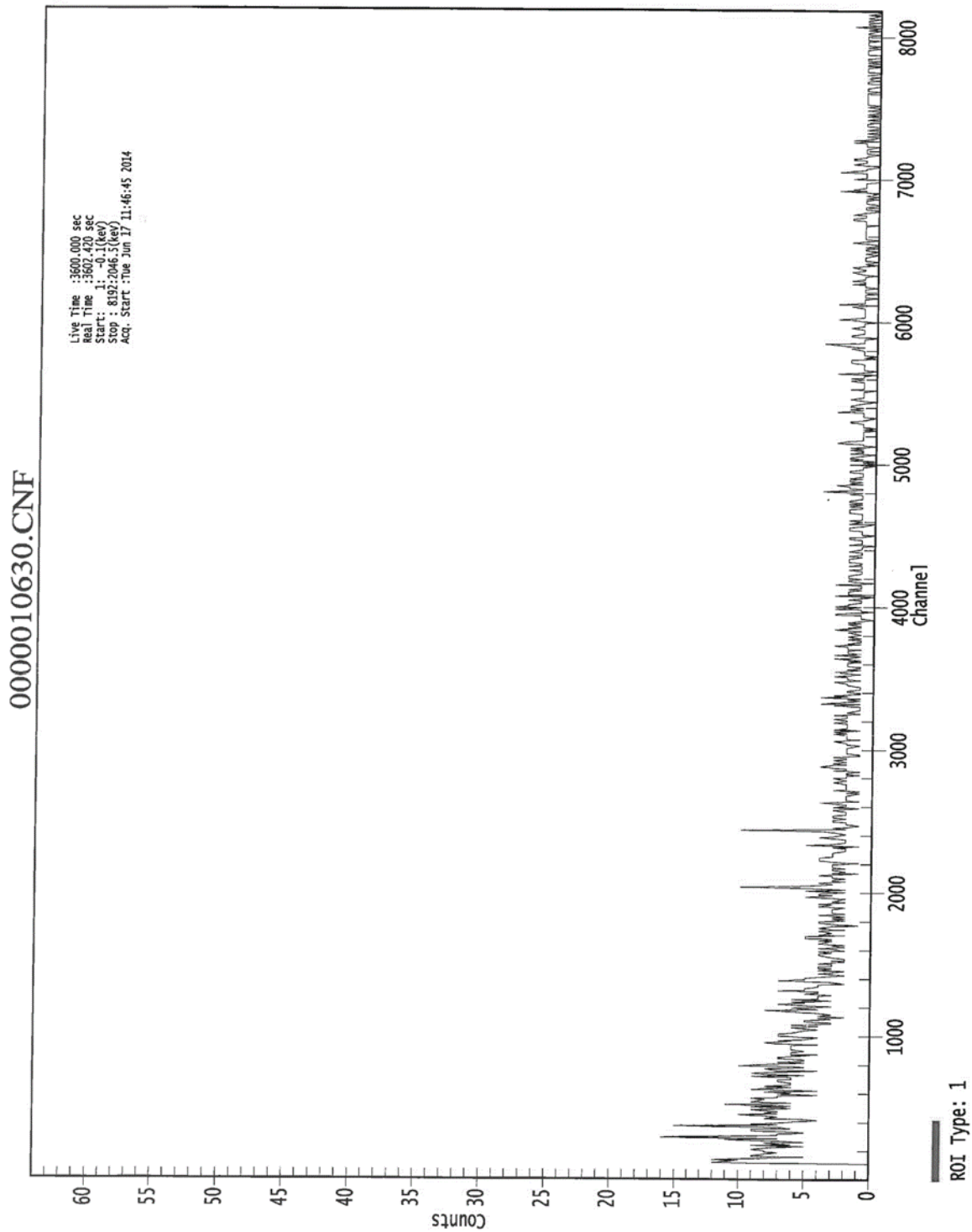
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



6/11/2014 1:50:20PM

Page 1 of 7

Analysis Report for 11-Jun-14-10004
CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Jun-14-10004
Sample Description	: CH-TRVSC-1F-Oil 878.99 06/11/14 09:40
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.790E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 9:40:56AM
Acquisition Started	: 6/11/2014 1:03:09PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 2000.0 seconds
Real Time	: 2001.3 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10591

M-B
6-16-14

M-D
6/16/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/11/2014 1:46:01PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 11-Jun-14-10004
CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
-----------------	------------------	-----------------	----------	-------------------------	-------------------------	---------------

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
-----------------	-----------------------------	------------------------------------	------------------------------------	----------

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

6/11/2014 1:50:20PM Page 3 of 7

Analysis Report for 11-Jun-14-10004
CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

? = 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

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10004

6/11/2014 1:50:20PM

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CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Colinc Corr
+	K-40	1460.82	10.66	2.46E-01	4.04E-01	4.04E-01	miss
+	Cr-51	320.08	9.91	4.89E-02	1.36E-01	1.36E-01	free
+	Mn-54	834.85	99.98	1.72E-03	1.70E-02	1.70E-02	miss
+	Co-58	810.76	99.45	7.66E-04	1.67E-02	1.67E-02	1.000
		1674.73	0.52	5.53E-01		3.74E+00	1.027
+	Co-60	1173.23	99.85	-4.73E-03	1.28E-02	1.28E-02	0.940
		1332.49	99.98	3.80E-03		1.76E-02	0.940
+	Nb-94	702.65	99.81	2.58E-03	1.61E-02	1.61E-02	0.937
		871.09	99.89	1.90E-03		1.71E-02	0.937
+	Sn-113	255.13	2.11	-1.28E-01	1.74E-02	4.95E-01	free
		391.70	64.97	4.51E-03		1.74E-02	free
+	Cs-134	475.36	1.48	5.20E-02	1.47E-02	8.81E-01	miss
		563.25	8.34	8.72E-02		2.42E-01	0.882
		569.33	15.37	-5.56E-02		8.84E-02	0.873
		604.72	97.62	5.27E-03		2.00E-02	0.922
		795.86	85.46	-1.06E-03		1.47E-02	0.924
		801.95	8.69	-1.64E-02		1.20E-01	0.884
		1038.61	0.99	2.17E-01		1.51E+00	0.935
		1167.97	1.79	1.90E-01		1.18E+00	1.094
		1365.19	3.02	0.00E+00		1.42E-01	1.146
+	Cs-137	661.66	85.10	-7.75E-03	1.69E-02	1.69E-02	miss
+	Eu-152	121.78	28.67	-7.46E-03	3.51E-02	3.51E-02	0.928
		244.70	7.61	2.30E-02		1.68E-01	0.922
		295.94	0.45	1.22E+00		3.23E+00	miss
		344.28	26.60	-1.72E-02		4.05E-02	0.952
		367.79	0.86	1.00E+00		1.93E+00	0.868
		411.12	2.24	-1.79E-01		4.19E-01	0.895
		443.96	2.83	9.32E-02		5.01E-01	0.922
		488.68	0.42	-1.23E+00		2.53E+00	miss
		563.99	0.49	1.59E-01		3.61E+00	0.923
		586.26	0.46	1.14E+00		3.31E+00	0.933
		678.62	0.47	-1.25E+00		2.53E+00	0.870
		688.67	0.86	-1.92E-01		1.63E+00	0.973
		719.35	0.28	9.57E-01		6.63E+00	miss

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10004
CH-TRVSC-1F-Oil 878.99 06/11/14 09:40
6/11/2014 1:50:20PM Page 5 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Eu-152	778.90	12.96	-2.03E-02	3.51E-02	7.47E-02	0.937
	810.45	0.32	9.87E-02		4.85E+00	1.066
	867.37	4.26	3.99E-02		3.68E-01	0.911
	919.33	0.43	1.66E-01		4.69E+00	0.973
	964.08	14.65	4.74E-03		1.02E-01	1.030
	1085.87	10.24	6.01E-02		2.09E-01	1.024
	1089.74	1.73	0.00E+00		1.15E+00	0.944
	1112.07	13.69	-1.95E-03		1.09E-01	0.986
	1212.95	1.43	-4.60E-02		1.20E+00	0.912
	1249.94	0.19	1.59E+00		1.15E+01	1.110
	1299.14	1.63	-3.96E-01		8.50E-01	0.935
	1408.01	21.07	-1.29E-03		6.67E-02	0.976
	1457.64	0.50	-4.01E-01		4.22E+00	1.085
	1528.10	0.28	-7.03E-01		5.17E+00	1.003
	+ Eu-154 123.07	40.40	8.12E-03		2.82E-02	0.927
	247.93	6.89	-2.15E-02		1.22E-01	0.915
	591.76	4.95	-1.37E-02		2.74E-01	0.900
Eu-154	692.42	1.78	-1.04E-01	2.82E-02	8.30E-01	0.924
	723.30	20.06	7.09E-03		7.57E-02	0.925
	756.80	4.52	-4.71E-02		3.57E-01	0.898
	873.18	12.08	-4.61E-02		1.12E-01	0.919
	996.29	10.48	1.44E-02		1.55E-01	0.971
	1004.76	18.01	-1.55E-02		1.01E-01	0.971
	1274.43	34.80	-8.75E-03		4.74E-02	0.975
	1596.48	1.80	1.92E-01		8.89E-01	1.196
	+ Eu-155 45.30	1.31	-7.54E-01		2.40E+00	0.998
	60.01	1.22	-1.83E+00		2.40E+00	1.000
Eu-155	86.55	30.70	-8.93E-03	4.66E-02	4.66E-02	free
	105.31	21.10	-1.33E-02		5.03E-02	1.000
	+ Tl-208 583.19	85.00	1.30E-02		2.41E-02	0.924
+ Bi-211	351.07	13.02	-2.13E-03	1.07E-01	1.07E-01	miss
+ Pb-211	404.85	3.78	-4.49E-02	2.45E-01	2.45E-01	miss
Bi-212	427.09	1.76	-2.46E-01	1.94E-01	4.91E-01	miss
	832.01	3.52	-8.55E-02		4.80E-01	miss
	39.86	1.06	-1.57E-01		3.26E+00	0.998
	727.33	6.67	-9.89E-02		1.94E-01	0.980
Pb-212	785.37	1.10	5.15E-01	2.72E-02	1.80E+00	0.936
	1620.50	1.47	0.00E+00		3.81E-01	1.007
	115.18	0.60	-4.58E-01		1.38E+00	miss
	238.63	43.60	1.16E-02		2.72E-02	free
Pb212-XR	300.09	3.30	1.83E-02	1.16E-01	3.14E-01	free
	74.82	10.28	4.77E-02		2.39E-01	miss
	77.11	17.10	-1.07E-03		1.16E-01	miss
Bi-214	87.35	3.97	-8.52E-03	3.84E-02	3.44E-01	miss
	89.78	1.46	-1.06E-01		8.34E-01	miss
	609.32	45.49	3.39E-03		3.84E-02	0.941
	768.36	4.89	-4.00E-02		3.21E-01	0.934
Bi-214	806.18	1.26	0.00E+00	3.84E-02	2.96E-01	0.912
	934.06	3.11	6.42E-02		5.19E-01	0.936
	1120.29	14.92	4.54E-02		1.36E-01	0.936
	1155.21	1.63	-3.49E-01		7.81E-01	0.935

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10004
CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

6/11/2014 1:50:20PM Page 6 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-214	1238.12	5.83	7.55E-02	3.84E-02	3.35E-01	0.936
	1280.98	1.43	1.62E-01		1.55E+00	0.936
	1377.67	3.99	1.90E-02		4.12E-01	1.035
	1385.31	0.79	-1.42E-01		1.82E+00	0.937
	1401.52	1.33	4.97E-02		1.60E+00	0.937
	1407.99	2.39	-1.19E-02		6.12E-01	0.937
	1509.21	2.13	7.70E-02		9.10E-01	0.943
	1661.27	1.05	2.03E-01		1.49E+00	1.001
	1729.59	2.88	2.28E-01		8.05E-01	1.137
	1764.49	15.30	1.18E-02		1.35E-01	1.002
	1847.43	2.03	1.32E-02		7.77E-01	1.073
	2118.51	1.16	0.00E+00		0.00E+00	1.047
	241.99	7.25	-1.24E-02	4.59E-02	1.34E-01	0.999
	295.22	18.42	6.98E-02		9.11E-02	1.000
	351.93	35.60	2.92E-02		4.59E-02	free
Pb-214	785.96	1.06	5.01E-01	2.04E-01	1.76E+00	0.999
	74.82	5.80	8.45E-02		4.23E-01	miss
	77.11	9.70	-1.88E-03		2.04E-01	miss
	87.35	2.24	-1.51E-02		6.10E-01	miss
Ra-226	89.78	0.82	-1.88E-01	2.76E-01	1.49E+00	miss
	186.21	3.64	1.58E-02		2.76E-01	free
Ac-228	129.07	2.42	-7.56E-02	1.02E-01	3.29E-01	0.937
	209.25	3.89	-9.12E-03		2.35E-01	0.974
	270.24	3.46	1.10E-01		3.85E-01	0.950
	328.00	2.95	7.48E-02		4.44E-01	0.949
	338.32	11.27	2.82E-02		1.14E-01	0.991
	409.46	1.92	-1.57E-01		4.71E-01	0.926
	463.00	4.40	0.00E+00		2.75E-01	0.921
	794.95	4.25	7.88E-02		3.79E-01	0.933
	911.20	25.80	4.87E-02		1.02E-01	0.989
	964.77	4.99	5.51E-02		3.53E-01	0.978
	968.97	15.80	-3.83E-03		1.11E-01	0.988
	1588.20	3.22	1.27E-01		5.89E-01	1.003
	27.36	10.30	0.00E+00	4.39E-02	4.39E-02	0.997
	283.69	1.70	-1.92E-01		5.28E-01	1.000
Pa-231	300.07	2.47	-2.04E-02		3.99E-01	1.000
	302.65	2.20	1.78E-02		5.35E-01	1.000
	330.06	1.40	-1.66E-01		8.26E-01	1.001
Th-234	92.38	2.13	2.80E-01	8.04E-01	8.06E-01	free
	92.80	2.10	4.73E-01		8.04E-01	free
	112.81	0.21	2.80E-01		4.64E+00	free
U-235	143.76	10.96	-3.81E-03	1.80E-02	9.04E-02	free
	163.33	5.08	-2.78E-02		1.87E-01	free
	185.71	57.20	4.60E-03		1.80E-02	free
	202.11	1.08	3.10E-02		8.96E-01	miss
Am-241	205.31	5.01	-2.42E-03	9.87E-02	1.54E-01	free
	59.54	35.90	-1.61E-02		9.87E-02	free

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10004

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CH-TRVSC-1F-Oil 878.99 06/11/14 09:40

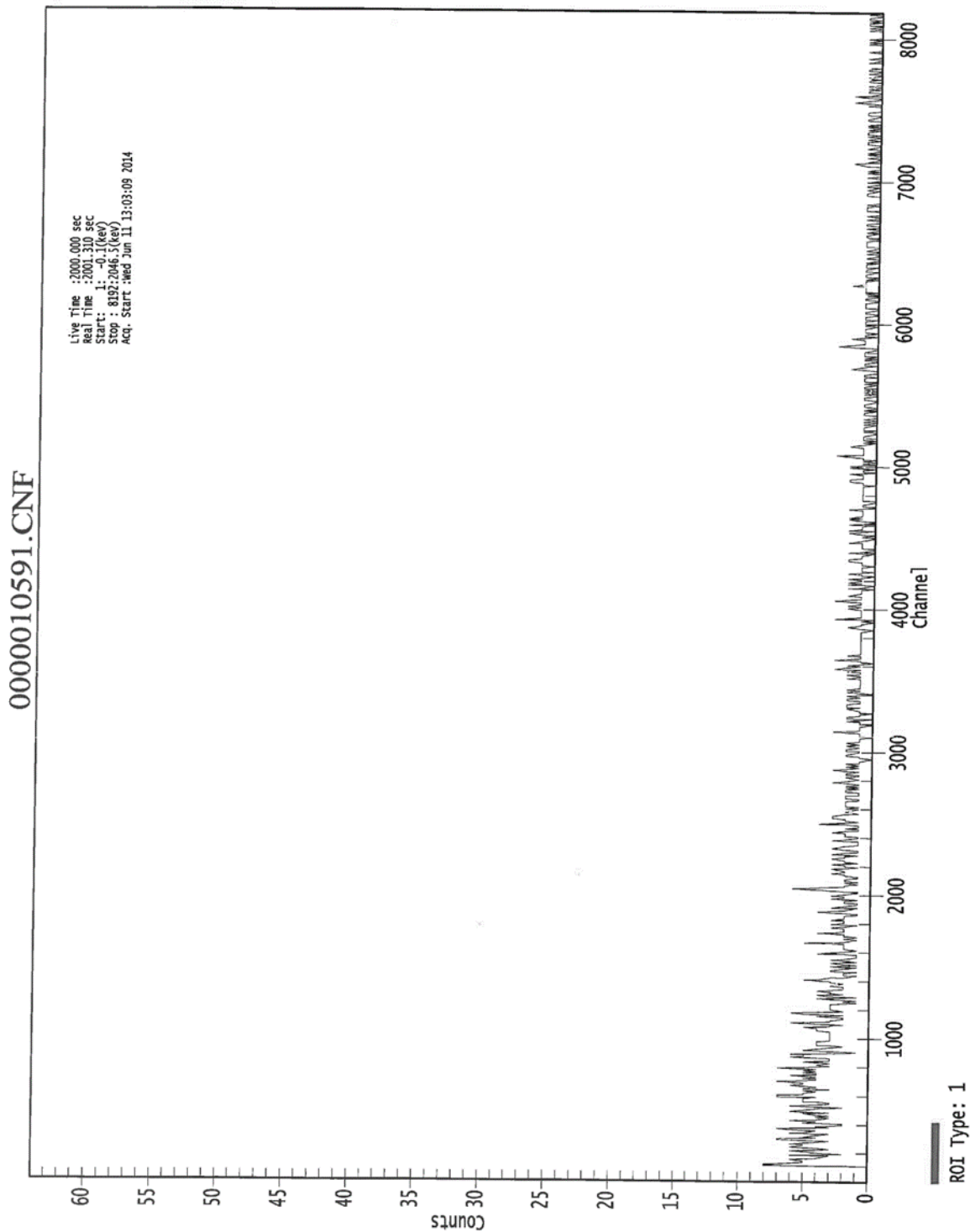
-
- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
 - ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



6/11/2014 2:15:10PM

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Analysis Report for 11-Jun-14-10005

CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Jun-14-10005
Sample Description	: CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.788E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 10:05:40AM
Acquisition Started	: 6/11/2014 1:37:16PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 2000.0 seconds
Real Time	: 2001.2 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10590

Handwritten signatures and dates:
JTB
6-16-14
[Signature]
6/16/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/11/2014 2:10:40PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.66	1402 -	1411	1406.70	1.99E+01	13.90	2.81E+01	Pb-214
2	609.41	2432 -	2442	2437.29	1.30E+01	12.57	2.39E+01	Bi-211 Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Bi-211	0.97	351.07 *	13.02	1.06E-01	7.60E-02	miss
Bi-214	1.00	609.32 *	45.49	3.21E-02	3.11E-02	0.941
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	3.89E-02	2.78E-02	free
		785.96	1.06			

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-011 878.85 grams 06/11/14 10:05

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* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
?	Bi-211	0.978	1.06E-01	7.60E-02	
	Bi-214	1.000	3.21E-02	3.11E-02	
?	Pb-214	0.997	3.89E-02	2.78E-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

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05
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UNIDENTIFIED PEAKS

Peak Locate Performed on : 6/11/2014 2:10:40PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	2.94E-01	4.50E-01	4.50E-01	miss
+	Cr-51	320.08	9.91	4.23E-02	1.32E-01	1.32E-01	free
+	Mn-54	834.85	99.98	-8.63E-04	1.20E-02	1.20E-02	miss
+	Co-58	810.76	99.45	-4.47E-03	1.53E-02	1.53E-02	1.000
		1674.73	0.52	-6.04E-01		2.96E+00	1.027
+	Co-60	1173.23	99.85	5.48E-04	1.40E-02	2.29E-02	0.940
		1332.49	99.98	1.90E-03		1.40E-02	0.940
+	Nb-94	702.65	99.81	6.34E-03	1.84E-02	1.84E-02	0.937
		871.09	99.89	-7.12E-04		1.87E-02	0.937
+	Sn-113	255.13	2.11	-1.64E-01	1.74E-02	3.45E-01	free
		391.70	64.97	3.65E-04		1.74E-02	free
+	Cs-134	475.36	1.48	-8.22E-02	1.38E-02	7.70E-01	miss
		563.25	8.34	-5.33E-03		1.75E-01	0.882
		569.33	15.37	2.80E-02		1.34E-01	0.873
		604.72	97.62	-8.20E-03		1.38E-02	0.922
		795.86	85.46	1.01E-02		2.64E-02	0.924
		801.95	8.69	4.26E-02		2.15E-01	0.884
		1038.61	0.99	2.55E-01		2.14E+00	0.935
		1167.97	1.79	2.50E-01		8.97E-01	1.094

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	-7.14E-02	1.38E-02	4.89E-01	1.146
+	Cs-137	661.66	85.10	1.12E-03	1.82E-02	1.82E-02	miss
+	Eu-152	121.78	28.67	-1.60E-03	3.19E-02	3.19E-02	0.928
		244.70	7.61	-7.46E-03		1.28E-01	0.922
		295.94	0.45	2.85E-01		3.01E+00	miss
		344.28	26.60	-1.35E-03		4.28E-02	0.952
		367.79	0.86	1.54E-01		1.67E+00	0.868
		411.12	2.24	-2.56E-02		5.85E-01	0.895
		443.96	2.83	8.67E-02		4.75E-01	0.922
		488.68	0.42	1.40E-02		2.97E+00	miss
		563.99	0.49	3.03E-01		2.84E+00	0.923
		586.26	0.46	5.64E-01		3.32E+00	0.933
		678.62	0.47	2.18E-01		2.93E+00	0.870
		688.67	0.86	2.62E-01		1.77E+00	0.973
		719.35	0.28	-1.39E-01		4.50E+00	miss
		778.90	12.96	2.82E-03		1.09E-01	0.937
		810.45	0.32	-9.25E-01		3.98E+00	1.066
		867.37	4.26	8.39E-02		5.14E-01	0.911
		919.33	0.43	5.55E-01		3.09E+00	0.973
		964.08	14.65	-3.01E-02		8.81E-02	1.030
		1085.87	10.24	1.04E-01		2.22E-01	1.024
		1089.74	1.73	1.85E-01		1.03E+00	0.944
		1112.07	13.69	2.99E-02		1.26E-01	0.986
		1212.95	1.43	5.52E-02		1.39E+00	0.912
		1249.94	0.19	1.16E-01		6.00E+00	1.110
		1299.14	1.63	-4.95E-02		8.50E-01	0.935
		1408.01	21.07	3.76E-02		1.28E-01	0.976
		1457.64	0.50	-1.35E+00		3.78E+00	1.085
		1528.10	0.28	1.08E+00		8.45E+00	1.003
+	Eu-154	123.07	40.40	1.23E-03	2.41E-02	2.41E-02	0.927
		247.93	6.89	-4.36E-02		1.37E-01	0.915
		591.76	4.95	-3.99E-02		2.74E-01	0.900
		692.42	1.78	2.46E-01		1.10E+00	0.924
		723.30	20.06	2.00E-02		7.57E-02	0.925
		756.80	4.52	-4.96E-02		2.76E-01	0.898
		873.18	12.08	-2.50E-02		1.44E-01	0.919
		996.29	10.48	-1.20E-02		1.06E-01	0.971
		1004.76	18.01	-2.25E-02		6.20E-02	0.971
		1274.43	34.80	7.29E-04		4.74E-02	0.975
		1596.48	1.80	0.00E+00		2.59E-01	1.196
+	Eu-155	45.30	1.31	-1.09E+00	5.03E-02	2.02E+00	0.998
		60.01	1.22	1.48E+00		3.50E+00	1.000
		86.55	30.70	1.31E-02		5.17E-02	free
		105.31	21.10	-1.08E-04		5.03E-02	1.000
+	Tl-208	583.19	85.00	3.18E-03	1.68E-02	1.68E-02	0.924
+	Bi-211	351.07	* 13.02	1.06E-01	1.08E-01	1.08E-01	miss
+	Pb-211	404.85	3.78	-6.07E-02	3.07E-01	3.07E-01	miss
		427.09	1.76	1.82E-02		5.98E-01	miss
		832.01	3.52	-9.16E-02		3.40E-01	miss
+	Bi-212	39.86	1.06	4.04E-01	1.67E-01	3.07E+00	0.998
		727.33	6.67	-4.49E-03		1.67E-01	0.980

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

6/11/2014 2:15:10PM Page 6 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	785.37	1.10	2.80E-01	1.67E-01	1.57E+00	0.936
	1620.50	1.47	-1.01E-01		1.31E+00	1.007
+ Pb-212	115.18	0.60	6.62E-02	2.72E-02	1.69E+00	miss
	238.63	43.60	1.02E-02		2.72E-02	free
	300.09	3.30	-9.94E-03		3.14E-01	free
+ Pb212-XR	74.82	10.28	3.09E-02	1.11E-01	2.31E-01	miss
	77.11	17.10	-9.03E-03		1.11E-01	miss
	87.35	3.97	5.20E-02		3.84E-01	miss
	89.78	1.46	-1.50E-01		7.84E-01	miss
+ Bi-214	609.32	* 45.49	3.21E-02	4.76E-02	4.76E-02	0.941
	768.36	4.89	1.16E-01		4.84E-01	0.934
	806.18	1.26	-4.47E-01		1.02E+00	0.912
	934.06	3.11	1.18E-01		6.80E-01	0.936
	1120.29	14.92	1.00E-01		1.98E-01	0.936
	1155.21	1.63	2.63E-01		1.50E+00	0.935
	1238.12	5.83	4.62E-02		4.08E-01	0.936
	1280.98	1.43	-1.85E-01		1.20E+00	0.936
	1377.67	3.99	6.34E-03		4.12E-01	1.035
	1385.31	0.79	-2.12E-01		1.82E+00	0.937
	1401.52	1.33	2.13E-02		1.61E+00	0.937
	1407.99	2.39	3.44E-01		1.17E+00	0.937
	1509.21	2.13	0.00E+00		2.65E-01	0.943
	1661.27	1.05	6.08E-01		2.18E+00	1.001
	1729.59	2.88	3.12E-01		8.78E-01	1.137
	1764.49	15.30	6.54E-02		2.05E-01	1.002
	1847.43	2.03	1.06E-01		7.77E-01	1.073
>	2118.51	1.16	0.00E+00		0.00E+00	1.047
+ Pb-214	241.99	7.25	4.44E-02	3.94E-02	1.61E-01	0.999
	295.22	18.42	5.28E-02		8.50E-02	1.000
	351.93	* 35.60	3.89E-02		3.94E-02	free
	785.96	1.06	3.67E-01		1.65E+00	0.999
+ Pb214-XR	74.82	5.80	5.48E-02	1.95E-01	4.10E-01	miss
	77.11	9.70	-1.59E-02		1.95E-01	miss
	87.35	2.24	9.22E-02		6.80E-01	miss
	89.78	0.82	-2.67E-01		1.40E+00	miss
+ Ra-226	186.21	3.64	2.97E-02	2.76E-01	2.76E-01	free
+ Ac-228	129.07	2.42	-2.10E-02	7.61E-02	4.21E-01	0.937
	209.25	3.89	-2.13E-02		2.60E-01	0.974
	270.24	3.46	1.19E-01		3.75E-01	0.950
	328.00	2.95	4.92E-02		4.44E-01	0.949
	338.32	11.27	-2.77E-03		1.14E-01	0.991
	409.46	1.92	-5.36E-02		6.94E-01	0.926
	463.00	4.40	1.68E-02		3.15E-01	0.921
	794.95	4.25	1.50E-02		4.73E-01	0.933
	911.20	25.80	1.02E-02		7.61E-02	0.989
	964.77	4.99	-4.90E-02		2.73E-01	0.978
	968.97	15.80	4.70E-02		1.30E-01	0.988
	1588.20	3.22	9.07E-02		6.83E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	4.39E-02	4.39E-02	0.997
	283.69	1.70	1.63E-01		7.07E-01	1.000
	300.07	2.47	8.17E-02		4.38E-01	1.000

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10005
CH-TRVSC-2E-oil 878.85 grams 06/11/14 10:05

6/11/2014 2:15:10PM Page 7 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	302.65	2.20	1.86E-01	4.39E-02	5.35E-01	1.000
	330.06	1.40	-2.10E-02		9.24E-01	1.001
+ Th-234	92.38	2.13	4.33E-01	7.62E-01	7.62E-01	free
	92.80	2.10	3.59E-01		7.82E-01	free
+ U-235	112.81	0.21	2.13E-01	1.80E-02	5.18E+00	free
	143.76	10.96	3.26E-02		9.68E-02	free
	163.33	5.08	6.92E-02		1.97E-01	free
	185.71	57.20	1.36E-03		1.80E-02	free
	202.11	1.08	-4.28E-03		8.68E-01	miss
	205.31	5.01	2.88E-02		2.06E-01	free
+ Am-241	59.54	35.90	3.50E-02	1.18E-01	1.18E-01	free

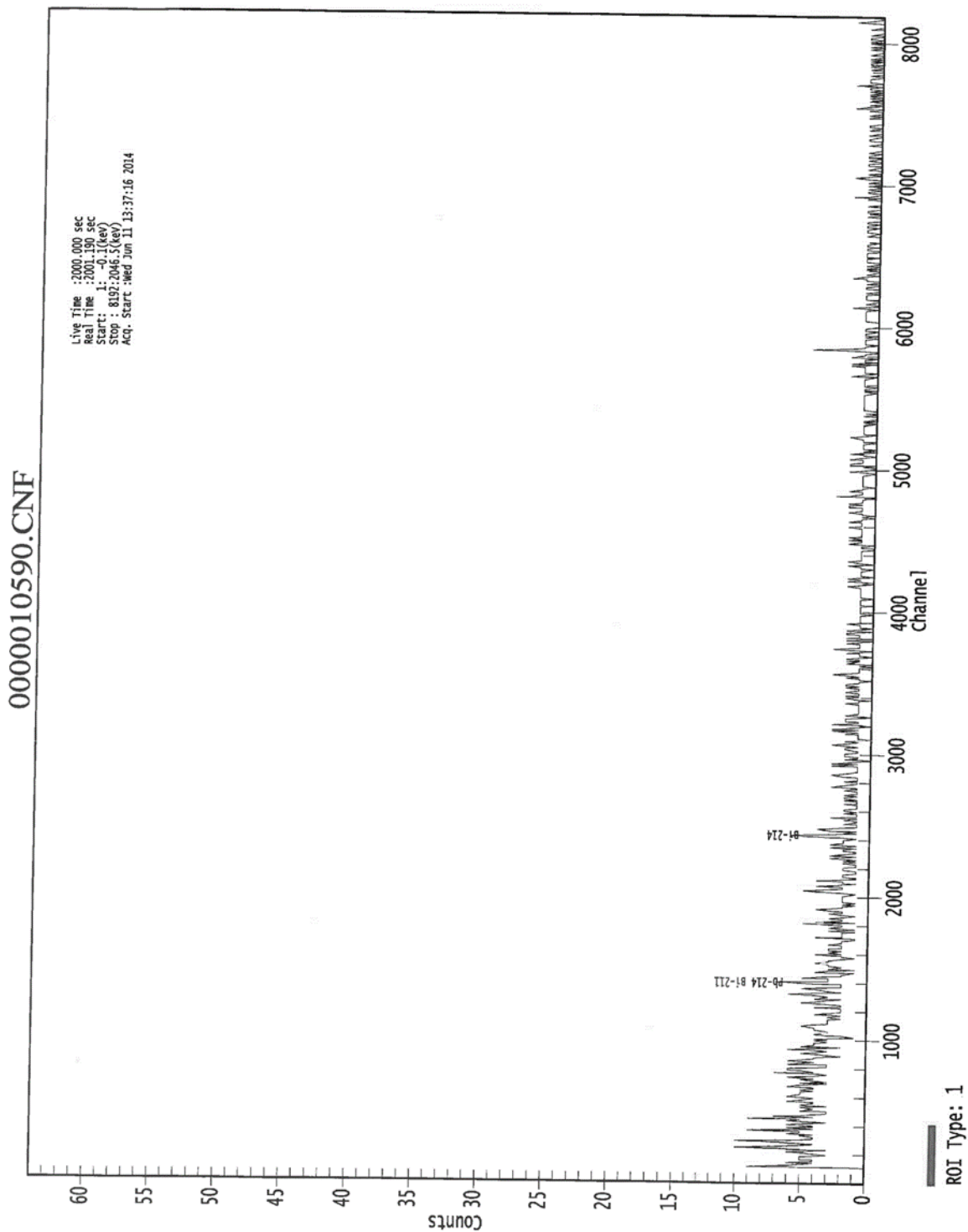
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

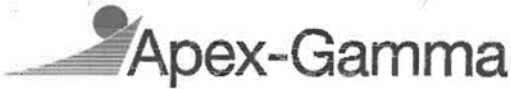
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



6/11/2014 3:32:12PM

Page 1 of 7

Analysis Report for 11-Jun-14-10007

CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Jun-14-10007
Sample Description	: CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 8.592E+02 grams
Facility	: Default
Sample Taken On	: 6/11/2014 9:50:01AM
Acquisition Started	: 6/11/2014 2:46:05PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 2500.0 seconds
Real Time	: 2501.6 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10593

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6-16-14

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6/16/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 6/11/2014 3:27:50PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10007
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
6/11/2014 3:32:12PM Page 2 of 7

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1460.40	5838 -	5849	5843.27	2.43E+01	10.11	1.44E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
K-40	0.98	1460.82 *	10.66	3.58E-01	1.52E-01	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

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Analysis Report for 11-Jun-14-10007

CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (pCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
K-40	0.989	3.58E-01	1.52E-01	
<p>? = nuclide is part of an undetermined solution X = nuclide rejected by the interference analysis @ = nuclide contains energy lines not used in Weighted Mean Activity</p>				
Errors quoted at 2.000sigma				

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10007
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
6/11/2014 3:32:12PM Page 4 of 7

UNIDENTIFIED PEAKS

Peak Locate Performed on : 6/11/2014 3:27:50PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	*	10.66	3.58E-01	9.47E-02	miss
+	Cr-51	320.08		9.91	-1.70E-02	9.78E-02	free
+	Mn-54	834.85		99.98	-4.03E-04	1.59E-02	miss
+	Co-58	810.76		99.45	1.39E-04	1.37E-02	1.000
		1674.73		0.52	6.59E-01	3.55E+00	1.027
+	Co-60	1173.23		99.85	-1.43E-03	1.05E-02	0.940
		1332.49		99.98	1.67E-03	1.44E-02	0.940
+	Nb-94	702.65		99.81	-3.07E-03	1.08E-02	0.937
		871.09		99.89	6.47E-05	1.25E-02	0.937
+	Sn-113	255.13		2.11	-1.79E-01	4.19E-01	free
		391.70		64.97	2.66E-03	1.65E-02	free
+	Cs-134	475.36		1.48	1.60E-02	1.56E-02	miss
		563.25		8.34	2.92E-02	1.73E-01	0.882
		569.33		15.37	-1.11E-02	1.00E-01	0.873
		604.72		97.62	-3.67E-03	1.56E-02	0.922
		795.86		85.46	3.50E-03	1.70E-02	0.924
		801.95		8.69	4.58E-02	2.12E-01	0.884
		1038.61		0.99	2.89E-01	1.60E+00	0.935
		1167.97		1.79	1.33E-01	8.94E-01	1.094

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10007
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50
6/11/2014 3:32:12PM Page 5 of 7

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	6.77E-02	1.56E-02	4.00E-01	1.146
+	Cs-137	661.66	85.10	4.06E-03	1.84E-02	1.84E-02	miss
+	Eu-152	121.78	28.67	-1.45E-02	2.01E-02	2.52E-02	0.928
		244.70	7.61	5.50E-02		1.30E-01	0.922
		295.94	0.45	-8.38E-01		2.81E+00	miss
		344.28	26.60	-7.73E-03		3.68E-02	0.952
		367.79	0.86	-1.54E-01		1.11E+00	0.868
		411.12	2.24	-4.75E-02		5.31E-01	0.895
		443.96	2.83	-1.17E-01		3.88E-01	0.922
		488.68	0.42	-6.96E-01		3.00E+00	miss
		563.99	0.49	-2.95E-02		2.50E+00	0.923
		586.26	0.46	-1.92E-01		3.49E+00	0.933
		678.62	0.47	-1.25E+00		1.64E+00	0.870
		688.67	0.86	4.09E-01		1.66E+00	0.973
		719.35	0.28	7.98E-01		4.82E+00	miss
		778.90	12.96	1.61E-02		1.17E-01	0.937
		810.45	0.32	-1.51E+00		2.81E+00	1.066
		867.37	4.26	8.59E-02		3.67E-01	0.911
		919.33	0.43	1.51E-02		3.84E+00	0.973
		964.08	14.65	2.14E-02		1.23E-01	1.030
		1085.87	10.24	-4.24E-02		1.13E-01	1.024
		1089.74	1.73	2.60E-02		9.37E-01	0.944
		1112.07	13.69	7.97E-03		1.03E-01	0.986
		1212.95	1.43	0.00E+00		2.85E-01	0.912
		1249.94	0.19	3.05E+00		1.00E+01	1.110
		1299.14	1.63	-6.75E-02		1.02E+00	0.935
		1408.01	21.07	0.00E+00		2.01E-02	0.976
		1457.64	0.50	-3.00E+00		2.11E+00	1.085
		1528.10	0.28	1.15E+00		5.34E+00	1.003
+	Eu-154	123.07	40.40	3.93E-03	1.87E-02	2.31E-02	0.927
		247.93	6.89	4.23E-02		1.33E-01	0.915
		591.76	4.95	5.60E-03		2.24E-01	0.900
		692.42	1.78	-1.19E-01		6.09E-01	0.924
		723.30	20.06	-1.32E-02		5.55E-02	0.925
		756.80	4.52	-5.37E-02		2.92E-01	0.898
		873.18	12.08	-1.64E-02		9.13E-02	0.919
		996.29	10.48	-3.93E-03		1.27E-01	0.971
		1004.76	18.01	0.00E+00		1.87E-02	0.971
		1274.43	34.80	-2.98E-03		3.07E-02	0.975
		1596.48	1.80	-6.72E-02		5.77E-01	1.196
+	Eu-155	45.30	1.31	1.69E-01	3.99E-02	2.10E+00	0.998
		60.01	1.22	3.97E-01		2.55E+00	1.000
		86.55	30.70	-8.14E-03		3.99E-02	free
		105.31	21.10	-1.72E-02		4.23E-02	1.000
+	Tl-208	583.19	85.00	1.72E-03	1.75E-02	1.75E-02	0.924
+	Bi-211	351.07	13.02	7.42E-02	1.30E-01	1.30E-01	miss
+	Pb-211	404.85	3.78	1.00E-02	2.78E-01	2.78E-01	miss
		427.09	1.76	1.49E-01		7.27E-01	miss
		832.01	3.52	5.00E-03		3.60E-01	miss
+	Bi-212	39.86	1.06	-2.79E-01	1.58E-01	2.75E+00	0.998
		727.33	6.67	-3.76E-02		1.58E-01	0.980

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10007
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

6/11/2014 3:32:12PM Page 6 of 7

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	785.37	1.10	-1.97E-01	1.58E-01	1.06E+00	0.936
	1620.50	1.47	1.64E-02		1.07E+00	1.007
+ Pb-212	115.18	0.60	1.34E-01	2.17E-02	1.35E+00	miss
	238.63	43.60	5.83E-03		2.17E-02	free
	300.09	3.30	7.00E-02		3.37E-01	free
+ Pb212-XR	74.82	10.28	1.69E-01	9.85E-02	2.36E-01	miss
	77.11	17.10	1.63E-02		9.85E-02	miss
	87.35	3.97	-4.56E-02		3.02E-01	miss
	89.78	1.46	-1.91E-03		8.24E-01	miss
+ Bi-214	609.32	45.49	3.98E-02	5.15E-02	5.15E-02	0.941
	768.36	4.89	2.08E-02		3.28E-01	0.934
	806.18	1.26	1.79E-01		1.34E+00	0.912
	934.06	3.11	9.86E-02		4.74E-01	0.936
	1120.29	14.92	-3.10E-03		1.40E-01	0.936
	1155.21	1.63	-7.44E-02		6.39E-01	0.935
	1238.12	5.83	7.05E-02		3.33E-01	0.936
	1280.98	1.43	9.08E-02		1.27E+00	0.936
	1377.67	3.99	3.89E-02		3.37E-01	1.035
	1385.31	0.79	-5.21E-01		1.88E+00	0.937
	1401.52	1.33	-1.74E-01		1.13E+00	0.937
	1407.99	2.39	0.00E+00		1.84E-01	0.937
	1509.21	2.13	-2.18E-01		5.90E-01	0.943
	1661.27	1.05	3.32E-01		1.54E+00	1.001
	1729.59	2.88	0.00E+00		4.03E-01	1.137
	1764.49	15.30	4.98E-02		1.68E-01	1.002
	1847.43	2.03	-7.56E-02		8.03E-01	1.073
>	2118.51	1.16	0.00E+00		0.00E+00	1.047
+ Pb-214	241.99	7.25	7.36E-02	4.70E-02	1.42E-01	0.999
	295.22	18.42	4.99E-02		8.25E-02	1.000
	351.93	35.60	3.05E-02		4.70E-02	free
	785.96	1.06	5.47E-01		1.44E+00	0.999
+ Pb214-XR	74.82	5.80	3.00E-01	1.74E-01	4.19E-01	miss
	77.11	9.70	2.87E-02		1.74E-01	miss
	87.35	2.24	-8.09E-02		5.35E-01	miss
	89.78	0.82	-3.40E-03		1.47E+00	miss
+ Ra-226	186.21	3.64	1.08E-01	2.95E-01	2.95E-01	free
+ Ac-228	129.07	2.42	-2.42E-02	6.23E-02	3.35E-01	0.937
	209.25	3.89	8.08E-03		2.44E-01	0.974
	270.24	3.46	4.49E-02		3.23E-01	0.950
	328.00	2.95	-1.91E-01		2.53E-01	0.949
	338.32	11.27	-5.40E-02		7.85E-02	0.991
	409.46	1.92	-4.56E-02		6.49E-01	0.926
	463.00	4.40	-4.47E-02		2.42E-01	0.921
	794.95	4.25	1.55E-02		3.38E-01	0.933
	911.20	25.80	1.48E-02		6.23E-02	0.989
	964.77	4.99	-4.01E-02		3.15E-01	0.978
	968.97	15.80	3.34E-02		1.13E-01	0.988
	1588.20	3.22	1.04E-01		4.82E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	3.59E-02	3.59E-02	0.997
	283.69	1.70	1.58E-01		6.61E-01	1.000
	300.07	2.47	-8.64E-02		4.27E-01	1.000

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports

Analysis Report for 11-Jun-14-10007
CH-TRVSC-1C-oil 859.23 grams 06/11/14 09:50

6/11/2014 3:32:12PM Page 7 of 7

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Pa-231	302.65	2.20	-3.31E-01	3.59E-02	3.49E-01	1.000
		330.06	1.40	2.93E-01		8.04E-01	1.001
+	Th-234	92.38	2.13	1.56E-01	6.25E-01	6.25E-01	free
		92.80	2.10	2.11E-01		6.68E-01	free
		112.81	0.21	1.14E+00		5.08E+00	free
+	U-235	143.76	10.96	2.00E-02	2.01E-02	9.15E-02	free
		163.33	5.08	5.13E-02		1.90E-01	free
		185.71	57.20	1.44E-02		2.01E-02	free
		202.11	1.08	-8.43E-02		7.77E-01	miss
		205.31	5.01	-6.44E-02		1.38E-01	free
+	Am-241	59.54	35.90	6.97E-03	9.10E-02	9.10E-02	free

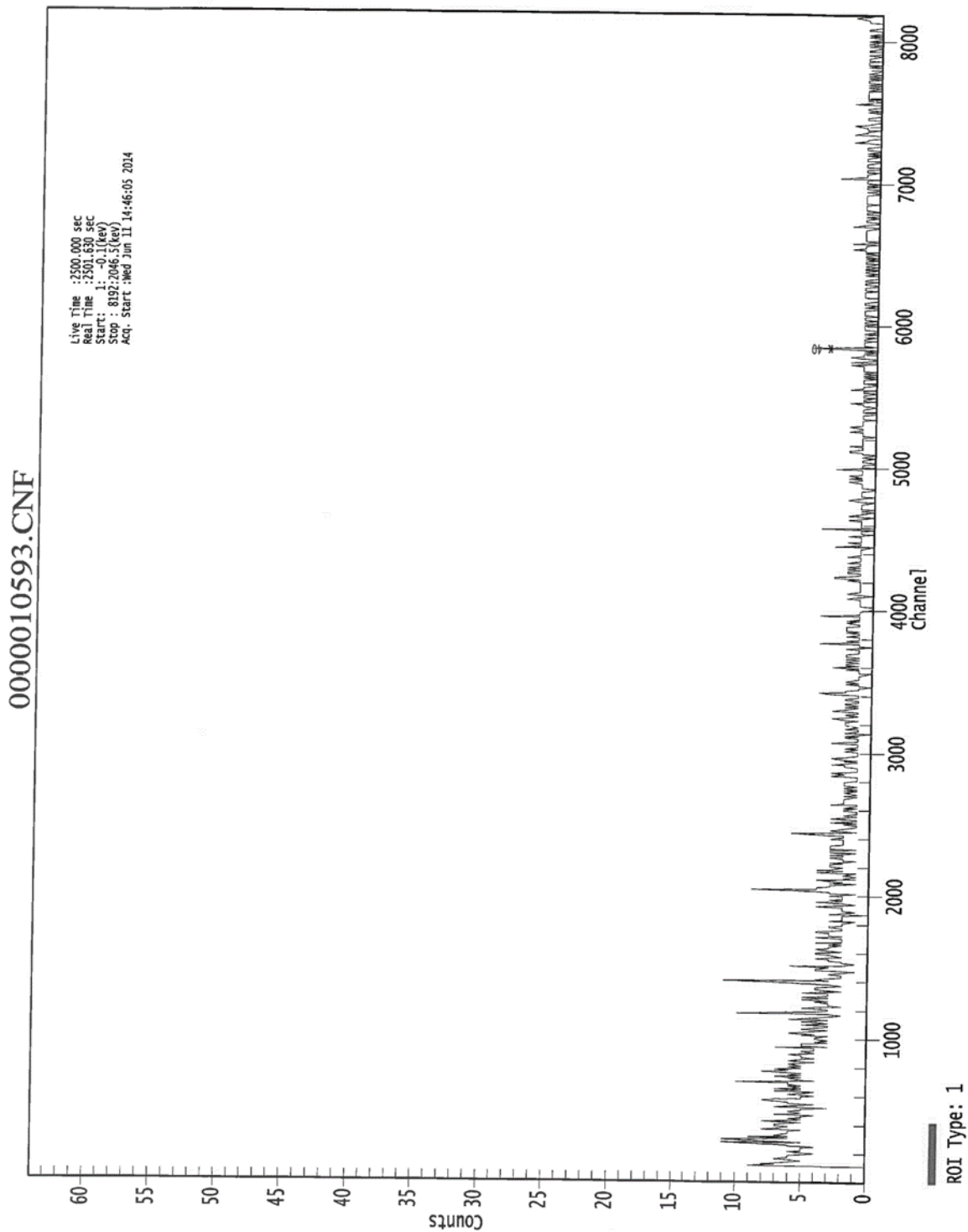
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-2 08200C Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S P   C T R U M   A N A L Y S   S      *****
*****

Filename: C:\Canberra\8-19-14\20140814164835.cnf

Report Generated On       : 8/19/2014   8:30:24 AM

Sample Title              : CHOS1
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

Sample Taken On           : 8/14/2014   4:31:35 PM
Acquisition Started       : 8/14/2014   4:31:35 PM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Dead Time                 : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst

Date 8-19-14

NO ERM 8/26/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:30:24 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS1
Peak Analysis Performed on: 8/19/2014 8:30:24 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.49	38.99	1.82	2.90E+003	213.20	1.47E+003
2	371-	422	397.40	296.96	1.64	3.70E+002	257.78	2.17E+003
3	440-	494	467.44	349.44	1.31	2.67E+002	250.42	1.96E+003
4	1899-	2007	1953.87	1458.36	22.16	2.23E+003	160.65	6.02E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:20:24 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.634	34.70*	66.40	4.02593E+001	8.57949E+000
		788.70	33.60		
		1436.80*	66.40	8.90557E+001	9.58165E+000
K-40	0.998	1460.82*	10.66	5.54718E+002	6.25541E+001
Pb-214	0.999	241.99	7.25		
		295.22*	18.42	1.39232E+001	9.96243E+000
		351.93*	35.60	5.82377E+000	5.53972E+000
		785.96	1.06		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:30:24 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.634	4.025927E+001	8.579495E+000
	K-40	0.998	3.039477E+002	8.011232E+001
X	Ba-133	0.572		
X	Bi-211	0.999		
	Pb-214	0.999	7.736675E+000	4.841549E+000
X	Ac-228	0.340		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:30:24 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

8/19/2014

8:30:24 AM

Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.244E+000	4.24E+000	4.026E+001	2.103E+000
		788.70	33.60	6.948E+000		3.585E+000	3.411E+000
		1436.80*	66.40	8.631E+000		8.906E+001	4.261E+000
+	K-40	1460.82*	10.66	5.376E+001	5.38E+001	5.547E+002	2.654E+001
	Cr-51	320.08	9.91	1.293E+001	1.29E+001	-6.310E+000	6.365E+000
	Mn-54	834.85	99.98	2.698E+000	2.70E+000	-1.469E+000	1.327E+000
	Co-58	810.76	99.45	2.665E+000	2.67E+000	1.760E+000	1.311E+000
	Co-60	1173.23	99.85	2.647E+000	1.44E+000	6.535E-001	1.293E+000
		1332.49	99.98	1.442E+000		-9.779E-002	6.879E-001
	Nb-94	702.65	99.81	1.789E+000	1.79E+000	3.645E-001	8.755E-001
		871.09	99.89	2.760E+000		2.109E+000	1.357E+000
	Sn-113	255.13	2.11	6.533E+001	2.09E+000	-3.659E+000	3.227E+001
		391.70	64.97	2.094E+000		1.229E-001	1.029E+000
	Cs-137	661.66	85.10	2.000E+000	2.00E+000	-1.717E-001	9.789E-001
	Eu-152	121.78	28.67	6.492E+000	5.62E+000	3.846E+000	3.221E+000
		244.70	7.61	1.896E+001		1.686E+001	9.371E+000
		295.94	0.45	3.074E+002		5.432E+002	1.516E+002
		344.28	26.60	5.625E+000		8.222E+000	2.773E+000
		367.79	0.86	1.604E+002		2.973E+001	7.894E+001
		411.12	2.24	6.196E+001		-4.937E+001	3.044E+001
		443.96	2.83	5.103E+001		-7.484E+000	2.506E+001
		488.68	0.42	3.494E+002		-2.162E+002	1.714E+002
		563.99	0.49	3.435E+002		-1.164E+002	1.686E+002
		586.26	0.46	4.008E+002		-1.513E+002	1.969E+002
		678.62	0.47	3.607E+002		-6.381E+001	1.764E+002
		688.67	0.86	2.032E+002		-8.998E+001	9.943E+001
		719.35	0.28	6.357E+002		4.460E+001	3.108E+002
		778.90	12.96	1.684E+001		4.722E+000	8.259E+000
		810.45	0.32	8.255E+002		5.450E+002	4.060E+002
		867.37	4.26	6.480E+001		4.720E+001	3.186E+001
		919.33	0.43	6.204E+002		-1.491E+001	3.045E+002
		964.08	14.65	1.838E+001		-7.483E-001	9.017E+000
		1085.87	10.24	2.319E+001		-2.149E+001	1.132E+001
		1089.74	1.73	1.401E+002		-6.033E+001	6.842E+001
		1112.07	13.69	1.864E+001		-5.347E-001	9.111E+000
		1212.95	1.43	1.787E+002		4.336E+001	8.721E+001
		1249.94	0.19	1.191E+003		4.322E+002	5.788E+002
		1299.14	1.63	1.093E+002		2.223E+001	5.264E+001
		1408.01	21.07	1.475E+001		-9.857E+000	7.211E+000
		1457.64	0.50	1.216E+003		6.787E+003	6.009E+002
		1528.10	0.28	3.411E+002		-1.772E+002	1.574E+002
	Eu-154	123.07	40.40	4.563E+000	4.56E+000	-7.657E-001	2.263E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Eu-154	247.93	6.89	2.069E+001	4.56E+000	1.062E+001	1.022E+001
	591.76	4.95	3.829E+001		-1.326E+001	1.881E+001
	692.42	1.78	9.872E+001		7.725E+000	4.830E+001
	723.30	20.06	8.871E+000		2.987E+000	4.338E+000
	756.80	4.52	4.047E+001		-1.237E+001	1.978E+001
	873.18	12.08	2.265E+001		-1.250E+001	1.114E+001
	996.29	10.48	2.444E+001		-1.083E+000	1.197E+001
	1004.76	18.01	1.383E+001		7.272E+000	6.771E+000
	1274.43	34.80	5.605E+000		-1.188E+000	2.710E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	2.012E+002	7.03E+000	-5.462E+001	9.965E+001
	60.01	1.22	2.134E+002		-1.250E+002	1.057E+002
	86.55	30.70	7.027E+000		5.173E+000	3.486E+000
	105.31	21.10	9.357E+000		5.754E+000	4.642E+000
Tl-208	583.19	85.00	2.148E+000	2.15E+000	1.423E+001	1.055E+000
Bi-211	351.07*	13.02	2.451E+001	2.45E+001	1.592E+001	1.218E+001
Pb-211	404.85	3.78	3.671E+001	3.67E+001	1.042E+001	1.804E+001
	427.09	1.76	7.987E+001		3.394E+000	3.923E+001
	832.01	3.52	7.710E+001		4.668E+001	3.792E+001
Bi-212	39.86	1.06	2.653E+002	2.65E+001	2.559E+003	1.315E+002
	727.33	6.67	2.654E+001		6.925E+000	1.297E+001
	785.37	1.10	2.079E+002		2.078E+002	1.020E+002
Pb-212	1620.50	1.47	0.000E+000	3.36E+000	0.000E+000	0.000E+000
	115.18	0.60	3.123E+002		-2.096E+002	1.549E+002
	238.63	43.60	3.362E+000		1.437E+000	1.662E+000
	300.09	3.30	4.130E+001		2.356E+001	2.036E+001
Pb212-XR	74.82	10.28	2.321E+001	1.36E+001	1.072E+001	1.151E+001
	77.11	17.10	1.358E+001		9.539E+000	6.735E+000
	87.35	3.97	5.383E+001		7.114E+001	2.670E+001
	89.78	1.46	1.431E+002		3.494E+001	7.100E+001
Bi-214	609.32	45.49	4.294E+000	4.29E+000	4.063E+000	2.110E+000
	768.36	4.89	4.000E+001		-2.101E+001	1.958E+001
	806.18	1.26	2.068E+002		1.698E+002	1.017E+002
	934.06	3.11	8.499E+001		-3.631E+001	4.171E+001
	1120.29	14.92	1.740E+001		1.170E+001	8.509E+000
	1155.21	1.63	1.601E+002		-3.874E+001	7.823E+001
	1238.12	5.83	4.060E+001		3.566E+001	1.977E+001
	1280.98	1.43	1.339E+002		-2.636E+001	6.470E+001
	1377.67	3.99	3.822E+001		-4.966E+001	1.825E+001
	1385.31	0.79	2.262E+002		-3.122E+002	1.088E+002
	1401.52	1.33	1.957E+002		-2.065E+002	9.525E+001
	1407.99	2.39	1.298E+002		-8.675E+001	6.346E+001
	1509.21	2.13	1.122E+002		-3.282E+001	5.439E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
Pb-214	1847.43	2.03	0.000E+000	8.97E+000	0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.016E+001		1.993E+001	9.968E+000
	295.22*	18.42	1.590E+001		1.392E+001	7.897E+000
	351.93*	35.60	8.965E+000		5.824E+000	4.453E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

8/19/2014

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	Pb-214	785.96	1.06	2.166E+002	8.97E+000	1.805E+002	1.063E+002
	Pb214-XR	74.82	5.80	4.113E+001	2.39E+001	1.900E+001	2.040E+001
		77.11	9.70	2.394E+001		1.682E+001	1.187E+001
		87.35	2.24	9.540E+001		1.261E+002	4.733E+001
		89.78	0.82	2.548E+002		6.222E+001	1.264E+002
	Ra-226	186.21	3.64	4.198E+001	4.20E+001	1.318E+001	2.079E+001
	Ac-228	129.07	2.42	7.421E+001	1.02E+001	1.146E+001	3.681E+001
		209.25	3.89	3.802E+001		6.222E+000	1.881E+001
		270.24	3.46	3.894E+001		4.559E+000	1.922E+001
		328.00	2.95	4.452E+001		-2.156E+001	2.192E+001
		338.32*	11.27	2.832E+001		1.840E+001	1.407E+001
		409.46	1.92	7.266E+001		-4.154E+001	3.570E+001
		463.00	4.40	3.300E+001		-3.618E+000	1.620E+001
		794.95	4.25	5.665E+001		1.157E+001	2.783E+001
		911.20	25.80	1.025E+001		1.395E+000	5.032E+000
		964.77	4.99	5.396E+001		1.859E+001	2.647E+001
		968.97	15.80	1.704E+001		6.194E+000	8.360E+000
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
		283.69	1.70	8.021E+001		3.330E-001	3.957E+001
		300.07	2.47	5.517E+001		3.148E+001	2.720E+001
		302.65	2.20	6.177E+001		6.409E+001	3.045E+001
		330.06	1.40	9.435E+001		-2.970E+001	4.645E+001
	Th-234	92.38	2.13	9.634E+001	9.63E+001	-4.395E+000	4.779E+001
		92.80	2.10	9.754E+001		-4.449E+000	4.839E+001
		112.81	0.21	9.028E+002		9.639E+002	4.479E+002
	U-235	143.76	10.96	1.515E+001	2.68E+000	-1.852E+000	7.510E+000
		163.33	5.08	3.153E+001		2.535E+001	1.563E+001
		185.71	57.20	2.677E+000		9.463E-001	1.326E+000
		202.11	1.08	1.348E+002		-9.700E+001	6.673E+001
		205.31	5.01	2.968E+001		-2.943E+001	1.469E+001
	Am-241	59.54	35.90	7.339E+000	7.34E+000	-4.297E+000	3.635E+000

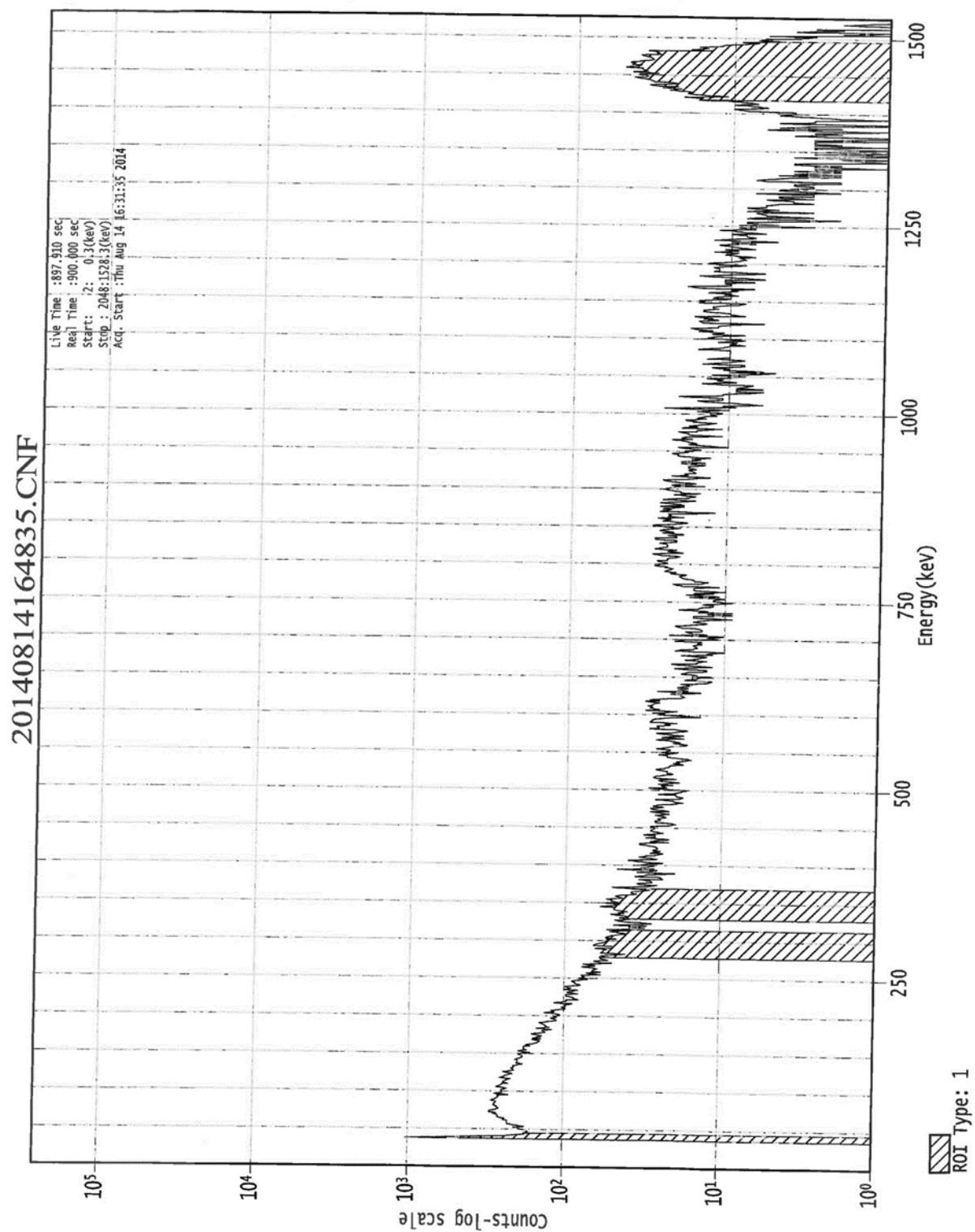
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

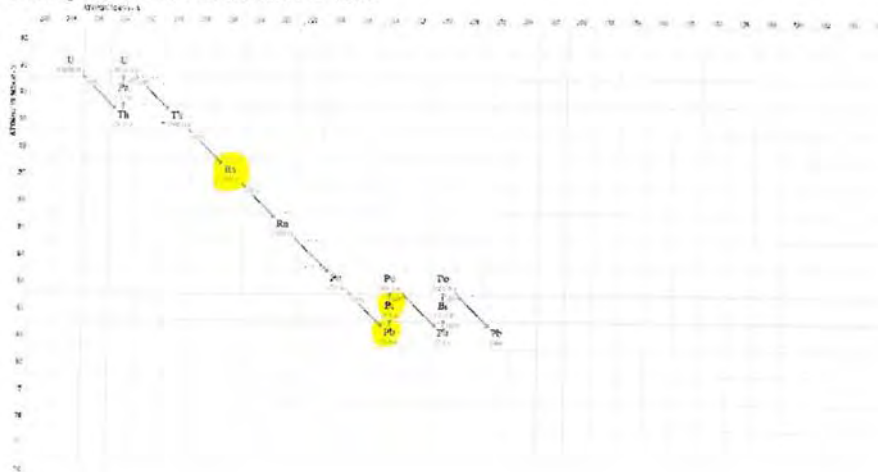
@ = Half-life too short to be able to perform the decay correction

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Decay Series for Uranium : U-238



U-235
or
Ra-226

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S P   C T R U M   A N A L Y S   S      ***
*****

Filename: C:\Canberra\8-19-14\20140814171244.cnf

Report Generated On       : 8/19/2014   8:31:43 AM

Sample Title              : CHOS2
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

Sample Taken On           : 8/14/2014   4:48:43 PM
Acquisition Started       : 8/14/2014   4:48:43 PM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Dead Time                 : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst *TL-S*
Date *8-19-14*

clu ew 8/20/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:31:43 AM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: CHOS2

Peak Analysis Performed on: 8/19/2014 8:31:43 AM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.39	38.91	1.67	2.82E+003	215.16	1.50E+003
2	777-	848	813.39	608.35	1.66	4.35E+002	180.44	1.10E+003
3	1037-	1119	1078.54	806.46	1.31	2.89E+002	194.19	1.32E+003
4	1897-	2005	1951.91	1456.91	23.68	2.05E+003	163.84	6.60E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:31:43 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.937	34.70*	66.40	3.92126E+001	8.39296E+000
		788.70*	33.60	1.37377E+001	9.36457E+000
		1436.80*	66.40	8.18380E+001	9.24592E+000
K-40	0.996	1460.82*	10.66	5.09760E+002	6.01098E+001
Ru-106⑥	0.956	621.93*	9.93	5.45974E+001	2.36955E+001
		1050.41	1.56		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

① Bi-214

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:31:43 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.937	2.786486E+001	6.250094E+000
K-40	0.996	3.361929E+002	6.951587E+001
X Co-58	0.995		
Ru-106	0.956	5.459740E+001	2.369552E+001
X Bi-214	1.000		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:31:43 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

① NOT Ru-106

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report 8/19/2014 8:31:43 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.314E+000	4.31E+000	3.921E+001	2.138E+000
		788.70*	33.60	1.507E+001		1.374E+001	7.471E+000
		1436.80*	66.40	9.054E+000		8.184E+001	4.473E+000
+	K-40	1460.82*	10.66	5.640E+001	5.64E+001	5.098E+002	2.786E+001
	Cr-51	320.08	9.91	1.303E+001	1.30E+001	6.559E+000	6.416E+000
	Mn-54	834.85	99.98	2.686E+000	2.69E+000	8.192E-001	1.321E+000
	Co-58	810.76*	99.45	5.092E+000	5.09E+000	4.641E+000	2.524E+000
	Co-60	1173.23	99.85	2.659E+000	1.34E+000	6.676E-001	1.300E+000
		1332.49	99.98	1.338E+000		-8.712E-001	6.357E-001
	Nb-94	702.65	99.81	1.750E+000	1.75E+000	-9.699E-001	8.560E-001
		871.09	99.89	2.666E+000		-1.566E+000	1.310E+000
	Sn-113	255.13	2.11	6.260E+001	2.04E+000	-6.639E+001	3.090E+001
		391.70	64.97	2.042E+000		4.156E-001	1.003E+000
	Cs-137	661.66	85.10	1.996E+000	2.00E+000	-1.523E+000	9.768E-001
	Eu-152	121.78	28.67	6.255E+000	5.19E+000	4.136E+000	3.102E+000
		244.70	7.61	1.863E+001		9.998E+000	9.207E+000
		295.94	0.45	2.974E+002		3.737E+001	1.466E+002
		344.28	26.60	5.194E+000		2.851E+000	2.558E+000
		367.79	0.86	1.552E+002		3.640E+001	7.632E+001
		411.12	2.24	5.984E+001		-1.093E+001	2.938E+001
		443.96	2.83	5.076E+001		2.997E+001	2.493E+001
		488.68	0.42	3.543E+002		-3.990E+001	1.738E+002
		563.99	0.49	3.308E+002		-2.545E+002	1.622E+002
		586.26	0.46	3.955E+002		-5.650E+001	1.942E+002
		678.62	0.47	3.552E+002		-1.169E+002	1.737E+002
		688.67	0.86	2.031E+002		-7.784E+000	9.935E+001
		719.35	0.28	6.291E+002		-1.235E+002	3.076E+002
		778.90	12.96	1.602E+001		-2.994E+000	7.850E+000
		810.45	0.32	8.241E+002		1.136E+003	4.053E+002
		867.37	4.26	6.288E+001		-2.664E+001	3.090E+001
		919.33	0.43	6.486E+002		3.723E+002	3.186E+002
		964.08	14.65	1.843E+001		4.484E+000	9.041E+000
		1085.87	10.24	2.340E+001		-9.273E+000	1.143E+001
		1089.74	1.73	1.395E+002		-2.926E+001	6.813E+001
		1112.07	13.69	1.873E+001		8.771E+000	9.159E+000
		1212.95	1.43	1.823E+002		1.623E+002	8.900E+001
		1249.94	0.19	1.233E+003		1.056E+003	5.997E+002
		1299.14	1.63	9.933E+001		-7.791E+001	4.766E+001
		1408.01	21.07	1.465E+001		-5.734E+000	7.160E+000
		1457.64	0.50	1.176E+003		5.128E+003	5.811E+002
		1528.10	0.28	3.311E+002		-2.332E+002	1.524E+002
	Eu-154	123.07	40.40	4.419E+000	4.42E+000	3.345E+000	2.191E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Eu-154	247.93	6.89	2.031E+001	4.42E+000	8.348E+000	1.003E+001
	591.76	4.95	3.766E+001		-3.504E+000	1.850E+001
	692.42	1.78	9.940E+001		9.296E+001	4.864E+001
	723.30	20.06	8.713E+000		-1.680E+000	4.259E+000
	756.80	4.52	3.989E+001		-3.514E+001	1.949E+001
	873.18	12.08	2.195E+001		-5.399E-001	1.079E+001
	996.29	10.48	2.395E+001		5.329E+000	1.173E+001
	1004.76	18.01	1.334E+001		-8.934E+000	6.523E+000
	1274.43	34.80	5.795E+000		2.429E+000	2.806E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.992E+002	6.75E+000	1.915E+001	9.863E+001
	60.01	1.22	2.074E+002		-1.361E+002	1.027E+002
	86.55	30.70	6.754E+000		5.058E+000	3.350E+000
	105.31	21.10	8.896E+000		-3.580E+000	4.412E+000
Tl-208	583.19	85.00	2.110E+000	2.11E+000	-2.492E-001	1.036E+000
Bi-211	351.07	13.02	1.078E+001	1.08E+001	1.676E+001	5.310E+000
Pb-211	404.85	3.78	3.571E+001	3.57E+001	-1.611E+001	1.754E+001
	427.09	1.76	7.972E+001		4.585E+001	3.915E+001
	832.01	3.52	7.632E+001		2.357E+001	3.753E+001
Bi-212	39.86	1.06	2.637E+002	2.63E+001	2.457E+003	1.307E+002
	727.33	6.67	2.627E+001		9.995E+000	1.284E+001
	785.37	1.10	1.984E+002		-1.006E+001	9.728E+001
Pb-212	1620.50	1.47	0.000E+000	3.31E+000	0.000E+000	0.000E+000
	115.18	0.60	2.974E+002		-7.661E+001	1.475E+002
	238.63	43.60	3.310E+000		5.978E+000	1.637E+000
Pb212-XR	300.09	3.30	3.974E+001	1.30E+001	-1.989E+000	1.958E+001
	74.82	10.28	2.223E+001		8.555E+000	1.102E+001
	77.11	17.10	1.298E+001		6.646E+000	6.435E+000
Bi-214	87.35	3.97	5.171E+001	7.98E+000	2.645E+001	2.565E+001
	89.78	1.46	1.377E+002		1.401E+001	6.827E+001
	609.32*	45.49	7.980E+000		1.192E+001	3.953E+000
	768.36	4.89	3.825E+001		-2.178E+001	1.870E+001
	806.18*	1.26	4.006E+002		3.652E+002	1.986E+002
	934.06	3.11	8.976E+001		-4.182E+001	4.409E+001
	1120.29	14.92	1.738E+001		6.457E+000	8.496E+000
	1155.21	1.63	1.619E+002		9.652E+001	7.914E+001
	1238.12	5.83	4.179E+001		1.451E+001	2.036E+001
	1280.98	1.43	1.320E+002		-8.886E+001	6.377E+001
	1377.67	3.99	3.651E+001		-4.252E+001	1.740E+001
	1385.31	0.79	2.131E+002		-3.396E+002	1.022E+002
	1401.52	1.33	1.984E+002		-1.441E+002	9.661E+001
	1407.99	2.39	1.289E+002		-5.047E+001	6.302E+001
	1509.21	2.13	1.116E+002		-6.893E+001	5.406E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	1.988E+001	3.93E+000	3.966E+001	9.826E+000
Pb-214	295.22	18.42	7.243E+000		-2.506E-001	3.571E+000
	351.93	35.60	3.932E+000		5.279E+000	1.937E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.071E+002	3.93E+000	-8.536E+000	1.016E+002
Pb214-XR	74.82	5.80	3.940E+001	2.29E+001	1.516E+001	1.953E+001
	77.11	9.70	2.288E+001		1.172E+001	1.134E+001
	87.35	2.24	9.165E+001		4.688E+001	4.545E+001
	89.78	0.82	2.451E+002		2.494E+001	1.216E+002
Ra-226	186.21	3.64	4.023E+001	4.02E+001	-3.409E+001	1.992E+001
Ac-228	129.07	2.42	7.203E+001	1.07E+001	7.719E+001	3.572E+001
	209.25	3.89	3.721E+001		2.626E+001	1.841E+001
	270.24	3.46	3.768E+001		-1.176E+001	1.859E+001
	328.00	2.95	4.414E+001		1.714E+001	2.173E+001
	338.32	11.27	1.180E+001		1.340E+000	5.811E+000
	409.46	1.92	7.015E+001		3.618E+001	3.445E+001
	463.00	4.40	3.227E+001		3.697E+000	1.583E+001
	794.95	4.25	5.617E+001		4.258E+001	2.758E+001
	911.20	25.80	1.068E+001		6.623E+000	5.246E+000
	964.77	4.99	5.413E+001		7.829E+000	2.656E+001
	968.97	15.80	1.699E+001		5.218E+000	8.337E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.797E+001		2.019E+001	3.845E+001
	300.07	2.47	5.309E+001		-2.658E+000	2.616E+001
	302.65	2.20	5.945E+001		-5.390E+000	2.929E+001
	330.06	1.40	9.318E+001		-2.383E+001	4.587E+001
Th-234	92.38	2.13	9.319E+001	9.32E+001	3.896E+001	4.622E+001
	92.80	2.10	9.435E+001		3.945E+001	4.679E+001
	112.81	0.21	8.507E+002		-9.637E+002	4.218E+002
U-235	143.76	10.96	1.451E+001	2.57E+000	-3.047E-001	7.191E+000
	163.33	5.08	3.043E+001		-5.932E+000	1.507E+001
	185.71	57.20	2.572E+000		-1.860E+000	1.273E+000
	202.11	1.08	1.306E+002		-7.843E+001	6.461E+001
	205.31	5.01	2.916E+001		2.701E+001	1.443E+001
Am-241	59.54	35.90	7.132E+000	7.13E+000	-4.682E+000	3.531E+000

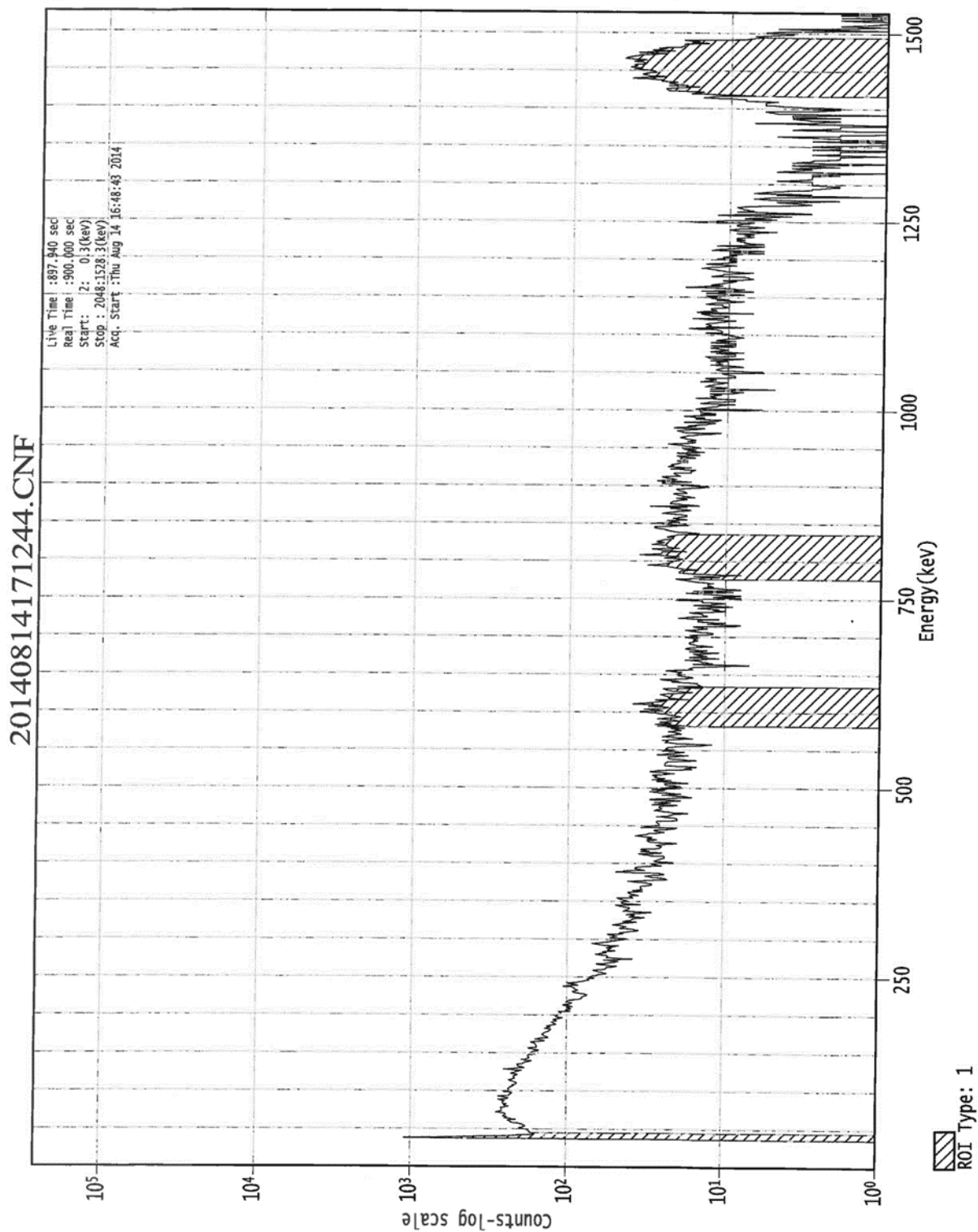
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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*****
***      G A M M A   S E C T R U M   A N A L Y S   S      ***
*****

Filename: C:\Canberra\8-19-14\20140817164234.cnf

Report Generated On       : 8/19/2014   8:32:39 AM

Sample Title              : CHOS3
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

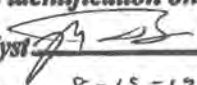
Sample Taken On           : 8/17/2014   4:27:32 PM
Acquisition Started      : 8/17/2014   4:27:32 PM

Live Time                 : 895.5 seconds
Dead Time                 : 897.6 seconds

Rad Time                  : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst 
Date 8-19-17

 8/20/17

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:32:39 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS3
Peak Analysis Performed on: 8/19/2014 8:32:38 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.39	38.91	1.72	3.09E+003	214.22	1.45E+003
2	784-	856	820.59	613.74	1.17	2.72E+002	174.68	1.04E+003
3	1034-	1115	1075.02	803.83	0.81	3.85E+002	185.98	1.21E+003
4	1898-	2006	1952.87	1457.62	8.03	2.19E+003	163.32	6.40E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:22:39 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.938	34.70*	66.40	4.31140E+001	9.12468E+000
		788.70*	33.60	1.82696E+001	9.09164E+000
		1436.80*	66.40	8.75906E+001	9.57703E+000
K-40	0.997	1460.82*	10.66	5.45593E+002	6.24350E+001
Bi-214	0.998	609.32*	45.49	7.53518E+000	4.91662E+000
		768.36	4.89		
		806.18*	1.26	4.85648E+002	2.41707E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:32:39 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.938	3.050710E+001	6.441078E+000
	K-40	0.997	3.555671E+002	7.189099E+001
X	Co-58	0.987		
X	Ru-106	0.984		
	Bi-214	0.998	7.397500E+000	4.915828E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:32:38 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

8/19/2014

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.233E+000	4.23E+000	4.311E+001	2.098E+000
		788.70*	33.60	1.434E+001		1.827E+001	7.104E+000
		1436.80*	66.40	8.907E+000		8.759E+001	4.400E+000
+	K-40	1460.82*	10.66	5.548E+001	5.55E+001	5.456E+002	2.740E+001
	Cr-51	320.08	9.91	1.243E+001	1.24E+001	-2.841E+001	6.117E+000
	Mn-54	834.85	99.98	2.678E+000	2.68E+000	-1.200E-001	1.317E+000
	Co-58	810.76*	99.45	4.844E+000	4.84E+000	6.173E+000	2.400E+000
	Co-60	1173.23	99.85	2.682E+000	1.32E+000	1.690E+000	1.311E+000
		1332.49	99.98	1.316E+000		-3.633E-001	6.244E-001
	Nb-94	702.65	99.81	1.700E+000	1.70E+000	4.823E-001	8.305E-001
		871.09	99.89	2.713E+000		-6.323E-001	1.333E+000
	Sn-113	255.13	2.11	6.059E+001	2.03E+000	-5.626E+001	2.989E+001
		391.70	64.97	2.028E+000		-1.363E+000	9.961E-001
	Cs-137	661.66	85.10	2.011E+000	2.01E+000	1.350E+000	9.843E-001
	Eu-152	121.78	28.67	6.387E+000	5.19E+000	3.434E+000	3.168E+000
		244.70	7.61	1.782E+001		1.132E+001	8.801E+000
		295.94	0.45	2.856E+002		-3.148E+000	1.407E+002
		344.28	26.60	5.185E+000		3.526E+000	2.553E+000
		367.79	0.86	1.542E+002		-5.162E+001	7.580E+001
		411.12	2.24	5.912E+001		-2.207E+001	2.902E+001
		443.96	2.83	5.004E+001		-2.421E+000	2.456E+001
		488.68	0.42	3.614E+002		-1.957E+002	1.774E+002
		563.99	0.49	3.373E+002		3.713E+002	1.654E+002
		586.26	0.46	3.654E+002		2.637E+001	1.791E+002
		678.62	0.47	3.601E+002		2.376E+002	1.761E+002
		688.67	0.86	1.970E+002		-5.550E+001	9.629E+001
		719.35	0.28	6.237E+002		1.951E+002	3.048E+002
		778.90	12.96	1.590E+001		-4.091E+000	7.787E+000
		810.45	0.32	8.373E+002		1.102E+003	4.119E+002
		867.37	4.26	6.358E+001		-3.887E+001	3.125E+001
		919.33	0.43	6.313E+002		3.125E+002	3.100E+002
		964.08	14.65	1.782E+001		-6.303E+000	8.740E+000
		1085.87	10.24	2.290E+001		-8.466E+000	1.118E+001
		1089.74	1.73	1.382E+002		4.538E+001	6.746E+001
		1112.07	13.69	1.842E+001		4.688E+000	9.001E+000
		1212.95	1.43	1.789E+002		-4.165E+001	8.729E+001
		1249.94	0.19	1.191E+003		6.617E+002	5.790E+002
		1299.14	1.63	9.784E+001		-5.114E+001	4.691E+001
		1408.01	21.07	1.478E+001		-5.367E+000	7.225E+000
		1457.64	0.50	1.214E+003		6.080E+003	6.000E+002
		1528.10	0.28	3.286E+002		-2.545E+002	1.511E+002
	Eu-154	123.07	40.40	4.497E+000	4.50E+000	1.664E+000	2.231E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	1.918E+001	4.50E+000	-1.927E+001	9.470E+000
		591.76	4.95	3.458E+001		-3.123E+000	1.696E+001
		692.42	1.78	9.466E+001		-6.050E+001	4.627E+001
		723.30	20.06	8.657E+000		2.742E+000	4.230E+000
		756.80	4.52	3.880E+001		-3.320E+001	1.895E+001
		873.18	12.08	2.239E+001		-2.314E+000	1.100E+001
		996.29	10.48	2.380E+001		8.116E-003	1.165E+001
		1004.76	18.01	1.366E+001		8.440E+000	6.682E+000
		1274.43	34.80	5.469E+000		-1.630E+000	2.642E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.030E+002	7.09E+000	-6.418E+001	1.005E+002
		60.01	1.22	2.175E+002		-1.237E+001	1.077E+002
		86.55	30.70	7.090E+000		4.663E+000	3.518E+000
		105.31	21.10	9.242E+000		1.604E+000	4.584E+000
	Tl-208	583.19	85.00	1.974E+000	1.97E+000	1.058E-001	9.678E-001
	Bi-211	351.07	13.02	1.056E+001	1.06E+001	-3.152E+000	5.198E+000
	Pb-211	404.85	3.78	3.547E+001	3.55E+001	2.039E+001	1.742E+001
		427.09	1.76	7.701E+001		9.519E+000	3.780E+001
		832.01	3.52	7.653E+001		1.302E+001	3.763E+001
	Bi-212	39.86	1.06	2.711E+002	2.59E+001	2.671E+003	1.344E+002
		727.33	6.67	2.594E+001		1.784E+001	1.267E+001
		785.37	1.10	1.997E+002		-2.818E+001	9.794E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.059E+002	3.21E+000	-9.448E+001	1.517E+002
		238.63	43.60	3.211E+000		2.356E+000	1.587E+000
		300.09	3.30	3.835E+001		9.360E+000	1.889E+001
	Pb212-XR	74.82	10.28	2.310E+001	1.35E+001	-1.356E+000	1.145E+001
		77.11	17.10	1.353E+001		1.571E+000	6.713E+000
		87.35	3.97	5.424E+001		5.117E+001	2.691E+001
		89.78	1.46	1.438E+002		6.870E+001	7.136E+001
+	Bi-214	609.32*	45.49	7.881E+000	7.88E+000	7.535E+000	3.903E+000
		768.36	4.89	3.761E+001		-1.644E+001	1.838E+001
		806.18*	1.26	3.811E+002		4.856E+002	1.888E+002
		934.06	3.11	8.719E+001		3.592E+001	4.281E+001
		1120.29	14.92	1.715E+001		9.906E+000	8.383E+000
		1155.21	1.63	1.652E+002		-4.911E+001	8.080E+001
		1238.12	5.83	4.071E+001		1.440E+001	1.982E+001
		1280.98	1.43	1.293E+002		8.942E+001	6.241E+001
		1377.67	3.99	3.598E+001		-5.242E+001	1.713E+001
		1385.31	0.79	2.109E+002		-5.753E+002	1.011E+002
		1401.52	1.33	1.967E+002		-1.263E+002	9.572E+001
		1407.99	2.39	1.301E+002		-4.724E+001	6.359E+001
		1509.21	2.13	1.074E+002		-5.321E+001	5.194E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.915E+001	3.87E+000	2.698E+001	9.460E+000
		295.22	18.42	6.948E+000		-5.740E-001	3.423E+000
		351.93	35.60	3.874E+000		1.939E+000	1.907E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.102E+002	3.87E+000	-9.298E+000	1.031E+002
Pb214-XR	74.82	5.80	4.094E+001	2.39E+001	-2.403E+000	2.030E+001
	77.11	9.70	2.386E+001		2.770E+000	1.183E+001
	87.35	2.24	9.613E+001		9.068E+001	4.769E+001
	89.78	0.82	2.561E+002		1.223E+002	1.271E+002
Ra-226	186.21	3.64	4.087E+001	4.09E+001	-1.184E+001	2.023E+001
Ac-228	129.07	2.42	7.305E+001	1.05E+001	8.423E+000	3.623E+001
	209.25	3.89	3.703E+001		6.721E+000	1.832E+001
	270.24	3.46	3.781E+001		4.085E+001	1.865E+001
	328.00	2.95	4.291E+001		-1.094E+001	2.111E+001
	338.32	11.27	1.168E+001		8.153E-001	5.750E+000
	409.46	1.92	6.936E+001		-6.505E+000	3.405E+001
	463.00	4.40	3.306E+001		9.028E+000	1.623E+001
	794.95	4.25	5.619E+001		2.224E+000	2.759E+001
	911.20	25.80	1.055E+001		4.712E+000	5.181E+000
	964.77	4.99	5.272E+001		1.493E+001	2.585E+001
	968.97	15.80	1.657E+001		1.158E+001	8.124E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.430E-001	2.43E-001	0.000E+000	0.000E+000
	283.69	1.70	7.694E+001		-8.415E+000	3.793E+001
	300.07	2.47	5.124E+001		1.250E+001	2.523E+001
	302.65	2.20	5.708E+001		-7.639E+000	2.811E+001
	330.06	1.40	9.133E+001		-1.420E+001	4.494E+001
Th-234	92.38	2.13	9.675E+001	9.68E+001	5.942E+001	4.800E+001
	92.80	2.10	9.796E+001		6.016E+001	4.859E+001
	112.81	0.21	8.836E+002		6.754E+001	4.382E+002
U-235	143.76	10.96	1.470E+001	2.61E+000	-6.249E-001	7.284E+000
	163.33	5.08	3.053E+001		-6.029E+000	1.512E+001
	185.71	57.20	2.611E+000		-3.052E-001	1.293E+000
	202.11	1.08	1.306E+002		-2.608E+001	6.462E+001
	205.31	5.01	2.887E+001		-1.346E+001	1.428E+001
Am-241	59.54	35.90	7.479E+000	7.48E+000	-4.254E-001	3.705E+000

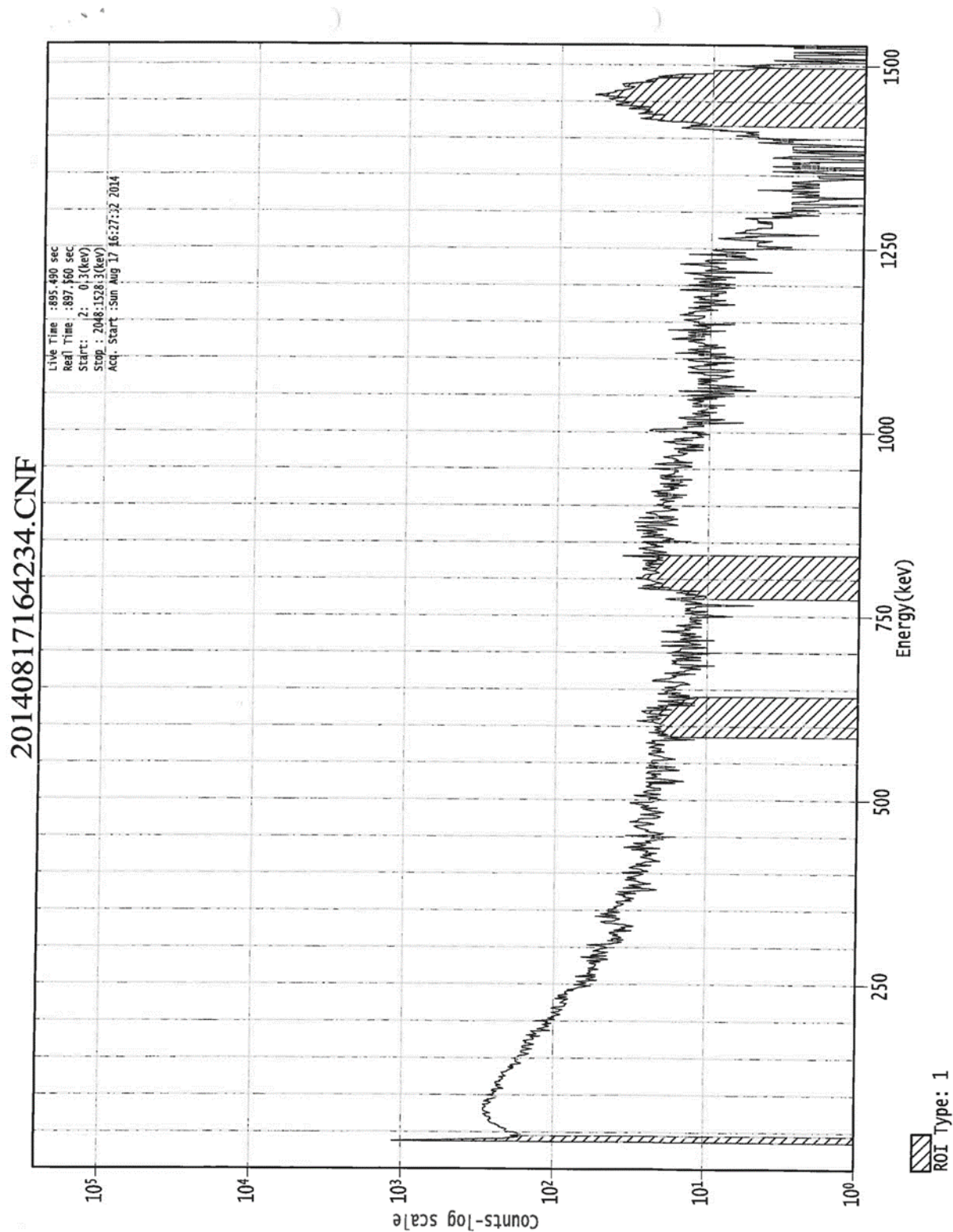
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

***** G A M M A S P C T R U M A N A L Y S I S *****

Filename: C:\Canberra\8-19-14\20140817172808.cnf

Report Generated On : 8/19/2014 8:33:55 AM

Sample Title : CHOS6

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 8/17/2014 5:06:26 PM

Acquisition Started : 8/17/2014 5:06:26 PM

Live Time : 897.9 seconds

Real Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVER

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst ST-B

Date 8-19-14

muom 8/20/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:33:55 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS6
Peak Analysis Performed on: 8/19/2014 8:33:54 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.42	38.93	1.66	3.07E+003	208.39	1.34E+003
2	784-	855	820.05	613.33	2.08	2.21E+002	185.41	1.20E+003
3	1039-	1121	1080.58	807.97	2.05	5.29E+002	182.95	1.13E+003
4	1900-	2008	1954.77	1459.04	19.46	2.04E+003	154.27	5.64E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:33:55 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS6
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.924	34.70*	66.40	4.25975E+001	8.99806E+000
		788.70*	33.60	2.51756E+001	9.18634E+000
		1436.80*	66.40	8.15355E+001	8.96822E+000
K-40	0.999	1460.82*	10.66	5.07876E+002	5.84358E+001
Bi-214	0.998	609.32*	45.49	6.08705E+000	5.16433E+000
		768.36	4.89		
		806.18*	1.26	6.69224E+002	2.44251E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:33:55 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	LaBr3	0.924	3.395677E+001	6.428826E+000
	K-40	0.999	2.963630E+002	6.873233E+001
X	Co-58	0.998		
X	Ru-106	0.982		
	Bi-214	0.998	5.979983E+000	5.163561E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:33:54 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report 8/19/2014 8:33:55 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS6
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	4.072E+000	4.07E+000	4.260E+001	2.017E+000
		788.70*	33.60	1.399E+001		2.518E+001	6.930E+000
		1436.80*	66.40	8.312E+000		8.154E+001	4.102E+000
+	K-40	1460.82*	10.66	5.177E+001	5.18E+001	5.079E+002	2.555E+001
	Cr-51	320.08	9.91	1.297E+001	1.30E+001	-6.477E+000	6.383E+000
	Mn-54	834.85	99.98	2.627E+000	2.63E+000	-1.324E+000	1.291E+000
	Co-58	810.76*	99.45	4.727E+000	4.73E+000	8.506E+000	2.342E+000
	Co-60	1173.23	99.85	2.502E+000	1.47E+000	-1.253E+000	1.221E+000
		1332.49	99.98	1.466E+000		7.292E-001	6.997E-001
	Nb-94	702.65	99.81	1.716E+000	1.72E+000	-3.998E-001	8.387E-001
		871.09	99.89	2.710E+000		6.300E-001	1.332E+000
	Sn-113	255.13	2.11	6.215E+001	1.99E+000	-1.004E+002	3.067E+001
		391.70	64.97	1.987E+000		9.625E-001	9.759E-001
	Cs-137	661.66	85.10	2.007E+000	2.01E+000	1.027E+000	9.823E-001
	Eu-152	121.78	28.67	6.244E+000	5.23E+000	5.118E+000	3.097E+000
		244.70	7.61	1.827E+001		7.425E+000	9.028E+000
		295.94	0.45	2.907E+002		1.282E+002	1.433E+002
		344.28	26.60	5.233E+000		-1.917E-001	2.577E+000
		367.79	0.86	1.549E+002		7.231E-001	7.619E+001
		411.12	2.24	5.875E+001		2.811E+001	2.884E+001
		443.96	2.83	4.935E+001		-9.622E+000	2.422E+001
		488.68	0.42	3.589E+002		-1.211E+002	1.761E+002
		563.99	0.49	3.237E+002		7.036E+001	1.586E+002
		586.26	0.46	3.856E+002		5.507E+001	1.893E+002
		678.62	0.47	3.586E+002		6.181E+001	1.754E+002
		688.67	0.86	2.015E+002		1.085E+002	9.857E+001
		719.35	0.28	6.215E+002		1.457E+002	3.038E+002
		778.90	12.96	1.639E+001		-1.961E+000	8.035E+000
		810.45	0.32	8.211E+002		8.893E+002	4.038E+002
		867.37	4.26	6.305E+001		6.066E+000	3.098E+001
		919.33	0.43	6.396E+002		-2.065E+002	3.141E+002
		964.08	14.65	1.826E+001		1.829E+001	8.958E+000
		1085.87	10.24	2.351E+001		-2.117E+000	1.148E+001
		1089.74	1.73	1.390E+002		-1.336E+002	6.790E+001
		1112.07	13.69	1.872E+001		2.065E-001	9.152E+000
		1212.95	1.43	1.804E+002		1.847E+002	8.807E+001
		1249.94	0.19	1.162E+003		-4.752E+002	5.645E+002
		1299.14	1.63	1.051E+002		2.517E-001	5.057E+001
		1408.01	21.07	1.447E+001		-1.534E+001	7.069E+000
		1457.64	0.50	1.164E+003		6.206E+003	5.751E+002
		1528.10	0.28	3.173E+002		-3.146E+002	1.454E+002
	Eu-154	123.07	40.40	4.382E+000	4.38E+000	-2.747E+000	2.173E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-154	247.93	6.89	2.004E+001	4.38E+000	2.183E+001	9.901E+000
		591.76	4.95	3.644E+001		-9.114E+000	1.789E+001
		692.42	1.78	9.732E+001		-1.192E+001	4.760E+001
		723.30	20.06	8.720E+000		3.320E+000	4.262E+000
		756.80	4.52	3.863E+001		-4.996E+001	1.886E+001
		873.18	12.08	2.253E+001		1.057E+001	1.107E+001
		996.29	10.48	2.295E+001		-2.032E+001	1.123E+001
		1004.76	18.01	1.307E+001		-1.046E+001	6.389E+000
		1274.43	34.80	5.586E+000		2.508E+000	2.701E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.967E+002	6.88E+000	-6.128E+001	9.739E+001
		60.01	1.22	2.106E+002		9.816E+001	1.043E+002
		86.55	30.70	6.878E+000		1.222E+000	3.412E+000
		105.31	21.10	9.108E+000		2.737E+000	4.518E+000
	Tl-208	583.19	85.00	2.056E+000	2.06E+000	-4.359E-001	1.009E+000
	Bi-211	351.07	13.02	1.078E+001	1.08E+001	4.457E+000	5.308E+000
	Pb-211	404.85	3.78	3.418E+001	3.42E+001	7.747E+000	1.677E+001
		427.09	1.76	7.711E+001		6.810E+001	3.785E+001
		832.01	3.52	7.461E+001		-1.943E+001	3.668E+001
	Bi-212	39.86	1.06	2.666E+002	2.61E+001	2.691E+003	1.321E+002
		727.33	6.67	2.613E+001		1.333E+000	1.277E+001
		785.37	1.10	2.008E+002		-7.049E+001	9.850E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.005E+002	3.26E+000	-1.500E+001	1.490E+002
		238.63	43.60	3.259E+000		2.149E+000	1.611E+000
		300.09	3.30	3.923E+001		-1.614E+001	1.933E+001
	Pb212-XR	74.82	10.28	2.256E+001	1.32E+001	2.267E+001	1.119E+001
		77.11	17.10	1.316E+001		-3.806E+000	6.524E+000
		87.35	3.97	5.282E+001		3.332E+001	2.620E+001
		89.78	1.46	1.414E+002		1.380E+002	7.012E+001
+	Bi-214	609.32*	45.49	8.376E+000	8.38E+000	6.087E+000	4.150E+000
		768.36	4.89	3.834E+001		-3.257E+001	1.875E+001
		806.18*	1.26	3.719E+002		6.692E+002	1.842E+002
		934.06	3.11	8.934E+001		2.981E+001	4.388E+001
		1120.29	14.92	1.729E+001		1.648E+001	8.451E+000
		1155.21	1.63	1.565E+002		5.741E+001	7.644E+001
		1238.12	5.83	4.077E+001		2.307E+001	1.985E+001
		1280.98	1.43	1.299E+002		-1.070E+002	6.271E+001
		1377.67	3.99	3.676E+001		-5.238E+001	1.752E+001
		1385.31	0.79	2.152E+002		-3.609E+002	1.033E+002
		1401.52	1.33	1.936E+002		-3.141E+002	9.418E+001
		1407.99	2.39	1.273E+002		-1.350E+002	6.222E+001
		1509.21	2.13	1.011E+002		-4.910E+001	4.881E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.938E+001	3.95E+000	1.234E+001	9.576E+000
		295.22	18.42	7.092E+000		7.397E+000	3.495E+000
		351.93	35.60	3.946E+000		1.258E+000	1.943E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

8/19/2014

8:33:55 AM

Page 7

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.100E+002	3.95E+000	-6.848E+001	1.030E+002
Pb214-XR	74.82	5.80	3.998E+001	2.32E+001	4.018E+001	1.982E+001
	77.11	9.70	2.319E+001		-6.710E+000	1.150E+001
	87.35	2.24	9.361E+001		5.906E+001	4.643E+001
	89.78	0.82	2.517E+002		2.457E+002	1.248E+002
Ra-226	186.21	3.64	4.107E+001	4.11E+001	1.938E+001	2.033E+001
Ac-228	129.07	2.42	7.164E+001	1.08E+001	-6.846E+001	3.552E+001
	209.25	3.89	3.725E+001		-1.176E+001	1.843E+001
	270.24	3.46	3.782E+001		-8.225E+000	1.866E+001
	328.00	2.95	4.389E+001		-4.753E+001	2.160E+001
	338.32	11.27	1.197E+001		5.269E+000	5.895E+000
	409.46	1.92	6.842E+001		4.210E+001	3.359E+001
	463.00	4.40	3.215E+001		-3.729E+001	1.577E+001
	794.95	4.25	5.606E+001		-1.681E+000	2.753E+001
	911.20	25.80	1.078E+001		8.087E+000	5.297E+000
	964.77	4.99	5.327E+001		2.338E+001	2.613E+001
	968.97	15.80	1.669E+001		3.321E+000	8.186E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.659E+001		-6.013E+001	3.776E+001
	300.07	2.47	5.241E+001		-2.156E+001	2.582E+001
	302.65	2.20	5.913E+001		2.821E+001	2.913E+001
	330.06	1.40	9.291E+001		-1.059E+002	4.573E+001
Th-234	92.38	2.13	9.495E+001	9.49E+001	2.340E+001	4.710E+001
	92.80	2.10	9.613E+001		2.369E+001	4.768E+001
	112.81	0.21	8.688E+002		-1.573E+002	4.309E+002
U-235	143.76	10.96	1.501E+001	2.63E+000	9.926E+000	7.440E+000
	163.33	5.08	3.046E+001		-1.676E+000	1.509E+001
	185.71	57.20	2.626E+000		2.392E+000	1.300E+000
	202.11	1.08	1.318E+002		-1.098E+001	6.522E+001
	205.31	5.01	2.910E+001		-2.973E+000	1.440E+001
Am-241	59.54	35.90	7.243E+000	7.24E+000	3.376E+000	3.587E+000

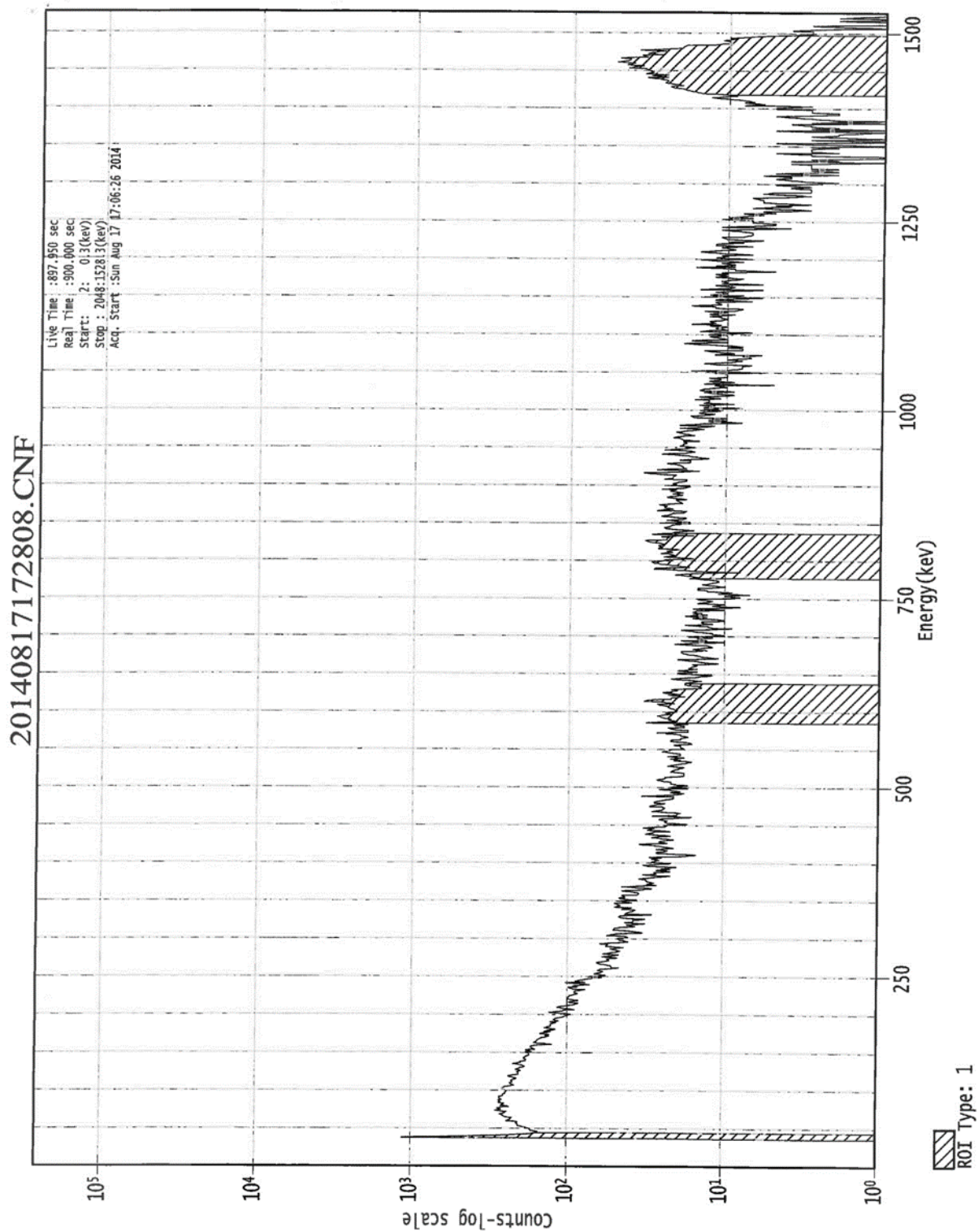
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S F   C T R U M   A N A L Y S   S      ***
*****

Filename: C:\Canberra\8-19-14\20140817174625.cnf

Report Generated On       : 8/19/2014    8:34:35 AM

Sample Title              : CHOS7
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

Sample Taken On           : 8/17/2014    5:30:46 PM
Acquisition Started       : 8/17/2014    5:30:46 PM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Rad Time                  : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst
Date 8-19-14

 8/20/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:34:35 AM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS7
Peak Analysis Performed on: 8/19/2014 8:34:35 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.40	38.92	1.68	2.97E+003	224.20	1.66E+003
2	87-	114	100.79	74.50	5.63	6.40E+002	508.98	8.00E+003
3	298-	344	321.30	239.92	5.45	4.10E+002	332.96	3.98E+003
4	443-	498	471.39	352.40	2.43	5.66E+002	259.34	2.03E+003
5	779-	850	814.64	609.29	1.88	4.05E+002	201.34	1.39E+003
6	1037-	1118	1078.23	806.22	1.23	3.54E+002	197.00	1.37E+003
7	1243-	1331	1287.64	962.48	0.75	1.80E+002	188.56	1.18E+003
8	1899-	2008	1954.03	1458.49	28.54	2.13E+003	170.01	7.25E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:34:35 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS7
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.930	34.70*	66.40	4.12037E+001	8.80995E+000
		788.70*	33.60	1.68206E+001	9.56212E+000
		1436.80*	66.40	8.51313E+001	9.61096E+000
K-40	0.998	1460.82*	10.66	5.30274E+002	6.24867E+001
Bi-211	1.000	351.07*	13.02	3.39759E+001	1.64917E+001
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	5.63584E+000	4.66318E+000
		300.09	3.30		
		609.32*	45.49	1.11115E+001	5.67957E+000
		768.36	4.89		
		806.18*	1.26	4.47131E+002	2.54207E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:34:35 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.930	2.981990E+001	6.479933E+000
	K-40	0.998	3.445288E+002	7.220145E+001
X	Co-58	0.994		
X	Ru-106	0.962		
	Bi-211	1.000	3.397589E+001	1.649171E+001
	Pb-212	1.000	5.635842E+000	4.663184E+000
	Bi-214	1.000	1.093360E+001	5.678267E+000
X	Pb-214	0.510		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:34:35 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	74.50	7.1297E-001	79.51	Tol.	Pb212-XR Pb214-XR
7	962.48	2.0070E-001	104.64	Sum	

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report 8/19/2014 8:34:35 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS7
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.517E+000	4.52E+000	4.120E+001	2.240E+000
		788.70*	33.60	1.524E+001		1.682E+001	7.555E+000
		1436.80*	66.40	9.472E+000		8.513E+001	4.682E+000
+	K-40	1460.82*	10.66	5.900E+001	5.90E+001	5.303E+002	2.916E+001
	Cr-51	320.08	9.91	1.396E+001	1.40E+001	-1.718E+001	6.881E+000
	Mn-54	834.85	99.98	2.760E+000	2.76E+000	1.598E-001	1.358E+000
	Co-58	810.76*	99.45	5.149E+000	5.15E+000	5.683E+000	2.553E+000
	Co-60	1173.23	99.85	2.665E+000	1.59E+000	-8.037E-001	1.303E+000
		1332.49	99.98	1.592E+000		2.227E-001	7.627E-001
	Nb-94	702.65	99.81	1.784E+000	1.78E+000	-2.755E-001	8.730E-001
		871.09	99.89	2.824E+000		-1.063E+000	1.389E+000
	Sn-113	255.13	2.11	6.813E+001	2.20E+000	-4.264E+001	3.366E+001
		391.70	64.97	2.200E+000		-6.006E-001	1.082E+000
	Cs-137	661.66	85.10	2.071E+000	2.07E+000	7.521E-001	1.014E+000
	Eu-152	121.78	28.67	6.829E+000	6.04E+000	3.861E+000	3.389E+000
		244.70	7.61	2.047E+001		1.711E+001	1.013E+001
		295.94	0.45	3.328E+002		5.737E+002	1.643E+002
		344.28	26.60	6.044E+000		9.896E+000	2.983E+000
		367.79	0.86	1.733E+002		-5.625E+000	8.536E+001
		411.12	2.24	6.338E+001		-2.222E+000	3.115E+001
		443.96	2.83	5.260E+001		1.581E+001	2.584E+001
		488.68	0.42	3.701E+002		-4.771E+002	1.817E+002
		563.99	0.49	3.506E+002		-3.658E+002	1.721E+002
		586.26	0.46	4.321E+002		-5.187E+001	2.125E+002
		678.62	0.47	3.855E+002		2.919E+002	1.888E+002
		688.67	0.86	2.119E+002		-4.766E+001	1.038E+002
		719.35	0.28	6.376E+002		3.061E+002	3.118E+002
		778.90	12.96	1.643E+001		-2.627E+000	8.055E+000
		810.45	0.32	8.616E+002		1.572E+003	4.241E+002
		867.37	4.26	6.617E+001		-3.837E+001	3.255E+001
		919.33	0.43	6.480E+002		-1.124E+002	3.184E+002
		964.08	14.65	1.881E+001		3.226E+001	9.233E+000
		1085.87	10.24	2.388E+001		1.962E+001	1.167E+001
		1089.74	1.73	1.406E+002		-5.102E+001	6.870E+001
		1112.07	13.69	1.878E+001		8.463E+000	9.181E+000
		1212.95	1.43	1.854E+002		1.089E+002	9.053E+001
		1249.94	0.19	1.209E+003		8.764E+002	5.880E+002
		1299.14	1.63	1.113E+002		4.468E+001	5.365E+001
		1408.01	21.07	1.561E+001		-1.236E+001	7.641E+000
		1457.64	0.50	1.218E+003		6.405E+003	6.018E+002
		1528.10	0.28	3.694E+002		-1.126E+002	1.715E+002
	Eu-154	123.07	40.40	4.822E+000	4.82E+000	5.119E+000	2.393E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report			8/19/2014 8:31:35 AM		Page 6				
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)		
>	Eu-154	247.93	6.89	2.230E+001	4.82E+000	2.399E-001	1.103E+001		
		591.76	4.95	4.150E+001		-5.238E+000	2.042E+001		
		692.42	1.78	1.019E+002		-1.005E+001	4.986E+001		
		723.30	20.06	8.852E+000		-2.820E+000	4.328E+000		
		756.80	4.52	4.132E+001		-9.163E+000	2.021E+001		
		873.18	12.08	2.355E+001		3.096E+000	1.158E+001		
		996.29	10.48	2.397E+001		-7.046E+000	1.174E+001		
		1004.76	18.01	1.374E+001		-4.102E+000	6.725E+000		
		1274.43	34.80	5.688E+000		1.166E+000	2.752E+000		
		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000		
		Eu-155	45.30	1.31		2.087E+002	7.59E+000	-6.554E+001	1.034E+002
			60.01	1.22		2.312E+002		-1.220E+001	1.146E+002
			86.55	30.70		7.589E+000		-7.858E-001	3.767E+000
			105.31	21.10		9.826E+000		-1.226E+001	4.877E+000
+	Tl-208	583.19	85.00	2.304E+000	2.30E+000	-6.619E-001	1.133E+000		
	Bi-211	351.07*	13.02	2.532E+001		2.53E+001	3.398E+001	1.258E+001	
	Pb-211	404.85	3.78	3.759E+001	3.76E+001	9.912E+000	1.848E+001		
		427.09	1.76	8.025E+001		-4.927E+001	3.942E+001		
	Bi-212	832.01	3.52	7.821E+001	2.67E+001	6.083E+000	3.848E+001		
		39.86	1.06	2.722E+002		2.590E+003	1.349E+002		
		727.33	6.67	2.666E+001		1.276E+001	1.303E+001		
		785.37	1.10	2.056E+002		4.378E+000	1.009E+002		
	>	Pb-212	1620.50	1.47	0.000E+000	7.50E+000	0.000E+000	0.000E+000	
			115.18	0.60	3.266E+002		1.097E+002	1.621E+002	
	+	Pb-212	238.63*	43.60	7.504E+000	1.47E+001	5.636E+000	3.734E+000	
			300.09	3.30	4.483E+001		7.604E+001	2.213E+001	
			74.82	10.28	2.506E+001		1.821E+001	1.244E+001	
		Pb212-XR	77.11	17.10	1.473E+001	8.97E+000	1.612E+001	7.310E+000	
87.35			3.97	5.795E+001	-2.253E+001		2.877E+001		
89.78			1.46	1.548E+002	-3.187E+001		7.685E+001		
Bi-214		609.32*	45.49	8.972E+000	8.08E+000	1.111E+001	4.449E+000		
		768.36	4.89	3.962E+001		-1.124E+001	1.939E+001		
		806.18*	1.26	4.051E+002		4.471E+002	2.008E+002		
		934.06	3.11	9.006E+001		2.377E+000	4.424E+001		
		1120.29	14.92	1.738E+001		1.799E+000	8.497E+000		
		1155.21	1.63	1.643E+002		1.056E+002	8.035E+001		
		1238.12	5.83	4.154E+001		2.915E+001	2.023E+001		
		1280.98	1.43	1.334E+002		-9.003E+001	6.447E+001		
	1377.67	3.99	4.153E+001	-7.488E+001		1.991E+001			
	1385.31	0.79	2.377E+002	-5.673E+002		1.145E+002			
	1401.52	1.33	2.078E+002	-1.333E+002		1.013E+002			
1407.99	2.39	1.374E+002	-1.088E+002	6.725E+001					
1509.21	2.13	1.132E+002	-2.900E+001	5.488E+001					
>	Pb-214	1661.27	1.05	0.000E+000	8.08E+000	0.000E+000	0.000E+000		
		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000		
		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000		
		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000		
		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000		
		241.99*	7.25	4.512E+001		3.389E+001	2.245E+001		
		295.22	18.42	8.078E+000		8.696E+000	3.988E+000		
		351.93*	35.60	9.260E+000		1.243E+001	4.600E+000		

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

8/19/2014

8:34:35 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96*	1.06	4.831E+002	8.08E+000	5.332E+002	2.395E+002
Pb214-XR	74.82	5.80	4.442E+001	2.60E+001	3.228E+001	2.205E+001
	77.11	9.70	2.597E+001		2.841E+001	1.289E+001
	87.35	2.24	1.027E+002		-3.993E+001	5.098E+001
	89.78	0.82	2.756E+002		-5.674E+001	1.368E+002
Ra-226	186.21	3.64	4.475E+001	4.48E+001	-2.951E+001	2.218E+001
Ac-228	129.07	2.42	7.821E+001	1.11E+001	8.033E+000	3.881E+001
	209.25	3.89	4.085E+001		1.909E+001	2.023E+001
	270.24	3.46	4.114E+001		-2.773E+001	2.032E+001
	328.00	2.95	4.779E+001		-1.529E+001	2.355E+001
	338.32	11.27	1.343E+001		-1.924E+000	6.625E+000
	409.46	1.92	7.378E+001		-1.866E+000	3.627E+001
	463.00	4.40	3.473E+001		1.487E+001	1.706E+001
	794.95	4.25	5.863E+001		1.070E+002	2.881E+001
	911.20	25.80	1.108E+001		-4.855E-001	5.445E+000
	964.77	4.99	5.509E+001		7.094E+001	2.704E+001
	968.97	15.80	1.737E+001		2.021E+001	8.522E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.477E+001		-1.917E+002	4.185E+001
	300.07	2.47	5.989E+001		1.016E+002	2.956E+001
	302.65	2.20	6.679E+001		1.218E+002	3.296E+001
	330.06	1.40	1.018E+002		-2.035E+001	5.017E+001
Th-234	92.38	2.13	1.038E+002	1.04E+002	-3.571E+001	5.150E+001
	92.80	2.10	1.050E+002		-3.615E+001	5.214E+001
	112.81	0.21	9.357E+002		-9.317E+002	4.643E+002
U-235	143.76	10.96	1.601E+001	2.86E+000	2.080E+000	7.940E+000
	163.33	5.08	3.318E+001		-1.531E+001	1.645E+001
	185.71	57.20	2.859E+000		2.689E-001	1.417E+000
	202.11	1.08	1.439E+002		-5.005E+001	7.123E+001
	205.31	5.01	3.183E+001		1.866E+001	1.576E+001
Am-241	59.54	35.90	7.951E+000	7.95E+000	-4.197E-001	3.941E+000

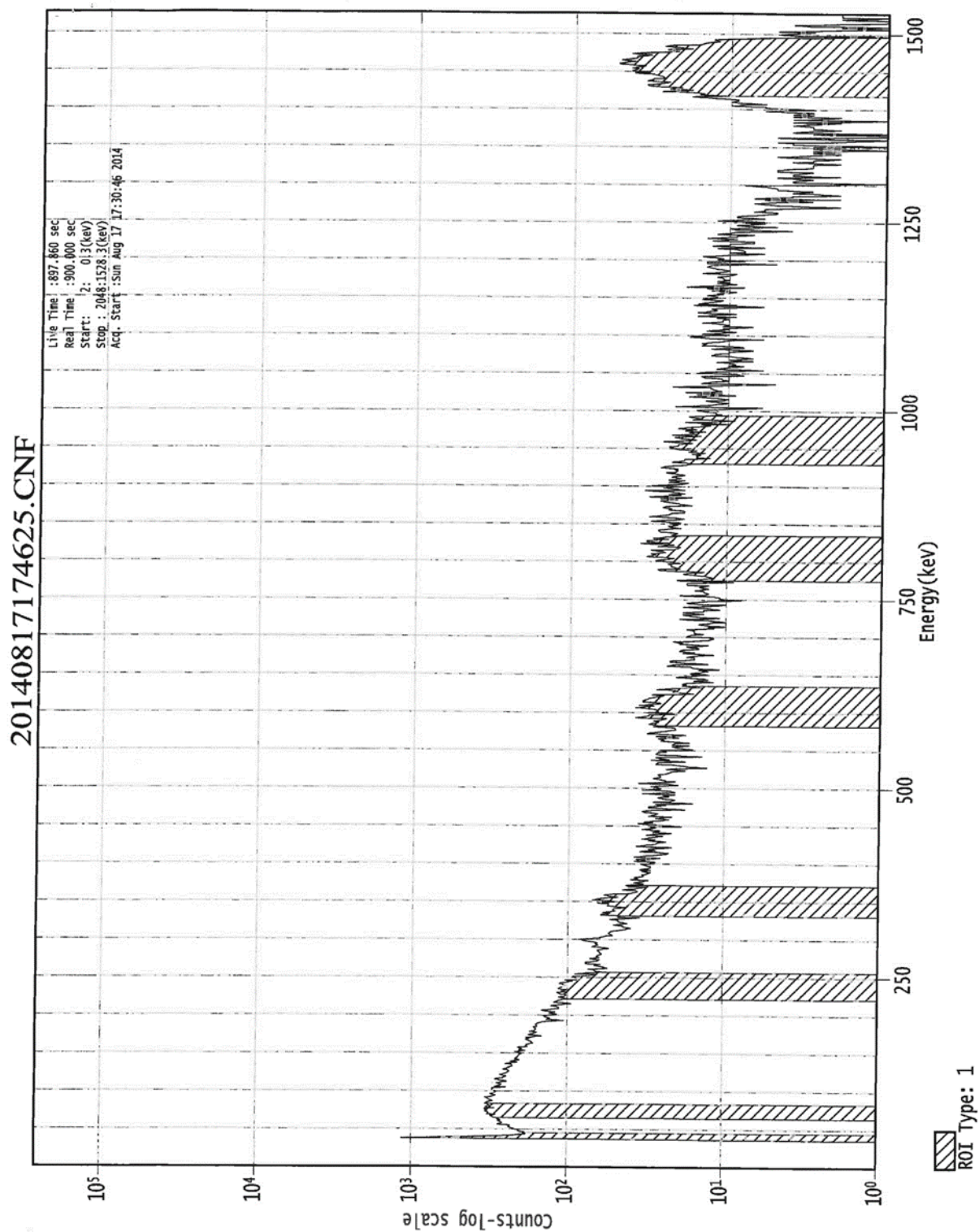
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S E   C T R U M   A N A L Y S   S      ***
*****

Filename: C:\Canberra\8-19-14\20140817180809.cnf

Report Generated On       : 8/19/2014   8:35:16 AM

Sample Title              : CHOS8
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

Sample Taken On           : 8/17/2014   5:49:22 PM
Acquisition Started       : 8/17/2014   5:49:22 PM

Live Time                 : 898.0 seconds
Dead Time                 : 900.0 seconds

Dead Time                 : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst *[Signature]*
Date 8-19-14

[Signature] 8/19/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:35:16 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS8
Peak Analysis Performed on: 8/19/2014 8:35:16 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.40	38.92	1.62	2.92E+003	211.60	1.41E+003
2	294-	339	316.99	236.69	2.39	4.31E+002	292.04	3.10E+003
3	775-	846	811.18	606.70	1.14	2.03E+002	187.54	1.23E+003
4	1898-	2006	1952.57	1457.40	20.15	2.12E+003	157.68	5.87E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:35:16 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS8
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.638	34.70*	66.40	4.05997E+001	8.63575E+000
		788.70	33.60		
		1436.80*	66.40	8.46792E+001	9.24057E+000
K-40	0.997	1460.82*	10.66	5.27458E+002	6.02518E+001
Ru-106	0.945	621.93*	9.93	2.53948E+001	2.36912E+001
		1050.41	1.56		
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	5.88313E+000	4.09401E+000
		300.09	3.30		
Bi-214	0.999	609.32*	45.49	5.54342E+000	5.16532E+000
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Th-227	0.712	50.13	8.40		
		79.69	1.95		
		94.97	0.03		
		210.62	1.25		
		235.96*	12.90	1.98841E+001	1.42393E+001
		256.23	7.00		
		286.09	1.74		
		299.98	2.21		
		304.50	1.15		
		329.85	2.90		
		334.37	1.14		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:35:16 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.638	4.059966E+001	8.635754E+000
K-40	0.997	2.745669E+002	7.878118E+001
? Ra-106	0.945	2.539476E+001	2.369123E+001
? Pb-212	0.999	5.883133E+000	4.094009E+000
? Bi-214	0.999	5.543416E+000	5.165320E+000
? Th-227	0.712	1.988408E+001	1.423929E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:35:16 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS8
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.195E+000	4.19E+000	4.060E+001	2.079E+000
		788.70	33.60	7.019E+000		1.057E+001	3.447E+000
		1436.80*	66.40	8.495E+000		8.468E+001	4.194E+000
+	K-40	1460.82*	10.66	5.292E+001	5.29E+001	5.275E+002	2.612E+001
	Cr-51	320.08	9.91	1.272E+001	1.27E+001	1.679E-001	6.262E+000
	Mn-54	834.85	99.98	2.654E+000	2.65E+000	-1.696E+000	1.305E+000
	Co-58	810.76	99.45	2.639E+000	2.64E+000	1.491E+000	1.298E+000
	Co-60	1173.23	99.85	2.603E+000	1.43E+000	4.099E-001	1.272E+000
		1332.49	99.98	1.433E+000		4.373E-001	6.830E-001
	Nb-94	702.65	99.81	1.703E+000	1.70E+000	7.103E-001	8.322E-001
		871.09	99.89	2.701E+000		-3.436E-001	1.327E+000
	Sn-113	255.13	2.11	6.104E+001	1.99E+000	-1.211E+001	3.012E+001
		391.70	64.97	1.994E+000		7.193E-001	9.792E-001
	Cs-137	661.66	85.10	2.050E+000	2.05E+000	1.230E+000	1.004E+000
	Eu-152	121.78	28.67	6.027E+000	5.17E+000	-1.232E+000	2.988E+000
		244.70	7.61	1.826E+001		1.666E-001	9.020E+000
		295.94	0.45	2.877E+002		1.970E+002	1.418E+002
		344.28	26.60	5.166E+000		2.669E+000	2.544E+000
		367.79	0.86	1.521E+002		-2.317E+002	7.477E+001
		411.12	2.24	5.833E+001		3.308E+001	2.863E+001
		443.96	2.83	4.760E+001		-3.070E+000	2.335E+001
		488.68	0.42	3.507E+002		-7.370E+001	1.720E+002
		563.99	0.49	3.266E+002		-4.077E+002	1.601E+002
		586.26	0.46	3.850E+002		-3.294E+001	1.890E+002
		678.62	0.47	3.625E+002		-6.811E+001	1.773E+002
		688.67	0.86	2.006E+002		8.708E+000	9.813E+001
		719.35	0.28	5.947E+002		-5.717E+002	2.903E+002
		778.90	12.96	1.649E+001		-1.591E+000	8.083E+000
		810.45	0.32	8.174E+002		4.618E+002	4.019E+002
		867.37	4.26	6.385E+001		4.250E+001	3.138E+001
		919.33	0.43	6.503E+002		4.656E+002	3.195E+002
		964.08	14.65	1.802E+001		1.136E+001	8.840E+000
		1085.87	10.24	2.199E+001		-1.861E+001	1.073E+001
		1089.74	1.73	1.318E+002		-6.759E+001	6.428E+001
		1112.07	13.69	1.795E+001		9.775E+000	8.767E+000
		1212.95	1.43	1.876E+002		3.586E+001	9.164E+001
		1249.94	0.19	1.234E+003		-2.004E+002	6.004E+002
		1299.14	1.63	1.049E+002		-1.922E-001	5.045E+001
		1408.01	21.07	1.481E+001		-1.161E+001	7.238E+000
		1457.64	0.50	1.184E+003		6.123E+003	5.848E+002
		1528.10	0.28	3.064E+002		-2.858E+002	1.400E+002
	Eu-154	123.07	40.40	4.242E+000	4.24E+000	-8.488E-001	2.103E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	1.976E+001	4.24E+000	2.630E-001	9.760E+000
		591.76	4.95	3.689E+001		-5.938E-001	1.811E+001
		692.42	1.78	9.640E+001		2.277E+001	4.714E+001
		723.30	20.06	8.304E+000		-1.911E+000	4.054E+000
		756.80	4.52	3.936E+001		-4.109E+001	1.923E+001
		873.18	12.08	2.226E+001		-1.858E+001	1.094E+001
		996.29	10.48	2.358E+001		-3.629E+000	1.154E+001
		1004.76	18.01	1.341E+001		4.324E+000	6.561E+000
		1274.43	34.80	5.840E+000		1.505E+000	2.828E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.971E+002	6.54E+000	2.611E+001	9.760E+001
		60.01	1.22	2.046E+002		1.084E+002	1.013E+002
		86.55	30.70	6.536E+000		-2.725E+000	3.241E+000
		105.31	21.10	8.806E+000		-4.914E+000	4.366E+000
	Tl-208	583.19	85.00	2.042E+000	2.04E+000	-3.142E-001	1.002E+000
	Bi-211	351.07	13.02	1.059E+001	1.06E+001	7.315E+000	5.216E+000
	Pb-211	404.85	3.78	3.433E+001	3.43E+001	3.525E+001	1.685E+001
		427.09	1.76	7.384E+001		1.976E+000	3.621E+001
		832.01	3.52	7.534E+001		-1.841E+001	3.704E+001
	Bi-212	39.86	1.06	2.642E+002	2.47E+001	2.510E+003	1.309E+002
		727.33	6.67	2.472E+001		-2.157E+001	1.206E+001
		785.37	1.10	2.058E+002		2.037E+002	1.010E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	2.916E+002	6.52E+000	9.144E+001	1.445E+002
		238.63*	43.60	6.521E+000		5.883E+000	3.242E+000
		300.09	3.30	3.877E+001		4.619E+001	1.910E+001
	Pb212-XR	74.82	10.28	2.183E+001	1.27E+001	1.487E+001	1.082E+001
		77.11	17.10	1.271E+001		-2.251E+000	6.300E+000
		87.35	3.97	5.022E+001		2.809E+001	2.490E+001
		89.78	1.46	1.344E+002		-2.332E+001	6.662E+001
+	Bi-214	609.32*	45.49	8.402E+000	8.40E+000	5.543E+000	4.164E+000
		768.36	4.89	3.981E+001		-2.622E+001	1.948E+001
		806.18	1.26	2.061E+002		1.600E+002	1.013E+002
		934.06	3.11	8.849E+001		-1.637E+001	4.346E+001
		1120.29	14.92	1.696E+001		1.527E+001	8.288E+000
		1155.21	1.63	1.560E+002		-8.499E+001	7.618E+001
		1238.12	5.83	4.310E+001		6.481E+000	2.101E+001
		1280.98	1.43	1.353E+002		-4.957E+001	6.538E+001
		1377.67	3.99	3.626E+001		-5.725E+001	1.727E+001
		1385.31	0.79	2.059E+002		-5.792E+002	9.859E+001
		1401.52	1.33	1.978E+002		-1.830E+002	9.629E+001
		1407.99	2.39	1.303E+002		-1.021E+002	6.371E+001
		1509.21	2.13	9.998E+001		-3.582E+001	4.826E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.923E+001	3.88E+000	1.303E-001	9.505E+000
		295.22	18.42	7.022E+000		5.512E+000	3.460E+000
		351.93	35.60	3.878E+000		3.683E+000	1.909E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.165E+002	3.88E+000	2.712E+002	1.062E+002
Pb214-XR	74.82	5.80	3.868E+001	2.24E+001	2.636E+001	1.918E+001
	77.11	9.70	2.241E+001		-3.968E+000	1.111E+001
	87.35	2.24	8.901E+001		4.979E+001	4.413E+001
	89.78	0.82	2.392E+002		-4.152E+001	1.186E+002
Ra-226	186.21	3.64	4.043E+001	4.04E+001	-2.940E+000	2.002E+001
Ac-228	129.07	2.42	6.897E+001	1.08E+001	7.245E+000	3.419E+001
	209.25	3.89	3.678E+001		-1.187E+001	1.819E+001
	270.24	3.46	3.674E+001		-1.402E+001	1.812E+001
	328.00	2.95	4.350E+001		-1.675E+001	2.141E+001
	338.32	11.27	1.169E+001		3.179E+000	5.753E+000
	409.46	1.92	6.752E+001		1.339E+001	3.313E+001
	463.00	4.40	3.137E+001		-9.183E+000	1.538E+001
	794.95	4.25	5.761E+001		4.716E+001	2.830E+001
	911.20	25.80	1.076E+001		7.923E+000	5.287E+000
	964.77	4.99	5.321E+001		5.520E+001	2.610E+001
	968.97	15.80	1.659E+001		6.064E+000	8.135E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.605E+001		-4.122E+001	3.749E+001
	300.07	2.47	5.180E+001		6.171E+001	2.552E+001
	302.65	2.20	5.765E+001		-1.741E+001	2.839E+001
	330.06	1.40	9.328E+001		7.231E+001	4.592E+001
Th-234	92.38	2.13	9.049E+001	9.05E+001	1.513E+001	4.486E+001
	92.80	2.10	9.161E+001		1.532E+001	4.542E+001
	112.81	0.21	8.414E+002		1.275E+002	4.171E+002
U-235	143.76	10.96	1.422E+001	2.57E+000	-7.150E+000	7.046E+000
	163.33	5.08	2.995E+001		-9.533E+000	1.483E+001
	185.71	57.20	2.574E+000		-3.576E-002	1.274E+000
	202.11	1.08	1.297E+002		-7.321E+001	6.413E+001
	205.31	5.01	2.876E+001		9.718E+000	1.423E+001
Am-241	59.54	35.90	7.037E+000	7.04E+000	3.726E+000	3.484E+000

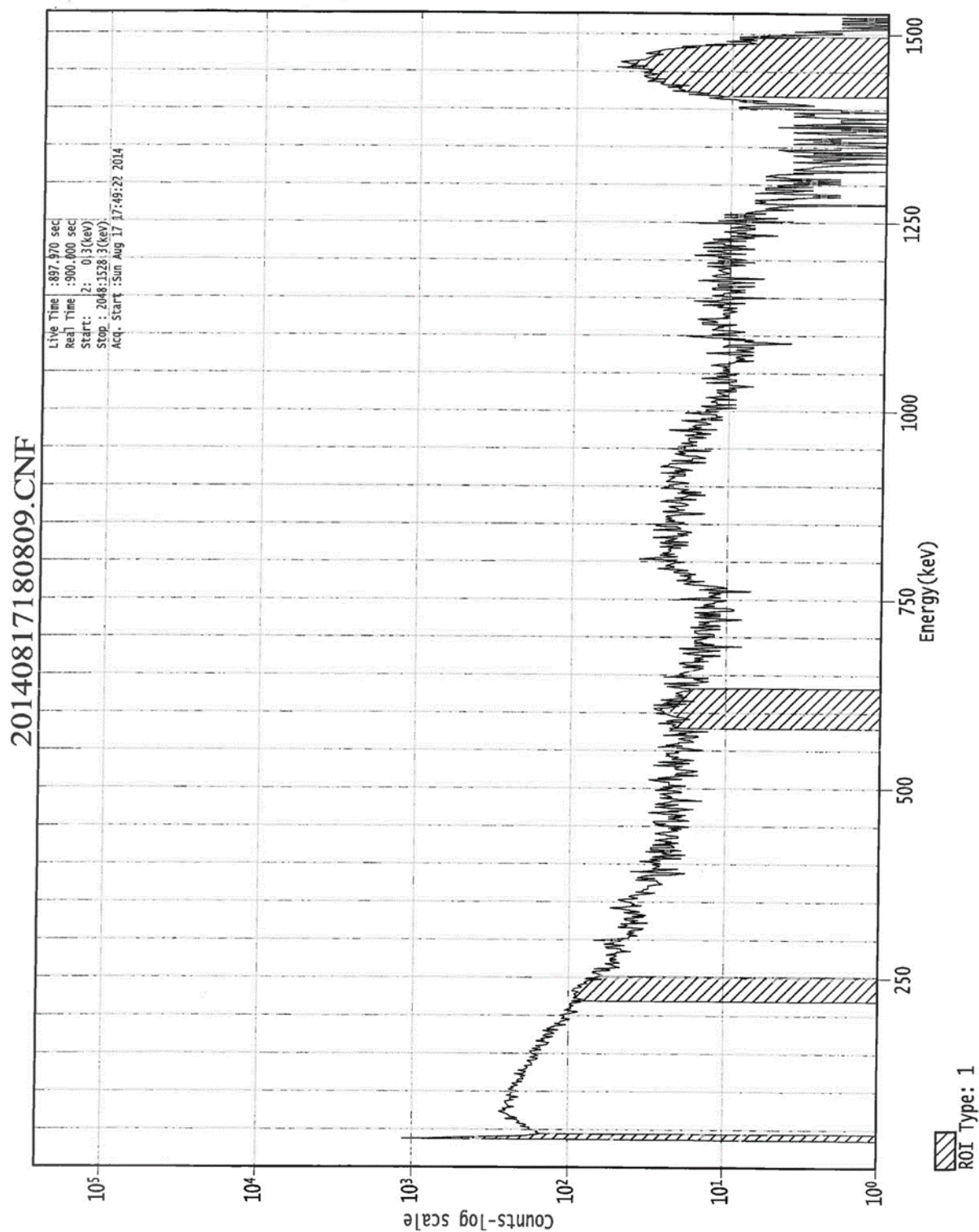
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

*** GAMMA SPECTRUM ANALYSIS ***

Filename: C:\Canberra\8-24-14\20140820115753.cnf

Report Generated On : 8/27/2014 12:12:11 PM

Sample Title : CH0511

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Gram

Sample Taken On : 8/20/2014 11:40:57 AM

Acquisition Started : 8/20/2014 11:40:57 AM

Live Time : 897.8 seconds

Real Time : 900.0 seconds

Dead Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004


Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVER

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst 

Date 8-27-14

 8/27/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report

8/27/2014 12:12:11 PM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: CH0511

Peak Analysis Performed on: 8/27/2014 12:12:10 PM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.53	39.02	1.73	3.16E+003	229.64	1.73E+003
2	87-	114	101.30	74.88	1.66	4.66E+002	514.44	8.20E+003
3	298-	344	321.83	240.32	1.08	3.22E+002	331.13	3.95E+003
4	446-	501	473.61	354.06	3.01	6.94E+002	247.81	1.84E+003
5	778-	850	814.53	609.21	6.21	3.59E+002	201.81	1.39E+003
6	1037-	1119	1078.58	806.48	0.75	1.71E+002	203.03	1.46E+003
7	1901-	2009	1955.84	1459.83	30.05	2.20E+003	160.26	6.01E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 12:11 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CH0511
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.923	34.70*	66.40	4.38712E+001	9.33648E+000
		788.70*	33.60	8.10203E+000	9.69395E+000
		1436.80*	66.40	8.77664E+001	9.49878E+000
K-40	1.000	1460.82*	10.66	5.46688E+002	6.19805E+001
Bi-211	0.997	351.07*	13.02	4.17936E+001	1.63731E+001
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	4.43076E+000	4.60945E+000
		300.09	3.30		
Bi-214	1.000	609.32*	45.49	9.85030E+000	5.65781E+000
		768.36	4.89		
		806.18*	1.26	2.15370E+002	2.57693E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 12:11 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.923	2.648430E+001	6.725494E+000
	K-40	1.000	3.817200E+002	7.249617E+001
X	Co-58	0.995		
	Bi-211	0.997	4.179356E+001	1.637313E+001
	Pb-212	0.999	4.430765E+000	4.609452E+000
	Bi-214	1.000	9.610147E+000	5.656674E+000
X	Pb-214	0.509		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/27/2014 12:12:10 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	74.88	5.1931E-001	110.33	Tol.	Pb212-XR Pb214-XR

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

8/27/2014 12:11 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CH0511
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.615E+000	4.62E+000	4.387E+001	2.289E+000
		788.70*	33.60	1.587E+001		8.102E+000	7.869E+000
		1436.80*	66.40	8.642E+000		8.777E+001	4.267E+000
+	K-40	1460.82*	10.66	5.383E+001	5.38E+001	5.467E+002	2.658E+001
	Cr-51	320.08	9.91	1.404E+001	1.40E+001	-4.199E+000	6.919E+000
	Mn-54	834.85	99.98	2.680E+000	2.68E+000	1.056E-001	1.318E+000
	Co-58	810.76*	99.45	5.361E+000	5.36E+000	2.737E+000	2.659E+000
	Co-60	1173.23	99.85	2.641E+000	1.37E+000	-6.490E-002	1.291E+000
		1332.49	99.98	1.369E+000		-1.478E+000	6.511E-001
	Nb-94	702.65	99.81	1.799E+000	1.80E+000	1.243E+000	8.805E-001
		871.09	99.89	2.755E+000		7.757E-002	1.355E+000
	Sn-113	255.13	2.11	6.784E+001	2.13E+000	-1.662E+001	3.352E+001
		391.70	64.97	2.133E+000		-1.843E-001	1.048E+000
	Cs-137	661.66	85.10	2.063E+000	2.06E+000	2.674E-001	1.010E+000
	Eu-152	121.78	28.67	6.748E+000	5.89E+000	-1.795E+000	3.349E+000
		244.70	7.61	2.022E+001		1.929E+001	1.000E+001
		295.94	0.45	3.197E+002		2.627E+002	1.578E+002
		344.28	26.60	5.889E+000		-5.253E-001	2.905E+000
		367.79	0.86	1.752E+002		9.049E+000	8.631E+001
		411.12	2.24	6.294E+001		3.429E+001	3.093E+001
		443.96	2.83	5.092E+001		-1.881E+000	2.500E+001
		488.68	0.42	3.694E+002		-3.979E+002	1.814E+002
		563.99	0.49	3.364E+002		-1.549E+002	1.650E+002
		586.26	0.46	4.054E+002		-7.741E+001	1.991E+002
		678.62	0.47	3.704E+002		-1.510E+002	1.813E+002
		688.67	0.86	2.049E+002		-7.582E+001	1.003E+002
		719.35	0.28	6.202E+002		-2.343E+002	3.031E+002
		778.90	12.96	1.645E+001		9.627E-001	8.065E+000
		810.45	0.32	8.128E+002		4.921E+002	3.996E+002
		867.37	4.26	6.432E+001		2.212E+000	3.162E+001
		919.33	0.43	6.575E+002		-1.141E+002	3.231E+002
		964.08	14.65	1.838E+001		-2.351E+000	9.018E+000
		1085.87	10.24	2.367E+001		3.439E+000	1.156E+001
		1089.74	1.73	1.413E+002		1.994E+001	6.904E+001
		1112.07	13.69	1.911E+001		1.209E+001	9.347E+000
		1212.95	1.43	1.773E+002		-3.886E+001	8.651E+001
		1249.94	0.19	1.251E+003		2.609E+002	6.086E+002
		1299.14	1.63	1.093E+002		-6.786E+001	5.265E+001
		1408.01	21.07	1.432E+001		-1.826E+001	6.996E+000
		1457.64	0.50	1.203E+003		5.920E+003	5.943E+002
		1528.10	0.28	3.664E+002		-3.223E+002	1.700E+002
	Eu-154	123.07	40.40	4.756E+000	4.76E+000	2.606E+000	2.360E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	2.207E+001	4.76E+000	1.372E+000	1.091E+001
		591.76	4.95	3.956E+001		-1.217E+000	1.945E+001
		692.42	1.78	9.879E+001		-5.688E+001	4.833E+001
		723.30	20.06	8.714E+000		-1.281E+000	4.259E+000
		756.80	4.52	4.114E+001		8.563E-001	2.012E+001
		873.18	12.08	2.271E+001		-1.515E+000	1.116E+001
		996.29	10.48	2.406E+001		-1.546E+001	1.179E+001
		1004.76	18.01	1.357E+001		-1.172E+001	6.642E+000
		1274.43	34.80	6.143E+000		2.370E-002	2.979E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.162E+002	7.52E+000	2.178E+001	1.071E+002
		60.01	1.22	2.354E+002		1.001E+002	1.167E+002
		86.55	30.70	7.522E+000		1.668E-002	3.734E+000
		105.31	21.10	9.899E+000		2.946E+000	4.913E+000
	Tl-208	583.19	85.00	2.153E+000	2.15E+000	-2.869E-001	1.058E+000
+	Bi-211	351.07*	13.02	2.415E+001	2.42E+001	4.179E+001	1.200E+001
	Pb-211	404.85	3.78	3.712E+001	3.71E+001	6.043E+000	1.824E+001
		427.09	1.76	8.014E+001		-3.247E+001	3.936E+001
		832.01	3.52	7.617E+001		1.772E+000	3.746E+001
	Bi-212	39.86	1.06	2.804E+002	2.63E+001	2.804E+003	1.390E+002
		727.33	6.67	2.634E+001		4.379E+000	1.287E+001
		785.37	1.10	2.053E+002		3.349E+001	1.007E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.260E+002	7.48E+000	-8.222E+001	1.617E+002
		238.63*	43.60	7.484E+000		4.431E+000	3.723E+000
		300.09	3.30	4.361E+001		3.241E+001	2.152E+001
	Pb212-XR	74.82	10.28	2.529E+001	1.48E+001	3.563E+001	1.255E+001
		77.11	17.10	1.481E+001		1.169E+001	7.349E+000
		87.35	3.97	5.745E+001		-1.244E+001	2.852E+001
		89.78	1.46	1.532E+002		6.651E+001	7.604E+001
+	Bi-214	609.32*	45.49	9.013E+000	9.01E+000	9.850E+000	4.469E+000
		768.36	4.89	4.027E+001		-1.294E+001	1.971E+001
		806.18*	1.26	4.218E+002		2.154E+002	2.092E+002
		934.06	3.11	8.952E+001		1.435E+001	4.397E+001
		1120.29	14.92	1.764E+001		5.975E+000	8.630E+000
		1155.21	1.63	1.629E+002		2.863E+001	7.964E+001
		1238.12	5.83	4.171E+001		2.034E+001	2.032E+001
		1280.98	1.43	1.445E+002		1.699E+001	7.002E+001
		1377.67	3.99	4.031E+001		-4.669E+001	1.930E+001
		1385.31	0.79	2.318E+002		-3.192E+002	1.116E+002
		1401.52	1.33	1.925E+002		-3.044E+002	9.366E+001
		1407.99	2.39	1.260E+002		-1.607E+002	6.157E+001
		1509.21	2.13	1.207E+002		-4.224E+001	5.863E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99*	7.25	4.500E+001	7.79E+000	2.664E+001	2.239E+001
		295.22	18.42	7.794E+000		7.211E+000	3.846E+000
		351.93*	35.60	8.834E+000		1.529E+001	4.387E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96*	1.06	5.030E+002	7.79E+000	2.568E+002	2.494E+002
Pb214-XR	74.82	5.80	4.482E+001	2.61E+001	6.315E+001	2.225E+001
	77.11	9.70	2.610E+001		2.061E+001	1.296E+001
	87.35	2.24	1.018E+002		-2.205E+001	5.054E+001
	89.78	0.82	2.728E+002		1.184E+002	1.354E+002
Ra-226	186.21	3.64	4.446E+001	4.45E+001	-2.987E+001	2.203E+001
Ac-228	129.07	2.42	7.723E+001	1.08E+001	-2.296E+001	3.832E+001
	209.25	3.89	4.008E+001		2.046E+000	1.984E+001
	270.24	3.46	4.054E+001		6.646E+000	2.002E+001
	328.00	2.95	4.745E+001		-1.394E+001	2.338E+001
	338.32	11.27	1.311E+001		1.755E+000	6.464E+000
	409.46	1.92	7.266E+001		-1.187E+001	3.571E+001
	463.00	4.40	3.440E+001		-2.542E+000	1.690E+001
	794.95	4.25	5.677E+001		1.396E+001	2.788E+001
	911.20	25.80	1.076E+001		-9.113E+000	5.288E+000
	964.77	4.99	5.396E+001		1.099E+000	2.648E+001
	968.97	15.80	1.675E+001		-6.445E+000	8.215E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.357E+001		-5.880E+001	4.125E+001
	300.07	2.47	5.826E+001		4.329E+001	2.875E+001
	302.65	2.20	6.533E+001		5.019E+001	3.223E+001
	330.06	1.40	1.005E+002		-9.855E+000	4.953E+001
Th-234	92.38	2.13	1.024E+002	1.02E+002	-7.254E+001	5.084E+001
	92.80	2.10	1.037E+002		-7.344E+001	5.147E+001
	112.81	0.21	9.441E+002		5.794E+002	4.685E+002
U-235	143.76	10.96	1.594E+001	2.84E+000	1.116E+001	7.907E+000
	163.33	5.08	3.265E+001		-5.112E+001	1.618E+001
	185.71	57.20	2.845E+000		4.445E-002	1.410E+000
	202.11	1.08	1.424E+002		-4.888E+001	7.051E+001
	205.31	5.01	3.149E+001		9.581E+000	1.559E+001
Am-241	59.54	35.90	8.094E+000	8.09E+000	3.442E+000	4.012E+000

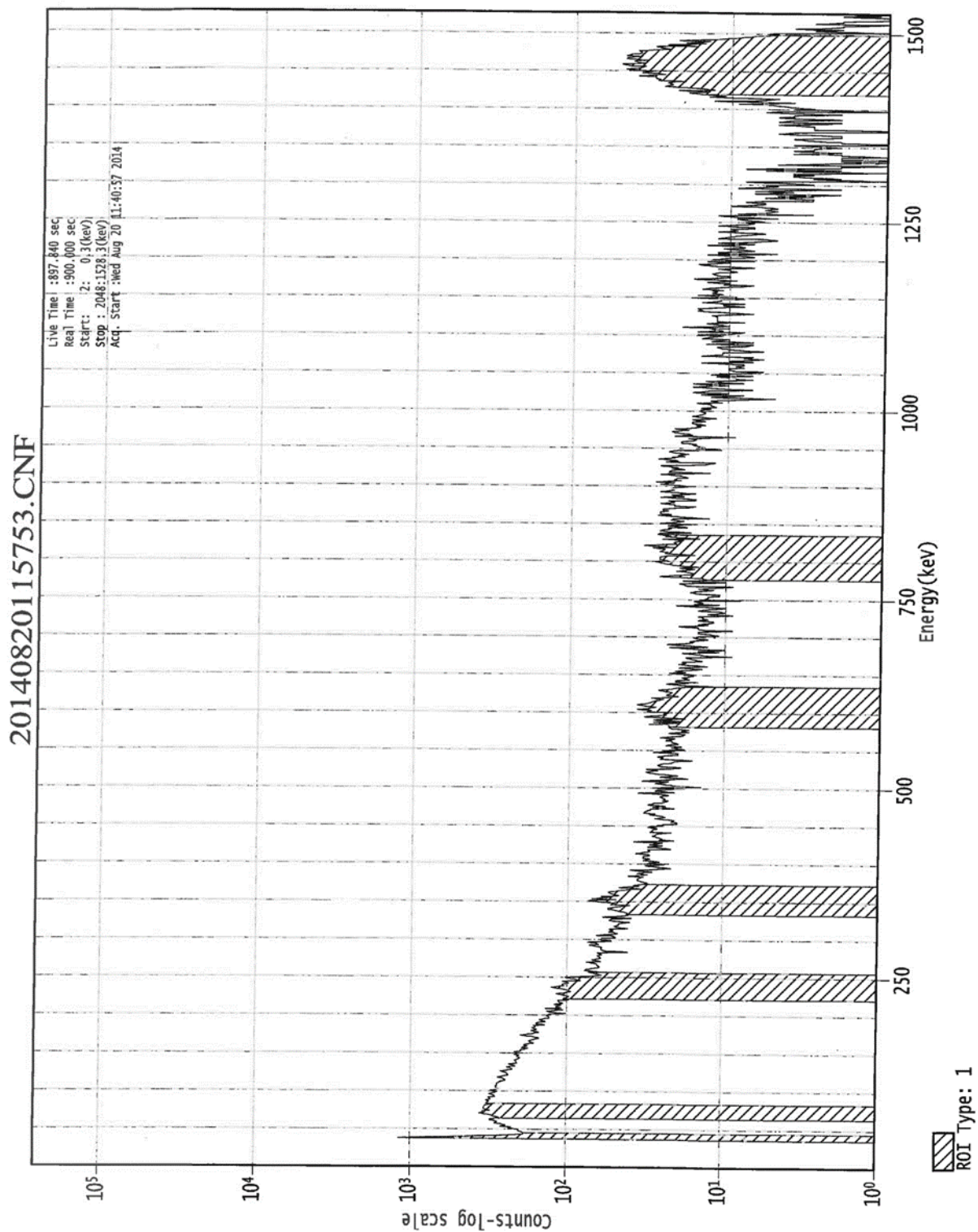
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S E   C T R U M   A N A L Y S I S      ***
*****

Filename: C:\Canberra\8-19-14\20140817170620.cnf

Report Generated On       : 8/19/2014   8:33:19 AM

Sample Title              : CHOS13
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Grams

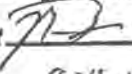
Sample Taken On           : 8/17/2014   4:47:05 PM
Acquisition Started      : 8/17/2014   4:47:05 PM

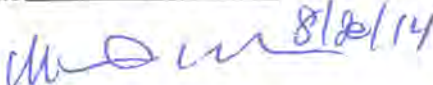
Live Time                 : 897.8 seconds
Real Time                 : 900.0 seconds

Dead Time                 : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID              : 1M_PAVER
```

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst 
Date 8-15-14

 8/26/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 8/19/2014 8:33:19 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: CHOS13
Peak Analysis Performed on: 8/19/2014 8:33:18 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.47	38.97	1.64	2.92E+003	222.04	1.64E+003
2	86-	114	100.45	74.24	3.37	5.94E+002	549.15	9.04E+003
3	298-	344	321.25	239.88	3.69	5.35E+002	320.17	3.66E+003
4	783-	854	818.93	612.49	2.80	2.15E+002	199.59	1.39E+003
5	1899-	2007	1953.16	1457.84	26.15	2.22E+003	159.05	5.92E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:33:19 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHOS13
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.636	34.70*	66.40	4.05285E+001	8.67303E+000
		788.70	33.60		
		1436.80*	66.40	8.83370E+001	9.49521E+000
K-40	0.997	1460.82*	10.66	5.50242E+002	6.19951E+001
Ru-106	0.979	621.93*	9.93	2.71891E+001	2.54253E+001
		1050.41	1.56		
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	7.34672E+000	4.55473E+000
		300.09	3.30		
Bi-214	0.999	609.32*	45.49	5.93509E+000	5.54343E+000
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:3:19 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.636	4.052850E+001	8.673025E+000
K-40	0.997	2.977941E+002	8.010375E+001
? Ru-106	0.979	2.718906E+001	2.542534E+001
Pb-212	1.000	7.346715E+000	4.554730E+000
? Bi-214	0.999	5.935092E+000	5.543434E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:33:18 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	74.24	6.6118E-001	92.51	Tol.	Pb212-XR Pb214-XR

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CHOS13
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.472E+000	4.47E+000	4.053E+001	2.217E+000
		788.70	33.60	6.879E+000		2.952E+000	3.376E+000
		1436.80*	66.40	8.516E+000		8.834E+001	4.204E+000
+	K-40	1460.82*	10.66	5.305E+001	5.30E+001	5.502E+002	2.619E+001
	Cr-51	320.08	9.91	1.416E+001	1.42E+001	-9.559E+000	6.981E+000
	Mn-54	834.85	99.98	2.662E+000	2.66E+000	9.233E+002	1.309E+000
	Co-58	810.76	99.45	2.604E+000	2.60E+000	2.283E+000	1.280E+000
	Co-60	1173.23	99.85	2.719E+000	1.51E+000	1.829E+000	1.330E+000
		1332.49	99.98	1.508E+000		-9.993E-001	7.206E-001
	Nb-94	702.65	99.81	1.767E+000	1.77E+000	-9.814E-001	8.643E-001
		871.09	99.89	2.719E+000		-1.359E+000	1.336E+000
	Sn-113	255.13	2.11	6.783E+001	2.15E+000	9.018E+000	3.352E+001
		391.70	64.97	2.152E+000		-4.881E-001	1.058E+000
	Cs-137	661.66	85.10	2.106E+000	2.11E+000	1.884E+004	1.032E+000
	Eu-152	121.78	28.67	6.954E+000	5.82E+000	-1.144E+000	3.452E+000
		244.70	7.61	1.996E+001		2.087E+001	9.873E+000
		295.94	0.45	3.234E+002		3.034E+002	1.596E+002
		344.28	26.60	5.823E+000		2.971E+000	2.873E+000
		367.79	0.86	1.670E+002		-1.862E+002	8.223E+001
		411.12	2.24	6.368E+001		5.513E+000	3.130E+001
		443.96	2.83	5.229E+001		-2.965E+000	2.569E+001
		488.68	0.42	3.674E+002		2.493E+002	1.804E+002
		563.99	0.49	3.366E+002		-1.473E+002	1.651E+002
		586.26	0.46	3.963E+002		-1.285E+002	1.946E+002
		678.62	0.47	3.794E+002		6.086E+001	1.858E+002
		688.67	0.86	2.105E+002		9.248E+001	1.031E+002
		719.35	0.28	6.263E+002		-1.183E+002	3.062E+002
		778.90	12.96	1.670E+001		-5.615E+000	8.189E+000
		810.45	0.32	8.064E+002		7.071E+002	3.964E+002
		867.37	4.26	6.456E+001		3.336E+001	3.174E+001
		919.33	0.43	6.548E+002		1.769E+002	3.218E+002
		964.08	14.65	1.831E+001		2.254E+000	8.984E+000
		1085.87	10.24	2.380E+001		-1.155E+001	1.163E+001
		1089.74	1.73	1.389E+002		-2.347E+002	6.785E+001
		1112.07	13.69	1.905E+001		3.318E+000	9.319E+000
		1212.95	1.43	1.855E+002		-6.488E+000	9.060E+001
		1249.94	0.19	1.215E+003		1.282E+002	5.908E+002
		1299.14	1.63	1.044E+002		-3.707E+001	5.022E+001
		1408.01	21.07	1.481E+001		-1.317E+001	7.239E+000
		1457.64	0.50	1.215E+003		7.031E+003	6.002E+002
		1528.10	0.28	3.571E+002		-1.101E+002	1.654E+002
	Eu-154	123.07	40.40	4.911E+000	4.91E+000	-8.219E-001	2.438E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	2.162E+001	4.91E+000	-8.447E-001	1.069E+001
		591.76	4.95	3.847E+001		-1.467E+000	1.890E+001
		692.42	1.78	1.015E+002		5.449E+001	4.970E+001
		723.30	20.06	8.741E+000		5.271E+000	4.272E+000
		756.80	4.52	4.147E+001		-1.366E+001	2.028E+001
		873.18	12.08	2.255E+001		-4.697E+000	1.108E+001
		996.29	10.48	2.360E+001		-3.735E+000	1.155E+001
		1004.76	18.01	1.339E+001		-1.045E+001	6.552E+000
		1274.43	34.80	5.660E+000		4.443E-001	2.738E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.119E+002	7.84E+000	5.469E+001	1.050E+002
		60.01	1.22	2.382E+002		7.439E+001	1.181E+002
		86.55	30.70	7.842E+000		1.372E+000	3.894E+000
		105.31	21.10	1.023E+001		-9.463E-001	5.081E+000
	Tl-208	583.19	85.00	2.138E+000	2.14E+000	2.655E-001	1.050E+000
	Bi-211	351.07	13.02	1.187E+001	1.19E+001	1.686E+001	5.857E+000
	Pb-211	404.85	3.78	3.713E+001	3.71E+001	-1.428E+001	1.825E+001
		427.09	1.76	8.115E+001		-6.111E+001	3.987E+001
		832.01	3.52	7.504E+001		-7.256E+001	3.689E+001
	Bi-212	39.86	1.06	2.707E+002	2.59E+001	2.570E+003	1.342E+002
		727.33	6.67	2.585E+001		-2.500E+000	1.263E+001
		785.37	1.10	2.029E+002		-1.900E+002	9.955E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.349E+002	7.19E+000	2.810E+001	1.662E+002
		238.63*	43.60	7.195E+000		7.347E+000	3.579E+000
		300.09	3.30	4.299E+001		2.238E+001	2.121E+001
	Pb212-XR	74.82	10.28	2.611E+001	1.53E+001	1.955E+001	1.296E+001
		77.11	17.10	1.529E+001		1.811E+000	7.589E+000
		87.35	3.97	6.009E+001		2.082E+000	2.984E+001
		89.78	1.46	1.597E+002		3.405E+001	7.929E+001
+	Bi-214	609.32*	45.49	9.019E+000	9.02E+000	5.935E+000	4.472E+000
		768.36	4.89	4.067E+001		4.158E-001	1.991E+001
		806.18	1.26	2.021E+002		2.485E+002	9.936E+001
		934.06	3.11	9.035E+001		-4.182E+001	4.439E+001
		1120.29	14.92	1.791E+001		7.306E+000	8.762E+000
		1155.21	1.63	1.656E+002		-1.122E+002	8.101E+001
		1238.12	5.83	4.225E+001		1.841E+001	2.059E+001
		1280.98	1.43	1.334E+002		-3.115E+001	6.448E+001
		1377.67	3.99	4.042E+001		-5.790E+001	1.935E+001
		1385.31	0.79	2.273E+002		-5.636E+002	1.093E+002
		1401.52	1.33	1.959E+002		-2.732E+002	9.536E+001
		1407.99	2.39	1.303E+002		-1.159E+002	6.371E+001
		1509.21	2.13	1.031E+002		-9.391E+000	4.980E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.121E+001	4.34E+000	2.697E+001	1.049E+001
		295.22	18.42	7.887E+000		9.522E+000	3.892E+000
		351.93	35.60	4.343E+000		5.997E+000	2.142E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.115E+002	4.34E+000	-2.039E+002	1.037E+002
Pb214-XR	74.82	5.80	4.628E+001	2.70E+001	3.466E+001	2.297E+001
	77.11	9.70	2.695E+001		3.193E+000	1.338E+001
	87.35	2.24	1.065E+002		3.689E+000	5.288E+001
	89.78	0.82	2.844E+002		6.063E+001	1.412E+002
Ra-226	186.21	3.64	4.451E+001	4.45E+001	6.137E+000	2.205E+001
Ac-228	129.07	2.42	8.019E+001	1.07E+001	8.570E+000	3.980E+001
	209.25	3.89	4.044E+001		1.046E+001	2.003E+001
	270.24	3.46	4.117E+001		-1.057E+001	2.033E+001
	328.00	2.95	4.809E+001		-1.265E+001	2.370E+001
	338.32	11.27	1.329E+001		1.050E+001	6.556E+000
	409.46	1.92	7.417E+001		2.640E+001	3.646E+001
	463.00	4.40	3.350E+001		-1.735E+001	1.645E+001
	794.95	4.25	5.628E+001		2.221E+001	2.764E+001
	911.20	25.80	1.068E+001		-3.002E+000	5.247E+000
	964.77	4.99	5.373E+001		8.903E+000	2.636E+001
	968.97	15.80	1.689E+001		1.003E+001	8.283E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.416E+001		-1.886E+001	4.154E+001
	300.07	2.47	5.744E+001		2.991E+001	2.834E+001
	302.65	2.20	6.424E+001		4.957E+000	3.169E+001
	330.06	1.40	1.020E+002		-2.501E+001	5.026E+001
Th-234	92.38	2.13	1.072E+002	1.07E+002	9.961E+000	5.323E+001
	92.80	2.10	1.086E+002		1.009E+001	5.390E+001
	112.81	0.21	9.693E+002		3.266E+002	4.811E+002
U-235	143.76	10.96	1.631E+001	2.85E+000	1.899E+000	8.093E+000
	163.33	5.08	3.336E+001		1.896E+001	1.654E+001
	185.71	57.20	2.848E+000		2.672E+000	1.411E+000
	202.11	1.08	1.428E+002		-5.308E+001	7.069E+001
	205.31	5.01	3.167E+001		-1.210E+001	1.568E+001
Am-241	59.54	35.90	8.191E+000	8.19E+000	2.558E+000	4.061E+000

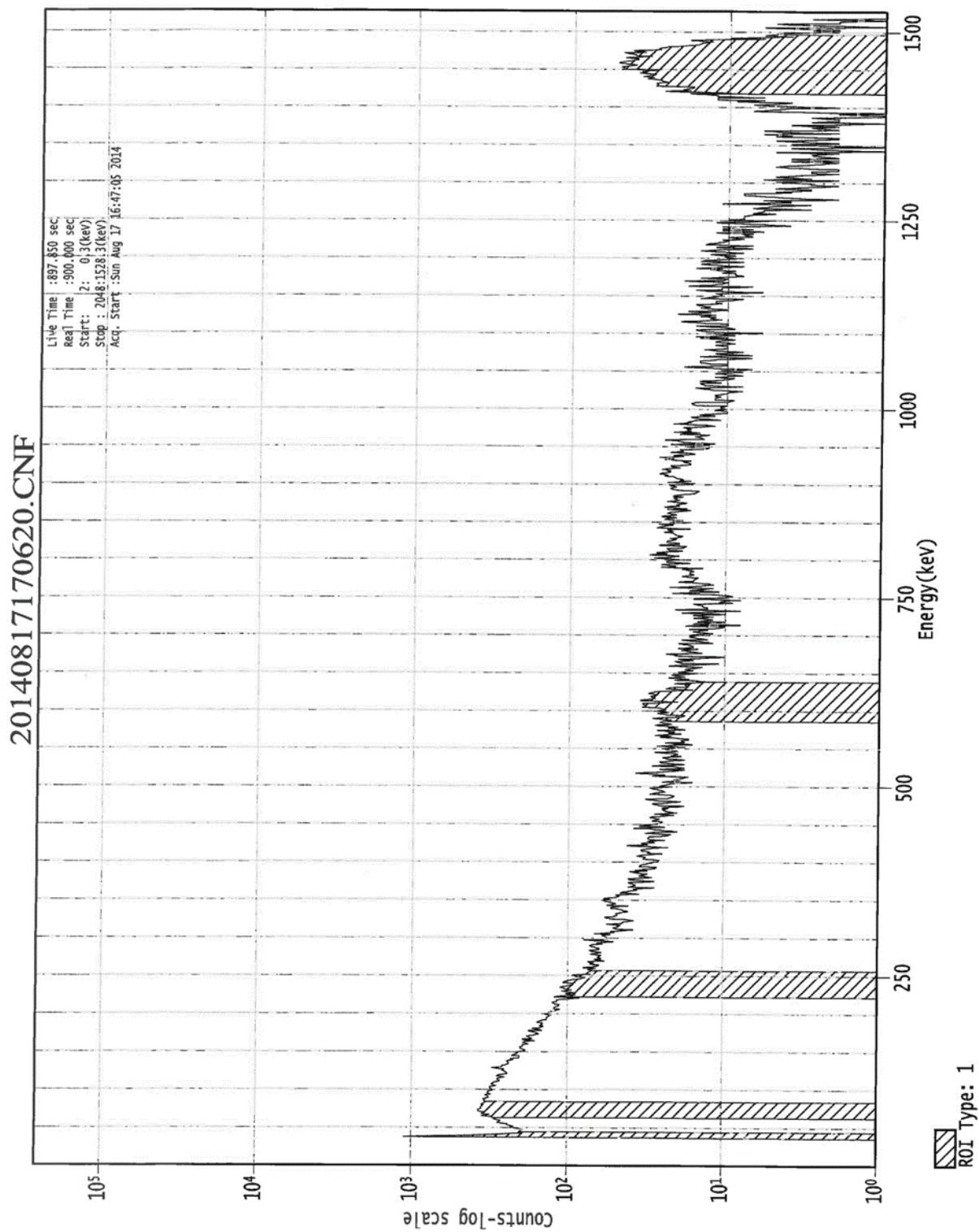
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S P   C T R U M   A N A L Y S _ S      ***
*****

Filename: C:\Canberra\8-24-14\20140820114031.cnf

Report Generated On       : 8/27/2014  12:11:32 PM

Sample Title              : CH0514
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Gram

Sample Taken On           : 8/20/2014  11:03:41 AM
Acquisition Started      : 8/20/2014  11:03:41 AM

Live Time                 : 897.8 seconds
Dead Time                 : 900.0 seconds

Load Time                 : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID               : 1M_PAVER
```

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst
Date 8-27-14

 8/27/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report

8/27/2014 12:11:32 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: CH0514

Peak Analysis Performed on: 8/27/2014 12:11:31 PM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.53	39.02	1.84	3.18E+003	241.10	1.99E+003
2	297-	343	320.88	239.60	0.85	6.11E+002	326.75	3.80E+003
3	370-	420	395.44	295.50	0.95	2.90E+002	281.00	2.64E+003
4	445-	501	473.42	353.92	1.17	3.10E+002	266.37	2.15E+003
5	783-	855	819.37	612.82	1.11	2.59E+002	201.61	1.40E+003
6	1025-	1106	1066.08	797.15	0.98	2.63E+002	199.63	1.25E+003
7	1902-	2011	1956.95	1460.65	26.61	2.20E+003	160.85	6.04E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 12:11:32 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CH0514
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.932	34.70*	66.40	4.42426E+001	9.46156E+000
		788.70*	33.60	1.23919E+001	9.50694E+000
		1436.80*	66.40	8.76781E+001	9.51167E+000
K-40	1.000	1460.82*	10.66	5.46138E+002	6.20516E+001
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	8.38114E+000	4.68444E+000
Bi-214	0.998	300.09*	3.30	6.08245E+001	5.97044E+001
		609.32*	45.49	7.14741E+000	5.62192E+000
Pb-214	0.999	768.36	4.89		
		806.18*	1.26	3.29405E+002	2.52729E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
Pb-214	0.999	1847.43	2.03		
		2118.51	1.16		
		241.99*	7.25	5.03955E+001	2.81445E+001
		295.22*	18.42	1.08969E+001	1.06931E+001
Pb-214	0.999	351.93*	35.60	6.83068E+000	5.96690E+000
		785.96*	1.06	3.92800E+002	3.02171E+002

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 12:11:32 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.932	2.814876E+001	6.707649E+000
	K-40	1.000	3.708021E+002	7.249758E+001
X	Co-58	0.949		
X	Ba-133	0.577		
X	Bi-211	0.998		
	Pb-212	0.999	7.242415E+000	4.782182E+000
	Bi-214	0.998	6.933677E+000	5.621001E+000
	Pb-214	0.999	7.317983E+000	5.250439E+000
X	Th-227	0.711		
X	Ac-228	0.336		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/27/2014 12:11:31 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

8/27/2014 12:11 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CH0514
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.908E+000	4.91E+000	4.424E+001	2.435E+000
		788.70*	33.60	1.537E+001		1.239E+001	7.623E+000
		1436.80*	66.40	8.698E+000		8.768E+001	4.295E+000
+	K-40	1460.82*	10.66	5.418E+001	5.42E+001	5.461E+002	2.675E+001
	Cr-51	320.08	9.91	1.421E+001	1.42E+001	-2.638E+000	7.006E+000
	Mn-54	834.85	99.98	2.742E+000	2.74E+000	3.073E-001	1.349E+000
	Co-58	810.76*	99.45	5.194E+000	5.19E+000	4.187E+000	2.575E+000
	Co-60	1173.23	99.85	2.657E+000	1.53E+000	1.612E+000	1.299E+000
		1332.49	99.98	1.531E+000		-2.601E-001	7.319E-001
	Nb-94	702.65	99.81	1.764E+000	1.76E+000	-1.382E+000	8.631E-001
		871.09	99.89	2.790E+000		4.384E-001	1.372E+000
	Sn-113	255.13	2.11	6.889E+001	2.15E+000	6.242E-001	3.405E+001
		391.70	64.97	2.149E+000		1.343E+000	1.057E+000
	Cs-137	661.66	85.10	2.111E+000	2.11E+000	7.625E-003	1.034E+000
	Eu-152	121.78	28.67	7.039E+000	5.85E+000	-3.727E+000	3.494E+000
		244.70	7.61	2.053E+001		1.890E+001	1.016E+001
		295.94	0.45	3.318E+002		4.283E+002	1.638E+002
		344.28	26.60	5.847E+000		7.956E-001	2.885E+000
		367.79	0.86	1.695E+002		-9.296E+000	8.348E+001
		411.12	2.24	6.230E+001		-3.403E+001	3.061E+001
		443.96	2.83	5.148E+001		-6.778E+000	2.528E+001
		488.68	0.42	3.673E+002		-1.964E+002	1.803E+002
		563.99	0.49	3.486E+002		8.769E+001	1.711E+002
		586.26	0.46	4.060E+002		1.087E+002	1.994E+002
		678.62	0.47	3.835E+002		4.359E+002	1.878E+002
		688.67	0.86	2.078E+002		-4.194E+001	1.017E+002
		719.35	0.28	6.404E+002		5.088E+002	3.132E+002
		778.90	12.96	1.627E+001		-3.149E+000	7.974E+000
		810.45	0.32	8.223E+002		-1.540E+001	4.044E+002
		867.37	4.26	6.546E+001		4.449E-002	3.219E+001
		919.33	0.43	6.433E+002		-1.480E+002	3.160E+002
		964.08	14.65	1.874E+001		1.576E+000	9.196E+000
		1085.87	10.24	2.282E+001		-2.341E+001	1.114E+001
		1089.74	1.73	1.383E+002		-6.217E+001	6.752E+001
		1112.07	13.69	1.847E+001		7.612E+000	9.027E+000
		1212.95	1.43	1.843E+002		4.341E+001	9.000E+001
		1249.94	0.19	1.269E+003		8.568E+002	6.180E+002
		1299.14	1.63	1.113E+002		7.353E+001	5.366E+001
		1408.01	21.07	1.356E+001		-1.602E+001	6.616E+000
		1457.64	0.50	1.206E+003		6.614E+003	5.958E+002
		1528.10	0.28	3.927E+002		-2.704E+002	1.831E+002
	Eu-154	123.07	40.40	4.979E+000	4.98E+000	1.671E+000	2.471E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	2.226E+001	4.98E+000	2.079E-001	1.101E+001
		591.76	4.95	3.867E+001		4.176E+000	1.901E+001
		692.42	1.78	9.990E+001		-3.348E+001	4.889E+001
		723.30	20.06	8.886E+000		5.106E+000	4.345E+000
		756.80	4.52	3.977E+001		-1.924E+001	1.943E+001
		873.18	12.08	2.311E+001		6.938E+000	1.136E+001
		996.29	10.48	2.452E+001		-1.563E+001	1.201E+001
		1004.76	18.01	1.405E+001		3.670E+000	6.881E+000
		1274.43	34.80	6.024E+000		2.529E+000	2.920E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.295E+002	7.98E+000	-4.886E+001	1.138E+002
		60.01	1.22	2.531E+002		2.667E+001	1.255E+002
		86.55	30.70	7.983E+000		4.316E+000	3.964E+000
		105.31	21.10	1.027E+001		-2.978E+000	5.101E+000
	Tl-208	583.19	85.00	2.146E+000	2.15E+000	-2.084E-001	1.054E+000
	Bi-211	351.07*	13.02	2.632E+001	2.63E+001	1.868E+001	1.308E+001
	Pb-211	404.85	3.78	3.689E+001	3.69E+001	-8.281E+000	1.813E+001
		427.09	1.76	7.958E+001		7.576E+000	3.908E+001
		832.01	3.52	7.708E+001		-3.696E+000	3.791E+001
	Bi-212	39.86	1.06	2.869E+002	2.67E+001	2.624E+003	1.423E+002
		727.33	6.67	2.674E+001		1.272E+001	1.307E+001
		785.37	1.10	2.032E+002		5.439E-001	9.967E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.404E+002	7.33E+000	1.861E+001	1.690E+002
		238.63*	43.60	7.329E+000		8.381E+000	3.646E+000
		300.09*	3.30	9.672E+001		6.082E+001	4.808E+001
	Pb212-XR	74.82	10.28	2.667E+001	1.56E+001	1.669E+001	1.324E+001
		77.11	17.10	1.563E+001		1.604E+001	7.759E+000
		87.35	3.97	6.102E+001		3.334E+001	3.030E+001
		89.78	1.46	1.615E+002		-8.239E+001	8.020E+001
+	Bi-214	609.32*	45.49	9.097E+000	9.10E+000	7.147E+000	4.511E+000
		768.36	4.89	3.927E+001		-8.866E-001	1.921E+001
		806.18*	1.26	4.087E+002		3.294E+002	2.026E+002
		934.06	3.11	9.065E+001		1.547E+001	4.453E+001
		1120.29	14.92	1.726E+001		1.089E+001	8.439E+000
		1155.21	1.63	1.623E+002		1.082E+001	7.934E+001
		1238.12	5.83	4.370E+001		2.305E+001	2.132E+001
		1280.98	1.43	1.387E+002		-1.259E+002	6.708E+001
		1377.67	3.99	3.601E+001		-9.309E+001	1.715E+001
		1385.31	0.79	2.059E+002		-3.549E+002	9.861E+001
		1401.52	1.33	1.819E+002		-2.893E+002	8.836E+001
		1407.99	2.39	1.194E+002		-1.410E+002	5.823E+001
		1509.21	2.13	1.218E+002		-3.543E+001	5.916E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99*	7.25	4.407E+001	9.62E+000	5.040E+001	2.192E+001
		295.22*	18.42	1.733E+001		1.090E+001	8.613E+000
		351.93*	35.60	9.624E+000		6.831E+000	4.782E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	Pb-214	785.96*	1.06	4.873E+002	9.62E+000	3.928E+002	2.416E+002
	Pb214-XR	74.82	5.80	4.727E+001	2.75E+001	2.958E+001	2.347E+001
		77.11	9.70	2.755E+001		2.827E+001	1.368E+001
		87.35	2.24	1.081E+002		5.910E+001	5.370E+001
		89.78	0.82	2.876E+002		-1.467E+002	1.428E+002
	Ra-226	186.21	3.64	4.520E+001	4.52E+001	1.983E+001	2.240E+001
	Ac-228	129.07	2.42	8.101E+001	1.06E+001	3.943E+001	4.021E+001
		209.25	3.89	4.140E+001		5.623E+001	2.051E+001
		270.24	3.46	4.110E+001		2.074E+001	2.029E+001
		328.00	2.95	4.764E+001		-9.013E+000	2.348E+001
		338.32*	11.27	3.040E+001		2.158E+001	1.511E+001
		409.46	1.92	7.263E+001		-8.963E+000	3.569E+001
		463.00	4.40	3.377E+001		-1.982E+001	1.658E+001
		794.95*	4.25	1.215E+002		9.797E+001	6.027E+001
		911.20	25.80	1.061E+001		-7.042E+000	5.213E+000
		964.77	4.99	5.470E+001		-2.347E+001	2.685E+001
		968.97	15.80	1.721E+001		-7.019E+000	8.447E+000
>	Pa-231	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
		27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
		283.69	1.70	8.558E+001		1.693E+000	4.225E+001
		300.07	2.47	6.016E+001		1.048E+002	2.970E+001
		302.65	2.20	6.684E+001		-5.372E+000	3.299E+001
		330.06	1.40	1.017E+002		6.362E+001	5.011E+001
	Th-234	92.38	2.13	1.081E+002	1.08E+002	3.166E+001	5.365E+001
		92.80	2.10	1.094E+002		3.205E+001	5.431E+001
		112.81	0.21	9.849E+002		7.439E+002	4.889E+002
@	U-235	143.76	10.96	1.667E+001	2.88E+000	7.841E+000	8.269E+000
		163.33	5.08	3.378E+001		4.907E+000	1.675E+001
		185.71	57.20	2.875E+000		-2.036E-001	1.425E+000
		202.11	1.08	1.473E+002		-7.986E+001	7.293E+001
		205.31	5.01	3.251E+001		1.115E+001	1.610E+001
	Am-241	59.54	35.90	8.704E+000	8.70E+000	9.173E-001	4.317E+000

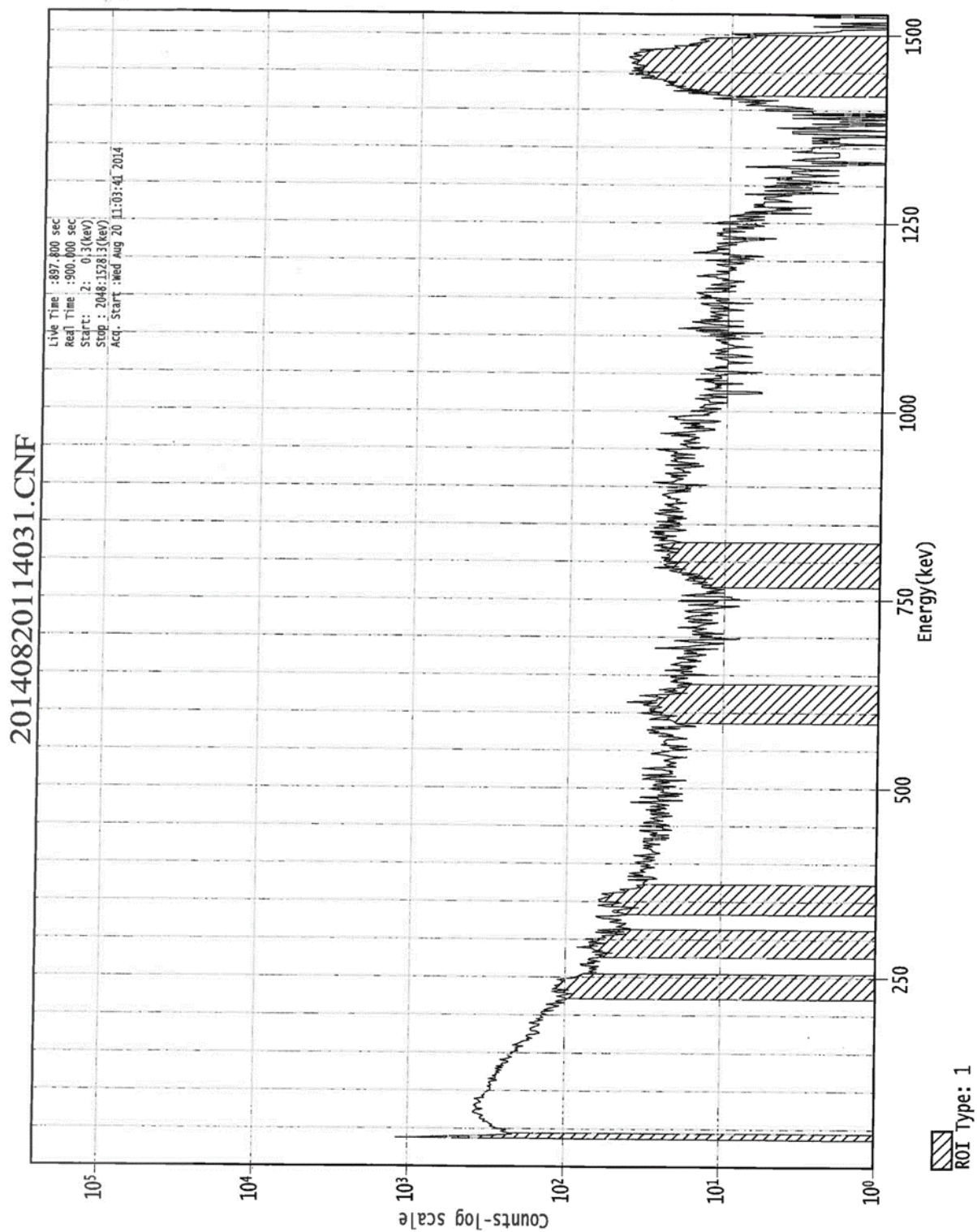
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A   S E L E C T R U M   A N A L Y S I S      ***
*****

Filename: C:\Canberra\8-24-14\20140820110135.cnf

Report Generated On       : 8/27/2014  11:59:29 AM

Sample Title              : CH0515
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 Gram

Sample Taken On           : 8/20/2014  11:00:09 AM
Acquisition Started       : 8/20/2014  11:00:09 AM

Live Time                 : 897.8 seconds
Dead Time                 : 900.0 seconds

Background Time           : 0.25 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID              : 1M_PAVER
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst JS

Date 8-27-14

msm 8/22/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report

8/27/2014 11:59:29 AM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: CH0515

Peak Analysis Performed on: 8/27/2014 11:59:29 AM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.58	39.05	1.70	3.22E+003	240.66	1.98E+003
2	297-	343	320.44	239.28	2.34	4.56E+002	352.14	4.45E+003
3	445-	500	472.57	353.29	1.16	6.93E+002	261.38	2.05E+003
4	1032-	1114	1073.47	802.67	1.82	3.09E+002	210.40	1.36E+003
5	1899-	2007	1953.62	1458.18	9.24	2.27E+003	155.61	5.37E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 11:29 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CH0515
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.937	34.70*	66.40	4.48060E+001	9.56491E+000
		788.70*	33.60	1.46446E+001	1.01058E+001
		1436.80*	66.40	9.03580E+001	9.52731E+000
K-40	0.998	1460.82*	10.66	5.62831E+002	6.23142E+001
Pb-214	0.510	241.99*	7.25	3.76203E+001	2.96502E+001
		295.22	18.42		
		351.93*	35.60	1.52385E+001	6.24346E+000
		785.96*	1.06	4.64207E+002	3.21410E+002

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/27/2014 11:59:29 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.937	3.031549E+001	6.947351E+000
K-40	0.998	3.739987E+002	7.344688E+001
X Co-58	0.982		
X Ba-133	0.351		
X Bi-211	0.999		
X Pb-212	1.000		
Pb-214	0.510	1.600222E+001	6.108624E+000
X Th-227	0.999		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/27/2014 11:59:29 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

8/27/2014 11:50:29 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: CH0515
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.888E+000	4.89E+000	4.481E+001	2.425E+000
		788.70*	33.60	1.628E+001		1.464E+001	8.075E+000
		1436.80*	66.40	8.184E+000		9.036E+001	4.038E+000
+	K-40	1460.82*	10.66	5.098E+001	5.10E+001	5.628E+002	2.515E+001
	Cr-51	320.08	9.91	1.473E+001	1.47E+001	-7.620E-001	7.266E+000
	Mn-54	834.85	99.98	2.693E+000	2.69E+000	3.379E-001	1.324E+000
	Co-58	810.76*	99.45	5.500E+000	5.50E+000	4.948E+000	2.728E+000
	Co-60	1173.23	99.85	2.627E+000	1.52E+000	-1.080E+000	1.283E+000
		1332.49	99.98	1.522E+000		-1.625E+000	7.274E-001
	Nb-94	702.65	99.81	1.838E+000	1.84E+000	-1.255E+000	9.000E-001
		871.09	99.89	2.824E+000		1.535E+000	1.389E+000
	Sn-113	255.13	2.11	7.349E+001	2.26E+000	-7.579E-001	3.635E+001
		391.70	64.97	2.259E+000		-3.449E-001	1.112E+000
	Cs-137	661.66	85.10	2.155E+000	2.16E+000	-2.682E-001	1.056E+000
	Eu-152	121.78	28.67	7.409E+000	6.13E+000	3.104E+000	3.679E+000
		244.70	7.61	2.157E+001		2.988E+001	1.068E+001
		295.94	0.45	3.405E+002		1.086E+002	1.682E+002
		344.28	26.60	6.129E+000		-6.010E-003	3.025E+000
		367.79	0.86	1.789E+002		-8.356E+001	8.818E+001
		411.12	2.24	6.694E+001		2.695E+001	3.293E+001
		443.96	2.83	5.409E+001		-1.391E+001	2.659E+001
		488.68	0.42	3.984E+002		1.781E+002	1.959E+002
		563.99	0.49	3.595E+002		-3.519E+002	1.765E+002
		586.26	0.46	4.295E+002		-5.603E+002	2.112E+002
		678.62	0.47	3.867E+002		2.137E+001	1.894E+002
		688.67	0.86	2.162E+002		-5.975E+001	1.059E+002
		719.35	0.28	6.680E+002		3.512E+002	3.270E+002
		778.90	12.96	1.677E+001		-4.140E+000	8.222E+000
		810.45	0.32	8.345E+002		6.566E+002	4.105E+002
		867.37	4.26	6.586E+001		1.528E+001	3.239E+001
		919.33	0.43	6.688E+002		6.641E+002	3.288E+002
		964.08	14.65	1.877E+001		-3.507E+000	9.215E+000
		1085.87	10.24	2.393E+001		-1.173E+001	1.170E+001
		1089.74	1.73	1.432E+002		2.440E+001	6.999E+001
		1112.07	13.69	1.952E+001		1.554E+001	9.550E+000
		1212.95	1.43	1.882E+002		6.550E+001	9.196E+001
		1249.94	0.19	1.284E+003		3.012E+002	6.253E+002
		1299.14	1.63	1.148E+002		3.647E+001	5.540E+001
		1408.01	21.07	1.423E+001		-1.874E+001	6.950E+000
		1457.64	0.50	1.202E+003		6.195E+003	5.938E+002
		1528.10	0.28	3.754E+002		-3.228E+002	1.745E+002
	Eu-154	123.07	40.40	5.201E+000	5.20E+000	-4.057E+000	2.583E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	Eu-154	247.93	6.89	2.351E+001	5.20E+000	-1.926E+000	1.163E+001
		591.76	4.95	4.164E+001		1.773E+000	2.049E+001
		692.42	1.78	1.040E+002		-8.728E+001	5.093E+001
		723.30	20.06	9.274E+000		4.348E-001	4.539E+000
		756.80	4.52	4.314E+001		7.240E-001	2.112E+001
		873.18	12.08	2.326E+001		-3.380E+000	1.144E+001
		996.29	10.48	2.445E+001		4.033E+000	1.198E+001
		1004.76	18.01	1.399E+001		7.956E+000	6.849E+000
		1274.43	34.80	5.990E+000		-7.322E+000	2.903E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.316E+002	8.35E+000	-2.355E+001	1.148E+002
		60.01	1.22	2.598E+002		4.992E+001	1.289E+002
		86.55	30.70	8.349E+000		-7.366E-001	4.147E+000
		105.31	21.10	1.086E+001		2.842E-002	5.393E+000
	Tl-208	583.19	85.00	2.299E+000	2.30E+000	-1.563E+000	1.130E+000
	Bi-211	351.07*	13.02	2.548E+001	2.55E+001	4.167E+001	1.266E+001
	Pb-211	404.85	3.78	3.943E+001	3.94E+001	-1.200E+001	1.940E+001
		427.09	1.76	8.432E+001		2.314E+000	4.145E+001
		832.01	3.52	7.590E+001		3.576E+000	3.732E+001
	Bi-212	39.86	1.06	2.880E+002	2.79E+001	2.769E+003	1.428E+002
		727.33	6.67	2.786E+001		-1.410E+001	1.363E+001
		785.37	1.10	2.102E+002		7.332E+000	1.032E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.561E+002	7.92E+000	6.002E+001	1.768E+002
		238.63*	43.60	7.921E+000		6.257E+000	3.942E+000
		300.09	3.30	4.598E+001		5.094E+001	2.270E+001
	Pb212-XR	74.82	10.28	2.771E+001	1.62E+001	1.929E+001	1.376E+001
		77.11	17.10	1.620E+001		1.489E+000	8.044E+000
		87.35	3.97	6.379E+001		-2.518E+001	3.169E+001
		89.78	1.46	1.699E+002		-7.373E+000	8.437E+001
	Bi-214	609.32	45.49	4.746E+000	4.75E+000	5.716E+000	2.336E+000
		768.36	4.89	4.216E+001		6.833E+000	2.066E+001
		806.18	1.26	2.093E+002		2.510E+002	1.029E+002
		934.06	3.11	9.131E+001		-6.683E+001	4.486E+001
		1120.29	14.92	1.803E+001		5.055E+000	8.824E+000
		1155.21	1.63	1.624E+002		-1.631E+002	7.940E+001
		1238.12	5.83	4.398E+001		3.845E+001	2.146E+001
		1280.98	1.43	1.420E+002		-5.883E+001	6.873E+001
		1377.67	3.99	4.186E+001		-2.919E+001	2.007E+001
		1385.31	0.79	2.283E+002		-4.208E+002	1.098E+002
		1401.52	1.33	1.913E+002		-3.865E+002	9.302E+001
		1407.99	2.39	1.252E+002		-1.649E+002	6.116E+001
		1509.21	2.13	1.210E+002		-5.465E+001	5.878E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99*	7.25	4.763E+001	8.31E+000	3.762E+001	2.370E+001
		295.22	18.42	8.306E+000		4.357E+000	4.102E+000
		351.93*	35.60	9.320E+000		1.524E+001	4.630E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	Pb-214	785.96*	1.06	5.160E+002	8.31E+000	4.642E+002	2.560E+002
	Pb214-XR	74.82	5.80	4.912E+001	2.86E+001	3.418E+001	2.439E+001
		77.11	9.70	2.855E+001		2.625E+000	1.418E+001
		87.35	2.24	1.131E+002		-4.462E+001	5.616E+001
		89.78	0.82	3.024E+002		-1.313E+001	1.502E+002
	Ra-226	186.21	3.64	4.798E+001	4.80E+001	3.210E+001	2.379E+001
	Ac-228	129.07	2.42	8.503E+001	1.11E+001	3.179E+000	4.222E+001
		209.25	3.89	4.285E+001		-7.166E+000	2.123E+001
		270.24	3.46	4.485E+001		8.145E-001	2.217E+001
		328.00	2.95	4.921E+001		-6.815E+000	2.427E+001
		338.32	11.27	1.371E+001		1.171E+000	6.763E+000
		409.46	1.92	7.797E+001		6.175E+000	3.836E+001
		463.00	4.40	3.625E+001		-4.827E+000	1.782E+001
		794.95	4.25	5.846E+001		7.971E+001	2.873E+001
		911.20	25.80	1.109E+001		9.738E+000	5.453E+000
		964.77	4.99	5.518E+001		-5.921E+000	2.708E+001
		968.97	15.80	1.738E+001		4.358E+000	8.528E+000
		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
>	Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
		283.69	1.70	8.984E+001		-8.583E+001	4.439E+001
		300.07	2.47	6.143E+001		6.805E+001	3.033E+001
		302.65	2.20	6.861E+001		1.049E+002	3.387E+001
		330.06	1.40	1.048E+002		3.691E+001	5.169E+001
	Th-234	92.38	2.13	1.140E+002	1.14E+002	-1.568E+001	5.663E+001
		92.80	2.10	1.154E+002		-1.588E+001	5.734E+001
		112.81	0.21	1.024E+003		-4.400E+002	5.083E+002
	U-235	143.76	10.96	1.732E+001	3.06E+000	-6.798E+000	8.593E+000
		163.33	5.08	3.558E+001		-3.820E+000	1.765E+001
		185.71	57.20	3.061E+000		2.424E+000	1.518E+000
		202.11	1.08	1.529E+002		-3.250E+001	7.577E+001
		205.31	5.01	3.379E+001		7.563E+000	1.674E+001
	Am-241	59.54	35.90	8.934E+000	8.93E+000	1.717E+000	4.432E+000

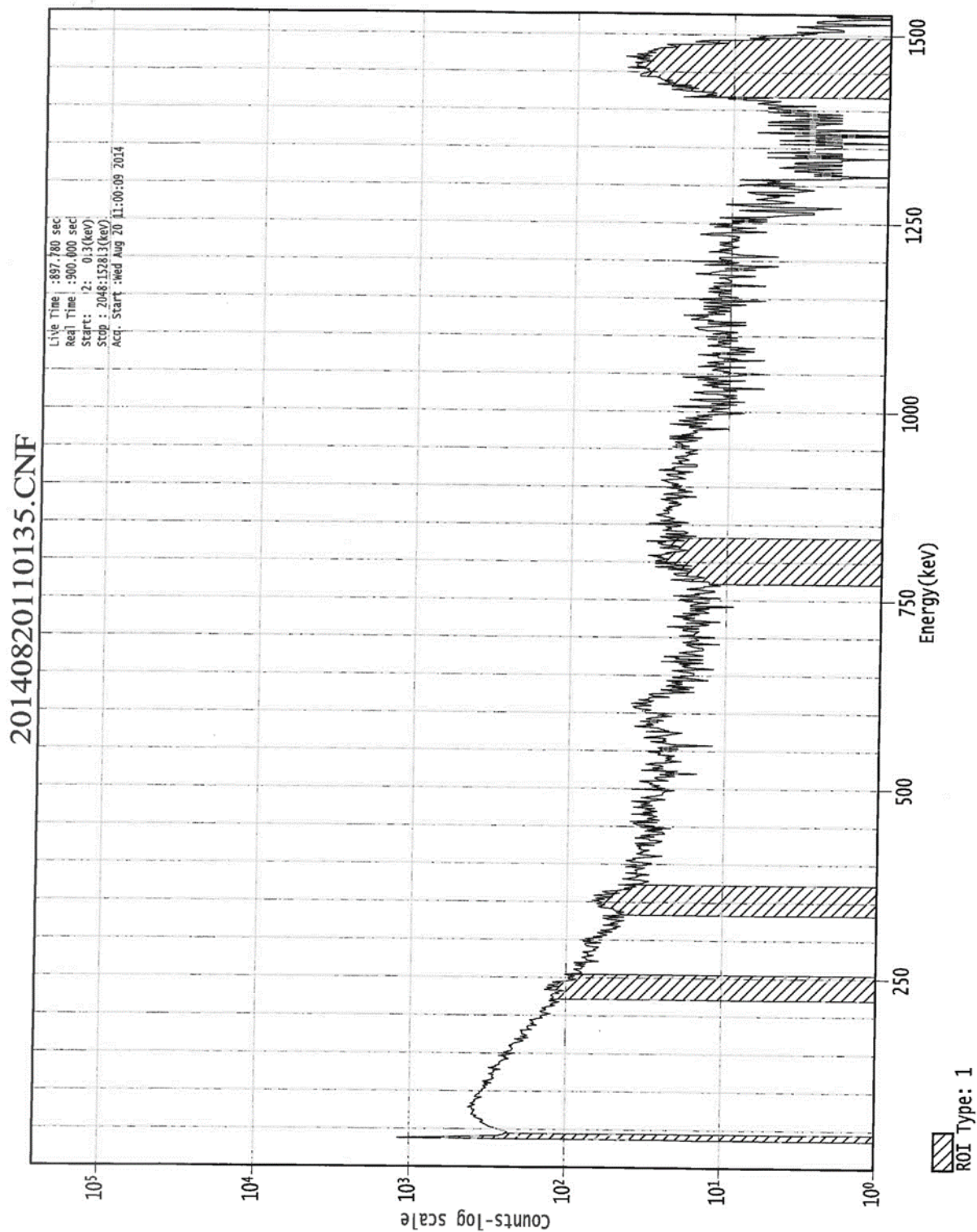
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\8-19-14\20140817183016.cnf

Report Generated On : 8/19/2014 8:35:55 AM

Sample Title : CHO16
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Grams

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 8/17/2014 6:15:01 PM
Acquisition Started : 8/17/2014 6:15:01 PM

Live Time : 897.9 seconds
Dead Time : 900.0 seconds

Background Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst
Date 8-19-14

du 8/20/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report

8/19/2014 8:35:55 AM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: CH016

Peak Analysis Performed on: 8/19/2014 8:35:54 AM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.46	38.96	1.80	2.84E+003	214.43	1.49E+003
2	298-	344	321.73	240.24	3.42	2.93E+002	314.50	3.56E+003
3	441-	495	468.46	350.21	3.29	4.65E+002	239.09	1.76E+003
4	781-	852	817.06	611.09	0.78	2.95E+002	189.90	1.25E+003
5	1899-	2008	1954.01	1458.47	27.14	2.24E+003	172.98	7.47E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8:55 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: CHO16
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.633	34.70*	66.40	3.94952E+001	8.44226E+000
		788.70	33.60		
K-40	0.998	1436.80*	66.40	8.92397E+001	9.92816E+000
		1460.82*	10.66		
Ru-106	0.972	621.93*	9.93	3.71610E+001	2.43844E+001
		1050.41	1.56		
Bi-214	1.000	609.32*	45.49	8.11187E+000	5.30989E+000
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
Pb-214	0.511	1764.49	15.30	2.42470E+001	2.62854E+001
		1847.43	2.03		
		2118.51	1.16		
		241.99*	7.25		
		295.22	18.42		
		351.93*	35.60	1.01556E+001	5.46875E+000
		785.96	1.06		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/19/2014 8 5:55 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
LaBr3	0.633	3.949525E+001	8.442261E+000
K-40	0.998	3.098525E+002	8.117665E+001
? Ru-106	0.972	3.716104E+001	2.438440E+001
X Ba-133	0.996		
X Bi-211	1.000		
X Pb-212	0.999		
? Bi-214	1.000	8.111873E+000	5.309890E+000
Pb-214	0.511	1.074023E+001	5.354101E+000
X Th-227	0.996		
X Ac-228	0.339		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/19/2014 8:35:54 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
----------	--------------	--------------------------------	------------------------	-----------	--------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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8:35 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: Grams
Sample Title: CHO16
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	4.290E+000	4.29E+000	3.950E+001	2.126E+000
		788.70	33.60	6.889E+000		1.287E+000	3.381E+000
		1436.80*	66.40	9.610E+000		8.924E+001	4.751E+000
+	K-40	1460.82*	10.66	5.986E+001	5.99E+001	5.559E+002	2.959E+001
	Cr-51	320.08	9.91	1.326E+001	1.33E+001	-9.142E+000	6.529E+000
	Mn-54	834.85	99.98	2.737E+000	2.74E+000	-5.001E-001	1.346E+000
	Co-58	810.76	99.45	2.710E+000	2.71E+000	1.470E+000	1.333E+000
	Co-60	1173.23	99.85	2.612E+000	1.50E+000	8.219E-001	1.276E+000
		1332.49	99.98	1.503E+000		1.024E+000	7.182E-001
	Nb-94	702.65	99.81	1.832E+000	1.83E+000	-1.361E-001	8.969E-001
		871.09	99.89	2.784E+000		5.836E-001	1.369E+000
	Sn-113	255.13	2.11	6.480E+001	2.08E+000	1.399E+001	3.200E+001
		391.70	64.97	2.081E+000		1.619E+000	1.023E+000
	Cs-137	661.66	85.10	2.094E+000	2.09E+000	2.058E+000	1.026E+000
	Eu-152	121.78	28.67	6.319E+000	5.62E+000	-4.712E+000	3.134E+000
		244.70	7.61	1.905E+001		4.501E+000	9.417E+000
		295.94	0.45	2.975E+002		-1.035E+002	1.467E+002
		344.28	26.60	5.620E+000		6.043E+000	2.771E+000
		367.79	0.86	1.565E+002		-1.058E+001	7.698E+001
		411.12	2.24	6.094E+001		-2.057E+000	2.993E+001
		443.96	2.83	5.166E+001		6.280E+000	2.538E+001
		488.68	0.42	3.556E+002		-7.045E+001	1.745E+002
		563.99	0.49	3.430E+002		-4.294E+001	1.683E+002
		586.26	0.46	4.055E+002		4.063E+001	1.992E+002
		678.62	0.47	3.704E+002		-8.199E+001	1.813E+002
		688.67	0.86	2.104E+002		-8.688E+001	1.030E+002
		719.35	0.28	6.403E+002		-5.134E+001	3.132E+002
		778.90	12.96	1.639E+001		-5.778E+000	8.036E+000
		810.45	0.32	8.393E+002		4.553E+002	4.129E+002
		867.37	4.26	6.440E+001		-6.510E+001	3.166E+001
		919.33	0.43	6.624E+002		1.961E+002	3.255E+002
		964.08	14.65	1.899E+001		4.130E-001	9.322E+000
		1085.87	10.24	2.378E+001		-1.081E+001	1.162E+001
		1089.74	1.73	1.417E+002		-5.370E+001	6.926E+001
		1112.07	13.69	1.882E+001		6.993E+000	9.201E+000
		1212.95	1.43	1.801E+002		-3.703E+001	8.792E+001
		1249.94	0.19	1.238E+003		5.733E+001	6.025E+002
		1299.14	1.63	1.047E+002		-2.256E+001	5.033E+001
		1408.01	21.07	1.494E+001		-7.224E+000	7.305E+000
		1457.64	0.50	1.252E+003		7.482E+003	6.187E+002
		1528.10	0.28	3.724E+002		-1.028E+002	1.730E+002
	Eu-154	123.07	40.40	4.447E+000	4.45E+000	-3.752E+000	2.206E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
> Eu-154	247.93	6.89	2.080E+001	4.45E+000	2.689E+000	1.028E+001
	591.76	4.95	3.870E+001		3.389E+000	1.902E+001
	692.42	1.78	1.034E+002		9.072E+001	5.066E+001
	723.30	20.06	8.826E+000		-3.934E+000	4.315E+000
	756.80	4.52	3.951E+001		-1.496E+001	1.931E+001
	873.18	12.08	2.292E+001		6.171E+000	1.127E+001
	996.29	10.48	2.425E+001		-3.478E+000	1.188E+001
	1004.76	18.01	1.378E+001		-1.623E+001	6.743E+000
	1274.43	34.80	5.605E+000		-1.659E+000	2.710E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.994E+002	6.99E+000	-4.827E+001	9.877E+001
	60.01	1.22	2.099E+002		-9.903E+000	1.039E+002
	86.55	30.70	6.992E+000		4.344E+000	3.469E+000
	105.31	21.10	9.242E+000		7.518E-001	4.585E+000
Tl-208	583.19	85.00	2.177E+000	2.18E+000	-3.822E-001	1.069E+000
Bi-211	351.07*	13.02	2.326E+001	2.33E+001	2.777E+001	1.155E+001
Pb-211	404.85	3.78	3.586E+001	3.59E+001	-1.607E+001	1.761E+001
	427.09	1.76	7.770E+001		-2.501E+001	3.814E+001
	832.01	3.52	7.827E+001		4.717E+001	3.850E+001
Bi-212	39.86	1.06	2.635E+002	2.64E+001	2.371E+003	1.306E+002
	727.33	6.67	2.636E+001		-8.468E-001	1.288E+001
	785.37	1.10	2.040E+002		1.386E+002	1.001E+002
> Pb-212	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	115.18	0.60	3.073E+002	7.11E+000	2.345E+002	1.524E+002
	238.63*	43.60	7.107E+000		4.032E+000	3.535E+000
Pb212-XR	300.09	3.30	4.022E+001		6.229E+000	1.982E+001
	74.82	10.28	2.297E+001	1.34E+001	2.273E+001	1.139E+001
	77.11	17.10	1.338E+001		-3.699E+000	6.633E+000
+ Bi-214	87.35	3.97	5.352E+001		4.186E+001	2.655E+001
	89.78	1.46	1.425E+002		-9.630E+000	7.071E+001
	609.32*	45.49	8.519E+000	8.52E+000	8.112E+000	4.222E+000
	768.36	4.89	3.929E+001		-3.788E+001	1.922E+001
	806.18	1.26	2.100E+002		2.410E+002	1.033E+002
	934.06	3.11	9.236E+001		-1.951E+001	4.539E+001
	1120.29	14.92	1.744E+001		8.981E+000	8.528E+000
	1155.21	1.63	1.570E+002		-1.571E+002	7.669E+001
	1238.12	5.83	4.253E+001		4.821E+001	2.073E+001
	1280.98	1.43	1.318E+002		-2.008E+001	6.366E+001
	1377.67	3.99	3.663E+001		-5.235E+001	1.746E+001
	1385.31	0.79	2.190E+002		-3.877E+002	1.051E+002
	1401.52	1.33	2.013E+002		-9.985E+001	9.806E+001
	1407.99	2.39	1.315E+002		-6.358E+001	6.430E+001
	1509.21	2.13	1.098E+002		-1.669E+001	5.315E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99*	7.25	4.273E+001	7.24E+000	2.425E+001	2.126E+001
	295.22	18.42	7.237E+000		-2.591E+000	3.568E+000
	351.93*	35.60	8.508E+000		1.016E+001	4.224E+000

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

8/19/2014

8:35 AM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	Pb-214	785.96	1.06	2.139E+002	7.24E+000	1.914E+002	1.050E+002
	Pb214-XR	74.82	5.80	4.071E+001	2.36E+001	4.028E+001	2.019E+001
		77.11	9.70	2.358E+001		-6.520E+000	1.169E+001
		87.35	2.24	9.486E+001		7.419E+001	4.706E+001
		89.78	0.82	2.538E+002		-1.715E+001	1.259E+002
	Ra-226	186.21	3.64	4.216E+001	4.22E+001	1.865E+001	2.088E+001
	Ac-228	129.07	2.42	7.268E+001	1.10E+001	-6.688E+000	3.604E+001
		209.25	3.89	3.805E+001		-2.630E+001	1.883E+001
		270.24	3.46	3.926E+001		5.562E+000	1.938E+001
		328.00	2.95	4.548E+001		-1.687E+001	2.240E+001
		338.32*	11.27	2.687E+001		3.208E+001	1.334E+001
		409.46	1.92	7.092E+001		1.152E+001	3.484E+001
		463.00	4.40	3.348E+001		1.880E+000	1.644E+001
		794.95	4.25	5.761E+001		3.574E+001	2.830E+001
		911.20	25.80	1.101E+001		-1.803E+000	5.412E+000
		964.77	4.99	5.559E+001		3.745E+000	2.729E+001
		968.97	15.80	1.750E+001		1.899E+001	8.588E+000
>	Pa-231	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
		27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
		283.69	1.70	7.963E+001		3.785E+001	3.928E+001
		300.07	2.47	5.373E+001		8.321E+000	2.648E+001
		302.65	2.20	5.983E+001		-2.152E+001	2.948E+001
		330.06	1.40	9.638E+001		-4.289E+001	4.747E+001
	Th-234	92.38	2.13	9.608E+001	9.61E+001	1.032E+001	4.766E+001
		92.80	2.10	9.728E+001		1.045E+001	4.825E+001
		112.81	0.21	8.797E+002		-4.128E+002	4.363E+002
	U-235	143.76	10.96	1.509E+001	2.69E+000	1.201E+000	7.479E+000
		163.33	5.08	3.125E+001		3.299E+000	1.549E+001
		185.71	57.20	2.694E+000		1.970E+000	1.334E+000
		202.11	1.08	1.348E+002		-8.476E+000	6.669E+001
		205.31	5.01	2.990E+001		2.179E+000	1.480E+001
	Am-241	59.54	35.90	7.217E+000	7.22E+000	-3.406E-001	3.574E+000

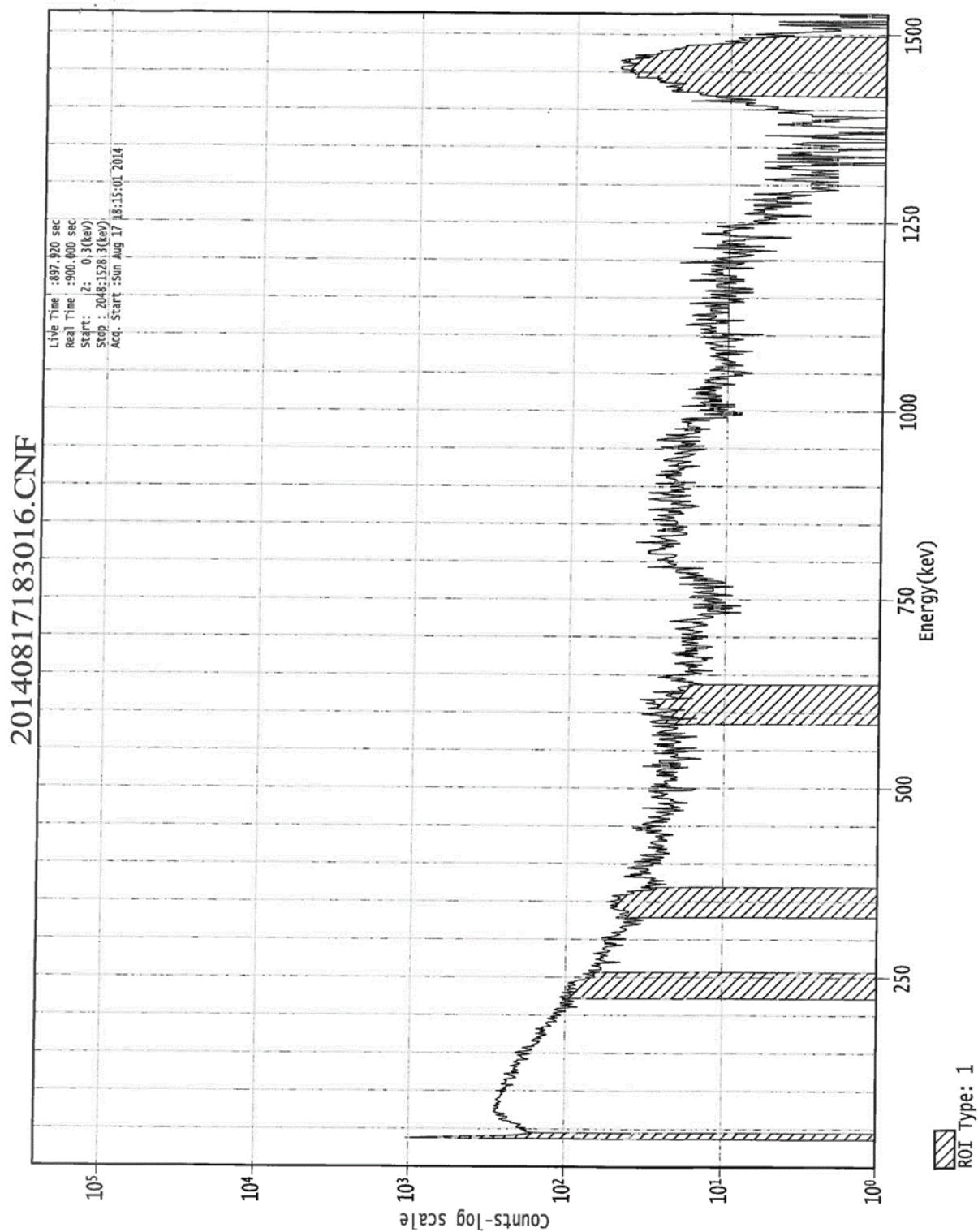
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

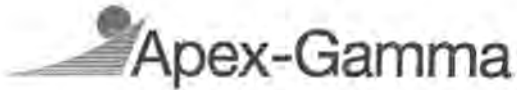
> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



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Analysis Report for 16-Jul-14-10002

Crib House CTT Upper Location 18 799.91 Grams

*note
Sample of Pavement on
Crib House
→ 485005
secondary*

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 16-Jul-14-10002
Sample Description	: Crib House CTT Upper Location 18 799.91 Grams
Sample Type	: 538G Soil
Unit	:
Sample Point	:
Sample Size	: 7.999E+02 grams
Facility	: Default
Sample Taken On	: 7/15/2014 1:40:00PM
Acquisition Started	: 7/16/2014 6:32:41AM
Procedure	: 538G Concrete Crushed
Operator	: Administrator
Detector Name	: DET02
Geometry	: 538G Concrete Crushed
Live Time	: 1500.0 seconds
Real Time	: 1501.4 seconds
Dead Time	: 0.09 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/5/2013
Efficiency Calibration Used Done On	: 7/16/2014
Efficiency Calibration Description	:
Sample Number	: 10807

the same > 12/21/14
77-B
7-16-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 7/16/2014 6:57:44AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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Analysis Report for 16-Jul-14-10002
Crib House CTT Upper Location 18 799.91 Grams

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	1	74.70	293 -	316	300.61	1.02E+02	31.66	5.05E+02	Pb214-XR
m	2	76.92	293 -	316	309.49	1.99E+02	39.14	5.02E+02	Pb212-XR
M	3	86.94	344 -	365	349.58	1.02E+02	33.26	4.27E+02	Pb214-XR
m	4	89.83	344 -	365	361.16	7.20E+01	31.03	4.57E+02	Pb212-XR
	5	185.87	737 -	754	745.49	1.65E+02	57.09	4.64E+02	Pb214-XR
	6	209.23	835 -	846	838.99	4.25E+01	41.96	3.53E+02	Pb212-XR
M	7	238.55	948 -	976	956.33	1.02E+03	70.45	4.40E+02	U-235
m	8	241.50	948 -	976	968.14	1.94E+02	35.10	3.98E+02	Pb212-XR
	9	277.58	1107 -	1117	1112.53	3.05E+01	30.42	1.91E+02	Pb214-XR
M	10	295.10	1175 -	1212	1182.66	3.70E+02	43.96	2.71E+02	Pb212-XR
m	11	299.99	1175 -	1212	1202.22	6.34E+01	24.11	2.74E+02	Th-231
	12	327.91	1308 -	1320	1313.99	6.97E+01	31.88	1.77E+02	Ac228-XR
	13	338.22	1346 -	1362	1355.27	2.11E+02	43.93	2.24E+02	U235-XR
	14	351.88	1400 -	1418	1409.95	7.36E+02	65.33	2.56E+02	Ra-226
	15	409.48	1635 -	1645	1640.51	2.89E+01	23.58	1.14E+02	Ac-228
	16	462.69	1847 -	1863	1853.54	5.39E+01	29.33	1.32E+02	Pb-212
	17	477.70	1905 -	1922	1913.67	5.92E+01	32.79	1.68E+02	Ac-228
	18	510.67	2038 -	2058	2045.66	1.51E+02	39.37	1.71E+02	Bi-211
	19	583.16	2326 -	2345	2335.91	3.22E+02	48.16	2.12E+02	Ac-228
	20	609.30	2430 -	2451	2440.63	5.51E+02	55.26	1.65E+02	Pb-214
	21	727.10	2904 -	2923	2912.38	8.55E+01	27.66	8.70E+01	Bi-212
	22	768.23	3070 -	3083	3077.12	5.15E+01	22.55	7.31E+01	Bi-214
	23	794.81	3175 -	3191	3183.59	4.06E+01	23.07	8.27E+01	Ac-228
	24	860.47	3438 -	3453	3446.62	5.00E+01	20.98	6.00E+01	Ac-228
	25	911.24	3639 -	3661	3650.03	2.86E+02	40.49	1.02E+02	Ac-228
M	26	964.84	3856 -	3893	3864.81	5.44E+01	18.85	9.11E+01	Ac-228
m	27	968.98	3856 -	3893	3881.38	1.76E+02	29.81	1.09E+02	Ac-228
	28	1120.25	4479 -	4498	4487.57	1.22E+02	29.07	8.49E+01	Bi-214
	29	1238.02	4952 -	4968	4959.60	4.29E+01	20.60	6.42E+01	Bi-214
	30	1377.68	5511 -	5528	5519.50	3.45E+01	18.31	4.90E+01	Bi-214
	31	1460.76	5838 -	5868	5852.64	1.14E+03	69.75	5.98E+01	K-40
	32	1729.73	6923 -	6940	6931.38	2.25E+01	11.19	8.98E+00	Bi-214
	33	1764.51	7060 -	7079	7070.92	1.03E+02	22.41	2.25E+01	Bi-214

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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Analysis Report for 16-Jul-14-10002

Crib House CTT Upper Location 18 799.91 Grams

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
BE-7	1.00	477.60 *	10.44	3.75E-01	2.14E-01	miss
K-40	1.00	1460.82 *	10.66	1.28E+01	1.36E+00	miss
Tl-208	1.00	583.19 *	85.00	3.20E-01	6.13E-02	0.895
Bi-212	0.99	39.86	1.06			
		727.33 *	6.67	1.09E+00	3.75E-01	0.971
		785.37	1.10			
		1620.50	1.47			
Pb-212	1.00	115.18	0.60			
		238.63 *	43.60	1.10E+00	1.93E-01	free
		300.09 *	3.30	9.95E-01	4.11E-01	free
Pb212-XR	0.99	74.82 *	10.28	1.74E+00	6.48E-01	miss
		77.11 *	17.10	1.81E+00	5.16E-01	miss
		87.35 *	3.97	2.45E+00	9.43E-01	miss
		89.78 *	1.46	4.31E+00	2.06E+00	miss
Bi-214	1.00	609.32 *	45.49	1.01E+00	1.58E-01	0.916
		768.36 *	4.89	1.01E+00	4.55E-01	0.909
		806.18	1.26			
		934.06	3.11			
		1120.29 *	14.92	9.50E-01	2.40E-01	0.912
		1155.21	1.63			
		1238.12 *	5.83	9.03E-01	4.40E-01	0.912
		1280.98	1.43			
		1377.67 *	3.99	9.49E-01	5.09E-01	1.056
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59 *	2.88	8.58E-01	4.32E-01	1.225
		1764.49 *	15.30	9.13E-01	2.12E-01	1.003
		1847.43	2.03			
		2118.51	1.16			

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Analysis Report for 16-Jul-14-10002
Crib House CTT Upper Location 18 799.91 Grams

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Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Pb-214	0.99	241.99 *	7.25	1.26E+00	3.05E-01	1.000
		295.22 *	18.42	1.03E+00	2.06E-01	1.000
		351.93 *	35.60	1.15E+00	2.10E-01	free
		785.96	1.06			
Ra-226	0.99	186.21 *	3.64	1.98E+00	7.58E-01	free
Ac-228	1.00	129.07	2.42			
		209.25 *	3.89	5.17E-01	5.18E-01	0.967
		270.24	3.46			
		328.00 *	2.95	1.40E+00	6.90E-01	0.929
		338.32 *	11.27	1.04E+00	2.76E-01	0.986
		409.46 *	1.92	1.04E+00	8.65E-01	0.901
		463.00 *	4.40	9.11E-01	5.13E-01	0.895
		794.95 *	4.25	9.30E-01	5.39E-01	0.913
		911.20 *	25.80	1.05E+00	1.74E-01	0.985
		964.77 *	4.99	1.09E+00	3.88E-01	0.970
		968.97 *	15.80	1.09E+00	2.08E-01	0.985
		1588.20	3.22			
U-235	0.99	143.76	10.96			
		163.33	5.08			
		185.71 *	57.20	1.26E-01	4.83E-02	free
		202.11	1.08			
		205.31	5.01			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
BE-7	1.000	3.75E-01	2.14E-01	
K-40	1.000	1.28E+01	1.36E+00	

Analysis Report for 16-Jul-14-10002
Crib House CTT Upper Loaction 18 799.91 Grams

$$U-238 \rightarrow Th-234 \rightarrow Pa-234 \rightarrow U-234 \rightarrow Th-230 \rightarrow Ra-226 \rightarrow Rn-222 \rightarrow Po-218 \rightarrow Pb-214$$

$$\downarrow$$

$$Bi-214$$

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Analysis Report for 16-Jul-14-10002

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Crib House CTT Upper Loaction 18 799.91 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/16/2014 6:57:44AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
9	277.58	2.03333E-02	49.87		
18	510.67	1.00865E-01	13.01		
24	860.47	3.33333E-02	20.98		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	* 10.66	1.28E+01	3.63E-01	3.63E-01	miss
+	Cr-51	320.08	9.91	-8.69E-02	2.40E-01	2.40E-01	free
+	Mn-54	834.85	99.98	6.44E-03	2.80E-02	2.80E-02	miss
+	Co-58	810.76	99.45	5.49E-04	2.28E-02	2.28E-02	1.000
		1674.73	0.52	9.79E-02		3.21E+00	1.045
+	Co-60	1173.23	99.85	1.58E-02	3.04E-02	3.59E-02	0.914
		1332.49	99.98	1.55E-02		3.04E-02	0.914
+	Nb-94	702.65	99.81	2.88E-04	2.91E-02	3.07E-02	0.911
		871.09	99.89	-7.55E-03		2.91E-02	0.912
+	Sn-113	255.13	2.11	-2.70E-01	3.21E-02	1.02E+00	free
		391.70	64.97	-1.50E-02		3.21E-02	free
+	Cs-134	475.36	1.48	-5.95E-02	2.96E-02	1.63E+00	miss
		563.25	8.34	1.05E-01		3.90E-01	0.839
		569.33	15.37	-2.38E-02		1.78E-01	0.827
		604.72	97.62	-1.46E-02		2.96E-02	0.892

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Analysis Report for 16-Jul-14-10002 7/16/2014 7:03:23AM Page 7 of 9

Crib House CTT Upper Location 18 799.91 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	795.86	85.46	-6.74E-03	2.96E-02	4.42E-02	0.895
	801.95	8.69	1.16E-02		3.47E-01	0.843
	1038.61	0.99	-9.53E-01		2.65E+00	0.911
	1167.97	1.79	-5.11E-01		1.29E+00	1.146
	1365.19	3.02	1.49E-02		6.76E-01	1.235
+ Cs-137	661.66	85.10	-2.14E-03	3.14E-02	3.14E-02	miss
+ Eu-152	121.78	28.67	-1.70E-04	9.16E-02	1.16E-01	0.901
	244.70	7.61	-1.43E-01		3.19E-01	0.900
	295.94	0.45	3.25E+01		1.11E+01	miss
	344.28	26.60	-7.59E-03		9.16E-02	0.934
	367.79	0.86	-3.25E-02		3.12E+00	0.827
	411.12	2.24	-1.23E-01		1.30E+00	0.862
	443.96	2.83	4.71E-01		9.24E-01	0.896
	488.68	0.42	-1.19E-01		5.13E+00	miss
	563.99	0.49	-9.21E-02		5.95E+00	0.896
	586.26	0.46	-1.75E+00		6.70E+00	0.912
	678.62	0.47	1.53E+00		6.49E+00	0.830
	688.67	0.86	-5.13E-01		2.70E+00	0.970
	719.35	0.28	2.64E+00		1.03E+01	miss
	778.90	12.96	-3.46E-02		1.89E-01	0.917
	810.45	0.32	1.30E-01		6.56E+00	1.071
	867.37	4.26	1.94E-01		7.69E-01	0.892
	919.33	0.43	-2.56E+00		5.71E+00	0.970
	964.08	14.65	1.75E-01		2.83E-01	1.032
	1085.87	10.24	7.50E-02		2.89E-01	1.025
	1089.74	1.73	-1.66E-01		1.84E+00	0.927
	1112.07	13.69	4.50E-02		2.27E-01	0.988
	1212.95	1.43	3.76E-02		2.59E+00	0.892
	1249.94	0.19	-2.58E+00		1.35E+01	1.157
	1299.14	1.63	2.84E-01		1.85E+00	0.913
	1408.01	21.07	7.88E-02		1.64E-01	0.974
	1457.64	0.50	-4.23E+00		1.42E+01	1.124
	1528.10	0.28	-1.60E+00		5.19E+00	1.017
+ Eu-154	123.07	40.40	-2.25E-02	8.26E-02	8.26E-02	0.899
	247.93	6.89	-1.06E-01		3.53E-01	0.890
	591.76	4.95	-2.64E-02		5.30E-01	0.869
	692.42	1.78	-2.16E-01		1.32E+00	0.901
	723.30	20.06	-1.02E-01		1.35E-01	0.898
	756.80	4.52	1.89E-01		6.49E-01	0.874
	873.18	12.08	-6.20E-02		2.39E-01	0.894
	996.29	10.48	-1.10E-02		2.62E-01	0.951
	1004.76	18.01	3.66E-03		1.53E-01	0.966
	1274.43	34.80	4.77E-03		9.49E-02	0.971
	1596.48	1.80	-1.08E-01		8.87E-01	1.333
+ Eu-155	45.30	1.31	-4.28E-01	1.96E-01	2.01E+01	0.998
	60.01	1.22	-8.51E-01		2.06E+01	1.000
	86.55	30.70	2.41E-01		2.22E-01	free
	105.31	21.10	1.46E-01		1.96E-01	1.000
+ Tl-208	583.19	*	85.00	5.32E-02	5.32E-02	0.895
+ Bi-211	351.07	*	13.02	3.14E+00	2.67E-01	miss
+ Pb-211	404.85	3.78	3.20E-01	6.64E-01	6.64E-01	miss

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Analysis Report for 16-Jul-14-10002
Crib House CTT Upper Loaction 18 799.91 Grams

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pb-211	427.09	1.76	-5.02E-01	6.64E-01	1.21E+00	miss
	832.01	3.52	-2.81E-01		6.83E-01	miss
+ Bi-212	39.86	1.06	3.65E+00	4.63E-01	2.46E+01	0.997
	727.33	*	6.67 1.09E+00		4.63E-01	0.971
	785.37	1.10	1.52E+00		2.85E+00	0.911
	1620.50	1.47	8.31E-01		1.99E+00	1.011
+ Pb-212	115.18	0.60	-5.49E-02	7.71E-02	4.92E+00	miss
	238.63	*	43.60 1.10E+00		7.71E-02	free
	300.09	*	3.30 9.95E-01		8.98E-01	free
+ Pb212-XR	74.82	*	10.28 1.74E+00	6.97E-01	1.31E+00	miss
	77.11	*	17.10 1.81E+00		6.97E-01	miss
	87.35	*	3.97 2.45E+00		1.70E+00	miss
	89.78	*	1.46 4.31E+00		4.38E+00	miss
+ Bi-214	609.32	*	45.49 1.01E+00	9.06E-02	9.06E-02	0.916
	768.36	*	4.89 1.01E+00		5.94E-01	0.909
	806.18		1.26 1.38E+00		2.56E+00	0.880
	934.06		3.11 2.38E-01		1.03E+00	0.912
	1120.29	*	14.92 9.50E-01		2.57E-01	0.912
	1155.21		1.63 1.05E+00		2.34E+00	0.910
	1238.12	*	5.83 9.03E-01		5.90E-01	0.912
	1280.98		1.43 6.78E-01		2.78E+00	0.912
	1377.67	*	3.99 9.49E-01		7.09E-01	1.056
	1385.31		0.79 -5.04E-01		3.33E+00	0.912
	1401.52		1.33 9.69E-01		2.55E+00	0.912
	1407.99		2.39 7.41E-01		1.54E+00	0.912
	1509.21		2.13 1.06E+00		1.82E+00	0.922
	1661.27		1.05 -8.10E-02		1.98E+00	1.003
	1729.59	*	2.88 8.58E-01		4.76E-01	1.225
	1764.49	*	15.30 9.13E-01		1.64E-01	1.003
	1847.43		2.03 8.62E-01		1.45E+00	1.120
>	2118.51		1.16 0.00E+00		0.00E+00	1.080
+ Pb-214	241.99	*	7.25 1.26E+00	9.77E-02	4.44E-01	1.000
	295.22	*	18.42 1.03E+00		1.59E-01	1.000
	351.93	*	35.60 1.15E+00		9.77E-02	free
	785.96		1.06 2.24E+00		2.82E+00	1.000
+ Pb214-XR	74.82	*	5.80 3.08E+00	1.23E+00	2.32E+00	miss
	77.11	*	9.70 3.20E+00		1.23E+00	miss
	87.35	*	2.24 4.34E+00		3.01E+00	miss
	89.78	*	0.82 7.68E+00		7.80E+00	miss
+ Ra-226	186.21	*	3.64 1.98E+00	1.04E+00	1.04E+00	free
+ Ac-228	129.07		2.42 3.48E-01	1.43E-01	1.52E+00	0.915
	209.25	*	3.89 5.17E-01		8.21E-01	0.967
	270.24		3.46 6.50E-01		9.38E-01	0.930
	328.00	*	2.95 1.40E+00		9.31E-01	0.929
	338.32	*	11.27 1.04E+00		2.80E-01	0.986
	409.46	*	1.92 1.04E+00		1.30E+00	0.901
	463.00	*	4.40 9.11E-01		7.27E-01	0.895
	794.95	*	4.25 9.30E-01		7.60E-01	0.913
	911.20	*	25.80 1.05E+00		1.43E-01	0.985
	964.77	*	4.99 1.09E+00		6.72E-01	0.970
	968.97	*	15.80 1.09E+00		2.28E-01	0.985

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

7/16/2014 7:03:23AM

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Analysis Report for 16-Jul-14-10002

Crib House CTT Upper Loaction 18 799.91 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	Ac-228	1588.20	3.22	4.07E-01	1.43E-01	9.84E-01	1.003
	Pa-231	27.36	10.30	4.27E-01	1.09E+00	2.92E+00	0.992
		283.69	1.70	-1.73E-01		1.30E+00	1.000
		300.07	2.47	1.33E+00		1.20E+00	1.000
		302.65	2.20	2.52E-01		1.09E+00	1.000
+		330.06	1.40	-1.05E+00		1.67E+00	1.000
	Th-234	92.38	2.13	2.14E+00	2.81E+00	2.81E+00	free
		92.80	2.10	3.45E+00		2.91E+00	free
		112.81	0.21	-7.54E+00		1.38E+01	free
	U-235	143.76	10.96	4.55E-02	6.63E-02	2.48E-01	free
+		163.33	5.08	1.95E-01		5.21E-01	free
		185.71	57.20	1.26E-01		6.63E-02	free
		202.11	1.08	-3.20E-01		2.28E+00	miss
		205.31	5.01	-3.76E-03		5.02E-01	free
	Am-241	59.54	35.90	5.56E-02	7.30E-01	7.30E-01	free

+ = 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

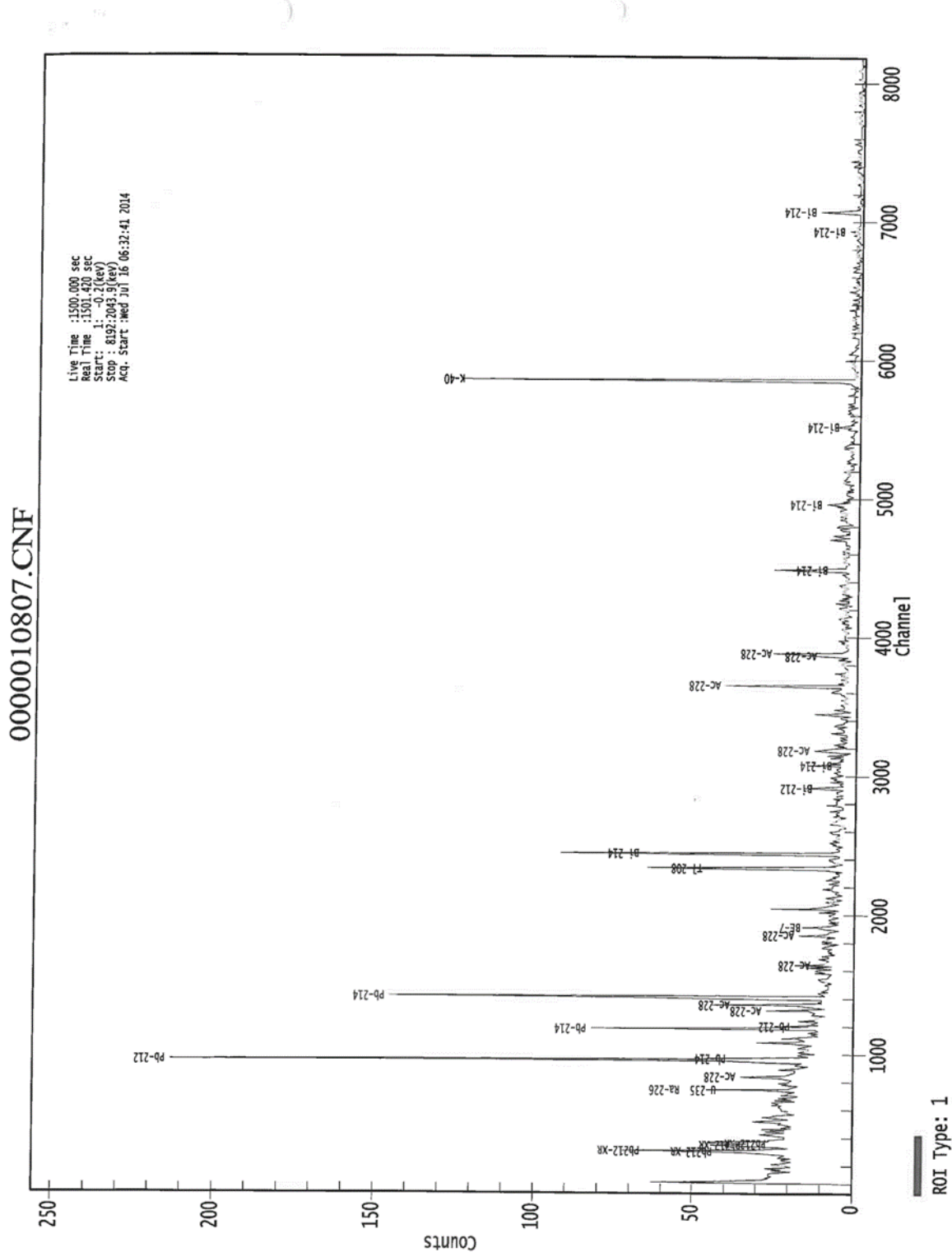
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L Y S I S      *****
*****

Filename: C:\Canberra\6-26-14\20140626101859.cnf

Report Generated On       : 7/14/2014   1:18:06 PM

Sample Title              : Ctt Upper Roof Grid 18
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM ← 2

Sample Size               : 1.000E+000 grams

Sample Taken On           : 6/26/2014   10:02:45 AM
Acquisition Started      : 6/26/2014   10:02:45 AM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Rad Time                  : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID               : 1m_EffxArea
```

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst
Date 7-14-14

AK-900
7/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:18:06 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Upper Roof Grid 18
Peak Analysis Performed on: 7/14/2014 1:18:06 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	22-	29	25.85	76.36	4.88	1.03E+003	453.33	9.91E+003
2	74-	86	80.45	239.97	12.67	5.52E+002	355.46	4.15E+003
3	110-	124	117.63	351.29	20.35	3.01E+002	269.94	2.11E+003
4	475-	502	489.20	1458.60	46.37	2.47E+003	158.94	4.82E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:18:06 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Upper Roof Grid 18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	2.83005E+008	3.05994E+007
Ni-65	0.350	366.27*	4.81	4.51421E+007	4.11293E+007
		1115.53	15.43		
		1481.84*	23.59	1.27886E+008	1.31357E+007
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	7.81424E+006	5.18527E+006
		300.09	3.30		
Pb212-XR	0.304	74.82	10.28		
		77.11*	17.10	4.03830E+007	1.96781E+007
		87.35	3.97		
		89.78	1.46		
Pb214-XR	0.306	74.82	5.80		
		77.11*	9.70	7.11907E+007	3.53014E+007
		87.35	2.24		
		89.78	0.82		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

*Ni-65 } deleted
Cs-137 }*

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:18:06 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.999	1.831082E+008	9.551354E+007
	Ni-65	0.350	4.514215E+007	4.111385E+007
X	Bi-211	1.000		
	Pb-212	1.000	7.814241E+006	5.185272E+006
?	Pb212-XR	0.304	4.038301E+007	1.967814E+007
X	Pb-214	0.518		
?	Pb214-XR	0.306	7.119067E+007	3.530144E+007

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:18:06 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report 7/14/2014 1:18:06 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Upper Roof Grid 18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	*Activity (pCi/gram)	Dec. Level (pCi/gram)
	LaBr3	34.70	66.40	3.749E+006	3.75E+006	3.175E+007	1.857E+006
		788.70	33.60	4.552E+006		3.401E+006	2.237E+006
		1436.80	66.40	3.781E+006		-6.485E+005	1.866E+006
+	K-40	1460.82*	10.66	2.372E+007	2.37E+007	2.830E+008	1.171E+007
	Cr-51	320.08	9.91	1.296E+007	1.30E+007	1.887E+006	6.387E+006
	Mn-54	834.85	99.98	1.752E+006	1.75E+006	5.610E+005	8.623E+005
	Co-58	810.76	99.45	1.718E+006	1.72E+006	1.708E+006	8.457E+005
	Co-60	1173.23	99.85	1.410E+006	7.45E+005	1.958E+005	6.898E+005
		1332.49	99.98	7.447E+005		-1.893E+005	3.564E+005
	Nb-94	702.65	99.81	1.206E+006	1.21E+006	-2.555E+005	5.900E+005
		871.09	99.89	1.689E+006		-2.377E+005	8.309E+005
	Sn-113	255.13	2.11	7.094E+007	1.95E+006	-1.550E+007	3.507E+007
		391.70	64.97	1.946E+006		-1.003E+006	9.571E+005
	Cs-134	475.36	1.48	8.457E+007	1.50E+006	1.685E+006	4.154E+007
		563.25	8.34	1.606E+007		-7.465E+006	7.887E+006
		569.33	15.37	8.868E+006		-9.389E+006	4.357E+006
		604.72	97.62	1.501E+006		7.470E+005	7.382E+005
		795.86	85.46	1.875E+006		2.514E+006	9.221E+005
		801.95	8.69	1.893E+007		6.947E+006	9.311E+006
		1038.61	0.99	1.303E+008		3.624E+007	6.365E+007
		1167.97	1.79	7.743E+007		-1.682E+007	3.786E+007
		1365.19	3.02	2.384E+007		-8.542E+005	1.139E+007
	Cs-137	661.66	85.10	1.462E+006	1.46E+006	8.412E+004	7.160E+005
	Eu-152	121.78	28.67	7.194E+006	5.48E+006	2.118E+006	3.572E+006
		244.70	7.61	2.167E+007		3.641E+007	1.072E+007
		295.94	0.45	3.093E+008		4.334E+008	1.526E+008
		344.28	26.60	5.484E+006		5.938E+006	2.706E+006
		367.79	0.86	1.583E+008		-2.002E+007	7.802E+007
		411.12	2.24	5.708E+007		-2.223E+007	2.808E+007
		443.96	2.83	4.224E+007		-5.944E+007	2.074E+007
		488.68	0.42	2.951E+008		-5.693E+006	1.449E+008
		563.99	0.49	2.728E+008		-1.268E+008	1.340E+008
		586.26	0.46	3.107E+008		4.956E+007	1.527E+008
		678.62	0.47	2.571E+008		-1.878E+007	1.259E+008
		688.67	0.86	1.394E+008		-5.784E+007	6.823E+007
		719.35	0.28	4.517E+008		-1.880E+008	2.212E+008
		778.90	12.96	1.084E+007		-7.285E+006	5.319E+006
		810.45	0.32	5.323E+008		5.292E+008	2.620E+008
		867.37	4.26	4.001E+007		3.516E+006	1.968E+007
		919.33	0.43	3.820E+008		6.913E+007	1.877E+008
		964.08	14.65	1.123E+007		4.987E+006	5.517E+006
		1085.87	10.24	1.259E+007		-1.528E+006	6.148E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

7/14/2014

1:18:06 PM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
> Eu-152	1089.74	1.73	7.560E+007	5.48E+006	2.811E+007	3.694E+007
	1112.07	13.69	9.898E+006		5.458E+005	4.840E+006
	1212.95	1.43	9.653E+007		1.060E+008	4.718E+007
	1249.94	0.19	6.575E+008		7.517E+007	3.205E+008
	1299.14	1.63	5.460E+007		1.918E+007	2.633E+007
	1408.01	21.07	6.706E+006		-8.487E+006	3.276E+006
	1457.64	0.50	5.710E+008		3.316E+009	2.822E+008
	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	> Eu-154	123.07	40.40	3.08E+006	1.502E+006	2.533E+006
		247.93	6.89		2.968E+007	1.163E+007
		591.76	4.95		1.628E+007	1.443E+007
		692.42	1.78		-2.745E+007	3.088E+006
		723.30	20.06		-5.122E+006	3.088E+006
		756.80	4.52		-1.716E+007	1.348E+007
		873.18	12.08		-1.967E+006	6.877E+006
		996.29	10.48		6.337E+006	7.037E+006
		1004.76	18.01		-5.548E+006	3.898E+006
		1274.43	34.80		1.996E+005	1.495E+006
	> Eu-155	1596.48	1.80		0.000E+000	0.000E+000
		45.30	1.31	7.47E+006	2.038E+009	1.238E+008
		60.01	1.22		-1.716E+008	1.243E+008
		86.55	30.70		2.988E+006	3.710E+006
	Tl-208	105.31	21.10		5.939E+006	5.367E+006
		583.19	85.00	1.66E+006	9.027E+005	8.170E+005
Bi-211	351.07*	13.02	2.454E+007	2.45E+007	1.668E+007	1.220E+007
Pb-211	404.85	3.78	3.344E+007	3.34E+007	2.031E+007	1.645E+007
Bi-212	427.09	1.76	6.950E+007	1.90E+007	-1.078E+007	3.415E+007
	832.01	3.52	4.955E+007		-2.638E+007	2.439E+007
	39.86	1.06	2.846E+008		2.296E+009	1.412E+008
	727.33	6.67	1.895E+007		-3.765E+006	9.281E+006
> Pb-212	785.37	1.10	1.347E+008	8.24E+006	4.082E+007	6.614E+007
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	115.18	0.60	3.593E+008		1.997E+008	1.784E+008
	238.63*	43.60	8.238E+006		7.814E+006	4.100E+006
+ Pb212-XR	300.09	3.30	4.103E+007	2.59E+007	2.948E+007	2.024E+007
	74.82	10.28	2.594E+007		-4.054E+006	1.288E+007
	77.11*	17.10	2.917E+007		4.038E+007	1.453E+007
	87.35	3.97	5.627E+007		7.026E+006	2.793E+007
Bi-214	89.78	1.46	1.782E+008	3.19E+006	1.419E+006	8.856E+007
	609.32	45.49	3.195E+006		3.301E+006	1.571E+006
	768.36	4.89	2.664E+007		-3.563E+007	1.305E+007
	806.18	1.26	1.342E+008		1.543E+008	6.606E+007
	934.06	3.11	5.105E+007		-1.786E+007	2.507E+007
	1120.29	14.92	9.198E+006		8.848E+006	4.498E+006
	1155.21	1.63	8.494E+007		-3.738E+007	4.154E+007
	1238.12	5.83	2.262E+007		1.218E+007	1.104E+007
	1280.98	1.43	7.140E+007		-1.701E+007	3.460E+007
	1377.67	3.99	1.860E+007		-3.235E+007	8.896E+006
	1385.31	0.79	1.049E+008		-3.214E+008	5.041E+007
	1401.52	1.33	9.082E+007		-1.527E+008	4.419E+007
	1407.99	2.39	5.902E+007		-7.470E+007	2.883E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Bi-214	1509.21	2.13	5.752E+007	3.19E+006	-1.540E+007	2.797E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99*	7.25	4.954E+007	7.51E+006	4.699E+007	2.465E+007
		295.22	18.42	7.514E+006		1.053E+007	3.708E+006
		351.93*	35.60	8.976E+006		6.099E+006	4.461E+006
		785.96	1.06	1.401E+008		4.245E+007	6.877E+007
+	Pb214-XR	74.82	5.80	4.597E+007	4.60E+007	-7.186E+006	2.283E+007
		77.11*	9.70	5.142E+007		7.119E+007	2.561E+007
		87.35	2.24	9.973E+007		1.245E+007	4.951E+007
		89.78	0.82	3.173E+008		2.527E+006	1.577E+008
	Ra-226	186.21	3.64	4.439E+007	4.44E+007	-6.505E+006	2.199E+007
	Ac-228	129.07	2.42	8.333E+007	6.42E+006	-2.300E+007	4.136E+007
		209.25	3.89	4.474E+007		5.050E+007	2.217E+007
		270.24	3.46	4.052E+007		-5.635E+006	2.001E+007
		328.00	2.95	4.822E+007		1.616E+007	2.379E+007
		338.32	11.27	1.288E+007		1.746E+006	6.356E+006
		409.46	1.92	6.624E+007		-1.033E+007	3.258E+007
		463.00	4.40	2.804E+007		4.858E+006	1.377E+007
		794.95	4.25	3.770E+007		5.054E+007	1.853E+007
		911.20	25.80	6.417E+006		1.120E+006	3.154E+006
		964.77	4.99	3.297E+007		1.465E+007	1.620E+007
		968.97	15.80	1.035E+007		9.051E+006	5.083E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	8.280E+007		3.450E+007	4.088E+007
		300.07	2.47	5.482E+007		3.939E+007	2.704E+007
		302.65	2.20	6.176E+007		4.438E+007	3.046E+007
		330.06	1.40	1.021E+008		3.015E+007	5.037E+007
	Th-234	92.38	2.13	1.196E+008	1.20E+008	2.413E+007	5.945E+007
		92.80	2.10	1.212E+008		2.445E+007	6.023E+007
		112.81	0.21	1.037E+009		-1.048E+008	5.151E+008
	U-235	143.76	10.96	1.744E+007	2.86E+006	8.957E+006	8.651E+006
		163.33	5.08	3.472E+007		1.555E+007	1.721E+007
		185.71	57.20	2.865E+006		-5.049E+005	1.419E+006
		202.11	1.08	1.635E+008		6.618E+007	8.102E+007
		205.31	5.01	3.493E+007		1.855E+007	1.731E+007
	Am-241	59.54	35.90	8.614E+006	8.61E+006	-5.900E+006	4.274E+006

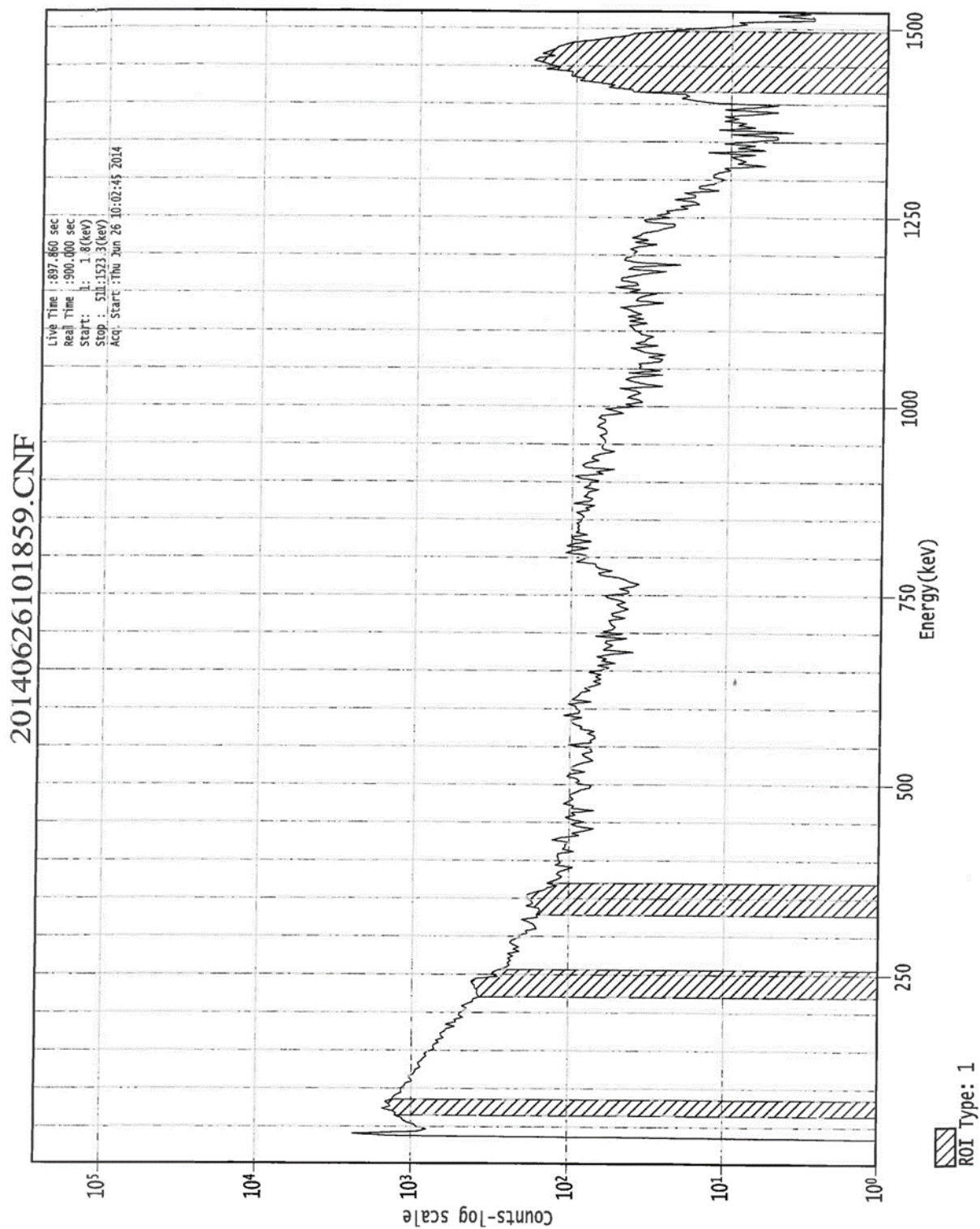
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L      S I S      *****
*****

Filename: C:\Canberra\6-26-14\20140626103602.cnf

Report Generated On       : 7/14/2014   1:19:44 PM

Sample Title              : Ctt Upper Roof Grid 19
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams


Sample Taken On           : 6/26/2014   10:20:28 AM
Acquisition Started      : 6/26/2014   10:20:28 AM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Dead Time                 : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID              : 1m_EffxArea
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst 

Date 7-14-14


7/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:19:44 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Upper Roof Grid 19
Peak Analysis Performed on: 7/14/2014 1:19:43 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	20-	27	23.70	69.92	20.01	9.50E+002	448.51	9.71E+003
2	74-	86	80.67	240.64	12.80	7.16E+002	347.10	3.92E+003
3	475-	502	488.64	1456.94	50.93	2.44E+003	169.51	5.96E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:19:44 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Upper Roof Grid 19
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES
.....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.996	1460.82*	10.66	2.79621E+008	3.11008E+007
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	1.01357E+007	5.18217E+006
		300.09	3.30		
Th-227	0.423	50.13	8.40		
		79.69	1.95		
		94.97	0.03		
		210.62	1.25		
		235.96*	12.90	3.42571E+007	1.84469E+007
		256.23	7.00		
		286.09	1.74		
		299.98	2.21		
		304.50	1.15		
		329.85	2.90		
		334.37	1.14		
Th-232	0.990	63.81*	0.26	2.64894E+009	1.38285E+009

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:19:44 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.996	2.796209E+008	3.110080E+007
? Pb-212	0.999	1.013570E+007	5.182173E+006
? Th-227	0.423	3.425709E+007	1.844690E+007
Th-232	0.990	2.648942E+009	1.382853E+009

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 7/14/2014 1:19:43 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report 7/14/2014 1:19:44 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Upper Roof Grid 19
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
LaBr3	34.70	66.40	3.659E+006	3.66E+006	2.926E+007	1.812E+006
	788.70	33.60	4.350E+006		3.078E+006	2.135E+006
	1436.80	66.40	3.918E+006		-4.758E+005	1.934E+006
+ K-40	1460.82*	10.66	2.629E+007	2.63E+007	2.796E+008	1.299E+007
Cr-51	320.08	9.91	1.251E+007	1.25E+007	-1.503E+007	6.163E+006
Mn-54	834.85	99.98	1.730E+006	1.73E+006	1.697E+006	8.514E+005
Co-58	810.76	99.45	1.648E+006	1.65E+006	1.945E+005	8.104E+005
Co-60	1173.23	99.85	1.387E+006	7.17E+005	6.621E+004	6.782E+005
	1332.49	99.98	7.167E+005		3.916E+005	3.424E+005
Nb-94	702.65	99.81	1.164E+006	1.16E+006	-8.510E+005	5.693E+005
	871.09	99.89	1.702E+006		-7.333E+003	8.370E+005
Sn-113	255.13	2.11	7.036E+007	1.92E+006	1.482E+007	3.477E+007
	391.70	64.97	1.923E+006		3.570E+005	9.460E+005
Cs-134	475.36	1.48	8.365E+007	1.49E+006	1.133E+007	4.108E+007
	563.25	8.34	1.584E+007		-5.701E+006	7.781E+006
	569.33	15.37	8.770E+006		-4.029E+006	4.308E+006
	604.72	97.62	1.486E+006		9.158E+005	7.307E+005
	795.86	85.46	1.764E+006		3.826E+005	8.663E+005
	801.95	8.69	1.810E+007		1.897E+007	8.894E+006
	1038.61	0.99	1.298E+008		-7.584E+007	6.344E+007
	1167.97	1.79	7.782E+007		-1.326E+007	3.806E+007
	1365.19	3.02	2.175E+007		-3.423E+007	1.034E+007
Cs-137	661.66	85.10	1.433E+006	1.43E+006	1.317E+006	7.019E+005
Eu-152	121.78	28.67	7.117E+006	5.32E+006	-1.916E+006	3.533E+006
	244.70	7.61	2.149E+007		3.855E+007	1.063E+007
	295.94	0.45	3.033E+008		1.531E+008	1.496E+008
	344.28	26.60	5.320E+006		6.042E+006	2.624E+006
	367.79	0.86	1.528E+008		-6.268E+007	7.526E+007
	411.12	2.24	5.442E+007		1.715E+007	2.674E+007
	443.96	2.83	4.259E+007		-3.116E+007	2.092E+007
	488.68	0.42	2.956E+008		9.059E+007	1.451E+008
	563.99	0.49	2.692E+008		-9.686E+007	1.322E+008
	586.26	0.46	3.064E+008		6.172E+006	1.506E+008
	678.62	0.47	2.522E+008		-1.357E+008	1.234E+008
	688.67	0.86	1.362E+008		4.289E+007	6.660E+007
	719.35	0.28	4.565E+008		-3.293E+007	2.236E+008
	778.90	12.96	1.049E+007		-9.629E+006	5.141E+006
	810.45	0.32	5.105E+008		6.027E+007	2.510E+008
	867.37	4.26	4.028E+007		2.713E+007	1.982E+007
	919.33	0.43	3.772E+008		9.478E+007	1.853E+008
	964.08	14.65	1.112E+007		5.877E+006	5.460E+006
	1085.87	10.24	1.276E+007		7.287E+006	6.233E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-152	1089.74	1.73	7.500E+007	5.32E+006	-3.796E+007	3.664E+007
		1112.07	13.69	1.000E+007		8.717E+005	4.891E+006
		1212.95	1.43	9.363E+007		1.087E+008	4.573E+007
		1249.94	0.19	6.563E+008		5.340E+008	3.199E+008
		1299.14	1.63	5.342E+007		-2.351E+006	2.574E+007
		1408.01	21.07	7.256E+006		-6.038E+006	3.551E+006
		1457.64	0.50	5.759E+008		2.957E+009	2.847E+008
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.048E+006	3.04E+006	-1.359E+006	2.506E+006
		247.93	6.89	2.332E+007		2.003E+007	1.154E+007
		591.76	4.95	2.894E+007		-8.559E+005	1.422E+007
		692.42	1.78	6.513E+007		-2.829E+007	3.185E+007
		723.30	20.06	6.373E+006		1.100E+006	3.122E+006
		756.80	4.52	2.752E+007		-1.506E+007	1.347E+007
		873.18	12.08	1.408E+007		-6.069E+004	6.927E+006
		996.29	10.48	1.416E+007		1.226E+007	6.944E+006
		1004.76	18.01	7.868E+006		-1.586E+006	3.854E+006
		1274.43	34.80	3.045E+006		3.619E+006	1.477E+006
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.466E+008	7.35E+006	1.756E+009	1.224E+008
		60.01	1.22	2.579E+008		-6.660E+007	1.280E+008
		86.55	30.70	7.353E+006		3.255E+006	3.650E+006
		105.31	21.10	1.070E+007		8.954E+006	5.316E+006
	Tl-208	583.19	85.00	1.659E+006	1.66E+006	1.937E+006	8.152E+005
	Bi-211	351.07	13.02	1.071E+007	1.07E+007	1.105E+007	5.280E+006
	Pb-211	404.85	3.78	3.215E+007	3.21E+007	-4.491E+006	1.580E+007
		427.09	1.76	6.802E+007		-3.584E+007	3.341E+007
		832.01	3.52	4.870E+007		-1.212E+007	2.396E+007
	Bi-212	39.86	1.06	2.816E+008	1.91E+007	2.290E+009	1.397E+008
		727.33	6.67	1.911E+007		6.290E+006	9.359E+006
		785.37	1.10	1.300E+008		7.051E+007	6.381E+007
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.559E+008	8.03E+006	-4.306E+007	1.767E+008
		238.63*	43.60	8.029E+006		1.014E+007	3.995E+006
		300.09	3.30	4.080E+007		3.718E+007	2.013E+007
	Pb212-XR	74.82	10.28	2.597E+007	1.51E+007	2.852E+007	1.289E+007
		77.11	17.10	1.514E+007		9.126E+006	7.517E+006
		87.35	3.97	5.555E+007		3.772E+007	2.757E+007
		89.78	1.46	1.758E+008		1.628E+007	8.736E+007
	Bi-214	609.32	45.49	3.113E+006	3.11E+006	7.939E+005	1.530E+006
		768.36	4.89	2.584E+007		-3.627E+007	1.265E+007
		806.18	1.26	1.277E+008		7.031E+007	6.280E+007
		934.06	3.11	5.154E+007		1.405E+007	2.531E+007
		1120.29	14.92	9.290E+006		3.888E+006	4.544E+006
		1155.21	1.63	8.777E+007		4.877E+007	4.296E+007
		1238.12	5.83	2.247E+007		1.845E+007	1.097E+007
		1280.98	1.43	7.026E+007		2.632E+007	3.404E+007
		1377.67	3.99	1.822E+007		-1.877E+007	8.703E+006
		1385.31	0.79	1.051E+008		-2.759E+008	5.053E+007
		1401.52	1.33	9.795E+007		-1.052E+008	4.775E+007
		1407.99	2.39	6.386E+007		-5.314E+007	3.125E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Bi-214	1509.21	2.13	5.496E+007	3.11E+006	-6.815E+006	2.669E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.285E+007	3.92E+006	5.067E+007	1.131E+007
		295.22	18.42	7.369E+006		3.720E+006	3.635E+006
		351.93	35.60	3.921E+006		4.046E+006	1.933E+006
		785.96	1.06	1.352E+008		7.332E+007	6.636E+007
	Pb214-XR	74.82	5.80	4.603E+007	2.67E+007	5.055E+007	2.285E+007
		77.11	9.70	2.669E+007		1.609E+007	1.325E+007
		87.35	2.24	9.845E+007		6.685E+007	4.887E+007
		89.78	0.82	3.130E+008		2.899E+007	1.555E+008
	Ra-226	186.21	3.64	4.329E+007	4.33E+007	-3.083E+006	2.143E+007
	Ac-228	129.07	2.42	8.252E+007	6.37E+006	5.375E+007	4.096E+007
		209.25	3.89	4.392E+007		2.388E+007	2.176E+007
		270.24	3.46	3.966E+007		-1.195E+007	1.958E+007
		328.00	2.95	4.668E+007		-3.342E+007	2.302E+007
		338.32	11.27	1.235E+007		-7.658E+006	6.088E+006
		409.46	1.92	6.360E+007		1.620E+007	3.126E+007
		463.00	4.40	2.800E+007		-1.892E+007	1.375E+007
		794.95	4.25	3.545E+007		7.690E+006	1.741E+007
		911.20	25.80	6.367E+006		1.943E+006	3.129E+006
		964.77	4.99	3.264E+007		1.726E+007	1.603E+007
		968.97	15.80	1.029E+007		1.032E+007	5.052E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	8.065E+007		2.840E+007	3.980E+007
		300.07	2.47	5.452E+007		4.967E+007	2.689E+007
		302.65	2.20	6.142E+007		5.596E+007	3.029E+007
		330.06	1.40	9.845E+007		-5.756E+007	4.855E+007
	Th-234	92.38	2.13	1.181E+008	1.18E+008	4.425E+007	5.868E+007
		92.80	2.10	1.196E+008		4.483E+007	5.945E+007
		112.81	0.21	1.027E+009		-3.369E+008	5.101E+008
	U-235	143.76	10.96	1.704E+007	2.79E+006	-1.187E+006	8.452E+006
		163.33	5.08	3.375E+007		-1.049E+007	1.673E+007
		185.71	57.20	2.787E+006		-6.217E+005	1.380E+006
		202.11	1.08	1.607E+008		1.474E+008	7.960E+007
		205.31	5.01	3.420E+007		-5.572E+006	1.694E+007
	Am-241	59.54	35.90	8.864E+006	8.86E+006	-2.289E+006	4.399E+006

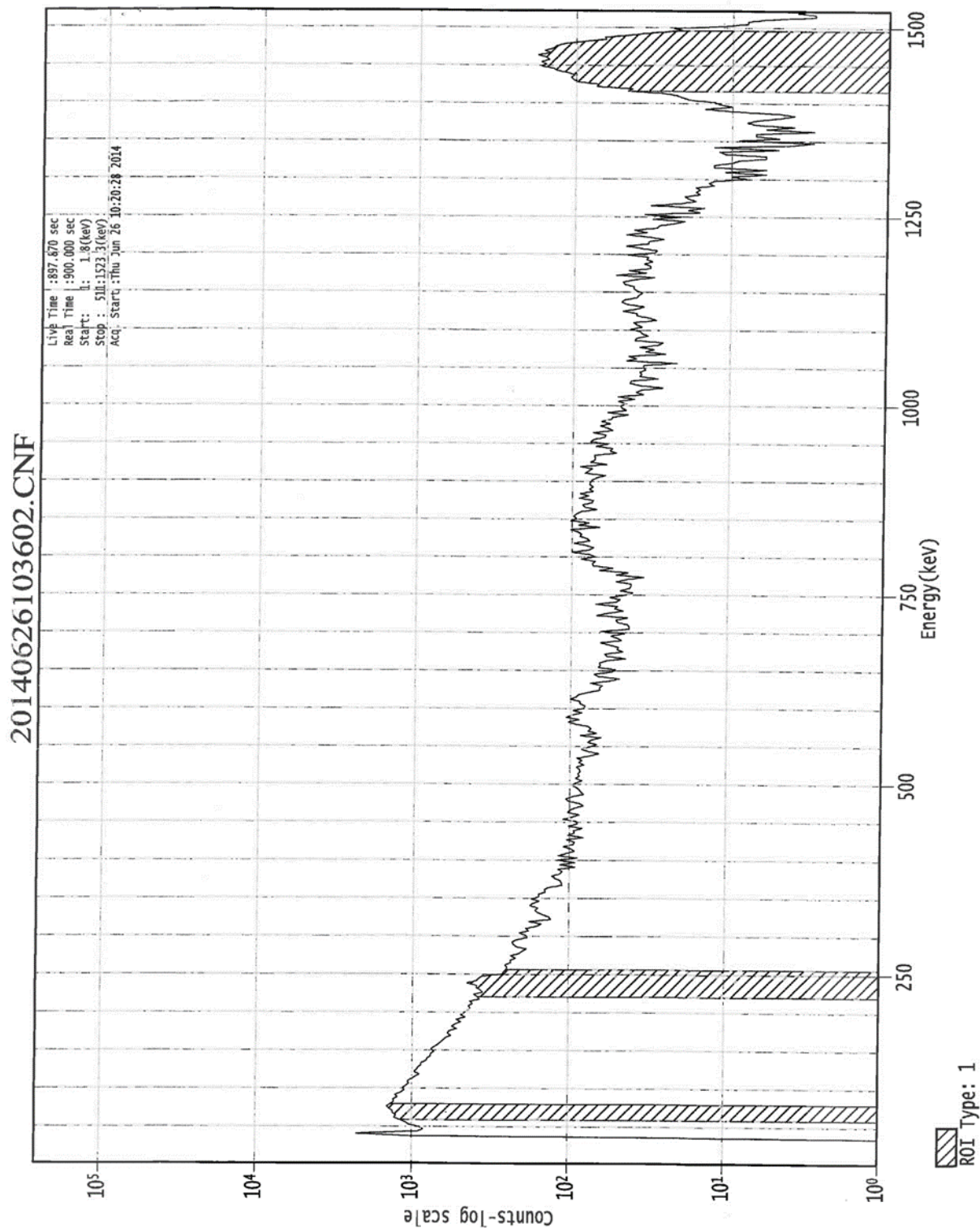
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L Y S I S      *****
*****

Filename: C:\Canberra\6-26-14\20140626111629.cnf

Report Generated On       : 7/14/2014   1:20:45 PM

Sample Title              : Ctt Upper Roof Grid 22
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams

Sample Taken On           : 6/26/2014   10:37:36 AM
Acquisition Started       : 6/26/2014   10:37:36 AM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Rad Time                  : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID               : 1m_EffxArea
```

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst 7-15-14
Date 7-15-14

7/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:20:45 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Upper Roof Grid 22
Peak Analysis Performed on: 7/14/2014 1:20:44 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	20-	27	24.28	71.65	13.47	8.79E+002	444.36	9.57E+003
2	74-	86	80.48	240.08	12.01	7.07E+002	346.33	3.92E+003
3	111-	125	118.16	352.85	21.80	5.06E+002	255.35	1.86E+003
4	195-	213	204.76	611.74	6.97	2.83E+002	245.48	1.42E+003
5	475-	502	489.19	1458.57	45.68	2.46E+003	159.88	4.96E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:20:45 PM Page 3

NUCLIDE IDENTIFICATION REPORT

Sample Title: Ctt Upper Roof Grid 22
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	2.81830E+008	3.05818E+007
Ni-65	0.351	366.27*	4.81	7.59925E+007	4.02833E+007
		1115.53	15.43		
		1481.84*	23.59	1.27355E+008	1.31332E+007
Ru-106	0.975	621.93*	9.93	2.56777E+007	2.25191E+007
		1050.41	1.56		
Cs-134	0.396	475.36	1.48		
		563.25	8.34		
		569.33	15.37		
		604.72*	97.62	2.61196E+006	2.28747E+006
		795.86	85.46		
		801.95	8.69		
		1038.61	0.99		
		1167.97	1.79		
		1365.19	3.02		
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	1.00020E+007	5.16046E+006
		300.09	3.30		
Bi-214	0.999	609.32*	45.49	5.60518E+006	4.90899E+006
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Th-232	0.983	63.81*	0.26	2.39245E+009	1.32205E+009

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:20:45 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.999	1.136630E+008	9.366870E+007
Ni-65	0.351	7.599252E+007	4.023862E+007
? Ru-106	0.975	2.567772E+007	2.251910E+007
? Cs-134	0.396	2.611962E+006	2.287474E+006
X Bi-211	0.999		
Pb-212	0.999	1.000204E+007	5.160462E+006
? Bi-214	0.999	5.605182E+006	4.908985E+006
X Pb-214	0.518		
Th-232	0.983	2.392445E+009	1.322049E+009

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:20:44 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report 7/14/2014 1:20:45 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Upper Roof Grid 22
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	LaBr3	34.70	66.40	3.702E+006	3.70E+006	3.145E+007	1.833E+006
		788.70	33.60	4.489E+006		2.434E+005	2.205E+006
		1436.80	66.40	3.834E+006		-6.793E+005	1.892E+006
+	K-40	1460.82*	10.66	2.398E+007	2.40E+007	2.818E+008	1.183E+007
	Cr-51	320.08	9.91	1.232E+007	1.23E+007	-5.955E+006	6.067E+006
	Mn-54	834.85	99.98	1.735E+006	1.73E+006	1.103E+006	8.537E+005
	Co-58	810.76	99.45	1.691E+006	1.69E+006	1.675E+006	8.321E+005
	Co-60	1173.23	99.85	1.362E+006	7.49E+005	-2.942E+005	6.659E+005
		1332.49	99.98	7.489E+005		2.984E+005	3.585E+005
	Nb-94	702.65	99.81	1.175E+006	1.17E+006	-5.155E+005	5.745E+005
		871.09	99.89	1.650E+006		-1.590E+006	8.110E+005
	Sn-113	255.13	2.11	7.017E+007	1.94E+006	6.215E+006	3.468E+007
		391.70	64.97	1.942E+006		4.854E+005	9.552E+005
+	Cs-134	475.36	1.48	8.437E+007	1.82E+006	4.714E+007	4.144E+007
		563.25	8.34	1.614E+007		-1.256E+007	7.928E+006
		569.33	15.37	9.020E+006		-4.947E+005	4.433E+006
		604.72*	97.62	3.717E+006		2.612E+006	1.846E+006
		795.86	85.46	1.817E+006		-6.416E+005	8.930E+005
		801.95	8.69	1.859E+007		2.203E+007	9.139E+006
		1038.61	0.99	1.313E+008		-4.910E+007	6.415E+007
		1167.97	1.79	7.543E+007		-5.191E+007	3.686E+007
		1365.19	3.02	2.215E+007		-2.233E+007	1.054E+007
	Cs-137	661.66	85.10	1.508E+006	1.51E+006	6.048E+005	7.390E+005
	Eu-152	121.78	28.67	7.058E+006	5.43E+006	1.732E+006	3.503E+006
		244.70	7.61	2.160E+007		4.754E+007	1.069E+007
		295.94	0.45	2.973E+008		7.369E+007	1.466E+008
		344.28	26.60	5.434E+006		3.859E+006	2.680E+006
		367.79	0.86	1.602E+008		3.321E+007	7.894E+007
		411.12	2.24	5.477E+007		-1.352E+007	2.692E+007
		443.96	2.83	4.300E+007		6.216E+006	2.112E+007
		488.68	0.42	2.921E+008		-2.156E+007	1.434E+008
		563.99	0.49	2.742E+008		-2.134E+008	1.347E+008
		586.26	0.46	3.143E+008		-7.778E+007	1.546E+008
		678.62	0.47	2.625E+008		-5.951E+006	1.285E+008
		688.67	0.86	1.406E+008		-7.648E+005	6.880E+007
		719.35	0.28	4.525E+008		2.000E+008	2.216E+008
		778.90	12.96	1.087E+007		-5.304E+006	5.333E+006
		810.45	0.32	5.239E+008		5.188E+008	2.578E+008
		867.37	4.26	3.903E+007		-2.568E+007	1.919E+007
		919.33	0.43	3.855E+008		4.530E+007	1.895E+008
		964.08	14.65	1.136E+007		1.599E+007	5.582E+006
		1085.87	10.24	1.267E+007		-1.237E+006	6.188E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

7/14/2014

1:20:45 PM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-152	1089.74	1.73	7.482E+007	5.43E+006	-5.225E+006	3.655E+007
		1112.07	13.69	9.978E+006		1.471E+006	4.880E+006
		1212.95	1.43	9.653E+007		4.936E+007	4.718E+007
		1249.94	0.19	6.474E+008		3.930E+008	3.154E+008
		1299.14	1.63	5.131E+007		-4.033E+007	2.468E+007
		1408.01	21.07	6.744E+006		-9.124E+006	3.295E+006
		1457.64	0.50	5.717E+008		3.221E+009	2.826E+008
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.005E+006	2.86E+006	1.228E+006	2.485E+006
		247.93	6.89	2.340E+007		2.846E+007	1.157E+007
		591.76	4.95	2.985E+007		-6.967E+006	1.468E+007
		692.42	1.78	6.761E+007		3.166E+007	3.309E+007
		723.30	20.06	6.245E+006		2.871E+005	3.058E+006
		756.80	4.52	2.787E+007		-5.001E+006	1.364E+007
		873.18	12.08	1.365E+007		-1.316E+007	6.712E+006
		996.29	10.48	1.390E+007		-1.842E+006	6.813E+006
		1004.76	18.01	7.783E+006		4.535E+005	3.811E+006
		1274.43	34.80	2.864E+006		-5.001E+005	1.387E+006
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.459E+008	7.17E+006	1.878E+009	1.220E+008
		60.01	1.22	2.522E+008		-3.596E+007	1.251E+008
		86.55	30.70	7.171E+006		-1.212E+006	3.559E+006
		105.31	21.10	1.061E+007		7.447E+006	5.272E+006
	Tl-208	583.19	85.00	1.696E+006	1.70E+006	-2.097E+005	8.340E+005
	Bi-211	351.07*	13.02	2.310E+007	2.31E+007	2.807E+007	1.147E+007
	Pb-211	404.85	3.78	3.291E+007	3.29E+007	-1.044E+007	1.618E+007
		427.09	1.76	6.947E+007		2.070E+007	3.413E+007
		832.01	3.52	4.941E+007		2.955E+007	2.432E+007
	Bi-212	39.86	1.06	2.818E+008	1.88E+007	2.382E+009	1.398E+008
		727.33	6.67	1.881E+007		5.365E+006	9.208E+006
		785.37	1.10	1.338E+008		-1.925E+007	6.571E+007
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.507E+008	8.00E+006	-1.322E+008	1.741E+008
		238.63*	43.60	8.004E+006		1.000E+007	3.983E+006
		300.09	3.30	3.927E+007		4.372E+007	1.936E+007
	Pb212-XR	74.82	10.28	2.592E+007	1.51E+007	3.526E+007	1.287E+007
		77.11	17.10	1.505E+007		1.541E+007	7.473E+006
		87.35	3.97	5.426E+007		3.982E+005	2.693E+007
		89.78	1.46	1.726E+008		2.738E+007	8.577E+007
+	Bi-214	609.32*	45.49	7.977E+006	7.98E+006	5.605E+006	3.962E+006
		768.36	4.89	2.664E+007		-1.506E+007	1.305E+007
		806.18	1.26	1.315E+008		1.310E+008	6.468E+007
		934.06	3.11	5.245E+007		-2.765E+007	2.577E+007
		1120.29	14.92	9.237E+006		1.339E+006	4.518E+006
		1155.21	1.63	8.339E+007		-9.429E+007	4.077E+007
		1238.12	5.83	2.271E+007		2.253E+007	1.109E+007
		1280.98	1.43	6.539E+007		-2.872E+007	3.160E+007
		1377.67	3.99	1.736E+007		-4.776E+007	8.274E+006
		1385.31	0.79	9.988E+007		-4.251E+008	4.790E+007
		1401.52	1.33	9.280E+007		-1.753E+008	4.518E+007
		1407.99	2.39	5.935E+007		-8.030E+007	2.900E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Nuclide MDA Report		7/14/2014 1:20:45 PM		Page 7			
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	Bi-214	1509.21	2.13	5.412E+007	7.98E+006	-1.396E+007	2.627E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99*	7.25	4.813E+007	7.22E+006	6.014E+007	2.395E+007
		295.22	18.42	7.223E+006		1.791E+006	3.562E+006
		351.93*	35.60	8.447E+006		1.027E+007	4.196E+006
		785.96	1.06	1.392E+008		-2.002E+007	6.833E+007
	Pb214-XR	74.82	5.80	4.595E+007	2.65E+007	6.250E+007	2.281E+007
		77.11	9.70	2.653E+007		2.717E+007	1.317E+007
		87.35	2.24	9.616E+007		7.058E+005	4.772E+007
		89.78	0.82	3.073E+008		4.875E+007	1.527E+008
	Ra-226	186.21	3.64	4.345E+007	4.35E+007	-1.103E+007	2.152E+007
	Ac-228	129.07	2.42	8.166E+007	6.50E+006	2.364E+007	4.053E+007
		209.25	3.89	4.395E+007		2.362E+007	2.177E+007
		270.24	3.46	3.978E+007		7.051E+006	1.964E+007
		328.00	2.95	4.599E+007		-1.254E+007	2.267E+007
		338.32	11.27	1.257E+007		-6.218E+004	6.200E+006
		409.46	1.92	6.460E+007		2.378E+007	3.176E+007
		463.00	4.40	2.813E+007		1.651E+007	1.382E+007
		794.95	4.25	3.653E+007		-1.290E+007	1.795E+007
		911.20	25.80	6.502E+006		4.893E+006	3.197E+006
		964.77	4.99	3.336E+007		4.696E+007	1.639E+007
		968.97	15.80	1.030E+007		1.917E+006	5.057E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	7.995E+007		2.183E+007	3.945E+007
		300.07	2.47	5.247E+007		5.841E+007	2.586E+007
		302.65	2.20	5.912E+007		6.581E+007	2.914E+007
		330.06	1.40	9.769E+007		-9.057E+006	4.816E+007
	Th-234	92.38	2.13	1.157E+008	1.16E+008	-9.910E+006	5.747E+007
		92.80	2.10	1.172E+008		-1.004E+007	5.822E+007
		112.81	0.21	1.014E+009		1.195E+008	5.035E+008
	U-235	143.76	10.96	1.700E+007	2.80E+006	-8.159E+005	8.433E+006
		163.33	5.08	3.391E+007		-7.361E+006	1.681E+007
		185.71	57.20	2.800E+006		-2.171E+006	1.387E+006
		202.11	1.08	1.612E+008		7.223E+007	7.989E+007
		205.31	5.01	3.451E+007		2.864E+007	1.710E+007
	Am-241	59.54	35.90	8.668E+006	8.67E+006	-1.236E+006	4.301E+006

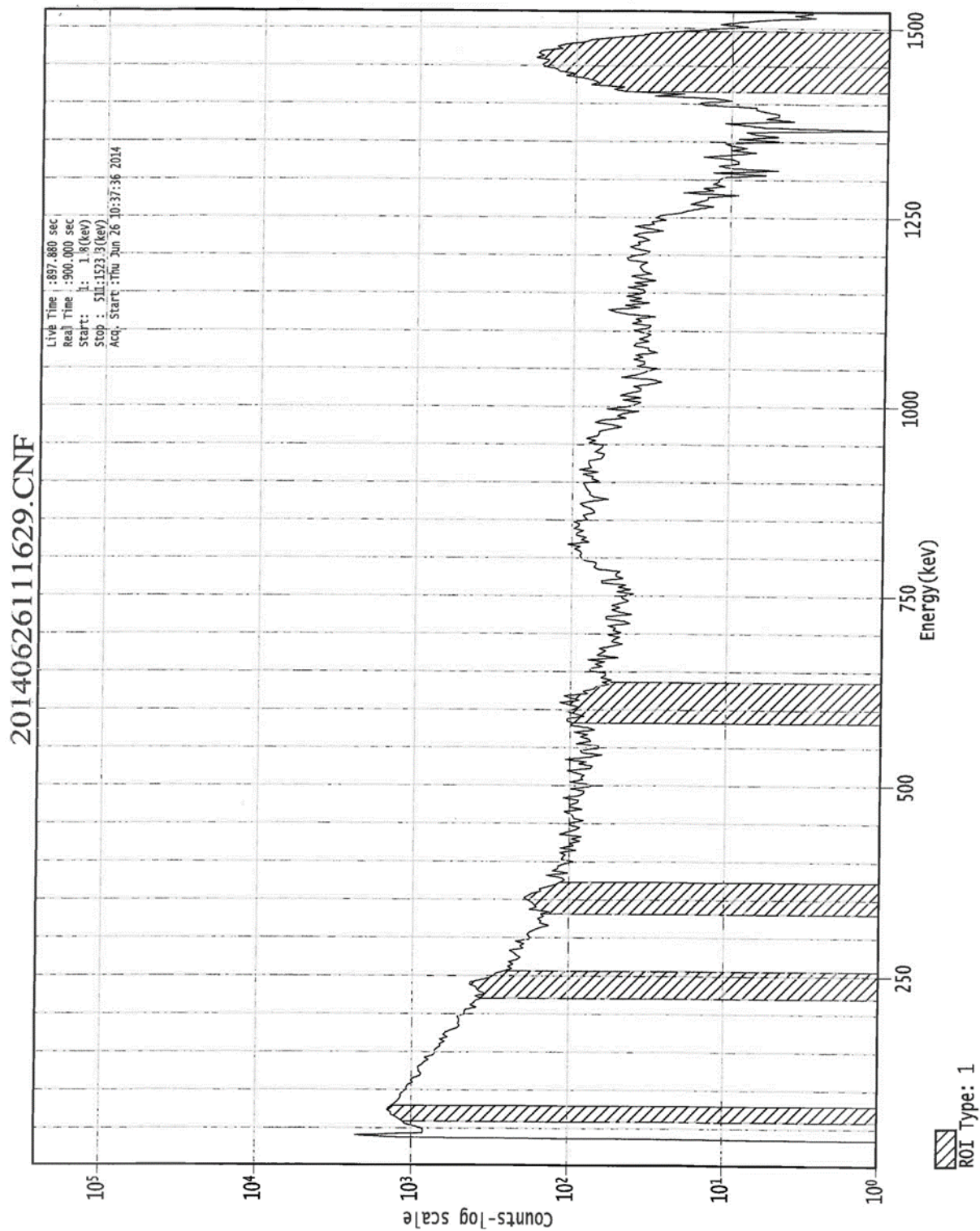
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L Y S I S      ***
*****

Filename: C:\Canberra\6-26-14\20140626125248.cnf

Report Generated On       : 7/14/2014   1:25:18 PM

Sample Title              : Ctt Mid Roof Grid 37
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams

Sample Taken On           : 6/26/2014   12:28:19 PM
Acquisition Started       : 6/26/2014   12:28:19 PM

Live Time                 : 897.9 seconds
Dead Time                  : 900.0 seconds

Rad Time                  : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID               : 1m_EffxArea
```

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst 7-8

Date 7-14-14

[Signature]
7/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:25:18 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Mid Roof Grid 37
Peak Analysis Performed on: 7/14/2014 1:25:17 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	20-	27	24.05	70.95	9.42	4.88E+002	431.14	9.05E+003
2	75-	87	81.31	242.56	12.20	8.09E+002	322.76	3.38E+003
3	475-	502	489.26	1458.75	42.28	2.45E+003	162.71	5.22E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:25:18 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Mid Roof Grid 37
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	2.80998E+008	3.07201E+007
Pb-212	0.996	115.18	0.60		
		238.63*	43.60	1.14948E+007	4.94836E+006
		300.09	3.30		
Th-227	0.421	50.13	8.40		
		79.69	1.95		
		94.97	0.03		
		210.62	1.25		
		235.96*	12.90	3.88506E+007	1.79672E+007
		256.23	7.00		
		286.09	1.74		
		299.98	2.21		
		304.50	1.15		
		329.85	2.90		
		334.37	1.14		
Th-232	0.986	63.81*	0.26	1.34081E+009	1.22186E+009

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:25:18 PM Page 4

 *** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.999	2.809976E+008	3.072014E+007
? Pb-212	0.996	1.149478E+007	4.948357E+006
? Th-227	0.421	3.885058E+007	1.796721E+007
Th-232	0.986	1.340811E+009	1.221860E+009

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:25:17 PM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report 7/14/2014 1:25:18 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Mid Roof Grid 37
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	LaBr3	34.70	66.40	3.687E+006	3.69E+006	3.209E+007	1.825E+006
		788.70	33.60	4.438E+006		-1.027E+006	2.180E+006
		1436.80	66.40	3.829E+006		-1.324E+005	1.890E+006
+	K-40	1460.82*	10.66	2.468E+007	2.47E+007	2.810E+008	1.218E+007
	Cr-51	320.08	9.91	1.245E+007	1.25E+007	-2.570E+006	6.132E+006
	Mn-54	834.85	99.98	1.698E+006	1.70E+006	1.408E+005	8.352E+005
	Co-58	810.76	99.45	1.696E+006	1.70E+006	1.947E+006	8.347E+005
	Co-60	1173.23	99.85	1.348E+006	7.30E+005	-7.992E+005	6.586E+005
		1332.49	99.98	7.298E+005		-2.932E+005	3.489E+005
	Nb-94	702.65	99.81	1.156E+006	1.16E+006	3.495E+005	5.650E+005
		871.09	99.89	1.624E+006		-6.939E+005	7.984E+005
	Sn-113	255.13	2.11	6.764E+007	1.91E+006	3.582E+006	3.342E+007
		391.70	64.97	1.909E+006		-3.621E+005	9.385E+005
	Cs-134	475.36	1.48	8.041E+007	1.44E+006	2.298E+007	3.946E+007
		563.25	8.34	1.603E+007		-4.381E+006	7.871E+006
		569.33	15.37	8.823E+006		-3.550E+006	4.334E+006
		604.72	97.62	1.438E+006		-4.734E+005	7.065E+005
		795.86	85.46	1.834E+006		2.412E+006	9.014E+005
		801.95	8.69	1.852E+007		1.728E+007	9.104E+006
		1038.61	0.99	1.267E+008		-1.904E+008	6.189E+007
		1167.97	1.79	7.663E+007		2.955E+007	3.746E+007
		1365.19	3.02	2.183E+007		2.172E+006	1.038E+007
	Cs-137	661.66	85.10	1.387E+006	1.39E+006	7.187E+005	6.786E+005
	Eu-152	121.78	28.67	6.954E+006	5.26E+006	-1.752E+006	3.452E+006
		244.70	7.61	2.062E+007		1.977E+007	1.020E+007
		295.94	0.45	2.901E+008		1.432E+008	1.430E+008
		344.28	26.60	5.264E+006		3.554E+005	2.596E+006
		367.79	0.86	1.539E+008		4.865E+007	7.581E+007
		411.12	2.24	5.503E+007		4.687E+007	2.705E+007
		443.96	2.83	4.170E+007		-3.985E+007	2.047E+007
		488.68	0.42	2.840E+008		2.076E+007	1.393E+008
		563.99	0.49	2.723E+008		-7.444E+007	1.337E+008
		586.26	0.46	3.110E+008		3.208E+008	1.529E+008
		678.62	0.47	2.478E+008		-2.500E+007	1.212E+008
		688.67	0.86	1.344E+008		4.606E+006	6.571E+007
		719.35	0.28	4.400E+008		1.042E+008	2.154E+008
		778.90	12.96	1.076E+007		-8.214E+006	5.277E+006
		810.45	0.32	5.255E+008		6.032E+008	2.586E+008
		867.37	4.26	3.818E+007		-1.561E+007	1.877E+007
		919.33	0.43	3.723E+008		5.254E+006	1.829E+008
		964.08	14.65	1.085E+007		4.141E+006	5.330E+006
		1085.87	10.24	1.314E+007		9.224E+005	6.425E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
> Eu-152	1089.74	1.73	7.912E+007	5.26E+006	6.653E+007	3.870E+007
	1112.07	13.69	1.010E+007		3.468E+006	4.941E+006
	1212.95	1.43	9.400E+007		6.168E+007	4.592E+007
	1249.94	0.19	6.364E+008		1.736E+008	3.100E+008
	1299.14	1.63	5.396E+007		3.707E+007	2.601E+007
	1408.01	21.07	6.480E+006		-3.471E+006	3.163E+006
	1457.64	0.50	5.747E+008		3.104E+009	2.841E+008
	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	> Eu-154	123.07	40.40	2.94E+006	-1.242E+006	2.448E+006
		247.93	6.89		3.583E+007	1.105E+007
		591.76	4.95		4.173E+006	1.406E+007
		692.42	1.78		1.632E+007	3.170E+007
		723.30	20.06		-8.760E+003	2.985E+006
		756.80	4.52		-2.032E+006	1.345E+007
		873.18	12.08		-5.742E+006	6.608E+006
		996.29	10.48		-5.042E+006	6.821E+006
		1004.76	18.01		-4.875E+006	3.851E+006
		1274.43	34.80		-8.370E+005	1.425E+006
> Eu-155	1596.48	1.80	0.000E+000	6.99E+006	0.000E+000	0.000E+000
	45.30	1.31	2.431E+008		1.894E+009	1.206E+008
	60.01	1.22	2.443E+008		-2.835E+007	1.212E+008
	86.55	30.70	6.993E+006		3.226E+005	3.470E+006
Tl-208	105.31	21.10	1.036E+007	1.67E+006	-1.897E+006	5.143E+006
Bi-211	583.19	85.00	1.670E+006		9.171E+005	8.209E+005
Pb-211	351.07	13.02	1.071E+007		1.014E+007	5.280E+006
Pb-211	404.85	3.78	3.285E+007		3.122E+007	1.615E+007
Bi-212	427.09	1.76	6.779E+007	1.82E+007	-4.111E+007	3.329E+007
	832.01	3.52	4.846E+007		8.843E+005	2.384E+007
	39.86	1.06	2.778E+008		2.212E+009	1.378E+008
	727.33	6.67	1.819E+007		-1.113E+007	8.899E+006
> Pb-212	785.37	1.10	1.322E+008	7.46E+006	-5.723E+007	6.491E+007
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	115.18	0.60	3.473E+008		1.919E+008	1.724E+008
	238.63*	43.60	7.465E+006		1.149E+007	3.713E+006
Pb212-XR	300.09	3.30	3.905E+007	1.44E+007	3.046E+007	1.925E+007
	74.82	10.28	2.460E+007		7.934E+006	1.221E+007
	77.11	17.10	1.442E+007		1.708E+007	7.156E+006
	87.35	3.97	5.309E+007		1.653E+007	2.634E+007
Bi-214	89.78	1.46	1.684E+008	3.09E+006	3.823E+007	8.364E+007
	609.32	45.49	3.087E+006		4.501E+006	1.517E+006
	768.36	4.89	2.631E+007		-3.247E+007	1.288E+007
	806.18	1.26	1.312E+008		1.384E+008	6.455E+007
	934.06	3.11	5.029E+007		1.686E+007	2.469E+007
	1120.29	14.92	9.190E+006		-6.264E+006	4.495E+006
	1155.21	1.63	8.363E+007		-5.179E+007	4.089E+007
	1238.12	5.83	2.220E+007		9.919E+006	1.083E+007
	1280.98	1.43	6.803E+007		-4.623E+007	3.292E+007
	1377.67	3.99	1.765E+007		-2.240E+007	8.419E+006
+	1385.31	0.79	1.014E+008	3.09E+006	-2.083E+008	4.866E+007
	1401.52	1.33	8.868E+007		-7.097E+007	4.312E+007
	1407.99	2.39	5.703E+007		-3.055E+007	2.784E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

7/14/2014

1:25:18 PM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Bi-214	1509.21	2.13	5.550E+007	3.09E+006	-2.269E+007	2.696E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.203E+007	3.92E+006	3.444E+007	1.090E+007
		295.22	18.42	7.049E+006		3.478E+006	3.475E+006
		351.93	35.60	3.921E+006		3.713E+006	1.933E+006
		785.96	1.06	1.375E+008		-5.951E+007	6.750E+007
	Pb214-XR	74.82	5.80	4.360E+007	2.54E+007	1.406E+007	2.164E+007
		77.11	9.70	2.542E+007		3.012E+007	1.261E+007
		87.35	2.24	9.409E+007		2.930E+007	4.669E+007
		89.78	0.82	2.998E+008		6.807E+007	1.489E+008
	Ra-226	186.21	3.64	4.269E+007	4.27E+007	6.603E+007	2.113E+007
	Ac-228	129.07	2.42	8.068E+007	6.25E+006	3.292E+007	4.004E+007
		209.25	3.89	4.178E+007		-3.989E+007	2.069E+007
		270.24	3.46	3.830E+007		6.894E+006	1.890E+007
		328.00	2.95	4.604E+007		-4.999E+007	2.270E+007
		338.32	11.27	1.235E+007		-7.304E+006	6.090E+006
		409.46	1.92	6.410E+007		-2.324E+007	3.151E+007
		463.00	4.40	2.703E+007		2.147E+006	1.327E+007
		794.95	4.25	3.687E+007		4.848E+007	1.812E+007
		911.20	25.80	6.249E+006		1.888E+006	3.070E+006
		964.77	4.99	3.187E+007		1.216E+007	1.565E+007
		968.97	15.80	9.963E+006		6.699E+006	4.891E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	7.706E+007		-2.009E+007	3.800E+007
		300.07	2.47	5.217E+007		4.070E+007	2.571E+007
		302.65	2.20	5.878E+007		4.586E+007	2.897E+007
		330.06	1.40	9.757E+007		-3.929E+007	4.811E+007
	Th-234	92.38	2.13	1.133E+008	1.13E+008	8.092E+007	5.626E+007
		92.80	2.10	1.147E+008		8.197E+007	5.700E+007
		112.81	0.21	1.001E+009		3.730E+008	4.971E+008
	U-235	143.76	10.96	1.673E+007	2.74E+006	-3.139E+006	8.297E+006
		163.33	5.08	3.348E+007		2.930E+007	1.659E+007
		185.71	57.20	2.738E+006		2.539E+006	1.356E+006
		202.11	1.08	1.539E+008		-2.163E+007	7.623E+007
		205.31	5.01	3.286E+007		1.574E+006	1.627E+007
	Am-241	59.54	35.90	8.396E+006	8.40E+006	-9.745E+005	4.165E+006

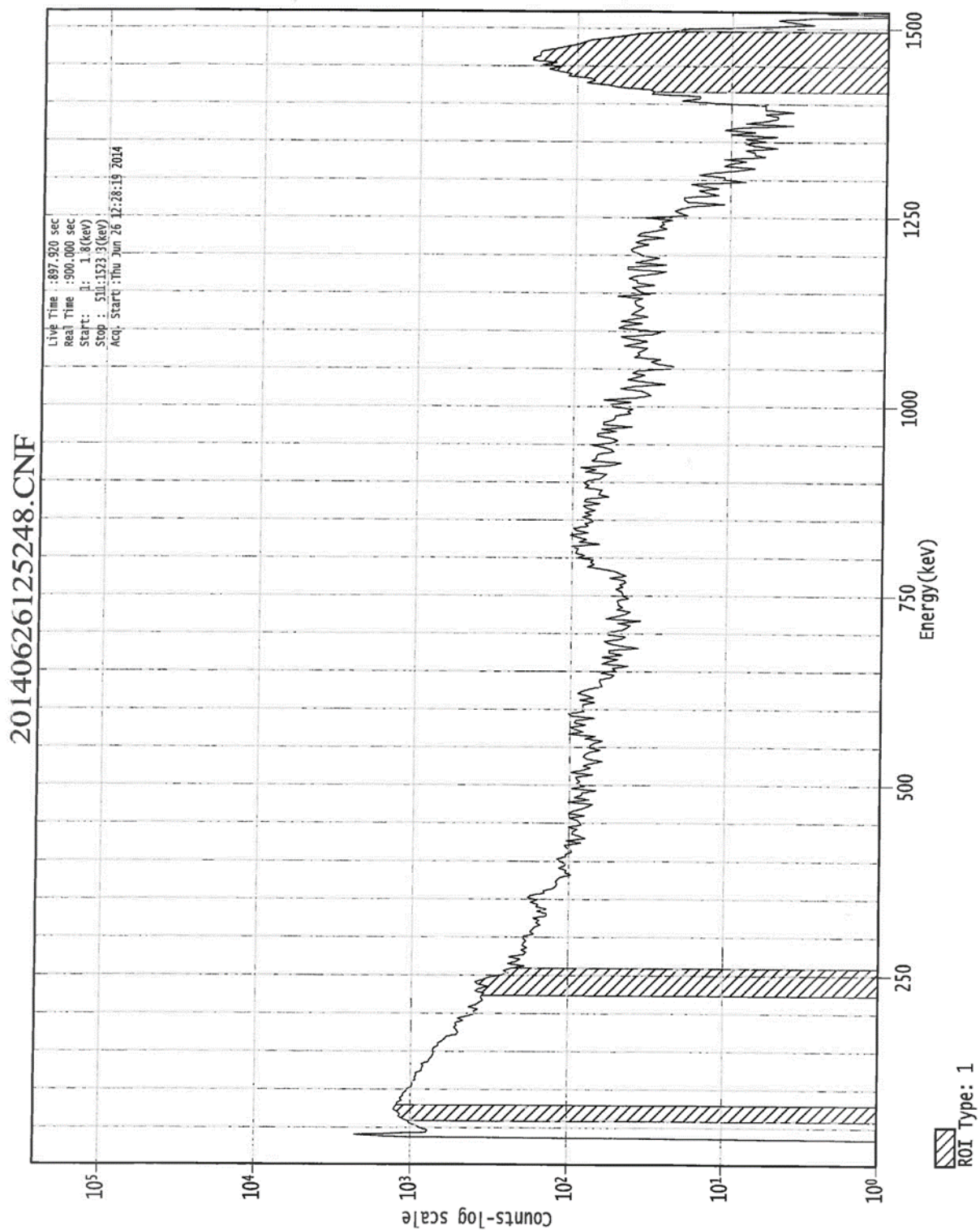
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\6-26-14\20140626122720.cnf

Report Generated On : 7/14/2014 1:24:14 PM

Sample Title : Ctt Mid Roof Grid 38
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Grams

Sample Taken On : 6/26/2014 11:53:18 AM
Acquisition Started : 6/26/2014 11:53:18 AM

Live Time : 897.9 seconds
Real Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID : 1m_EffxArea

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst
Date 7-14-14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:24:14 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Mid Roof Grid 38
Peak Analysis Performed on: 7/14/2014 1:24:13 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	22-	29	26.38	77.94	10.03	7.15E+002	422.07	8.66E+003
2	74-	85	80.15	239.07	11.04	2.84E+002	310.18	3.40E+003
3	111-	125	118.51	353.91	9.94	3.10E+002	251.66	1.82E+003
4	196-	214	205.82	614.92	18.45	3.61E+002	216.56	1.10E+003
5	475-	502	488.88	1457.65	48.21	2.27E+003	178.69	7.16E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:24:14 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Mid Roof Grid 38
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
K-40	0.997	1460.82*	10.66	2.60294E+008	3.05078E+007
Ni-65	0.346	366.27*	4.81	4.65622E+007	3.85926E+007
		1115.53	15.43		
		1481.84*	23.59	1.17623E+008	1.32014E+007
Ru-106	0.988	621.93*	9.93	3.28108E+007	2.01359E+007
		1050.41	1.56		
Cs-134	0.389	475.36	1.48		
		563.25	8.34		
		569.33	15.37		
		604.72*	97.62	3.33754E+006	2.04241E+006
		795.86	85.46		
		801.95	8.69		
		1038.61	0.99		
		1167.97	1.79		
		1365.19	3.02		
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	4.01574E+006	4.42919E+006
		300.09	3.30		
Pb212-XR	0.509	74.82	10.28		
		77.11*	17.10	2.75746E+007	1.72421E+007
		87.35	3.97		
		89.78	1.46		
Bi-214	0.996	609.32*	45.49	7.16226E+006	4.38321E+006
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb214-XR	0.510	74.82	5.80		
		77.11*	9.70	4.86109E+007	3.07222E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:24:14 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
Pb214-XR	0.510	87.35	2.24		
		89.78	0.82		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:24:14 PM Page 5

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
K-40	0.997	1.572547E+008	9.022514E+007
Ni-65	0.346	4.656221E+007	3.857512E+007
? Ru-106	0.988	3.281079E+007	2.013588E+007
? Cs-134	0.389	3.337545E+006	2.042412E+006
X Bi-211	0.998		
Pb-212	1.000	4.015738E+006	4.429193E+006
? Pb212-XR	0.509	2.757458E+007	1.724212E+007
? Bi-214	0.996	7.162258E+006	4.383206E+006
X Pb-214	0.517		
? Pb214-XR	0.510	4.861086E+007	3.072220E+007

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:24:13 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Mid Roof Grid 38
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	LaBr3	34.70	66.40	3.642E+006	3.64E+006	2.943E+007	1.803E+006
		788.70	33.60	4.330E+006		-1.705E+006	2.125E+006
		1436.80	66.40	3.830E+006		8.030E+004	1.890E+006
+	K-40	1460.82*	10.66	2.882E+007	2.88E+007	2.603E+008	1.426E+007
	Cr-51	320.08	9.91	1.216E+007	1.22E+007	3.334E+005	5.983E+006
	Mn-54	834.85	99.98	1.703E+006	1.70E+006	5.695E+005	8.381E+005
	Co-58	810.76	99.45	1.660E+006	1.66E+006	2.108E+006	8.167E+005
	Co-60	1173.23	99.85	1.364E+006	6.88E+005	-2.026E+005	6.669E+005
		1332.49	99.98	6.875E+005		-1.932E+005	3.278E+005
	Nb-94	702.65	99.81	1.165E+006	1.17E+006	7.598E+005	5.697E+005
		871.09	99.89	1.578E+006		-5.739E+005	7.752E+005
	Sn-113	255.13	2.11	6.586E+007	1.83E+006	-1.007E+007	3.252E+007
		391.70	64.97	1.831E+006		1.288E+005	8.999E+005
+	Cs-134	475.36	1.48	7.969E+007	1.79E+006	-3.411E+007	3.910E+007
		563.25	8.34	1.550E+007		-1.672E+007	7.607E+006
		569.33	15.37	8.596E+006		-6.305E+006	4.221E+006
		604.72*	97.62	3.268E+006		3.338E+006	1.622E+006
		795.86	85.46	1.791E+006		8.714E+005	8.799E+005
		801.95	8.69	1.829E+007		1.892E+007	8.991E+006
		1038.61	0.99	1.273E+008		1.686E+007	6.215E+007
		1167.97	1.79	7.513E+007		-2.985E+007	3.671E+007
		1365.19	3.02	2.100E+007		-1.807E+007	9.967E+006
	Cs-137	661.66	85.10	1.388E+006	1.39E+006	1.505E+006	6.790E+005
	Eu-152	121.78	28.67	6.752E+006	5.18E+006	-5.032E+004	3.351E+006
		244.70	7.61	1.970E+007		1.458E+007	9.740E+006
		295.94	0.45	2.905E+008		2.888E+007	1.432E+008
		344.28	26.60	5.184E+006		1.470E+006	2.555E+006
		367.79	0.86	1.507E+008		-2.297E+007	7.418E+007
		411.12	2.24	5.160E+007		-4.239E+007	2.534E+007
		443.96	2.83	4.212E+007		-4.348E+006	2.068E+007
		488.68	0.42	2.806E+008		4.017E+007	1.377E+008
		563.99	0.49	2.633E+008		-2.840E+008	1.292E+008
		586.26	0.46	2.948E+008		-1.026E+008	1.448E+008
		678.62	0.47	2.528E+008		1.482E+008	1.237E+008
		688.67	0.86	1.344E+008		-5.361E+007	6.571E+007
		719.35	0.28	4.444E+008		-2.310E+008	2.176E+008
		778.90	12.96	1.050E+007		-8.246E+006	5.147E+006
		810.45	0.32	5.143E+008		6.530E+008	2.530E+008
		867.37	4.26	3.757E+007		-2.914E+006	1.846E+007
		919.33	0.43	3.807E+008		1.214E+008	1.871E+008
		964.08	14.65	1.086E+007		-7.830E+005	5.335E+006
		1085.87	10.24	1.200E+007		-2.497E+006	5.857E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
> Eu-152	1089.74	1.73	7.164E+007	5.18E+006	-1.693E+007	3.496E+007
	1112.07	13.69	9.713E+006		5.428E+006	4.747E+006
	1212.95	1.43	9.309E+007		-6.028E+006	4.546E+007
	1249.94	0.19	6.338E+008		6.741E+008	3.087E+008
	1299.14	1.63	4.851E+007		-8.458E+006	2.328E+007
	1408.01	21.07	6.727E+006		-2.611E+006	3.286E+006
	1457.64	0.50	5.769E+008		3.457E+009	2.851E+008
	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
> Eu-154	123.07	40.40	4.789E+006	2.85E+006	-3.569E+004	2.376E+006
	247.93	6.89	2.152E+007		-2.396E+006	1.064E+007
	591.76	4.95	2.779E+007		-9.979E+006	1.365E+007
	692.42	1.78	6.536E+007		1.643E+007	1.396E+007
	723.30	20.06	6.184E+006		-3.289E+006	3.028E+006
	756.80	4.52	2.755E+007		-3.459E+007	1.349E+007
	873.18	12.08	1.306E+007		-4.749E+006	6.415E+006
	996.29	10.48	1.329E+007		-1.533E+007	6.509E+006
	1004.76	18.01	7.543E+006		3.694E+006	3.691E+006
	1274.43	34.80	2.847E+006		-1.228E+005	1.378E+006
> Eu-155	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	45.30	1.31	2.420E+008	6.91E+006	1.899E+009	1.201E+008
	60.01	1.22	2.356E+008		-7.600E+007	1.168E+008
	86.55	30.70	6.910E+006		1.643E+006	3.429E+006
	105.31	21.10	1.021E+007		1.113E+007	5.071E+006
Tl-208	583.19	85.00	1.575E+006	1.57E+006	-6.418E+005	7.734E+005
Bi-211	351.07*	13.02	2.293E+007	2.29E+007	1.720E+007	1.139E+007
Pb-211	404.85	3.78	3.091E+007	3.09E+007	6.589E+005	1.518E+007
	427.09	1.76	6.708E+007		3.805E+007	3.294E+007
	832.01	3.52	4.855E+007		3.034E+007	2.389E+007
> Bi-212	39.86	1.06	2.762E+008	1.88E+007	2.160E+009	1.370E+008
	727.33	6.67	1.878E+007		2.707E+006	9.196E+006
	785.37	1.10	1.289E+008		-5.056E+007	6.323E+007
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+ > Pb-212	115.18	0.60	3.382E+008	7.20E+006	3.836E+007	1.678E+008
	238.63*	43.60	7.203E+006		4.016E+006	3.582E+006
	300.09	3.30	3.933E+007		5.395E+007	1.939E+007
+ Pb212-XR	74.82	10.28	2.420E+007	2.42E+007	1.663E+007	1.201E+007
	77.11*	17.10	2.668E+007		2.757E+007	1.329E+007
	87.35	3.97	5.195E+007		-1.780E+006	2.577E+007
	89.78	1.46	1.656E+008		2.655E+007	8.228E+007
+ Bi-214	609.32*	45.49	7.014E+006	7.01E+006	7.162E+006	3.480E+006
	768.36	4.89	2.626E+007		-3.165E+007	1.286E+007
	806.18	1.26	1.281E+008		9.208E+007	6.298E+007
	934.06	3.11	5.158E+007		1.232E+007	2.534E+007
	1120.29	14.92	8.906E+006		-2.658E+006	4.352E+006
	1155.21	1.63	8.231E+007		-1.694E+007	4.023E+007
	1238.12	5.83	2.196E+007		2.128E+007	1.072E+007
	1280.98	1.43	6.539E+007		1.390E+007	3.160E+007
	1377.67	3.99	1.608E+007		-4.410E+007	7.632E+006
	1385.31	0.79	9.962E+007		-1.827E+008	4.777E+007
	1401.52	1.33	8.950E+007		-5.675E+007	4.353E+007
	1407.99	2.39	5.921E+007		-2.298E+007	2.892E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	Bi-214	1509.21	2.13	5.604E+007	7.01E+006	-4.811E+005	2.723E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99*	7.25	4.331E+007	7.06E+006	2.415E+007	2.154E+007
		295.22	18.42	7.057E+006		7.018E+005	3.479E+006
		351.93*	35.60	8.385E+006		6.291E+006	4.165E+006
		785.96	1.06	1.340E+008		-5.258E+007	6.575E+007
+	Pb214-XR	74.82	5.80	4.290E+007	4.29E+007	2.947E+007	2.129E+007
		77.11*	9.70	4.703E+007		4.861E+007	2.342E+007
		87.35	2.24	9.207E+007		-3.154E+006	4.568E+007
		89.78	0.82	2.949E+008		4.727E+007	1.465E+008
	Ra-226	186.21	3.64	4.177E+007	4.18E+007	-1.738E+007	2.068E+007
	Ac-228	129.07	2.42	7.799E+007	6.23E+006	4.364E+006	3.869E+007
		209.25	3.89	4.214E+007		3.093E+007	2.086E+007
		270.24	3.46	3.866E+007		1.740E+007	1.907E+007
		328.00	2.95	4.428E+007		-2.032E+007	2.182E+007
		338.32	11.27	1.188E+007		-1.892E+006	5.856E+006
		409.46	1.92	6.061E+007		-1.335E+007	2.976E+007
		463.00	4.40	2.730E+007		1.255E+007	1.340E+007
		794.95	4.25	3.600E+007		1.752E+007	1.769E+007
		911.20	25.80	6.231E+006		-5.195E+005	3.061E+006
		964.77	4.99	3.190E+007		-2.299E+006	1.567E+007
		968.97	15.80	9.848E+006		6.593E+006	4.833E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	7.744E+007		-3.405E+007	3.820E+007
		300.07	2.47	5.255E+007		7.207E+007	2.590E+007
		302.65	2.20	5.920E+007		8.120E+007	2.918E+007
		330.06	1.40	9.416E+007		-2.853E+007	4.640E+007
	Th-234	92.38	2.13	1.109E+008	1.11E+008	-1.523E+007	5.509E+007
		92.80	2.10	1.124E+008		-1.543E+007	5.581E+007
		112.81	0.21	9.803E+008		3.681E+008	4.866E+008
	U-235	143.76	10.96	1.619E+007	2.70E+006	-4.307E+005	8.027E+006
		163.33	5.08	3.219E+007		-8.128E+006	1.595E+007
		185.71	57.20	2.699E+006		1.459E+006	1.336E+006
		202.11	1.08	1.548E+008		7.779E+007	7.670E+007
		205.31	5.01	3.304E+007		1.910E+007	1.636E+007
	Am-241	59.54	35.90	8.096E+006	8.10E+006	-2.612E+006	4.015E+006

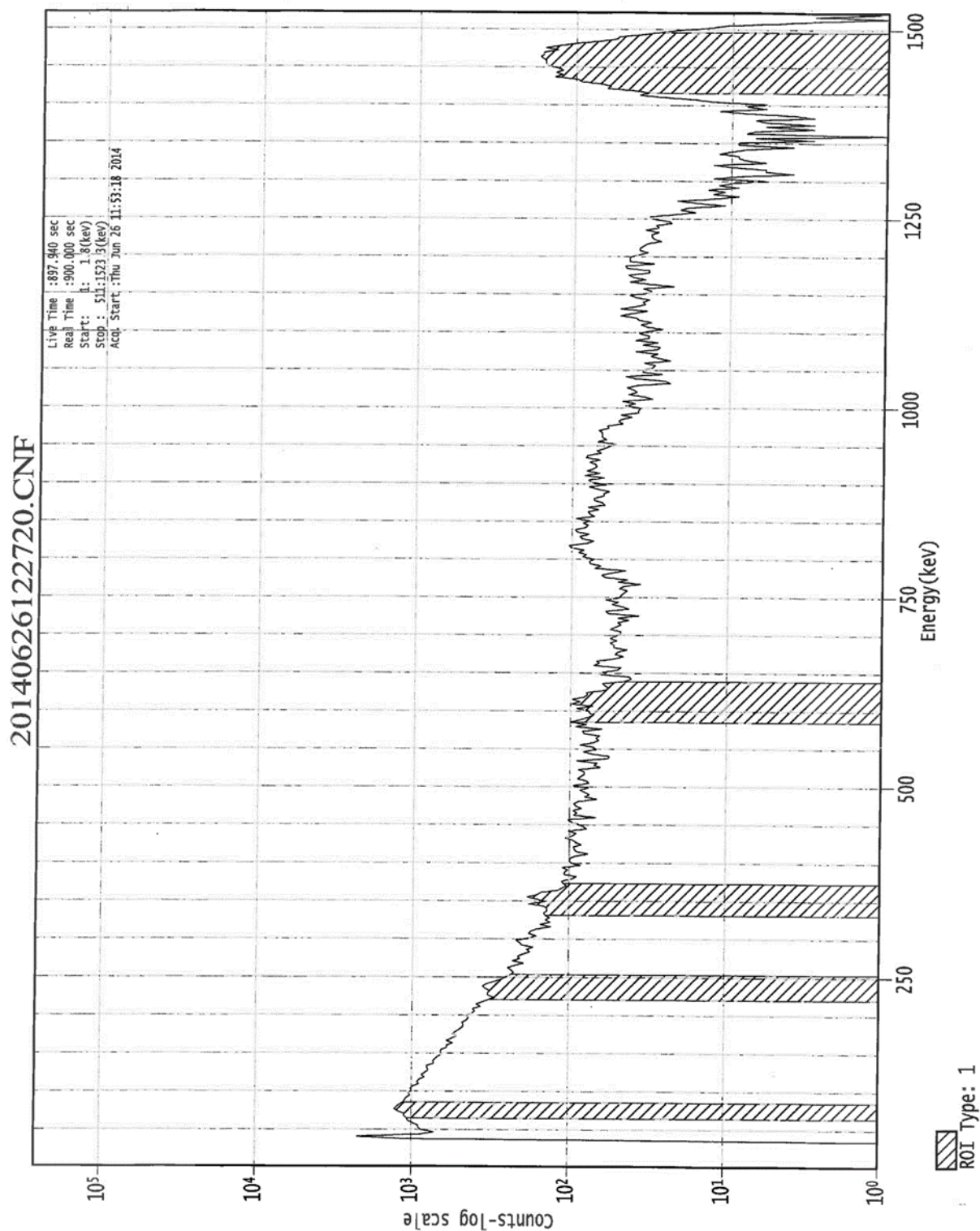
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L Y S I S      ***
*****

Filename: C:\Canberra\6-26-14\20140626115134.cnf

Report Generated On       : 7/14/2014   1:23:04 PM

Sample Title              : Ctt Mid Roof Grid 40
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams

Sample Taken On           : 6/26/2014 11:36:17 AM
Acquisition Started       : 6/26/2014 11:36:17 AM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Background Time           : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID              : 1m_EffxArea
```

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst JS
Date 7-14-14

du
7/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:23:04 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Mid Roof Grid 40
Peak Analysis Performed on: 7/14/2014 1:23:03 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	21-	28	24.78	73.15	6.27	6.26E+002	418.28	8.49E+003
2	74-	86	80.59	240.40	13.09	4.58E+002	321.63	3.38E+003
3	109-	123	116.36	347.47	12.57	3.30E+002	246.41	1.75E+003
4	475-	502	489.20	1458.60	39.25	2.28E+003	169.42	6.20E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:23:04 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Mid Roof Grid 40
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.999	1460.82*	10.66	2.61814E+008	2.99078E+007
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	6.47938E+006	4.67230E+006
		300.09	3.30		
Pb-214	0.515	241.99*	7.25	3.89603E+007	2.80807E+007
		295.22	18.42		
		351.93*	35.60	6.65771E+006	5.08218E+006
		785.96	1.06		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:23:04 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.999	2.618145E+008	2.990780E+007
X	Bi-211	0.996		
	Pb-212	0.999	5.372153E+006	4.745804E+006
	Pb-214	0.515	6.657711E+006	5.082113E+006

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:23:03 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	73.15	6.9695E-001	66.84		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Slide MDA Report 7/14/2014 1:23:04 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Mid Roof Grid 40
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
LaBr3	34.70	66.40	3.580E+006	3.58E+006	2.914E+007	1.772E+006
	788.70	33.60	4.346E+006		4.442E+006	2.133E+006
	1436.80	66.40	3.904E+006		-3.913E+005	1.927E+006
+ K-40	1460.82*	10.66	2.671E+007	2.67E+007	2.618E+008	1.320E+007
Cr-51	320.08	9.91	1.157E+007	1.16E+007	1.253E+006	5.692E+006
Mn-54	834.85	99.98	1.650E+006	1.65E+006	1.652E+005	8.114E+005
Co-58	810.76	99.45	1.648E+006	1.65E+006	2.667E+006	8.103E+005
Co-60	1173.23	99.85	1.346E+006	7.23E+005	9.105E+005	6.576E+005
	1332.49	99.98	7.232E+005		3.956E+005	3.457E+005
Nb-94	702.65	99.81	1.123E+006	1.12E+006	-7.389E+004	5.488E+005
	871.09	99.89	1.629E+006		-6.157E+004	8.009E+005
Sn-113	255.13	2.11	6.479E+007	1.79E+006	1.965E+007	3.199E+007
	391.70	64.97	1.794E+006		-9.857E+005	8.814E+005
Cs-134	475.36	1.48	7.948E+007	1.41E+006	-1.890E+007	3.899E+007
	563.25	8.34	1.463E+007		-7.461E+006	7.173E+006
	569.33	15.37	8.058E+006		-4.707E+006	3.952E+006
	604.72	97.62	1.410E+006		5.831E+005	6.927E+005
	795.86	85.46	1.754E+006		-3.937E+005	8.616E+005
	801.95	8.69	1.799E+007		1.217E+007	8.842E+006
	1038.61	0.99	1.296E+008		-6.365E+007	6.334E+007
	1167.97	1.79	7.372E+007		-3.311E+006	3.601E+007
	1365.19	3.02	2.142E+007		-1.169E+007	1.018E+007
Cs-137	661.66	85.10	1.360E+006	1.36E+006	4.405E+005	6.651E+005
Eu-152	121.78	28.67	6.631E+006	5.07E+006	-3.959E+006	3.290E+006
	244.70	7.61	1.933E+007		1.529E+007	9.555E+006
	295.94	0.45	2.763E+008		2.111E+008	1.361E+008
	344.28	26.60	5.069E+006		5.281E+006	2.498E+006
	367.79	0.86	1.464E+008		1.967E+007	7.205E+007
	411.12	2.24	5.201E+007		1.855E+006	2.554E+007
	443.96	2.83	4.166E+007		1.544E+007	2.045E+007
	488.68	0.42	2.771E+008		-2.529E+008	1.359E+008
	563.99	0.49	2.486E+008		-1.268E+008	1.219E+008
	586.26	0.46	2.849E+008		4.890E+007	1.399E+008
	678.62	0.47	2.322E+008		-1.336E+008	1.134E+008
	688.67	0.86	1.294E+008		5.611E+006	6.324E+007
	719.35	0.28	4.385E+008		3.832E+008	2.146E+008
	778.90	12.96	1.050E+007		-1.571E+006	5.150E+006
	810.45	0.32	5.104E+008		8.263E+008	2.510E+008
	867.37	4.26	3.804E+007		-1.930E+007	1.869E+007
	919.33	0.43	3.771E+008		8.267E+007	1.853E+008
	964.08	14.65	1.092E+007		8.621E+006	5.361E+006
	1085.87	10.24	1.248E+007		-5.484E+006	6.096E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Module MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-152	1089.74	1.73	7.505E+007	5.07E+006	-2.774E+007	3.667E+007
		1112.07	13.69	9.487E+006		1.541E+006	4.634E+006
		1212.95	1.43	8.905E+007		1.255E+007	4.344E+007
		1249.94	0.19	6.079E+008		6.147E+008	2.957E+008
		1299.14	1.63	5.165E+007		-1.700E+007	2.485E+007
		1408.01	21.07	6.991E+006		-7.218E+006	3.418E+006
		1457.64	0.50	5.700E+008		3.546E+009	2.817E+008
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	4.703E+006	2.86E+006	-2.808E+006	2.334E+006
		247.93	6.89	2.105E+007		-2.415E+006	1.040E+007
		591.76	4.95	2.687E+007		6.300E+006	1.319E+007
		692.42	1.78	6.199E+007		-2.299E+007	3.028E+007
		723.30	20.06	6.007E+006		2.758E+006	2.939E+006
		756.80	4.52	2.591E+007		-2.120E+007	1.266E+007
		873.18	12.08	1.348E+007		-5.095E+005	6.628E+006
		996.29	10.48	1.354E+007		-1.689E+007	6.633E+006
		1004.76	18.01	7.763E+006		-5.324E+004	3.801E+006
		1274.43	34.80	2.855E+006		1.460E+006	1.383E+006
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.374E+008	6.85E+006	1.812E+009	1.178E+008
		60.01	1.22	2.369E+008		-5.278E+007	1.175E+008
		86.55	30.70	6.852E+006		1.326E+006	3.400E+006
		105.31	21.10	1.005E+007		2.909E+006	4.990E+006
	Tl-208	583.19	85.00	1.521E+006	1.52E+006	-1.279E+005	7.464E+005
	Bi-211	351.07*	13.02	2.226E+007	2.23E+007	1.820E+007	1.105E+007
	Pb-211	404.85	3.78	3.078E+007	3.08E+007	1.521E+007	1.512E+007
		427.09	1.76	6.567E+007		-8.619E+007	3.223E+007
		832.01	3.52	4.665E+007		-1.488E+007	2.294E+007
	Bi-212	39.86	1.06	2.718E+008	1.81E+007	2.179E+009	1.348E+008
		727.33	6.67	1.807E+007		3.976E+006	8.843E+006
		785.37	1.10	1.289E+008		2.313E+007	6.323E+007
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.317E+008	7.46E+006	-8.223E+007	1.646E+008
		238.63*	43.60	7.462E+006		6.479E+006	3.712E+006
		300.09	3.30	3.680E+007		4.634E+006	1.812E+007
	Pb212-XR	74.82	10.28	2.389E+007	1.40E+007	1.470E+007	1.186E+007
		77.11	17.10	1.403E+007		1.501E+007	6.960E+006
		87.35	3.97	5.185E+007		2.482E+007	2.572E+007
		89.78	1.46	1.648E+008		4.372E+007	8.186E+007
	Bi-214	609.32	45.49	3.004E+006	3.00E+006	2.234E+006	1.475E+006
		768.36	4.89	2.527E+007		-2.388E+007	1.236E+007
		806.18	1.26	1.276E+008		1.503E+008	6.274E+007
		934.06	3.11	5.063E+007		-1.268E+007	2.486E+007
		1120.29	14.92	8.760E+006		5.097E+006	4.280E+006
		1155.21	1.63	7.855E+007		-4.503E+007	3.835E+007
		1238.12	5.83	2.051E+007		-2.089E+007	9.987E+006
		1280.98	1.43	6.770E+007		4.346E+007	3.276E+007
		1377.67	3.99	1.747E+007		-2.487E+007	8.332E+006
		1385.31	0.79	1.047E+008		-3.622E+008	5.028E+007
		1401.52	1.33	9.473E+007		-1.417E+008	4.614E+007
		1407.99	2.39	6.153E+007		-6.353E+007	3.009E+007

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Bi-214	1509.21	2.13	4.996E+007	3.00E+006	-8.435E+006	2.419E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99*	7.25	4.487E+007	6.71E+006	3.896E+007	2.232E+007
		295.22	18.42	6.714E+006		5.130E+006	3.308E+006
		351.93*	35.60	8.140E+006		6.658E+006	4.042E+006
		785.96	1.06	1.340E+008		2.406E+007	6.575E+007
	Pb214-XR	74.82	5.80	4.235E+007	2.47E+007	2.606E+007	2.101E+007
		77.11	9.70	2.472E+007		2.645E+007	1.227E+007
		87.35	2.24	9.190E+007		4.399E+007	4.559E+007
		89.78	0.82	2.934E+008		7.785E+007	1.458E+008
	Ra-226	186.21	3.64	4.112E+007	4.11E+007	-5.869E+006	2.035E+007
	Ac-228	129.07	2.42	7.728E+007	6.40E+006	5.309E+007	3.834E+007
		209.25	3.89	4.154E+007		-2.666E+006	2.057E+007
		270.24	3.46	3.717E+007		9.249E+005	1.833E+007
		328.00	2.95	4.374E+007		3.635E+006	2.155E+007
		338.32	11.27	1.179E+007		2.171E+006	5.812E+006
		409.46	1.92	6.073E+007		-6.278E+005	2.982E+007
		463.00	4.40	2.708E+007		-1.114E+007	1.329E+007
		794.95	4.25	3.527E+007		-7.913E+006	1.732E+007
		911.20	25.80	6.403E+006		5.758E+006	3.147E+006
		964.77	4.99	3.206E+007		2.532E+007	1.574E+007
		968.97	15.80	1.006E+007		9.455E+006	4.940E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	7.360E+007		-2.842E+007	3.627E+007
		300.07	2.47	4.916E+007		6.192E+006	2.421E+007
		302.65	2.20	5.539E+007		6.976E+006	2.728E+007
		330.06	1.40	9.336E+007		1.760E+007	4.600E+007
	Th-234	92.38	2.13	1.107E+008	1.11E+008	7.211E+007	5.499E+007
		92.80	2.10	1.122E+008		7.304E+007	5.571E+007
		112.81	0.21	9.613E+008		3.170E+007	4.771E+008
	U-235	143.76	10.96	1.612E+007	2.65E+006	3.084E+006	7.994E+006
		163.33	5.08	3.212E+007		-2.648E+006	1.591E+007
		185.71	57.20	2.651E+006		-4.085E+005	1.312E+006
		202.11	1.08	1.521E+008		1.778E+008	7.532E+007
		205.31	5.01	3.239E+007		-5.589E+006	1.604E+007
	Am-241	59.54	35.90	8.141E+006	8.14E+006	-1.814E+006	4.037E+006

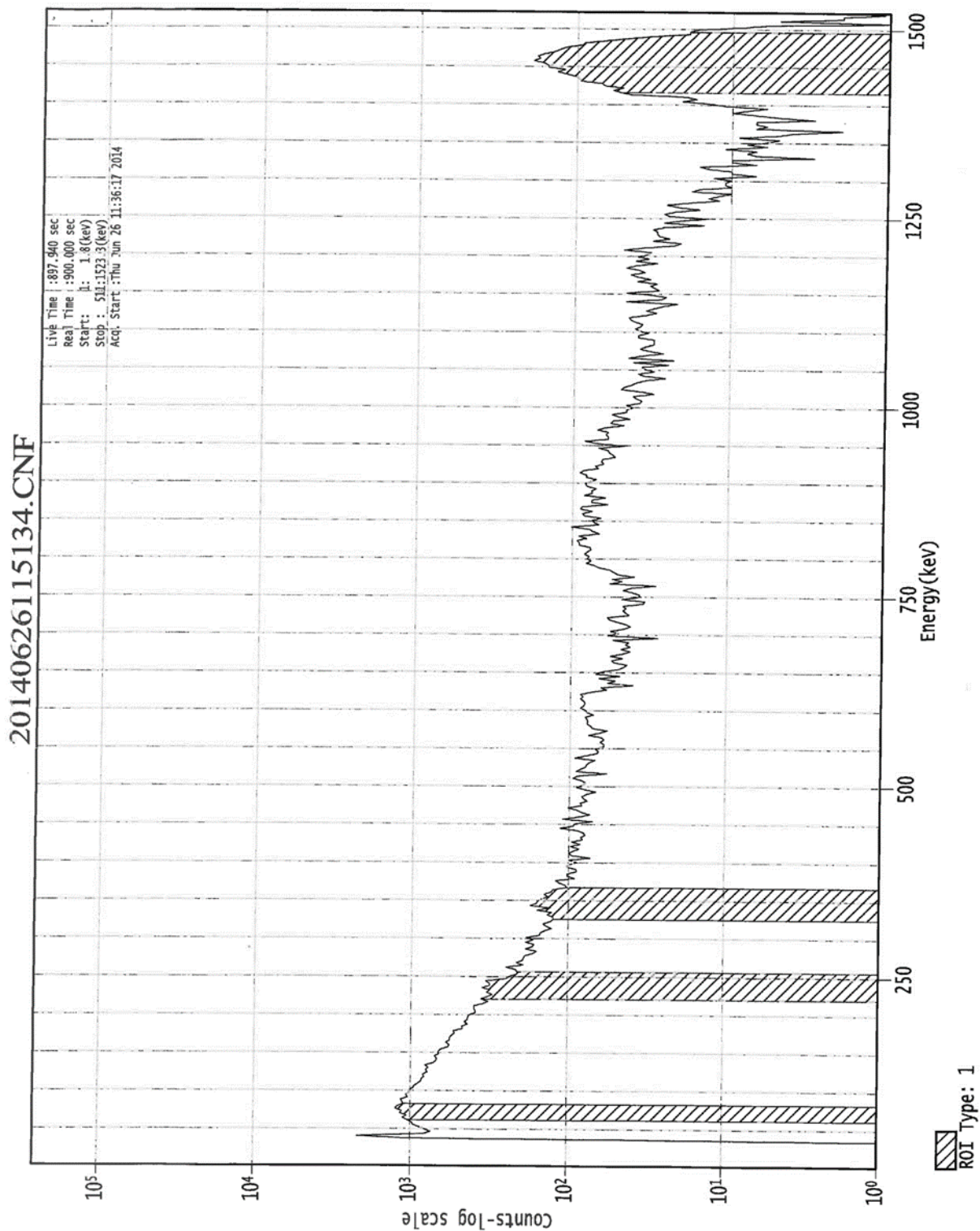
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

```
*****
***      G A M M A      P E C T R U M      A N A L Y S I S      ***
*****

Filename: C:\Canberra\6-26-14\20140626113507.cnf

Report Generated On       : 7/14/2014   1:21:45 PM

Sample Title              : Ctt Mid Roof Grid 41
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams

Sample Taken On           : 6/26/2014   11:18:31 AM
Acquisition Started       : 6/26/2014   11:18:31 AM

Live Time                 : 897.9 seconds
Dead Time                 : 900.0 seconds

Background Time           : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/1/2014
Efficiency ID              : 1m_EffxArea
```

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst M-S
Date 7-14-14

M-S
5/15/14

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Peak Analysis Report 7/14/2014 1:21:45 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Ctt Mid Roof Grid 41
Peak Analysis Performed on: 7/14/2014 1:21:45 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	20-	27	24.23	71.51	13.01	7.47E+002	434.56	9.18E+003
2	312-	334	323.69	966.50	6.32	1.97E+002	181.63	1.19E+003
3	475-	502	488.61	1456.85	39.48	2.30E+003	170.99	6.32E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:21:46 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Ctt Mid Roof Grid 41
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.996	1460.82*	10.66	2.63772E+008	3.01478E+007
Th-232	0.983	63.81*	0.26	2.03615E+009	1.26919E+009

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/14/2014 1:21:46 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.996	2.637716E+008	3.014777E+007
Th-232	0.983	2.036148E+009	1.269191E+009

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 7/14/2014 1:21:45 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	966.50	2.1896E-001	92.38		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

iclude MDA Report 7/14/2014 1:21:46 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Ctt Mid Roof Grid 41
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	LaBr3	34.70	66.40	3.693E+006	3.69E+006	3.086E+007	1.828E+006
		788.70	33.60	4.291E+006		1.296E+006	2.106E+006
		1436.80	66.40	3.887E+006		5.606E+004	1.919E+006
+	K-40	1460.82*	10.66	2.700E+007	2.70E+007	2.638E+008	1.335E+007
	Cr-51	320.08	9.91	1.186E+007	1.19E+007	9.273E+005	5.835E+006
	Mn-54	834.85	99.98	1.714E+006	1.71E+006	5.736E+005	8.433E+005
	Co-58	810.76	99.45	1.662E+006	1.66E+006	2.294E+006	8.177E+005
	Co-60	1173.23	99.85	1.403E+006	7.10E+005	-1.608E+005	6.863E+005
		1332.49	99.98	7.101E+005		-8.095E+004	3.391E+005
	Nb-94	702.65	99.81	1.201E+006	1.20E+006	-1.619E+005	5.878E+005
		871.09	99.89	1.642E+006		-6.157E+005	8.072E+005
	Sn-113	255.13	2.11	6.665E+007	1.86E+006	-7.089E+007	3.292E+007
		391.70	64.97	1.864E+006		8.914E+005	9.164E+005
	Cs-134	475.36	1.48	7.897E+007	1.43E+006	-2.373E+006	3.874E+007
		563.25	8.34	1.567E+007		5.113E+006	7.696E+006
		569.33	15.37	8.496E+006		-9.489E+006	4.171E+006
		604.72	97.62	1.432E+006		6.143E+004	7.036E+005
		795.86	85.46	1.760E+006		7.142E+005	8.641E+005
		801.95	8.69	1.809E+007		1.501E+007	8.889E+006
		1038.61	0.99	1.276E+008		-8.896E+007	6.231E+007
		1167.97	1.79	7.815E+007		-2.970E+007	3.823E+007
		1365.19	3.02	2.125E+007		-1.603E+007	1.009E+007
	Cs-137	661.66	85.10	1.429E+006	1.43E+006	-6.838E+005	6.996E+005
	Eu-152	121.78	28.67	6.956E+006	4.99E+006	-1.669E+006	3.453E+006
		244.70	7.61	2.012E+007		8.132E+006	9.950E+006
		295.94	0.45	2.913E+008		2.671E+008	1.436E+008
		344.28	26.60	4.995E+006		1.522E+006	2.461E+006
		367.79	0.86	1.485E+008		-9.832E+007	7.308E+007
		411.12	2.24	5.276E+007		4.185E+006	2.591E+007
		443.96	2.83	4.212E+007		2.073E+007	2.068E+007
		488.68	0.42	2.744E+008		-1.510E+008	1.345E+008
		563.99	0.49	2.663E+008		8.688E+007	1.308E+008
		586.26	0.46	2.920E+008		-2.090E+008	1.434E+008
		678.62	0.47	2.573E+008		2.697E+007	1.259E+008
		688.67	0.86	1.407E+008		-1.025E+007	6.889E+007
		719.35	0.28	4.568E+008		1.713E+008	2.238E+008
		778.90	12.96	1.025E+007		-8.865E+006	5.025E+006
		810.45	0.32	5.150E+008		7.105E+008	2.533E+008
		867.37	4.26	3.863E+007		-2.036E+007	1.899E+007
		919.33	0.43	3.801E+008		1.000E+008	1.867E+008
		964.08	14.65	1.097E+007		-2.827E+006	5.390E+006
		1085.87	10.24	1.215E+007		-8.105E+006	5.931E+006

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

Module MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)	
>	Eu-152	1089.74	1.73	7.214E+007	4.99E+006	-3.546E+007	3.521E+007	
		1112.07	13.69	9.317E+006		-1.222E+007	4.549E+006	
		1212.95	1.43	9.218E+007		7.240E+007	4.501E+007	
		1249.94	0.19	6.351E+008		4.449E+008	3.093E+008	
		1299.14	1.63	5.210E+007		-3.304E+007	2.508E+007	
		1408.01	21.07	6.913E+006		-3.114E+006	3.379E+006	
		1457.64	0.50	5.737E+008		3.492E+009	2.836E+008	
		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000	
	Eu-154	123.07	40.40	4.933E+006	3.02E+006	-1.183E+006	2.449E+006	
		247.93	6.89	2.196E+007		1.918E+007	1.086E+007	
		591.76	4.95	2.777E+007		6.497E+006	1.364E+007	
		692.42	1.78	6.678E+007		-7.117E+007	3.267E+007	
		723.30	20.06	6.361E+006		3.544E+006	3.116E+006	
		756.80	4.52	2.650E+007		-1.264E+007	1.296E+007	
		873.18	12.08	1.359E+007		-5.095E+006	6.680E+006	
		996.29	10.48	1.369E+007		2.109E+006	6.705E+006	
		1004.76	18.01	7.631E+006		3.131E+006	3.735E+006	
		1274.43	34.80	3.020E+006		1.022E+006	1.465E+006	
>	Eu-155	1596.48	1.80	0.000E+000	7.10E+006	0.000E+000	0.000E+000	
		45.30	1.31	2.446E+008		1.868E+009	1.214E+008	
		60.01	1.22	2.467E+008		2.355E+007	1.224E+008	
		86.55	30.70	7.096E+006		9.079E+004	3.522E+006	
	Tl-208	105.31	21.10	1.047E+007	1.57E+006	1.205E+006	5.201E+006	
		583.19	85.00	1.574E+006		3.478E+005	7.730E+005	
	Bi-211	351.07	13.02	1.028E+007	1.03E+007	6.238E+006	5.064E+006	
	Pb-211	404.85	3.78	3.136E+007	3.14E+007	6.993E+006	1.541E+007	
		427.09	1.76	6.760E+007		3.357E+007	3.320E+007	
		832.01	3.52	4.868E+007		4.099E+006	2.395E+007	
	Bi-212	39.86	1.06	2.810E+008	1.91E+007	2.427E+009	1.394E+008	
		727.33	6.67	1.914E+007		9.137E+006	9.376E+006	
		785.37	1.10	1.273E+008		1.415E+007	6.245E+007	
		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000	
	>	Pb-212	115.18	0.60	3.487E+008	3.58E+006	2.489E+008	1.731E+008
			238.63	43.60	3.579E+006		4.627E+006	1.770E+006
			300.09	3.30	3.898E+007		4.386E+007	1.921E+007
	Pb212-XR	74.82	10.28	2.527E+007	1.47E+007	3.173E+007	1.254E+007	
77.11		17.10	1.472E+007	1.771E+007		7.306E+006		
87.35		3.97	5.389E+007	1.120E+006		2.674E+007		
Bi-214	89.78	1.46	1.712E+008	3.09E+006	1.288E+008	8.508E+007		
	609.32	45.49	3.086E+006		2.610E+006	1.516E+006		
	768.36	4.89	2.470E+007		-5.200E+007	1.208E+007		
	806.18	1.26	1.291E+008		1.662E+008	6.348E+007		
	934.06	3.11	4.971E+007		-1.462E+007	2.440E+007		
	1120.29	14.92	8.865E+006		3.708E+006	4.332E+006		
	1155.21	1.63	8.554E+007		-3.176E+007	4.184E+007		
	1238.12	5.83	2.171E+007		9.576E+006	1.059E+007		
	1280.98	1.43	6.963E+007		-2.375E+007	3.372E+007		
	1377.67	3.99	1.694E+007		-5.290E+007	8.066E+006		
	1385.31	0.79	1.024E+008		-1.943E+008	4.917E+007		
	1401.52	1.33	9.041E+007		-5.326E+007	4.398E+007		
1407.99	2.39	6.085E+007	-2.740E+007	2.974E+007				

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Bi-214	1509.21	2.13	5.284E+007	3.09E+006	-3.218E+006	2.563E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.148E+007	3.76E+006	5.213E+007	1.063E+007
		295.22	18.42	7.078E+006		6.489E+006	3.490E+006
		351.93	35.60	3.762E+006		2.284E+006	1.854E+006
		785.96	1.06	1.324E+008		1.471E+007	6.494E+007
	Pb214-XR	74.82	5.80	4.479E+007	2.59E+007	5.624E+007	2.223E+007
		77.11	9.70	2.595E+007		3.123E+007	1.288E+007
		87.35	2.24	9.551E+007		1.985E+006	4.740E+007
		89.78	0.82	3.049E+008		2.293E+008	1.515E+008
	Ra-226	186.21	3.64	4.290E+007	4.29E+007	4.501E+006	2.124E+007
	Ac-228	129.07	2.42	8.051E+007	6.28E+006	7.219E+006	3.995E+007
		209.25	3.89	4.288E+007		2.717E+007	2.124E+007
		270.24	3.46	3.823E+007		1.658E+007	1.886E+007
		328.00	2.95	4.401E+007		-4.550E+007	2.168E+007
		338.32	11.27	1.169E+007		9.260E+005	5.760E+006
		409.46	1.92	6.177E+007		4.507E+007	3.034E+007
		463.00	4.40	2.661E+007		1.527E+007	1.306E+007
		794.95	4.25	3.537E+007		1.436E+007	1.737E+007
		911.20	25.80	6.280E+006		1.155E+006	3.086E+006
		964.77	4.99	3.223E+007		-8.302E+006	1.583E+007
		968.97	15.80	1.011E+007		1.475E+007	4.965E+006
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.320E+005	2.32E+005	0.000E+000	0.000E+000
		283.69	1.70	7.727E+007		2.298E+007	3.811E+007
		300.07	2.47	5.207E+007		5.859E+007	2.567E+007
		302.65	2.20	5.867E+007		6.601E+007	2.892E+007
		330.06	1.40	9.307E+007		-6.613E+007	4.585E+007
	Th-234	92.38	2.13	1.148E+008	1.15E+008	5.303E+007	5.704E+007
		92.80	2.10	1.163E+008		5.372E+007	5.779E+007
		112.81	0.21	1.007E+009		4.684E+008	5.001E+008
	U-235	143.76	10.96	1.660E+007	2.74E+006	3.049E+006	8.233E+006
		163.33	5.08	3.270E+007		1.386E+007	1.621E+007
		185.71	57.20	2.741E+006		-8.539E+005	1.357E+006
		202.11	1.08	1.556E+008		-1.021E+008	7.709E+007
		205.31	5.01	3.343E+007		8.366E+006	1.656E+007
	Am-241	59.54	35.90	8.481E+006	8.48E+006	8.093E+005	4.207E+006

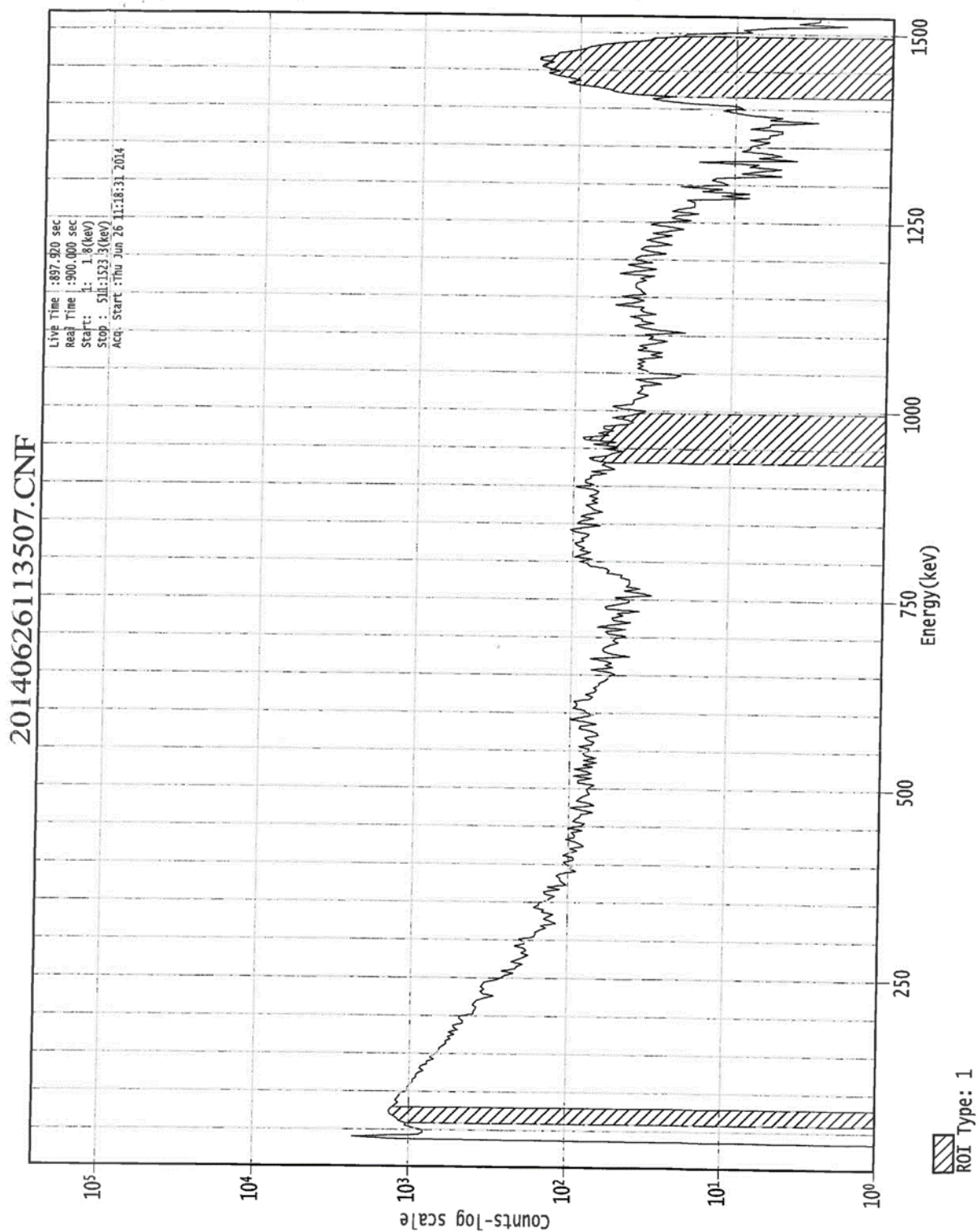
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

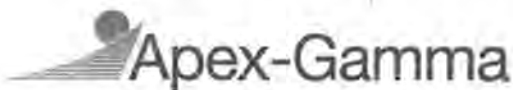
> = MDA value not calculated

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

Attachment Figure 2-3 08301 Gamma Spectroscopy Reports



Attachment Figure 2-4 07001A Gamma Spectroscopy Reports



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Analysis Report for 17-Nov-14-10003
7001AR02LQ0L01 11/05/14 14:00

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 17-Nov-14-10003
Sample Description	: 7001AR02LQ0L01 11/05/14 14:00
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 2.500E+02 mL
Facility	: Default
Sample Taken On	: 11/17/2014 2:21:08PM
Acquisition Started	: 11/24/2014 2:42:37PM
Procedure	: Oil Taral 160z 475ml
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: Oil Taral 160z 475ml
Live Time	: 80000.0 seconds
Real Time	: 80056.0 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 11/17/2014
Efficiency Calibration Description	:
Sample Number	: 11420

Handwritten signature and date: 11/25/14
Handwritten initials and date: JTB 11-25-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 11/25/2014 12:57:03PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003

7001AR02LQ0L01 11/05/14 14:00

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
	1	63.29	249 -	258	254.26	1.81E+02	90.40	1.39E+03	Th-232
M	2	72.66	285 -	306	291.72	2.89E+02	59.48	1.79E+03	Pb-212
m	3	74.95	285 -	306	300.83	5.13E+02	71.61	1.87E+03	Pb214-XR
									Pb212-XR
M	4	84.69	333 -	356	339.78	4.07E+02	71.66	1.98E+03	Th-231
									Th227-XR
m	5	87.22	333 -	356	349.88	1.75E+02	59.34	2.08E+03	Pb214-XR
									Pb212-XR
									Eu-155
	6	92.58	364 -	377	371.29	4.36E+02	126.28	2.13E+03	Th-234
									Th-234
									Ac228-XR
									U235-XR
	7	185.71	736 -	749	743.44	3.06E+02	107.47	1.87E+03	U-235 <i>Rat2b</i>
									Pb-212
	8	198.30	785 -	799	793.73	1.94E+02	106.65	1.84E+03	Pb-212
	9	238.53	949 -	959	954.52	2.22E+02	85.28	1.34E+03	Pb-212
	10	295.36	1173 -	1187	1181.67	1.17E+02	89.95	1.32E+03	Pb-214
									Eu-152
	11	351.78	1399 -	1415	1407.17	1.58E+02	87.90	1.31E+03	Pb-214
									Bi-214
	12	510.80	2032 -	2052	2042.94	1.70E+03	119.88	1.22E+03	Bi-214
	13	558.24	2228 -	2242	2232.66	1.61E+02	58.92	5.58E+02	Bi-214
	14	583.10	2328 -	2338	2332.06	1.02E+02	48.73	4.62E+02	Tl-208
	15	609.17	2425 -	2446	2436.33	3.02E+02	82.19	8.67E+02	Bi-214
	16	911.29	3634 -	3655	3644.91	6.40E+01	54.89	4.86E+02	Ac-228
	17	968.80	3869 -	3883	3875.04	5.35E+01	40.02	3.05E+02	Ac-228
	18	1120.31	4475 -	4491	4481.45	8.67E+01	44.55	3.37E+02	Bi-214
	19	1238.14	4941 -	4961	4953.17	8.52E+01	40.41	2.58E+02	Bi-214
	20	1460.46	5829 -	5854	5843.52	7.49E+02	64.45	2.03E+02	K-40
	21	1654.28	6614 -	6625	6619.98	1.85E+01	16.73	5.51E+01	Bi-214
	22	1764.22	7050 -	7069	7060.54	1.14E+02	30.84	1.10E+02	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003

7001AR02LQ0L01 11/05/14 14:00

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	2.00E+00	2.45E-01	miss
Eu-155	0.32	45.30	1.31			
		60.01	1.22			
		86.55 *	30.70	5.03E-02	1.98E-02	free
		105.31	21.10			
Tl-208	1.00	583.19 *	85.00	2.03E-02	1.00E-02	0.933
Pb-212	0.99	115.18	0.60			
		238.63 *	43.60	4.19E-02	1.75E-02	free
		300.09	3.30			
Bi-214	0.99	609.32 *	45.49	1.13E-01	3.37E-02	0.949
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29 *	14.92	1.50E-01	7.79E-02	0.945
		1155.21	1.63			
		1238.12 *	5.83	4.01E-01	1.93E-01	0.946
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	2.45E-01	6.92E-02	1.001
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.99	241.99	7.25			
		295.22 *	18.42	6.02E-02	4.74E-02	1.000
		351.93 *	35.60	4.77E-02	2.76E-02	free
		785.96	1.06			
Ra-226	0.98	186.21 *	3.64	6.01E-01	2.32E-01	free
Ac-228	0.99	129.07	2.42			
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32	11.27			
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20 *	25.80	5.24E-02	4.52E-02	0.990
		964.77	4.99			
		968.97 *	15.80	7.44E-02	5.61E-02	0.990
		1588.20	3.22			
Ac228-XR	0.37	89.96	1.90			
		93.35 *	3.10	1.17E+00	5.11E-01	miss
Th-231	0.99	25.64	14.10			
		84.21 *	6.60	5.77E-01	1.69E-01	0.999
		89.95	1.00			
Th-232	0.98	63.81 *	0.26	1.19E+01	6.51E+00	1.000
U-235	1.00	143.76	10.96			
		163.33	5.08			
		185.71 *	57.20	3.82E-02	1.48E-02	free

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003

7001AR02LQ0L01 11/05/14 14:00

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
U-235	1.00	202.11 205.31	1.08 5.01			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.992	2.00E+00	2.45E-01	
Eu-155	0.321	5.03E-02	1.98E-02	
Tl-208	1.000	2.03E-02	1.00E-02	
X Bi-211	0.969			
Pb-212	0.999	4.19E-02	1.75E-02	
Bi-214	0.999	1.45E-01	2.79E-02	
Pb-214	0.999	5.09E-02	2.38E-02	
? Ra-226	0.984	6.01E-01	2.32E-01	
Ac-228	0.999	6.11E-02	3.52E-02	
Ac228-XR	0.374	1.17E+00	5.11E-01	
Th-231	0.996	5.77E-01	1.69E-01	
Th-232	0.983	1.19E+01	6.51E+00	
? U-235	1.000	3.82E-02	1.48E-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

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003

7001AR02LQ0L01 11/05/14 14:00

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/25/2014 12:57:03PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
M 2	72.66	3.60911E-03	10.30		
m 3	74.95	6.41045E-03	6.98	Tol.	Pb212-XR Pb214-XR
8	198.30	2.42017E-03	27.54		
12	510.80	2.13065E-02	3.52		
13	558.24	2.01495E-03	18.28		
21	1654.28	2.30901E-04	45.30		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	* 10.66	2.00E+00	1.57E-01	1.57E-01	miss
+	Cr-51	320.08	9.91	5.87E-02	1.19E-01	1.19E-01	free
+	Mn-54	834.85	99.98	5.39E-03	1.24E-02	1.24E-02	miss
+	Co-58	810.76	99.45	-1.13E-03	1.17E-02	1.17E-02	1.000
		1674.73	0.52	3.28E-01		2.17E+00	1.022
+	Co-60	1173.23	99.85	1.36E-02	1.41E-02	1.49E-02	0.949
		1332.49	99.98	7.92E-03		1.41E-02	0.948
+	Nb-94	702.65	99.81	-3.39E-03	1.25E-02	1.25E-02	0.946
		871.09	99.89	5.99E-03		1.28E-02	0.946
+	Sn-113	255.13	2.11	1.02E-01	1.60E-02	4.32E-01	free
		391.70	64.97	6.70E-03		1.60E-02	free

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

11/25/2014 12:59:42PM Page 6 of 8

Analysis Report for 17-Nov-14-10003
7001AR02LQ0L01 11/05/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	Cs-134	475.36	1.48	7.80E-02	1.29E-02	6.74E-01	miss
		563.25	8.34	1.77E-02		1.36E-01	0.897
		569.33	15.37	4.32E-02		8.33E-02	0.889
		604.72	97.62	-7.89E-03		1.29E-02	0.932
		795.86	85.46	5.88E-03		1.52E-02	0.934
		801.95	8.69	7.86E-02		1.62E-01	0.900
		1038.61	0.99	1.54E-01		1.21E+00	0.945
		1167.97	1.79	3.22E-01		6.50E-01	1.076
		1365.19	3.02	-8.32E-02		3.32E-01	1.117
+	Cs-137	661.66	85.10	-3.40E-03	1.34E-02	1.34E-02	miss
+	Eu-152	121.78	28.67	1.20E-02	2.82E-02	2.82E-02	0.933
		244.70	7.61	-2.34E-03		1.13E-01	0.928
		295.94	0.45	2.75E-01		2.18E+00	miss
		344.28	26.60	1.69E-02		3.76E-02	0.958
		367.79	0.86	-1.76E-01		1.27E+00	0.881
		411.12	2.24	6.10E-03		4.72E-01	0.906
		443.96	2.83	1.65E-01		3.73E-01	0.930
		488.68	0.42	2.74E-01		2.40E+00	miss
		563.99	0.49	7.75E-02		2.24E+00	0.931
		586.26	0.46	1.40E+00		2.38E+00	0.941
		678.62	0.47	8.03E-01		2.83E+00	0.885
		688.67	0.86	-1.82E-01		1.29E+00	0.974
		719.35	0.28	-6.87E-01		4.07E+00	miss
		778.90	12.96	-1.83E-02		9.01E-02	0.945
		810.45	0.32	1.09E-01		3.26E+00	1.059
		867.37	4.26	7.30E-02		2.93E-01	0.920
		919.33	0.43	-8.98E-01		2.51E+00	0.975
		964.08	14.65	1.31E-02		8.12E-02	1.027
		1085.87	10.24	-2.01E-02		1.08E-01	1.021
		1089.74	1.73	1.14E-01		6.68E-01	0.952
		1112.07	13.69	-2.01E-02		8.91E-02	0.986
		1212.95	1.43	-1.67E-01		9.37E-01	0.921
		1249.94	0.19	-1.82E+00		5.81E+00	1.088
		1299.14	1.63	3.96E-02		7.77E-01	0.944
		1408.01	21.07	-1.82E-04		5.71E-02	0.978
		1457.64	0.50	-2.06E-01		2.96E+00	1.068
		1528.10	0.28	7.27E-01		3.66E+00	1.000
+	Eu-154	123.07	40.40	-8.82E-03	1.91E-02	1.91E-02	0.933
		247.93	6.89	4.89E-02		1.29E-01	0.922
		591.76	4.95	4.79E-02		2.27E-01	0.911
		692.42	1.78	2.38E-01		7.30E-01	0.933
		723.30	20.06	-6.77E-04		6.28E-02	0.934
		756.80	4.52	-1.32E-01		2.57E-01	0.909
		873.18	12.08	-5.04E-02		9.63E-02	0.929
		996.29	10.48	-4.93E-02		1.05E-01	0.977
		1004.76	18.01	4.41E-03		6.66E-02	0.974
		1274.43	34.80	2.05E-02		3.74E-02	0.977
		1596.48	1.80	-3.63E-01		4.84E-01	1.154
+	Eu-155	45.30	1.31	-1.15E+00	3.89E-02	1.53E+00	0.998
		60.01	1.22	-4.88E-01		1.73E+00	1.000
		86.55	* 30.70	5.03E-02		4.39E-02	free

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003
7001AR02LQ0L01 11/05/14 14:00

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Eu-155	105.31	21.10	-9.27E-03	3.89E-02	3.89E-02	1.000
+ Tl-208	583.19	* 85.00	2.03E-02	1.47E-02	1.47E-02	0.933
+ Bi-211	351.07	* 13.02	1.30E-01	1.16E-01	1.16E-01	miss
+ Pb-211	404.85	3.78	5.85E-02	2.65E-01	2.65E-01	miss
	427.09	1.76	-1.12E-01		5.46E-01	miss
	832.01	3.52	-1.44E-01		2.96E-01	miss
+ Bi-212	39.86	1.06	-6.99E-01	1.90E-01	1.99E+00	0.998
	727.33	6.67	9.13E-02		1.90E-01	0.983
	785.37	1.10	1.33E-02		1.10E+00	0.945
	1620.50	1.47	-3.06E-02		7.08E-01	1.006
+ Pb-212	115.18	0.60	7.87E-01	2.53E-02	1.29E+00	miss
	238.63	* 43.60	4.19E-02		2.53E-02	free
	300.09	3.30	-6.16E-03		2.83E-01	free
+ Pb212-XR	74.82	10.28	5.83E-01	7.83E-02	1.86E-01	miss
	77.11	17.10	5.32E-02		7.83E-02	miss
	87.35	3.97	1.85E-01		2.59E-01	miss
	89.78	1.46	-2.05E-01		6.16E-01	miss
+ Bi-214	609.32	* 45.49	1.13E-01	4.60E-02	4.60E-02	0.949
	768.36	4.89	7.21E-02		2.62E-01	0.943
	806.18	1.26	1.57E-01		1.01E+00	0.924
	934.06	3.11	2.13E-01		4.20E-01	0.945
	1120.29	* 14.92	1.50E-01		1.17E-01	0.945
	1155.21	1.63	2.76E-01		8.59E-01	0.945
	1238.12	* 5.83	4.01E-01		2.84E-01	0.946
	1280.98	1.43	4.42E-01		9.34E-01	0.946
	1377.67	3.99	2.76E-01		3.27E-01	1.029
	1385.31	0.79	5.91E-01		1.61E+00	0.946
	1401.52	1.33	-4.80E-02		9.31E-01	0.946
	1407.99	2.39	-1.65E-03		5.19E-01	0.946
	1509.21	2.13	-2.30E-02		5.67E-01	0.952
	1661.27	1.05	4.46E-03		1.06E+00	1.001
	1729.59	2.88	2.23E-01		3.87E-01	1.111
	1764.49	* 15.30	2.45E-01		8.45E-02	1.001
	1847.43	2.03	3.76E-01		6.17E-01	1.059
> Pb-214	2118.51	1.16	0.00E+00		0.00E+00	1.038
+ Pb-214	241.99	7.25	9.19E-03	4.25E-02	1.14E-01	0.999
	295.22	* 18.42	6.02E-02		7.56E-02	1.000
	351.93	* 35.60	4.77E-02		4.25E-02	free
	785.96	1.06	-1.99E-01		1.09E+00	0.999
+ Pb214-XR	74.82	5.80	1.03E+00	1.38E-01	3.29E-01	miss
	77.11	9.70	9.38E-02		1.38E-01	miss
	87.35	2.24	3.28E-01		4.59E-01	miss
	89.78	0.82	-3.65E-01		1.10E+00	miss
+ Ra-226	186.21	* 3.64	6.01E-01	3.34E-01	3.34E-01	free
+ Ac-228	129.07	2.42	1.57E-01	7.25E-02	3.30E-01	0.941
	209.25	3.89	4.76E-02		2.07E-01	0.976
	270.24	3.46	4.48E-02		2.82E-01	0.955
	328.00	2.95	5.94E-02		3.35E-01	0.955
	338.32	11.27	2.97E-02		9.16E-02	0.993
	409.46	1.92	1.50E-01		5.40E-01	0.934

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports

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Analysis Report for 17-Nov-14-10003
7001AR02LQ0L01 11/05/14 14:00

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Ac-228	463.00	4.40	2.06E-02	7.25E-02	2.48E-01	0.928
	794.95	4.25	4.58E-02		2.87E-01	0.941
	911.20	* 25.80	5.24E-02		7.25E-02	0.990
	964.77	4.99	3.19E-02		2.44E-01	0.981
	968.97	* 15.80	7.44E-02		8.86E-02	0.990
+ Pa-231	1588.20	3.22	7.57E-02	5.59E-03	3.50E-01	1.002
	27.36	10.30	0.00E+00		5.59E-03	0.997
	283.69	1.70	6.39E-04		5.33E-01	0.999
	300.07	2.47	1.77E-01		3.88E-01	1.000
	302.65	2.20	-1.99E-02		4.19E-01	1.000
+ Th-234	330.06	1.40	-3.75E-02	6.86E-01	6.77E-01	1.001
	92.38	2.13	1.53E+00		6.86E-01	free
	92.80	2.10	1.97E+00		7.07E-01	free
+ U-235	112.81	0.21	3.71E+00	2.12E-02	4.68E+00	free
	143.76	10.96	-4.46E-03		6.79E-02	free
	163.33	5.08	1.04E-01		1.52E-01	free
	185.71	* 57.20	3.82E-02		2.12E-02	free
	202.11	1.08	-1.58E-01		6.88E-01	miss
+ Am-241	205.31	5.01	-4.73E-02	5.99E-02	1.50E-01	free
	59.54	35.90	-2.02E-02		5.99E-02	free

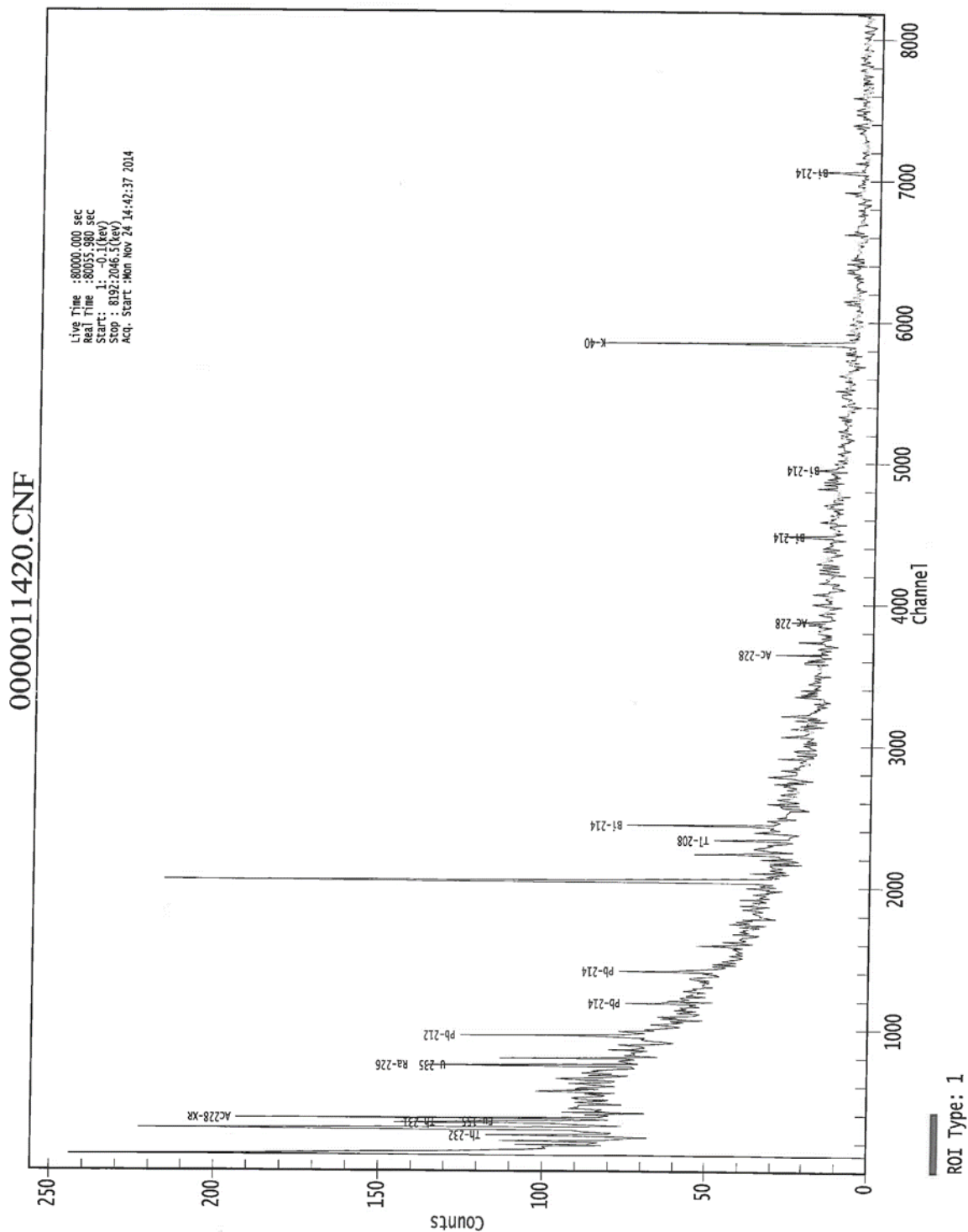
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-4 07001A Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\9-8-14\20140904161856.cnf

Report Generated On : 9/8/2014 10:10:26 AM

Sample Title : S Fillter Bank AC1
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Grams

Sample Taken On : 9/4/2014 4:01:39 PM
Acquisition Started : 9/4/2014 4:01:39 PM

Live Time : 897.8 seconds
Real Time : 900.0 seconds

Dead Time : 0.25 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVR

The accuracy of this count CANNOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst 79-8

Date 9-8-14

9/8/2014

*Top of East Service Bldg.
reduce Bkg. and
No. CoB. would
be found
F*

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 9/8/2014 10:10:26 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: S Fillter Bank AC1
Peak Analysis Performed on: 9/8/2014 10:10:25 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.44	38.95	1.71	3.11E+003	217.94	1.53E+003
2	1035-	1116	1076.13	804.66	5.17	4.37E+002	192.12	1.28E+003
3	1516-	1614	1565.53	1169.53	1.15	1.92E+002	155.88	8.19E+002
4	1721-	1824	1773.23	1324.10	0.97	1.21E+002	83.84	2.17E+002
5	1894-	2002	1948.07	1454.06	13.24	2.03E+003	156.18	5.85E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:22:26 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: S Fillter Bank AC1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.951	34.70*	66.40	4.32588E+001	9.16655E+000
		788.70*	33.60	2.07480E+001	9.43058E+000
		1436.80*	66.40	8.08961E+001	8.97223E+000
K-40	0.987	1460.82*	10.66	5.03893E+002	5.84204E+001
Co-60	0.988	1173.23*	99.85	4.21927E+000	3.44448E+000
		1332.49*	99.98	2.96600E+000	2.06826E+000

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:10:26 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	LaBr3	0.951	3.232294E+001	6.573092E+000
	K-40	0.987	3.025571E+002	6.927986E+001
X	Co-58	0.990		
	Co-60	0.988	3.298114E+000	1.773159E+000
X	Cu-64	0.876		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/8/2014 10:10:25 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

9/8/2014

10:10 26 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: S Fillter Bank AC1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.317E+000	4.32E+000	4.326E+001	2.140E+000
		788.70*	33.60	1.476E+001		2.075E+001	7.315E+000
		1436.80*	66.40	8.454E+000		8.090E+001	4.173E+000
+	K-40	1460.82*	10.66	5.266E+001	5.27E+001	5.039E+002	2.599E+001
	Cr-51	320.08	9.91	1.556E+001	1.56E+001	-4.764E+000	7.680E+000
	Mn-54	834.85	99.98	2.754E+000	2.75E+000	1.835E-001	1.355E+000
	Co-58	810.76*	99.45	4.986E+000	4.99E+000	7.010E+000	2.471E+000
+	Co-60	1173.23*	99.85	5.609E+000	3.33E+000	4.219E+000	2.775E+000
		1332.49*	99.98	3.328E+000		2.966E+000	1.631E+000
	Nb-94	702.65	99.81	1.883E+000	1.88E+000	1.322E+000	9.221E-001
		871.09	99.89	2.809E+000		-3.153E-001	1.381E+000
	Sn-113	255.13	2.11	7.764E+001	2.37E+000	-1.277E+001	3.842E+001
		391.70	64.97	2.371E+000		-7.425E-001	1.168E+000
	Cs-137	661.66	85.10	2.190E+000	2.19E+000	-4.861E-001	1.074E+000
	Eu-152	121.78	28.67	7.873E+000	6.00E+000	-1.842E+000	3.911E+000
		244.70	7.61	2.229E+001		9.237E+000	1.103E+001
		295.94	0.45	3.542E+002		-6.546E+001	1.750E+002
		344.28	26.60	5.997E+000		4.421E+000	2.960E+000
		367.79	0.86	1.776E+002		5.347E+001	8.753E+001
		411.12	2.24	6.929E+001		1.264E+000	3.411E+001
		443.96	2.83	5.616E+001		5.506E+001	2.763E+001
		488.68	0.42	3.987E+002		3.194E+002	1.960E+002
		563.99	0.49	3.585E+002		2.285E+002	1.760E+002
		586.26	0.46	4.011E+002		-4.976E+001	1.970E+002
		678.62	0.47	3.922E+002		-9.163E+001	1.922E+002
		688.67	0.86	2.185E+002		-1.495E+001	1.070E+002
		719.35	0.28	6.600E+002		-3.364E+002	3.230E+002
		778.90	12.96	1.717E+001		1.597E+000	8.422E+000
		810.45	0.32	8.502E+002		9.826E+002	4.183E+002
		867.37	4.26	6.607E+001		-1.238E+001	3.250E+001
		919.33	0.43	6.487E+002		1.454E+002	3.187E+002
		964.08	14.65	1.815E+001		-3.058E+000	8.901E+000
		1085.87	10.24	2.342E+001		-1.232E+001	1.144E+001
		1089.74	1.73	1.384E+002		-7.511E+001	6.757E+001
		1112.07	13.69	1.817E+001		-6.121E+000	8.878E+000
		1212.95	1.43	1.741E+002		4.852E+001	8.492E+001
		1249.94	0.19	1.109E+003		-7.589E+001	5.377E+002
		1299.14	1.63	1.155E+002		-1.009E+001	5.572E+001
		1408.01	21.07	1.585E+001		-3.090E+000	7.762E+000
		1457.64	0.50	1.153E+003		5.796E+003	5.695E+002
		1528.10	0.28	2.753E+002		-8.137E+001	1.244E+002
	Eu-154	123.07	40.40	5.571E+000	5.31E+000	-7.307E-001	2.768E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Slide MDA Report

9/8/2014

10:10 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Eu-154	247.93	6.89	2.440E+001	5.31E+000	8.065E+000	1.208E+001
	591.76	4.95	3.765E+001		-5.631E+000	1.849E+001
	692.42	1.78	1.051E+002		3.231E+001	5.148E+001
	723.30	20.06	9.212E+000		-2.197E+000	4.508E+000
	756.80	4.52	4.247E+001		-5.232E+000	2.078E+001
	873.18	12.08	2.310E+001		-3.350E+000	1.136E+001
	996.29	10.48	2.373E+001		-6.811E-001	1.162E+001
	1004.76	18.01	1.373E+001		3.339E+000	6.721E+000
	1274.43	34.80	5.311E+000		1.808E+000	2.563E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	2.114E+002	8.06E+000	-9.104E+000	1.047E+002
	60.01	1.22	2.305E+002		-5.196E+001	1.142E+002
	86.55	30.70	8.055E+000		-8.715E+000	4.000E+000
	105.31	21.10	1.113E+001		-8.166E+000	5.528E+000
Tl-208	583.19	85.00	2.156E+000	2.16E+000	-5.126E-001	1.059E+000
Bi-211	351.07	13.02	1.223E+001	1.22E+001	-3.411E-001	6.036E+000
Pb-211	404.85	3.78	4.111E+001	4.11E+001	-4.667E+000	2.024E+001
	427.09	1.76	8.764E+001		-4.584E+001	4.311E+001
	832.01	3.52	7.831E+001		1.522E+001	3.853E+001
Bi-212	39.86	1.06	2.728E+002	2.76E+001	2.602E+003	1.352E+002
	727.33	6.67	2.756E+001		-1.768E+000	1.348E+001
	785.37	1.10	2.112E+002		-1.346E+001	1.037E+002
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	3.740E+002	3.93E+000	-9.019E+001	1.857E+002
	238.63	43.60	3.934E+000		-2.752E-001	1.949E+000
	300.09	3.30	4.757E+001		-5.934E+000	2.350E+001
Pb212-XR	74.82	10.28	2.556E+001	1.50E+001	1.079E+001	1.268E+001
	77.11	17.10	1.504E+001		5.992E-001	7.465E+000
	87.35	3.97	6.189E+001		-6.750E+001	3.074E+001
Bi-214	89.78	1.46	1.670E+002	4.24E+000	4.291E+001	8.297E+001
	609.32	45.49	4.236E+000		2.383E+000	2.081E+000
	768.36	4.89	4.157E+001		-2.729E+000	2.036E+001
	806.18	1.26	2.136E+002		2.203E+002	1.051E+002
	934.06	3.11	8.982E+001		2.634E+001	4.412E+001
	1120.29	14.92	1.683E+001		-8.073E+000	8.224E+000
	1155.21	1.63	1.701E+002		1.726E+000	8.323E+001
	1238.12	5.83	3.854E+001		5.326E+000	1.873E+001
	1280.98	1.43	1.292E+002		2.103E+001	6.237E+001
	1377.67	3.99	3.498E+001		-3.243E+001	1.663E+001
Pb-214	1385.31	0.79	2.195E+002	4.47E+000	-2.096E+002	1.054E+002
	1401.52	1.33	2.076E+002		-5.580E+001	1.012E+002
	1407.99	2.39	1.395E+002		-2.720E+001	6.832E+001
	1509.21	2.13	8.807E+001		-4.335E+001	4.230E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.349E+001		-1.142E+001	1.163E+001
Pb-214	295.22	18.42	8.673E+000	4.47E+000	5.978E+000	4.286E+000
	351.93	35.60	4.467E+000		7.966E-002	2.204E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.203E+002	4.47E+000	-2.486E+001	1.082E+002
Pb214-XR	74.82	5.80	4.530E+001	2.65E+001	1.912E+001	2.248E+001
	77.11	9.70	2.651E+001		1.056E+000	1.316E+001
	87.35	2.24	1.097E+002		-1.196E+002	5.448E+001
	89.78	0.82	2.974E+002		7.641E+001	1.477E+002
Ra-226	186.21	3.64	5.189E+001	5.19E+001	-2.876E+000	2.574E+001
Ac-228	129.07	2.42	9.162E+001	1.08E+001	8.302E+001	4.552E+001
	209.25	3.89	4.751E+001		2.501E+001	2.356E+001
	270.24	3.46	4.709E+001		-3.010E+001	2.329E+001
	328.00	2.95	5.202E+001		-4.841E+001	2.567E+001
	338.32	11.27	1.386E+001		1.543E+001	6.841E+000
	409.46	1.92	8.078E+001		2.750E+001	3.976E+001
	463.00	4.40	3.588E+001		-1.111E+001	1.764E+001
	794.95	4.25	5.869E+001		2.301E+001	2.884E+001
	911.20	25.80	1.076E+001		3.414E+000	5.286E+000
	964.77	4.99	5.334E+001		-1.304E-001	2.616E+001
	968.97	15.80	1.681E+001		2.735E+000	8.243E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	9.425E+001		-3.491E+001	4.659E+001
	300.07	2.47	6.355E+001		-7.928E+000	3.139E+001
	302.65	2.20	7.127E+001		5.453E+000	3.520E+001
	330.06	1.40	1.098E+002		-1.111E+002	5.418E+001
Th-234	92.38	2.13	1.135E+002	1.13E+002	5.415E+001	5.637E+001
	92.80	2.10	1.149E+002		5.482E+001	5.707E+001
	112.81	0.21	1.074E+003		2.842E+002	5.335E+002
U-235	143.76	10.96	1.877E+001	3.32E+000	-8.504E+000	9.321E+000
	163.33	5.08	3.914E+001		2.153E+001	1.943E+001
	185.71	57.20	3.322E+000		1.504E+000	1.648E+000
	202.11	1.08	1.678E+002		-1.167E+002	8.320E+001
	205.31	5.01	3.730E+001		3.126E+001	1.850E+001
Am-241	59.54	35.90	7.927E+000	7.93E+000	-1.787E+000	3.929E+000

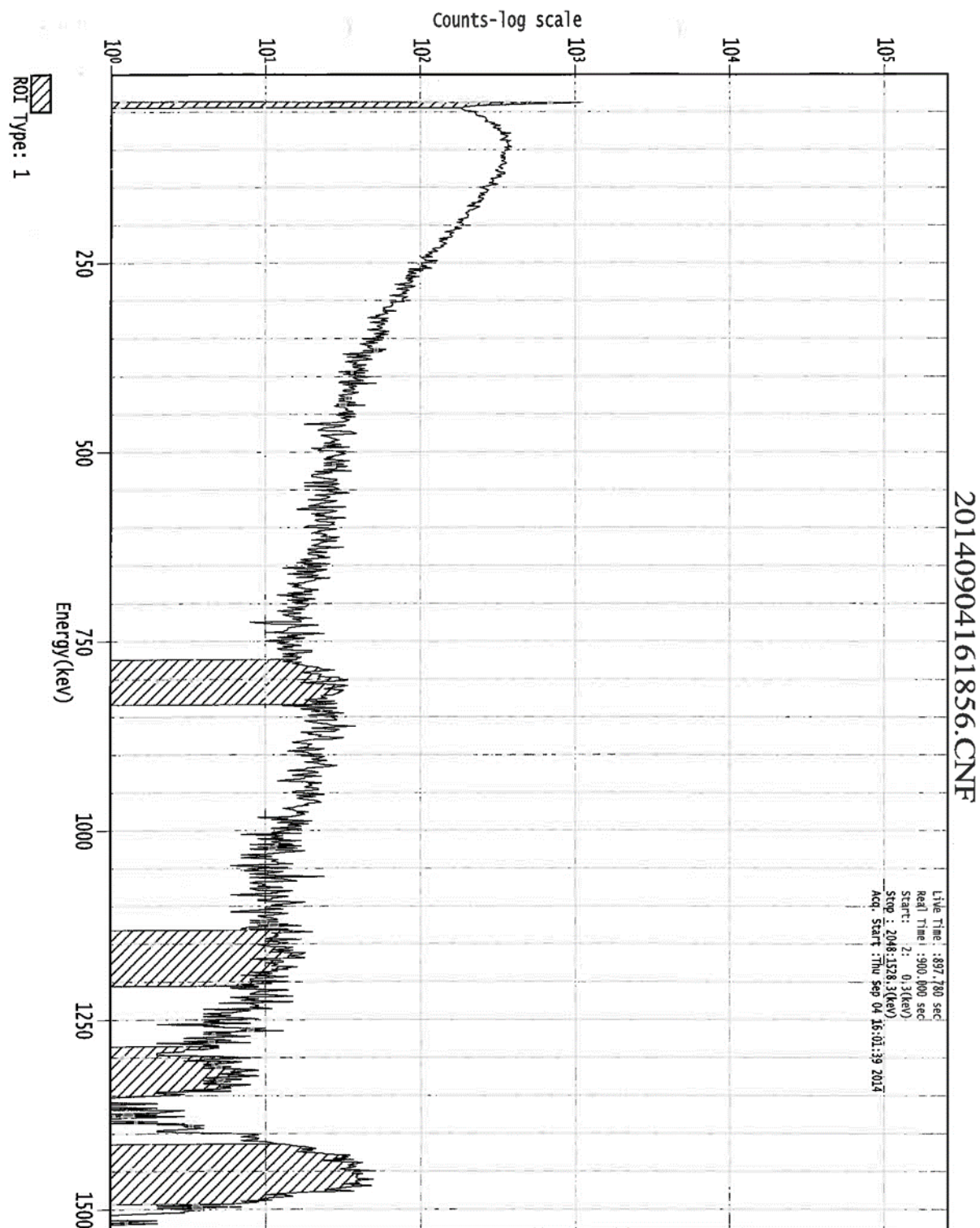
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\9-8-14\20140904160131.cnf

Report Generated On : 9/8/2014 10:08:41 AM

Sample Title : Background
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

*East Service Bldg Roof
view of Rad Storage Array*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

- Co-60

Sample Size : 1.000E+000 grams

Sample Taken On : 9/4/2014 3:44:40 PM

Acquisition Started : 9/4/2014 3:44:40 PM

Live Time : 897.4 seconds

Real Time : 900.0 seconds

Dead Time : 0.29 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *[Signature]*
Date 9-8-14

[Signature]
9/8/14

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

9/8/2014 10:08:41 AM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: Background

Peak Analysis Performed on: 9/8/2014 10:08:40 AM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	64	53.84	39.25	1.83	4.34E+003	353.68	4.81E+003
2	88-	116	102.52	75.80	3.63	8.02E+002	824.94	2.05E+004
3	1514-	1612	1563.51	1168.04	1.11	2.51E+002	176.66	1.05E+003
4	1719-	1823	1771.54	1322.84	1.60	3.83E+002	87.79	2.05E+002
5	1896-	2004	1950.30	1455.71	8.77	2.03E+003	159.68	6.25E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:08:41 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Background
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.645	34.70*	66.40	6.02788E+001	1.30199E+001
		788.70	33.60		
		1436.80*	66.40	8.07569E+001	9.06734E+000
K-40	0.993	1460.82*	10.66	5.03026E+002	5.89790E+001
Co-60	0.983	1173.23*	99.85	5.52418E+000	3.90743E+000
		1332.49*	99.98	9.37780E+000	2.27764E+000
Cu-64	0.862	1345.77*	0.47	1.97393E+003	4.88059E+002

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:08:41 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.645	6.027878E+001	1.301993E+001
K-40	0.993	1.275562E+002	9.882866E+001
Co-60	0.983	5.524182E+000	3.907425E+000
Cu-64	0.862	8.111465E+002	9.520002E+002

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/8/2014 10:08:40 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	75.80	8.9397E-001	102.83	Tol.	Pb212-XR Pb214-XR

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report 9/8/2014 10:08:41 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Background
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	7.544E+000	7.54E+000	6.028E+001	3.753E+000
		788.70	33.60	7.919E+000		5.420E+000	3.896E+000
		1436.80*	66.40	8.751E+000		8.076E+001	4.322E+000
+	K-40	1460.82*	10.66	5.451E+001	5.45E+001	5.030E+002	2.692E+001
	Cr-51	320.08	9.91	1.824E+001	1.82E+001	-1.894E+001	9.020E+000
	Mn-54	834.85	99.98	2.978E+000	2.98E+000	1.138E+000	1.467E+000
	Co-58	810.76	99.45	3.019E+000	3.02E+000	3.361E+000	1.488E+000
+	Co-60	1173.23*	99.85	6.342E+000	3.23E+000	5.524E+000	3.141E+000
		1332.49*	99.98	3.233E+000		9.378E+000	1.583E+000
	Nb-94	702.65	99.81	2.138E+000	2.14E+000	-4.893E-002	1.050E+000
		871.09	99.89	3.020E+000		-5.446E-001	1.487E+000
	Sn-113	255.13	2.11	9.290E+001	2.78E+000	5.020E+001	4.605E+001
		391.70	64.97	2.775E+000		-3.253E+000	1.370E+000
	Cs-137	661.66	85.10	2.519E+000	2.52E+000	1.526E+000	1.238E+000
	Eu-152	121.78	28.67	9.893E+000	6.98E+000	-2.991E+000	4.921E+000
		244.70	7.61	2.648E+001		2.030E+001	1.313E+001
		295.94	0.45	4.107E+002		1.769E+002	2.033E+002
		344.28	26.60	6.976E+000		2.381E+000	3.449E+000
		367.79	0.86	2.097E+002		1.209E+002	1.036E+002
		411.12	2.24	8.069E+001		3.814E+001	3.981E+001
		443.96	2.83	6.520E+001		3.493E+000	3.215E+001
		488.68	0.42	4.534E+002		-6.406E+001	2.234E+002
		563.99	0.49	4.145E+002		-2.769E+002	2.040E+002
		586.26	0.46	4.584E+002		1.064E+002	2.256E+002
		678.62	0.47	4.453E+002		1.775E+002	2.187E+002
		688.67	0.86	2.461E+002		-1.816E+002	1.209E+002
		719.35	0.28	7.576E+002		-8.661E+001	3.718E+002
		778.90	12.96	1.906E+001		-9.579E-001	9.366E+000
		810.45	0.32	9.351E+002		1.041E+003	4.608E+002
		867.37	4.26	7.038E+001		2.156E+001	3.465E+001
		919.33	0.43	7.115E+002		5.908E+001	3.501E+002
		964.08	14.65	2.025E+001		-7.740E+000	9.954E+000
		1085.87	10.24	2.528E+001		3.912E-001	1.237E+001
		1089.74	1.73	1.510E+002		-7.061E+000	7.389E+001
		1112.07	13.69	1.979E+001		7.707E+000	9.687E+000
		1212.95	1.43	1.785E+002		1.761E+001	8.711E+001
		1249.94	0.19	1.154E+003		1.541E+002	5.604E+002
		1299.14	1.63	1.420E+002		-4.087E-001	6.902E+001
		1408.01	21.07	1.539E+001		-2.486E+000	7.528E+000
		1457.64	0.50	1.168E+003		6.368E+003	5.771E+002
		1528.10	0.28	2.953E+002		-1.470E+002	1.345E+002
	Eu-154	123.07	40.40	6.969E+000	5.42E+000	2.826E-001	3.467E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-154	247.93	6.89	2.872E+001	5.42E+000	-3.187E+001	1.424E+001
	591.76	4.95	4.259E+001		-2.433E+001	2.096E+001
	692.42	1.78	1.201E+002		-6.763E+001	5.897E+001
	723.30	20.06	1.057E+001		-3.280E+000	5.188E+000
	756.80	4.52	4.947E+001		-1.684E+001	2.428E+001
	873.18	12.08	2.499E+001		5.543E+000	1.230E+001
	996.29	10.48	2.684E+001		8.111E+000	1.317E+001
	1004.76	18.01	1.549E+001		5.742E+000	7.600E+000
	1274.43	34.80	5.420E+000		7.987E-001	2.618E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	3.369E+002	1.13E+001	4.890E+001	1.675E+002
	60.01	1.22	3.841E+002		-3.670E+001	1.910E+002
	86.55	30.70	1.133E+001		4.648E+000	5.639E+000
	105.31	21.10	1.468E+001		7.083E+000	7.305E+000
Tl-208	583.19	85.00	2.487E+000	2.49E+000	2.215E+000	1.224E+000
Bi-211	351.07	13.02	1.432E+001		9.944E+000	7.077E+000
Pb-211	404.85	3.78	4.795E+001	4.80E+001	3.263E+000	2.366E+001
	427.09	1.76	1.004E+002		-9.785E+001	4.948E+001
	832.01	3.52	8.434E+001		-2.821E+001	4.154E+001
Bi-212	39.86	1.06	3.638E+002	3.22E+001	3.326E+003	1.807E+002
	727.33	6.67	3.218E+001		-2.426E+000	1.579E+001
	785.37	1.10	2.344E+002		-3.666E+001	1.153E+002
Pb-212	1620.50	1.47	0.000E+000	4.70E+000	0.000E+000	0.000E+000
	115.18	0.60	4.815E+002		1.020E+002	2.395E+002
	238.63	43.60	4.697E+000		6.059E-001	2.330E+000
	300.09	3.30	5.557E+001		2.979E+001	2.750E+001
Pb212-XR	74.82	10.28	3.864E+001	2.24E+001	4.337E+001	1.922E+001
	77.11	17.10	2.242E+001		1.246E+001	1.115E+001
	87.35	3.97	8.659E+001		4.407E+001	4.309E+001
Bi-214	89.78	1.46	2.306E+002	4.64E+000	7.726E+001	1.148E+002
	609.32	45.49	4.643E+000		1.813E+000	2.284E+000
	768.36	4.89	4.739E+001		-4.890E+001	2.327E+001
	806.18	1.26	2.334E+002		1.564E+002	1.150E+002
	934.06	3.11	9.866E+001		2.752E+000	4.854E+001
	1120.29	14.92	1.859E+001		6.365E+000	9.102E+000
	1155.21	1.63	1.977E+002		1.564E+002	9.704E+001
	1238.12	5.83	3.901E+001		-1.331E+001	1.897E+001
	1280.98	1.43	1.374E+002		2.637E+001	6.645E+001
	1377.67	3.99	3.590E+001		-7.113E+001	1.709E+001
	1385.31	0.79	2.186E+002		-3.374E+002	1.049E+002
	1401.52	1.33	2.039E+002		-4.902E+001	9.934E+001
	1407.99	2.39	1.354E+002		-2.188E+001	6.625E+001
	1509.21	2.13	9.379E+001		-2.373E+001	4.516E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
Pb-214	1729.59	2.88	0.000E+000	5.22E+000	0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.801E+001		-3.200E+000	1.389E+001
Pb-214	295.22	18.42	9.997E+000	5.22E+000	4.883E+000	4.948E+000
	351.93	35.60	5.222E+000		1.594E+000	2.581E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.456E+002	5.22E+000	-1.609E+001	1.208E+002
Pb214-XR	74.82	5.80	6.848E+001	3.95E+001	7.687E+001	3.407E+001
	77.11	9.70	3.952E+001		2.196E+001	1.966E+001
	87.35	2.24	1.535E+002		7.810E+001	7.636E+001
	89.78	0.82	4.107E+002		1.376E+002	2.043E+002
Ra-226	186.21	3.64	6.140E+001	6.14E+001	-1.915E+001	3.050E+001
Ac-228	129.07	2.42	1.126E+002	1.19E+001	-4.119E+001	5.602E+001
	209.25	3.89	5.645E+001		3.990E+001	2.803E+001
	270.24	3.46	5.619E+001		1.590E+001	2.784E+001
	328.00	2.95	6.094E+001		-1.841E+001	3.013E+001
	338.32	11.27	1.587E+001		-1.607E+001	7.843E+000
	409.46	1.92	9.402E+001		6.234E+001	4.638E+001
	463.00	4.40	4.237E+001		5.902E+000	2.088E+001
	794.95	4.25	6.455E+001		2.442E+001	3.177E+001
	911.20	25.80	1.190E+001		-1.587E+000	5.859E+000
	964.77	4.99	5.947E+001		-1.537E+001	2.923E+001
	968.97	15.80	1.880E+001		1.119E+001	9.240E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.425E-001	2.43E-001	0.000E+000	0.000E+000
	283.69	1.70	1.101E+002		1.122E+001	5.449E+001
	300.07	2.47	7.425E+001		3.980E+001	3.674E+001
	302.65	2.20	8.348E+001		1.135E+002	4.131E+001
	330.06	1.40	1.282E+002		-2.582E+001	6.338E+001
Th-234	92.38	2.13	1.548E+002	1.55E+002	1.779E+002	7.701E+001
	92.80	2.10	1.567E+002		1.801E+002	7.797E+001
	112.81	0.21	1.392E+003		3.881E+001	6.923E+002
U-235	143.76	10.96	2.275E+001	3.91E+000	-1.104E+001	1.131E+001
	163.33	5.08	4.685E+001		3.050E+001	2.329E+001
	185.71	57.20	3.912E+000		-1.510E+000	1.943E+000
	202.11	1.08	1.993E+002		1.402E+002	9.896E+001
	205.31	5.01	4.407E+001		-3.234E+000	2.188E+001
Am-241	59.54	35.90	1.321E+001	1.32E+001	-1.262E+000	6.570E+000

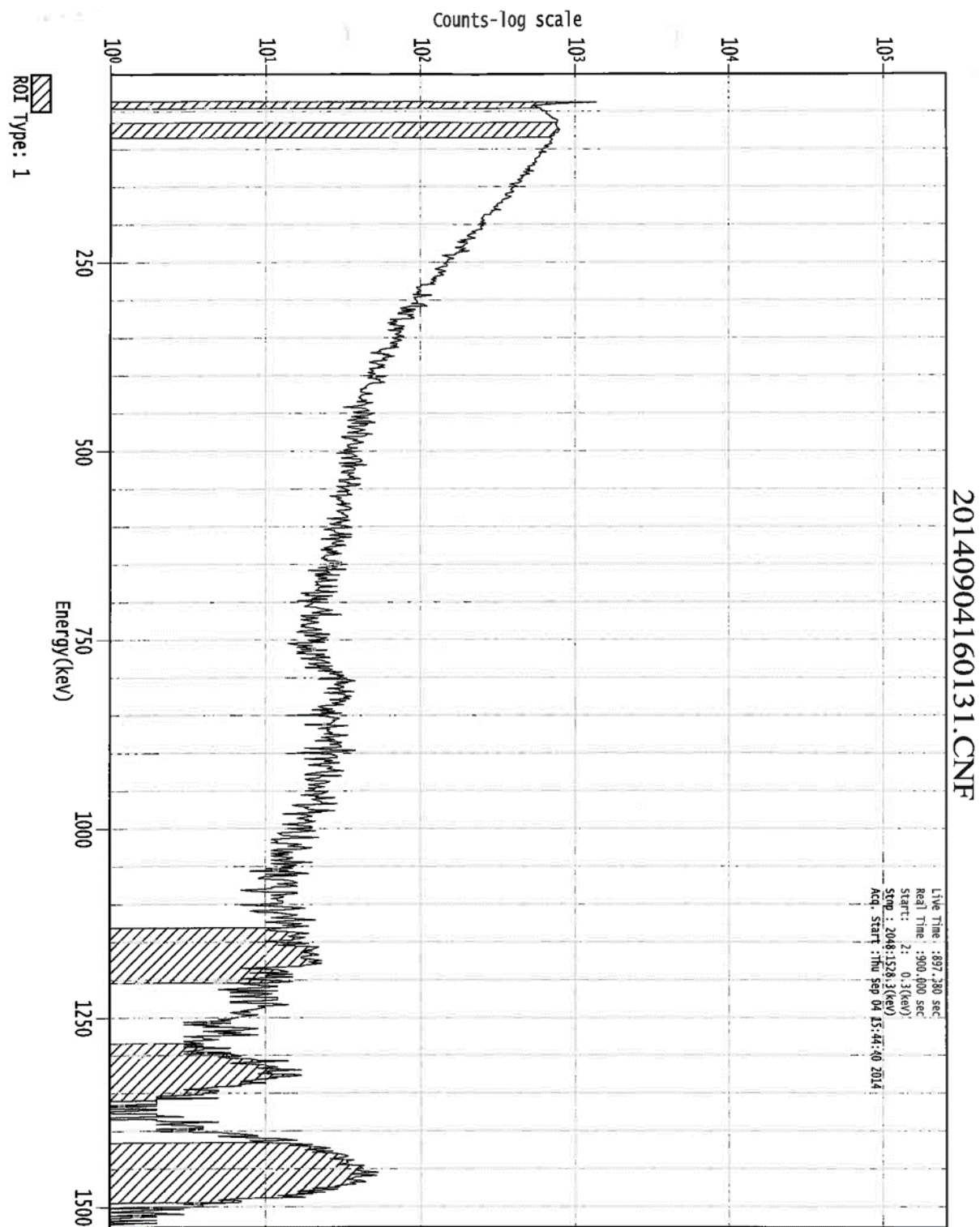
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

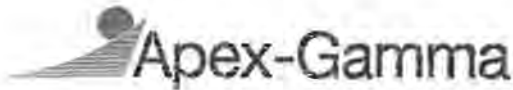
> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



11/3/2014 10:31:02AM

Page 1 of 7

Analysis Report for 03-Nov-14-10001
VG04F Filter Survey Unit 7001B Smear

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 03-Nov-14-10001
Sample Description	: VG04F Filter Survey Unit 7001B Smear
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 11/3/2014 10:09:48AM
Acquisition Started	: 11/3/2014 10:10:15AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: DET02
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.7 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/5/2013
Efficiency Calibration Used Done On	: 10/28/2014
Efficiency Calibration Description	:
Sample Number	: 11321

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11-3-14
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11/3/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 11/3/2014 10:30:18AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 03-Nov-14-10001

VG04F Filter Survey Unit 7001B Smear

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	352.08	1405 -	1416	1410.76	3.98E+01	15.84	2.24E+01	Pb-214
2	1461.57	5848 -	5863	5855.87	1.52E+01	8.68	3.61E+00	Bi-214 or K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.97	1460.82 *	10.66	6.21E-05	3.59E-05	miss
Bi-211	0.96	351.07 *	13.02	5.01E-05	2.15E-05	miss
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	1.83E-05	7.87E-06	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Analysis Report for 03-Nov-14-10001
VG04F Filter Survey Unit 7001B Smear

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INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
K-40	0.979	6.21E-05	3.59E-05	
? Bi-211	0.962	5.01E-05	2.15E-05	
? Pb-214	1.000	1.83E-05	7.87E-06	

? = 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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 03-Nov-14-10001
VG04F Filter Survey Unit 7001B Smear

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/3/2014 10:30:18AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	*	10.66	6.21E-05	3.67E-05	miss
+	Cr-51	320.08	9.91	-1.32E-06	2.47E-05	2.47E-05	free
+	Mn-54	834.85	99.98	-1.86E-07	2.19E-06	2.19E-06	miss
+	Co-58	810.76	99.45	5.62E-07	4.14E-06	4.14E-06	0.999
		1674.73	0.52	-5.84E-05		6.13E-04	1.126
+	Co-60	1173.23	99.85	4.70E-07	4.37E-06	4.37E-06	0.794
		1332.49	99.98	4.55E-07		5.51E-06	0.790
+	Nb-94	702.65	99.81	-2.49E-06	4.75E-06	4.81E-06	0.778
		871.09	99.89	-8.27E-07		4.75E-06	0.774
+	Sn-113	255.13	2.11	3.97E-05	3.27E-06	1.31E-04	free
		391.70	64.97	-1.49E-06		3.27E-06	free
+	Cs-134	475.36	1.48	-1.83E-05	3.60E-06	1.47E-04	miss
		563.25	8.34	1.87E-05		7.36E-05	0.618
		569.33	15.37	8.27E-06		3.78E-05	0.592
		604.72	97.62	-2.10E-06		3.60E-06	0.733
		795.86	85.46	-2.76E-06		4.27E-06	0.732
		801.95	8.69	9.62E-06		7.57E-05	0.620
		1038.61	0.99	1.33E-05		4.90E-04	0.765
		1167.97	1.79	-6.33E-05		1.10E-04	1.385

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 03-Nov-14-10001
VG04F Filter Survey Unit 7001B Smear

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	0.00E+00	3.60E-06	2.36E-05	1.567
+	Cs-137	661.66	85.10	4.27E-08	3.22E-06	3.22E-06	miss
+	Eu-152	121.78	28.67	-4.77E-06	7.52E-06	7.52E-06	0.767
		244.70	7.61	-2.24E-05		3.69E-05	0.733
		295.94	0.45	7.66E-04		9.77E-04	miss
		344.28	26.60	1.27E-06		1.27E-05	0.835
		367.79	0.86	-7.47E-05		5.47E-04	0.569
		411.12	2.24	8.02E-05		2.21E-04	0.645
		443.96	2.83	4.06E-05		1.62E-04	0.734
		488.68	0.42	3.55E-05		6.92E-04	miss
		563.99	0.49	2.08E-04		1.00E-03	0.734
		586.26	0.46	-9.01E-05		1.13E-03	0.753
		678.62	0.47	1.45E-04		1.16E-03	0.569
		688.67	0.86	-1.17E-04		4.51E-04	0.885
		719.35	0.28	-9.18E-06		1.04E-03	miss
		778.90	12.96	-9.75E-06		3.76E-05	0.763
		810.45	0.32	1.27E-04		1.00E-03	1.280
		867.37	4.26	1.33E-06		9.89E-05	0.671
		919.33	0.43	3.17E-04		1.52E-03	0.885
		964.08	14.65	6.51E-06		2.61E-05	1.127
		1085.87	10.24	9.70E-06		3.77E-05	1.105
		1089.74	1.73	-1.96E-05		2.81E-04	0.788
		1112.07	13.69	3.75E-06		3.03E-05	0.936
		1212.95	1.43	-1.24E-04		3.69E-04	0.672
		1249.94	0.19	1.86E-04		1.54E-03	1.433
		1299.14	1.63	1.99E-05		3.02E-04	0.753
		1408.01	21.07	-8.96E-06		1.65E-05	0.895
		1457.64	0.50	-3.09E-04		6.01E-04	1.335
		1528.10	0.28	4.77E-04		1.71E-03	1.007
+	Eu-154	123.07	40.40	6.88E-07	5.90E-06	5.90E-06	0.767
		247.93	6.89	1.15E-05		5.36E-05	0.713
		591.76	4.95	-4.32E-05		8.64E-05	0.661
		692.42	1.78	1.59E-05		3.53E-04	0.729
		723.30	20.06	2.52E-06		2.57E-05	0.738
		756.80	4.52	-2.06E-05		7.09E-05	0.639
		873.18	12.08	1.82E-05		5.66E-05	0.711
		996.29	10.48	4.47E-07		3.32E-05	0.895
		1004.76	18.01	-2.13E-06		1.56E-05	0.882
		1274.43	34.80	-3.24E-06		1.18E-05	0.890
		1596.48	1.80	1.40E-06		1.03E-04	1.864
+	Eu-155	45.30	1.31	2.44E-04	9.07E-06	8.20E-04	0.995
		60.01	1.22	-2.19E-04		6.90E-04	0.999
		86.55	30.70	-1.55E-06		9.07E-06	free
		105.31	21.10	1.06E-06		1.05E-05	1.000
+	Tl-208	583.19	85.00	9.70E-07	5.75E-06	5.75E-06	0.758
+	Bi-211	351.07	*	5.01E-05	2.33E-05	2.33E-05	miss
+	Pb-211	404.85	3.78	-3.35E-05	5.75E-05	5.75E-05	miss
		427.09	1.76	3.44E-05		1.78E-04	miss
		832.01	3.52	2.79E-05		1.19E-04	miss
+	Bi-212	39.86	1.06	-2.54E-04	7.63E-05	8.63E-04	0.993
		727.33	6.67	2.87E-05		7.63E-05	0.928

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Analysis Report for		03-Nov-14-10001		11/3/20 14	10:31:02AM	Page 6 of 7	
VG04F Filter Survey Unit 7001B Smear							
	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	785.37	1.10	4.78E-06	7.63E-05	3.11E-04	0.774
		1620.50	1.47	0.00E+00		3.45E-05	1.032
+	Pb-212	115.18	0.60	7.89E-05	4.64E-06	3.81E-04	miss
		238.63	43.60	-2.05E-07		4.64E-06	free
		300.09	3.30	-1.17E-06		8.74E-05	free
+	Pb212-XR	74.82	10.28	-2.92E-06	2.90E-05	4.98E-05	miss
		77.11	17.10	1.21E-05		2.90E-05	miss
		87.35	3.97	2.12E-05		8.13E-05	miss
		89.78	1.46	-1.34E-05		1.93E-04	miss
+	Bi-214	609.32	45.49	1.11E-05	1.69E-05	1.69E-05	0.798
		768.36	4.89	4.30E-05		1.13E-04	0.764
		806.18	1.26	-4.30E-05		3.93E-04	0.701
		934.06	3.11	4.37E-05		1.62E-04	0.769
		1120.29	14.92	6.05E-06		3.79E-05	0.769
		1155.21	1.63	1.97E-05		3.18E-04	0.765
		1238.12	5.83	9.56E-06		9.26E-05	0.769
		1280.98	1.43	6.36E-05		3.85E-04	0.769
		1377.67	3.99	9.97E-07		8.33E-05	1.160
		1385.31	0.79	2.43E-04		8.97E-04	0.769
		1401.52	1.33	-1.37E-04		3.03E-04	0.769
		1407.99	2.39	-9.19E-05		1.69E-04	0.769
		1509.21	2.13	6.77E-05		3.19E-04	0.791
		1661.27	1.05	0.00E+00		1.24E-04	1.010
		1729.59	2.88	3.25E-05		1.37E-04	1.654
		1764.49	15.30	2.99E-05		5.72E-05	1.009
		1847.43	2.03	1.53E-05		1.41E-04	1.344
>		2118.51	1.16	0.00E+00		0.00E+00	1.227
+	Pb-214	241.99	7.25	2.20E-05	8.51E-06	4.09E-05	0.998
		295.22	18.42	2.40E-05		2.49E-05	1.001
		351.93	*	1.83E-05		8.51E-06	free
		785.96	1.06	6.55E-05		2.90E-04	0.998
+	Pb214-XR	74.82	5.80	-5.18E-06	5.11E-05	8.83E-05	miss
		77.11	9.70	2.13E-05		5.11E-05	miss
		87.35	2.24	3.75E-05		1.44E-04	miss
		89.78	0.82	-2.39E-05		3.43E-04	miss
+	Ra-226	186.21	3.64	6.13E-07	5.77E-05	5.77E-05	free
+	Ac-228	129.07	2.42	6.29E-06	1.60E-05	1.12E-04	0.786
		209.25	3.89	-7.43E-06		4.43E-05	0.905
		270.24	3.46	1.43E-05		7.67E-05	0.827
		328.00	2.95	-2.35E-05		9.68E-05	0.824
		338.32	11.27	8.10E-06		2.75E-05	0.971
		409.46	1.92	-2.12E-05		1.91E-04	0.747
		463.00	4.40	1.06E-05		9.95E-05	0.720
		794.95	4.25	-1.41E-05		1.09E-04	0.748
		911.20	25.80	4.47E-06		1.80E-05	0.958
		964.77	4.99	-1.43E-05		6.66E-05	0.917
		968.97	15.80	-3.00E-06		1.60E-05	0.957
		1588.20	3.22	2.22E-05		1.33E-04	1.012
+	Pa-231	27.36	10.30	-2.97E-05	1.13E-04	1.13E-04	0.987
		283.69	1.70	6.05E-06		1.46E-04	0.999
		300.07	2.47	-1.57E-06		1.17E-04	1.000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 03-Nov-14-10001
VG04F Filter Survey Unit 7001B Smear

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	-1.97E-05	1.13E-04	1.27E-04	1.000
		330.06	1.40	1.28E-04		2.39E-04	1.001
+	Th-234	92.38	2.13	6.69E-05	1.15E-04	1.41E-04	free
		92.80	2.10	-2.30E-05		1.15E-04	free
		112.81	0.21	6.94E-04		1.17E-03	free
+	U-235	143.76	10.96	-1.07E-06	4.04E-06	1.78E-05	free
		163.33	5.08	8.43E-06		4.68E-05	free
		185.71	57.20	1.38E-06		4.04E-06	free
		202.11	1.08	-9.01E-05		1.62E-04	miss
		205.31	5.01	-4.23E-06		3.91E-05	free
+	Am-241	59.54	35.90	-8.58E-06	2.62E-05	2.62E-05	free

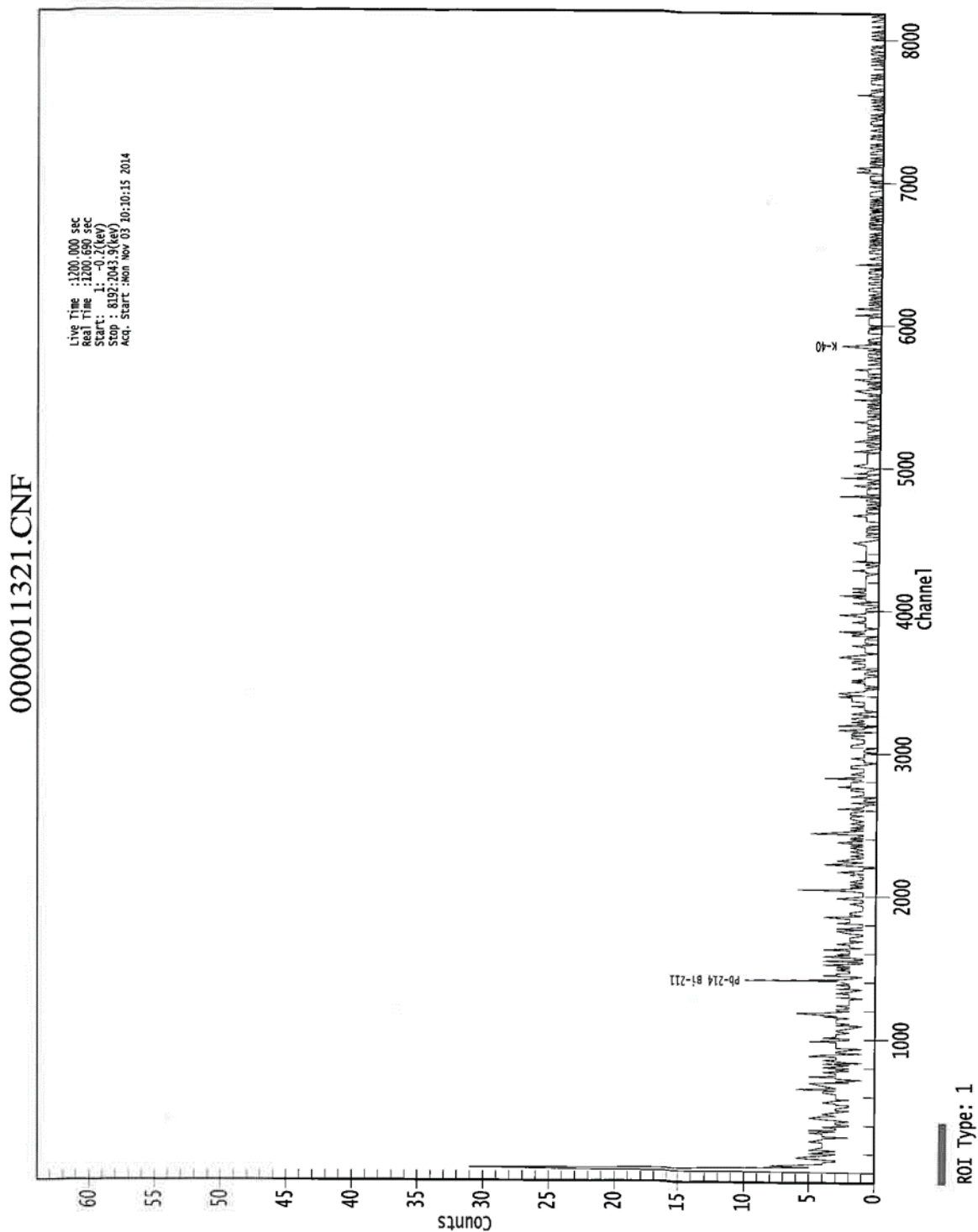
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S ***

2014-05A-0-142

Filename: C:\Canberra\11-3-14\20141103135534.cnf

Report Generated On : 11/3/2014 2:37:09 PM

Sample Title : ESB-672 4F
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

HEATING Filters
Inspector Collect

2 → No Cs-137
Co-60

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Identified

Sample Size : 1.000E+000 grams

CH

Sample Taken On : 11/3/2014 1:39:30 PM
Acquisition Started : 11/3/2014 1:39:30 PM

Live Time : 898.0 seconds
Dead Time : 900.0 seconds

Load Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAPER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst RS

Date 11-3-14

du Sam 11/3/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

11/3/2014 2:37:09 PM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: ESB-672 4F

Peak Analysis Performed on: 11/3/2014 2:37:08 PM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.43	38.94	1.69	2.83E+003	208.24	1.38E+003
2	106-	136	121.45	90.00	2.72	4.02E+002	489.98	6.81E+003
3	1898-	2007	1953.03	1457.74	26.82	2.22E+003	161.92	6.30E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/3/2014 2:37:09 PM Page ²⁴⁷⁴3
8413

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: ESB-672 4F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.637	34.70*	66.40	3.93294E+001	8.38109E+000
		788.70	33.60		
K-40	0.997	1436.80*	66.40	8.84745E+001	9.57935E+000
		1460.82*	10.66	5.51098E+002	6.25039E+001
Cd-109	0.999	88.03*	3.70	6.55799E+001	8.09864E+001
Eu-155	0.998	45.30	1.31		
		60.01	1.22		
		86.55*	30.70	7.90376E+000	9.75122E+000
Th227-XR	0.396	105.31	21.10		
		85.43	1.34		
		88.47*	2.18	1.11305E+002	1.37565E+002

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/3/2014 2:37:09 PM Page 94 13

 *** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.637	3.932935E+001	8.381087E+000
K-40	0.997	3.061197E+002	7.928245E+001
? Cd-109	0.999	6.557989E+001	8.098640E+001
? Eu-155	0.998	7.903765E+000	9.751221E+000
? Th227-XR	0.396	1.113053E+002	1.375650E+002

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 11/3/2014 2:37:08 PM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: ESB-672 4F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	4.129E+000	4.13E+000	3.933E+001	2.046E+000
		788.70	33.60	6.927E+000		5.242E-001	3.400E+000
		1436.80*	66.40	8.743E+000		8.847E+001	4.318E+000
+	K-40	1460.82*	10.66	5.446E+001	5.45E+001	5.511E+002	2.690E+001
	Cr-51	320.08	9.91	1.280E+001	1.28E+001	2.611E+000	6.302E+000
	Mn-54	834.85	99.98	2.699E+000	2.70E+000	-5.500E-001	1.327E+000
	Co-58	810.76	99.45	2.698E+000	2.70E+000	2.205E+000	1.327E+000
	Co-60	1173.23	99.85	2.667E+000	1.48E+000	6.725E-002	1.304E+000
		1332.49	99.98	1.480E+000		-1.599E+000	7.067E-001
	Nb-94	702.65	99.81	1.699E+000	1.70E+000	-9.094E-002	8.302E-001
		871.09	99.89	2.768E+000		3.205E+000	1.361E+000
	Sn-113	255.13	2.11	6.030E+001	1.95E+000	-3.933E+001	2.975E+001
		391.70	64.97	1.948E+000		-6.953E-001	9.560E-001
	Cs-137	661.66	85.10	2.048E+000	2.05E+000	9.662E-001	1.003E+000
	Eu-152	121.78	28.67	5.990E+000	5.11E+000	2.277E+000	2.970E+000
		244.70	7.61	1.767E+001		6.123E+000	8.725E+000
		295.94	0.45	2.840E+002		1.558E+002	1.399E+002
		344.28	26.60	5.112E+000		3.772E+000	2.517E+000
		367.79	0.86	1.528E+002		-9.834E+001	7.512E+001
		411.12	2.24	5.851E+001		1.970E+001	2.872E+001
		443.96	2.83	4.912E+001		3.117E+000	2.410E+001
		488.68	0.42	3.509E+002		-2.697E+002	1.721E+002
		563.99	0.49	3.289E+002		1.364E+002	1.612E+002
		586.26	0.46	3.864E+002		-5.451E+001	1.896E+002
		678.62	0.47	3.683E+002		2.600E+002	1.802E+002
		688.67	0.86	2.039E+002		1.126E+002	9.978E+001
		719.35	0.28	6.011E+002		-4.900E+002	2.936E+002
		778.90	12.96	1.652E+001		-1.223E+000	8.097E+000
		810.45	0.32	8.357E+002		6.830E+002	4.111E+002
		867.37	4.26	6.409E+001		1.486E+001	3.151E+001
		919.33	0.43	6.444E+002		5.382E+002	3.165E+002
		964.08	14.65	1.798E+001		5.154E+000	8.820E+000
		1085.87	10.24	2.330E+001		1.112E+001	1.138E+001
		1089.74	1.73	1.398E+002		2.823E+001	6.830E+001
		1112.07	13.69	1.848E+001		8.810E+000	9.033E+000
		1212.95	1.43	1.818E+002		1.020E+002	8.876E+001
		1249.94	0.19	1.168E+003		2.181E+002	5.673E+002
		1299.14	1.63	1.065E+002		-2.566E+001	5.127E+001
		1408.01	21.07	1.604E+001		-4.036E+000	7.854E+000
		1457.64	0.50	1.216E+003		6.713E+003	6.007E+002
		1528.10	0.28	3.101E+002		-1.570E+002	1.418E+002
	Eu-154	123.07	40.40	4.218E+000	4.22E+000	1.160E+000	2.091E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-154	247.93	6.89	1.928E+001	4.22E+000	1.140E+001	9.520E+000
	591.76	4.95	3.703E+001		2.150E+001	1.819E+001
	692.42	1.78	9.676E+001		-4.127E+001	4.732E+001
	723.30	20.06	8.381E+000		1.254E+001	4.093E+000
	756.80	4.52	3.992E+001		-1.882E+001	1.951E+001
	873.18	12.08	2.281E+001		1.158E+001	1.121E+001
	996.29	10.48	2.375E+001		9.385E+000	1.163E+001
	1004.76	18.01	1.330E+001		-1.283E+001	6.504E+000
	1274.43	34.80	5.329E+000		-4.919E+000	2.572E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.948E+002	8.73E+000	-6.421E+001	9.646E+001
	60.01	1.22	2.015E+002		-1.070E+002	9.975E+001
	86.55*	30.70	1.583E+001		7.904E+000	7.888E+000
	105.31	21.10	8.733E+000		-2.780E+000	4.330E+000
Tl-208	583.19	85.00	2.069E+000	2.07E+000	-5.695E+001	1.015E+000
Bi-211	351.07	13.02	1.054E+001	1.05E+001	1.201E+001	5.190E+000
Pb-211	404.85	3.78	3.452E+001	3.45E+001	2.463E+001	1.695E+001
	427.09	1.76	7.525E+001		1.778E+000	3.692E+001
	832.01	3.52	7.641E+001		-2.765E+001	3.758E+001
Bi-212	39.86	1.06	2.608E+002	2.51E+001	2.486E+003	1.292E+002
	727.33	6.67	2.508E+001		-1.303E+001	1.224E+001
	785.37	1.10	2.052E+002		5.143E+001	1.007E+002
Pb-212	1620.50	1.47	0.000E+000	3.14E+000	0.000E+000	0.000E+000
	115.18	0.60	2.894E+002		-1.858E+001	1.434E+002
	238.63	43.60	3.145E+000		2.433E+000	1.554E+000
Pb212-XR	300.09	3.30	3.825E+001	1.27E+001	1.081E+001	1.884E+001
	74.82	10.28	2.169E+001		1.816E+000	1.075E+001
	77.11	17.10	1.272E+001		2.530E+000	6.303E+000
Bi-214	87.35	3.97	5.122E+001	4.21E+000	2.170E+001	2.540E+001
	89.78	1.46	1.368E+002		1.170E+002	6.783E+001
	609.32	45.49	4.206E+000		5.248E+000	2.066E+000
	768.36	4.89	3.991E+001		-2.166E+001	1.953E+001
	806.18	1.26	2.091E+002		2.423E+002	1.028E+002
	934.06	3.11	8.764E+001		2.554E+001	4.303E+001
	1120.29	14.92	1.691E+001		-3.889E+001	8.262E+000
	1155.21	1.63	1.627E+002		7.083E+001	7.956E+001
	1238.12	5.83	4.039E+001		2.201E+001	1.966E+001
	1280.98	1.43	1.294E+002		-2.975E+001	6.247E+001
	1377.67	3.99	3.928E+001		-7.681E+001	1.878E+001
	1385.31	0.79	2.391E+002		-3.418E+002	1.152E+002
	1401.52	1.33	2.163E+002		-1.107E+002	1.056E+002
	1407.99	2.39	1.411E+002		-3.552E+001	6.912E+001
	1509.21	2.13	9.214E+001		-3.829E+001	4.434E+001
Pb-214	1661.27	1.05	0.000E+000	3.87E+000	0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	1.881E+001		1.992E+001	9.292E+000
	295.22	18.42	6.850E+000		2.123E+001	3.374E+000
	351.93	35.60	3.866E+000		4.617E+000	1.903E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.138E+002	3.87E+000	-5.589E+000	1.049E+002
Pb214-XR	74.82	5.80	3.845E+001	2.24E+001	3.219E+000	1.906E+001
	77.11	9.70	2.242E+001		4.461E+000	1.111E+001
	87.35	2.24	9.078E+001		3.845E+001	4.502E+001
	89.78	0.82	2.435E+002		2.083E+002	1.208E+002
Ra-226	186.21	3.64	3.924E+001	3.92E+001	-2.528E+001	1.942E+001
Ac-228	129.07	2.42	6.868E+001	1.07E+001	8.730E+000	3.404E+001
	209.25	3.89	3.628E+001		1.515E+000	1.794E+001
	270.24	3.46	3.556E+001		-2.122E+001	1.753E+001
	328.00	2.95	4.274E+001		-1.512E+001	2.103E+001
	338.32	11.27	1.159E+001		-4.679E+000	5.702E+000
	409.46	1.92	6.762E+001		-1.280E+001	3.319E+001
	463.00	4.40	3.201E+001		2.412E+001	1.570E+001
	794.95	4.25	5.737E+001		3.100E+001	2.818E+001
	911.20	25.80	1.069E+001		1.018E+000	5.251E+000
	964.77	4.99	5.277E+001		1.753E+001	2.588E+001
	968.97	15.80	1.664E+001		1.451E+001	8.158E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.315E+001		-2.153E+001	3.604E+001
	300.07	2.47	5.110E+001		1.444E+001	2.517E+001
	302.65	2.20	5.686E+001		-1.946E+001	2.800E+001
	330.06	1.40	9.063E+001		-6.378E+000	4.459E+001
Th-234	92.38	2.13	9.199E+001	9.20E+001	2.908E+001	4.561E+001
	92.80	2.10	9.313E+001		2.944E+001	4.618E+001
	112.81	0.21	8.341E+002		1.184E+002	4.135E+002
U-235	143.76	10.96	1.424E+001	2.51E+000	9.663E+000	7.054E+000
	163.33	5.08	2.921E+001		3.834E-001	1.447E+001
	185.71	57.20	2.508E+000		-2.241E+000	1.241E+000
	202.11	1.08	1.269E+002		-8.765E+000	6.275E+001
	205.31	5.01	2.815E+001		-4.191E+000	1.392E+001
Am-241	59.54	35.90	6.930E+000	6.93E+000	-3.680E+000	3.430E+000

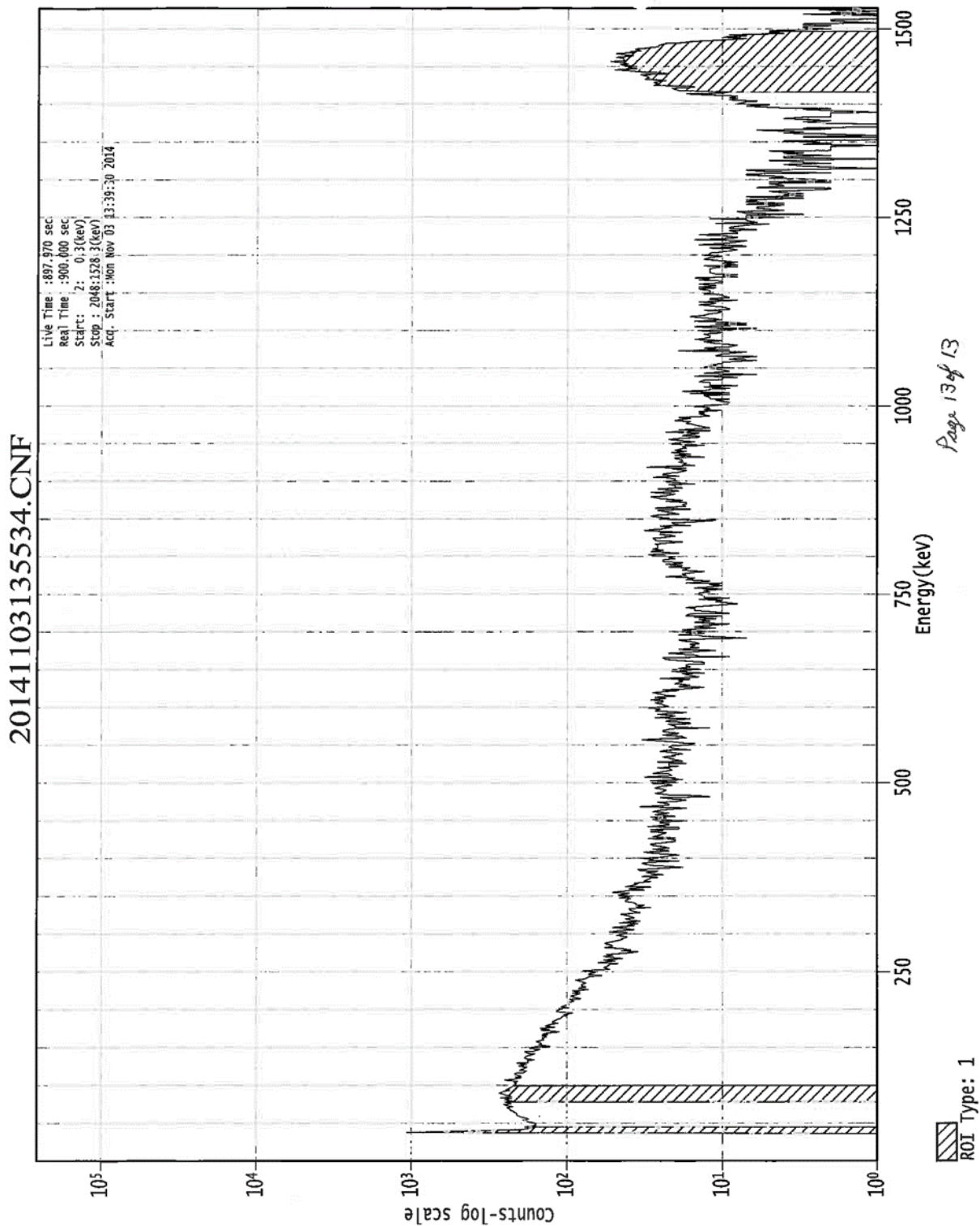
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y I S ***

Filename: C:\Canberra\11-10-14\20141104125449.cnf

Report Generated On : 11/10/2014 8:51:10 AM

Sample Title : 2 meter @ VG-09 bkgd

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 512

Peak Area Range (in channels) : 1 - 512

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 11/4/2014 12:38:51 PM

Acquisition Started : 11/4/2014 12:38:51 PM

Live Time : 897.9 seconds

Real Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 8/4/2014

Efficiency ID : 1m_Offset_area

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst

Date 11-10-14

11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

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*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 2 meter @ VG-09 bkgd
Peak Analysis Performed on: 11/10/2014 8:51:10 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.36	38.89	1.73	2.93E+003	199.25	1.19E+003
2	443-	498	471.22	352.28	1.58	2.49E+002	242.26	1.81E+003

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:51:10 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 2 meter @ VG-09 bkgd
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.993	34.70*	66.40	3.08741E+007	6.52273E+006
		788.70	33.60		
		1436.80	66.40		
Zr-97	1.000	254.17	1.15		
		355.40*	2.09	6.75935E+007	6.68691E+007
		507.64	5.03		
		602.37	1.38		
		743.36	93.09		
		1021.20	1.01		
		1147.97	2.62		
		1362.68	1.02		
		1750.24	1.09		
Ba-133	0.993	79.61	2.65		
		81.00	32.90		
		276.40	7.16		
		302.85	18.34		
		356.01*	62.05	2.27672E+006	2.24377E+006
		383.85	8.94		
Eu-152	0.622	121.78	28.67		
		244.70	7.61		
		295.94	0.45		
		344.28*	26.60	5.31091E+006	5.23786E+006
		367.79	0.86		
		411.12	2.24		
		443.96	2.83		
		488.68	0.42		
		563.99	0.49		
		586.26	0.46		
		678.62	0.47		
		688.67	0.86		
		719.35	0.28		
		778.90	12.96		
		810.45	0.32		
		867.37	4.26		
		919.33	0.43		
		964.08	14.65		
		1085.87	10.24		
		1089.74	1.73		
		1112.07	13.69		
		1212.95	1.43		
		1249.94	0.19		
		1299.14	1.63		

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
Eu-152	0.622	1408.01	21.07		
		1457.64	0.50		
		1528.10	0.28		
Bi-211	0.999	351.07*	13.02	1.08503E+007	1.06951E+007
Bi-212	1.000	39.86*	1.06	1.93400E+009	5.24219E+008
		727.33	6.67		
		785.37	1.10		
Pb-214	1.000	1620.50	1.47		
		241.99	7.25		
		295.22	18.42		
		351.93*	35.60	3.96827E+006	3.91087E+006
		785.96	1.06		
		129.07	2.42		
Ac-228	0.974	209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32*	11.27	1.25351E+007	1.23609E+007
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
? LaBr3	0.993	3.087411E+007	6.522734E+006
? Zr-97	1.000	6.759345E+007	6.686912E+007
? Ba-133	0.993	2.276717E+006	2.243769E+006
? Eu-152	0.622	5.310914E+006	5.237861E+006
? Bi-211	0.999	1.085026E+007	1.069510E+007
? Bi-212	1.000	1.934001E+009	5.242191E+008
? Pb-214	1.000	3.968267E+006	3.910870E+006
? Ac-228	0.974	1.253508E+007	1.236090E+007

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 11/10/2014 8:51:10 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report 11/10/2014 8:51:11 AM Page 6

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 2 meter @ VG-09 bkgd
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	2.932E+006	2.93E+006	3.087E+007	1.452E+006
		788.70	33.60	3.548E+006		2.019E+006	1.743E+006
		1436.80	66.40	2.989E+006		1.051E+007	1.475E+006
	K-40	1460.82	10.66	2.037E+007	2.04E+007	1.124E+008	1.006E+007
	Cr-51	320.08	9.91	1.019E+007	1.02E+007	-3.985E+006	5.022E+006
	Mn-54	834.85	99.98	1.315E+006	1.31E+006	-1.997E+005	6.466E+005
	Co-58	810.76	99.45	1.351E+006	1.35E+006	1.613E+006	6.648E+005
	Co-60	1173.23	99.85	1.115E+006	7.32E+005	4.728E+005	5.457E+005
		1332.49	99.98	7.324E+005		7.036E+005	3.537E+005
	Nb-94	702.65	99.81	9.431E+005	9.43E+005	-3.515E+005	4.615E+005
		871.09	99.89	1.328E+006		-8.543E+005	6.530E+005
	Sn-113	255.13	2.11	5.158E+007	1.49E+006	-2.735E+007	2.547E+007
		391.70	64.97	1.487E+006		1.151E+006	7.314E+005
	Cs-137	661.66	85.10	1.169E+006	1.17E+006	6.708E+005	5.729E+005
+	Eu-152	121.78	28.67	4.903E+006	4.90E+006	-2.125E+006	2.432E+006
		244.70	7.61	1.498E+007		7.505E+006	7.402E+006
		295.94	0.45	2.287E+008		8.562E+007	1.128E+008
		344.28*	26.60	8.481E+006		5.311E+006	4.212E+006
		367.79	0.86	1.115E+008		-3.991E+007	5.486E+007
		411.12	2.24	4.213E+007		-6.512E+006	2.070E+007
		443.96	2.83	3.527E+007		-1.174E+007	1.733E+007
		488.68	0.42	2.293E+008		-6.168E+007	1.126E+008
		563.99	0.49	2.084E+008		1.647E+008	1.023E+008
		586.26	0.46	2.271E+008		-2.215E+008	1.115E+008
		678.62	0.47	2.051E+008		5.295E+007	1.005E+008
		688.67	0.86	1.114E+008		-3.783E+006	5.453E+007
		719.35	0.28	3.337E+008		6.852E+007	1.632E+008
		778.90	12.96	8.448E+006		-1.325E+007	4.144E+006
		810.45	0.32	4.184E+008		4.997E+008	2.059E+008
		867.37	4.26	3.133E+007		2.187E+006	1.541E+007
		919.33	0.43	3.006E+008		-8.999E+007	1.477E+008
		964.08	14.65	8.352E+006		-2.088E+006	4.099E+006
		1085.87	10.24	1.006E+007		-4.991E+006	4.916E+006
		1089.74	1.73	6.071E+007		5.640E+006	2.968E+007
		1112.07	13.69	7.769E+006		-1.704E+006	3.799E+006
		1212.95	1.43	7.097E+007		-1.989E+007	3.464E+007
		1249.94	0.19	4.689E+008		3.105E+008	2.280E+008
		1299.14	1.63	4.506E+007		-5.982E+007	2.177E+007
		1408.01	21.07	5.302E+006		2.493E+006	2.590E+006
		1457.64	0.50	4.348E+008		2.226E+009	2.148E+008
		1528.10	0.28	1.116E+008		-1.034E+008	5.108E+007
	Eu-154	123.07	40.40	3.464E+006	2.20E+006	-2.273E+006	1.718E+006

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	Eu-154	247.93	6.89	1.627E+007	2.20E+006	-9.145E+005	8.039E+006
		591.76	4.95	2.140E+007		-1.393E+007	1.051E+007
		692.42	1.78	5.369E+007		-2.145E+006	2.628E+007
		723.30	20.06	4.656E+006		7.083E+005	2.278E+006
		756.80	4.52	2.110E+007		-1.034E+007	1.032E+007
		873.18	12.08	1.099E+007		2.914E+006	5.404E+006
		996.29	10.48	1.082E+007		-3.287E+006	5.304E+006
		1004.76	18.01	6.119E+006		1.260E+006	2.996E+006
		1274.43	34.80	2.197E+006		-1.114E+006	1.063E+006
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.395E+008	4.65E+006	9.889E+006	6.903E+007
		60.01	1.22	1.353E+008		-8.386E+007	6.689E+007
		86.55	30.70	4.647E+006		-2.282E+006	2.303E+006
		105.31	21.10	6.795E+006		4.887E+006	3.369E+006
	Tl-208	583.19	85.00	1.232E+006	1.23E+006	-2.778E+005	6.049E+005
+	Bi-211	351.07*	13.02	1.733E+007	1.73E+007	1.085E+007	8.605E+006
	Pb-211	404.85	3.78	2.486E+007	2.49E+007	-7.361E+006	1.222E+007
		427.09	1.76	5.448E+007		2.301E+006	2.677E+007
		832.01	3.52	3.747E+007		-4.656E+006	1.843E+007
+	Bi-212	39.86*	1.06	1.837E+008	1.40E+007	1.934E+009	9.093E+007
		727.33	6.67	1.403E+007		9.367E+006	6.862E+006
		785.37	1.10	1.056E+008		2.853E+007	5.184E+007
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	2.327E+008	2.66E+006	-7.161E+006	1.154E+008
		238.63	43.60	2.664E+006		2.147E+005	1.317E+006
		300.09	3.30	3.084E+007		2.761E+007	1.520E+007
	Pb212-XR	74.82	10.28	1.484E+007	8.75E+006	-9.353E+006	7.347E+006
		77.11	17.10	8.751E+006		2.931E+006	4.334E+006
		87.35	3.97	3.560E+007		-4.517E+006	1.764E+007
		89.78	1.46	9.629E+007		3.963E+007	4.772E+007
	Bi-214	609.32	45.49	2.404E+006	2.40E+006	1.429E+006	1.181E+006
		768.36	4.89	2.024E+007		-2.527E+007	9.907E+006
		806.18	1.26	1.041E+008		7.300E+007	5.119E+007
		934.06	3.11	4.136E+007		-1.160E+006	2.032E+007
		1120.29	14.92	7.255E+006		3.431E+006	3.549E+006
		1155.21	1.63	6.879E+007		-2.663E+006	3.367E+007
		1238.12	5.83	1.576E+007		-1.094E+007	7.670E+006
		1280.98	1.43	5.238E+007		-3.048E+007	2.533E+007
		1377.67	3.99	1.225E+007		-3.345E+007	5.805E+006
		1385.31	0.79	6.972E+007		-2.710E+008	3.326E+007
		1401.52	1.33	6.918E+007		-4.043E+007	3.363E+007
		1407.99	2.39	4.666E+007		2.195E+007	2.280E+007
		1509.21	2.13	3.611E+007		-5.428E+007	1.744E+007
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99	7.25	1.589E+007	5.55E+006	2.011E+006	7.853E+006
		295.22	18.42	5.548E+006		-1.174E+006	2.735E+006
		351.93*	35.60	6.337E+006		3.968E+006	3.147E+006

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	Pb-214	785.96	1.06	1.105E+008	5.55E+006	5.519E+007	5.427E+007
	Pb214-XR	74.82	5.80	2.630E+007	1.54E+007	-1.658E+007	1.302E+007
		77.11	9.70	1.543E+007		5.167E+006	7.640E+006
		87.35	2.24	6.309E+007		-8.005E+006	3.126E+007
		89.78	0.82	1.714E+008		7.056E+007	8.496E+007
	Ra-226	186.21	3.64	3.439E+007	3.44E+007	2.417E+007	1.703E+007
+	Ac-228	129.07	2.42	5.714E+007	5.02E+006	2.008E+007	2.833E+007
		209.25	3.89	3.139E+007		-1.832E+007	1.553E+007
		270.24	3.46	3.080E+007		-1.130E+007	1.520E+007
		328.00	2.95	3.389E+007		4.379E+006	1.669E+007
		338.32*	11.27	2.002E+007		1.254E+007	9.941E+006
		409.46	1.92	4.856E+007		-5.075E+007	2.386E+007
		463.00	4.40	2.235E+007		1.389E+007	1.098E+007
		794.95	4.25	2.890E+007		2.099E+007	1.420E+007
		911.20	25.80	5.020E+006		1.051E+006	2.467E+006
		964.77	4.99	2.431E+007		-1.467E+007	1.193E+007
		968.97	15.80	7.655E+006		1.416E+006	3.756E+006
>	Pa-231	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
		27.36	10.30	1.840E+005	1.84E+005	0.000E+000	0.000E+000
		283.69	1.70	6.078E+007		1.730E+007	2.998E+007
		300.07	2.47	4.120E+007		3.689E+007	2.031E+007
		302.65	2.20	4.580E+007		2.095E+007	2.257E+007
		330.06	1.40	7.162E+007		2.837E+007	3.528E+007
	Th-234	92.38	2.13	6.567E+007	6.57E+007	-2.092E+007	3.254E+007
		92.80	2.10	6.652E+007		-2.119E+007	3.297E+007
		112.81	0.21	6.678E+008		3.022E+008	3.311E+008
	U-235	143.76	10.96	1.198E+007	2.19E+006	1.319E+006	5.940E+006
		163.33	5.08	2.547E+007		5.214E+006	1.262E+007
		185.71	57.20	2.194E+006		1.058E+006	1.087E+006
		202.11	1.08	1.118E+008		1.045E+008	5.535E+007
		205.31	5.01	2.474E+007		1.565E+007	1.225E+007
	Am-241	59.54	35.90	4.654E+006	4.65E+006	-2.884E+006	2.300E+006

+ = Nuclide identified during the nuclide identification

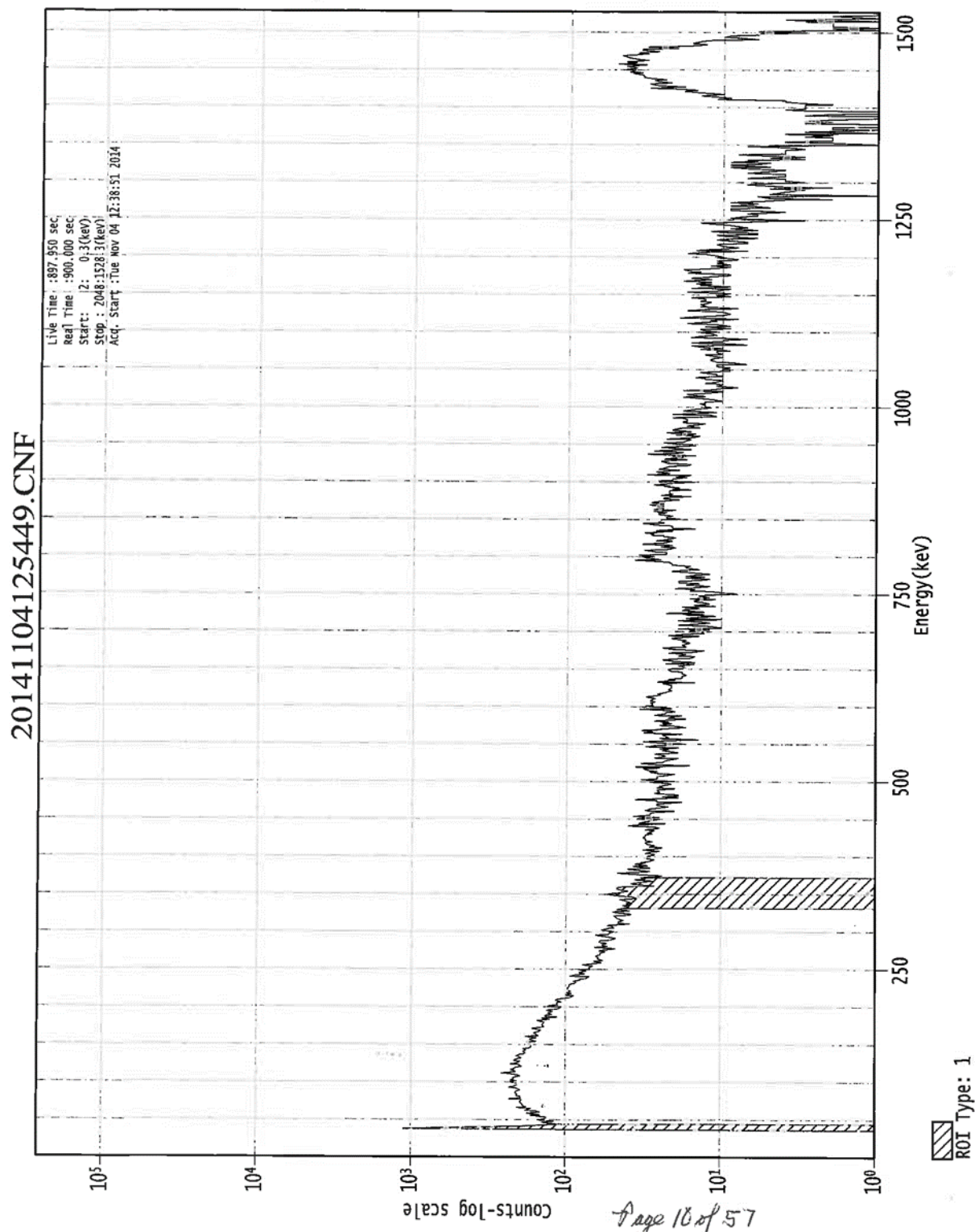
* = Energy line found in the spectrum

> = MDA value not calculated

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

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\11-10-14\20141104131215.cnf

Report Generated On : 11/10/2014 8:53:11 AM

Sample Title : 1 meter @ VG-09
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 11/4/2014 12:55:28 PM
Acquisition Started : 11/4/2014 12:55:28 PM

Live Time : 898.0 seconds
Real Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst RB

Date 11-10-14

du Owen 11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 11/10/2014 8:53:11 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 1 meter @ VG-09
Peak Analysis Performed on: 11/10/2014 8:53:10 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.37	38.90	1.81	2.84E+003	188.37	1.02E+003
2	1515-	1613	1564.57	1168.82	0.75	1.83E+002	163.47	9.03E+002
3	1895-	2003	1949.38	1455.03	30.44	2.19E+003	153.90	5.34E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:53:11 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 1 meter @ VG-09
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.648	34.70*	66.40	3.94976E+001	8.32175E+000
		788.70	33.60		
		1436.80*	66.40	8.69961E+001	9.27148E+000
K-40	0.991	1460.82*	10.66	5.41889E+002	6.05812E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:53:11 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
LaBr3	0.648	3.949758E+001	8.321750E+000
K-40	0.991	2.958630E+002	7.760209E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 11/10/2014 8:53:10 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	1168.82	2.0338E-001	89.51		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude_MDA Report

11/10/2014 8:53:11 AM

Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 1 meter @ VG-09
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	3.586E+000	3.59E+000	3.950E+001	1.774E+000
		788.70	33.60	7.161E+000		9.753E+000	3.518E+000
		1436.80*	66.40	8.111E+000		8.700E+001	4.002E+000
+	K-40	1460.82*	10.66	5.052E+001	5.05E+001	5.419E+002	2.493E+001
	Cr-51	320.08	9.91	1.357E+001	1.36E+001	-1.159E+001	6.685E+000
	Mn-54	834.85	99.98	2.813E+000	2.81E+000	1.173E+000	1.384E+000
	Co-58	810.76	99.45	2.747E+000	2.75E+000	-3.851E-001	1.351E+000
	Co-60	1173.23	99.85	2.884E+000	1.83E+000	1.088E+000	1.412E+000
		1332.49	99.98	1.828E+000		1.684E+000	8.805E-001
	Nb-94	702.65	99.81	1.854E+000	1.85E+000	8.867E-001	9.077E-001
		871.09	99.89	2.769E+000		2.278E-001	1.361E+000
	Sn-113	255.13	2.11	6.496E+001	2.17E+000	1.250E+001	3.208E+001
		391.70	64.97	2.168E+000		1.221E+000	1.066E+000
	Cs-137	661.66	85.10	2.104E+000	2.10E+000	-1.966E+000	1.031E+000
	Eu-152	121.78	28.67	5.936E+000	5.28E+000	1.232E+000	2.943E+000
		244.70	7.61	1.848E+001		1.149E+000	9.134E+000
		295.94	0.45	3.067E+002		1.460E+002	1.513E+002
		344.28	26.60	5.276E+000		2.301E+000	2.599E+000
		367.79	0.86	1.593E+002		-1.242E+002	7.836E+001
		411.12	2.24	6.282E+001		-1.502E+001	3.087E+001
		443.96	2.83	5.294E+001		1.589E+001	2.602E+001
		488.68	0.42	3.781E+002		2.764E+001	1.857E+002
		563.99	0.49	3.556E+002		-7.489E+001	1.746E+002
		586.26	0.46	4.019E+002		-9.569E+001	1.974E+002
		678.62	0.47	3.815E+002		-1.077E+002	1.868E+002
		688.67	0.86	2.125E+002		7.782E+001	1.041E+002
		719.35	0.28	6.517E+002		-1.324E+002	3.189E+002
		778.90	12.96	1.691E+001		-1.722E+001	8.291E+000
		810.45	0.32	8.506E+002		-1.193E+002	4.186E+002
		867.37	4.26	6.515E+001		-6.585E+000	3.203E+001
		919.33	0.43	6.568E+002		3.473E+002	3.228E+002
		964.08	14.65	1.859E+001		-3.582E+000	9.122E+000
		1085.87	10.24	2.305E+001		-9.404E+000	1.125E+001
		1089.74	1.73	1.389E+002		4.931E+001	6.784E+001
		1112.07	13.69	1.841E+001		8.240E+000	8.997E+000
		1212.95	1.43	1.811E+002		7.679E+001	8.838E+001
		1249.94	0.19	1.156E+003		8.845E+002	5.615E+002
		1299.14	1.63	1.148E+002		6.901E+000	5.539E+001
		1408.01	21.07	1.506E+001		-1.466E+001	7.366E+000
		1457.64	0.50	1.179E+003		6.325E+003	5.826E+002
		1528.10	0.28	2.489E+002		-1.497E+002	1.113E+002
	Eu-154	123.07	40.40	4.188E+000	4.19E+000	-1.147E+000	2.076E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude_MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Eu-154	247.93	6.89	2.040E+001	4.19E+000	1.203E+001	1.008E+001
	591.76	4.95	3.810E+001		1.065E+001	1.872E+001
	692.42	1.78	1.028E+002		1.190E+001	5.036E+001
	723.30	20.06	9.032E+000		9.264E-001	4.418E+000
	756.80	4.52	4.146E+001		-3.014E+001	2.028E+001
	873.18	12.08	2.296E+001		1.678E+001	1.129E+001
	996.29	10.48	2.467E+001		-6.348E+000	1.209E+001
	1004.76	18.01	1.387E+001		-1.384E+000	6.788E+000
	1274.43	34.80	5.520E+000		-1.680E+000	2.668E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.748E+002	5.69E+000	-5.950E+001	8.646E+001
	60.01	1.22	1.671E+002		-1.406E+001	8.256E+001
	86.55	30.70	5.694E+000		-8.442E-001	2.820E+000
	105.31	21.10	8.300E+000		3.074E+000	4.114E+000
Tl-208	583.19	85.00	2.154E+000	2.15E+000	-6.207E-001	1.058E+000
Bi-211	351.07	13.02	1.074E+001	1.07E+001	1.368E+000	5.291E+000
Pb-211	404.85	3.78	3.700E+001	3.70E+001	-4.375E+000	1.819E+001
	427.09	1.76	8.151E+001		-2.954E+001	4.005E+001
	832.01	3.52	7.926E+001		1.320E+001	3.900E+001
Bi-212	39.86	1.06	2.502E+002	2.71E+001	2.400E+003	1.239E+002
	727.33	6.67	2.707E+001		6.598E+000	1.324E+001
	785.37	1.10	2.113E+002		1.332E+002	1.038E+002
> Pb-212	1620.50	1.47	0.000E+000	3.23E+000	0.000E+000	0.000E+000
	115.18	0.60	2.814E+002		3.742E+001	1.395E+002
	238.63	43.60	3.230E+000		-2.593E+000	1.596E+000
Pb212-XR	300.09	3.30	4.170E+001	1.07E+001	2.683E+001	2.056E+001
	74.82	10.28	1.829E+001		6.544E-001	9.052E+000
	77.11	17.10	1.072E+001		-3.055E+000	5.307E+000
Bi-214	87.35	3.97	4.375E+001	4.18E+000	2.253E+001	2.167E+001
	89.78	1.46	1.171E+002		-6.249E+001	5.801E+001
	609.32	45.49	4.176E+000		3.308E+000	2.051E+000
	768.36	4.89	4.112E+001		-1.820E+001	2.013E+001
	806.18	1.26	2.154E+002		3.359E+002	1.060E+002
	934.06	3.11	9.108E+001		-2.075E+001	4.475E+001
	1120.29	14.92	1.744E+001		7.923E+000	8.528E+000
	1155.21	1.63	1.757E+002		3.421E+000	8.604E+001
	1238.12	5.83	3.951E+001		-1.574E+001	1.922E+001
	1280.98	1.43	1.299E+002		-1.922E+002	6.271E+001
> Pb-214	1377.67	3.99	3.510E+001	3.91E+000	-6.772E+001	1.669E+001
	1385.31	0.79	1.954E+002		-1.067E+003	9.338E+001
	1401.52	1.33	1.970E+002		-2.258E+002	9.587E+001
	1407.99	2.39	1.326E+002		-1.290E+002	6.482E+001
	1509.21	2.13	9.489E+001		-3.348E+001	4.572E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	1.943E+001	3.91E+000	-4.053E-001	9.605E+000
	295.22	18.42	7.467E+000		3.553E+000	3.683E+000
	351.93	35.60	3.915E+000		4.045E-001	1.928E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.210E+002	3.91E+000	1.555E+002	1.085E+002
Pb214-XR	74.82	5.80	3.242E+001	1.89E+001	1.160E+000	1.604E+001
	77.11	9.70	1.890E+001		-5.386E+000	9.355E+000
	87.35	2.24	7.754E+001		3.993E+001	3.840E+001
	89.78	0.82	2.086E+002		-1.113E+002	1.033E+002
Ra-226	186.21	3.64	4.093E+001	4.09E+001	-3.296E+001	2.026E+001
Ac-228	129.07	2.42	6.879E+001	1.08E+001	1.246E+001	3.410E+001
	209.25	3.89	3.823E+001		3.107E+001	1.892E+001
	270.24	3.46	3.927E+001		-2.146E+001	1.938E+001
	328.00	2.95	4.540E+001		-5.258E+000	2.236E+001
	338.32	11.27	1.208E+001		1.854E+000	5.951E+000
	409.46	1.92	7.320E+001		-3.078E+001	3.597E+001
	463.00	4.40	3.402E+001		-5.474E+000	1.671E+001
	794.95	4.25	5.818E+001		-1.426E+001	2.859E+001
	911.20	25.80	1.082E+001		1.154E+000	5.319E+000
	964.77	4.99	5.478E+001		1.183E+001	2.688E+001
	968.97	15.80	1.719E+001		1.215E+001	8.436E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.932E+001		-1.006E+001	3.913E+001
	300.07	2.47	5.570E+001		3.585E+001	2.747E+001
	302.65	2.20	6.239E+001		4.398E+001	3.076E+001
	330.06	1.40	9.546E+001		-4.999E+001	4.701E+001
Th-234	92.38	2.13	8.008E+001	8.01E+001	3.641E+001	3.966E+001
	92.80	2.10	8.107E+001		3.687E+001	4.015E+001
	112.81	0.21	8.094E+002		-2.505E+001	4.011E+002
U-235	143.76	10.96	1.448E+001	2.61E+000	3.821E+000	7.176E+000
	163.33	5.08	3.022E+001		-1.386E+001	1.497E+001
	185.71	57.20	2.611E+000		-1.844E+000	1.293E+000
	202.11	1.08	1.341E+002		-4.846E+001	6.637E+001
	205.31	5.01	2.970E+001		-2.507E+001	1.470E+001
Am-241	59.54	35.90	5.747E+000	5.75E+000	-4.837E-001	2.839E+000

+ = Nuclide identified during the nuclide identification

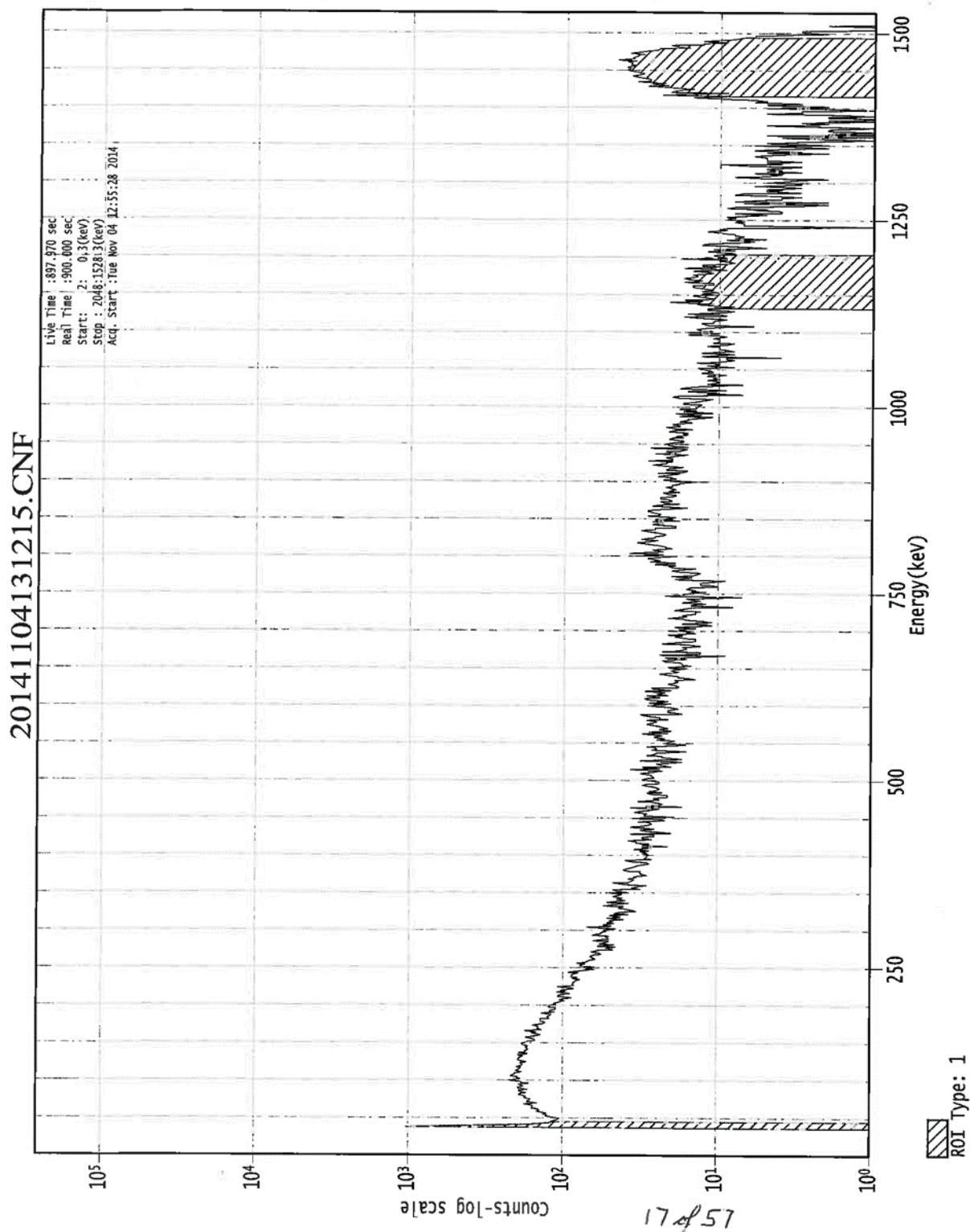
* = Energy line found in the spectrum

> = MDA value not calculated

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

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S *****

Filename: C:\Canberra\11-10-14\20141104132759.cnf

Report Generated On : 11/10/2014 8:53:55 AM

Sample Title : 1 meter @ VG-02F

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 11/4/2014 1:12:23 PM

Acquisition Started : 11/4/2014 1:12:23 PM

Live Time : 897.9 seconds

Real Time : 900.0 seconds

Dead Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVAR

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst [Signature]

Date 11-10-14

NEED TO USE ISOCS ¹¹Co⁶⁰ PEAK
11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 11/10/2014 8:53:55 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 1 meter @ VG-02F
Peak Analysis Performed on: 11/10/2014 8:53:54 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.44	38.95	1.70	2.99E+003	217.03	1.52E+003
2	1034-	1115	1074.94	803.76	0.96	2.35E+002	198.72	1.41E+003
3	1520-	1617	1568.80	1171.97	0.79	1.49E+002	153.68	8.07E+002
4	1895-	2003	1949.95	1455.45	25.23	2.00E+003	158.63	6.10E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 9:53:55 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 1 meter @ VG-02F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.947	34.70*	66.40	4.14901E+001	8.82900E+000
		788.70*	33.60	1.11258E+001	9.50531E+000
		1436.80*	66.40	7.95961E+001	8.96885E+000
K-40	0.992	1460.82*	10.66	4.95795E+002	5.83212E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:53:55 AM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.947	2.742645E+001	6.468938E+000
K-40	0.992	3.249588E+002	6.888140E+001
X Co-58	0.986		

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 11/10/2014 8:53:54 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS * Uncertainty	Peak Type	Tol. Nuclide
3	1171.97	1.6565E-001	103.33		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Ca 60

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-154	247.93	6.89	2.254E+001	4.94E+000	-3.585E+000	1.115E+001
		591.76	4.95	3.700E+001		-1.347E+001	1.817E+001
		692.42	1.78	1.008E+002		-1.636E+001	4.936E+001
		723.30	20.06	9.298E+000		9.569E-001	4.551E+000
		756.80	4.52	4.224E+001		1.089E+001	2.067E+001
		873.18	12.08	2.306E+001		-3.872E+000	1.134E+001
		996.29	10.48	2.479E+001		1.243E+001	1.215E+001
		1004.76	18.01	1.367E+001		-1.433E+001	6.693E+000
		1274.43	34.80	5.715E+000		-3.763E+000	2.765E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.043E+002	6.94E+000	1.908E+001	1.012E+002
		60.01	1.22	2.026E+002		-2.175E+001	1.003E+002
		86.55	30.70	6.942E+000		6.232E+000	3.444E+000
		105.31	21.10	9.782E+000		2.404E+000	4.855E+000
	Tl-208	583.19	85.00	2.116E+000	2.12E+000	-1.103E+000	1.039E+000
	Bi-211	351.07	13.02	1.137E+001	1.14E+001	6.466E+000	5.603E+000
	Pb-211	404.85	3.78	3.986E+001	3.99E+001	9.175E+000	1.962E+001
		427.09	1.76	8.377E+001		-1.312E+001	4.118E+001
		832.01	3.52	7.677E+001		2.323E+001	3.775E+001
	Bi-212	39.86	1.06	2.693E+002	2.79E+001	2.568E+003	1.335E+002
		727.33	6.67	2.793E+001		1.363E+001	1.367E+001
		785.37	1.10	2.084E+002		-1.663E+000	1.023E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.324E+002	3.68E+000	1.524E+002	1.650E+002
		238.63	43.60	3.681E+000		2.927E+000	1.822E+000
		300.09	3.30	4.569E+001		-2.340E+000	2.256E+001
	Pb212-XR	74.82	10.28	2.190E+001	1.29E+001	8.413E+000	1.086E+001
		77.11	17.10	1.289E+001		2.325E+000	6.389E+000
		87.35	3.97	5.331E+001		4.087E+001	2.645E+001
		89.78	1.46	1.429E+002		-4.441E+001	7.089E+001
	Bi-214	609.32	45.49	4.212E+000	4.21E+000	4.466E-001	2.069E+000
		768.36	4.89	4.128E+001		4.015E-001	2.022E+001
		806.18	1.26	2.090E+002		2.751E+002	1.028E+002
		934.06	3.11	9.093E+001		-4.802E+001	4.467E+001
		1120.29	14.92	1.705E+001		8.432E+000	8.335E+000
		1155.21	1.63	1.641E+002		7.174E+000	8.023E+001
		1238.12	5.83	3.987E+001		-2.713E+001	1.940E+001
		1280.98	1.43	1.393E+002		-8.943E+001	6.741E+001
		1377.67	3.99	3.445E+001		-1.107E+002	1.637E+001
		1385.31	0.79	2.114E+002		-2.324E+002	1.014E+002
		1401.52	1.33	1.955E+002		-5.605E+001	9.515E+001
		1407.99	2.39	1.304E+002		-4.008E+001	6.376E+001
		1509.21	2.13	9.701E+001		-6.121E+001	4.678E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.183E+001	4.13E+000	6.329E+000	1.080E+001
		295.22	18.42	8.218E+000		4.418E+000	4.058E+000
		351.93	35.60	4.133E+000		9.455E-001	2.037E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.186E+002	4.13E+000	1.576E+001	1.073E+002
Pb214-XR	74.82	5.80	3.882E+001	2.27E+001	1.491E+001	1.924E+001
	77.11	9.70	2.272E+001		4.098E+000	1.126E+001
	87.35	2.24	9.448E+001		7.244E+001	4.687E+001
	89.78	0.82	2.544E+002		-7.907E+001	1.262E+002
Ra-226	186.21	3.64	4.729E+001	4.73E+001	1.139E+001	2.345E+001
Ac-228	129.07	2.42	8.101E+001	1.10E+001	2.821E+001	4.021E+001
	209.25	3.89	4.323E+001		-2.019E+001	2.142E+001
	270.24	3.46	4.396E+001		-6.799E+000	2.172E+001
	328.00	2.95	4.912E+001		-4.409E-001	2.422E+001
	338.32	11.27	1.272E+001		-6.642E+000	6.271E+000
	409.46	1.92	7.859E+001		4.800E+001	3.867E+001
	463.00	4.40	3.541E+001		4.724E+000	1.740E+001
	794.95	4.25	5.850E+001		6.907E+001	2.875E+001
	911.20	25.80	1.096E+001		-3.361E+000	5.386E+000
	964.77	4.99	5.553E+001		2.758E+001	2.726E+001
	968.97	15.80	1.735E+001		7.624E+000	8.513E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.821E+001		-3.948E+001	4.357E+001
	300.07	2.47	6.104E+001		-3.127E+000	3.014E+001
	302.65	2.20	6.851E+001		2.507E+001	3.382E+001
	330.06	1.40	1.023E+002		-1.373E+002	5.041E+001
Th-234	92.38	2.13	9.762E+001	9.76E+001	6.799E+001	4.843E+001
	92.80	2.10	9.884E+001		6.884E+001	4.904E+001
	112.81	0.21	9.514E+002		2.956E+001	4.722E+002
U-235	143.76	10.96	1.672E+001	3.02E+000	-1.267E+001	8.296E+000
	163.33	5.08	3.526E+001		2.449E+001	1.749E+001
	185.71	57.20	3.015E+000		-2.849E-001	1.495E+000
	202.11	1.08	1.531E+002		-7.575E+001	7.586E+001
	205.31	5.01	3.396E+001		-1.076E+001	1.683E+001
Am-241	59.54	35.90	6.966E+000	6.97E+000	-7.481E-001	3.448E+000

+ = Nuclide identified during the nuclide identification

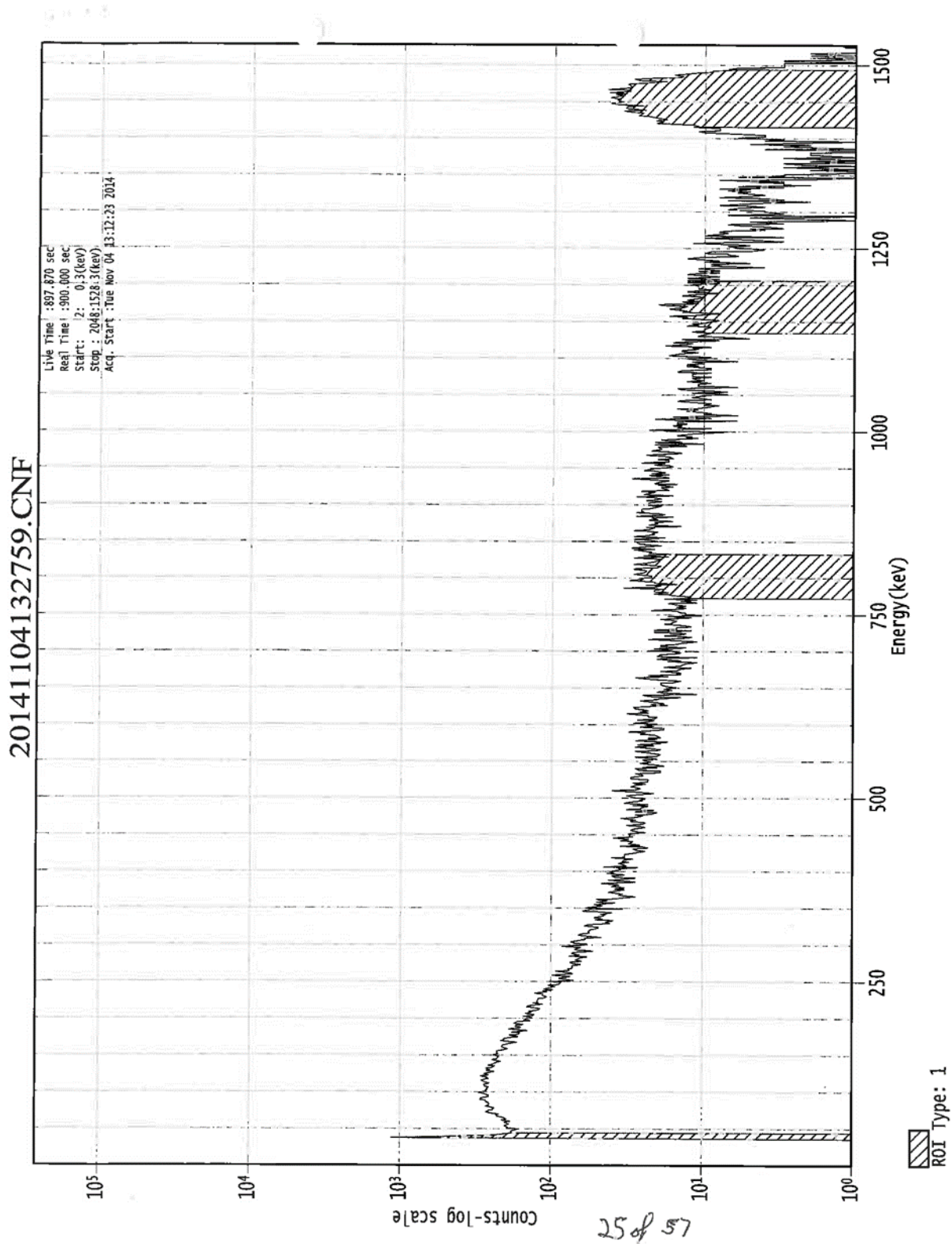
* = Energy line found in the spectrum

> = MDA value not calculated

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

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\11-10-14\20141104134402.cnf

Report Generated On : 11/10/2014 8:54:34 AM

Sample Title : 1 meter @ VG-03F
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 11/4/2014 1:28:11 PM
Acquisition Started : 11/4/2014 1:28:11 PM

Live Time : 897.9 seconds
Dead Time : 900.0 seconds

Rad Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst

Date 11-10-14

11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 11/10/2014 8:54:34 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 1 meter @ VG-03F
Peak Analysis Performed on: 11/10/2014 8:54:33 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.42	38.93	1.75	2.92E+003	201.68	1.24E+003
2	1027-	1108	1067.68	798.35	0.88	1.74E+002	212.16	1.42E+003
3	1898-	2006	1952.17	1457.10	18.58	1.99E+003	161.33	6.54E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:54:34 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 1 meter @ VG-03F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.948	34.70*	66.40	4.05602E+001	8.58242E+000
		788.70*	33.60	8.20451E+000	1.00411E+001
		1436.80*	66.40	7.91837E+001	9.02595E+000
K-40	0.996	1460.82*	10.66	4.93227E+002	5.86372E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:54:34 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.948	2.690115E+001	6.524034E+000
K-40	0.996	3.256623E+002	6.937061E+001
X Co-58	0.958		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 11/10/2014 8:54:33 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

11/10/2014 8:54:34 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 1 meter @ VG-03F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	3.930E+000	3.93E+000	4.056E+001	1.946E+000
		788.70*	33.60	1.644E+001		8.205E+000	8.156E+000
		1436.80*	66.40	8.923E+000		7.918E+001	4.408E+000
+	K-40	1460.82*	10.66	5.558E+001	5.56E+001	4.932E+002	2.745E+001
	Cr-51	320.08	9.91	1.467E+001	1.47E+001	-8.068E+000	7.237E+000
	Mn-54	834.85	99.98	2.720E+000	2.72E+000	9.808E-001	1.338E+000
	Co-58	810.76*	99.45	5.554E+000	5.55E+000	2.772E+000	2.756E+000
	Co-60	1173.23	99.85	2.683E+000	1.65E+000	1.319E-001	1.312E+000
		1332.49	99.98	1.647E+000		5.019E-001	7.901E-001
	Nb-94	702.65	99.81	1.824E+000	1.82E+000	4.142E-003	8.926E-001
		871.09	99.89	2.781E+000		-2.640E-001	1.367E+000
	Sn-113	255.13	2.11	7.033E+001	2.25E+000	-3.814E+001	3.477E+001
		391.70	64.97	2.245E+000		-5.012E-001	1.105E+000
	Cs-137	661.66	85.10	2.068E+000	2.07E+000	-2.997E+000	1.013E+000
	Eu-152	121.78	28.67	6.633E+000	5.57E+000	-4.009E+000	3.291E+000
		244.70	7.61	2.036E+001		2.801E+001	1.007E+001
		295.94	0.45	3.257E+002		2.025E+002	1.608E+002
		344.28	26.60	5.569E+000		2.203E+000	2.745E+000
		367.79	0.86	1.682E+002		-6.069E+001	8.280E+001
		411.12	2.24	6.704E+001		4.131E+001	3.298E+001
		443.96	2.83	5.351E+001		-2.144E+001	2.630E+001
		488.68	0.42	3.899E+002		1.081E+002	1.916E+002
		563.99	0.49	3.507E+002		-3.319E+001	1.721E+002
		586.26	0.46	3.876E+002		-3.067E+001	1.902E+002
		678.62	0.47	3.876E+002		1.609E+002	1.899E+002
		688.67	0.86	2.142E+002		6.390E+001	1.049E+002
		719.35	0.28	6.254E+002		-6.818E+002	3.057E+002
		778.90	12.96	1.687E+001		1.554E+000	8.273E+000
		810.45	0.32	8.334E+002		-6.736E+001	4.100E+002
		867.37	4.26	6.507E+001		-1.497E+001	3.200E+001
		919.33	0.43	6.480E+002		-2.352E+002	3.183E+002
		964.08	14.65	1.854E+001		8.903E+000	9.099E+000
		1085.87	10.24	2.340E+001		-9.550E+000	1.143E+001
		1089.74	1.73	1.398E+002		-7.425E+001	6.830E+001
		1112.07	13.69	1.831E+001		8.835E+000	8.948E+000
		1212.95	1.43	1.775E+002		2.278E+001	8.658E+001
		1249.94	0.19	1.103E+003		-2.559E+002	5.346E+002
		1299.14	1.63	1.088E+002		3.341E+001	5.242E+001
		1408.01	21.07	1.529E+001		-9.734E+000	7.480E+000
		1457.64	0.50	1.165E+003		5.825E+003	5.754E+002
		1528.10	0.28	2.913E+002		-1.260E+002	1.324E+002
	Eu-154	123.07	40.40	4.699E+000	4.70E+000	2.000E+000	2.331E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-154	247.93	6.89	2.197E+001	4.70E+000	-1.789E+001	1.086E+001
	591.76	4.95	3.660E+001		1.300E+000	1.797E+001
	692.42	1.78	1.032E+002		-1.432E+001	5.056E+001
	723.30	20.06	8.806E+000		4.188E-001	4.305E+000
	756.80	4.52	4.117E+001		2.047E+001	2.013E+001
	873.18	12.08	2.305E+001		-5.441E-002	1.133E+001
	996.29	10.48	2.383E+001		-1.149E+001	1.167E+001
	1004.76	18.01	1.372E+001		-3.892E+000	6.715E+000
	1274.43	34.80	5.201E+000		-2.036E+000	2.508E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.886E+002	6.37E+000	-1.092E+001	9.336E+001
	60.01	1.22	1.792E+002		-1.025E+002	8.859E+001
	86.55	30.70	6.367E+000		4.654E+000	3.156E+000
	105.31	21.10	9.203E+000		4.112E+000	4.565E+000
Tl-208	583.19	85.00	2.095E+000	2.10E+000	-9.853E-001	1.029E+000
Bi-211	351.07	13.02	1.146E+001	1.15E+001	5.418E+000	5.647E+000
Pb-211	404.85	3.78	3.917E+001	3.92E+001	-8.773E+000	1.927E+001
	427.09	1.76	8.466E+001		-1.331E+001	4.162E+001
	832.01	3.52	7.732E+001		9.642E+000	3.803E+001
Bi-212	39.86	1.06	2.594E+002	2.68E+001	2.578E+003	1.285E+002
	727.33	6.67	2.681E+001		1.576E+001	1.311E+001
	785.37	1.10	2.101E+002		6.529E+000	1.031E+002
> Pb-212	1620.50	1.47	0.000E+000	3.57E+000	0.000E+000	0.000E+000
	115.18	0.60	3.143E+002		1.660E+002	1.559E+002
	238.63	43.60	3.569E+000		-4.482E-001	1.766E+000
Pb212-XR	300.09	3.30	4.463E+001	1.19E+001	4.519E+001	2.203E+001
	74.82	10.28	1.995E+001		-1.403E+000	9.880E+000
	77.11	17.10	1.185E+001		1.420E+001	5.872E+000
Bi-214	87.35	3.97	4.886E+001	4.04E+000	2.906E+001	2.422E+001
	89.78	1.46	1.316E+002		5.487E+001	6.522E+001
	609.32	45.49	4.039E+000		1.450E+000	1.982E+000
	768.36	4.89	4.038E+001		4.169E+000	1.976E+001
	806.18	1.26	2.103E+002		1.707E+002	1.034E+002
	934.06	3.11	9.010E+001		-4.954E+001	4.426E+001
	1120.29	14.92	1.676E+001		-3.517E+000	8.190E+000
	1155.21	1.63	1.617E+002		-1.276E+001	7.903E+001
	1238.12	5.83	3.790E+001		-2.186E+001	1.841E+001
	1280.98	1.43	1.265E+002		-6.294E+001	6.103E+001
	1377.67	3.99	3.537E+001		-9.639E+001	1.682E+001
	1385.31	0.79	2.184E+002		-5.594E+002	1.049E+002
	1401.52	1.33	2.040E+002		-1.767E+002	9.938E+001
	1407.99	2.39	1.346E+002		-8.567E+001	6.583E+001
	1509.21	2.13	9.739E+001		-3.098E+001	4.696E+001
>	1661.27	1.05	0.000E+000	4.18E+000	0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	2.144E+001	4.18E+000	6.705E+000	1.061E+001
	295.22	18.42	7.929E+000		4.440E+000	3.914E+000
	351.93	35.60	4.185E+000		1.136E+000	2.063E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.196E+002	4.18E+000	6.342E+000	1.078E+002
Pb214-XR	74.82	5.80	3.535E+001	2.09E+001	-2.487E+000	1.751E+001
	77.11	9.70	2.090E+001		2.504E+001	1.035E+001
	87.35	2.24	8.660E+001		5.151E+001	4.293E+001
	89.78	0.82	2.342E+002		9.769E+001	1.161E+002
Ra-226	186.21	3.64	4.623E+001	4.62E+001	3.120E+001	2.292E+001
Ac-228	129.07	2.42	7.704E+001	1.08E+001	-3.982E+001	3.823E+001
	209.25	3.89	4.222E+001		-1.081E+001	2.091E+001
	270.24	3.46	4.268E+001		1.229E+001	2.109E+001
	328.00	2.95	4.848E+001		-4.355E+001	2.390E+001
	338.32	11.27	1.274E+001		-7.768E+000	6.280E+000
	409.46	1.92	7.763E+001		3.263E+001	3.819E+001
	463.00	4.40	3.522E+001		2.117E+001	1.731E+001
	794.95	4.25	5.925E+001		1.375E+002	2.912E+001
	911.20	25.80	1.082E+001		-3.243E+000	5.319E+000
	964.77	4.99	5.424E+001		3.076E+001	2.662E+001
	968.97	15.80	1.708E+001		1.479E+001	8.378E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.597E+001		-6.300E+001	4.245E+001
	300.07	2.47	5.962E+001		6.038E+001	2.943E+001
	302.65	2.20	6.689E+001		6.732E+001	3.301E+001
	330.06	1.40	1.023E+002		-5.180E+001	5.041E+001
Th-234	92.38	2.13	9.000E+001	9.00E+001	-3.770E+000	4.462E+001
	92.80	2.10	9.112E+001		-3.816E+000	4.518E+001
	112.81	0.21	8.962E+002		-1.393E+002	4.446E+002
U-235	143.76	10.96	1.627E+001	2.94E+000	-1.786E+001	8.072E+000
	163.33	5.08	3.468E+001		8.672E+000	1.720E+001
	185.71	57.20	2.944E+000		4.860E-001	1.459E+000
	202.11	1.08	1.489E+002		-6.468E+001	7.375E+001
	205.31	5.01	3.311E+001		2.305E-001	1.640E+001
Am-241	59.54	35.90	6.162E+000	6.16E+000	-3.526E+000	3.046E+000

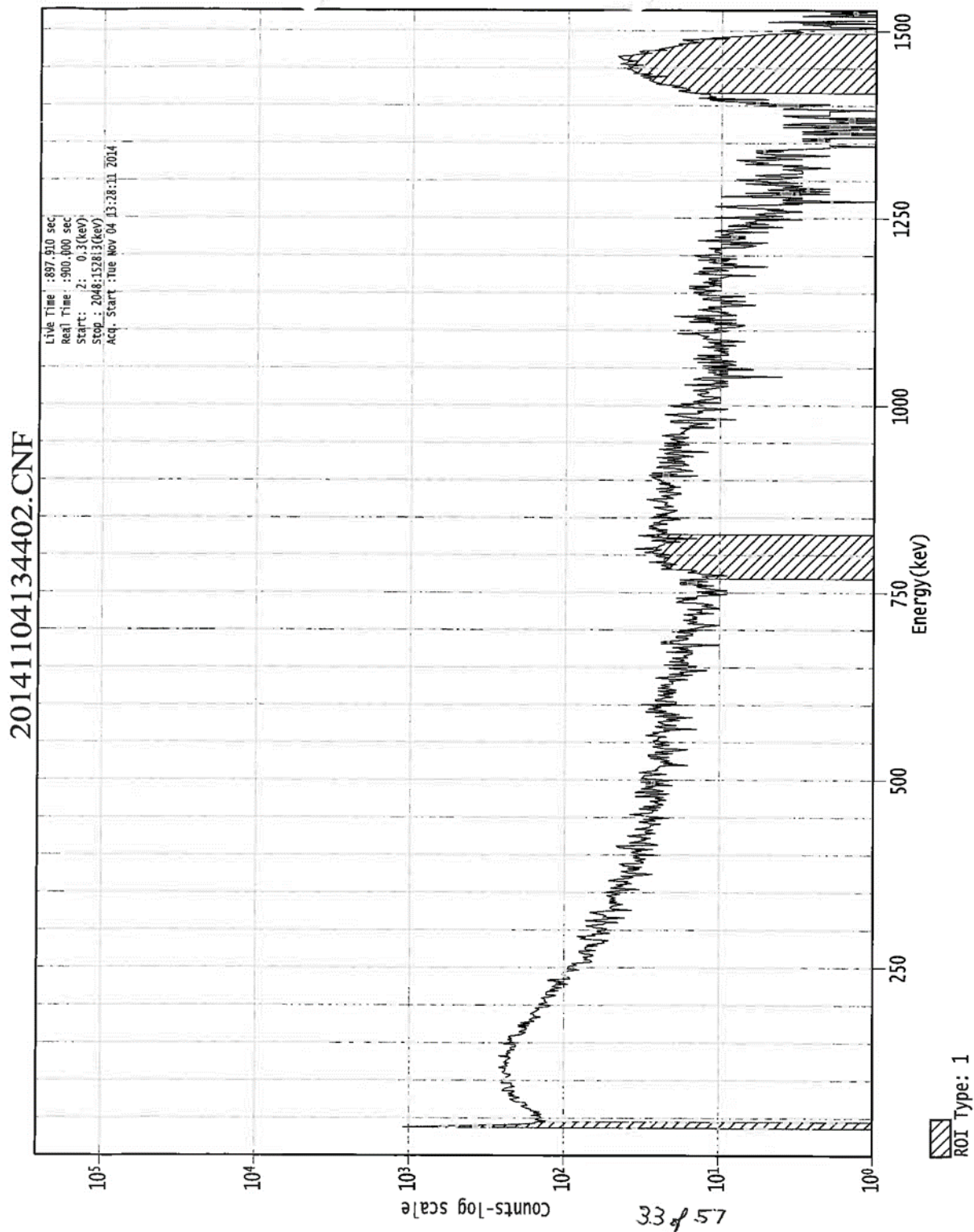
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

***** GAMMA S E C T R U M A N A L Y T S *****

Filename: C:\Canberra\11-10-14\20141104164007.cnf

Report Generated On : 11/10/2014 8:55:13 AM

Sample Title : Bkgd @ ESB-592'
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 11/4/2014 4:24:31 PM
Acquisition Started : 11/4/2014 4:24:31 PM

Live Time : 898.0 seconds
Dead Time : 900.0 seconds

Dead Time : 0.22 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVAR

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst JP-B

Date 11-10-14

M. D. W. 11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 11/10/2014 8:55:13 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Bkgd @ ESB-592'
Peak Analysis Performed on: 11/10/2014 8:55:12 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.39	38.91	1.87	2.93E+003	186.45	9.80E+002
2	1036-	1118	1077.45	805.64	1.07	3.44E+002	194.18	1.31E+003
3	1898-	2006	1952.55	1457.38	24.52	2.05E+003	174.63	8.00E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:55:13 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Bkgd @ ESB-592'
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.936	34.70*	66.40	4.07385E+001	8.54956E+000
		788.70*	33.60	1.63317E+001	9.41308E+000
		1436.80*	66.40	8.15844E+001	9.54153E+000
K-40	0.997	1460.82*	10.66	5.08181E+002	6.18614E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:55:13 AM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
LaBr3	0.936	2.970574E+001	6.328767E+000
K-40	0.997	3.231466E+002	7.131855E+001
X Cc-58	0.993		

? - 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 11/10/2014 8:55:12 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

11/10/2014 8:55:13 AM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Bkgd @ ESB-592'
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	3.506E+000	3.51E+000	4.074E+001	1.734E+000
		788.70*	33.60	1.501E+001		1.633E+001	7.442E+000
		1436.80*	66.40	9.900E+000		8.158E+001	4.896E+000
+	K-40	1460.82*	10.66	6.167E+001	6.17E+001	5.082E+002	3.050E+001
	Cr-51	320.08	9.91	1.236E+001	1.24E+001	-2.600E+000	6.081E+000
	Mn-54	834.85	99.98	2.639E+000	2.64E+000	-1.094E-001	1.297E+000
	Co-58	810.76*	99.45	5.072E+000	5.07E+000	5.518E+000	2.514E+000
	Co-60	1173.23	99.85	2.597E+000	1.48E+000	7.439E-001	1.269E+000
		1332.49	99.98	1.480E+000		4.552E-001	7.067E-001
	Nb-94	702.65	99.81	1.712E+000	1.71E+000	-1.878E+000	8.367E-001
		871.09	99.89	2.696E+000		2.098E-001	1.325E+000
	Sn-113	255.13	2.11	6.190E+001	2.03E+000	-3.893E+001	3.055E+001
		391.70	64.97	2.030E+000		-3.336E-002	9.971E-001
	Cs-137	661.66	85.10	2.046E+000	2.05E+000	4.359E-001	1.002E+000
	Eu-152	121.78	28.67	5.929E+000	5.18E+000	1.281E+000	2.939E+000
		244.70	7.61	1.801E+001		1.580E+001	8.899E+000
		295.94	0.45	2.860E+002		3.488E+002	1.409E+002
		344.28	26.60	5.185E+000		2.693E+000	2.553E+000
		367.79	0.86	1.508E+002		-7.052E+001	7.413E+001
		411.12	2.24	5.998E+001		1.435E+001	2.945E+001
		443.96	2.83	4.904E+001		-4.357E+000	2.407E+001
		488.68	0.42	3.526E+002		-1.943E+002	1.730E+002
		563.99	0.49	3.326E+002		-1.670E+002	1.631E+002
		586.26	0.46	3.930E+002		-1.186E+002	1.929E+002
		678.62	0.47	3.716E+002		1.700E+002	1.819E+002
		688.67	0.86	2.041E+002		4.902E+000	9.985E+001
		719.35	0.28	6.267E+002		1.593E+002	3.064E+002
		778.90	12.96	1.624E+001		6.741E-001	7.958E+000
		810.45	0.32	8.353E+002		1.099E+003	4.109E+002
		867.37	4.26	6.343E+001		3.418E+001	3.118E+001
		919.33	0.43	6.360E+002		5.100E+002	3.123E+002
		964.08	14.65	1.858E+001		2.406E+001	9.117E+000
		1085.87	10.24	2.276E+001		-1.173E+001	1.111E+001
		1089.74	1.73	1.345E+002		-1.237E+002	6.564E+001
		1112.07	13.69	1.848E+001		6.928E+000	9.033E+000
		1212.95	1.43	1.865E+002		9.284E+001	9.112E+001
		1249.94	0.19	1.212E+003		1.021E+003	5.893E+002
		1299.14	1.63	1.037E+002		-3.514E+001	4.985E+001
		1408.01	21.07	1.537E+001		-2.399E+000	7.517E+000
		1457.64	0.50	1.223E+003		7.385E+003	6.042E+002
		1528.10	0.28	3.277E+002		-5.838E+001	1.506E+002
	Eu-154	123.07	40.40	4.196E+000	4.20E+000	2.285E+000	2.080E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
> Eu-154	247.93	6.89	1.964E+001	4.20E+000	-6.140E+000	9.700E+000
	591.76	4.95	3.741E+001		1.817E+001	1.837E+001
	692.42	1.78	9.661E+001		-8.475E+001	4.724E+001
	723.30	20.06	8.772E+000		8.044E+000	4.288E+000
	756.80	4.52	3.888E+001		-6.273E+001	1.899E+001
	873.18	12.08	2.226E+001		4.640E+000	1.094E+001
	996.29	10.48	2.327E+001		-2.724E+001	1.139E+001
	1004.76	18.01	1.328E+001		7.183E+000	6.494E+000
	1274.43	34.80	5.548E+000		-6.854E-001	2.682E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	> Eu-155					
	45.30	1.31	1.786E+002	6.02E+000	-3.710E+001	8.833E+001
	60.01	1.22	1.744E+002		8.907E+001	8.618E+001
	86.55	30.70	6.015E+000		1.541E+000	2.980E+000
Tl-208	105.31	21.10	8.285E+000		2.036E+000	4.106E+000
	583.19	85.00	2.109E+000	2.11E+000	9.825E-001	1.035E+000
Bi-211	351.07	13.02	1.077E+001	1.08E+001	1.839E+001	5.304E+000
Pb-211	404.85	3.78	3.539E+001	3.54E+001	-1.840E+001	1.738E+001
	427.09	1.76	7.593E+001		-1.165E+002	3.726E+001
	832.01	3.52	7.544E+001		4.594E+000	3.709E+001
Bi-212	39.86	1.06	2.516E+002	2.65E+001	2.466E+003	1.246E+002
	727.33	6.67	2.647E+001		3.307E+001	1.294E+001
	785.37	1.10	2.040E+002		1.171E+000	1.001E+002
> Pb-212	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	115.18	0.60	2.823E+002	3.19E+000	1.406E+002	1.399E+002
	238.63	43.60	3.191E+000		1.471E+000	1.577E+000
Pb212-XR	300.09	3.30	3.799E+001		-8.955E+000	1.871E+001
	74.82	10.28	1.949E+001	1.15E+001	1.589E+001	9.654E+000
	77.11	17.10	1.153E+001		4.656E+000	5.708E+000
Bi-214	87.35	3.97	4.605E+001		2.339E+001	2.281E+001
	89.78	1.46	1.237E+002		4.955E+001	6.127E+001
	609.32	45.49	4.116E+000	4.12E+000	4.051E+000	2.021E+000
>	768.36	4.89	3.828E+001		-1.063E+001	1.872E+001
	806.18	1.26	2.104E+002		4.275E+002	1.035E+002
	934.06	3.11	8.946E+001		1.042E+001	4.394E+001
	1120.29	14.92	1.717E+001		1.225E+001	8.392E+000
	1155.21	1.63	1.556E+002		-1.352E+002	7.599E+001
	1238.12	5.83	4.207E+001		2.500E+001	2.050E+001
	1280.98	1.43	1.287E+002		-1.142E+002	6.211E+001
	1377.67	3.99	3.638E+001		-7.582E+001	1.733E+001
	1385.31	0.79	2.221E+002		-5.909E+002	1.067E+002
	1401.52	1.33	2.058E+002		-9.362E+001	1.003E+002
	1407.99	2.39	1.352E+002		-2.111E+001	6.616E+001
	1509.21	2.13	9.998E+001		-3.370E+000	4.826E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
>	241.99	7.25	1.908E+001	3.92E+000	7.268E+000	9.430E+000
	295.22	18.42	6.975E+000		7.743E+000	3.437E+000
	351.93	35.60	3.916E+000		4.774E+000	1.928E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.141E+002	3.92E+000	4.992E+000	1.051E+002
Pb214-XR	74.82	5.80	3.455E+001	2.03E+001	2.817E+001	1.711E+001
	77.11	9.70	2.032E+001		8.208E+000	1.006E+001
	87.35	2.24	8.161E+001		4.146E+001	4.044E+001
	89.78	0.82	2.202E+002		8.822E+001	1.091E+002
Ra-226	186.21	3.64	3.999E+001	4.00E+001	7.546E+000	1.979E+001
Ac-228	129.07	2.42	6.783E+001	1.05E+001	-2.923E+001	3.362E+001
	209.25	3.89	3.697E+001		-2.358E+001	1.829E+001
	270.24	3.46	3.709E+001		-1.507E+001	1.829E+001
	328.00	2.95	4.310E+001		-5.638E+000	2.121E+001
	338.32	11.27	1.174E+001		4.135E+000	5.781E+000
	409.46	1.92	7.025E+001		5.970E+001	3.450E+001
	463.00	4.40	3.203E+001		-4.135E+001	1.571E+001
	794.95	4.25	5.747E+001		5.840E+001	2.823E+001
	911.20	25.80	1.051E+001		1.751E+000	5.162E+000
	964.77	4.99	5.424E+001		4.729E+001	2.661E+001
	968.97	15.80	1.698E+001		1.778E+001	8.332E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.610E+001		3.062E+001	3.751E+001
	300.07	2.47	5.075E+001		-1.196E+001	2.499E+001
	302.65	2.20	5.649E+001		-2.172E+001	2.781E+001
	330.06	1.40	9.158E+001		4.009E+000	4.507E+001
Th-234	92.38	2.13	8.322E+001	8.32E+001	-7.156E-001	4.123E+001
	92.80	2.10	8.426E+001		-7.245E-001	4.175E+001
	112.81	0.21	8.097E+002		4.266E+002	4.013E+002
U-235	143.76	10.96	1.401E+001	2.54E+000	5.663E+000	6.940E+000
	163.33	5.08	2.936E+001		3.973E+000	1.454E+001
	185.71	57.20	2.544E+000		7.402E-001	1.259E+000
	202.11	1.08	1.317E+002		1.192E+002	6.516E+001
	205.31	5.01	2.914E+001		5.443E+000	1.442E+001
Am-241	59.54	35.90	5.997E+000	6.00E+000	3.063E+000	2.964E+000

+ = Nuclide identified during the nuclide identification

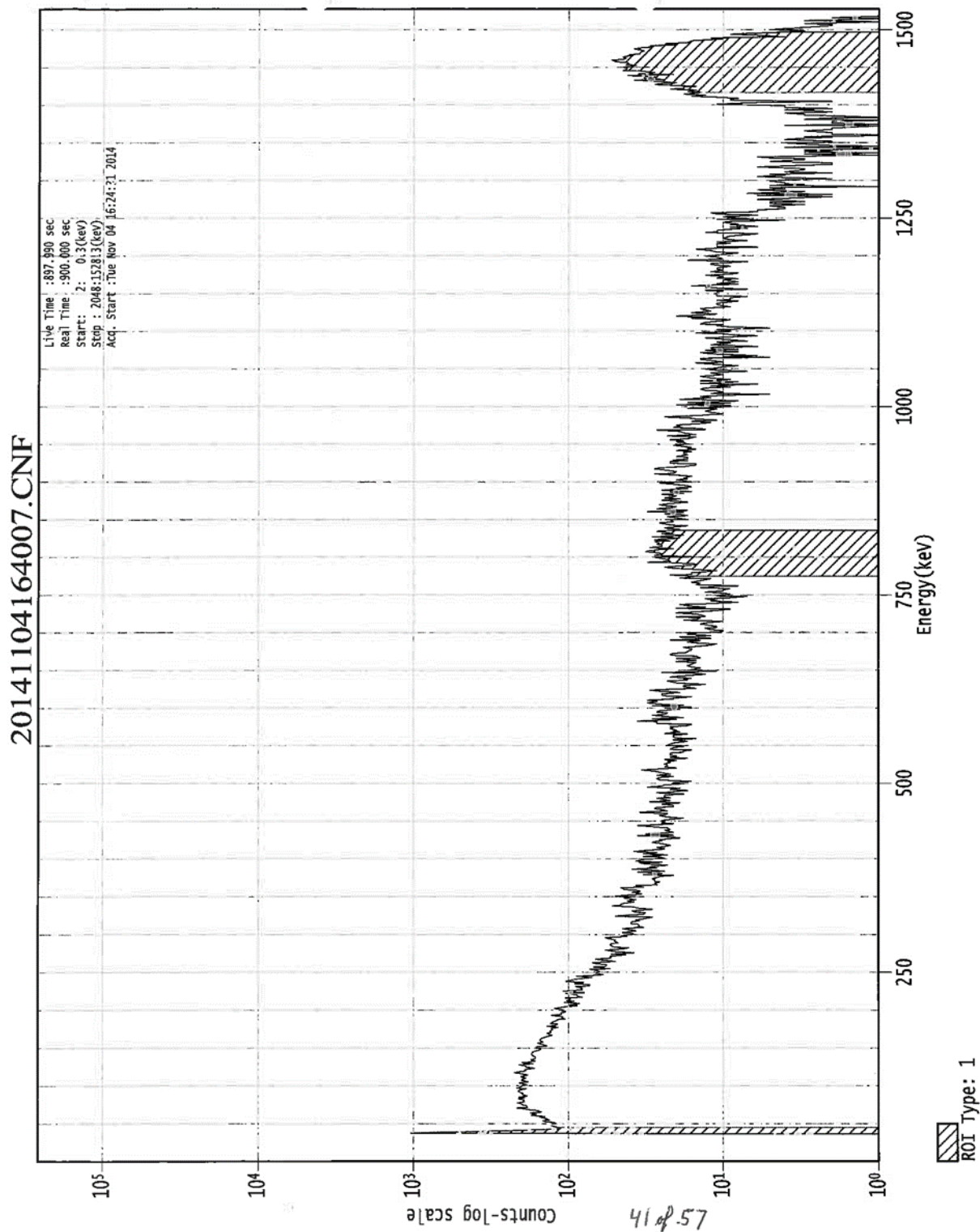
* = Energy line found in the spectrum

> = MDA value not calculated

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

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S - E C T R U M A N A L Y S - S ***

Filename: C:\Canberra\11-10-14\20141104165657.cnf

Report Generated On : 11/10/2014 8:56:00 AM

Sample Title : 1 meter @ VG-09F
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 11/4/2014 4:40:43 PM
Acquisition Started : 11/4/2014 4:40:43 PM

Live Time : 898.0 seconds
Dead Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst JS
Date 11-10-14

du 11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

11/10/2014 8:56:00 AM

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*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: 1 meter @ VG-09F

Peak Analysis Performed on: 11/10/2014 8:55:59 AM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.28	38.83	1.62	2.83E+003	192.67	1.08E+003
2	295-	341	318.16	237.57	1.05	4.18E+002	301.74	3.26E+003
3	436-	491	464.15	346.98	1.94	2.77E+002	241.14	1.78E+003
4	772-	843	808.15	604.44	0.98	2.45E+002	189.13	1.24E+003
5	1034-	1115	1075.08	803.87	1.12	1.73E+002	199.92	1.44E+003
6	1897-	2005	1951.62	1456.69	16.34	2.32E+003	165.01	6.45E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:56:00 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 1 meter @ VG-09F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.942	34.70*	66.40	3.93168E+001	8.30648E+000
		788.70*	33.60	8.19262E+000	9.52069E+000
		1436.80*	66.40	9.23004E+001	9.38662E+000
K-40	0.995	1460.82*	10.66	5.74930E+002	6.45710E+001
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	5.70777E+000	4.22284E+000
Bi-214	0.997	300.09	3.30		
		609.32*	45.49	6.65873E+000	5.21056E+000
		768.36	4.89		
		806.18*	1.26	2.17779E+002	2.53087E+002
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
1661.27	1.05				
1729.59	2.88				
1764.49	15.30				
1847.43	2.03				
2118.51	1.16				

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:56:00 AM Page 4

*** INTERFERENCE CORRECTED REPORT ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
	LaBr3	0.942	2.575975E+001	6.259688E+000
	K-40	0.995	4.144747E+002	7.288843E+001
X	Co-58	0.987		
X	Ba-133	0.989		
X	Tl-208	0.881		
X	Bi-211	0.995		
	Pb-212	1.000	5.707770E+000	4.222838E+000
	Bi-214	0.997	6.458064E+000	5.209722E+000
X	Pb-214	0.506		
X	Th-227	0.711		
X	Ac-228	0.341		

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 11/10/2014 8:55:59 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
3	346.98	3.0853E-001	87.04		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

11/10/2014 8:56:00 AM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 1 meter @ VG-09F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	3.709E+000	3.71E+000	3.932E+001	1.836E+000
		788.70*	33.60	1.557E+001		8.193E+000	7.723E+000
		1436.80*	66.40	8.892E+000		9.230E+001	4.392E+000
+	K-40	1460.82*	10.66	5.538E+001	5.54E+001	5.749E+002	2.736E+001
	Cr-51	320.08	9.91	1.297E+001	1.30E+001	-5.266E-001	6.385E+000
	Mn-54	834.85	99.98	2.711E+000	2.71E+000	9.911E-001	1.333E+000
	Co-58	810.76*	99.45	5.262E+000	5.26E+000	2.768E+000	2.609E+000
	Co-60	1173.23	99.85	2.578E+000	1.45E+000	3.611E-001	1.259E+000
		1332.49	99.98	1.447E+000		3.416E-001	6.902E-001
	Nb-94	702.65	99.81	1.738E+000	1.74E+000	-2.035E+000	8.496E-001
		871.09	99.89	2.771E+000		1.105E+000	1.362E+000
	Sn-113	255.13	2.11	6.184E+001	2.01E+000	-1.034E+001	3.052E+001
		391.70	64.97	2.006E+000		-7.634E-001	9.854E-001
	Cs-137	661.66	85.10	2.018E+000	2.02E+000	-5.530E-001	9.877E-001
	Eu-152	121.78	28.67	6.070E+000	5.31E+000	2.748E+000	3.010E+000
		244.70	7.61	1.854E+001		6.381E-001	9.160E+000
		295.94	0.45	2.893E+002		2.696E+002	1.425E+002
		344.28	26.60	5.307E+000		7.435E+000	2.615E+000
		367.79	0.86	1.535E+002		3.125E+001	7.550E+001
		411.12	2.24	6.045E+001		-2.456E+000	2.968E+001
		443.96	2.83	4.972E+001		4.205E+001	2.441E+001
		488.68	0.42	3.554E+002		3.237E+002	1.744E+002
		563.99	0.49	3.371E+002		-1.965E+002	1.653E+002
		586.26	0.46	3.991E+002		1.492E+001	1.960E+002
		678.62	0.47	3.596E+002		1.342E+001	1.759E+002
		688.67	0.86	2.005E+002		9.651E-001	9.806E+001
		719.35	0.28	6.333E+002		-4.202E+001	3.097E+002
		778.90	12.96	1.619E+001		3.386E-001	7.933E+000
		810.45	0.32	8.327E+002		1.157E+003	4.096E+002
		867.37	4.26	6.483E+001		1.332E+001	3.187E+001
		919.33	0.43	6.568E+002		6.550E+001	3.228E+002
		964.08	14.65	1.892E+001		8.887E-001	9.289E+000
		1085.87	10.24	2.297E+001		-9.457E+000	1.121E+001
		1089.74	1.73	1.388E+002		6.654E+001	6.779E+001
		1112.07	13.69	1.802E+001		1.093E+001	8.804E+000
		1212.95	1.43	1.760E+002		-9.144E+001	8.586E+001
		1249.94	0.19	1.187E+003		1.465E+002	5.767E+002
		1299.14	1.63	1.051E+002		-5.082E+001	5.057E+001
		1408.01	21.07	1.564E+001		-1.053E+001	7.656E+000
		1457.64	0.50	1.237E+003		6.562E+003	6.115E+002
		1528.10	0.28	2.443E+002		-2.602E+002	1.089E+002
	Eu-154	123.07	40.40	4.292E+000	4.29E+000	1.799E+000	2.128E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	Eu-154	247.93	6.89	2.010E+001	4.29E+000	2.432E+000	9.931E+000
		591.76	4.95	3.841E+001		3.848E+000	1.887E+001
		692.42	1.78	9.676E+001		-1.967E+001	4.732E+001
		723.30	20.06	8.805E+000		-3.702E+000	4.305E+000
		756.80	4.52	4.093E+001		4.292E+000	2.001E+001
		873.18	12.08	2.276E+001		-9.499E+000	1.119E+001
		996.29	10.48	2.449E+001		-4.881E+000	1.200E+001
		1004.76	18.01	1.376E+001		-1.734E+000	6.733E+000
		1274.43	34.80	5.696E+000		-5.001E+000	2.756E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.753E+002	6.23E+000	2.856E+001	8.671E+001
		60.01	1.22	1.813E+002		2.087E+002	8.965E+001
		86.55	30.70	6.228E+000		-5.083E+000	3.087E+000
		105.31	21.10	8.533E+000		-5.828E+000	4.230E+000
	Tl-208	583.19*	85.00	4.510E+000	4.51E+000	3.564E+000	2.235E+000
	Bi-211	351.07*	13.02	2.347E+001	2.35E+001	1.644E+001	1.165E+001
	Pb-211	404.85	3.78	3.571E+001	3.57E+001	-8.055E+000	1.754E+001
		427.09	1.76	7.777E+001		-3.289E+001	3.818E+001
		832.01	3.52	7.694E+001		2.602E+001	3.784E+001
	Bi-212	39.86	1.06	2.527E+002	2.68E+001	2.530E+003	1.252E+002
		727.33	6.67	2.675E+001		1.853E+001	1.308E+001
		785.37	1.10	2.028E+002		-1.119E+000	9.948E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	2.905E+002	6.75E+000	1.815E+002	1.440E+002
		238.63*	43.60	6.753E+000		5.708E+000	3.358E+000
		300.09	3.30	3.872E+001		-2.349E+001	1.907E+001
	Pb212-XR	74.82	10.28	2.021E+001	1.18E+001	3.046E+001	1.001E+001
		77.11	17.10	1.180E+001		-1.987E+000	5.844E+000
		87.35	3.97	4.787E+001		-3.119E+001	2.372E+001
		89.78	1.46	1.283E+002		-6.567E+001	6.360E+001
+	Bi-214	609.32*	45.49	8.427E+000	8.43E+000	6.659E+000	4.176E+000
		768.36	4.89	3.918E+001		-1.290E+001	1.916E+001
		806.18*	1.26	4.140E+002		2.178E+002	2.053E+002
		934.06	3.11	9.129E+001		-1.475E+001	4.486E+001
		1120.29	14.92	1.649E+001		-6.760E-001	8.055E+000
		1155.21	1.63	1.527E+002		-1.406E+002	7.453E+001
		1238.12	5.83	4.099E+001		-2.172E-001	1.996E+001
		1280.98	1.43	1.357E+002		5.721E+001	6.561E+001
		1377.67	3.99	3.881E+001		-5.717E+001	1.855E+001
		1385.31	0.79	2.293E+002		-3.943E+002	1.103E+002
		1401.52	1.33	2.094E+002		-2.201E+002	1.021E+002
		1407.99	2.39	1.377E+002		-9.269E+001	6.738E+001
		1509.21	2.13	9.643E+001		-5.057E+001	4.648E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99*	7.25	4.061E+001	7.02E+000	3.432E+001	2.019E+001
		295.22	18.42	7.022E+000		2.474E+000	3.460E+000
		351.93*	35.60	8.584E+000		6.012E+000	4.262E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96*	1.06	4.937E+002	7.02E+000	2.597E+002	2.448E+002
Pb214-XR	74.82	5.80	3.581E+001	2.08E+001	5.399E+001	1.774E+001
	77.11	9.70	2.080E+001		-3.503E+000	1.030E+001
	87.35	2.24	8.483E+001		-5.527E+001	4.205E+001
	89.78	0.82	2.285E+002		-1.169E+002	1.132E+002
Ra-226	186.21	3.64	4.086E+001	4.09E+001	9.813E+000	2.023E+001
Ac-228	129.07	2.42	6.966E+001	1.09E+001	-1.040E+001	3.453E+001
	209.25	3.89	3.700E+001		-1.360E+001	1.830E+001
	270.24	3.46	3.789E+001		-9.219E+000	1.869E+001
	328.00	2.95	4.371E+001		-5.473E+000	2.151E+001
	338.32*	11.27	2.711E+001		1.899E+001	1.346E+001
	409.46	1.92	7.068E+001		3.261E+001	3.472E+001
	463.00	4.40	3.149E+001		-1.157E+001	1.544E+001
	794.95*	4.25	1.231E+002		6.477E+001	6.106E+001
	911.20	25.80	1.090E+001		8.496E-001	5.355E+000
	964.77	4.99	5.547E+001		1.386E+001	2.723E+001
	968.97	15.80	1.730E+001		-7.121E-001	8.490E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.704E+001		-2.170E+000	3.798E+001
	300.07	2.47	5.173E+001		-3.138E+001	2.548E+001
	302.65	2.20	5.813E+001		1.319E+001	2.863E+001
	330.06	1.40	9.318E+001		-2.452E+001	4.587E+001
Th-234	92.38	2.13	8.753E+001	8.75E+001	4.243E+001	4.339E+001
	92.80	2.10	8.862E+001		4.296E+001	4.393E+001
	112.81	0.21	8.301E+002		4.036E+002	4.115E+002
U-235	143.76	10.96	1.436E+001	2.60E+000	7.147E-001	7.118E+000
	163.33	5.08	3.009E+001		9.618E+000	1.490E+001
	185.71	57.20	2.602E+000		3.766E-001	1.288E+000
	202.11	1.08	1.317E+002		-7.404E+001	6.517E+001
	205.31	5.01	2.918E+001		-5.518E+000	1.444E+001
Am-241	59.54	35.90	6.235E+000	6.24E+000	7.179E+000	3.083E+000

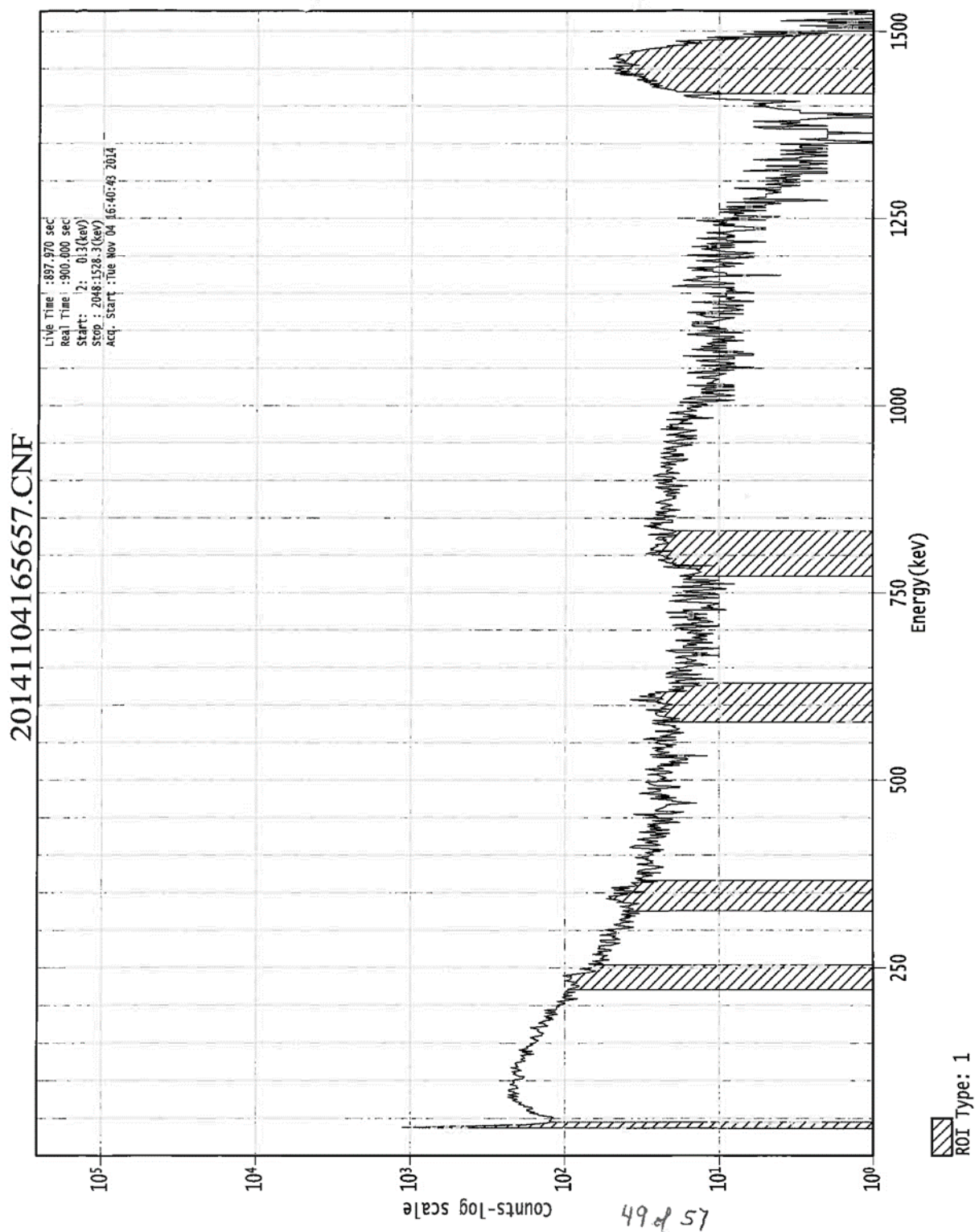
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** GAMMA S E C T R U M A N A L Y T S ***

Filename: C:\Canberra\11-10-14\20141104171942.cnf

Report Generated On : 11/10/2014 8:56:32 AM

Sample Title : 1 meter @ VG-08F
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 11/4/2014 5:04:09 PM
Acquisition Started : 11/4/2014 5:04:09 PM

Live Time : 898.0 seconds
Real Time : 900.0 seconds

Dead Time : 0.22 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVEN

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst JS
Date 11-10-14

JS 11/10/14

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

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*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 1 meter @ VG-08F
Peak Analysis Performed on: 11/10/2014 8:56:32 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.37	38.90	1.75	2.94E+003	195.45	1.12E+003
2	80-	106	93.68	69.16	4.45	4.03E+002	375.90	4.50E+003
3	1896-	2004	1950.64	1455.96	23.12	2.25E+003	167.28	6.77E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:56:32 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 1 meter @ VG-08F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
LaBr3	0.644	34.70*	66.40	4.08970E+001	8.61836E+000
		788.70	33.60		
		1436.80*	66.40	8.95920E+001	9.78525E+000
K-40	0.993	1460.82*	10.66	5.58059E+002	6.37984E+001
Th-232	0.992	63.81*	0.26	1.17919E+003	1.13183E+003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 11/10/2014 8:56:32 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
LaBr3	0.644	4.089703E+001	8.618361E+000
K-40	0.993	3.033158E+002	8.122132E+001
Th-232	0.992	1.179193E+003	1.131834E+003

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 11/10/2014 8:56:32 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 1 meter @ VG-08F
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
+	LaBr3	34.70*	66.40	3.753E+000	3.75E+000	4.090E+001	1.858E+000
		788.70	33.60	6.748E+000		3.914E+000	3.311E+000
		1436.80*	66.40	9.134E+000		8.959E+001	4.513E+000
+	K-40	1460.82*	10.66	5.690E+001	5.69E+001	5.581E+002	2.811E+001
	Cr-51	320.08	9.91	1.294E+001	1.29E+001	-1.221E+001	6.371E+000
	Mn-54	834.85	99.98	2.735E+000	2.74E+000	1.098E+000	1.345E+000
	Co-58	810.76	99.45	2.668E+000	2.67E+000	1.744E+000	1.312E+000
	Co-60	1173.23	99.85	2.715E+000	1.50E+000	3.572E-001	1.327E+000
		1332.49	99.98	1.503E+000		9.486E-002	7.182E-001
	Nb-94	702.65	99.81	1.780E+000	1.78E+000	2.667E-001	8.710E-001
		871.09	99.89	2.731E+000		1.181E+000	1.343E+000
	Sn-113	255.13	2.11	6.264E+001	1.99E+000	-1.514E+001	3.092E+001
		391.70	64.97	1.990E+000		-1.327E+000	9.773E-001
	Cs-137	661.66	85.10	2.072E+000	2.07E+000	4.690E-001	1.015E+000
	Eu-152	121.78	28.67	6.061E+000	5.27E+000	1.426E+000	3.005E+000
		244.70	7.61	1.811E+001		9.829E+000	8.945E+000
		295.94	0.45	2.929E+002		2.458E+002	1.443E+002
		344.28	26.60	5.266E+000		1.345E+000	2.594E+000
		367.79	0.86	1.529E+002		-8.670E+001	7.518E+001
		411.12	2.24	5.940E+001		2.014E+000	2.916E+001
		443.96	2.83	4.851E+001		-1.887E+001	2.380E+001
		488.68	0.42	3.449E+002		-3.910E+002	1.691E+002
		563.99	0.49	3.338E+002		-2.579E+002	1.637E+002
		586.26	0.46	4.016E+002		1.922E+002	1.972E+002
		678.62	0.47	3.620E+002		-5.045E+002	1.770E+002
		688.67	0.86	2.073E+002		-2.225E+001	1.015E+002
		719.35	0.28	6.590E+002		6.396E+001	3.225E+002
		778.90	12.96	1.585E+001		-2.200E+001	7.766E+000
		810.45	0.32	8.264E+002		5.402E+002	4.064E+002
		867.37	4.26	6.398E+001		1.845E+001	3.145E+001
		919.33	0.43	6.411E+002		1.256E+002	3.149E+002
		964.08	14.65	1.831E+001		-5.321E+000	8.982E+000
		1085.87	10.24	2.309E+001		-1.166E+001	1.127E+001
		1089.74	1.73	1.382E+002		5.034E+000	6.750E+001
		1112.07	13.69	1.785E+001		-7.195E+000	8.716E+000
		1212.95	1.43	1.853E+002		5.997E+001	9.051E+001
		1249.94	0.19	1.175E+003		3.307E+002	5.709E+002
		1299.14	1.63	1.093E+002		1.594E+001	5.264E+001
		1408.01	21.07	1.549E+001		-6.549E+000	7.581E+000
		1457.64	0.50	1.234E+003		7.193E+003	6.096E+002
		1528.10	0.28	3.101E+002		-1.348E+002	1.418E+002
	Eu-154	123.07	40.40	4.248E+000	4.25E+000	-3.722E+000	2.106E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Eu-154	247.93	6.89	1.985E+001	4.25E+000	1.215E+000	9.803E+000
	591.76	4.95	3.782E+001		2.493E+000	1.858E+001
	692.42	1.78	1.004E+002		2.121E+001	4.915E+001
	723.30	20.06	9.109E+000		-6.662E+000	4.457E+000
	756.80	4.52	4.206E+001		-1.259E+000	2.058E+001
	873.18	12.08	2.267E+001		1.397E+001	1.114E+001
	996.29	10.48	2.421E+001		-9.340E-001	1.186E+001
	1004.76	18.01	1.390E+001		1.139E+001	6.807E+000
	1274.43	34.80	5.558E+000		1.757E+000	2.687E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.826E+002	6.22E+000	3.534E+001	9.034E+001
	60.01	1.22	1.774E+002		-1.420E+001	8.769E+001
	86.55	30.70	6.224E+000		1.334E+000	3.085E+000
	105.31	21.10	8.532E+000		3.884E+000	4.230E+000
Tl-208	583.19	85.00	2.173E+000	2.17E+000	2.806E+000	1.068E+000
Bi-211	351.07	13.02	1.071E+001	1.07E+001	9.503E+000	5.276E+000
Pb-211	404.85	3.78	3.452E+001	3.45E+001	-5.008E+000	1.695E+001
	427.09	1.76	7.561E+001		-1.824E+001	3.710E+001
	832.01	3.52	7.666E+001		-9.806E+000	3.770E+001
Bi-212	39.86	1.06	2.571E+002	2.77E+001	2.664E+003	1.274E+002
	727.33	6.67	2.768E+001		8.482E+000	1.355E+001
	785.37	1.10	1.999E+002		5.805E+001	9.805E+001
> Pb-212	1620.50	1.47	0.000E+000	3.22E+000	0.000E+000	0.000E+000
	115.18	0.60	2.879E+002		-6.338E+001	1.427E+002
	238.63	43.60	3.219E+000		1.396E+000	1.591E+000
Pb212-XR	300.09	3.30	3.955E+001	1.17E+001	3.383E+001	1.949E+001
	74.82	10.28	2.004E+001		1.028E+000	9.928E+000
	77.11	17.10	1.168E+001		-6.494E+000	5.784E+000
Bi-214	87.35	3.97	4.776E+001	4.07E+000	6.368E+001	2.367E+001
	89.78	1.46	1.273E+002		-4.635E+001	6.308E+001
	609.32	45.49	4.067E+000		1.818E+000	1.997E+000
	768.36	4.89	3.951E+001		-2.546E+001	1.933E+001
	806.18	1.26	2.067E+002		3.023E+002	1.016E+002
	934.06	3.11	8.942E+001		1.761E+001	4.392E+001
	1120.29	14.92	1.668E+001		-1.072E+000	8.149E+000
	1155.21	1.63	1.639E+002		-3.894E+000	8.016E+001
	1238.12	5.83	4.021E+001		-1.136E+001	1.957E+001
	1280.98	1.43	1.318E+002		-5.380E+001	6.365E+001
	1377.67	3.99	3.893E+001		-8.119E+001	1.860E+001
	1385.31	0.79	2.313E+002		-3.538E+002	1.113E+002
	1401.52	1.33	2.038E+002		-1.988E+002	9.927E+001
	1407.99	2.39	1.364E+002		-5.764E+001	6.672E+001
>	1509.21	2.13	1.031E+002		-3.201E+001	4.980E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	1.927E+001	3.92E+000	2.007E+001	9.521E+000
> Pb-214	295.22	18.42	7.109E+000		6.336E+000	3.504E+000
	351.93	35.60	3.924E+000		3.811E+000	1.932E+000

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.086E+002	3.92E+000	-1.496E+001	1.023E+002
Pb214-XR	74.82	5.80	3.552E+001	2.06E+001	1.822E+000	1.760E+001
	77.11	9.70	2.058E+001		-1.145E+001	1.020E+001
	87.35	2.24	8.465E+001		1.129E+002	4.195E+001
	89.78	0.82	2.266E+002		-8.253E+001	1.123E+002
Ra-226	186.21	3.64	4.017E+001	4.02E+001	-1.613E+001	1.989E+001
Ac-228	129.07	2.42	6.979E+001	1.06E+001	6.497E+001	3.460E+001
	209.25	3.89	3.780E+001		2.517E+001	1.870E+001
	270.24	3.46	3.755E+001		2.247E+001	1.852E+001
	328.00	2.95	4.341E+001		-6.375E+001	2.136E+001
	338.32	11.27	1.211E+001		7.687E+000	5.965E+000
	409.46	1.92	6.944E+001		4.024E+001	3.410E+001
	463.00	4.40	3.225E+001		2.417E+001	1.582E+001
	794.95	4.25	5.546E+001		7.727E+000	2.723E+001
	911.20	25.80	1.061E+001		-1.289E+000	5.211E+000
	964.77	4.99	5.367E+001		-1.891E+001	2.633E+001
	968.97	15.80	1.701E+001		4.012E+000	8.346E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.603E+001		3.796E+001	3.748E+001
	300.07	2.47	5.284E+001		4.520E+001	2.604E+001
	302.65	2.20	5.943E+001		9.112E+001	2.928E+001
	330.06	1.40	9.291E+001		-5.693E+001	4.573E+001
Th-234	92.38	2.13	8.614E+001	8.61E+001	-3.681E+001	4.269E+001
	92.80	2.10	8.721E+001		-3.727E+001	4.322E+001
	112.81	0.21	8.236E+002		9.546E+000	4.083E+002
U-235	143.76	10.96	1.427E+001	2.56E+000	-1.053E+001	7.070E+000
	163.33	5.08	2.978E+001		1.704E+001	1.475E+001
	185.71	57.20	2.560E+000		1.171E-001	1.267E+000
	202.11	1.08	1.319E+002		-4.654E+001	6.525E+001
	205.31	5.01	2.935E+001		1.115E+001	1.452E+001
Am-241	59.54	35.90	6.101E+000	6.10E+000	-4.885E-001	3.016E+000

+ = Nuclide identified during the nuclide identification

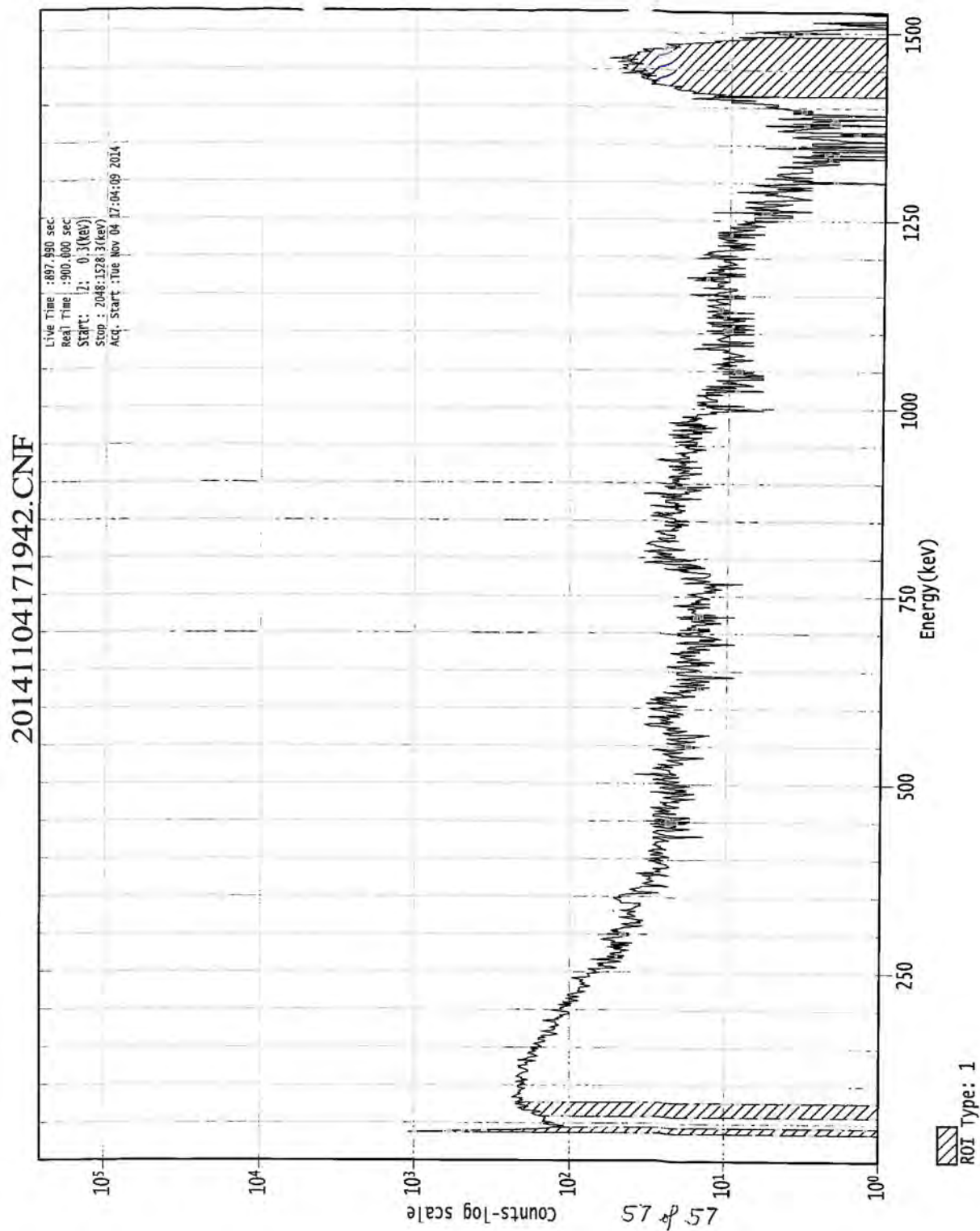
* = Energy line found in the spectrum

> = MDA value not calculated

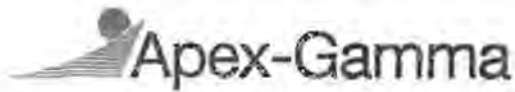
@ = Half-life too short to be able to perform the decay correction

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Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



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Analysis Report for 18-Sep-14-10001
AC-1 Filter 09/17/14 13:30 259.03 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 18-Sep-14-10001
Sample Description	: AC-1 Filter 09/17/14 13:30 259.03 Grams
Sample Type	: Miscellaneous
Unit	:
Sample Point	:
Sample Size	: 2.590E+02 grams
Facility	: Default
Sample Taken On	: 9/17/2014 1:30:56PM
Acquisition Started	: 9/18/2014 6:29:05AM
Procedure	: RADECO
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 41mm AS BS
Live Time	: 1200.0 seconds
Real Time	: 1200.8 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11061

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst *[Signature]*
Date 9-19-14

[Signature] 9/22/14

PEAK WITH NID REPORT

Peak Analysis Performed on : 9/18/2014 6:49:08AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001

AC-1 Filter 09/17/14 13:30 259.03 Grams

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/grams)	Activity Uncertainty	Coinc Corr
-----------------	------------------	-----------------	----------	-------------------------	-------------------------	---------------

* = Energy line found in the spectrum.

o = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/grams)	Wt mean Activity Uncertainty	Comments
-----------------	-----------------------------	------------------------------------	------------------------------------	----------

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001
AC-1 Filter 09/17/14 13:30 259.03 Grams

? = 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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001
AC-1 Filter 09/17/14 13:30 259.03 Grams

No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+ K-40	1460.82	10.66	1.46E-06	2.47E-06	2.47E-06	miss
+ Cr-51	320.08	9.91	-2.56E-07	3.28E-07	3.28E-07	free
+ Mn-54	834.85	99.98	-1.33E-08	9.91E-08	9.91E-08	miss
+ Co-58	810.76	99.45	9.10E-09	9.80E-08	9.80E-08	1.000
	1674.73	0.52	0.00E+00		8.09E-06	1.016
+ Co-60	1173.23	99.85	-3.50E-08	9.02E-08	9.02E-08	0.966
	1332.49	99.98	-1.15E-08		9.87E-08	0.965
+ Nb-94	702.65	99.81	1.71E-08	9.15E-08	1.10E-07	0.964
	871.09	99.89	4.93E-09		9.15E-08	0.963
+ Sn-113	255.13	2.11	-3.46E-07	8.50E-08	3.25E-06	free
	391.70	64.97	-1.58E-08		8.50E-08	free
+ Cs-134	475.36	1.48	1.88E-07	7.99E-08	4.34E-06	miss
	563.25	8.34	-1.23E-07		8.14E-07	0.932
	569.33	15.37	6.99E-08		5.79E-07	0.927
	604.72	97.62	-2.21E-08		8.32E-08	0.955
	795.86	85.46	-4.16E-08		7.99E-08	0.956
	801.95	8.69	1.28E-07		1.19E-06	0.933
	1038.61	0.99	-3.80E-07		1.06E-05	0.962
	1167.97	1.79	5.31E-07		5.76E-06	1.063
	1365.19	3.02	-1.14E-07		3.71E-06	1.097
+ Cs-137	661.66	85.10	4.53E-08	1.19E-07	1.19E-07	miss
+ Eu-152	121.78	28.67	-6.17E-08	1.24E-07	1.24E-07	0.960
	244.70	7.61	7.67E-08		6.83E-07	0.953
	295.94	0.45	-1.78E-06		1.65E-05	miss
	344.28	26.60	-8.27E-08		2.82E-07	0.973
	367.79	0.86	7.31E-07		6.56E-06	0.923
	411.12	2.24	8.09E-08		3.31E-06	0.939
	443.96	2.83	-4.60E-07		2.74E-06	0.954
	488.68	0.42	9.85E-07		1.90E-05	miss
	563.99	0.49	-3.78E-06		1.35E-05	0.954
	586.26	0.46	3.18E-07		1.17E-05	0.961
	678.62	0.47	-3.61E-07		1.68E-05	0.923
	688.67	0.86	1.05E-06		1.02E-05	0.981
	719.35	0.28	6.67E-06		3.86E-05	miss

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001

AC-1 Filter 09/17/14 13:30 259.03 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Eu-152	778.90	12.96	0.00E+00	1.24E-07	1.89E-07	0.963
	810.45	0.32	3.12E-06		2.88E-05	1.046
	867.37	4.26	2.35E-07		1.73E-06	0.944
	919.33	0.43	2.36E-06		2.19E-05	0.981
	964.08	14.65	2.09E-07		8.24E-07	1.021
	1085.87	10.24	0.00E+00		2.91E-07	1.016
	1089.74	1.73	-4.47E-07		4.94E-06	0.967
	1112.07	13.69	1.40E-08		6.18E-07	0.989
	1212.95	1.43	8.99E-07		6.62E-06	0.944
	1249.94	0.19	-8.74E-06		5.68E-05	1.069
	1299.14	1.63	1.63E-06		8.76E-06	0.961
	1408.01	21.07	1.96E-07		7.04E-07	0.983
	1457.64	0.50	-3.01E-06		1.94E-05	1.053
	1528.10	0.28	1.47E-06		3.79E-05	0.999
Eu-154	123.07	40.40	3.95E-08	1.35E-07	1.35E-07	0.960
	247.93	6.89	5.67E-08		9.84E-07	0.950
	591.76	4.95	-3.65E-07		1.41E-06	0.940
	692.42	1.78	3.93E-07		5.66E-06	0.954
	723.30	20.06	-4.66E-08		4.00E-07	0.956
	756.80	4.52	-5.04E-07		1.87E-06	0.937
	873.18	12.08	0.00E+00		7.69E-07	0.951
	996.29	10.48	-1.36E-07		7.49E-07	0.987
	1004.76	18.01	-9.99E-08		4.41E-07	0.981
	1274.43	34.80	4.19E-08		3.40E-07	0.983
	1596.48	1.80	1.67E-06		8.03E-06	1.122
Eu-155	45.30	1.31	-2.83E-06	1.42E-07	6.00E-06	0.999
	60.01	1.22	-3.97E-06		6.85E-06	1.000
	86.55	30.70	-1.03E-07		1.78E-07	free
	105.31	21.10	-6.76E-08		1.42E-07	1.000
Tl-208	583.19	85.00	2.73E-08	1.21E-07	1.21E-07	0.956
Bi-211	351.07	13.02	1.51E-07	6.75E-07	6.75E-07	miss
Pb-211	404.85	3.78	-4.71E-07	8.41E-07	1.29E-06	miss
Bi-212	427.09	1.76	0.00E+00	1.65E-06	8.41E-07	miss
	832.01	3.52	-5.42E-08		3.13E-06	miss
	39.86	1.06	1.92E-06		8.69E-06	0.999
	727.33	6.67	2.64E-07		1.65E-06	0.988
Pb-212	785.37	1.10	1.65E-06	1.59E-07	9.93E-06	0.963
	1620.50	1.47	0.00E+00		2.79E-06	1.004
	115.18	0.60	5.33E-07		6.72E-06	miss
	238.63	43.60	5.31E-08		1.59E-07	free
Pb212-XR	300.09	3.30	7.19E-07	5.18E-07	1.98E-06	free
	74.82	10.28	4.57E-07		1.01E-06	miss
	77.11	17.10	2.61E-07		5.18E-07	miss
	87.35	3.97	4.26E-07		1.57E-06	miss
Bi-214	89.78	1.46	1.38E-07	3.31E-07	3.28E-06	miss
	609.32	45.49	1.65E-07		3.31E-07	0.966
	768.36	4.89	9.94E-07		2.91E-06	0.962
	806.18	1.26	8.71E-07		8.03E-06	0.949
	934.06	3.11	6.70E-07		3.11E-06	0.963
	1120.29	14.92	1.11E-07		8.57E-07	0.963
	1155.21	1.63	-1.42E-07		8.01E-06	0.962

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001

AC-1 Filter 09/17/14 13:30 259.03 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Bi-214	1238.12	5.83	1.23E-06	3.31E-07	3.47E-06	0.963
	1280.98	1.43	0.00E+00		2.47E-06	0.963
	1377.67	3.99	0.00E+00		8.84E-07	1.021
	1385.31	0.79	-1.50E-06		1.29E-05	0.963
	1401.52	1.33	4.52E-07		7.75E-06	0.963
	1407.99	2.39	1.76E-06		6.33E-06	0.963
	1509.21	2.13	0.00E+00		1.89E-06	0.966
	1661.27	1.05	0.00E+00		4.01E-06	1.001
	1729.59	2.88	0.00E+00		1.39E-06	1.085
	1764.49	15.30	2.26E-07		1.15E-06	1.001
	1847.43	2.03	0.00E+00		2.15E-06	1.044
	2118.51	1.16	0.00E+00		0.00E+00	1.029
	241.99	7.25	-1.20E-07	2.95E-07	6.78E-07	0.999
	295.22	18.42	6.04E-08		4.31E-07	1.000
Pb-214	351.93	35.60	1.27E-07		2.95E-07	free
	785.96	1.06	2.76E-06		9.96E-06	0.999
Pb214-XR	74.82	5.80	8.10E-07	9.13E-07	1.79E-06	miss
	77.11	9.70	4.60E-07		9.13E-07	miss
	87.35	2.24	7.55E-07		2.77E-06	miss
	89.78	0.82	2.45E-07		5.84E-06	miss
Ra-226	186.21	3.64	5.96E-07	1.44E-06	1.44E-06	free
Ac-228	129.07	2.42	-3.12E-07	2.82E-07	1.68E-06	0.964
	209.25	3.89	2.26E-07		1.49E-06	0.984
	270.24	3.46	6.47E-07		1.88E-06	0.972
	328.00	2.95	-1.16E-07		2.18E-06	0.971
	338.32	11.27	-3.32E-08		6.07E-07	0.996
	409.46	1.92	-2.30E-07		4.06E-06	0.957
	463.00	4.40	3.06E-07		1.67E-06	0.953
	794.95	4.25	-3.26E-07		2.02E-06	0.960
	911.20	25.80	1.28E-08		2.82E-07	0.993
	964.77	4.99	3.24E-07		2.25E-06	0.987
	968.97	15.80	1.31E-07		6.10E-07	0.993
	1588.20	3.22	4.64E-07		3.41E-06	1.002
	27.36	10.30	0.00E+00	1.72E-07	1.72E-07	0.998
	283.69	1.70	2.03E-07		3.69E-06	0.999
Pa-231	300.07	2.47	1.12E-06		2.65E-06	1.000
	302.65	2.20	2.93E-07		2.48E-06	1.000
	330.06	1.40	1.12E-06		4.76E-06	1.001
Th-234	92.38	2.13	1.70E-06	3.08E-06	3.28E-06	free
	92.80	2.10	2.89E-07		3.08E-06	free
	112.81	0.21	4.37E-06		2.08E-05	free
U-235	143.76	10.96	-7.86E-08	8.03E-08	4.03E-07	free
	163.33	5.08	2.21E-07		9.82E-07	free
	185.71	57.20	1.04E-08		8.03E-08	free
	202.11	1.08	1.60E-07		4.51E-06	miss
Am-241	205.31	5.01	3.01E-07	2.88E-07	1.03E-06	free
	59.54	35.90	-3.02E-09		2.88E-07	free

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10001

AC-1 Filter 09/17/14 13:30 259.03 Grams

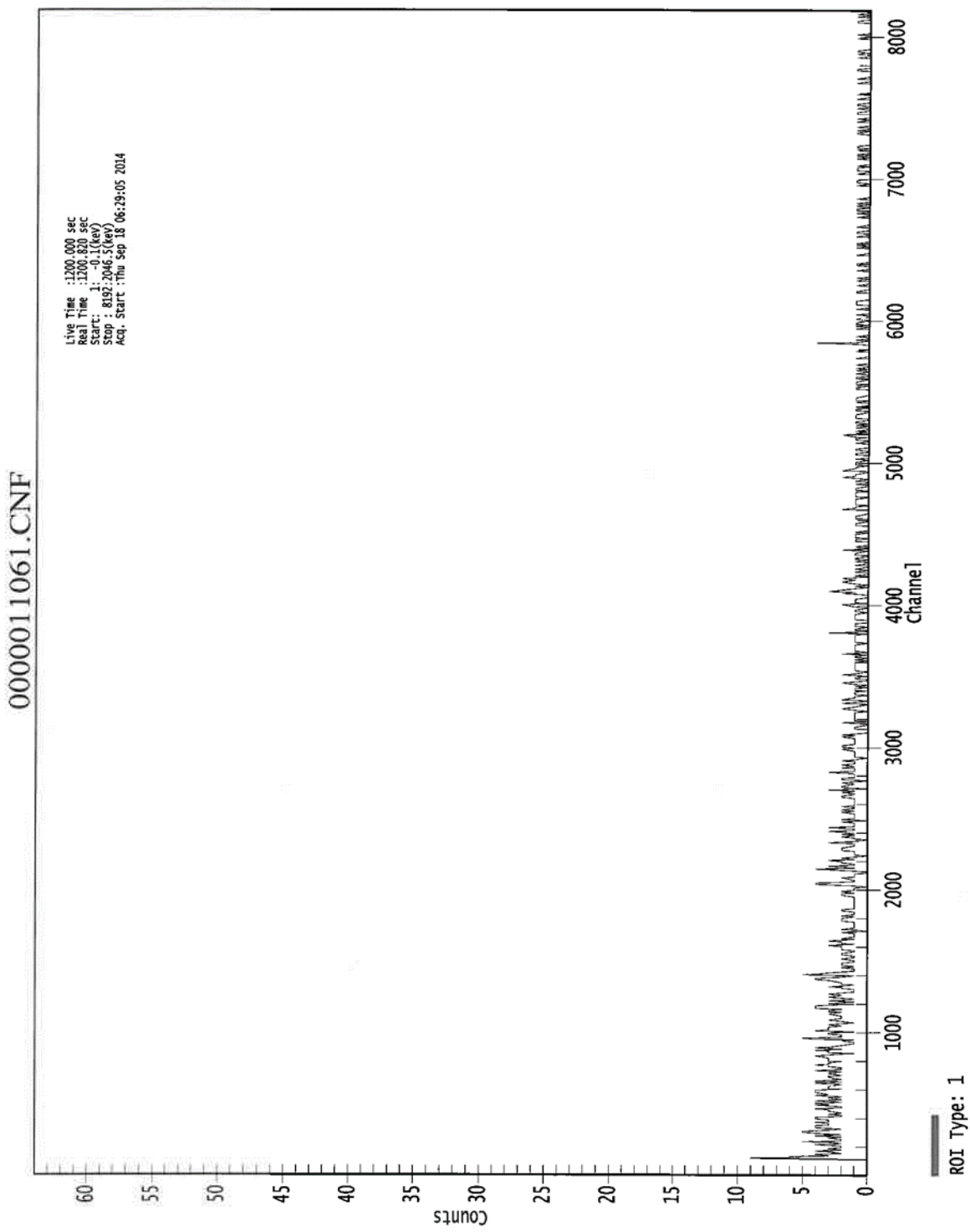
-
- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
 - ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

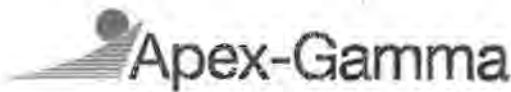
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



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Analysis Report for 18-Sep-14-10002

AC-2E Filter 09/17/14 13:20 123.37 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 18-Sep-14-10002
Sample Description	: AC-2E Filter 09/17/14 13:20 123.37 Grams
Sample Type	: Miscellaneous
Unit	:
Sample Point	:
Sample Size	: 1.234E+02 grams
Facility	: Default
Sample Taken On	: 9/17/2014 1:20:22PM
Acquisition Started	: 9/18/2014 6:52:30AM
Procedure	: RADECO
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 41mm AS BS
Live Time	: 1200.0 seconds
Real Time	: 1200.8 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11062

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst PH-B
Date 9-18-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 9/18/2014 7:12:33AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Mc Sam 9/22/14

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10002

AC-2E Filter 09/17/14 13:20 123.37 Grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.79	1401 -	1412	1407.23	1.22E+01	14.06	3.36E+01	Pb-214 Bi-211

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/grams)	Activity Uncertainty	Coinc Corr
Bi-211	0.96	351.07 *	13.02	9.19E-07	1.07E-06	miss
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	3.36E-07	3.91E-07	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10002

AC-2E Filter 09/17/14 13:20 123.37 Grams

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/grams)	Wt mean Activity Uncertainty	Comments
? Bi-211	0.967	9.19E-07	1.07E-06	
? Pb-214	0.999	3.36E-07	3.91E-07	

? = 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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10002

AC-2E Filter 09/17/14 13:20 123.37 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/18/2014 7:12:33AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	3.10E-06	5.70E-06	5.70E-06	miss
+	Cr-51	320.08	9.91	-2.76E-07	1.23E-06	1.23E-06	free
+	Mn-54	834.85	99.98	3.22E-09	1.79E-07	1.79E-07	miss
+	Co-58	810.76	99.45	-9.56E-09	1.41E-07	1.41E-07	1.000
		1674.73	0.52	8.24E-06		5.83E-05	1.016
+	Co-60	1173.23	99.85	-1.84E-08	1.89E-07	1.89E-07	0.966
		1332.49	99.98	-1.45E-07		2.07E-07	0.965
+	Nb-94	702.65	99.81	1.91E-08	1.64E-07	1.64E-07	0.964
		871.09	99.89	2.24E-08		1.92E-07	0.963
+	Sn-113	255.13	2.11	-3.63E-07	2.17E-07	4.76E-06	free
		391.70	64.97	-3.65E-08		2.17E-07	free
+	Cs-134	475.36	1.48	-2.79E-06	4.39E-08	1.02E-05	miss
		563.25	8.34	3.44E-07		1.98E-06	0.932
		569.33	15.37	1.55E-07		1.43E-06	0.927
		604.72	97.62	0.00E+00		4.39E-08	0.955
		795.86	85.46	-3.42E-08		1.68E-07	0.956
		801.95	8.69	3.47E-07		2.78E-06	0.933
		1038.61	0.99	-1.99E-06		1.76E-05	0.962
		1167.97	1.79	-1.86E-07		9.58E-06	1.063

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10002

AC-2E Filter 09/17/14 13:20 123.37 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	1.20E-07	4.39E-08	7.78E-06	1.097
+	Cs-137	661.66	85.10	5.42E-08	2.29E-07	2.29E-07	miss
+	Eu-152	121.78	28.67	-5.53E-08	3.14E-07	3.14E-07	0.960
		244.70	7.61	-2.29E-07		1.10E-06	0.953
		295.94	0.45	2.12E-05		4.08E-05	miss
		344.28	26.60	-1.21E-07		4.48E-07	0.973
		367.79	0.86	-8.70E-06		9.41E-06	0.923
		411.12	2.24	-9.55E-07		7.48E-06	0.939
		443.96	2.83	-1.17E-07		6.19E-06	0.954
		488.68	0.42	4.26E-06		3.99E-05	miss
		563.99	0.49	-7.95E-06		2.25E-05	0.954
		586.26	0.46	5.34E-06		4.71E-05	0.961
		678.62	0.47	-1.82E-05		4.55E-05	0.923
		688.67	0.86	-1.32E-06		1.84E-05	0.981
		719.35	0.28	-2.78E-05		5.74E-05	miss
		778.90	12.96	8.97E-08		1.58E-06	0.963
		810.45	0.32	-3.75E-06		4.14E-05	1.046
		867.37	4.26	1.48E-06		5.32E-06	0.944
		919.33	0.43	2.75E-07		5.33E-05	0.981
		964.08	14.65	-3.48E-07		1.34E-06	1.021
		1085.87	10.24	-1.13E-07		2.10E-06	1.016
		1089.74	1.73	-3.29E-06		1.04E-05	0.967
		1112.07	13.69	-1.76E-07		1.30E-06	0.989
		1212.95	1.43	-2.70E-07		1.75E-05	0.944
		1249.94	0.19	1.47E-05		1.19E-04	1.069
		1299.14	1.63	0.00E+00		4.62E-06	0.961
		1408.01	21.07	0.00E+00		1.28E-06	0.983
		1457.64	0.50	-2.09E-05		5.13E-05	1.053
		1528.10	0.28	-2.01E-05		7.95E-05	0.999
+	Eu-154	123.07	40.40	3.96E-08	2.08E-07	2.55E-07	0.960
		247.93	6.89	1.68E-07		1.90E-06	0.950
		591.76	4.95	4.47E-07		4.19E-06	0.940
		692.42	1.78	-1.65E-06		9.18E-06	0.954
		723.30	20.06	-2.91E-07		9.73E-07	0.956
		756.80	4.52	-1.48E-06		3.93E-06	0.937
		873.18	12.08	-3.77E-07		1.28E-06	0.951
		996.29	10.48	-2.49E-07		1.57E-06	0.987
		1004.76	18.01	-6.99E-08		1.35E-06	0.981
		1274.43	34.80	0.00E+00		2.08E-07	0.983
		1596.48	1.80	0.00E+00		4.24E-06	1.122
+	Eu-155	45.30	1.31	-1.63E-05	3.90E-07	1.75E-05	0.999
		60.01	1.22	2.56E-06		2.21E-05	1.000
		86.55	30.70	-5.99E-08		3.90E-07	free
		105.31	21.10	1.59E-07		4.17E-07	1.000
+	Tl-208	583.19	85.00	6.73E-08	2.37E-07	2.37E-07	0.956
+	Bi-211	351.07	* 13.02	9.19E-07	1.72E-06	1.72E-06	miss
+	Pb-211	404.85	3.78	-7.76E-07	3.13E-06	3.13E-06	miss
		427.09	1.76	1.92E-06		7.84E-06	miss
		832.01	3.52	-1.00E-06		4.02E-06	miss
+	Bi-212	39.86	1.06	-2.96E-06	2.45E-06	1.94E-05	0.999
		727.33	6.67	1.32E-07		2.45E-06	0.988

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10002
AC-2E Filter 09/17/14 13:20 123.37 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Bi-212	785.37	1.10	4.82E-07	2.45E-06	1.87E-05	0.963
	1620.50	1.47	2.16E-06		1.59E-05	1.004
+ Pb-212	115.18	0.60	5.85E-06	3.01E-07	1.57E-05	miss
	238.63	43.60	8.45E-08		3.01E-07	free
	300.09	3.30	-6.56E-08		3.70E-06	free
+ Pb212-XR	74.82	10.28	1.87E-07	9.80E-07	1.86E-06	miss
	77.11	17.10	-2.81E-07		9.80E-07	miss
	87.35	3.97	6.72E-07		3.08E-06	miss
	89.78	1.46	2.87E-06		7.56E-06	miss
+ Bi-214	609.32	45.49	4.47E-07	6.96E-07	6.96E-07	0.966
	768.36	4.89	4.49E-07		4.15E-06	0.962
	806.18	1.26	0.00E+00		1.45E-05	0.949
	934.06	3.11	6.45E-07		6.53E-06	0.963
	1120.29	14.92	1.50E-06		2.79E-06	0.963
	1155.21	1.63	1.34E-06		1.45E-05	0.962
	1238.12	5.83	7.71E-07		5.51E-06	0.963
	1280.98	1.43	2.73E-07		1.78E-05	0.963
	1377.67	3.99	5.39E-07		6.37E-06	1.021
	1385.31	0.79	0.00E+00		9.95E-06	0.963
	1401.52	1.33	5.69E-06		2.66E-05	0.963
	1407.99	2.39	0.00E+00		1.15E-05	0.963
	1509.21	2.13	0.00E+00		3.96E-06	0.966
	1661.27	1.05	2.67E-06		2.89E-05	1.001
	1729.59	2.88	0.00E+00		2.92E-06	1.085
	1764.49	15.30	4.47E-07		2.08E-06	1.001
	1847.43	2.03	-1.25E-06		1.23E-05	1.044
> Pb-214	2118.51	1.16	0.00E+00		0.00E+00	1.029
+ Pb-214	241.99	7.25	5.81E-07	6.28E-07	1.83E-06	0.999
	295.22	18.42	6.78E-07		1.09E-06	1.000
	351.93	35.60	3.36E-07		6.28E-07	free
	785.96	1.06	5.29E-06		2.09E-05	0.999
+ Pb214-XR	74.82	5.80	3.32E-07	1.73E-06	3.30E-06	miss
	77.11	9.70	-4.95E-07		1.73E-06	miss
	87.35	2.24	1.19E-06		5.45E-06	miss
	89.78	0.82	5.10E-06		1.35E-05	miss
+ Ra-226	186.21	3.64	2.93E-07	3.03E-06	3.03E-06	free
+ Ac-228	129.07	2.42	3.21E-07	7.48E-07	4.26E-06	0.964
	209.25	3.89	-2.53E-07		2.74E-06	0.984
	270.24	3.46	-1.52E-06		3.11E-06	0.972
	328.00	2.95	1.74E-06		6.10E-06	0.971
	338.32	11.27	1.27E-07		1.20E-06	0.996
	409.46	1.92	1.28E-06		1.01E-05	0.957
	463.00	4.40	1.75E-06		4.12E-06	0.953
	794.95	4.25	1.01E-06		4.91E-06	0.960
	911.20	25.80	1.34E-08		7.48E-07	0.993
	964.77	4.99	-1.09E-06		4.07E-06	0.987
	968.97	15.80	5.75E-07		1.94E-06	0.993
	1588.20	3.22	-2.78E-07		9.04E-06	1.002
+ Pa-231	27.36	10.30	0.00E+00	3.61E-07	3.61E-07	0.998
	283.69	1.70	-1.95E-06		5.25E-06	0.999
	300.07	2.47	7.89E-07		4.95E-06	1.000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Analysis Report for 18-Sep-14-10002
AC-2E Filter 09/17/14 13:20 123.37 Grams

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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Pa-231	302.65	2.20	-8.72E-07	3.61E-07	5.20E-06	1.000
	330.06	1.40	2.78E-08		9.40E-06	1.001
+ Th-234	92.38	2.13	1.60E-06	5.64E-06	5.64E-06	free
	92.80	2.10	1.82E-06		5.91E-06	free
	112.81	0.21	-4.98E-06		4.13E-05	free
+ U-235	143.76	10.96	-4.68E-07	2.00E-07	7.16E-07	free
	163.33	5.08	-7.81E-08		1.80E-06	free
	185.71	57.20	5.49E-08		2.00E-07	free
	202.11	1.08	7.09E-07		9.47E-06	miss
	205.31	5.01	-1.30E-07		1.83E-06	free
+ Am-241	59.54	35.90	1.67E-07	7.90E-07	7.90E-07	free

+ = 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

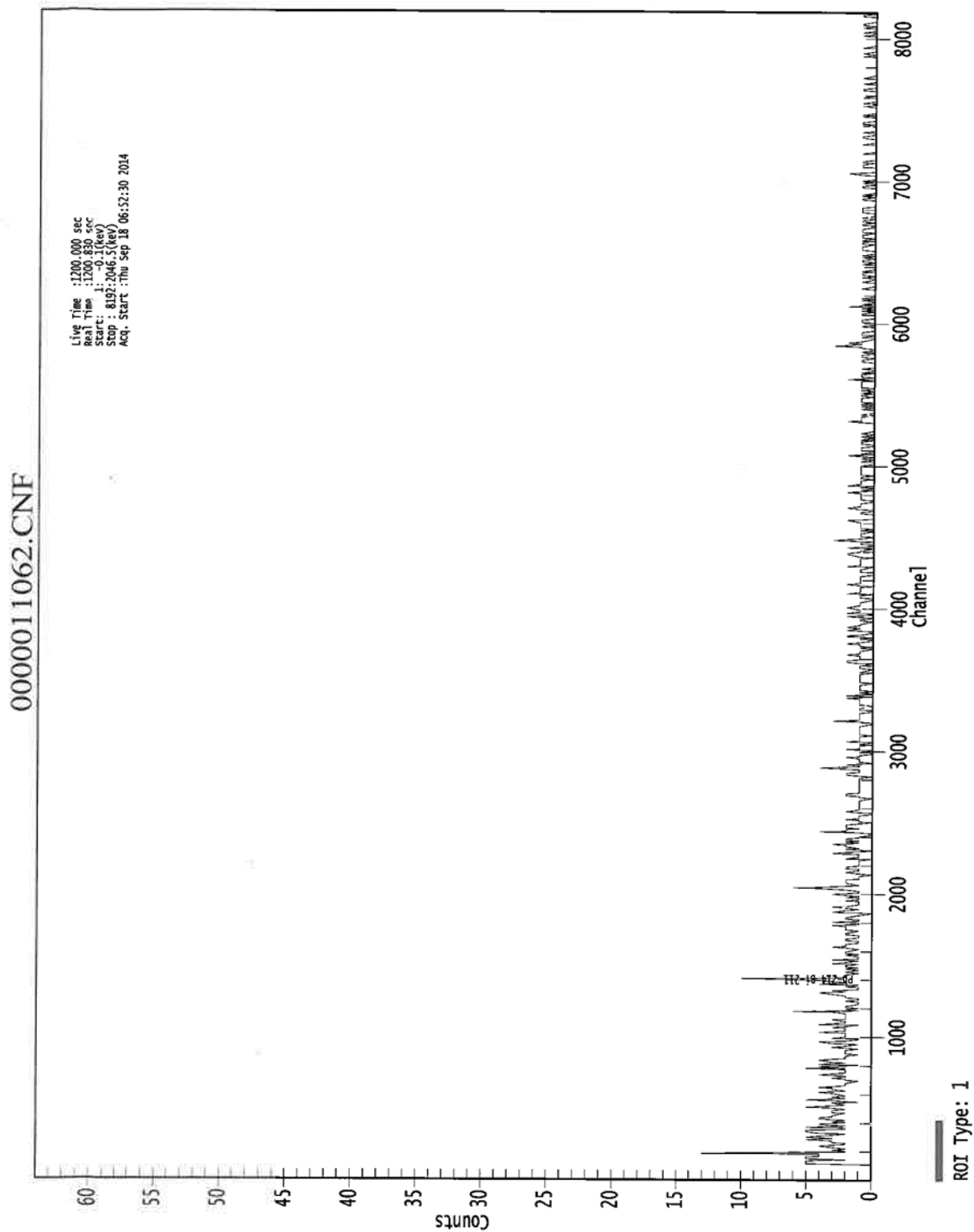
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

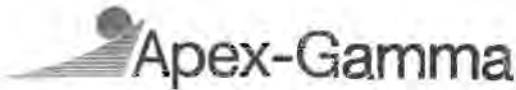
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



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Analysis Report for 18-Sep-14-10004
AC-3 Filter 09/17/14 13:25 101.30 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification : 18-Sep-14-10004
Sample Description : AC-3 Filter 09/17/14 13:25 101.30 Grams
Sample Type : Miscellaneous
Unit :
Sample Point :

Sample Size : 1.013E+02 grams
Facility : Default

Sample Taken On : 9/17/2014 1:25:45PM
Acquisition Started : 9/18/2014 7:41:35AM

Procedure : RADECO
Operator : Administrator
Detector Name : P11314X2
Geometry : 41mm AS BS
Live Time : 1200.0 seconds
Real Time : 1200.9 seconds

Dead Time : 0.08 %

Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM

Energy Calibration Used Done On : 2/19/2014
Efficiency Calibration Used Done On : 9/11/2014
Efficiency Calibration Description :

Sample Number : 11064

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst *[Signature]*

Date 9-18-14

[Signature] 9/22/14

PEAK WITH NID REPORT

Peak Analysis Performed on : 9/18/2014 8:01:38AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.83	1402 -	1412	1407.37	1.72E+01	12.37	1.97E+01	Pb-214 Bi-211

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/grams)	Activity Uncertainty	Colnc Corr
Bi-211	0.96	351.07 *	13.02	1.57E-06	1.16E-06	miss
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	5.76E-07	4.25E-07	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/grams)	Wt mean Activity Uncertainty	Comments
?	Bi-211	0.964	1.57E-06	1.16E-06	
?	Pb-214	1.000	5.76E-07	4.25E-07	

- ? = 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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 9/18/2014 8:01:38AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	6.69E-06	8.05E-06	8.05E-06	miss
+	Cr-51	320.08	9.91	6.71E-07	1.99E-06	1.99E-06	free
+	Mn-54	834.85	99.98	0.00E+00	6.37E-08	6.37E-08	miss
+	Co-58	810.76	99.45	-1.01E-07	1.71E-07	1.71E-07	1.000
		1674.73	0.52	0.00E+00		2.07E-05	1.016
+	Co-60	1173.23	99.85	4.14E-08	3.69E-07	3.77E-07	0.966
		1332.49	99.98	1.03E-07		3.69E-07	0.965
+	Nb-94	702.65	99.81	1.07E-08	2.58E-07	2.58E-07	0.964
		871.09	99.89	7.25E-08		3.03E-07	0.963
+	Sn-113	255.13	2.11	1.58E-07	2.65E-07	6.64E-06	free
		391.70	64.97	-2.66E-08		2.65E-07	free
+	Cs-134	475.36	1.48	-4.54E-06	2.37E-07	9.58E-06	miss
		563.25	8.34	-3.59E-07		2.08E-06	0.932
		569.33	15.37	-3.70E-07		9.08E-07	0.927
		604.72	97.62	1.88E-08		2.37E-07	0.955
		795.86	85.46	-7.72E-09		2.99E-07	0.956
		801.95	8.69	2.35E-07		2.07E-06	0.933
		1038.61	0.99	3.40E-06		3.13E-05	0.962
		1167.97	1.79	0.00E+00		4.29E-06	1.063

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	1.82E-06	2.37E-07	1.23E-05	1.097
+	Cs-137	661.66	85.10	1.16E-08	2.15E-07	2.15E-07	miss
+	Eu-152	121.78	28.67	-1.93E-07	2.90E-07	2.90E-07	0.960
		244.70	7.61	5.58E-07		1.97E-06	0.953
		295.94	0.45	1.01E-05		3.50E-05	miss
		344.28	26.60	3.24E-09		6.82E-07	0.973
		367.79	0.86	9.34E-07		2.20E-05	0.923
		411.12	2.24	3.81E-06		1.13E-05	0.939
		443.96	2.83	-2.71E-06		5.75E-06	0.954
		488.68	0.42	1.57E-05		4.86E-05	miss
		563.99	0.49	-1.12E-05		2.74E-05	0.954
		586.26	0.46	7.05E-06		4.38E-05	0.961
		678.62	0.47	1.36E-05		5.54E-05	0.923
		688.67	0.86	-4.02E-07		2.60E-05	0.981
		719.35	0.28	-6.28E-06		6.99E-05	miss
		778.90	12.96	-1.49E-07		1.92E-06	0.963
		810.45	0.32	-2.28E-05		7.37E-05	1.046
		867.37	4.26	-2.11E-06		4.43E-06	0.944
		919.33	0.43	1.27E-05		6.49E-05	0.981
		964.08	14.65	-2.92E-07		1.89E-06	1.021
		1085.87	10.24	4.28E-07		2.96E-06	1.016
		1089.74	1.73	-7.15E-06		1.26E-05	0.967
		1112.07	13.69	-6.45E-07		1.58E-06	0.989
		1212.95	1.43	6.90E-06		2.48E-05	0.944
		1249.94	0.19	-1.34E-05		1.15E-04	1.069
		1299.14	1.63	2.08E-06		1.53E-05	0.961
		1408.01	21.07	2.03E-07		1.55E-06	0.983
		1457.64	0.50	-8.56E-05		4.96E-05	1.053
		1528.10	0.28	0.00E+00		3.56E-05	0.999
+	Eu-154	123.07	40.40	8.72E-08	3.11E-07	3.11E-07	0.960
		247.93	6.89	-9.37E-07		1.29E-06	0.950
		591.76	4.95	-1.24E-06		2.86E-06	0.940
		692.42	1.78	1.51E-06		1.45E-05	0.954
		723.30	20.06	-2.38E-07		8.10E-07	0.956
		756.80	4.52	6.01E-07		5.55E-06	0.937
		873.18	12.08	2.82E-07		2.28E-06	0.951
		996.29	10.48	-6.07E-07		2.42E-06	0.987
		1004.76	18.01	-1.28E-08		1.84E-06	0.981
		1274.43	34.80	1.87E-07		8.71E-07	0.983
		1596.48	1.80	-8.17E-07		1.40E-05	1.122
+	Eu-155	45.30	1.31	-2.41E-05	5.08E-07	2.32E-05	0.999
		60.01	1.22	1.78E-06		2.33E-05	1.000
		86.55	30.70	8.28E-08		5.26E-07	free
		105.31	21.10	-3.54E-08		5.08E-07	1.000
+	Tl-208	583.19	85.00	1.30E-07	3.31E-07	3.31E-07	0.956
+	Bi-211	351.07	13.02	1.57E-06	1.64E-06	1.64E-06	miss
+	Pb-211	404.85	3.78	-9.93E-07	2.61E-06	2.61E-06	miss
		427.09	1.76	-2.70E-06		7.38E-06	miss
		832.01	3.52	3.33E-07		6.18E-06	miss
+	Bi-212	39.86	1.06	-1.77E-06	2.36E-06	2.50E-05	0.999
		727.33	6.67	-1.45E-06		2.36E-06	0.988

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Bi-212	785.37	1.10	-5.87E-07	2.36E-06	2.28E-05	0.963
	1620.50	1.47	0.00E+00		7.13E-06	1.004
+ Pb-212	115.18	0.60	-1.91E-06	4.07E-07	1.99E-05	miss
	238.63	43.60	1.51E-07		4.07E-07	free
	300.09	3.30	7.27E-07		5.80E-06	free
+ Pb212-XR	74.82	10.28	1.35E-06	1.08E-06	2.48E-06	miss
	77.11	17.10	4.22E-07		1.08E-06	miss
	87.35	3.97	-6.57E-07		3.61E-06	miss
	89.78	1.46	-1.41E-07		9.21E-06	miss
+ Bi-214	609.32	45.49	6.71E-07	9.45E-07	9.45E-07	0.966
	768.36	4.89	-9.77E-07		4.36E-06	0.962
	806.18	1.26	-1.59E-06		1.77E-05	0.949
	934.06	3.11	4.28E-06		1.12E-05	0.963
	1120.29	14.92	4.75E-07		2.19E-06	0.963
	1155.21	1.63	3.81E-06		1.77E-05	0.962
	1238.12	5.83	-1.60E-07		6.72E-06	0.963
	1280.98	1.43	0.00E+00		6.31E-06	0.963
	1377.67	3.99	0.00E+00		2.26E-06	1.021
	1385.31	0.79	0.00E+00		1.21E-05	0.963
	1401.52	1.33	7.70E-07		2.50E-05	0.963
	1407.99	2.39	1.82E-06		1.40E-05	0.963
	1509.21	2.13	3.56E-06		1.66E-05	0.966
	1661.27	1.05	2.44E-06		3.52E-05	1.001
	1729.59	2.88	3.29E-07		9.67E-06	1.085
	1764.49	15.30	1.63E-06		4.09E-06	1.001
	1847.43	2.03	2.92E-06		1.89E-05	1.044
>	2118.51	1.16	0.00E+00		0.00E+00	1.029
+ Pb-214	241.99	7.25	1.08E-06	5.98E-07	2.40E-06	0.999
	295.22	18.42	3.82E-07		9.42E-07	1.000
	351.93	35.60	5.76E-07		5.98E-07	free
	785.96	1.06	-3.89E-06		1.97E-05	0.999
+ Pb214-XR	74.82	5.80	2.40E-06	1.91E-06	4.39E-06	miss
	77.11	9.70	7.45E-07		1.91E-06	miss
	87.35	2.24	-1.16E-06		6.40E-06	miss
	89.78	0.82	-2.51E-07		1.64E-05	miss
+ Ra-226	186.21	3.64	8.77E-07	3.97E-06	3.97E-06	free
+ Ac-228	129.07	2.42	1.29E-06	9.11E-07	5.19E-06	0.964
	209.25	3.89	-2.89E-07		2.52E-06	0.984
	270.24	3.46	-1.14E-06		4.08E-06	0.972
	328.00	2.95	-1.69E-07		5.93E-06	0.971
	338.32	11.27	-8.61E-08		1.46E-06	0.996
	409.46	1.92	-6.92E-06		6.83E-06	0.957
	463.00	4.40	-2.20E-06		4.27E-06	0.953
	794.95	4.25	1.34E-06		6.67E-06	0.960
	911.20	25.80	1.96E-07		9.11E-07	0.993
	964.77	4.99	4.44E-08		6.41E-06	0.987
	968.97	15.80	3.64E-07		2.02E-06	0.993
	1588.20	3.22	0.00E+00		1.10E-05	1.002
+ Pa-231	27.36	10.30	0.00E+00	4.39E-07	4.39E-07	0.998
	283.69	1.70	-1.22E-06		7.79E-06	0.999
	300.07	2.47	1.71E-07		7.44E-06	1.000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

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Analysis Report for 18-Sep-14-10004

AC-3 Filter 09/17/14 13:25 101.30 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
	Pa-231	302.65	2.20	6.90E-07	4.39E-07	9.71E-06	1.000
		330.06	1.40	1.83E-06		1.35E-05	1.001
+	Th-234	92.38	2.13	9.04E-07	7.35E-06	7.35E-06	free
		92.80	2.10	2.10E-06		7.88E-06	free
		112.81	0.21	-2.35E-05		3.61E-05	free
+	U-235	143.76	10.96	3.25E-07	2.68E-07	1.24E-06	free
		163.33	5.08	-2.42E-07		2.61E-06	free
		185.71	57.20	8.39E-08		2.68E-07	free
		202.11	1.08	6.12E-06		1.37E-05	miss
		205.31	5.01	-1.51E-07		2.08E-06	free
+	Am-241	59.54	35.90	-2.20E-07	7.36E-07	7.36E-07	free

+ = 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

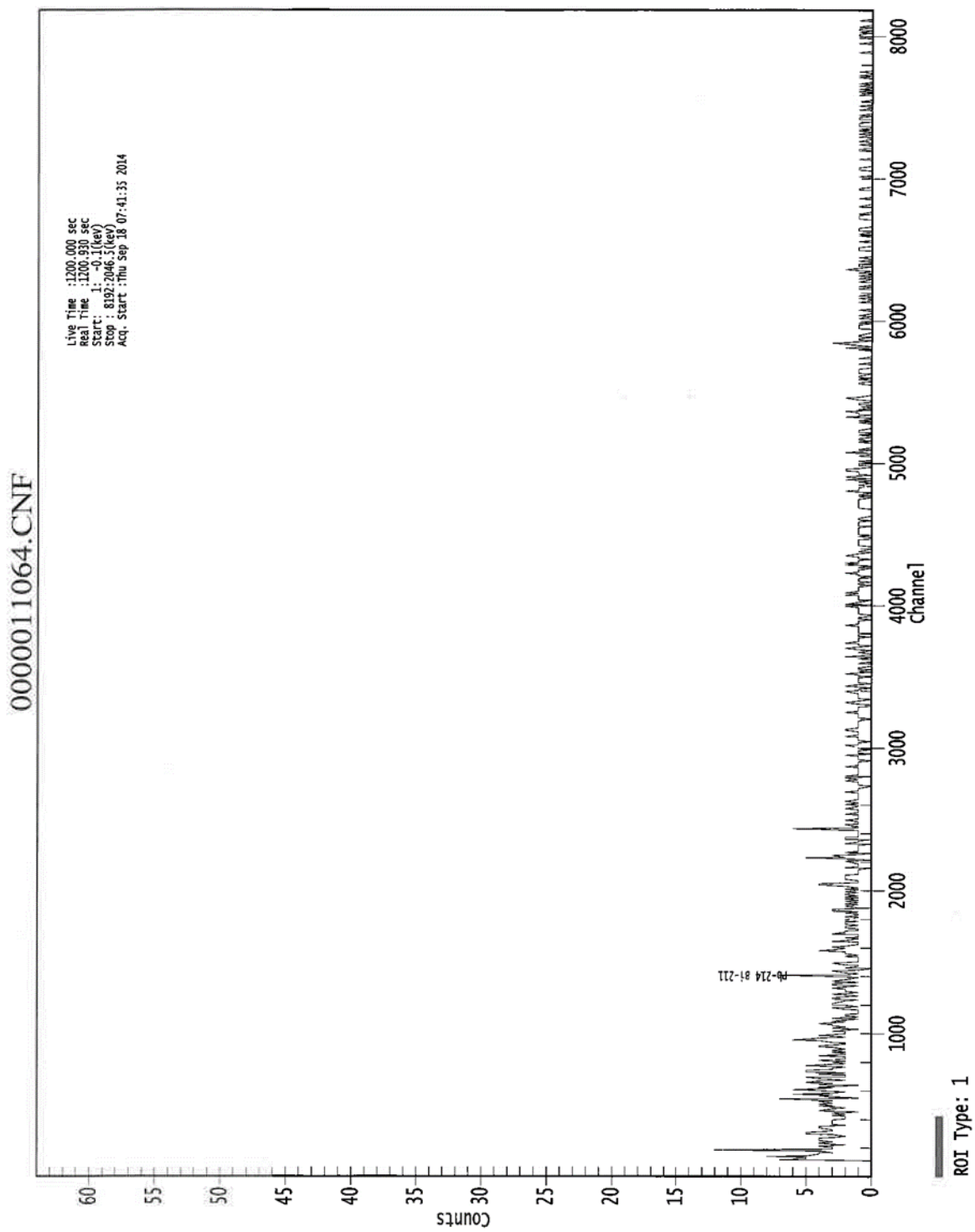
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\9-8-14\20140904163454.cnf

Report Generated On : 9/8/2014 10:11:09 AM

Sample Title : N Fillter Bank 2
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

*Slightly shielded by
1/8" steel*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

*Top of E. Service Bldg
Roof*

Sample Size : 1.000E+000 Grams

Sample Taken On : 9/4/2014 4:19:04 PM
Acquisition Started : 9/4/2014 4:19:04 PM

Live Time : 897.9 seconds
Real Time : 900.0 seconds

Dead Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVAR

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *[Signature]*

Date 9-8-14

[Signature]
9/8/14

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report 9/8/2014 10:11:09 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: N Fillter Bank 2
Peak Analysis Performed on: 9/8/2014 10:11:08 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.47	38.97	1.91	3.06E+003	210.38	1.39E+003
2	1897-	2005	1951.41	1456.54	8.47	2.00E+003	158.34	6.16E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:09 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: N Filter Bank 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.642	34.70*	66.40	4.25256E+001	8.99349E+000
		788.70	33.60		
K-40	0.995	1436.80*	66.40	7.96175E+001	8.96476E+000
		1460.82*	10.66	4.95929E+002	5.82981E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:11:09 AM Page 4

 *** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.642	4.252565E+001	8.993492E+000
K-40	0.995	2.310411E+002	7.909711E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/8/2014 10:11:08 AM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report 9/8/2014 10:11:09 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: N Fillter Bank 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	4.128E+000	4.13E+000	4.253E+001	2.045E+000
		788.70	33.60	6.955E+000		-8.754E-001	3.414E+000
		1436.80*	66.40	8.673E+000		7.962E+001	4.282E+000
+	K-40	1460.82*	10.66	5.402E+001	5.40E+001	4.959E+002	2.668E+001
	Cr-51	320.08	9.91	1.482E+001	1.48E+001	9.420E+000	7.308E+000
	Mn-54	834.85	99.98	2.787E+000	2.79E+000	1.317E+000	1.371E+000
	Co-58	810.76	99.45	2.691E+000	2.69E+000	8.139E-001	1.324E+000
	Co-60	1173.23	99.85	2.717E+000	1.95E+000	1.625E-001	1.329E+000
		1332.49	99.98	1.951E+000		3.035E+000	9.419E-001
	Nb-94	702.65	99.81	1.814E+000	1.81E+000	-5.247E-001	8.878E-001
		871.09	99.89	2.812E+000		3.367E-002	1.383E+000
	Sn-113	255.13	2.11	7.173E+001	2.27E+000	-4.581E+001	3.546E+001
		391.70	64.97	2.275E+000		1.752E+000	1.120E+000
	Cs-137	661.66	85.10	2.164E+000	2.16E+000	6.884E-001	1.061E+000
	Eu-152	121.78	28.67	7.098E+000	5.51E+000	1.100E+000	3.524E+000
		244.70	7.61	2.060E+001		-4.293E+000	1.019E+001
		295.94	0.45	3.246E+002		1.157E+002	1.602E+002
		344.28	26.60	5.506E+000		-1.071E+000	2.714E+000
		367.79	0.86	1.684E+002		7.334E+001	8.295E+001
		411.12	2.24	6.591E+001		8.839E+001	3.242E+001
		443.96	2.83	5.413E+001		5.524E+001	2.661E+001
		488.68	0.42	3.756E+002		-9.825E+001	1.845E+002
		563.99	0.49	3.489E+002		-3.098E+002	1.713E+002
		586.26	0.46	3.965E+002		-1.439E+002	1.947E+002
		678.62	0.47	3.784E+002		-2.346E+002	1.853E+002
		688.67	0.86	2.135E+002		6.173E+001	1.046E+002
		719.35	0.28	6.649E+002		2.823E+002	3.254E+002
		778.90	12.96	1.694E+001		-4.715E+000	8.310E+000
		810.45	0.32	8.335E+002		2.521E+002	4.100E+002
		867.37	4.26	6.593E+001		-5.971E+000	3.243E+001
		919.33	0.43	6.397E+002		-2.093E+002	3.142E+002
		964.08	14.65	1.912E+001		7.675E+000	9.388E+000
		1085.87	10.24	2.406E+001		-3.808E-001	1.176E+001
		1089.74	1.73	1.421E+002		-6.928E+001	6.943E+001
		1112.07	13.69	1.807E+001		1.024E+001	8.826E+000
		1212.95	1.43	1.805E+002		-1.716E+000	8.808E+001
		1249.94	0.19	1.146E+003		1.145E+003	5.564E+002
		1299.14	1.63	1.129E+002		-1.415E+002	5.442E+001
		1408.01	21.07	1.507E+001		-6.570E+000	7.372E+000
		1457.64	0.50	1.159E+003		6.294E+003	5.722E+002
		1528.10	0.28	2.244E+002		-4.265E+002	9.901E+001
	Eu-154	123.07	40.40	5.002E+000	5.00E+000	-2.430E+000	2.483E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Slide MDA Report

9/8/2014

10:11:09 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Eu-154	247.93	6.89	2.258E+001	5.00E+000	-3.246E+000	1.117E+001
	591.76	4.95	3.752E+001		6.684E+000	1.843E+001
	692.42	1.78	1.032E+002		3.195E+001	5.053E+001
	723.30	20.06	9.192E+000		-5.772E+000	4.498E+000
	756.80	4.52	4.316E+001		-1.972E+001	2.113E+001
	873.18	12.08	2.322E+001		8.595E+000	1.142E+001
	996.29	10.48	2.450E+001		-1.246E+001	1.200E+001
	1004.76	18.01	1.396E+001		-1.376E+000	6.835E+000
	1274.43	34.80	5.080E+000		-6.394E+000	2.448E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	2.033E+002	7.07E+000	-9.910E+000	1.007E+002
	60.01	1.22	2.036E+002		-2.655E+000	1.008E+002
	86.55	30.70	7.066E+000		-2.010E+002	3.506E+000
	105.31	21.10	9.843E+000		-4.655E+000	4.885E+000
Tl-208	583.19	85.00	2.127E+000	2.13E+000	-5.586E+001	1.044E+000
Bi-211	351.07	13.02	1.126E+001	1.13E+001	7.528E+000	5.549E+000
Pb-211	404.85	3.78	3.873E+001	3.87E+001	2.078E+001	1.905E+001
	427.09	1.76	8.301E+001		-2.800E+001	4.080E+001
	832.01	3.52	7.936E+001		5.154E+001	3.905E+001
Bi-212	39.86	1.06	2.679E+002	2.78E+001	2.650E+003	1.328E+002
	727.33	6.67	2.782E+001		8.988E+000	1.361E+001
	785.37	1.10	2.080E+002		-5.366E+001	1.021E+002
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
> Pb-212	115.18	0.60	3.374E+002	3.66E+000	-1.910E+001	1.675E+002
	238.63	43.60	3.655E+000		1.870E+000	1.809E+000
	300.09	3.30	4.365E+001		-1.691E+001	2.154E+001
Pb212-XR	74.82	10.28	2.226E+001	1.31E+001	2.300E+001	1.103E+001
	77.11	17.10	1.309E+001		9.095E+000	6.492E+000
	87.35	3.97	5.440E+001		1.296E+001	2.699E+001
	89.78	1.46	1.459E+002		2.591E+001	7.239E+001
Bi-214	609.32	45.49	4.198E+000	4.20E+000	1.598E+000	2.062E+000
	768.36	4.89	4.188E+001		-1.007E+001	2.051E+001
	806.18	1.26	2.082E+002		1.856E+001	1.024E+002
	934.06	3.11	8.897E+001		-6.406E+001	4.369E+001
	1120.29	14.92	1.651E+001		-1.223E+001	8.063E+000
	1155.21	1.63	1.615E+002		1.981E+001	7.897E+001
	1238.12	5.83	3.890E+001		-8.659E+000	1.891E+001
	1280.98	1.43	1.226E+002		-9.356E+001	5.905E+001
	1377.67	3.99	3.445E+001		-1.380E+002	1.637E+001
	1385.31	0.79	2.103E+002		-5.659E+002	1.008E+002
	1401.52	1.33	2.054E+002		-1.089E+002	1.001E+002
	1407.99	2.39	1.327E+002		-5.782E+001	6.488E+001
	1509.21	2.13	9.034E+001		-6.021E+001	4.344E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.183E+001	4.10E+000	5.560E+000	1.080E+001
> Pb-214	295.22	18.42	7.914E+000		5.035E+000	3.906E+000
	351.93	35.60	4.097E+000		1.587E+001	2.019E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.175E+002	4.10E+000	2.529E+001	1.067E+002
Pb214-XR	74.82	5.80	3.945E+001	2.31E+001	4.077E+001	1.956E+001
	77.11	9.70	2.308E+001		1.603E+001	1.144E+001
	87.35	2.24	9.641E+001		2.297E+001	4.783E+001
	89.78	0.82	2.598E+002		4.614E+001	1.289E+002
Ra-226	186.21	3.64	4.762E+001	4.76E+001	-3.089E+001	2.361E+001
Ac-228	129.07	2.42	8.294E+001	1.06E+001	6.210E+001	4.118E+001
	209.25	3.89	4.435E+001		4.753E+001	2.198E+001
	270.24	3.46	4.406E+001		4.503E+001	2.177E+001
	328.00	2.95	4.928E+001		-2.048E+001	2.430E+001
	338.32	11.27	1.270E+001		1.059E+000	6.257E+000
	409.46	1.92	7.669E+001		8.305E+001	3.772E+001
	463.00	4.40	3.536E+001		1.406E+001	1.738E+001
	794.95	4.25	5.745E+001		5.437E+001	2.823E+001
	911.20	25.80	1.064E+001		-2.425E+000	5.224E+000
	964.77	4.99	5.619E+001		3.982E+001	2.759E+001
	968.97	15.80	1.765E+001		2.451E+001	8.664E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.643E+001		-5.299E+001	4.268E+001
	300.07	2.47	5.831E+001		-2.259E+001	2.877E+001
	302.65	2.20	6.577E+001		-2.464E+001	3.245E+001
	330.06	1.40	1.031E+002		-8.339E+001	5.080E+001
Th-234	92.38	2.13	9.916E+001	9.92E+001	6.953E+001	4.920E+001
	92.80	2.10	1.004E+002		7.040E+001	4.981E+001
	112.81	0.21	9.656E+002		3.267E+002	4.793E+002
U-235	143.76	10.96	1.720E+001	3.05E+000	1.093E+001	8.535E+000
	163.33	5.08	3.542E+001		-3.196E+001	1.757E+001
	185.71	57.20	3.051E+000		4.912E-003	1.513E+000
	202.11	1.08	1.562E+002		5.239E-001	7.740E+001
	205.31	5.01	3.460E+001		-4.724E+000	1.715E+001
Am-241	59.54	35.90	7.003E+000	7.00E+000	-9.129E-002	3.467E+000

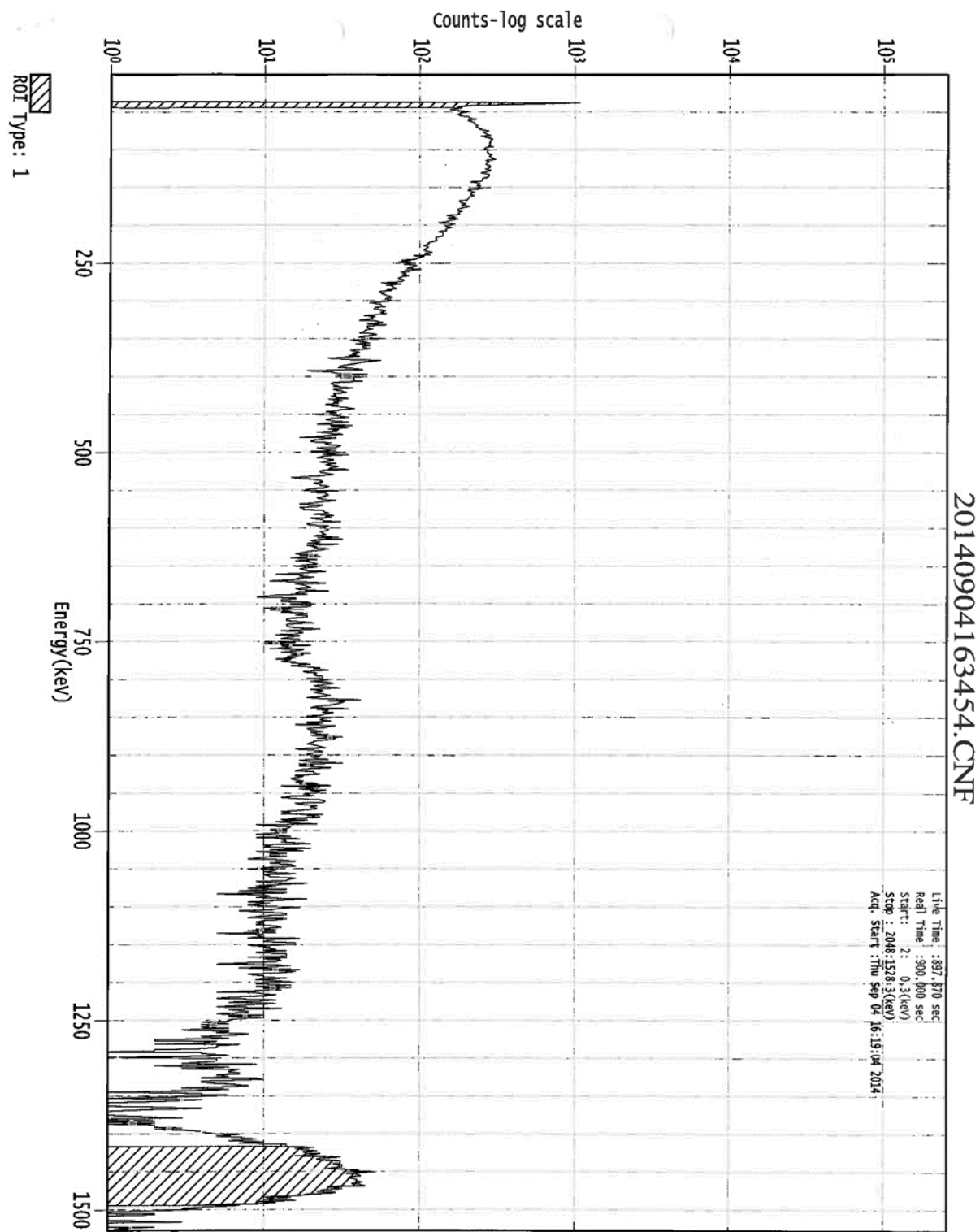
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

*** G A M M A S P C T R U M A N A L Y S I S ***

Filename: C:\Canberra\9-8-14\20140904170031.cnf

Report Generated On : 9/8/2014 10:11:46 AM

Sample Title : N Fillter Bank 3
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

*Slightly shielded by
1/8" Steel dome
Top of East Service
Bldg roof*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Grams

Sample Taken On : 9/4/2014 4:35:09 PM
Acquisition Started : 9/4/2014 4:35:09 PM

Live Time : 897.9 seconds
Real Time : 900.0 seconds

Dead Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst N-B
Date 9-8-14

du S du 9/9/14

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Peak Analysis Report

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: N Fillter Bank 3
Peak Analysis Performed on: 9/8/2014 10:11:46 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.35	38.89	1.67	2.99E+003	199.56	1.19E+003
2	1722-	1825	1774.17	1324.79	1.21	1.51E+002	74.90	1.70E+002
3	1898-	2006	1952.56	1457.39	26.28	2.03E+003	158.44	6.19E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:11:46 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: N Filter Bank 3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
LaBr3	0.638	34.70*	66.40	4.15550E+001	8.76137E+000
		788.70	33.60		
		1436.80*	66.40	8.09279E+001	9.04457E+000
K-40	0.997	1460.82*	10.66	5.04091E+002	5.88535E+001
Cu-64	0.883	1345.77*	0.47	7.81279E+002	3.93189E+002

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/8/2014 10:11:46 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
LaBr3	0.638	4.155503E+001	8.761371E+000
K-40	0.997	2.452497E+002	7.843605E+001
Cu-64	0.883	7.812795E+002	3.931886E+002

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/8/2014 10:11:46 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

nuclide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: N Fillter Bank 3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	LaBr3	34.70*	66.40	3.853E+000	3.85E+000	4.156E+001	1.908E+000
		788.70	33.60	7.027E+000		3.739E+000	3.450E+000
		1436.80*	66.40	8.653E+000		8.093E+001	4.273E+000
+	K-40	1460.82*	10.66	5.390E+001	5.39E+001	5.041E+002	2.661E+001
	Cr-51	320.08	9.91	1.460E+001	1.46E+001	8.317E-001	7.202E+000
	Mn-54	834.85	99.98	2.815E+000	2.82E+000	2.822E+000	1.385E+000
	Co-58	810.76	99.45	2.715E+000	2.72E+000	4.990E-001	1.336E+000
	Co-60	1173.23	99.85	2.743E+000	1.82E+000	1.497E+000	1.341E+000
		1332.49	99.98	1.820E+000		2.878E+000	8.769E-001
	Nb-94	702.65	99.81	1.844E+000	1.84E+000	4.648E-001	9.030E-001
		871.09	99.89	2.791E+000		-1.253E+000	1.372E+000
	Sn-113	255.13	2.11	7.264E+001	2.29E+000	-1.364E+001	3.592E+001
		391.70	64.97	2.294E+000		-3.866E-001	1.129E+000
	Cs-137	661.66	85.10	2.184E+000	2.18E+000	-5.438E-001	1.071E+000
	Eu-152	121.78	28.67	7.134E+000	5.57E+000	1.895E+000	3.542E+000
		244.70	7.61	2.099E+001		3.908E+000	1.039E+001
		295.94	0.45	3.294E+002		-6.673E+001	1.626E+002
		344.28	26.60	5.566E+000		-2.639E+000	2.744E+000
		367.79	0.86	1.700E+002		-1.552E+002	8.375E+001
		411.12	2.24	6.623E+001		2.857E+000	3.258E+001
		443.96	2.83	5.318E+001		-2.146E+001	2.614E+001
		488.68	0.42	3.890E+002		-1.816E+002	1.912E+002
		563.99	0.49	3.591E+002		9.690E+001	1.764E+002
		586.26	0.46	4.026E+002		9.444E+001	1.977E+002
		678.62	0.47	3.959E+002		2.615E+002	1.940E+002
		688.67	0.86	2.151E+002		-1.952E+002	1.054E+002
		719.35	0.28	6.550E+002		4.221E+002	3.205E+002
		778.90	12.96	1.666E+001		-3.520E-001	8.169E+000
		810.45	0.32	8.410E+002		1.546E+002	4.137E+002
		867.37	4.26	6.625E+001		2.643E+001	3.258E+001
		919.33	0.43	6.492E+002		4.470E+002	3.190E+002
		964.08	14.65	1.777E+001		-1.006E+001	8.712E+000
		1085.87	10.24	2.327E+001		-1.718E+001	1.136E+001
		1089.74	1.73	1.376E+002		-1.756E+002	6.717E+001
		1112.07	13.69	1.858E+001		1.068E+001	9.083E+000
		1212.95	1.43	1.757E+002		-3.433E+001	8.571E+001
		1249.94	0.19	1.154E+003		-6.744E+000	5.601E+002
		1299.14	1.63	1.111E+002		-2.568E+001	5.354E+001
		1408.01	21.07	1.583E+001		-1.193E+001	7.751E+000
		1457.64	0.50	1.160E+003		5.665E+003	5.727E+002
		1528.10	0.28	2.244E+002		-1.382E+002	9.901E+001
	Eu-154	123.07	40.40	5.034E+000	5.03E+000	1.832E+000	2.499E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Eu-154	247.93	6.89	2.294E+001	5.03E+000	-1.041E+000	1.135E+001
	591.76	4.95	3.720E+001		-6.026E-001	1.827E+001
	692.42	1.78	1.040E+002		-5.526E+001	5.092E+001
	723.30	20.06	9.065E+000		-3.445E+000	4.435E+000
	756.80	4.52	4.108E+001		-4.481E+001	2.009E+001
	873.18	12.08	2.296E+001		-1.520E+001	1.129E+001
	996.29	10.48	2.412E+001		-1.077E+001	1.182E+001
	1004.76	18.01	1.404E+001		-3.974E+000	6.875E+000
	1274.43	34.80	5.300E+000		2.757E-001	2.558E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.871E+002	6.92E+000	-1.683E-001	9.258E+001
	60.01	1.22	1.845E+002		-9.967E+001	9.124E+001
	86.55	30.70	6.917E+000		1.590E+000	3.431E+000
	105.31	21.10	9.868E+000		-4.908E+000	4.898E+000
Tl-208	583.19	85.00	2.173E+000	2.17E+000	8.884E-002	1.067E+000
Bi-211	351.07	13.02	1.140E+001	1.14E+001	6.418E+000	5.617E+000
Pb-211	404.85	3.78	3.943E+001	3.94E+001	2.574E+001	1.940E+001
	427.09	1.76	8.287E+001		-2.227E+001	4.073E+001
	832.01	3.52	8.011E+001		6.406E+001	3.943E+001
Bi-212	39.86	1.06	2.600E+002	2.76E+001	2.595E+003	1.288E+002
	727.33	6.67	2.759E+001		7.358E+000	1.350E+001
	785.37	1.10	2.081E+002		6.071E+001	1.021E+002
> Pb-212	1620.50	1.47	0.000E+000	3.73E+000	0.000E+000	0.000E+000
	115.18	0.60	3.386E+002		1.318E+002	1.681E+002
	238.63	43.60	3.733E+000		4.551E+000	1.848E+000
Pb212-XR	300.09	3.30	4.405E+001	1.25E+001	1.533E+001	2.174E+001
	74.82	10.28	2.096E+001		-4.433E+000	1.039E+001
	77.11	17.10	1.246E+001		7.861E+000	6.174E+000
Bi-214	87.35	3.97	5.316E+001	4.07E+000	3.670E+001	2.637E+001
	89.78	1.46	1.430E+002		3.133E+001	7.094E+001
	609.32	45.49	4.070E+000		2.618E+000	1.998E+000
>	768.36	4.89	4.046E+001	4.16E+000	-5.488E+001	1.981E+001
	806.18	1.26	2.131E+002		3.392E+002	1.048E+002
	934.06	3.11	8.993E+001		4.849E+001	4.418E+001
	1120.29	14.92	1.745E+001		7.296E+000	8.535E+000
	1155.21	1.63	1.699E+002		1.239E+002	8.316E+001
	1238.12	5.83	3.983E+001		1.229E+001	1.938E+001
	1280.98	1.43	1.285E+002		4.519E+001	6.200E+001
	1377.67	3.99	3.458E+001		-4.465E+001	1.643E+001
	1385.31	0.79	2.200E+002		-3.627E+002	1.057E+002
	1401.52	1.33	2.144E+002		-2.516E+002	1.046E+002
	1407.99	2.39	1.393E+002		-1.050E+002	6.822E+001
	1509.21	2.13	9.033E+001		-1.707E+001	4.344E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.222E+001		8.542E+000	1.100E+001
	295.22	18.42	8.049E+000		4.835E-002	3.974E+000
	351.93	35.60	4.160E+000		9.336E-001	2.050E+000

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
Pb-214	785.96	1.06	2.172E+002	4.16E+000	2.001E+001	1.066E+002
Pb214-XR	74.82	5.80	3.715E+001	2.20E+001	-7.857E+000	1.841E+001
	77.11	9.70	2.196E+001		1.386E+001	1.088E+001
	87.35	2.24	9.421E+001		6.504E+001	4.674E+001
	89.78	0.82	2.546E+002		5.578E+001	1.263E+002
Ra-226	186.21	3.64	4.840E+001	4.84E+001	1.436E+001	2.400E+001
Ac-228	129.07	2.42	8.233E+001	1.07E+001	-4.614E+001	4.087E+001
	209.25	3.89	4.404E+001		-1.884E+001	2.182E+001
	270.24	3.46	4.454E+001		-7.085E+000	2.202E+001
	328.00	2.95	4.899E+001		7.814E+000	2.416E+001
	338.32	11.27	1.296E+001		5.298E+000	6.389E+000
	409.46	1.92	7.717E+001		3.961E+000	3.796E+001
	463.00	4.40	3.511E+001		-2.422E+001	1.725E+001
	794.95	4.25	5.793E+001		5.897E+001	2.846E+001
	911.20	25.80	1.066E+001		-1.035E+001	5.239E+000
	964.77	4.99	5.199E+001		-3.954E+001	2.549E+001
	968.97	15.80	1.649E+001		4.128E+000	8.084E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	8.973E+001		3.002E+001	4.433E+001
	300.07	2.47	5.885E+001		2.048E+001	2.904E+001
	302.65	2.20	6.533E+001		-2.172E+001	3.223E+001
	330.06	1.40	1.037E+002		2.594E+001	5.114E+001
Th-234	92.38	2.13	9.783E+001	9.78E+001	3.473E+001	4.854E+001
	92.80	2.10	9.905E+001		3.517E+001	4.914E+001
	112.81	0.21	9.694E+002		8.642E+002	4.811E+002
U-235	143.76	10.96	1.734E+001	3.08E+000	1.023E+001	8.605E+000
	163.33	5.08	3.576E+001		5.641E+000	1.774E+001
	185.71	57.20	3.076E+000		1.338E-002	1.525E+000
	202.11	1.08	1.572E+002		6.548E+001	7.791E+001
	205.31	5.01	3.479E+001		2.447E+001	1.724E+001
Am-241	59.54	35.90	6.345E+000	6.34E+000	-3.427E+000	3.138E+000

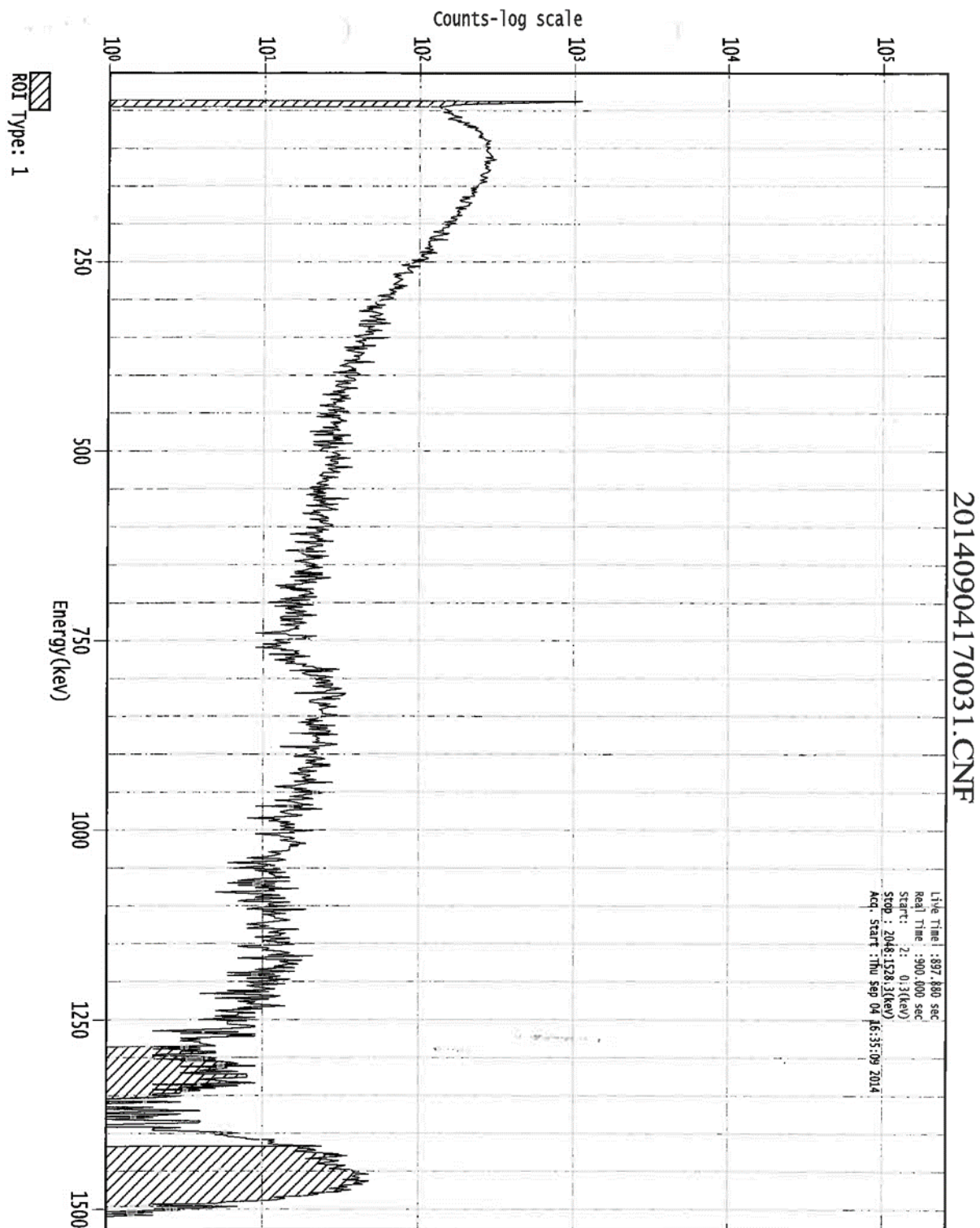
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-5 07001B Gamma Spectroscopy Reports



Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

*** GAMMA SPECTRUM ANALYSIS ***

Filename: C:\Canberra\10-15-14\20141014150934.cnf

Report Generated On : 10/15/2014 3:12:56 PM

Sample Title : ESB South Stairs 19
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :

*Ceiling Panels @ 1m
7001 c*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 10/14/2014 2:53:14 PM
Acquisition Started : 10/14/2014 2:53:14 PM

Live Time : 897.8 seconds
Dead Time : 900.0 seconds

Dead Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *[Signature]*
Date 10-15-14

[Signature]

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Peak Analysis Report 10/15/2014 3:12:56 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: ESB South Stairs 19
Peak Analysis Performed on: 10/15/2014 3:12:55 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.43	38.94	1.82	2.78E+003	218.96	1.56E+003
2	1038-	1120	1079.40	807.10	1.95	1.88E+002	220.23	1.72E+003
3	1896-	2004	1950.33	1455.73	28.85	2.14E+003	165.30	6.73E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/15/2014 3:12:56 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: ESB South Stairs 19
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.940	34.70*	66.40	3.85821E+001	8.29465E+000
		788.70*	33.60	8.92932E+000	1.05237E+001
		1436.80*	66.40	8.52229E+001	9.47736E+000
K-40	0.993	1460.82*	10.66	5.30845E+002	6.16955E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/15/2014 3:12:56 PM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.940	2.721955E+001	6.514400E+000
K-40	0.993	3.612968E+002	7.163439E+001
X Co-58	0.996		

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 10/15/2014 3:12:55 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

include MDA Report

10/15/2014 3:17:56 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: ESB South Stairs 19
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	4.425E+000	4.42E+000	3.858E+001	2.194E+000
		788.70*	33.60	1.722E+001		8.929E+000	8.546E+000
		1436.80*	66.40	9.082E+000		8.522E+001	4.487E+000
+	K-40	1460.82*	10.66	5.657E+001	5.66E+001	5.308E+002	2.795E+001
	Cr-51	320.08	9.91	1.532E+001	1.53E+001	-1.178E+001	7.562E+000
	Mn-54	834.85	99.98	2.845E+000	2.84E+000	2.607E-001	1.400E+000
	Co-58	810.76*	99.45	5.818E+000	5.82E+000	3.017E+000	2.887E+000
	Co-60	1173.23	99.85	2.860E+000	1.84E+000	1.828E+000	1.400E+000
		1332.49	99.98	1.836E+000		3.386E-002	8.844E-001
	Nb-94	702.65	99.81	1.991E+000	1.99E+000	1.433E+000	9.764E-001
		871.09	99.89	2.885E+000		-1.240E+000	1.419E+000
	Sn-113	255.13	2.11	7.528E+001	2.37E+000	-1.838E+001	3.724E+001
		391.70	64.97	2.371E+000		-9.919E-001	1.168E+000
	Cs-137	661.66	85.10	2.252E+000	2.25E+000	7.548E-001	1.105E+000
	Eu-152	121.78	28.67	7.329E+000	6.05E+000	-6.979E+000	3.639E+000
		244.70	7.61	2.176E+001		7.903E+000	1.077E+001
		295.94	0.45	3.473E+002		2.046E+002	1.716E+002
		344.28	26.60	6.055E+000		1.800E+000	2.988E+000
		367.79	0.86	1.798E+002		-8.912E+001	8.864E+001
		411.12	2.24	6.902E+001		-2.458E+001	3.397E+001
		443.96	2.83	5.751E+001		-4.526E+000	2.830E+001
		488.68	0.42	4.103E+002		-8.215E+001	2.018E+002
		563.99	0.49	3.767E+002		-1.374E+002	1.852E+002
		586.26	0.46	4.267E+002		-7.904E+001	2.098E+002
		678.62	0.47	4.082E+002		-4.760E+000	2.002E+002
		688.67	0.86	2.278E+002		-7.924E+001	1.117E+002
		719.35	0.28	6.928E+002		-1.591E+002	3.394E+002
		778.90	12.96	1.811E+001		1.308E+000	8.891E+000
		810.45	0.32	8.862E+002		9.417E+002	4.363E+002
		867.37	4.26	6.746E+001		-2.614E+001	3.319E+001
		919.33	0.43	6.748E+002		-2.820E+002	3.318E+002
		964.08	14.65	1.916E+001		-4.939E+000	9.407E+000
		1085.87	10.24	2.489E+001		-7.220E+000	1.217E+001
		1089.74	1.73	1.487E+002		3.251E+001	7.275E+001
		1112.07	13.69	1.871E+001		-1.557E+001	9.147E+000
		1212.95	1.43	1.896E+002		-4.445E+001	9.262E+001
		1249.94	0.19	1.255E+003		-3.852E+001	6.107E+002
		1299.14	1.63	1.217E+002		1.685E+001	5.884E+001
		1408.01	21.07	1.553E+001		-1.210E+001	7.599E+000
		1457.64	0.50	1.200E+003		6.546E+003	5.927E+002
		1528.10	0.28	3.101E+002		-1.199E+001	1.419E+002
	Eu-154	123.07	40.40	5.180E+000	5.18E+000	-3.474E-001	2.572E+000

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-154	247.93	6.89	2.383E+001	5.18E+000	7.043E+000	1.179E+001
	591.76	4.95	4.022E+001		-1.590E+000	1.978E+001
	692.42	1.78	1.114E+002		5.019E+001	5.462E+001
	723.30	20.06	9.611E+000		1.654E+000	4.708E+000
	756.80	4.52	4.604E+001		3.585E+001	2.257E+001
	873.18	12.08	2.391E+001		-7.742E+000	1.176E+001
	996.29	10.48	2.541E+001		1.958E+000	1.246E+001
	1004.76	18.01	1.470E+001		2.344E+000	7.206E+000
	1274.43	34.80	5.929E+000		-1.171E+000	2.872E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.992E+002	7.62E+000	7.685E+001	9.864E+001
	60.01	1.22	2.165E+002		-4.184E+001	1.072E+002
	86.55	30.70	7.625E+000		-2.640E+000	2.785E+000
	105.31	21.10	1.063E+001		-5.124E+000	5.280E+000
Tl-208	583.19	85.00	2.304E+000	2.30E+000	7.694E+001	1.133E+000
Bi-211	351.07	13.02	1.233E+001	1.23E+001	1.143E+001	6.082E+000
Pb-211	404.85	3.78	4.054E+001	4.05E+001	-3.285E+001	1.996E+001
	427.09	1.76	8.980E+001		4.203E+001	4.419E+001
	832.01	3.52	8.130E+001		1.384E+001	4.002E+001
Bi-212	39.86	1.06	2.647E+002	2.87E+001	2.509E+003	1.312E+002
	727.33	6.67	2.868E+001		-1.417E+001	1.405E+001
	785.37	1.10	2.246E+002		5.638E+001	1.104E+002
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	3.552E+002	3.90E+000	2.753E+002	1.763E+002
	238.63	43.60	3.904E+000		4.951E+000	1.934E+000
	300.09	3.30	4.650E+001		1.241E+001	2.296E+001
Pb212-XR	74.82	10.28	2.453E+001	1.44E+001	1.952E+001	1.217E+001
	77.11	17.10	1.440E+001		2.361E+000	7.147E+000
	87.35	3.97	5.831E+001		-6.976E+001	2.894E+001
Bi-214	89.78	1.46	1.570E+002	4.51E+000	-1.678E+001	7.793E+001
	609.32	45.49	4.508E+000		4.193E+000	2.217E+000
	768.36	4.89	4.515E+001		1.746E+001	2.215E+001
	806.18	1.26	2.239E+002		3.358E+002	1.102E+002
	934.06	3.11	9.354E+001		-3.100E+001	4.598E+001
	1120.29	14.92	1.753E+001		1.216E+001	8.574E+000
	1155.21	1.63	1.705E+002		-2.775E+001	8.346E+001
	1238.12	5.83	4.330E+001		3.719E+001	2.112E+001
	1280.98	1.43	1.439E+002		-3.488E+001	6.970E+001
	1377.67	3.99	3.588E+001		-1.485E+002	1.708E+001
	1385.31	0.79	2.184E+002		-6.913E+002	1.049E+002
	1401.52	1.33	2.086E+002		-2.423E+002	1.017E+002
	1407.99	2.39	1.367E+002		-1.065E+002	6.688E+001
	1509.21	2.13	9.833E+001		1.060E+001	4.744E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
Pb-214	1729.59	2.88	0.000E+000	4.51E+000	0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.313E+001		9.246E+000	1.145E+001
Pb-214	295.22	18.42	8.479E+000	4.51E+000	6.623E+000	4.189E+000
	351.93	35.60	4.505E+000		5.202E+000	2.223E+000

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.341E+002	4.51E+000	3.600E+001	1.151E+002
Pb214-XR	74.82	5.80	4.347E+001	2.54E+001	3.460E+001	2.157E+001
	77.11	9.70	2.539E+001		4.162E+000	1.260E+001
	87.35	2.24	1.033E+002		-1.236E+002	5.130E+001
	89.78	0.82	2.795E+002		-2.988E+001	1.387E+002
Ra-226	186.21	3.64	4.878E+001	4.88E+001	2.052E+001	2.419E+001
Ac-228	129.07	2.42	8.480E+001	1.13E+001	9.648E+001	4.211E+001
	209.25	3.89	4.538E+001		1.545E+001	2.249E+001
	270.24	3.46	4.579E+001		-1.194E+001	2.264E+001
	328.00	2.95	5.147E+001		7.366E+000	2.539E+001
	338.32	11.27	1.387E+001		1.421E+000	6.842E+000
	409.46	1.92	8.037E+001		8.890E+000	3.956E+001
	463.00	4.40	3.725E+001		-1.031E+001	1.832E+001
	794.95	4.25	6.186E+001		5.464E+000	3.043E+001
	911.20	25.80	1.129E+001		4.497E-001	5.553E+000
	964.77	4.99	5.636E+001		9.187E+000	2.768E+001
	968.97	15.80	1.767E+001		1.037E+001	8.673E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	9.230E+001		8.619E+001	4.562E+001
	300.07	2.47	6.212E+001		1.658E+001	3.068E+001
	302.65	2.20	6.908E+001		2.837E+001	3.411E+001
	330.06	1.40	1.086E+002		-4.397E+001	5.356E+001
Th-234	92.38	2.13	1.069E+002	1.07E+002	3.026E+001	5.307E+001
	92.80	2.10	1.082E+002		3.064E+001	5.373E+001
	112.81	0.21	1.017E+003		6.821E+001	5.052E+002
U-235	143.76	10.96	1.736E+001	3.11E+000	-1.033E+001	8.617E+000
	163.33	5.08	3.594E+001		1.050E+001	1.783E+001
	185.71	57.20	3.108E+000		9.650E-001	1.542E+000
	202.11	1.08	1.601E+002		-2.077E+001	7.933E+001
	205.31	5.01	3.549E+001		5.155E+000	1.759E+001
Am-241	59.54	35.90	7.444E+000	7.44E+000	-1.439E+000	3.687E+000

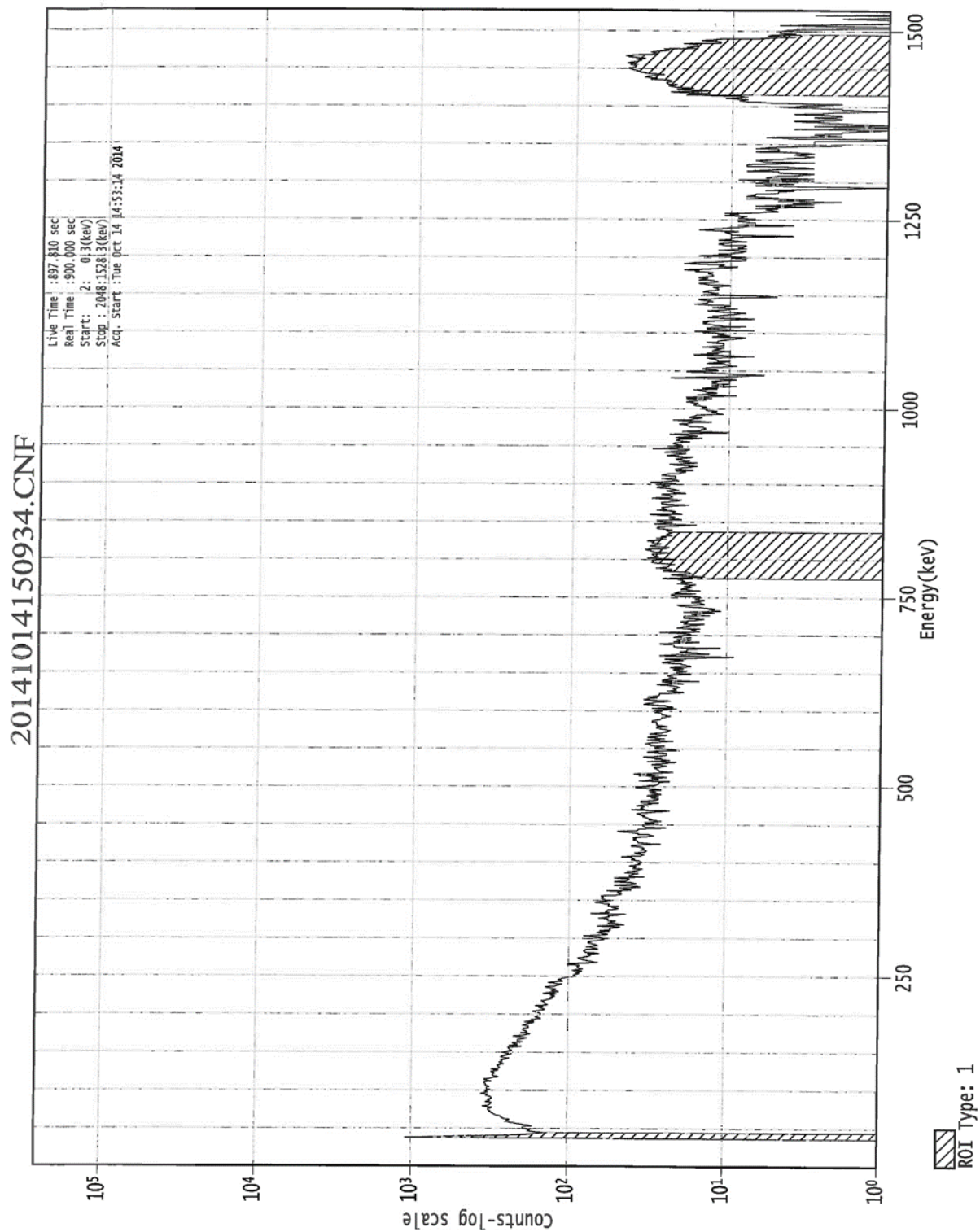
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports



Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\10-15-14\20141014142828.cnf

Report Generated On : 10/15/2014 3:12:13 PM

Sample Title : ESB South Stairs 23

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

*Ceiling panels @ 1 m
7001c*

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 10/14/2014 2:12:22 PM

Acquisition Started : 10/14/2014 2:12:22 PM

Live Time : 897.7 seconds

Real Time : 900.0 seconds

Dead Time : 0.25 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVEN

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *[Signature]*

Date 10-15-14

[Signature]

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Peak Analysis Report 10/15/2014 3:12:13 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: ESB South Stairs 23
Peak Analysis Performed on: 10/15/2014 3:12:12 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.37	38.90	1.75	3.01E+003	223.85	1.64E+003
2	1027-	1108	1067.96	798.56	1.02	2.97E+002	221.62	1.53E+003
3	1531-	1628	1580.13	1180.41	1.07	2.92E+002	157.44	8.29E+002
4	1896-	2004	1950.92	1456.17	17.55	2.22E+003	165.42	6.64E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/15/2014 3:12:13 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: ESB South Stairs 23
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.952	34.70*	66.40	4.18606E+001	8.93143E+000
		788.70*	33.60	1.39938E+001	1.05741E+001
		1436.80*	66.40	8.84902E+001	9.67198E+000
K-40	0.994	1460.82*	10.66	5.51196E+002	6.30559E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/15/2014 3:12:13 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.952	3.025758E+001	6.823196E+000
K-40	0.994	3.627246E+002	7.372844E+001
X Co-58	0.959		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 10/15/2014 3:12:12 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
⇒ 3	1180.41	3.2487E-001	53.98		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

include MDA Report 10/15/2014 3:12:13 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: ESB South Stairs 23
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	4.498E+000	4.50E+000	4.186E+001	2.230E+000
		788.70*	33.60	1.710E+001		1.399E+001	8.486E+000
		1436.80*	66.40	9.017E+000		8.849E+001	4.454E+000
+	K-40	1460.82*	10.66	5.616E+001	5.62E+001	5.512E+002	2.775E+001
	Cr-51	320.08	9.91	1.627E+001	1.63E+001	-1.240E+001	8.036E+000
	Mn-54	834.85	99.98	2.863E+000	2.86E+000	-6.733E-001	1.409E+000
	Co-58	810.76*	99.45	5.777E+000	5.78E+000	4.728E+000	2.867E+000
	Co-60	1173.23	99.85	2.985E+000	2.02E+000	3.739E-001	1.463E+000
		1332.49	99.98	2.019E+000		2.339E+000	9.764E-001
	Nb-94	702.65	99.81	1.994E+000	1.99E+000	-1.977E+000	9.776E-001
		871.09	99.89	2.980E+000		7.778E-001	1.467E+000
	Sn-113	255.13	2.11	8.007E+001	2.54E+000	-2.149E+001	3.963E+001
		391.70	64.97	2.542E+000		-1.294E-001	1.253E+000
	Cs-137	661.66	85.10	2.369E+000	2.37E+000	1.280E+000	1.163E+000
	Eu-152	121.78	28.67	7.818E+000	6.43E+000	1.831E+000	3.884E+000
		244.70	7.61	2.308E+001		1.467E+001	1.143E+001
		295.94	0.45	3.709E+002		2.121E+002	1.833E+002
		344.28	26.60	6.431E+000		3.990E+000	3.176E+000
		367.79	0.86	1.897E+002		-7.121E+001	9.357E+001
		411.12	2.24	7.483E+001		-5.009E+001	3.687E+001
		443.96	2.83	6.063E+001		-5.906E+001	2.986E+001
		488.68	0.42	4.154E+002		-1.363E+002	2.044E+002
		563.99	0.49	3.883E+002		-1.211E+002	1.909E+002
		586.26	0.46	4.490E+002		2.164E+002	2.210E+002
		678.62	0.47	4.281E+002		1.567E+002	2.101E+002
		688.67	0.86	2.407E+002		3.047E+002	1.182E+002
		719.35	0.28	7.274E+002		-2.749E+002	3.567E+002
		778.90	12.96	1.854E+001		2.041E+000	9.107E+000
		810.45	0.32	8.872E+002		-4.772E+001	4.368E+002
		867.37	4.26	6.983E+001		1.323E+001	3.438E+001
		919.33	0.43	6.828E+002		4.219E+002	3.358E+002
		964.08	14.65	1.903E+001		8.508E+000	9.343E+000
		1085.87	10.24	2.489E+001		-2.668E+001	1.217E+001
		1089.74	1.73	1.495E+002		-6.133E+001	7.312E+001
		1112.07	13.69	1.968E+001		1.976E+001	9.631E+000
		1212.95	1.43	1.937E+002		4.114E+001	9.468E+001
		1249.94	0.19	1.255E+003		5.596E+002	6.107E+002
		1299.14	1.63	1.245E+002		-1.022E+002	6.024E+001
		1408.01	21.07	1.550E+001		-1.165E+001	7.584E+000
		1457.64	0.50	1.218E+003		7.161E+003	6.016E+002
		1528.10	0.28	3.509E+002		-1.173E+002	1.622E+002
	Eu-154	123.07	40.40	5.506E+000	5.51E+000	-2.047E-001	2.735E+000

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-154	247.93	6.89	2.509E+001	5.51E+000	-1.251E+001	1.242E+001
	591.76	4.95	4.224E+001		-2.634E+001	2.079E+001
	692.42	1.78	1.148E+002		-1.737E+001	5.631E+001
	723.30	20.06	1.014E+001		4.492E+000	4.974E+000
	756.80	4.52	4.618E+001		-2.321E+000	2.264E+001
	873.18	12.08	2.449E+001		-1.268E+001	1.205E+001
	996.29	10.48	2.537E+001		6.230E+000	1.244E+001
	1004.76	18.01	1.476E+001		2.065E+001	7.233E+000
	1274.43	34.80	6.016E+000		2.501E+000	2.916E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	2.092E+002	8.18E+000	-3.480E+001	1.036E+002
	60.01	1.22	2.345E+002		2.236E+000	1.163E+002
	86.55	30.70	8.177E+000		-3.651E-001	4.061E+000
	105.31	21.10	1.114E+001		-5.604E+000	5.534E+000
Tl-208	583.19	85.00	2.402E+000	2.40E+000	1.150E+000	1.182E+000
Bi-211	351.07	13.02	1.312E+001	1.31E+001	1.263E+001	6.479E+000
Pb-211	404.85	3.78	4.460E+001	4.46E+001	4.213E+001	2.199E+001
	427.09	1.76	9.601E+001		1.789E+000	4.730E+001
	832.01	3.52	8.183E+001		1.834E+001	4.029E+001
Bi-212	39.86	1.06	2.733E+002	3.02E+001	2.620E+003	1.355E+002
	727.33	6.67	3.019E+001		-2.040E+001	1.480E+001
	785.37	1.10	2.246E+002		5.186E+000	1.104E+002
> Pb-212	1620.50	1.47	0.000E+000	4.07E+000	0.000E+000	0.000E+000
	115.18	0.60	3.758E+002		3.264E+002	1.867E+002
	238.63	43.60	4.075E+000		8.192E-001	2.019E+000
Pb212-XR	300.09	3.30	4.962E+001	1.54E+001	7.783E+000	2.452E+001
	74.82	10.28	2.616E+001		1.263E+001	1.299E+001
	77.11	17.10	1.541E+001		-1.945E+000	7.652E+000
Bi-214	87.35	3.97	6.274E+001	4.70E+000	-1.187E+001	3.116E+001
	89.78	1.46	1.682E+002		-1.229E+001	8.355E+001
	609.32	45.49	4.701E+000		3.812E+000	2.313E+000
	768.36	4.89	4.460E+001		9.884E+000	2.188E+001
	806.18	1.26	2.235E+002		2.314E+002	1.100E+002
	934.06	3.11	9.494E+001		2.465E+001	4.668E+001
	1120.29	14.92	1.787E+001		-1.189E+001	8.744E+000
	1155.21	1.63	1.762E+002		-2.772E+001	8.629E+001
	1238.12	5.83	4.192E+001		1.232E-001	2.042E+001
	1280.98	1.43	1.441E+002		-4.361E+001	6.981E+001
	1377.67	3.99	3.835E+001		-1.317E+002	1.832E+001
	1385.31	0.79	2.283E+002		-6.856E+002	1.098E+002
	1401.52	1.33	2.098E+002		-3.031E+002	1.023E+002
	1407.99	2.39	1.364E+002		-1.025E+002	6.674E+001
	1509.21	2.13	9.797E+001		-5.034E+001	4.725E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.444E+001	4.80E+000	1.261E+001	1.211E+001
	295.22	18.42	9.017E+000		3.976E+000	4.458E+000
	351.93	35.60	4.800E+000		7.146E+000	2.370E+000

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.347E+002	4.80E+000	1.132E+001	1.153E+002
Pb214-XR	74.82	5.80	4.637E+001	2.72E+001	2.239E+001	2.302E+001
	77.11	9.70	2.717E+001		-3.429E+000	1.349E+001
	87.35	2.24	1.112E+002		-2.104E+001	5.523E+001
	89.78	0.82	2.995E+002		-2.189E+001	1.488E+002
Ra-226	186.21	3.64	5.101E+001	5.10E+001	1.292E+001	2.531E+001
Ac-228	129.07	2.42	8.971E+001	1.14E+001	1.780E+001	4.456E+001
	209.25	3.89	4.714E+001		5.782E+000	2.337E+001
	270.24	3.46	4.904E+001		-1.086E+001	2.426E+001
	328.00	2.95	5.468E+001		7.434E-001	2.700E+001
	338.32	11.27	1.461E+001		-2.858E+000	7.212E+000
	409.46	1.92	8.720E+001		-6.170E+001	4.298E+001
	463.00	4.40	3.919E+001		6.135E+000	1.929E+001
	794.95	4.25	6.215E+001		6.891E+001	3.057E+001
	911.20	25.80	1.141E+001		-2.527E+000	5.613E+000
	964.77	4.99	5.565E+001		5.268E+000	2.732E+001
	968.97	15.80	1.757E+001		-2.223E+000	8.625E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	9.993E+001		8.386E+001	4.943E+001
	300.07	2.47	6.630E+001		1.040E+001	3.276E+001
	302.65	2.20	7.397E+001		-1.241E+001	3.655E+001
	330.06	1.40	1.153E+002		-6.357E+001	5.694E+001
Th-234	92.38	2.13	1.134E+002	1.13E+002	-5.022E+001	5.633E+001
	92.80	2.10	1.148E+002		-5.084E+001	5.703E+001
	112.81	0.21	1.078E+003		4.200E+002	5.353E+002
U-235	143.76	10.96	1.850E+001	3.26E+000	2.863E+000	9.187E+000
	163.33	5.08	3.814E+001		2.306E+001	1.893E+001
	185.71	57.20	3.258E+000		1.470E+000	1.616E+000
	202.11	1.08	1.668E+002		-5.834E+001	8.271E+001
	205.31	5.01	3.680E+001		-1.516E+001	1.825E+001
Am-241	59.54	35.90	8.065E+000	8.07E+000	7.688E-002	3.998E+000

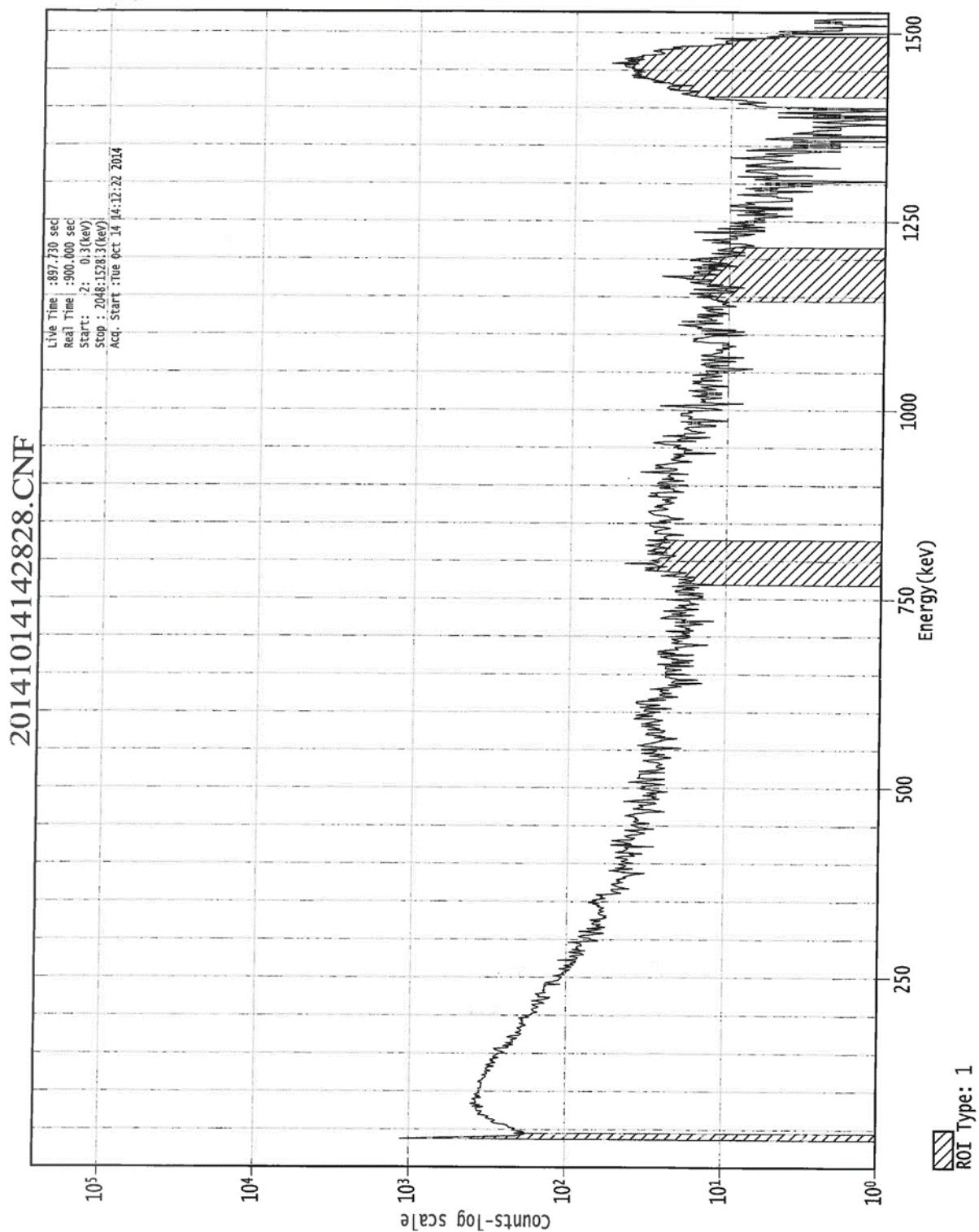
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

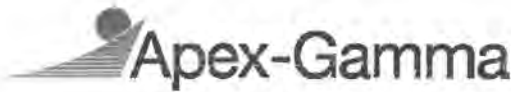
> = MDA value not calculated

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

Attachment Figure 2-6 07001C Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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8-11-2015
Page 1 of 7

Analysis Report for 10-Aug-15-10002
PARTICLE MM SHOP GRID 12

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 10-Aug-15-10002
Sample Description	: PARTICLE MM SHOP GRID 12
Sample Type	: Hot Count Lab
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 8/10/2015 10:15:00AM
Acquisition Started	: 8/10/2015 10:45:14AM
Procedure	: 03 POINT
Operator	: HTomlin
Detector Name	: P11314X2
Geometry	: resin test
Live Time	: 600.0 seconds
Real Time	: 600.7 seconds
Dead Time	: 0.11 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 12831

Handwritten signature and date 8/11/15

Co-60 1.26E-02

PEAK WITH NID REPORT

UCi

Peak Analysis Performed on	: 8/10/2015 10:55:18AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Handwritten signature and date 8-10-15

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 10-Aug-15-10002

PARTICLE MM SHOP GRID 12

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.75	1403 -	1412	1406.63	1.92E+01	17.45	5.57E+01	Pb-214
2	829.83	3313 -	3322	3317.90	1.65E+01	16.55	5.50E+01	Bi-211
3	1173.28	4678 -	4702	4692.00	1.56E+03	82.35	9.35E+01	....
4	1332.57	5316 -	5342	5329.57	1.48E+03	77.40	1.53E+01	Co-60

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Co-60	1.00	1173.23 *	99.85	1.24E-02	1.19E-03	0.972
		1332.49 *	99.98	1.28E-02	1.23E-03	0.972
Bi-211	0.97	351.07 *	13.02	4.64E-04	4.30E-04	miss
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	1.70E-04	1.57E-04	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 10-Aug-15-10002
PARTICLE MM SHOP GRID 12

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INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
Co-60	1.000	1.26E-02	8.55E-04	
? Bi-211	0.972	4.64E-04	4.30E-04	
? Pb-214	0.999	1.70E-04	1.57E-04	

? = 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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 10-Aug-15-10002
PARTICLE MM SHOP GRID 12

UNIDENTIFIED PEAKS

Peak Locate Performed on : 8/10/2015 10:55:18AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	829.83	2.75000E-02	50.14		

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	3.77E-04	1.20E-03	1.20E-03	miss
+	Cr-51	320.08	9.91	-1.33E-04	6.82E-04	6.82E-04	free
+	Mn-54	834.85	99.98	3.87E-05	1.78E-04	1.78E-04	miss
+	Co-58	810.76	99.45	2.63E-05	1.78E-04	1.78E-04	1.000
		1674.73	0.52	1.21E-03		1.42E-02	1.013
+	Co-60	1173.23	* 99.85	1.24E-02	1.58E-04	3.21E-04	0.972
		1332.49	* 99.98	1.28E-02		1.58E-04	0.972
+	Nb-94	702.65	99.81	-5.51E-05	1.57E-04	1.57E-04	0.971
		871.09	99.89	9.78E-05		2.02E-04	0.970
+	Sn-113	255.13	2.11	-3.52E-04	1.19E-04	2.99E-03	free
		391.70	64.97	-2.71E-05		1.19E-04	free
+	Cs-134	475.36	1.48	-5.14E-04	1.55E-04	6.20E-03	miss
		563.25	8.34	-7.42E-04		1.29E-03	0.945
		569.33	15.37	1.06E-04		8.20E-04	0.941
		604.72	97.62	8.87E-05		1.55E-04	0.964
		795.86	85.46	1.81E-05		2.11E-04	0.964
		801.95	8.69	4.53E-04		2.22E-03	0.945
		1038.61	0.99	1.29E-02		2.48E-02	0.970

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 10-Aug-15-10002 8/10/2015 10:57:41AM Page 5 of 7

PARTICLE MM SHOP GRID 12

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Cs-134	1167.97	1.79	-9.72E-03	1.55E-04	1.02E-02	1.049
	1365.19	3.02	7.74E-04		3.18E-03	1.077
+ Cs-137	661.66	85.10	6.51E-05	1.84E-04	1.84E-04	miss
+ Eu-152	121.78	28.67	6.91E-05	1.74E-04	1.74E-04	0.967
	244.70	7.61	2.27E-05		8.79E-04	0.963
	295.94	0.45	-3.46E-03		1.48E-02	miss
	344.28	26.60	-1.23E-04		2.54E-04	0.978
	367.79	0.86	3.53E-03		1.03E-02	0.939
	411.12	2.24	1.64E-03		4.80E-03	0.951
	443.96	2.83	-3.72E-04		3.12E-03	0.963
	488.68	0.42	2.37E-04		2.17E-02	miss
	563.99	0.49	2.06E-03		2.49E-02	0.963
	586.26	0.46	-1.42E-02		2.52E-02	0.969
	678.62	0.47	-1.03E-03		2.69E-02	0.939
	688.67	0.86	6.72E-03		1.78E-02	0.985
	719.35	0.28	5.69E-03		6.24E-02	miss
	778.90	12.96	-2.28E-05		1.23E-03	0.970
	810.45	0.32	-1.36E-02		4.94E-02	1.035
	867.37	4.26	2.08E-03		4.62E-03	0.956
	919.33	0.43	2.72E-03		5.28E-02	0.985
	964.08	14.65	4.05E-04		1.68E-03	1.016
	1085.87	10.24	1.58E-04		2.36E-03	1.012
	1089.74	1.73	3.15E-03		1.53E-02	0.974
	1112.07	13.69	2.03E-04		1.74E-03	0.992
	1212.95	1.43	-2.04E-03		1.05E-02	0.956
	1249.94	0.19	1.07E-02		4.85E-02	1.054
	1299.14	1.63	0.00E+00		1.42E-03	0.969
	1408.01	21.07	0.00E+00		3.12E-04	0.986
	1457.64	0.50	1.97E-03		1.60E-02	1.041
	1528.10	0.28	0.00E+00		9.02E-03	0.999
+ Eu-154	123.07	40.40	-2.27E-05	1.10E-04	1.10E-04	0.967
	247.93	6.89	-4.73E-04		9.33E-04	0.960
	591.76	4.95	4.38E-04		2.59E-03	0.952
	692.42	1.78	-1.33E-03		8.14E-03	0.963
	723.30	20.06	1.63E-04		8.28E-04	0.964
	756.80	4.52	-1.99E-04		3.80E-03	0.950
	873.18	12.08	-2.59E-04		1.65E-03	0.961
	996.29	10.48	8.65E-04		2.36E-03	0.989
	1004.76	18.01	6.50E-04		1.36E-03	0.985
	1274.43	34.80	3.40E-05		2.86E-04	0.987
	1596.48	1.80	4.94E-04		3.63E-03	1.098
+ Eu-155	45.30	1.31	2.14E-03	1.69E-04	7.58E-03	0.999
	60.01	1.22	-3.75E-03		7.33E-03	1.000
	86.55	30.70	-4.13E-05		1.69E-04	free
	105.31	21.10	6.25E-05		2.41E-04	1.000
+ Tl-208	583.19	85.00	5.24E-05	1.47E-04	1.47E-04	0.964
+ Bi-211	351.07	13.02	4.64E-04	6.68E-04	6.68E-04	miss
+ Pb-211	404.85	3.78	5.95E-04	2.55E-03	2.55E-03	miss
	427.09	1.76	9.84E-04		5.22E-03	miss
	832.01	3.52	-1.50E-03		4.90E-03	miss
+ Bi-212	39.86	1.06	-1.39E-04	2.44E-03	9.81E-03	0.999

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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PARTICLE MM SHOP GRID 12

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	727.33	6.67	2.85E-04	2.44E-03	2.44E-03	0.990
	785.37	1.10	7.23E-03		1.74E-02	0.970
	1620.50	1.47	6.68E-04		4.92E-03	1.003
+ Pb-212	115.18	0.60	-1.28E-03	1.56E-04	8.04E-03	miss
	238.63	43.60	3.61E-05		1.56E-04	free
	300.09	3.30	1.04E-04		2.24E-03	free
+ Pb212-XR	74.82	10.28	-7.85E-06	4.01E-04	6.78E-04	miss
	77.11	17.10	-1.03E-05		4.01E-04	miss
	87.35	3.97	5.03E-04		1.44E-03	miss
+ Bi-214	89.78	1.46	8.98E-05	2.77E-04	3.20E-03	miss
	609.32	45.49	3.04E-05		2.77E-04	0.973
	768.36	4.89	9.20E-05		3.38E-03	0.969
	806.18	1.26	-1.83E-03		1.41E-02	0.959
	934.06	3.11	-2.25E-03		7.40E-03	0.970
	1120.29	14.92	-8.54E-06		1.34E-03	0.970
	1155.21	1.63	-9.76E-04		1.25E-02	0.969
	1238.12	5.83	1.11E-03		2.66E-03	0.970
	1280.98	1.43	-3.79E-04		5.47E-03	0.970
	1377.67	3.99	0.00E+00		5.77E-04	1.017
	1385.31	0.79	-3.23E-04		8.31E-03	0.970
	1401.52	1.33	6.80E-04		5.00E-03	0.970
	1407.99	2.39	0.00E+00		2.79E-03	0.970
	1509.21	2.13	4.49E-04		3.30E-03	0.973
	1661.27	1.05	0.00E+00		2.60E-03	1.000
	1729.59	2.88	0.00E+00		9.14E-04	1.068
	1764.49	15.30	2.07E-04		8.27E-04	1.001
	1847.43	2.03	-8.42E-04		4.81E-03	1.035
> Pb-214	2118.51	1.16	0.00E+00	2.44E-04	0.00E+00	1.023
	241.99	7.25	3.69E-04		1.07E-03	0.999
	295.22	18.42	7.99E-05		3.75E-04	1.000
+ Pb214-XR	351.93	* 35.60	1.70E-04	7.08E-04	2.44E-04	free
	785.96	1.06	3.10E-03		1.71E-02	0.999
	74.82	5.80	-1.39E-05		1.20E-03	miss
	77.11	9.70	-1.82E-05		7.08E-04	miss
	87.35	2.24	8.92E-04		2.56E-03	miss
	89.78	0.82	1.60E-04		5.70E-03	miss
+ Ra-226	186.21	3.64	3.63E-04	1.47E-03	1.47E-03	free
+ Ac-228	129.07	2.42	-4.59E-04	6.96E-04	1.72E-03	0.971
	209.25	3.89	1.24E-04		1.53E-03	0.988
	270.24	3.46	-1.95E-04		2.02E-03	0.977
	328.00	2.95	-1.44E-04		2.55E-03	0.977
	338.32	11.27	1.56E-04		6.96E-04	0.996
	409.46	1.92	3.46E-04		5.08E-03	0.965
	463.00	4.40	-1.23E-04		2.48E-03	0.962
	794.95	4.25	5.52E-04		4.23E-03	0.968
	911.20	25.80	4.80E-05		8.36E-04	0.995
	964.77	4.99	-6.28E-04		4.71E-03	0.989
	968.97	15.80	2.02E-04		1.33E-03	0.994
	1588.20	3.22	6.01E-04		2.79E-03	1.001
+ Pa-231	27.36	10.30	0.00E+00	1.16E-04	1.16E-04	0.998
	283.69	1.70	1.09E-03		4.24E-03	1.000

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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PARTICLE MM SHOP GRID 12

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	300.07	2.47	1.39E-04	1.16E-04	2.99E-03	1.000
		302.65	2.20	1.34E-03		3.71E-03	1.000
		330.06	1.40	-2.03E-04		5.77E-03	1.001
+	Th-234	92.38	2.13	1.56E-03	2.99E-03	2.99E-03	free
		92.80	2.10	1.83E-03		3.21E-03	free
		112.81	0.21	4.88E-03		2.58E-02	free
+	U-235	143.76	10.96	-5.50E-05	7.80E-05	3.92E-04	free
		163.33	5.08	-1.45E-04		8.16E-04	free
		185.71	57.20	-1.04E-05		7.80E-05	free
		202.11	1.08	6.64E-04		5.32E-03	miss
		205.31	5.01	-1.63E-04		1.08E-03	free
+	Am-241	59.54	35.90	-4.37E-05	2.55E-04	2.55E-04	free

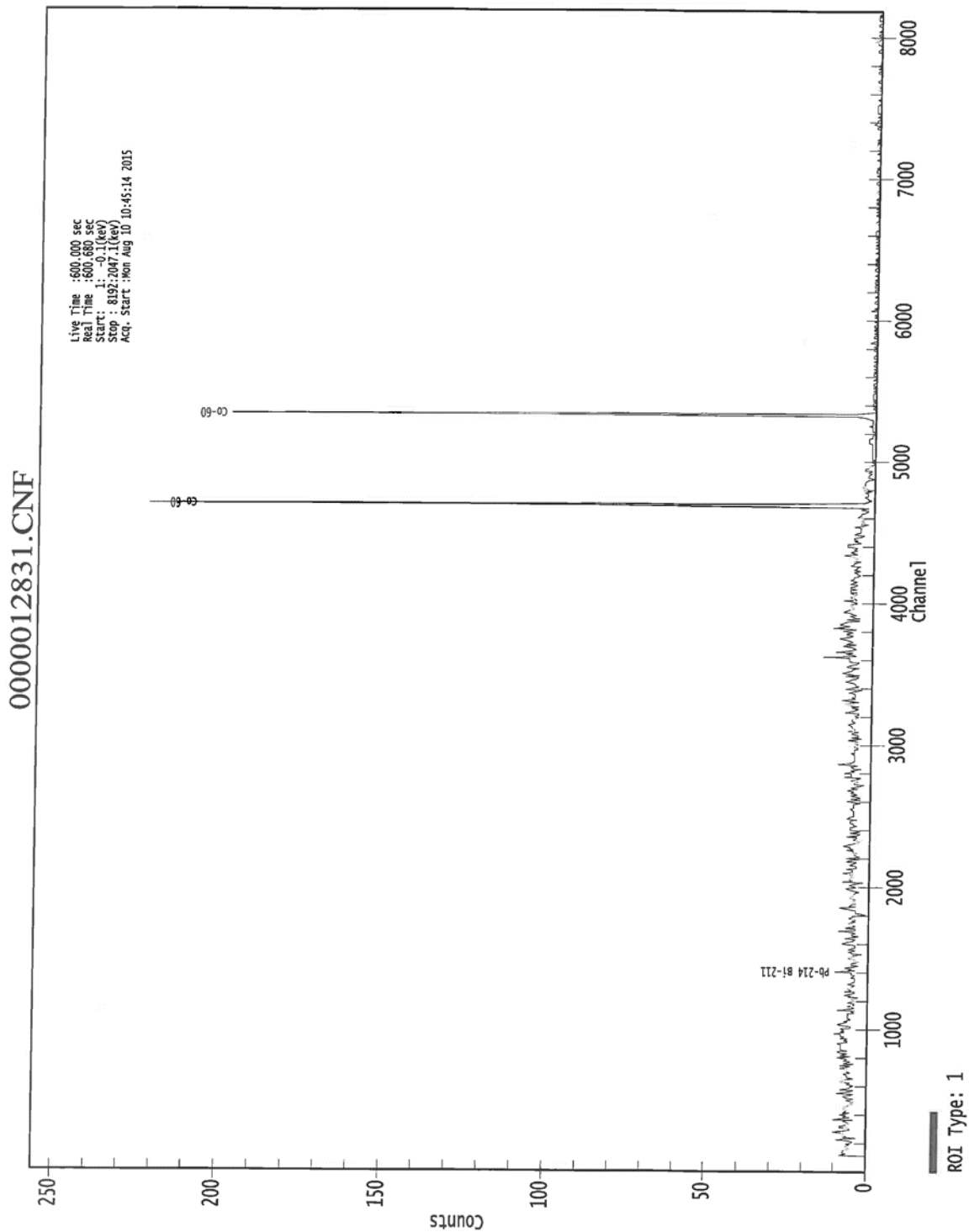
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

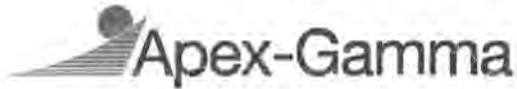
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 30-Mar-15-10001

7102AREQLQ01 SS-150 Solvent from parts washer

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 30-Mar-15-10001
Sample Description	: 7102AREQLQ01 SS-150 Solvent from parts washer
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 7.269E+02 grams
Facility	: Default
Sample Taken On	: 3/26/2015 12:30:00PM
Acquisition Started	: 3/30/2015 6:12:08AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 6000.0 seconds
Real Time	: 6002.9 seconds
Dead Time	: 0.05 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 12127

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/30/2015 7:52:14AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 30-Mar-15-10001

7102AREQLQ01 SS-150 Solvent from parts washer

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.86	1403 -	1413	1407.06	2.86E+01	20.85	7.48E+01	Pb-214
2	1460.57	5835 -	5849	5842.05	4.54E+01	16.17	1.93E+01	Bi-211 K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	3.29E-01	1.21E-01	miss
Bi-211	0.96	351.07 *	13.02	6.15E-02	4.59E-02	miss
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	2.25E-02	1.68E-02	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 30-Mar-15-10001

7102AREQLQ01 SS-150 Solvent from parts washer

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.996	3.29E-01	1.21E-01	
? Bi-211	0.962	6.15E-02	4.59E-02	
? Pb-214	1.000	2.25E-02	1.68E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 30-Mar-15-10001

7102AREQLQ01 SS-150 Solvent from parts washer

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/30/2015 7:52:14AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+ K-40	1460.82	* 10.66	3.29E-01	1.26E-01	1.26E-01	miss
+ Cr-51	320.08	9.91	1.34E-02	8.54E-02	8.54E-02	free
+ Mn-54	834.85	99.98	7.80E-04	9.53E-03	9.53E-03	miss
+ Co-58	810.76	99.45	2.13E-03	1.10E-02	1.10E-02	1.000
	1674.73	0.52	-3.86E-01		2.20E+00	1.027
+ Co-60	1173.23	99.85	1.56E-03	1.23E-02	1.23E-02	0.940
	1332.49	99.98	6.90E-03		1.34E-02	0.940
+ Nb-94	702.65	99.81	-5.06E-04	9.10E-03	9.94E-03	0.937
	871.09	99.89	-9.64E-03		9.10E-03	0.937
+ Sn-113	255.13	2.11	-5.36E-02	1.15E-02	3.10E-01	free
	391.70	64.97	-1.53E-03		1.15E-02	free
+ Cs-134	475.36	1.48	-2.13E-01	9.03E-03	5.20E-01	miss
	563.25	8.34	1.57E-02		1.01E-01	0.882
	569.33	15.37	-4.82E-03		5.40E-02	0.873
	604.72	97.62	-2.26E-03		9.03E-03	0.922
	795.86	85.46	-1.28E-03		1.12E-02	0.924
	801.95	8.69	-3.38E-03		1.37E-01	0.884
	1038.61	0.99	1.10E-02		9.29E-01	0.935
	1167.97	1.79	7.06E-02		5.62E-01	1.094

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 30-Mar-15-10001
7102AREQLQ01 SS-150 Solvent from parts washer
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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	-1.28E-02	9.03E-03	2.79E-01	1.146
+	Cs-137	661.66	85.10	7.15E-04	1.14E-02	1.14E-02	miss
+	Eu-152	121.78	28.67	-6.49E-04	2.17E-02	2.17E-02	0.928
		244.70	7.61	-2.80E-02		8.18E-02	0.922
		295.94	0.45	4.15E-01		1.84E+00	miss
		344.28	26.60	2.05E-02		3.46E-02	0.952
		367.79	0.86	-2.30E-01		8.89E-01	0.868
		411.12	2.24	3.30E-02		4.01E-01	0.895
		443.96	2.83	3.69E-02		3.06E-01	0.922
		488.68	0.42	-5.77E-02		1.76E+00	miss
		563.99	0.49	-6.13E-01		1.39E+00	0.923
		586.26	0.46	-3.73E-01		1.96E+00	0.933
		678.62	0.47	2.53E-01		2.40E+00	0.870
		688.67	0.86	7.39E-03		1.16E+00	0.973
		719.35	0.28	-4.01E-02		3.39E+00	miss
		778.90	12.96	1.06E-02		7.42E-02	0.937
		810.45	0.32	7.96E-01		3.18E+00	1.066
		867.37	4.26	-9.20E-03		2.78E-01	0.911
		919.33	0.43	-1.62E-01		2.24E+00	0.973
		964.08	14.65	2.13E-03		6.38E-02	1.030
		1085.87	10.24	-8.69E-03		1.08E-01	1.024
		1089.74	1.73	5.49E-02		6.70E-01	0.944
		1112.07	13.69	3.64E-02		8.55E-02	0.986
		1212.95	1.43	3.43E-01		1.01E+00	0.912
		1249.94	0.19	1.06E+00		4.63E+00	1.110
		1299.14	1.63	2.86E-01		7.39E-01	0.935
		1408.01	21.07	1.15E-02		4.79E-02	0.976
		1457.64	0.50	-1.86E+00		2.13E+00	1.085
		1528.10	0.28	3.95E-01		3.41E+00	1.003
+	Eu-154	123.07	40.40	-1.14E-03	1.63E-02	1.63E-02	0.927
		247.93	6.89	-3.27E-03		1.14E-01	0.915
		591.76	4.95	-2.10E-02		1.60E-01	0.900
		692.42	1.78	-9.08E-02		5.43E-01	0.924
		723.30	20.06	1.51E-04		5.12E-02	0.925
		756.80	4.52	-9.84E-02		1.90E-01	0.898
		873.18	12.08	4.36E-02		1.14E-01	0.919
		996.29	10.48	-1.94E-03		8.72E-02	0.971
		1004.76	18.01	-3.48E-03		5.11E-02	0.971
		1274.43	34.80	-1.01E-02		2.70E-02	0.975
		1596.48	1.80	-4.41E-02		2.84E-01	1.196
+	Eu-155	45.30	1.31	-7.88E-01	2.66E-02	1.38E+00	0.998
		60.01	1.22	2.91E-02		1.68E+00	1.000
		86.55	30.70	-1.12E-02		2.66E-02	free
		105.31	21.10	9.67E-03		3.58E-02	1.000
+	Tl-208	583.19	85.00	6.33E-03	1.45E-02	1.45E-02	0.924
+	Bi-211	351.07	13.02	6.15E-02	6.91E-02	6.91E-02	miss
+	Pb-211	404.85	3.78	-6.54E-02	2.02E-01	2.02E-01	miss
		427.09	1.76	-5.07E-02		4.22E-01	miss
		832.01	3.52	-9.85E-03		2.97E-01	miss
+	Bi-212	39.86	1.06	-9.31E-01	1.46E-01	1.82E+00	0.998
		727.33	6.67	1.77E-02		1.46E-01	0.980

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 30-Mar-15-10001
7102AREQLQ01 SS-150 Solvent from parts washer

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	785.37	1.10	-1.03E-01	1.46E-01	8.07E-01	0.936
	1620.50	1.47	6.38E-02		8.00E-01	1.007
+ Pb-212	115.18	0.60	-4.58E-01	1.82E-02	8.61E-01	miss
	238.63	43.60	8.23E-03		1.82E-02	free
	300.09	3.30	4.42E-02		1.97E-01	free
+ Pb212-XR	74.82	10.28	4.83E-02	7.74E-02	1.53E-01	miss
	77.11	17.10	4.56E-02		7.74E-02	miss
	87.35	3.97	7.59E-02		2.14E-01	miss
	89.78	1.46	6.55E-02		5.03E-01	miss
+ Bi-214	609.32	45.49	2.26E-02	2.95E-02	2.95E-02	0.941
	768.36	4.89	-7.37E-02		1.79E-01	0.934
	806.18	1.26	-3.19E-01		7.00E-01	0.912
	934.06	3.11	1.13E-01		4.03E-01	0.936
	1120.29	14.92	2.09E-02		8.62E-02	0.936
	1155.21	1.63	-1.06E-01		6.03E-01	0.935
	1238.12	5.83	1.31E-01		2.67E-01	0.936
	1280.98	1.43	4.26E-03		7.83E-01	0.936
	1377.67	3.99	3.96E-02		2.84E-01	1.035
	1385.31	0.79	-1.54E-01		1.31E+00	0.937
	1401.52	1.33	-1.75E-01		6.47E-01	0.937
	1407.99	2.39	1.05E-01		4.39E-01	0.937
	1509.21	2.13	2.32E-01		5.93E-01	0.943
	1661.27	1.05	-3.27E-01		7.59E-01	1.001
	1729.59	2.88	-4.72E-02		2.51E-01	1.137
	1764.49	15.30	4.61E-02		1.02E-01	1.002
	1847.43	2.03	-6.92E-02		5.11E-01	1.073
>	2118.51	1.16	0.00E+00		0.00E+00	1.047
+ Pb-214	241.99	7.25	-2.15E-02	2.53E-02	8.75E-02	0.999
	295.22	18.42	3.26E-02		4.74E-02	1.000
	351.93	* 35.60	2.25E-02		2.53E-02	free
	785.96	1.06	8.65E-02		8.22E-01	0.999
+ Pb214-XR	74.82	5.80	8.57E-02	1.36E-01	2.71E-01	miss
	77.11	9.70	8.03E-02		1.36E-01	miss
	87.35	2.24	1.34E-01		3.79E-01	miss
	89.78	0.82	1.17E-01		8.96E-01	miss
+ Ra-226	186.21	3.64	6.43E-02	1.95E-01	1.95E-01	free
+ Ac-228	129.07	2.42	-1.54E-02	3.79E-02	2.67E-01	0.937
	209.25	3.89	8.77E-02		1.71E-01	0.974
	270.24	3.46	3.81E-02		2.17E-01	0.950
	328.00	2.95	2.60E-02		2.72E-01	0.949
	338.32	11.27	2.03E-02		7.27E-02	0.991
	409.46	1.92	-1.27E-01		3.65E-01	0.926
	463.00	4.40	5.20E-02		2.12E-01	0.921
	794.95	4.25	-4.66E-02		2.02E-01	0.933
	911.20	25.80	2.90E-03		3.79E-02	0.989
	964.77	4.99	5.26E-03		1.97E-01	0.978
	968.97	15.80	2.90E-02		7.91E-02	0.988
	1588.20	3.22	3.66E-03		2.38E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	1.77E-02	1.77E-02	0.997
	283.69	1.70	2.09E-02		4.34E-01	1.000
	300.07	2.47	5.90E-02		2.63E-01	1.000

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 30-Mar-15-10001

7102AREQLQ01 SS-150 Solvent from parts washer

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Pa-231	302.65	2.20	1.43E-02	1.77E-02	3.03E-01	1.000
		330.06	1.40	-1.05E-01		5.70E-01	1.001
+	Th-234	92.38	2.13	2.94E-01	4.62E-01	4.79E-01	free
		92.80	2.10	4.54E-02		4.62E-01	free
		112.81	0.21	-2.68E-01		3.49E+00	free
+	U-235	143.76	10.96	-4.72E-03	1.25E-02	5.89E-02	free
		163.33	5.08	2.27E-02		1.24E-01	free
		185.71	57.20	6.73E-03		1.25E-02	free
		202.11	1.08	-6.29E-02		5.56E-01	miss
		205.31	5.01	-1.12E-02		1.18E-01	free
+	Am-241	59.54	35.90	-1.84E-02	5.49E-02	5.49E-02	free

+ = 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

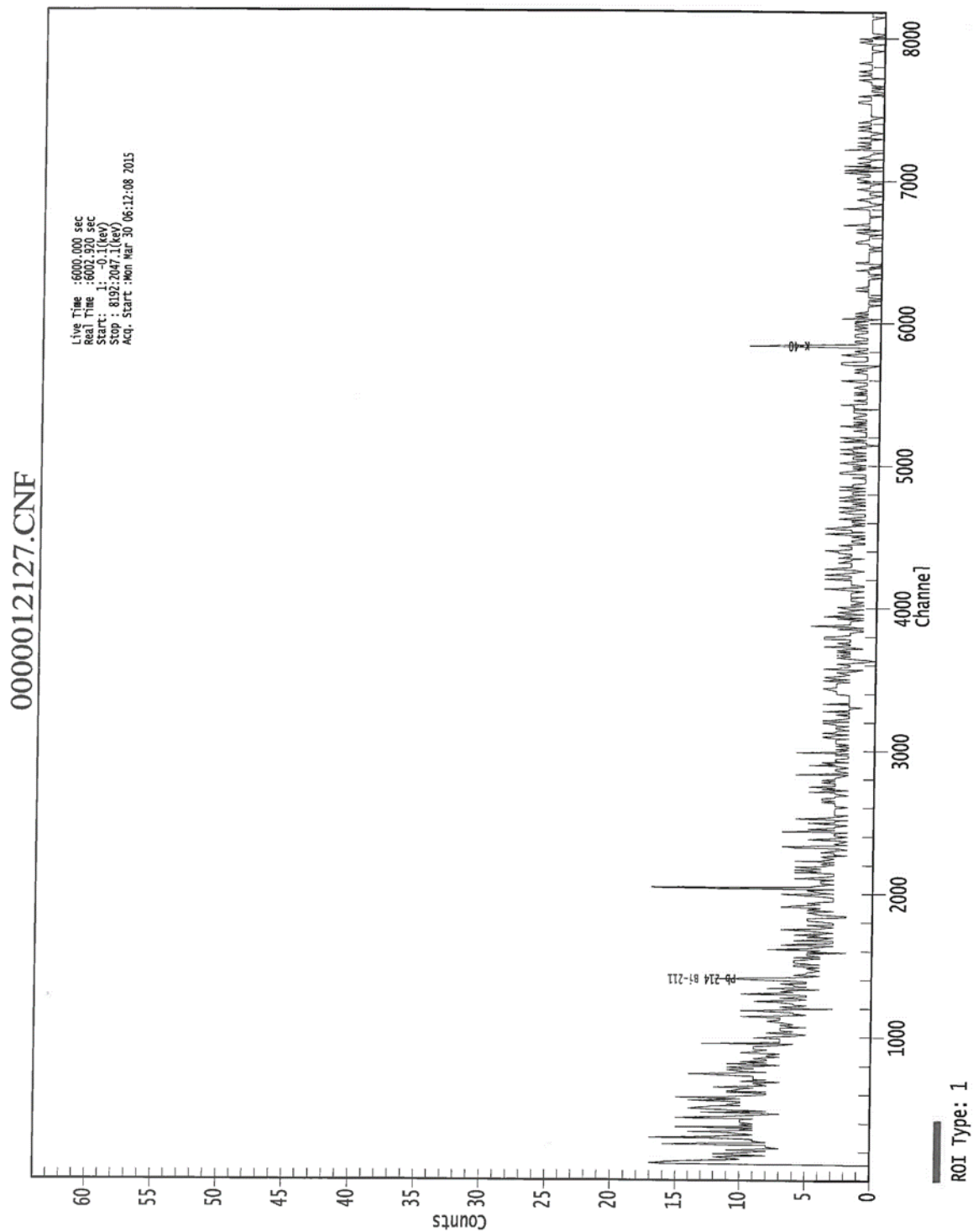
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 15-Jul-15-10009
B1-01701-AJSL-001-OL 16" LATHE

GAMMA SPECTRUM ANALYSIS

Sample Identification : 15-Jul-15-10009
Sample Description : B1-01701-AJSL-001-OL 16" LATHE
Sample Type : Oil
Unit :
Sample Point :
Sample Size : 6.708E+02 mL
Facility : Default
Sample Taken On : 7/14/2015 10:00:00AM
Acquisition Started : 7/15/2015 10:56:39AM
Procedure : 130G Oil
Operator : Administrator
Detector Name : P11314X2
Geometry : 130G Oil
Live Time : 10800.0 seconds
Real Time : 10807.3 seconds
Dead Time : 0.07 %
Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM
Energy Calibration Used Done On : 12/3/2014
Efficiency Calibration Used Done On : 3/31/2014
Efficiency Calibration Description :
Sample Number : 12680

PEAK WITH NID REPORT

Peak Analysis Performed on : 7/15/2015 1:56:49PM
Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192
Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10009

B1-01701-AIJSL-001-OL 16" LATHE

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	92.50	366 -	376	370.91	4.38E+01	41.26	2.68E+02	Th-234
2	185.45	737 -	749	742.19	7.86E+01	38.91	2.27E+02	Th-234
3	351.87	1403 -	1411	1407.11	2.32E+01	20.15	8.17E+01	U-235
4	558.40	2226 -	2238	2232.59	2.21E+01	21.98	8.57E+01	Ra-226
5	911.08	3638 -	3650	3642.91	1.64E+01	16.37	4.71E+01	Pb-214
6	1460.76	5830 -	5851	5842.81	9.64E+01	24.01	3.73E+01	Bi-211

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	1.00	1460.82	*	10.66	4.21E-01	1.11E-01
Bi-211	0.96	351.07	*	13.02	3.00E-02	2.65E-02
Pb-214	1.00	241.99		7.25		
		295.22		18.42		
		351.93	*	35.60	1.10E-02	9.70E-03
		785.96		1.06		
Ra-226	0.96	186.21	*	3.64	2.40E-01	1.25E-01
Ac-228	1.00	129.07		2.42		
		209.25		3.89		
		270.24		3.46		
		328.00		2.95		
		338.32		11.27		
		409.46		1.92		
		463.00		4.40		
		794.95		4.25		
		911.20	*	25.80	2.13E-02	2.13E-02
		964.77		4.99		
		968.97		15.80		
		1588.20		3.22		

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10009
B1-01701-AIJS-001-OL 16" LATHE

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
Th-234	1.00	92.38 *	2.13	2.95E-01	2.89E-01	miss
		92.80	2.10			
		112.81	0.21			
U-235	0.99	143.76	10.96			
		163.33	5.08			
		185.71 *	57.20	1.53E-02	7.95E-03	miss
		202.11	1.08			
		205.31	5.01			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	1.000	4.21E-01	1.11E-01	
? Bi-211	0.961	3.00E-02	2.65E-02	
? Pb-214	1.000	1.10E-02	9.70E-03	
? Ra-226	0.965	2.40E-01	1.25E-01	
Ac-228	1.000	2.13E-02	2.13E-02	
Th-234	1.000	2.95E-01	2.89E-01	
? U-235	0.997	1.53E-02	7.95E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10009
B1-01701-AIJSI-001-OL 16" LATHE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/15/2015 1:56:49PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
4	558.40	2.05071E-03	49.62		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Colinc Corr
+	K-40	1460.82	*	10.66	4.21E-01	1.11E-01	miss
+	Cz-51	320.08	9.91	-1.73E-02	5.37E-02	5.37E-02	free
+	Mn-54	834.85	99.98	-2.63E-03	5.48E-03	5.48E-03	miss
+	Co-58	810.76	99.45	-2.19E-03	6.28E-03	6.28E-03	miss
		1674.73	0.52	3.97E-02	1.52E+00	1.52E+00	miss
+	Co-60	1173.23	99.85	5.95E-04	8.16E-03	9.15E-03	miss
		1332.49	99.98	1.72E-03	8.16E-03	8.16E-03	miss
+	Nb-94	702.65	99.81	-1.39E-04	7.49E-03	7.49E-03	miss
		871.09	99.89	2.19E-03	8.25E-03	8.25E-03	miss
+	Sn-113	255.13	2.11	1.84E-02	8.67E-03	2.84E-01	free
		391.70	64.97	-3.11E-04	8.67E-03	8.67E-03	free
+	Cs-134	475.36	1.48	-1.00E-02	7.76E-03	3.83E-01	miss
		563.25	8.34	-2.45E-02	6.86E-02	6.86E-02	miss
		569.33	15.37	7.97E-03	4.59E-02	4.59E-02	miss
		604.72	97.62	-1.95E-03	7.76E-03	7.76E-03	miss
		795.86	85.46	2.75E-03	9.23E-03	9.23E-03	miss
		801.95	8.69	2.04E-02	9.13E-02	9.13E-02	miss
		1038.61	0.99	1.87E-01	7.67E-01	7.67E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for		15-Jul-15-10009		7/15/2015	1:57:26PM	Page 5 of 7	
B1-01701-AJSL-001-OL 16" LATHE							
	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Cs-134	1167.97	1.79	-1.77E-01	7.76E-03	4.31E-01	miss
		1365.19	3.02	4.48E-02		3.04E-01	miss
+	Cs-137	661.66	85.10	1.67E-03	8.97E-03	8.97E-03	miss
+	Eu-152	121.78	28.67	-8.06E-04	1.64E-02	1.64E-02	miss
		244.70	7.61	5.26E-04		6.55E-02	miss
		295.94	0.45	2.60E-01		1.43E+00	miss
		344.28	26.60	6.54E-04		2.38E-02	miss
		367.79	0.86	8.93E-02		6.86E-01	miss
		411.12	2.24	4.47E-02		2.66E-01	miss
		443.96	2.83	-7.92E-02		2.05E-01	miss
		488.68	0.42	-2.59E-01		1.50E+00	miss
		563.99	0.49	-1.49E-01		1.26E+00	miss
		586.26	0.46	-4.48E-01		1.38E+00	miss
		678.62	0.47	-5.25E-01		1.41E+00	miss
		688.67	0.86	-5.82E-01		7.17E-01	miss
		719.35	0.28	-4.90E-01		2.33E+00	miss
		778.90	12.96	4.83E-03		5.77E-02	miss
		810.45	0.32	-3.39E-01		2.10E+00	miss
		867.37	4.26	7.12E-02		1.93E-01	miss
		919.33	0.43	-3.49E-01		1.53E+00	miss
		964.08	14.65	-3.44E-03		5.19E-02	miss
		1085.87	10.24	3.27E-02		7.85E-02	miss
		1089.74	1.73	8.45E-02		4.39E-01	miss
		1112.07	13.69	1.04E-02		5.97E-02	miss
		1212.95	1.43	-2.70E-02		6.07E-01	miss
		1249.94	0.19	-8.25E-01		3.66E+00	miss
		1299.14	1.63	3.87E-02		4.37E-01	miss
		1408.01	21.07	8.78E-03		4.18E-02	miss
		1457.64	0.50	-5.08E-01		2.07E+00	miss
		1528.10	0.28	2.12E-01		2.41E+00	miss
+	Eu-154	123.07	40.40	-3.42E-03	1.09E-02	1.09E-02	miss
		247.93	6.89	-4.11E-02		7.53E-02	miss
		591.76	4.95	7.79E-02		1.45E-01	miss
		692.42	1.78	2.10E-01		4.98E-01	miss
		723.30	20.06	1.05E-02		3.68E-02	miss
		756.80	4.52	3.31E-02		1.56E-01	miss
		873.18	12.08	-1.99E-02		6.02E-02	miss
		996.29	10.48	1.38E-02		6.83E-02	miss
		1004.76	18.01	3.38E-03		3.46E-02	miss
		1274.43	34.80	1.04E-03		2.27E-02	miss
		1596.48	1.80	1.01E-01		4.41E-01	miss
+	Eu-155	45.30	1.31	-2.03E-01	2.34E-02	1.17E+00	miss
		60.01	1.22	-5.44E-01		1.20E+00	miss
		86.55	30.70	1.93E-03		2.34E-02	miss
		105.31	21.10	4.65E-04		2.55E-02	miss
+	Tl-208	583.19	85.00	3.51E-03	8.68E-03	8.68E-03	miss
+	Bi-211	351.07	*	13.02	3.00E-02	4.12E-02	miss
+	Pb-211	404.85	3.78	-7.53E-02	1.35E-01	1.35E-01	miss
		427.09	1.76	-1.28E-01		3.39E-01	miss
		832.01	3.52	6.42E-03		2.00E-01	miss
+	Bi-212	39.86	1.06	6.08E-02	1.17E-01	1.43E+00	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10009

B1-01701-AIJSJL-001-OL 16" LATHE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Bi-212	727.33	6.67	5.70E-02	1.17E-01	1.17E-01	miss
	785.37	1.10	-3.35E-01		5.65E-01	miss
	1620.50	1.47	-3.44E-02		4.13E-01	miss
+ Pb-212	115.18	0.60	-5.13E-01	1.25E-02	7.29E-01	miss
	238.63	43.60	1.05E-03		1.25E-02	miss
	300.09	3.30	1.43E-02		1.77E-01	miss
+ Pb212-XR	74.82	10.28	1.02E-01	5.26E-02	1.18E-01	miss
	77.11	17.10	1.06E-02		5.26E-02	miss
	87.35	3.97	2.35E-02		1.75E-01	miss
+ Bi-214	89.78	1.46	1.38E-01	2.32E-02	4.67E-01	miss
	609.32	45.49	2.30E-02		2.32E-02	miss
	768.36	4.89	1.81E-02		1.60E-01	miss
	806.18	1.26	-1.86E-02		5.02E-01	miss
	934.06	3.11	-2.67E-02		2.20E-01	miss
	1120.29	14.92	1.28E-02		6.46E-02	miss
	1155.21	1.63	2.56E-01		6.02E-01	miss
	1238.12	5.83	-9.94E-03		1.42E-01	miss
	1280.98	1.43	1.39E-01		5.91E-01	miss
	1377.67	3.99	7.65E-02		2.50E-01	miss
	1385.31	0.79	-2.25E-01		5.23E-01	miss
	1401.52	1.33	-1.11E-01		4.78E-01	miss
	1407.99	2.39	7.72E-02		3.68E-01	miss
	1509.21	2.13	-8.74E-03		4.07E-01	miss
	1661.27	1.05	8.20E-03		8.20E-01	miss
	1729.59	2.88	1.13E-01		3.35E-01	miss
	1764.49	15.30	4.10E-02		7.93E-02	miss
	1847.43	2.03	1.03E-02		3.88E-01	miss
> + Pb-214	2118.51	1.16	0.00E+00	1.51E-02	0.00E+00	miss
	241.99	7.25	-1.24E-02		6.54E-02	miss
	295.22	18.42	8.10E-03		3.43E-02	miss
	351.93	* 35.60	1.10E-02		1.51E-02	miss
	785.96	1.06	-2.25E-01		5.88E-01	miss
	74.82	5.80	1.80E-01	9.28E-02	2.09E-01	miss
+ Pb214-XR	77.11	9.70	1.88E-02		9.28E-02	miss
	87.35	2.24	4.17E-02		3.11E-01	miss
	89.78	0.82	2.46E-01	1.82E-01	8.32E-01	miss
+ Ra-226	186.21	* 3.64	2.40E-01		1.82E-01	miss
+ Ac-228	129.07	2.42	2.17E-02	3.38E-02	1.95E-01	miss
	209.25	3.89	1.79E-03		1.34E-01	miss
	270.24	3.46	1.66E-02		1.77E-01	miss
	328.00	2.95	5.74E-02		2.02E-01	miss
	338.32	11.27	1.33E-02		5.18E-02	miss
	409.46	1.92	-5.26E-02		2.97E-01	miss
	463.00	4.40	6.24E-02		1.40E-01	miss
	794.95	4.25	-6.24E-02		1.64E-01	miss
	911.20	* 25.80	2.13E-02		3.38E-02	miss
	964.77	4.99	-8.07E-02		1.31E-01	miss
	968.97	15.80	1.59E-02		5.52E-02	miss
	1588.20	3.22	-1.05E-01		2.18E-01	miss
+ Pa-231	27.36	10.30	0.00E+00	1.06E-02	1.06E-02	miss
	283.69	1.70	-4.68E-02		3.38E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10009
B1-01701-AIJSI-001-OL 16" LATHE

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Pa-231	300.07	2.47	1.90E-02	1.06E-02	2.36E-01	miss
		302.65	2.20	-1.28E-01		2.50E-01	miss
		330.06	1.40	-6.57E-02		3.74E-01	miss
+	Th-234	92.38 *	2.13	2.95E-01	3.89E-01	4.50E-01	miss
		92.80	2.10	4.07E-01		3.89E-01	miss
		112.81	0.21	1.93E-01		2.79E+00	miss
+	U-235	143.76	10.96	4.06E-03	1.16E-02	4.36E-02	miss
		163.33	5.08	-3.17E-03		9.04E-02	miss
		185.71 *	57.20	1.53E-02		1.16E-02	miss
		202.11	1.08	2.68E-01		4.95E-01	miss
		205.31	5.01	-4.10E-02		9.38E-02	miss
+	Am-241	59.54	35.90	-2.20E-02	4.11E-02	4.11E-02	miss

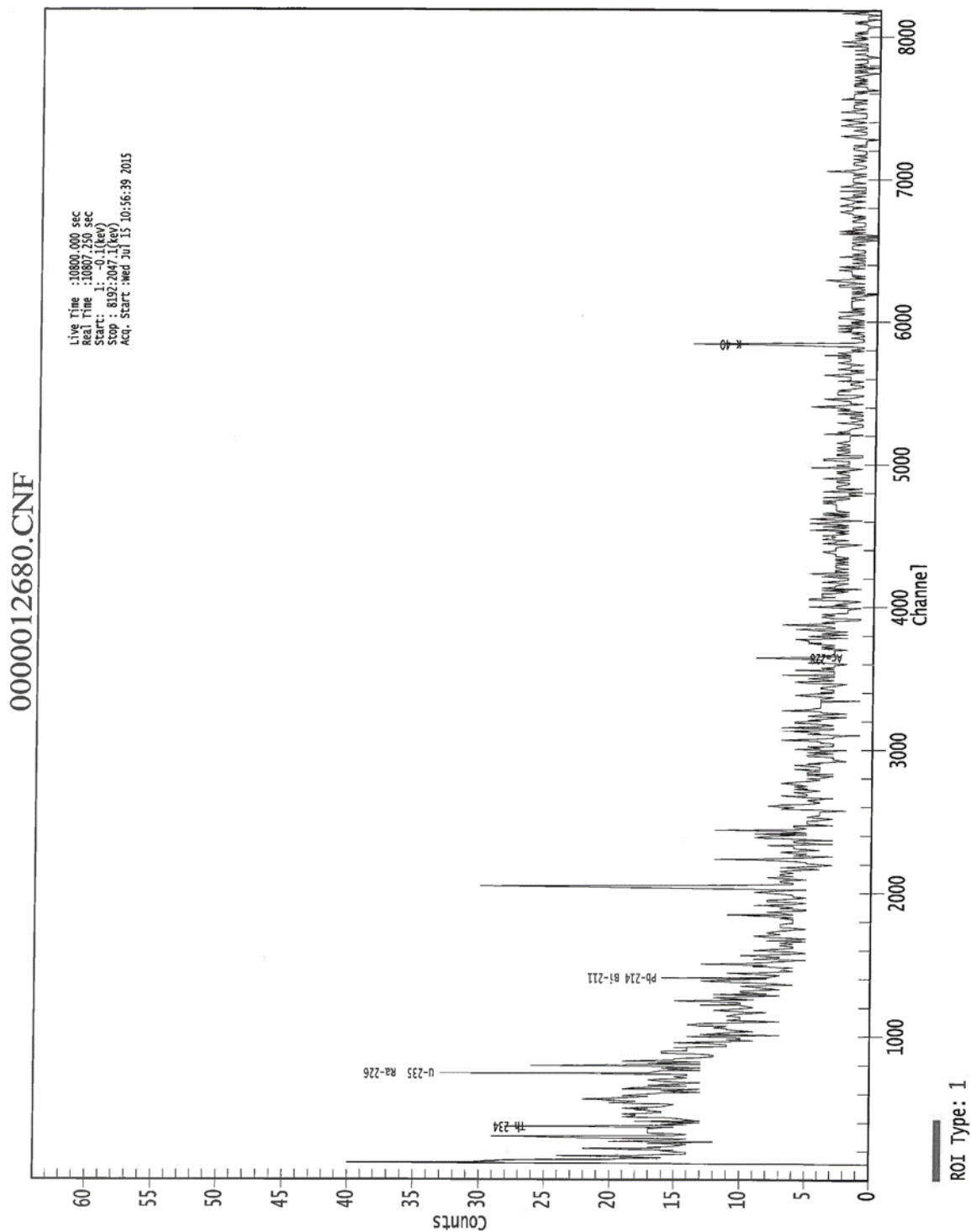
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

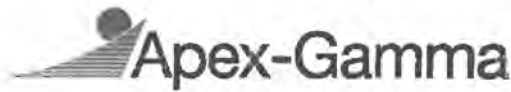
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 14-Jul-15-10008
B1-07102-AIJSI-002-OL

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 14-Jul-15-10008
Sample Description	: B1-07102-AIJSI-002-OL
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 3.897E+02 mL
Facility	: Default
Sample Taken On	: 7/14/2015 10:00:00AM
Acquisition Started	: 7/14/2015 3:05:34PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 10800.0 seconds
Real Time	: 10807.6 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 12662

PEAK WITH NID REPORT

Peak Analysis Performed on	: 7/14/2015 6:05:46PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10008
B1-07102-AIJSL-002-OL

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	92.81	366 -	376	372.13	8.02E+01	39.58	2.20E+02	Th-234 Th-234 Ac228-XR U235-XR
2	327.70	1307 -	1314	1310.52	1.94E+01	19.30	7.31E+01	Ac-228
3	510.98	2032 -	2051	2043.04	1.47E+02	44.34	2.28E+02	.....
4	661.49	2638 -	2650	2644.72	3.52E+01	18.44	4.75E+01	Cs-137
5	1460.63	5833 -	5851	5842.30	9.84E+01	22.02	1.92E+01	K-40

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 : C:\Canberra\Apex\Root\DefaultLibrary\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	7.40E-01	1.78E-01	miss
Cs-137	0.99	661.66 *	85.10	1.90E-02	1.02E-02	miss
Ac228-XR	0.38	89.96	1.90			
		93.35 *	3.10	6.17E-01	3.65E-01	miss
U235-XR	0.46	89.96	3.47			
		93.35 *	5.60	3.42E-01	1.82E-01	miss
		105.60	1.32			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence Index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 14-Jul-15-10008
B1-07102-AIJSL-002-OL

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INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.998	7.40E-01	1.78E-01	
Cs-137	0.998	1.90E-02	1.02E-02	
? Ac228-XR	0.387	6.17E-01	3.65E-01	
? B235-XR	0.465	3.42E-01	1.82E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-JUL-15-10008
B1-07102-AIJSI-002-OL

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/14/2015 6:05:46PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	327.70	1.79894E-03	49.68	Tol.	Ac-228
3	510.98	1.36194E-02	15.07		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	* 10.66	7.40E-01	1.39E-01	1.39E-01	miss
+	Cr-51	320.08	9.91	-4.25E-03	9.53E-02	9.53E-02	free
+	Mn-54	834.85	99.98	-5.35E-03	1.12E-02	1.12E-02	miss
+	Co-58	810.76	99.45	-3.32E-04	1.11E-02	1.11E-02	miss
		1674.73	0.52	-1.35E+00		1.86E+00	miss
+	Co-60	1173.23	99.85	-3.48E-03	1.33E-02	1.33E-02	miss
		1332.49	99.98	5.26E-03		1.55E-02	miss
+	Nb-94	702.65	99.81	-8.00E-04	1.25E-02	1.25E-02	miss
		871.09	99.89	-5.07E-03		1.28E-02	miss
+	Sn-113	255.13	2.11	1.92E-02	1.69E-02	4.48E-01	free
		391.70	64.97	1.69E-03		1.69E-02	free
+	Cs-134	475.36	1.48	1.22E-01	1.41E-02	7.22E-01	miss
		563.25	8.34	3.28E-02		1.34E-01	miss
		569.33	15.37	1.88E-02		8.01E-02	miss
		604.72	97.62	6.41E-03		1.47E-02	miss
		795.86	85.46	-3.05E-03		1.41E-02	miss
		801.95	8.69	2.30E-02		1.57E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 14-Jul-15-10008
B1-07102-AIJSL-002-OL

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Cs-134	1038.61	0.99	-3.50E-01	1.41E-02	1.15E+00	miss
	1167.97	1.79	4.79E-01		8.95E-01	miss
	1365.19	3.02	-6.00E-04		4.74E-01	miss
+ Cs-137	661.66	* 85.10	1.90E-02	1.40E-02	1.40E-02	miss
+ Eu-152	121.78	28.67	-3.29E-03	2.79E-02	2.79E-02	miss
	244.70	7.61	1.84E-02		1.10E-01	miss
	295.94	0.45	1.06E+00		2.34E+00	miss
	344.28	26.60	-3.61E-03		3.60E-02	miss
	367.79	0.86	-1.89E-01		1.11E+00	miss
	411.12	2.24	-5.81E-02		4.29E-01	miss
	443.96	2.83	2.80E-02		3.96E-01	miss
	488.68	0.42	0.00E+00		2.36E+00	miss
	563.99	0.49	-4.64E-02		2.09E+00	miss
	586.26	0.46	-1.20E+00		2.50E+00	miss
	678.62	0.47	2.19E-01		2.71E+00	miss
	688.67	0.86	7.14E-01		1.62E+00	miss
	719.35	0.28	2.12E+00		4.92E+00	miss
	778.90	12.96	2.15E-02		1.08E-01	miss
	810.45	0.32	1.06E-01		3.51E+00	miss
	867.37	4.26	1.46E-01		3.26E-01	miss
	919.33	0.43	8.52E-01		3.11E+00	miss
	964.08	14.65	2.49E-02		1.08E-01	miss
	1085.87	10.24	1.54E-02		1.39E-01	miss
	1089.74	1.73	-2.31E-01		7.08E-01	miss
	1112.07	13.69	-8.22E-03		1.05E-01	miss
	1212.95	1.43	3.96E-01		1.05E+00	miss
	1249.94	0.19	-1.16E+00		6.58E+00	miss
	1299.14	1.63	-1.39E-01		7.86E-01	miss
	1408.01	21.07	9.50E-03		6.44E-02	miss
	1457.64	0.50	-1.39E+00		2.88E+00	miss
	1528.10	0.28	-6.61E-01		4.42E+00	miss
+ Eu-154	123.07	40.40	-4.60E-04	1.94E-02	1.94E-02	miss
	247.93	6.89	9.74E-03		1.38E-01	miss
	591.76	4.95	5.54E-02		2.72E-01	miss
	692.42	1.78	1.48E-01		7.52E-01	miss
	723.30	20.06	1.02E-02		5.47E-02	miss
	756.80	4.52	-5.21E-02		2.31E-01	miss
	873.18	12.08	3.63E-02		1.30E-01	miss
	996.29	10.48	4.03E-02		1.40E-01	miss
	1004.76	18.01	3.06E-02		7.86E-02	miss
	1274.43	34.80	7.28E-03		3.62E-02	miss
	1596.48	1.80	-2.05E-01		6.27E-01	miss
+ Eu-155	45.30	1.31	-1.58E-01	3.60E-02	2.03E+00	miss
	60.01	1.22	3.33E-01		2.33E+00	miss
	86.55	30.70	-2.79E-02		3.60E-02	miss
	105.31	21.10	-7.13E-03		4.19E-02	miss
+ Tl-208	583.19	85.00	1.03E-02	1.71E-02	1.71E-02	miss
+ Bi-211	351.07	13.02	-4.16E-03	6.72E-02	6.72E-02	miss
+ Pb-211	404.85	3.78	1.48E-01	3.01E-01	3.01E-01	miss
	427.09	1.76	-1.29E-01		5.28E-01	miss
	832.01	3.52	1.72E-01		3.83E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10008
B1-07102-AIJSL-002-OL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	Bi-212	39.86	1.06	1.04E+00	1.98E-01	2.80E+00	miss
		727.33	6.67	7.00E-02		1.98E-01	miss
		785.37	1.10	7.14E-01		1.36E+00	miss
		1620.50	1.47	-2.66E-02		7.76E-01	miss
+	Pb-212	115.18	0.60	-1.06E-01	2.34E-02	1.34E+00	miss
		238.63	43.60	1.53E-02		2.34E-02	miss
		300.09	3.30	1.99E-02		2.95E-01	miss
+	Pb212-XR	74.82	10.28	1.99E-01	9.46E-02	2.10E-01	miss
		77.11	17.10	1.51E-02		9.46E-02	miss
		87.35	3.97	1.53E-01		3.02E-01	miss
		89.78	1.46	2.14E-01		7.50E-01	miss
+	Bi-214	609.32	45.49	3.50E-02	3.75E-02	3.75E-02	miss
		768.36	4.89	-1.58E-01		2.22E-01	miss
		806.18	1.26	1.50E-01		9.58E-01	miss
		934.06	3.11	6.07E-02		4.23E-01	miss
		1120.29	14.92	5.73E-02		1.27E-01	miss
		1155.21	1.63	9.29E-02		9.74E-01	miss
		1238.12	5.83	8.30E-02		2.79E-01	miss
		1280.98	1.43	6.24E-02		9.18E-01	miss
		1377.67	3.99	1.81E-01		4.09E-01	miss
		1385.31	0.79	4.40E-01		1.69E+00	miss
		1401.52	1.33	-2.83E-01		7.65E-01	miss
		1407.99	2.39	8.36E-02		5.66E-01	miss
		1509.21	2.13	-1.71E-01		5.06E-01	miss
		1661.27	1.05	2.94E-01		1.34E+00	miss
		1729.59	2.88	-1.60E-01		5.30E-01	miss
		1764.49	15.30	3.74E-02		1.43E-01	miss
		1847.43	2.03	-2.40E-01		5.69E-01	miss
>		2118.51	1.16	0.00E+00		0.00E+00	miss
+	Pb-214	241.99	7.25	3.77E-02	2.68E-02	1.22E-01	miss
		295.22	18.42	2.88E-02		5.84E-02	miss
		351.93	35.60	6.52E-03		2.68E-02	miss
		785.96	1.06	2.44E-01		1.31E+00	miss
+	Pb214-XR	74.82	5.80	3.53E-01	1.67E-01	3.72E-01	miss
		77.11	9.70	2.66E-02		1.67E-01	miss
		87.35	2.24	2.72E-01		5.35E-01	miss
		89.78	0.82	3.81E-01		1.33E+00	miss
+	Ra-226	186.21	3.64	1.39E-01	2.59E-01	2.59E-01	miss
+	Ac-228	129.07	2.42	5.83E-02	6.09E-02	3.56E-01	miss
		209.25	3.89	3.24E-02		2.13E-01	miss
		270.24	3.46	1.14E-01		3.01E-01	miss
		328.00	2.95	-2.37E-02		3.57E-01	miss
		338.32	11.27	1.99E-02		9.16E-02	miss
		409.46	1.92	7.18E-02		5.18E-01	miss
		463.00	4.40	2.72E-02		2.50E-01	miss
		794.95	4.25	6.21E-02		2.95E-01	miss
		911.20	25.80	2.02E-02		6.09E-02	miss
		964.77	4.99	5.20E-02		3.12E-01	miss
		968.97	15.80	7.15E-03		9.13E-02	miss
		1588.20	3.22	7.09E-02		4.43E-01	miss
+	Pa-231	27.36	10.30	0.00E+00	1.83E-02	1.83E-02	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10008
B1-07102-AIJSI-002-OL

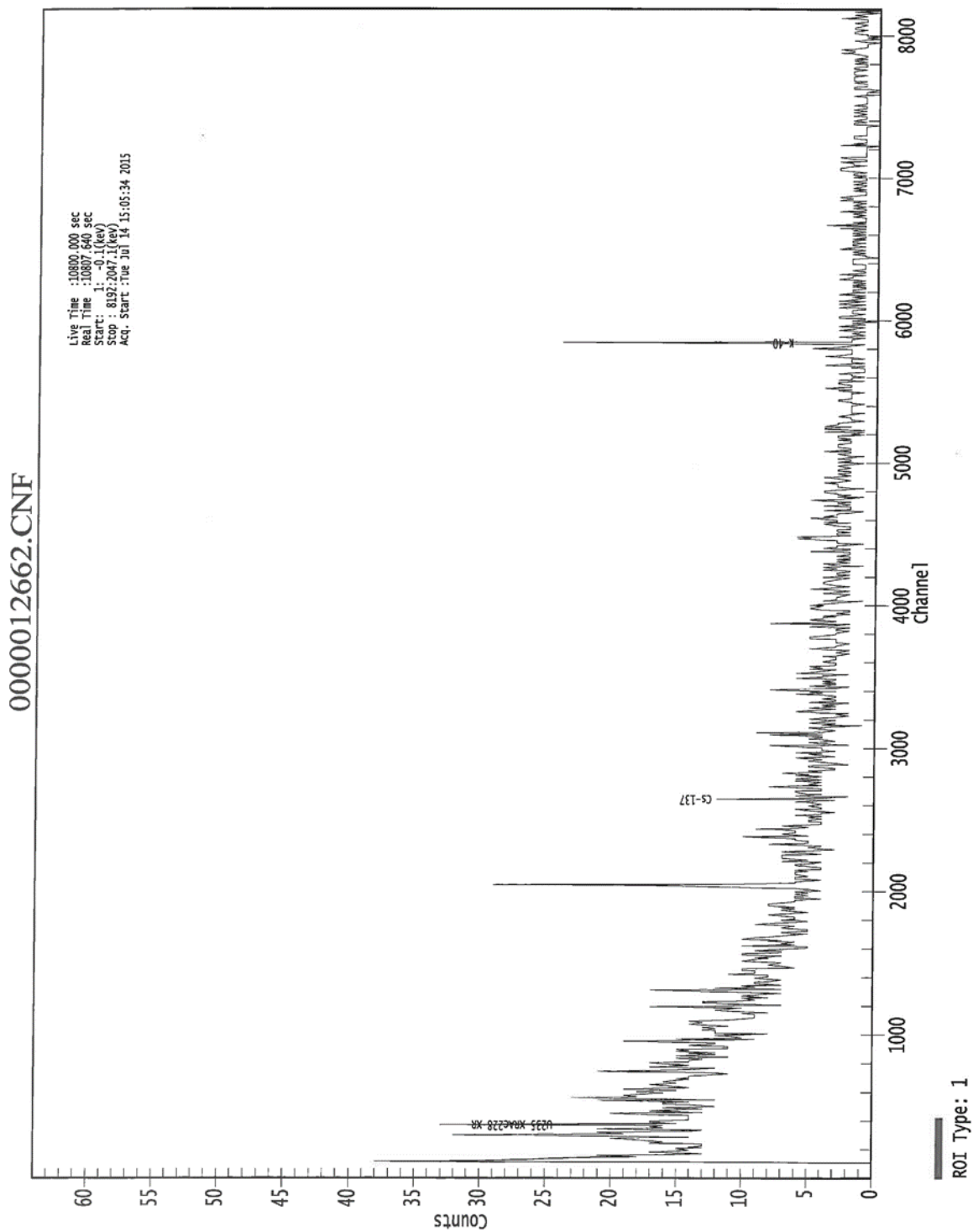
Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Pa-231	283.69	1.70	-1.11E-01	1.83E-02	5.37E-01	miss
	300.07	2.47	2.65E-02		3.94E-01	miss
	302.65	2.20	1.44E-01		4.45E-01	miss
	330.06	1.40	1.48E-01		7.37E-01	miss
+ Th-234	92.38	2.13	7.95E-01	6.67E-01	6.67E-01	miss
	92.80	2.10	8.18E-01		6.71E-01	miss
	112.81	0.21	2.65E+00		4.50E+00	miss
+ U-235	143.76	10.96	2.40E-02	1.74E-02	8.09E-02	miss
	163.33	5.08	-5.25E-02		1.55E-01	miss
	185.71	57.20	1.72E-02		1.74E-02	miss
	202.11	1.08	-9.16E-03		7.69E-01	miss
	205.31	5.01	1.60E-02	8.21E-02	1.65E-01	miss
+ Am-241	59.54	35.90	-2.60E-03		8.21E-02	miss

- + = 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
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

- free = No coincidence correction required.
- miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 14-Jul-15-10007
B1-07102-AIJSL-002-OL

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 14-Jul-15-10007
Sample Description	: B1-07102-AIJSL-002-OL
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 3.897E+02 mL
Facility	: Default
Sample Taken On	: 7/14/2015 10:00:00AM
Acquisition Started	: 7/14/2015 12:34:47PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 3600.0 seconds
Real Time	: 3602.4 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 12655

Handwritten: 12655
7-14-15

Handwritten: Did not meet
FSS MDA.

Handwritten: V. M. M.
7-15-15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 7/14/2015 1:34:53PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10007
B1-07102-AIJSI-002-OL

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	238.21	949 -	957	952.99	2.58E+01	17.12	4.44E+01	Pb-212
2	1460.62	5837 -	5848	5842.26	2.39E+01	11.25	8.14E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	5.40E-01	2.58E-01	miss
Pb-212	0.99	115.18	0.60			
		238.63 *	43.60	3.92E-02	2.68E-02	miss
		300.09	3.30			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10007
B1-07102-AIJSI-002-OL

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.998	5.40E-01	2.58E-01	
Pb-212	0.990	3.92E-02	2.68E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10007
B1-07102-AJSL-002-OL

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/14/2015 1:34:53PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
----------	--------------	-----------------	-----------------------------	--------------	----------------------

All peaks were identified.

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL,NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+ K-40	1460.82	* 10.66	5.40E-01	2.67E-01	2.67E-01	miss
+ Cr-51	320.08	9.91	-8.58E-02	1.49E-01	1.49E-01	free
+ Mn-54	834.85	99.98	-6.12E-03	2.29E-02	2.29E-02	miss
+ Co-58	810.76	99.45	3.23E-03	2.40E-02	2.40E-02	miss
	1674.73	0.52	1.94E-01		4.81E+00	miss
+ Co-60	1173.23	99.85	5.80E-03	3.36E-02	3.42E-02	miss
	1332.49	99.98	-4.57E-04		3.36E-02	miss
+ Nb-94	702.65	99.81	-1.61E-02	1.55E-02	1.55E-02	miss
	871.09	99.89	-1.95E-03		2.51E-02	miss
+ Sn-113	255.13	2.11	-2.06E-01	2.83E-02	8.24E-01	free
	391.70	64.97	3.58E-03		2.83E-02	free
+ Cs-134	475.36	1.48	2.23E-01	2.21E-02	1.33E+00	miss
	563.25	8.34	-1.33E-02		2.34E-01	miss
	569.33	15.37	5.64E-02		1.72E-01	miss
	604.72	97.62	-1.16E-02		2.21E-02	miss
	795.86	85.46	1.22E-02		3.57E-02	miss
	801.95	8.69	1.20E-01		3.76E-01	miss
	1038.61	0.99	6.36E-01		2.87E+00	miss
	1167.97	1.79	8.16E-01		1.90E+00	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 14-Jul-15-10007
B1-07102-AIJSI-002-OL

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Cs-134	1365.19	3.02	0.00E+00	2.21E-02	8.14E-01	miss
+ Cs-137	661.66	85.10	7.58E-03	3.81E-02	3.81E-02	miss
+ Eu-152	121.78	28.67	-1.16E-02	4.93E-02	4.93E-02	miss
	244.70	7.61	8.48E-02		2.04E-01	miss
	295.94	0.45	-1.37E+00		3.95E+00	miss
	344.28	26.60	-1.30E-02		6.06E-02	miss
	367.79	0.86	1.03E+00		2.51E+00	miss
	411.12	2.24	-2.92E-01		7.93E-01	miss
	443.96	2.83	1.73E-01		6.62E-01	miss
	488.68	0.42	-8.74E-01		4.40E+00	miss
	563.99	0.49	5.01E-01		4.17E+00	miss
	586.26	0.46	2.13E+00		5.53E+00	miss
	678.62	0.47	5.57E-01		4.71E+00	miss
	688.67	0.86	1.09E+00		3.21E+00	miss
	719.35	0.28	1.22E+00		8.31E+00	miss
	778.90	12.96	-9.21E-02		1.56E-01	miss
	810.45	0.32	3.02E-01		6.97E+00	miss
	867.37	4.26	-2.46E-02		6.51E-01	miss
	919.33	0.43	-3.94E-01		5.72E+00	miss
	964.08	14.65	5.81E-02		2.22E-01	miss
	1085.87	10.24	1.09E-03		2.49E-01	miss
	1089.74	1.73	0.00E+00		3.05E-01	miss
	1112.07	13.69	1.86E-02		1.89E-01	miss
	1212.95	1.43	2.66E-01		2.07E+00	miss
	1249.94	0.19	-1.13E+00		1.36E+01	miss
	1299.14	1.63	6.86E-01		2.15E+00	miss
	1408.01	21.07	-1.11E-02		8.16E-02	miss
	1457.64	0.50	-3.83E+00		6.73E+00	miss
	1528.10	0.28	8.52E-01		1.06E+01	miss
+ Eu-154	123.07	40.40	1.22E-02	3.93E-02	3.93E-02	miss
	247.93	6.89	9.07E-02		2.66E-01	miss
	591.76	4.95	-1.44E-02		4.48E-01	miss
	692.42	1.78	-6.54E-01		1.27E+00	miss
	723.30	20.06	1.90E-02		1.42E-01	miss
	756.80	4.52	1.79E-01		5.58E-01	miss
	873.18	12.08	-5.95E-02		1.81E-01	miss
	996.29	10.48	-1.16E-01		2.30E-01	miss
	1004.76	18.01	-1.91E-02		1.34E-01	miss
	1274.43	34.80	-2.54E-02		7.49E-02	miss
	1596.48	1.80	6.83E-03		1.54E+00	miss
+ Eu-155	45.30	1.31	-2.07E+00	6.72E-02	3.00E+00	miss
	60.01	1.22	2.32E-02		4.74E+00	miss
	86.55	30.70	4.85E-03		6.72E-02	miss
	105.31	21.10	2.66E-03		8.17E-02	miss
+ Tl-208	583.19	85.00	-8.35E-04	2.69E-02	2.69E-02	miss
+ Bi-211	351.07	13.02	2.95E-02	1.67E-01	1.67E-01	miss
+ Pb-211	404.85	3.78	4.32E-02	4.64E-01	4.64E-01	miss
	427.09	1.76	-3.52E-01		1.04E+00	miss
	832.01	3.52	-1.53E-02		6.89E-01	miss
+ Bi-212	39.86	1.06	6.28E-01	3.11E-01	4.73E+00	miss
	727.33	6.67	-1.23E-02		3.11E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 14-Jul-15-10007
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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Bi-212	785.37	1.10	-9.39E-02	3.11E-01	1.52E+00	miss
	1620.50	1.47	4.44E-02		2.13E+00	miss
+ Pb-212	115.18	0.60	-1.66E-01	3.85E-02	2.39E+00	miss
	238.63	* 43.60	3.92E-02		3.85E-02	miss
	300.09	3.30	-1.18E-01		6.01E-01	miss
+ Pb212-XR	74.82	10.28	3.41E-01	1.59E-01	3.98E-01	miss
	77.11	17.10	-3.09E-04		1.59E-01	miss
	87.35	3.97	-1.38E-01		4.62E-01	miss
	89.78	1.46	8.97E-01		1.46E+00	miss
+ Bi-214	609.32	45.49	5.54E-02	7.55E-02	7.55E-02	miss
	768.36	4.89	7.81E-02		4.96E-01	miss
	806.18	1.26	7.09E-01		2.27E+00	miss
	934.06	3.11	2.86E-01		8.97E-01	miss
	1120.29	14.92	-4.00E-02		1.43E-01	miss
	1155.21	1.63	1.69E-01		1.49E+00	miss
	1238.12	5.83	5.21E-03		3.93E-01	miss
	1280.98	1.43	-4.77E-01		1.82E+00	miss
	1377.67	3.99	7.40E-02		6.92E-01	miss
	1385.31	0.79	-5.40E-01		2.14E+00	miss
	1401.52	1.33	5.37E-01		2.10E+00	miss
	1407.99	2.39	-9.76E-02		7.18E-01	miss
	1509.21	2.13	1.57E-01		1.39E+00	miss
	1661.27	1.05	-4.13E-01		2.36E+00	miss
	1729.59	2.88	-1.13E-01		8.87E-01	miss
	1764.49	15.30	2.85E-02		2.57E-01	miss
	1847.43	2.03	4.29E-01		2.00E+00	miss
>	2118.51	1.16	0.00E+00		0.00E+00	miss
+ Pb-214	241.99	7.25	2.17E-02	6.35E-02	2.22E-01	miss
	295.22	18.42	7.58E-03		1.05E-01	miss
	351.93	35.60	1.46E-02		6.35E-02	miss
	785.96	1.06	2.12E-01		1.58E+00	miss
+ Pb214-XR	74.82	5.80	6.05E-01	2.81E-01	7.05E-01	miss
	77.11	9.70	-5.45E-04		2.81E-01	miss
	87.35	2.24	-2.44E-01		8.18E-01	miss
	89.78	0.82	1.60E+00		2.61E+00	miss
+ Ra-226	186.21	3.64	1.84E-01	4.90E-01	4.90E-01	miss
+ Ac-228	129.07	2.42	2.02E-02	9.43E-02	6.22E-01	miss
	209.25	3.89	-6.57E-02		3.88E-01	miss
	270.24	3.46	-1.95E-01		5.13E-01	miss
	328.00	2.95	-1.29E-01		5.82E-01	miss
	338.32	11.27	-5.06E-02		1.80E-01	miss
	409.46	1.92	3.19E-02		1.02E+00	miss
	463.00	4.40	-2.31E-02		4.04E-01	miss
	794.95	4.25	1.70E-01		6.93E-01	miss
	911.20	25.80	1.23E-02		9.43E-02	miss
	964.77	4.99	9.93E-02		6.00E-01	miss
	968.97	15.80	1.71E-02		1.71E-01	miss
	1588.20	3.22	-4.56E-02		7.41E-01	miss
+ Pa-231	27.36	10.30	0.00E+00	5.48E-02	5.48E-02	miss
	283.69	1.70	-8.07E-02		1.06E+00	miss
	300.07	2.47	-1.58E-01		8.03E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 14-Jul-15-10007
B1-07102-AIJSI-002-OL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Pa-231	302.65	2.20	5.54E-02	5.48E-02	9.41E-01	miss
		330.06	1.40	-2.15E-01		1.33E+00	miss
+	Th-234	92.38	2.13	7.27E-01	1.05E+00	1.05E+00	miss
		92.80	2.10	7.66E-01		1.10E+00	miss
		112.81	0.21	8.66E-01		8.26E+00	miss
+	U-235	143.76	10.96	-4.89E-02	3.61E-02	1.19E-01	miss
		163.33	5.08	-1.40E-01		2.53E-01	miss
		185.71	57.20	3.42E-02		3.61E-02	miss
		202.11	1.08	8.37E-02		1.28E+00	miss
		205.31	5.01	2.72E-02		3.21E-01	miss
+	Am-241	59.54	35.90	1.42E-02	1.63E-01	1.63E-01	miss

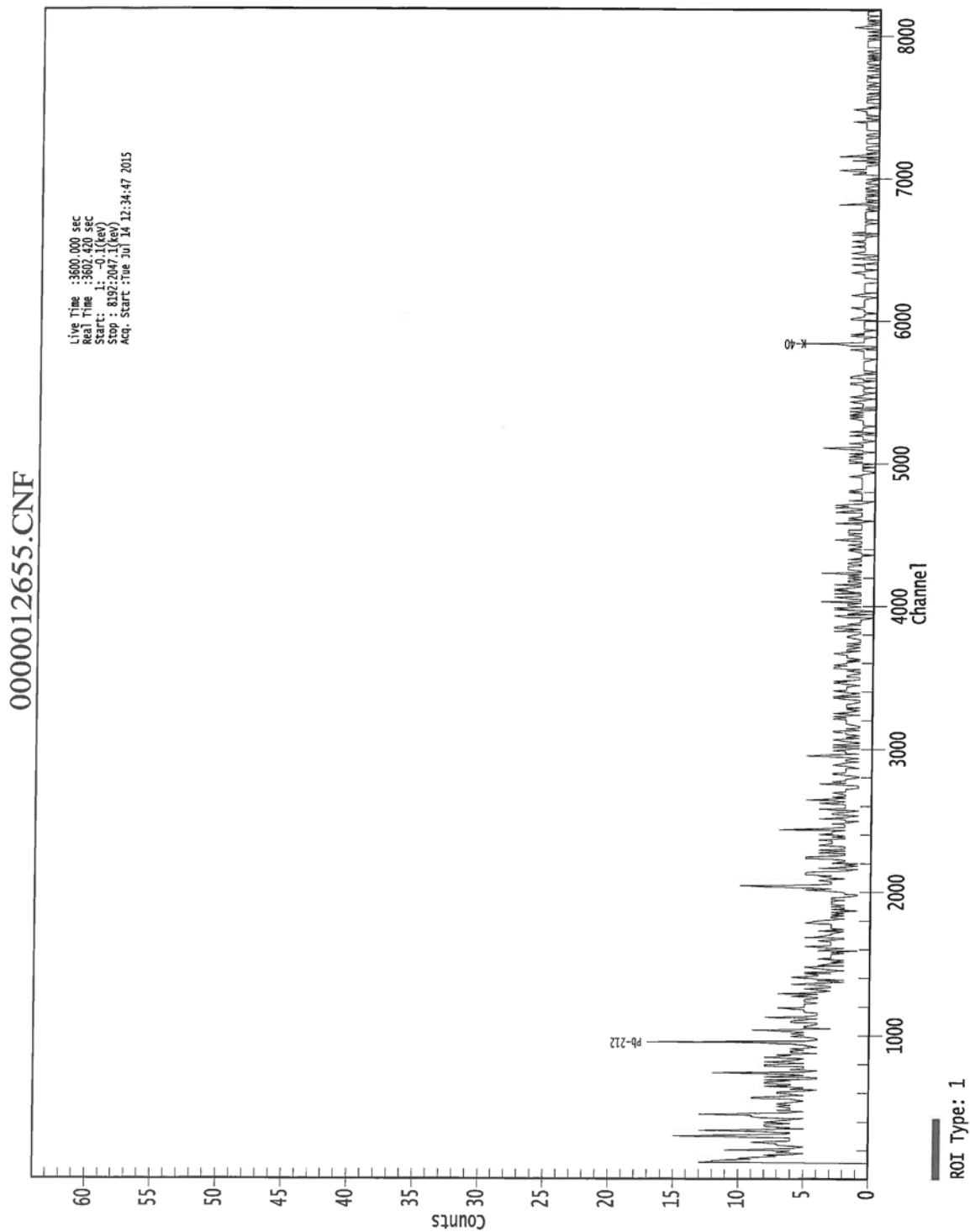
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 15-Jul-15-10001
B1-07102-AIJSI-003-OL

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 15-Jul-15-10001
Sample Description	: B1-07102-AIJSI-003-OL
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 4.554E+02 mL
Facility	: Default
Sample Taken On	: 7/14/2015 10:00:00AM
Acquisition Started	: 7/15/2015 7:32:58AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 10800.0 seconds
Real Time	: 10807.5 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 12672

M. Schu 7/15/15

g.R. W. H.
7-15-15

7-15-15

PEAK WITH NID REPORT

Peak Analysis Performed on : 7/15/2015 10:33:14AM

Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10001

B1-07102-AIJSI-003-OL

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	75.00	297 -	304	301.01	8.95E+01	35.36	1.91E+02	Pb214-XR Pb212-XR
2	198.28	785 -	798	793.46	5.78E+01	39.01	2.32E+02	.....
3	253.10	1009 -	1017	1012.47	2.20E+01	23.99	1.14E+02	.....
4	510.80	2033 -	2052	2042.32	2.19E+02	42.24	1.51E+02	.....
5	609.20	2430 -	2440	2435.67	4.18E+01	23.81	9.45E+01	Bi-214
6	1460.52	5832 -	5852	5841.85	1.06E+02	22.94	2.08E+01	K-40
7	1764.13	7051 -	7064	7057.89	1.88E+01	10.79	1.04E+01	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	6.79E-01	1.59E-01	miss
Bi-214	0.99	609.32 *	45.49	3.40E-02	1.98E-02	miss
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	9.79E-02	5.67E-02	miss
		1847.43	2.03			
		2118.51	1.16			

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10001

B1-07102-AIJSI-003-OL

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.994	6.79E-01	1.59E-01	
Bi-214	0.999	4.10E-02	1.87E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10001
B1-07102-AIJSI-003-OL

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/15/2015 10:33:14AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	75.00	8.28679E-03	19.76	Tol.	Pb212-XR Pb214-XR
2	198.28	5.35281E-03	33.74		
3	253.10	2.04143E-03	54.40		
4	510.80	2.03124E-02	9.63 AP		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	* 10.66	6.79E-01	1.25E-01	1.25E-01	miss
+	Cr-51	320.08	9.91	2.29E-03	8.29E-02	8.29E-02	free
+	Mn-54	834.85	99.98	3.84E-03	1.14E-02	1.14E-02	miss
+	Co-58	810.76	99.45	-9.32E-04	1.01E-02	1.01E-02	miss
		1674.73	0.52	4.28E-01	1.95E+00	1.95E+00	miss
+	Co-60	1173.23	99.85	-1.41E-03	1.32E-02	1.41E-02	miss
		1332.49	99.98	6.06E-03	1.32E-02	1.32E-02	miss
+	Nb-94	702.65	99.81	-3.32E-03	1.05E-02	1.05E-02	miss
		871.09	99.89	-4.92E-03	1.10E-02	1.10E-02	miss
+	Sn-113	255.13	2.11	1.93E-02	1.32E-02	3.74E-01	free
		391.70	64.97	-1.68E-03	1.32E-02	1.32E-02	free
+	Cs-134	475.36	1.48	-1.16E-01	8.72E-03	6.09E-01	miss
		563.25	8.34	-5.98E-03		1.13E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for 15-Jul-15-10001 7/15/2015 10:33:45AM Page 5 of 7

B1-07102-AIJSI-003-OL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr		
	Cs-134	569.33	15.37	1.53E-02	8.72E-03	6.58E-02	miss		
		604.72	97.62	-2.95E-03		1.10E-02	miss		
		795.86	85.46	-5.35E-03		8.72E-03	miss		
		801.95	8.69	4.57E-02		1.44E-01	miss		
		1038.61	0.99	-4.59E-01		9.49E-01	miss		
		1167.97	1.79	-4.18E-01		7.14E-01	miss		
		1365.19	3.02	-7.16E-02		3.42E-01	miss		
		661.66	85.10	4.75E-03		1.28E-02	miss		
+	Cs-137				1.28E-02				
+	Eu-152	121.78	28.67	8.70E-03	2.68E-02	2.68E-02	miss		
		244.70	7.61	1.03E-02		9.65E-02	miss		
		295.94	0.45	1.97E-01		2.06E+00	miss		
		344.28	26.60	4.25E-03		3.24E-02	miss		
		367.79	0.86	-8.60E-02		1.02E+00	miss		
		411.12	2.24	-9.97E-03		4.01E-01	miss		
		443.96	2.83	2.46E-03		3.31E-01	miss		
		488.68	0.42	6.43E-01		2.33E+00	miss		
		563.99	0.49	6.37E-02		1.82E+00	miss		
		586.26	0.46	-2.47E-01		2.34E+00	miss		
		678.62	0.47	-4.59E-01		1.86E+00	miss		
		688.67	0.86	1.30E-02		1.18E+00	miss		
		719.35	0.28	-7.55E-01		3.51E+00	miss		
		778.90	12.96	-2.50E-02		8.16E-02	miss		
		810.45	0.32	-1.21E+00		2.84E+00	miss		
		867.37	4.26	-3.64E-02		2.62E-01	miss		
		919.33	0.43	7.04E-01		2.66E+00	miss		
		964.08	14.65	-2.41E-03		7.24E-02	miss		
		1085.87	10.24	6.04E-02		1.38E-01	miss		
		1089.74	1.73	2.53E-01		7.40E-01	miss		
		1112.07	13.69	-9.27E-03		8.79E-02	miss		
		1212.95	1.43	9.53E-02		9.87E-01	miss		
		1249.94	0.19	1.25E+00		6.70E+00	miss		
		1299.14	1.63	-8.55E-02		7.26E-01	miss		
		1408.01	21.07	1.57E-02		6.36E-02	miss		
		1457.64	0.50	-1.61E+00		3.05E+00	miss		
		1528.10	0.28	6.75E-01		4.00E+00	miss		
+		Eu-154	123.07	40.40		2.62E-03	1.81E-02	1.81E-02	miss
			247.93	6.89		8.34E-03		1.20E-01	miss
			591.76	4.95		-4.08E-02		2.00E-01	miss
			692.42	1.78		3.26E-02		6.03E-01	miss
			723.30	20.06		2.43E-03		5.41E-02	miss
	756.80		4.52	-6.93E-03	2.09E-01	miss			
	873.18		12.08	3.29E-02	9.68E-02	miss			
	996.29		10.48	3.42E-02	1.09E-01	miss			
	1004.76		18.01	-1.27E-02	5.70E-02	miss			
	1274.43		34.80	3.99E-03	3.58E-02	miss			
	1596.48	1.80	-1.14E-01	5.77E-01	miss				
+	Eu-155	45.30	1.31	-2.10E-01	3.38E-02	1.87E+00	miss		
		60.01	1.22	-1.10E+00		1.86E+00	miss		
		86.55	30.70	3.40E-03		3.38E-02	miss		
		105.31	21.10	-5.15E-03		3.87E-02	miss		
+	Tl-208	583.19	85.00	4.49E-03	1.42E-02	1.42E-02	miss		

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10001
B1-07102-AIJS-003-OL

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	Bi-211	351.07	13.02	-2.47E-02	6.45E-02	6.45E-02	miss
+	Pb-211	404.85	3.78	-4.42E-02	2.29E-01	2.29E-01	miss
		427.09	1.76	-9.18E-02		4.73E-01	miss
		832.01	3.52	-2.45E-02		2.63E-01	miss
+	Bi-212	39.86	1.06	2.92E-02	1.60E-01	2.31E+00	miss
		727.33	6.67	2.83E-02		1.60E-01	miss
		785.37	1.10	-5.82E-02		8.57E-01	miss
		1620.50	1.47	-1.23E-01		6.08E-01	miss
+	Pb-212	115.18	0.60	6.97E-01	2.19E-02	1.32E+00	miss
		238.63	43.60	1.82E-02		2.19E-02	miss
		300.09	3.30	2.00E-02		2.59E-01	miss
+	Pb212-XR	74.82	10.28	2.66E-01	7.71E-02	1.97E-01	miss
		77.11	17.10	3.58E-03		7.71E-02	miss
		87.35	3.97	-2.22E-02		2.43E-01	miss
		89.78	1.46	1.67E-01		6.56E-01	miss
+	Bi-214	609.32	* 45.49	3.40E-02	2.90E-02	2.90E-02	miss
		768.36	4.89	1.14E-01		2.62E-01	miss
		806.18	1.26	2.39E-01		1.02E+00	miss
		934.06	3.11	6.40E-02		4.03E-01	miss
		1120.29	14.92	4.21E-02		1.12E-01	miss
		1155.21	1.63	2.11E-01		8.52E-01	miss
		1238.12	5.83	-1.49E-03		2.33E-01	miss
		1280.98	1.43	4.32E-01		1.10E+00	miss
		1377.67	3.99	9.23E-02		3.69E-01	miss
		1385.31	0.79	3.59E-01		1.38E+00	miss
		1401.52	1.33	1.21E-01		8.32E-01	miss
		1407.99	2.39	1.38E-01		5.60E-01	miss
		1509.21	2.13	-2.38E-01		4.33E-01	miss
		1661.27	1.05	2.27E-01		1.26E+00	miss
		1729.59	2.88	1.70E-01		4.74E-01	miss
		1764.49	* 15.30	9.79E-02		6.90E-02	miss
		1847.43	2.03	4.56E-02		5.71E-01	miss
>		2118.51	1.16	0.00E+00		0.00E+00	miss
+	Pb-214	241.99	7.25	-1.51E-02	2.74E-02	1.01E-01	miss
		295.22	18.42	4.42E-02		5.67E-02	miss
		351.93	35.60	5.33E-03		2.74E-02	miss
		785.96	1.06	-2.31E-01		8.66E-01	miss
+	Pb214-XR	74.82	5.80	4.72E-01	1.36E-01	3.48E-01	miss
		77.11	9.70	6.31E-03		1.36E-01	miss
		87.35	2.24	-3.93E-02		4.31E-01	miss
		89.78	0.82	2.97E-01		1.17E+00	miss
+	Ra-226	186.21	3.64	1.80E-01	2.46E-01	2.46E-01	miss
+	Ac-228	129.07	2.42	1.48E-02	4.95E-02	2.86E-01	miss
		209.25	3.89	-2.35E-02		1.76E-01	miss
		270.24	3.46	-9.00E-02		2.10E-01	miss
		328.00	2.95	-1.60E-02		2.66E-01	miss
		338.32	11.27	1.14E-02		7.84E-02	miss
		409.46	1.92	-1.14E-01		4.38E-01	miss
		463.00	4.40	4.38E-02		2.17E-01	miss
		794.95	4.25	-7.00E-02		1.83E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10001
B1-07102-AIJSI-003-OL

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Ac-228	911.20	25.80	4.72E-03	4.95E-02	4.95E-02	miss
	964.77	4.99	-2.86E-02		2.06E-01	miss
	968.97	15.80	2.18E-02		8.59E-02	miss
	1588.20	3.22	-6.45E-02		3.42E-01	miss
+ Pa-231	27.36	10.30	0.00E+00	1.56E-02	1.56E-02	miss
	283.69	1.70	-2.88E-02		5.30E-01	miss
	300.07	2.47	2.67E-02		3.45E-01	miss
	302.65	2.20	1.55E-02		4.02E-01	miss
	330.06	1.40	-1.69E-01		5.63E-01	miss
+ Th-234	92.38	2.13	3.13E-01	5.48E-01	5.48E-01	miss
	92.80	2.10	5.69E-01		5.80E-01	miss
	112.81	0.21	1.67E+00		4.16E+00	miss
+ U-235	143.76	10.96	1.48E-02	1.59E-02	6.34E-02	miss
	163.33	5.08	1.68E-02		1.45E-01	miss
	185.71	57.20	1.36E-02		1.59E-02	miss
	202.11	1.08	2.19E-01		6.84E-01	miss
	205.31	5.01	2.36E-02		1.40E-01	miss
+ Am-241	59.54	35.90	-5.65E-03	6.75E-02	6.75E-02	miss

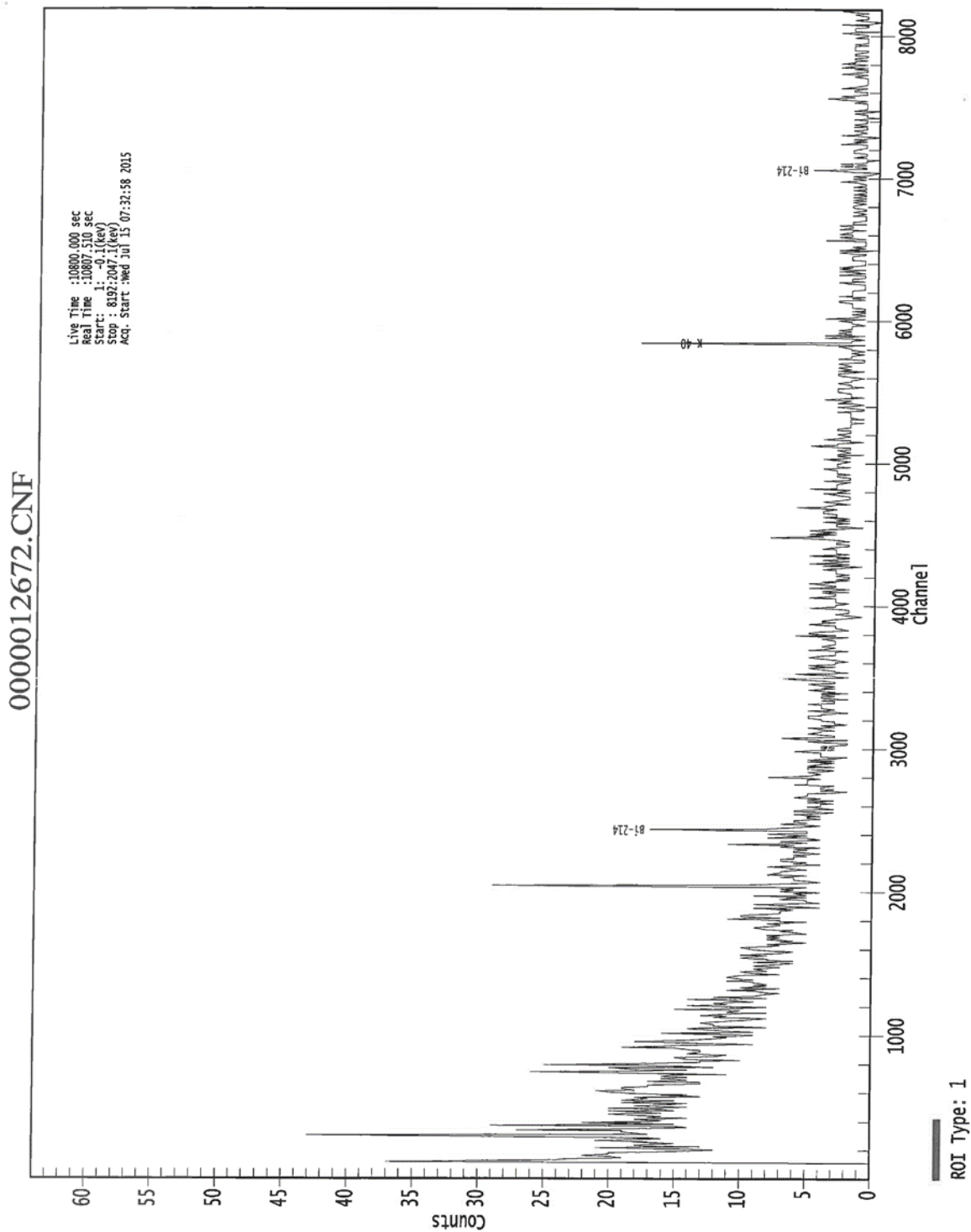
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

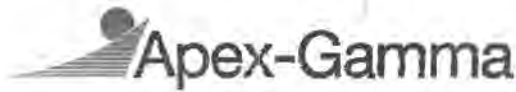
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 23-Jul-15-10006

B1-01701-AIJSI-005-OL MISSING MACHINE

GAMMA SPECTRUM ANALYSIS

Sample Identification : 23-Jul-15-10006
Sample Description : B1-01701-AIJSI-005-OL MISSING MACHINE
Sample Type : Oil
Unit :
Sample Point :
Sample Size : 6.286E+02 mL
Facility : Default
Sample Taken On : 7/16/2015 1:30:00PM
Acquisition Started : 7/23/2015 12:37:48PM
Procedure : 130G Oil
Operator : Administrator
Detector Name : P11314X2
Geometry : 130G Oil
Live Time : 5000.0 seconds
Real Time : 5003.3 seconds
Dead Time : 0.07 %
Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM
Energy Calibration Used Done On : 12/3/2014
Efficiency Calibration Used Done On : 3/31/2014
Efficiency Calibration Description :
Sample Number : 12721

PEAK WITH NID REPORT

Peak Analysis Performed on : 7/23/2015 2:01:16PM
Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192
Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006

B1-01701-AIJSI-005-OL MISSING MACHINE

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	93.00	367 -	375	372.88	2.66E+01	25.71	1.11E+02	Th-234 U235-XR Ac228-XR Th-234
2	510.63	2033 -	2051	2041.62	9.69E+01	27.98	6.82E+01	.....
3	609.40	2430 -	2441	2436.47	1.96E+01	14.33	2.87E+01	Bi-214
4	1460.55	5835 -	5850	5841.97	4.93E+01	16.00	1.35E+01	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	4.96E-01	1.67E-01	miss
Bi-214	1.00	609.32 *	45.49	2.51E-02	1.85E-02	miss
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Ac228-XR	0.99	89.96	1.90			
		93.35 *	3.10	2.74E-01	2.79E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006

B1-01701-AIJSI-005-OL MISSING MACHINE

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
Th-234	0.99	92.38 92.80 112.81	2.13 2.10 0.21	4.94E-01	4.96E-01	miss
U235-XR	0.99	89.96 93.35 105.60	3.47 5.60 1.32	1.52E-01	1.50E-01	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.995	4.96E-01	1.67E-01	
Bi-214	1.000	2.51E-02	1.85E-02	
? Ac228-XR	0.995	2.74E-01	2.79E-01	
? Th-234	0.998	4.94E-01	4.96E-01	
Th-234 U235-XR	0.996	1.52E-01	1.50E-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

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006

B1-01701-AIJSL-005-OL MISSING MACHINE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/23/2015 2:01:16PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	510.63	1.93847E-02	14.43		Am-241

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+ K-40	1460.82	* 10.66	4.96E-01	1.54E-01	1.54E-01	miss
+ Cr-51	320.08	9.91	8.00E-03	1.11E-01	1.11E-01	free
+ Mn-54	834.85	99.98	-4.18E-03	1.17E-02	1.17E-02	miss
+ Co-58	810.76	99.45	-3.29E-03	1.15E-02	1.15E-02	miss
	1674.73	0.52	7.72E-01		2.97E+00	miss
+ Co-60	1173.23	99.85	3.84E-03	1.20E-02	1.53E-02	miss
	1332.49	99.98	-7.58E-03		1.20E-02	miss
+ Nb-94	702.65	99.81	-1.84E-03	1.05E-02	1.17E-02	miss
	871.09	99.89	-9.94E-04		1.05E-02	miss
+ Sn-113	255.13	2.11	-3.42E-02	1.72E-02	4.32E-01	free
	391.70	64.97	3.92E-03		1.72E-02	free
+ Cs-134	475.36	1.48	1.18E-01	1.23E-02	7.77E-01	miss
	563.25	8.34	-4.85E-02		9.33E-02	miss
	569.33	15.37	-5.43E-03		6.81E-02	miss
	604.72	97.62	1.67E-04		1.23E-02	miss
	795.86	85.46	-1.54E-03		1.37E-02	miss
	801.95	8.69	-3.51E-02		1.22E-01	miss
	1038.61	0.99	-1.22E-01		1.29E+00	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006
B1-01701-AIJSL-005-OL MISSING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Cs-134	1167.97	1.79	2.48E-01	1.23E-02	8.55E-01	miss
	1365.19	3.02	-5.33E-02		4.08E-01	miss
+ Cs-137	661.66	85.10	4.64E-03	1.41E-02	1.41E-02	miss
+ Eu-152	121.78	28.67	1.35E-03	2.83E-02	2.83E-02	miss
	244.70	7.61	3.73E-02		1.12E-01	miss
	295.94	0.45	-1.56E-01		2.32E+00	miss
	344.28	26.60	4.62E-03		4.12E-02	miss
	367.79	0.86	-2.00E-02		1.12E+00	miss
	411.12	2.24	-1.06E-01		4.27E-01	miss
	443.96	2.83	1.76E-01		3.84E-01	miss
	488.68	0.42	2.90E-01		2.83E+00	miss
	563.99	0.49	-3.64E-01		1.77E+00	miss
	586.26	0.46	-3.19E-01		2.05E+00	miss
	678.62	0.47	4.08E-01		2.67E+00	miss
	688.67	0.86	-2.32E-01		1.44E+00	miss
	719.35	0.28	1.07E+00		4.56E+00	miss
	778.90	12.96	-5.34E-02		6.39E-02	miss
	810.45	0.32	-1.28E+00		3.12E+00	miss
	867.37	4.26	1.25E-01		3.62E-01	miss
	919.33	0.43	7.85E-01		3.02E+00	miss
	964.08	14.65	-3.33E-02		8.68E-02	miss
	1085.87	10.24	-2.87E-02		1.20E-01	miss
	1089.74	1.73	3.04E-01		9.14E-01	miss
	1112.07	13.69	3.32E-02		1.12E-01	miss
	1212.95	1.43	2.82E-02		9.27E-01	miss
	1249.94	0.19	-2.17E+00		6.64E+00	miss
	1299.14	1.63	2.07E-01		1.01E+00	miss
	1408.01	21.07	5.56E-03		7.44E-02	miss
	1457.64	0.50	-2.47E+00		3.20E+00	miss
	1528.10	0.28	5.64E-02		3.67E+00	miss
+ Eu-154	123.07	40.40	5.61E-03	2.20E-02	2.20E-02	miss
	247.93	6.89	1.04E-02		1.30E-01	miss
	591.76	4.95	-2.27E-02		2.31E-01	miss
	692.42	1.78	9.17E-02		6.97E-01	miss
	723.30	20.06	-1.10E-02		6.15E-02	miss
	756.80	4.52	-5.01E-02		2.71E-01	miss
	873.18	12.08	1.24E-02		1.08E-01	miss
	996.29	10.48	-8.95E-03		1.18E-01	miss
	1004.76	18.01	3.82E-03		6.47E-02	miss
	1274.43	34.80	9.96E-04		3.93E-02	miss
	1596.48	1.80	-2.93E-01		4.72E-01	miss
+ Eu-155	45.30	1.31	-6.76E-01	3.74E-02	1.85E+00	miss
	60.01	1.22	-9.52E-01		2.33E+00	miss
	86.55	30.70	-1.00E-02		3.74E-02	miss
	105.31	21.10	2.65E-02		4.66E-02	miss
+ Tl-208	583.19	85.00	5.97E-03	1.52E-02	1.52E-02	miss
+ Bi-211	351.07	13.02	1.79E-02	8.77E-02	8.77E-02	miss
+ Pb-211	404.85	3.78	-5.25E-02	2.43E-01	2.43E-01	miss
	427.09	1.76	-2.89E-02		5.28E-01	miss
	832.01	3.52	-1.71E-02		3.86E-01	miss
+ Bi-212	39.86	1.06	-8.59E-01	1.56E-01	2.24E+00	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006

B1-01701-AIJSI-005-OL MISSING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Bi-212	727.33	6.67	-4.72E-02	1.56E-01	1.56E-01	miss
	785.37	1.10	-2.41E-01		1.05E+00	miss
	1620.50	1.47	-3.47E-02		7.36E-01	miss
+ Pb-212	115.18	0.60	-9.50E-02	2.48E-02	1.44E+00	miss
	238.63	43.60	1.63E-02		2.48E-02	miss
	300.09	3.30	-8.93E-02		2.88E-01	miss
+ Pb212-XR	74.82	10.28	1.81E-01	9.22E-02	2.17E-01	miss
	77.11	17.10	1.10E-02		9.22E-02	miss
	87.35	3.97	-3.00E-02		2.69E-01	miss
	89.78	1.46	-1.76E-01		7.07E-01	miss
+ Bi-214	609.32	* 45.49	2.51E-02	2.71E-02	2.71E-02	miss
	768.36	4.89	1.86E-02		2.97E-01	miss
	806.18	1.26	-2.63E-01		8.38E-01	miss
	934.06	3.11	-1.77E-01		3.31E-01	miss
	1120.29	14.92	3.65E-02		1.23E-01	miss
	1155.21	1.63	-1.33E-01		8.80E-01	miss
	1238.12	5.83	6.00E-02		2.84E-01	miss
	1280.98	1.43	-9.10E-02		8.89E-01	miss
	1377.67	3.99	3.03E-02		3.09E-01	miss
	1385.31	0.79	1.48E-01		1.56E+00	miss
	1401.52	1.33	-6.69E-02		7.25E-01	miss
	1407.99	2.39	4.89E-02		6.54E-01	miss
	1509.21	2.13	-6.65E-02		5.56E-01	miss
	1661.27	1.05	7.01E-01		1.70E+00	miss
	1729.59	2.88	9.06E-02		5.12E-01	miss
	1764.49	15.30	6.86E-02		1.42E-01	miss
	1847.43	2.03	-8.45E-02		6.82E-01	miss
>	2118.51	1.16	0.00E+00		0.00E+00	miss
+ Pb-214	241.99	7.25	4.62E-02	3.34E-02	1.14E-01	miss
	295.22	18.42	8.94E-03		5.64E-02	miss
	351.93	35.60	1.48E-02		3.34E-02	miss
	785.96	1.06	-6.54E-03		1.14E+00	miss
+ Pb214-XR	74.82	5.80	3.20E-01	1.63E-01	3.85E-01	miss
	77.11	9.70	1.93E-02		1.63E-01	miss
	87.35	2.24	-5.31E-02		4.77E-01	miss
	89.78	0.82	-3.13E-01		1.26E+00	miss
+ Ra-226	186.21	3.64	1.11E-01	2.39E-01	2.39E-01	miss
+ Ac-228	129.07	2.42	4.13E-02	6.86E-02	3.28E-01	miss
	209.25	3.89	1.50E-02		2.16E-01	miss
	270.24	3.46	1.20E-01		2.63E-01	miss
	328.00	2.95	-1.67E-02		3.53E-01	miss
	338.32	11.27	-3.24E-02		8.55E-02	miss
	409.46	1.92	3.88E-01		6.67E-01	miss
	463.00	4.40	-6.39E-02		1.96E-01	miss
	794.95	4.25	-1.55E-02		2.74E-01	miss
	911.20	25.80	3.82E-02		6.86E-02	miss
	964.77	4.99	-2.83E-02		2.68E-01	miss
	968.97	15.80	6.94E-04		9.23E-02	miss
	1588.20	3.22	-1.40E-02		4.28E-01	miss
+ Pa-231	27.36	10.30	0.00E+00	2.45E-02	2.45E-02	miss
	283.69	1.70	2.16E-01		6.09E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10006

B1-01701-AJSL-005-OL MISSING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Pa-231	300.07	2.47	-1.19E-01	2.45E-02	3.84E-01	miss
	302.65	2.20	2.27E-01		4.93E-01	miss
	330.06	1.40	5.48E-02		7.48E-01	miss
+ Th-234	92.38	2.13	5.43E-01	7.69E-01	7.71E-01	miss
	92.80	*	4.94E-01		7.69E-01	miss
	112.81	0.21	-2.43E-01		5.21E+00	miss
+ U-235	143.76	10.96	-1.01E-02	1.37E-02	7.07E-02	miss
	163.33	5.08	3.48E-02		1.50E-01	miss
	185.71	57.20	1.68E-04		1.37E-02	miss
	202.11	1.08	4.98E-02		7.02E-01	miss
	205.31	5.01	8.30E-02		1.80E-01	miss
+ Am-241	59.54	35.90	2.42E-02	8.69E-02	8.69E-02	miss

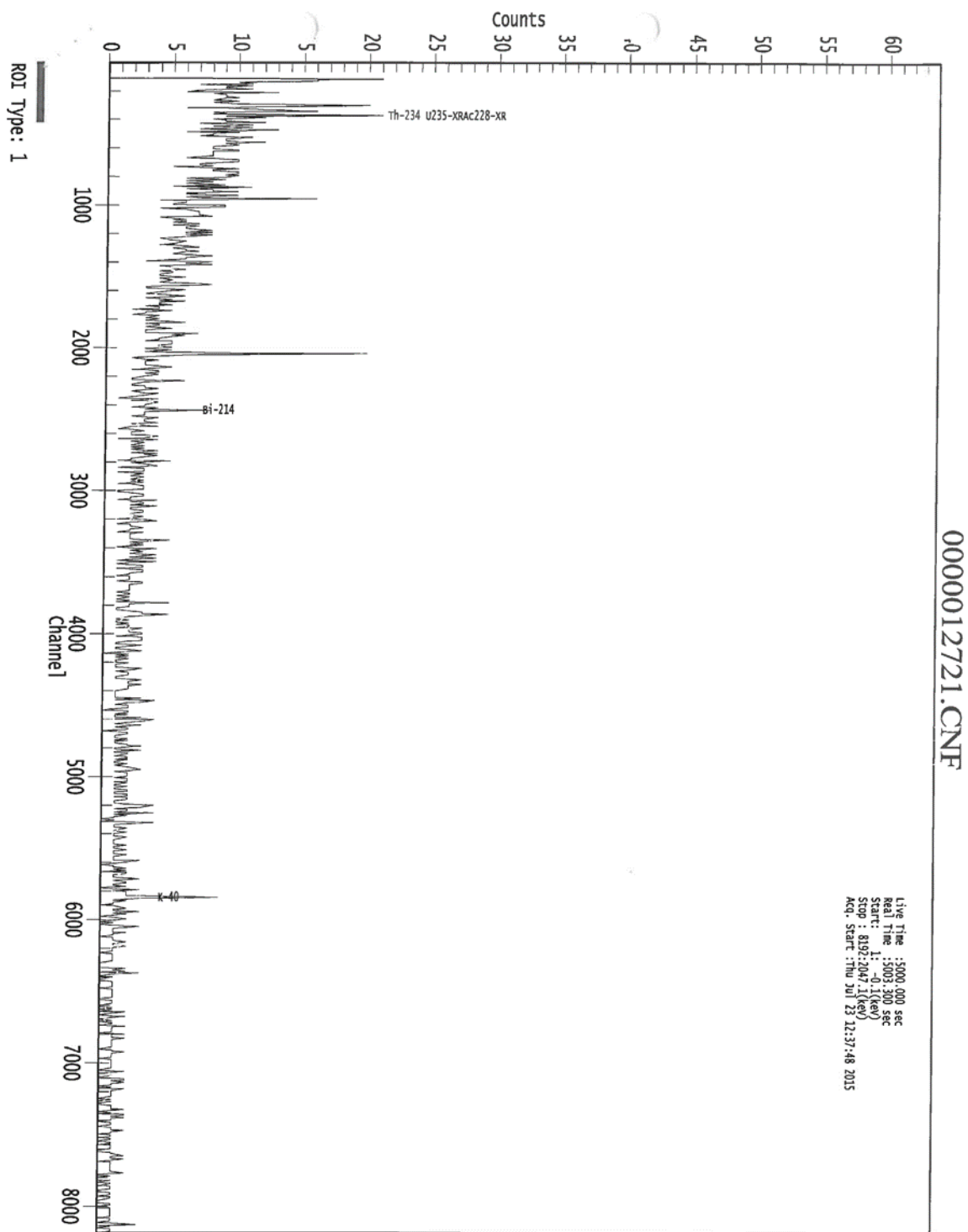
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



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Analysis Report for 23-Jul-15-10007

B1-01701-AIJSI-004-OL MILLING MACHINE

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 23-Jul-15-10007
Sample Description	: B1-01701-AIJSI-004-OL MILLING MACHINE
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 6.336E+02 mL
Facility	: Default
Sample Taken On	: 7/16/2015 1:30:00PM
Acquisition Started	: 7/23/2015 1:24:55PM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P40818B
Geometry	: 130G Oil
Live Time	: 5000.0 seconds
Real Time	: 5001.1 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/9/2014
Efficiency Calibration Used Done On	: 1/5/2015
Efficiency Calibration Description	:
Sample Number	: 12723

PEAK WITH NID REPORT

Peak Analysis Performed on	: 7/23/2015 2:48:20PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10007

B1-01701-AIJSI-004-OL MILLING MACHINE

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	120.58	476 -	485	482.95	4.48E+01	38.63	2.44E+02	.....

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
--------------	---------------	--------------	----------	-------------------	----------------------	------------

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Analysis Report for

23-Jul-15-10007

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B1-01701-AJSL-004-OL MILLING MACHINE

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
<div> <div>?</div> <div>=</div> <div>nuclide is part of an undetermined solution</div> </div> <div> <div>X</div> <div>=</div> <div>nuclide rejected by the interference analysis</div> </div> <div> <div>@</div> <div>=</div> <div>nuclide contains energy lines not used in Weighted Mean Activity</div> </div>				
Errors quoted at 2.000sigma				

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10007

B1-01701-AIJSI-004-OL MILLING MACHINE

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/23/2015 2:48:20PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	120.58	8.95689E-03	43.13		

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

SPN
727-15

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root(Default)\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	10.66	2.72E-01	3.22E-01	3.22E-01	miss
+	Cr-51	320.08	9.91	3.48E-03	1.72E-01	1.72E-01	free
+	Mn-54	834.85	99.98	-2.24E-03	1.46E-02	1.46E-02	miss
+	Co-58	810.76	99.45	-3.19E-03	1.69E-02	1.69E-02	miss
		1674.73	0.52	-4.28E-01		2.00E+00	miss
+	Co-60	1173.23	99.85	-2.89E-04	1.69E-02	1.69E-02	miss
		1332.49	99.98	9.38E-03		2.00E-02	miss
+	Nb-94	702.65	99.81	-4.18E-03	1.38E-02	1.38E-02	miss
		871.09	99.89	-5.19E-04		1.43E-02	miss
+	Sn-113	255.13	2.11	2.97E-01	2.28E-02	7.52E-01	free
		391.70	64.97	2.26E-03		2.28E-02	free
+	Cs-134	475.36	1.48	-9.21E-02	1.36E-02	8.16E-01	miss
		563.25	8.34	-2.06E-02		1.71E-01	miss
		569.33	15.37	1.65E-02		9.95E-02	miss
		604.72	97.62	-1.05E-04		1.36E-02	miss
		795.86	85.46	-1.63E-03		1.88E-02	miss
		801.95	8.69	-2.56E-02		1.69E-01	miss
		1038.61	0.99	0.00E+00		2.55E-01	miss

4 per
table

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10007
B1-01701-AIJSI-004-OL MILLING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Cs-134	1167.97	1.79	-2.42E-01	1.36E-02	7.40E-01	miss
	1365.19	3.02	1.21E-01		5.61E-01	miss
+ Cs-137	661.66	85.10	-6.04E-03	1.26E-02	1.26E-02	miss
+ Eu-152	121.78	28.67	-1.12E-02	5.17E-02	5.17E-02	miss
	244.70	7.61	-4.06E-02		1.79E-01	miss
	295.94	0.45	9.25E-02		3.33E+00	miss
	344.28	26.60	5.66E-03		5.27E-02	miss
	367.79	0.86	4.61E-01		1.63E+00	miss
	411.12	2.24	1.06E-01		6.06E-01	miss
	443.96	2.83	1.04E-01		5.14E-01	miss
	488.68	0.42	3.03E-01		3.49E+00	miss
	563.99	0.49	-3.12E-01		2.89E+00	miss
	586.26	0.46	9.82E-01		3.31E+00	miss
	678.62	0.47	-9.59E-01		2.32E+00	miss
	688.67	0.86	2.45E-01		1.63E+00	miss
	719.35	0.28	-2.06E+00		4.48E+00	miss
	778.90	12.96	-6.20E-03		1.06E-01	miss
	810.45	0.32	3.41E-01		5.18E+00	miss
	867.37	4.26	1.01E-01		3.86E-01	miss
	919.33	0.43	-4.87E-01		3.32E+00	miss
	964.08	14.65	1.71E-02		1.13E-01	miss
	1085.87	10.24	-3.11E-03		1.40E-01	miss
	1089.74	1.73	8.78E-02		7.82E-01	miss
	1112.07	13.69	-5.21E-03		9.31E-02	miss
	1212.95	1.43	7.61E-02		1.31E+00	miss
	1249.94	0.19	2.15E+00		1.01E+01	miss
	1299.14	1.63	-2.23E-01		1.06E+00	miss
	1408.01	21.07	7.01E-03		7.15E-02	miss
	1457.64	0.50	-9.19E-01		4.09E+00	miss
	1528.10	0.28	1.86E+00		6.90E+00	miss
+ Eu-154	123.07	40.40	-1.70E-02	3.83E-02	3.83E-02	miss
	247.93	6.89	4.92E-02		2.01E-01	miss
	591.76	4.95	6.19E-02		3.04E-01	miss
	692.42	1.78	3.16E-02		7.13E-01	miss
	723.30	20.06	-1.74E-02		6.51E-02	miss
	756.80	4.52	-1.04E-02		3.31E-01	miss
	873.18	12.08	-3.22E-02		1.23E-01	miss
	996.29	10.48	-7.66E-03		1.44E-01	miss
	1004.76	18.01	-9.73E-03		7.57E-02	miss
	1274.43	34.80	-4.76E-03		4.61E-02	miss
	1596.48	1.80	-7.07E-02		6.56E-01	miss
+ Eu-155	45.30	1.31	1.20E+00	7.90E-02	6.64E+00	miss
	60.01	1.22	1.74E+00		7.46E+00	miss
	86.55	30.70	8.03E-03		7.90E-02	miss
	105.31	21.10	2.19E-03		8.74E-02	miss
+ Tl-208	583.19	85.00	9.37E-04	1.63E-02	1.63E-02	miss
+ Bi-211	351.07	13.02	-8.13E-03	1.11E-01	1.11E-01	miss
+ Pb-211	404.85	3.78	-2.14E-01	3.43E-01	3.43E-01	miss
	427.09	1.76	1.60E-01		8.03E-01	miss
	832.01	3.52	2.12E-01		4.53E-01	miss
+ Bi-212	39.86	1.06	8.51E-01	2.04E-01	8.03E+00	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10007

B1-01701-AIJSI-004-OL MILLING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Bi-212	727.33	6.67	-9.41E-02	2.04E-01	2.04E-01	miss
	785.37	1.10	7.49E-02		1.20E+00	miss
	1620.50	1.47	6.55E-01		1.52E+00	miss
+ Pb-212	115.18	0.60	5.77E-01	3.64E-02	2.61E+00	miss
	238.63	43.60	2.72E-02		3.64E-02	miss
	300.09	3.30	1.06E-01		4.66E-01	miss
+ Pb212-XR	74.82	10.28	1.94E-01	2.05E-01	4.13E-01	miss
	77.11	17.10	5.12E-02		2.05E-01	miss
	87.35	3.97	-1.08E-01		5.72E-01	miss
	89.78	1.46	-4.90E-02		1.47E+00	miss
+ Bi-214	609.32	45.49	2.84E-02	4.85E-02	4.85E-02	miss
	768.36	4.89	-9.04E-03		2.99E-01	miss
	806.18	1.26	-4.79E-01		1.11E+00	miss
	934.06	3.11	-1.69E-01		4.40E-01	miss
	1120.29	14.92	-1.88E-02		1.04E-01	miss
	1155.21	1.63	-4.98E-03		9.17E-01	miss
	1238.12	5.83	-4.64E-02		2.84E-01	miss
	1280.98	1.43	-4.87E-01		8.03E-01	miss
	1377.67	3.99	2.02E-02		4.93E-01	miss
	1385.31	0.79	-1.43E-01		1.33E+00	miss
	1401.52	1.33	-1.76E-01		9.26E-01	miss
	1407.99	2.39	6.17E-02		6.29E-01	miss
	1509.21	2.13	-4.07E-02		5.29E-01	miss
	1661.27	1.05	-7.86E-02		1.64E+00	miss
	1729.59	2.88	2.18E-01		7.05E-01	miss
	1764.49	15.30	4.10E-02		1.42E-01	miss
	1847.43	2.03	1.22E-02		9.16E-01	miss
>	2118.51	1.16	0.00E+00		0.00E+00	miss
+ Pb-214	241.99	7.25	1.77E-02	4.32E-02	2.00E-01	miss
	295.22	18.42	2.83E-02		8.43E-02	miss
	351.93	35.60	1.09E-02		4.32E-02	miss
	785.96	1.06	2.40E-01		1.25E+00	miss
+ Pb214-XR	74.82	5.80	3.44E-01	3.62E-01	7.31E-01	miss
	77.11	9.70	9.02E-02		3.62E-01	miss
	87.35	2.24	-1.91E-01		1.01E+00	miss
	89.78	0.82	-8.73E-02		2.62E+00	miss
+ Ra-226	186.21	3.64	9.74E-02	3.69E-01	3.69E-01	miss
+ Ac-228	129.07	2.42	-3.13E-01	7.72E-02	5.97E-01	miss
	209.25	3.89	-4.53E-02		3.40E-01	miss
	270.24	3.46	7.48E-02		4.32E-01	miss
	328.00	2.95	2.43E-01		4.84E-01	miss
	338.32	11.27	6.75E-02		1.44E-01	miss
	409.46	1.92	-2.67E-01		6.48E-01	miss
	463.00	4.40	2.89E-02		3.35E-01	miss
	794.95	4.25	1.57E-01		4.15E-01	miss
	911.20	25.80	4.59E-02		7.72E-02	miss
	964.77	4.99	4.76E-02		3.32E-01	miss
	968.97	15.80	3.73E-02		1.13E-01	miss
	1588.20	3.22	1.12E-02		4.71E-01	miss
+ Pa-231	27.36	10.30	-1.48E-01	6.22E-01	8.96E-01	miss
	283.69	1.70	-3.07E-02		8.25E-01	miss

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

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Analysis Report for 23-Jul-15-10007

B1-01701-AIJSI-004-OL MILLING MACHINE

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Pa-231	300.07	2.47	1.41E-01	6.22E-01	6.22E-01	miss
	302.65	2.20	7.28E-02		6.44E-01	miss
	330.06	1.40	3.88E-02		8.38E-01	miss
+ Th-234	92.38	2.13	3.04E-01	1.32E+00	1.32E+00	miss
	92.80	2.10	7.86E-01		1.40E+00	miss
	112.81	0.21	3.46E-01		9.23E+00	miss
+ U-235	143.76	10.96	6.39E-02	2.36E-02	1.39E-01	miss
	163.33	5.08	3.36E-02		2.83E-01	miss
	185.71	57.20	4.02E-03		2.36E-02	miss
	202.11	1.08	1.30E-01		1.25E+00	miss
	205.31	5.01	8.40E-02		2.74E-01	miss
+ Am-241	59.54	35.90	1.28E-01	2.66E-01	2.66E-01	miss

+ = 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

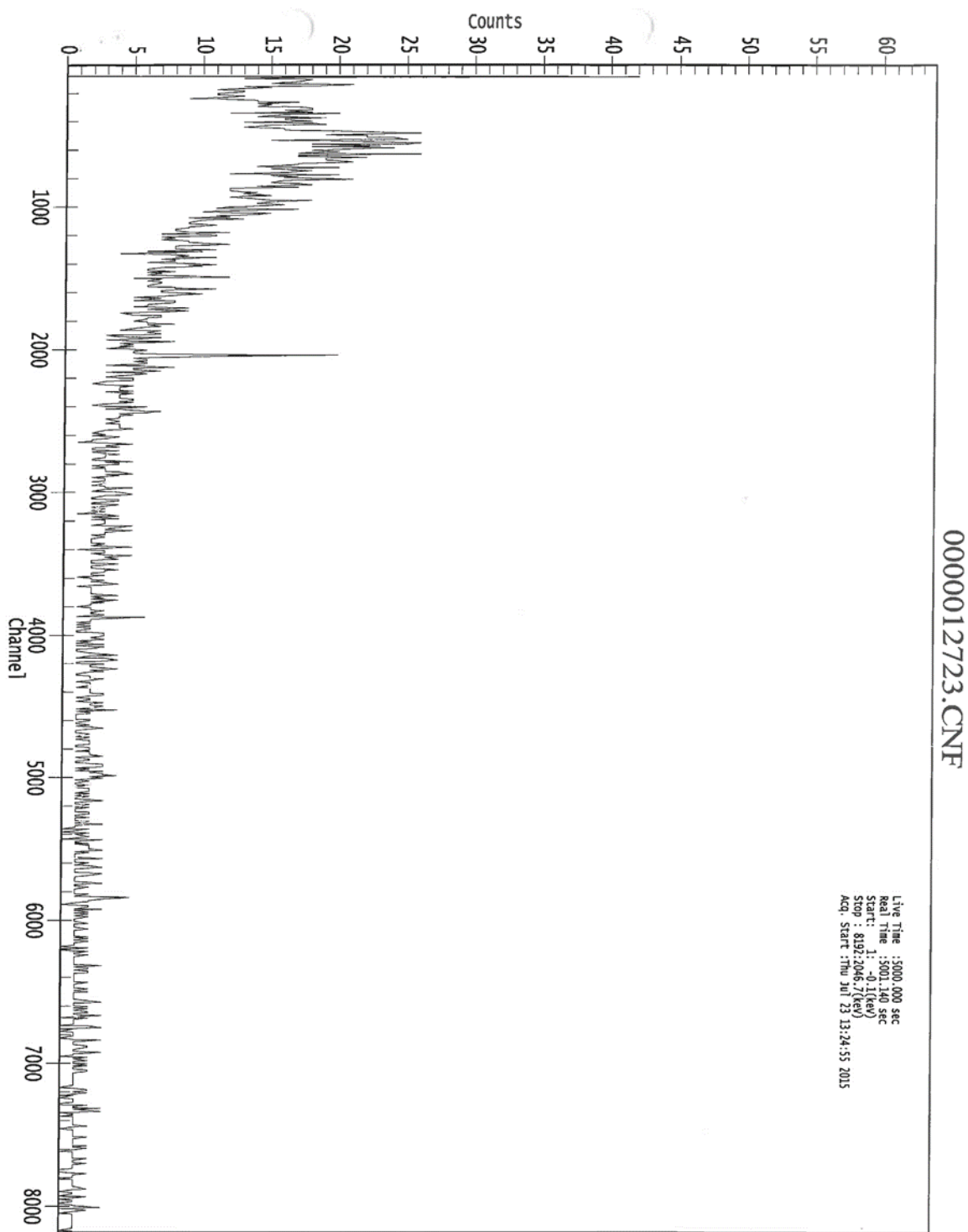
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports



Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

*** GAMMA SPECTRUM ANALYSIS ***

Filename: C:\Canberra\7-28-15\20150728101231.cnf

Report Generated On : 7/28/2015 1:15:32 PM
Sample Title : MM East Wall WSB 592' CF
Sample Description : Grinder Wall
Sample Identification :
Sample Type :
Sample Geometry : LaBr complete
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 1
Sample Taken On : 7/28/2015 10:01:48 AM
Acquisition Started : 7/28/2015 10:01:48 AM
Live Time : 598.7 seconds
Real Time : 600.0 seconds
Dead Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

*Alkan due to Natural
Radioisotopes
CF
7/28/2015*

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *R. Pease*
Date 7-28-15

*Note: See Download survey report : 15-0336 performed on 7/27/15
vb 8/17/2015*

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Peak Analysis Report 7/28/2015 1:15:32 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: MM East Wall
Peak Analysis Performed on: 7/28/2015 1:15:32 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	474-	501	488.29	1455.89	37.41	1.50E+003	129.06	3.36E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2015 15:32 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: MM East Wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/l)	Activity Uncertainty
K-40	0.993	1460.82*	10.66	5.57104E+002	6.81574E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2015 15:32 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/l)	Wt mean Activity Uncertainty
K-40	0.993	5.571039E+002	6.815744E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 7/28/2015 1:15:32 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

include MDA Report

7/28/2015

1: 32 PM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: LaBr complete
Sample Title: MM East Wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/1)	Nuclide MDA (pCi/1)	Activity (pCi/1)	Dec. Level (pCi/1)
	LaBr3	34.70	66.40	4.494E+000	4.49E+000	3.338E+001	2.219E+000
		788.70	33.60	8.784E+000		4.513E+000	4.297E+000
		1436.80	66.40	1.019E+001		2.925E+001	5.017E+000
+	K-40	1460.82*	10.66	6.421E+001	6.42E+001	5.571E+002	3.160E+001
	Cr-51	320.08	9.91	1.560E+001	1.56E+001	-3.196E+000	7.648E+000
	Mn-54	834.85	99.98	3.375E+000	3.37E+000	-8.863E-002	1.654E+000
	Co-58	810.76	99.45	3.334E+000	3.33E+000	2.241E+000	1.634E+000
	Co-60	1173.23	99.85	3.291E+000	1.89E+000	-9.108E-001	1.601E+000
		1332.49	99.98	1.887E+000		2.094E-001	8.934E-001
	Nb-94	702.65	99.81	2.029E+000	2.03E+000	7.631E-002	9.857E-001
		871.09	99.89	3.365E+000		-1.396E+000	1.648E+000
	Sn-113	255.13	2.11	8.007E+001	2.55E+000	1.773E+001	3.943E+001
		391.70	64.97	2.554E+000		-2.816E-001	1.251E+000
	Cs-137	661.66	85.10	2.486E+000	2.49E+000	7.176E-001	1.211E+000
	Eu-152	121.78	28.67	7.908E+000	6.73E+000	7.194E+000	3.916E+000
		244.70	7.61	2.335E+001		2.138E+001	1.151E+001
		295.94	0.45	3.619E+002		2.677E+002	1.778E+002
		344.28	26.60	6.726E+000		2.330E+000	3.304E+000
		367.79	0.86	1.981E+002		5.382E+001	9.716E+001
		411.12	2.24	7.599E+001		5.636E+001	3.719E+001
		443.96	2.83	6.046E+001		8.562E+000	2.955E+001
		488.68	0.42	4.178E+002		-3.241E+001	2.039E+002
		563.99	0.49	4.234E+002		-1.809E+002	2.069E+002
		586.26	0.46	4.654E+002		9.858E+001	2.274E+002
		678.62	0.47	4.435E+002		3.381E+001	2.159E+002
		688.67	0.86	2.399E+002		-1.285E+002	1.167E+002
		719.35	0.28	7.599E+002		-8.189E+002	3.695E+002
		778.90	12.96	2.127E+001		6.010E+000	1.039E+001
		810.45	0.32	1.033E+003		6.940E+002	5.062E+002
		867.37	4.26	7.927E+001		1.793E+001	3.882E+001
		919.33	0.43	7.885E+002		6.596E+001	3.858E+002
		964.08	14.65	2.390E+001		-1.705E+000	1.169E+001
		1085.87	10.24	2.904E+001		3.798E-001	1.411E+001
		1089.74	1.73	1.707E+002		-3.673E+001	8.294E+001
		1112.07	13.69	2.254E+001		3.862E+000	1.096E+001
		1212.95	1.43	2.241E+002		-1.296E+001	1.088E+002
		1249.94	0.19	1.516E+003		1.322E+003	7.331E+002
		1299.14	1.63	1.352E+002		1.207E+002	6.460E+001
		1408.01	21.07	1.899E+001		-8.180E+000	9.248E+000
		1457.64	0.50	1.462E+003		6.971E+003	7.203E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.600E+000	5.60E+000	5.094E+000	2.773E+000

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/l)	Nuclide MDA (pCi/l)	Activity (pCi/l)	Dec. Level (pCi/l)
Eu-154	247.93	6.89	2.544E+001	5.60E+000	-5.490E+000	1.254E+001
	591.76	4.95	4.432E+001		1.290E+001	2.166E+001
	692.42	1.78	1.173E+002		1.000E+001	5.707E+001
	723.30	20.06	1.073E+001		-8.643E+000	5.219E+000
	756.80	4.52	5.146E+001		-1.544E+001	2.505E+001
	873.18	12.08	2.788E+001		-1.156E+001	1.365E+001
	996.29	10.48	3.178E+001		1.724E+001	1.552E+001
	1004.76	18.01	1.760E+001		4.172E+000	8.583E+000
	1274.43	34.80	7.109E+000		-6.302E+000	3.416E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	>					
	Eu-155	45.30	1.31	7.30E+000	1.990E+003	1.367E+002
		60.01	1.22		-2.822E+001	1.130E+002
		86.55	30.70		5.363E-001	3.609E+000
		105.31	21.10		-2.333E+000	5.714E+000
Tl-208	583.19	85.00	2.509E+000	2.51E+000	-9.291E-001	1.226E+000
Bi-211	351.07	13.02	1.349E+001	1.35E+001	5.795E+000	6.622E+000
Pb-211	404.85	3.78	4.463E+001	4.46E+001	1.648E+001	2.184E+001
	427.09	1.76	9.633E+001		8.870E+000	4.710E+001
	832.01	3.52	9.591E+001		2.586E+001	4.701E+001
Bi-212	39.86	1.06	3.236E+002	3.24E+001	2.425E+003	1.600E+002
	727.33	6.67	3.243E+001		-1.058E+001	1.577E+001
	785.37	1.10	2.606E+002		4.825E+001	1.274E+002
>	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	3.896E+002	4.13E+000	-8.286E+001	1.929E+002
	238.63	43.60	4.128E+000		5.763E-001	2.036E+000
	300.09	3.30	4.794E+001		2.814E+001	2.354E+001
Pb212-XR	74.82	10.28	2.401E+001	1.44E+001	-7.606E+000	1.187E+001
	77.11	17.10	1.435E+001		1.223E+001	7.093E+000
	87.35	3.97	5.600E+001		-4.936E-001	2.769E+001
	89.78	1.46	1.772E+002		1.802E+001	8.776E+001
Bi-214	609.32	45.49	4.886E+000	4.89E+000	2.191E+000	2.387E+000
	768.36	4.89	5.011E+001		-1.130E+002	2.442E+001
	806.18	1.26	2.603E+002		2.596E+002	1.276E+002
	934.06	3.11	1.069E+002		-4.101E+001	5.226E+001
	1120.29	14.92	2.076E+001		-3.649E+000	1.009E+001
	1155.21	1.63	1.999E+002		8.165E+001	9.725E+001
	1238.12	5.83	5.245E+001		2.885E+001	2.542E+001
	1280.98	1.43	1.680E+002		-1.482E+002	8.062E+001
	1377.67	3.99	4.639E+001		-9.696E+001	2.191E+001
	1385.31	0.79	2.766E+002		-4.906E+002	1.318E+002
	1401.52	1.33	2.533E+002		-1.915E+002	1.227E+002
	1407.99	2.39	1.671E+002		-7.199E+001	8.139E+001
	1509.21	2.13	1.253E+002		-5.604E+001	6.005E+001
>	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	2.463E+001	4.94E+000	5.752E+000	1.215E+001
	295.22	18.42	8.786E+000		6.500E+000	4.317E+000
	351.93	35.60	4.941E+000		2.123E+000	2.426E+000

Attachment Figure 2-7 07102A Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/1)	Nuclide MDA (pCi/1)	Activity (pCi/1)	Dec. Level (pCi/1)
Pb-214	785.96	1.06	2.711E+002	4.94E+000	5.019E+001	1.325E+002
Pb214-XR	74.82	5.80	4.256E+001	2.53E+001	-1.348E+001	2.103E+001
	77.11	9.70	2.530E+001		2.157E+001	1.250E+001
	87.35	2.24	9.925E+001		-8.749E-001	4.907E+001
	89.78	0.82	3.155E+002		3.208E+001	1.563E+002
Ra-226	186.21	3.64	4.859E+001	4.86E+001	-8.028E+000	2.400E+001
Ac-228	129.07	2.42	9.081E+001	1.31E+001	6.286E+001	4.496E+001
	209.25	3.89	4.986E+001		-1.359E+000	2.463E+001
	270.24	3.46	4.698E+001		-2.017E+001	2.311E+001
	328.00	2.95	5.908E+001		2.984E+001	2.903E+001
	338.32	11.27	1.585E+001		1.184E+001	7.787E+000
	409.46	1.92	8.763E+001		-8.241E+000	4.288E+001
	463.00	4.40	4.009E+001		2.057E+001	1.959E+001
	794.95	4.25	7.284E+001		4.448E+001	3.567E+001
	911.20	25.80	1.310E+001		2.478E+000	6.410E+000
	964.77	4.99	7.020E+001		-5.008E+000	3.434E+001
	968.97	15.80	2.213E+001		-9.204E-001	1.082E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.562E+001		4.359E+001	4.701E+001
	300.07	2.47	6.404E+001		3.759E+001	3.145E+001
	302.65	2.20	7.233E+001		4.246E+001	3.552E+001
	330.06	1.40	1.245E+002		2.436E+001	6.118E+001
Th-234	92.38	2.13	1.202E+002	1.20E+002	-4.353E+001	5.955E+001
	92.80	2.10	1.217E+002		-4.408E+001	6.029E+001
	112.81	0.21	1.123E+003		1.811E+002	5.560E+002
U-235	143.76	10.96	1.864E+001	3.11E+000	-6.422E+000	9.225E+000
	163.33	5.08	3.759E+001		7.458E+000	1.859E+001
	185.71	57.20	3.109E+000		-1.816E+000	1.535E+000
	202.11	1.08	1.790E+002		5.950E+001	8.848E+001
	205.31	5.01	3.862E+001		7.325E+000	1.908E+001
Am-241	59.54	35.90	7.877E+000	7.88E+000	-9.703E-001	3.887E+000

+ = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



10/1/2014 11:41:39AM

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 01-Oct-14-10002
Sample Description	: ESBRI002 Sediment 10/01/14 10:00 630.78 Grams
Sample Type	: 1L 130G Soil Sample
Unit	:
Sample Point	:
Sample Size	: 6.307E+02 grams
Facility	: Default
Sample Taken On	: 10/1/2014 10:00:39AM
Acquisition Started	: 10/1/2014 11:20:34AM
Procedure	: 130G Concrete Crushed
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Concrete Broken
Live Time	: 600.0 seconds
Real Time	: 600.5 seconds
Dead Time	: 0.09 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 5/7/2014
Efficiency Calibration Description	:
Sample Number	: 11178

Total Activity:
Cs-137: 195.5 pCi

M. S.
10-1-14
Man... 10/1/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 10/1/2014 11:30:37AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

10/1/2014 11:41:39AM

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	46.55	181 -	192	187.37	1.19E+02	33.76	1.10E+02	
2	77.11	304 -	315	309.48	3.19E+01	37.32	2.08E+02	Pb214-XR
3	238.78	950 -	961	955.50	9.29E+01	33.43	1.44E+02	Pb212-XR
4	295.27	1176 -	1186	1181.31	3.40E+01	20.53	6.01E+01	Pb-212
5	351.91	1402 -	1415	1407.70	7.84E+01	21.61	3.12E+01	Pb-214
6	477.55	1902 -	1919	1910.01	7.79E+02	57.57	3.53E+01	Bi-214
7	510.41	2037 -	2046	2041.38	1.49E+01	14.94	4.02E+01	BE-7
8	583.16	2326 -	2337	2332.29	4.46E+01	15.88	1.67E+01	Tl-208
9	609.19	2430 -	2443	2436.41	6.32E+01	18.64	1.97E+01	Bi-214
10	661.84	2640 -	2653	2646.99	4.93E+01	17.04	1.95E+01	Cs-137
11	911.17	3639 -	3650	3644.44	3.02E+01	12.31	7.67E+00	Ac-228
12	969.14	3872 -	3881	3876.42	2.44E+01	10.82	5.16E+00	Ac-228
13	1460.87	5835 -	5854	5845.15	1.22E+02	23.59	1.42E+01	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
BE-7	1.00	477.60 *	10.44	3.19E+01	5.01E+00	miss
K-40	1.00	1460.82 *	10.66	1.05E+01	2.24E+00	miss
Cs-137	0.99	661.66 *	85.10	3.10E-01	1.14E-01	miss
Tl-208	1.00	583.19 *	85.00	2.86E-01	1.07E-01	0.924
Pb-212	0.99	115.18	0.60			
		238.63 *	43.60	5.62E-01	2.22E-01	free
		300.09	3.30			
Pb212-XR	1.00	74.82	10.28			
		77.11 *	17.10	8.95E-01	1.06E+00	miss
		87.35	3.97			
		89.78	1.46			
Bi-214	1.00	609.32 *	45.49	7.61E-01	2.42E-01	0.941

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Bi-214	1.00	768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	1.00	241.99	7.25			
		295.22 *	18.42	5.61E-01	3.51E-01	1.000
		351.93 *	35.60	7.54E-01	2.41E-01	free
Pb214-XR	1.00	785.96	1.06			
		74.82	5.80			
		77.11 *	9.70	1.58E+00	1.88E+00	miss
		87.35	2.24			
Ac-228	1.00	89.78	0.82			
		129.07	2.42			
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32	11.27			
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20 *	25.80	7.92E-01	3.30E-01	0.989
		964.77	4.99			
		968.97 *	15.80	1.09E+00	4.94E-01	0.989
		1588.20	3.22			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

10/1/2014 11:41:39AM

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
BE-7	1.000	3.19E+01	5.01E+00	
K-40	1.000	1.05E+01	2.24E+00	
Cs-137	0.998	3.10E-01	1.14E-01	
Tl-208	1.000	2.86E-01	1.07E-01	
X Bi-211	0.956			
Pb-212	0.999	5.62E-01	2.22E-01	
? Pb212-XR	1.000	8.95E-01	1.06E+00	
Bi-214	1.000	7.61E-01	2.42E-01	
Pb-214	1.000	6.93E-01	1.98E-01	
? Pb214-XR	1.000	1.58E+00	1.88E+00	
Ac-228	1.000	8.85E-01	2.75E-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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

10/1/2014 11:41:39AM

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/1/2014 11:30:37AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	46.55	1.98046E-01	14.20		
7	510.41	2.48476E-02	50.09		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	*	10.66	1.05E+01	1.41E+00	miss
+	Cr-51	320.08		9.91	-1.75E-01	6.92E-01	free
+	Mn-54	834.85		99.98	9.23E-03	8.85E-02	miss
+	Co-58	810.76		99.45	2.01E-02	8.72E-02	1.000
		1674.73		0.52	1.93E+00	1.42E+01	1.026
+	Co-60	1173.23		99.85	2.11E-01	2.26E-01	0.941
		1332.49		99.98	1.84E-01	2.29E-01	0.940
+	Nb-94	702.65		99.81	-6.63E-04	6.40E-02	0.937
		871.09		99.89	-3.16E-02	6.40E-02	0.938
+	Sn-113	255.13		2.11	8.42E-01	1.15E-01	free
		391.70		64.97	1.62E-02	1.15E-01	free
+	Cs-134	475.36		1.48	-3.40E+00	6.13E+00	miss
		563.25		8.34	-1.63E-02	7.81E-01	0.884
		569.33		15.37	-6.46E-02	5.69E-01	0.875
		604.72		97.62	4.14E-02	1.12E-01	0.923
		795.86		85.46	3.10E-02	1.22E-01	0.925
		801.95		8.69	1.85E-01	1.12E+00	0.886

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	1038.61	0.99	-1.31E+00	1.12E-01	7.30E+00	0.936
	1167.97	1.79	3.45E-01		4.84E+00	1.091
	1365.19	3.02	7.14E-01		2.73E+00	1.142
+	Cs-137	661.66 *	85.10	3.10E-01	1.17E-01	miss
+	Eu-152	121.78	28.67	1.09E-01	2.73E-01	0.928
		244.70	7.61	1.83E-01	1.08E+00	0.924
		295.94	0.45	5.10E-01	2.49E+01	miss
		344.28	26.60	1.17E-01	3.20E-01	0.953
		367.79	0.86	-6.37E-01	7.49E+00	0.870
		411.12	2.24	9.37E-01	4.08E+00	0.897
		443.96	2.83	-4.34E-01	2.46E+00	0.924
		488.68	0.42	2.75E+00	1.46E+01	miss
		563.99	0.49	4.68E+00	1.59E+01	0.924
		586.26	0.46	8.51E-01	1.72E+01	0.935
		678.62	0.47	1.16E+00	1.73E+01	0.873
		688.67	0.86	-4.67E+00	7.08E+00	0.974
		719.35	0.28	1.19E+00	1.89E+01	miss
		778.90	12.96	2.46E-02	6.94E-01	0.938
		810.45	0.32	-4.35E+00	2.16E+01	1.063
		867.37	4.26	-2.94E-01	1.78E+00	0.915
		919.33	0.43	4.52E+00	2.41E+01	0.975
		964.08	14.65	1.46E-01	6.03E-01	1.029
		1085.87	10.24	8.15E-02	1.01E+00	1.023
		1089.74	1.73	-1.10E+00	4.95E+00	0.945
		1112.07	13.69	-5.12E-01	7.94E-01	0.988
		1212.95	1.43	3.41E+00	9.80E+00	0.916
		1249.94	0.19	1.24E+01	5.16E+01	1.107
		1299.14	1.63	6.34E-01	5.15E+00	0.936
		1408.01	21.07	9.32E-02	5.22E-01	0.978
		1457.64	0.50	-2.08E+01	2.94E+01	1.083
		1528.10	0.28	0.00E+00	9.12E+00	1.004
+	Eu-154	123.07	40.40	-2.21E-02	1.83E-01	0.927
		247.93	6.89	6.43E-02	9.38E-01	0.917
		591.76	4.95	-2.89E-01	1.03E+00	0.903
		692.42	1.78	1.54E+00	6.09E+00	0.926
		723.30	20.06	1.53E-02	3.68E-01	0.926
		756.80	4.52	5.28E-01	2.16E+00	0.902
		873.18	12.08	-1.45E-02	6.98E-01	0.921
		996.29	10.48	-1.20E-01	7.50E-01	0.971
		1004.76	18.01	1.59E-01	5.74E-01	0.972
		1274.43	34.80	1.87E-02	2.64E-01	0.976
		1596.48	1.80	6.59E-02	4.28E+00	1.192
+	Eu-155	45.30	1.31	-3.69E+01	3.77E-01	0.998
		60.01	1.22	1.88E+00	2.68E+01	1.000
		86.55	30.70	5.58E-02	3.77E-01	free
		105.31	21.10	2.28E-01	4.29E-01	1.000
+	Tl-208	583.19 *	85.00	2.86E-01	1.05E-01	0.924
+	Bi-211	351.07 *	13.02	2.06E+00	6.08E-01	miss
+	Pb-211	404.85	3.78	4.42E-01	1.96E+00	miss
		427.09	1.76	-5.92E-01	3.73E+00	miss
		832.01	3.52	2.96E-02	2.51E+00	miss

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10002

ESBRI002 Sediment 10/01/14 10:00 630.78 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	Bi-212	39.86	1.06	2.45E+00	1.91E+00	2.67E+01	0.998
		727.33	6.67	1.15E+00		1.91E+00	0.980
		785.37	1.10	9.95E-01		9.24E+00	0.937
		1620.50	1.47	4.82E-01		4.97E+00	1.007
+	Pb-212	115.18	0.60	3.14E+00	2.88E-01	1.24E+01	miss
		238.63	* 43.60	5.62E-01		2.88E-01	free
		300.09	3.30	1.42E+00		3.03E+00	free
+	Pb212-XR	74.82	10.28	1.54E+00	1.72E+00	2.19E+00	miss
		77.11	* 17.10	8.95E-01		1.72E+00	miss
		87.35	3.97	2.33E+00		3.12E+00	miss
		89.78	1.46	6.76E+00		8.14E+00	miss
+	Bi-214	609.32	* 45.49	7.61E-01	2.21E-01	2.21E-01	0.941
		768.36	4.89	6.95E-01		2.35E+00	0.935
		806.18	1.26	6.06E-01		7.96E+00	0.914
		934.06	3.11	1.47E+00		3.88E+00	0.937
		1120.29	14.92	5.83E-01		1.17E+00	0.937
		1155.21	1.63	-2.55E-01		6.14E+00	0.936
		1238.12	5.83	1.49E+00		2.91E+00	0.938
		1280.98	1.43	-3.11E+00		4.58E+00	0.938
		1377.67	3.99	-4.07E-02		2.30E+00	1.034
		1385.31	0.79	0.00E+00		3.22E+00	0.938
		1401.52	1.33	8.18E-01		7.70E+00	0.938
		1407.99	2.39	8.55E-01		4.79E+00	0.938
		1509.21	2.13	4.03E-01		4.37E+00	0.944
		1661.27	1.05	2.92E+00		1.05E+01	1.001
		1729.59	2.88	3.22E-01		2.37E+00	1.134
		1764.49	15.30	9.79E-01		1.44E+00	1.002
		1847.43	2.03	1.01E+00		4.71E+00	1.071
>		2118.51	1.16	0.00E+00		0.00E+00	1.046
+	Pb-214	241.99	7.25	9.10E-01	2.22E-01	1.38E+00	1.000
		295.22	* 18.42	5.61E-01		5.04E-01	1.000
		351.93	* 35.60	7.54E-01		2.22E-01	free
		785.96	1.06	2.98E-01		8.53E+00	1.000
+	Pb214-XR	74.82	5.80	2.73E+00	3.03E+00	3.88E+00	miss
		77.11	* 9.70	1.58E+00		3.03E+00	miss
		87.35	2.24	4.13E+00		5.53E+00	miss
		89.78	0.82	1.20E+01		1.45E+01	miss
+	Ra-226	186.21	3.64	1.63E+00	2.42E+00	2.42E+00	free
+	Ac-228	129.07	2.42	1.61E+00	3.09E-01	3.45E+00	0.937
		209.25	3.89	1.59E+00		2.22E+00	0.975
		270.24	3.46	1.58E+00		2.60E+00	0.950
		328.00	2.95	2.60E+00		3.39E+00	0.950
		338.32	11.27	1.21E+00		1.11E+00	0.991
		409.46	1.92	1.13E+00		4.82E+00	0.928
		463.00	4.40	5.35E-01		2.00E+00	0.922
		794.95	4.25	1.11E+00		2.66E+00	0.935
		911.20	* 25.80	7.92E-01		3.09E-01	0.989
		964.77	4.99	7.30E-01		2.00E+00	0.978
		968.97	* 15.80	1.09E+00		4.43E-01	0.989
		1588.20	3.22	4.57E-01		2.83E+00	1.003
+	Pa-231	27.36	10.30	0.00E+00	2.92E-01	2.92E-01	0.996

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

Analysis Report for 01-Oct-14-10002
ESBRI002 Sediment 10/01/14 10:00 630.78 Grams
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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	283.69	1.70	-1.77E+00	2.92E-01	3.91E+00	1.000
	300.07	2.47	2.39E+00		4.14E+00	1.000
	302.65	2.20	-1.42E-01		3.78E+00	1.000
	330.06	1.40	-4.02E+00		4.56E+00	1.000
+ Th-234	92.38	2.13	1.61E+00	5.08E+00	5.08E+00	free
	92.80	2.10	4.46E+00		5.57E+00	free
	112.81	0.21	-6.71E+00		3.51E+01	free
+ U-235	143.76	10.96	-7.62E-02	1.50E-01	6.14E-01	free
	163.33	5.08	-5.27E-01		9.73E-01	free
	185.71	57.20	5.99E-02		1.50E-01	free
	202.11	1.08	-1.74E+00		4.63E+00	miss
+ Am-241	205.31	5.01	2.32E-01	9.55E-01	1.39E+00	free
	59.54	35.90	1.59E-01		9.55E-01	free

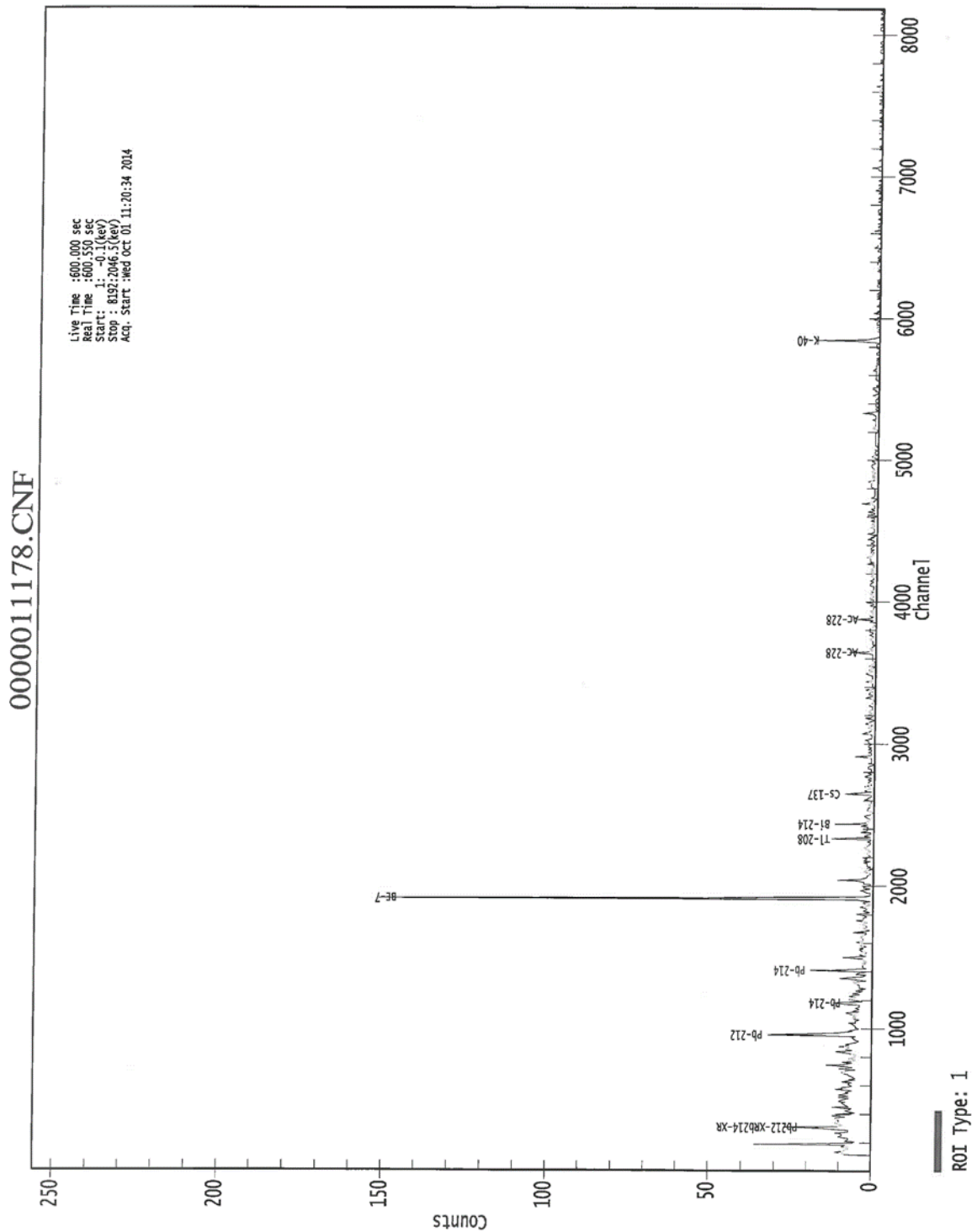
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

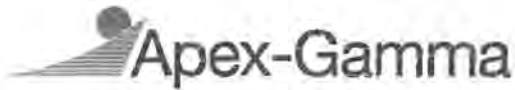
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 01-Oct-14-10001
Sample Description	: ESBRI003 Sediment 10/01/14 10:20 887.06 Grams
Sample Type	: 1L 130G Soil Sample
Unit	:
Sample Point	:
Sample Size	: 8.871E+02 grams
Facility	: Default
Sample Taken On	: 10/1/2014 10:20:23AM
Acquisition Started	: 10/1/2014 10:56:15AM
Procedure	: 130G Concrete Crushed
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Concrete Broken
Live Time	: 600.0 seconds
Real Time	: 600.5 seconds
Dead Time	: 0.09 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 5/7/2014
Efficiency Calibration Description	:
Sample Number	: 11177

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M-S
10-1-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 10/1/2014 11:06:17AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	1	46.58	181 -	190	187.50	6.60E+01	28.08	9.80E+01	Pb-214
	2	74.76	296 -	316	300.09	5.88E+01	20.51	1.20E+02	Pb214-XR
m	3	77.21	296 -	316	309.86	6.75E+01	20.39	9.56E+01	Pb212 XR Pb214 XR Pb212 XR
	4	238.57	950 -	960	954.66	1.67E+02	36.19	1.32E+02	Pb-212
	5	295.37	1176 -	1187	1181.70	6.84E+01	24.52	6.52E+01	Pb-214
	6	338.46	1346 -	1359	1353.93	4.52E+01	20.73	4.36E+01	Eu-152
	7	352.02	1399 -	1414	1408.12	1.16E+02	27.86	6.02E+01	Ac-228
	8	477.63	1901 -	1918	1910.31	6.22E+02	51.44	2.86E+01	Pb-214
	9	510.51	2037 -	2046	2041.79	1.86E+01	14.90	3.47E+01	Bi-211
	10	583.17	2326 -	2338	2332.34	4.84E+01	17.33	2.33E+01	BE-7
	11	609.38	2428 -	2444	2437.18	8.67E+01	19.55	6.56E+00	3.47E+01
	12	911.13	3637 -	3652	3644.27	3.95E+01	14.79	1.31E+01	Tl-208
	13	1460.73	5834 -	5855	5844.57	1.99E+02	28.75	6.03E+00	Bi-214
									Ac-228
									K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
BE-7	1.00	477.60 *	10.44	1.81E+01	2.92E+00	miss
K-40	0.99	1460.82 *	10.66	1.22E+01	2.06E+00	miss
Tl-208	1.00	583.19 *	85.00	2.20E-01	8.33E-02	0.924
Pb-212	1.00	115.18	0.60			
		238.63 *	43.60	7.18E-01	1.94E-01	free
		300.09	3.30			
		74.82 *	10.28	2.13E+00	8.63E-01	miss
Pb212-XR	1.00	77.11 *	17.10	1.34E+00	4.90E-01	miss
		87.35	3.97			
		89.78	1.46			
Bi-214	1.00	609.32 *	45.49	7.43E-01	1.90E-01	0.941

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Bi-214	1.00	768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.99	241.99	7.25			
		295.22 *	18.42	8.04E-01	3.16E-01	1.000
		351.93 *	35.60	7.93E-01	2.29E-01	free
		785.96	1.06			
Ac-228	0.74	129.07	2.42			
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32 *	11.27	9.65E-01	4.70E-01	0.991
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20 *	25.80	7.37E-01	2.83E-01	0.989
		964.77	4.99			
		968.97	15.80			
		1588.20	3.22			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
	BE-7	1.000	1.81E+01	2.92E+00	
	K-40	0.999	1.22E+01	2.06E+00	
	Tl-208	1.000	2.20E-01	8.33E-02	
X	Bi-211	0.945			
	Pb-212	1.000	7.18E-01	1.94E-01	
	Pb212-XR	1.000	1.53E+00	4.26E-01	
	Bi-214	1.000	7.43E-01	1.90E-01	
	Pb-214	0.999	7.97E-01	1.85E-01	
X	Pb214-XR	1.000			
	Ac-228	0.745	7.98E-01	2.43E-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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

10/1/2014 11:17:18AM

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/1/2014 11:06:17AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	46.58	1.09995E-01	21.27		
9	510.51	3.10833E-02	39.96		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	* 10.66	1.22E+01	7.24E-01	7.24E-01	miss
+	Cr-51	320.08	9.91	4.86E-02	5.30E-01	5.30E-01	free
+	Mn-54	834.85	99.98	1.68E-02	6.29E-02	6.29E-02	miss
+	Co-58	810.76	99.45	-4.76E-03	4.08E-02	4.08E-02	1.000
		1674.73	0.52	2.74E+00		1.27E+01	1.026
+	Co-60	1173.23	99.85	4.30E-02	1.03E-01	1.20E-01	0.941
		1332.49	99.98	3.50E-02		1.03E-01	0.940
+	Nb-94	702.65	99.81	2.69E-02	5.27E-02	7.39E-02	0.937
		871.09	99.89	-6.80E-03		5.27E-02	0.938
+	Sn-113	255.13	2.11	-1.07E+00	8.41E-02	2.46E+00	free
		391.70	64.97	3.10E-02		8.41E-02	free
+	Cs-134	475.36	1.48	-1.05E+00	7.21E-02	4.24E+00	miss
		563.25	8.34	3.84E-01		8.70E-01	0.884
		569.33	15.37	1.45E-01		4.44E-01	0.875
		604.72	97.62	3.13E-02		7.21E-02	0.923
		795.86	85.46	4.08E-02		1.16E-01	0.925
		801.95	8.69	2.87E-01		8.46E-01	0.886

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	1038.61	0.99	-3.10E-02	7.21E-02	6.01E+00	0.936
	1167.97	1.79	1.23E+00		4.55E+00	1.091
	1365.19	3.02	0.00E+00		4.89E-01	1.142
+ Cs-137	661.66	85.10	1.08E-01	1.37E-01	1.37E-01	miss
+ Eu-152	121.78	28.67	4.82E-03	2.18E-01	2.18E-01	0.928
	244.70	7.61	1.54E-01		7.41E-01	0.924
	295.94	0.45	2.10E+01		2.11E+01	miss
	344.28	26.60	1.42E-02		2.18E-01	0.953
	367.79	0.86	1.07E+00		6.95E+00	0.870
	411.12	2.24	-1.06E+00		2.56E+00	0.897
	443.96	2.83	-4.41E-02		1.84E+00	0.924
	488.68	0.42	-4.26E+00		9.62E+00	miss
	563.99	0.49	1.35E+00		1.25E+01	0.924
	586.26	0.46	-1.63E+00		1.22E+01	0.935
	678.62	0.47	5.64E-01		1.23E+01	0.873
	688.67	0.86	1.87E+00		7.79E+00	0.974
	719.35	0.28	6.38E+00		2.29E+01	miss
	778.90	12.96	-7.00E-02		2.57E-01	0.938
	810.45	0.32	-3.84E+00		9.43E+00	1.063
	867.37	4.26	1.29E-01		1.76E+00	0.915
	919.33	0.43	1.52E+00		1.06E+01	0.975
	964.08	14.65	7.63E-02		4.61E-01	1.029
	1085.87	10.24	6.79E-02		6.67E-01	1.023
	1089.74	1.73	-1.91E-01		3.92E+00	0.945
	1112.07	13.69	-1.44E-01		4.81E-01	0.988
	1212.95	1.43	5.65E-01		5.76E+00	0.916
	1249.94	0.19	4.60E+00		3.95E+01	1.107
	1299.14	1.63	0.00E+00		1.07E+00	0.936
	1408.01	21.07	9.72E-02		4.05E-01	0.978
	1457.64	0.50	-9.27E+00		2.26E+01	1.083
	1528.10	0.28	1.71E+00		1.76E+01	1.004
+ Eu-154	123.07	40.40	8.09E-03	1.53E-01	1.53E-01	0.927
	247.93	6.89	2.44E-01		8.05E-01	0.917
	591.76	4.95	5.92E-02		1.25E+00	0.903
	692.42	1.78	-1.23E+00		2.57E+00	0.926
	723.30	20.06	-1.34E-01		2.02E-01	0.926
	756.80	4.52	1.79E-01		1.44E+00	0.902
	873.18	12.08	4.82E-02		4.45E-01	0.921
	996.29	10.48	-1.32E-01		5.33E-01	0.971
	1004.76	18.01	1.36E-01		4.34E-01	0.972
	1274.43	34.80	4.99E-02		2.10E-01	0.976
	1596.48	1.80	0.00E+00		8.87E-01	1.192
+ Eu-155	45.30	1.31	-1.86E+01	2.85E-01	1.67E+01	0.998
	60.01	1.22	-5.19E-01		1.76E+01	1.000
	86.55	30.70	4.71E-03		2.90E-01	free
	105.31	21.10	-1.44E-02		2.85E-01	1.000
+ Tl-208	583.19	*	85.00	8.76E-02	8.76E-02	0.924
+ Bi-211	351.07	*	13.02	5.95E-01	5.95E-01	miss
+ Pb-211	404.85	3.78	7.14E-01	1.36E+00	1.56E+00	miss
	427.09	1.76	1.06E+00		3.20E+00	miss
	832.01	3.52	-3.16E-01		1.36E+00	miss

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	Bi-212	39.86	1.06	-4.94E+00	1.30E+00	1.97E+01	0.998
		727.33	6.67	1.03E+00		1.49E+00	0.980
		785.37	1.10	1.10E+00		7.21E+00	0.937
		1620.50	1.47	0.00E+00		1.30E+00	1.007
+	Pb-212	115.18	0.60	-2.54E+00	1.91E-01	8.82E+00	miss
		238.63	* 43.60	7.18E-01		1.91E-01	free
		300.09	3.30	4.59E-01		2.00E+00	free
+	Pb212-XR	74.82	* 10.28	2.13E+00	6.93E-01	1.40E+00	miss
		77.11	* 17.10	1.34E+00		6.93E-01	miss
		87.35	3.97	2.15E+00		2.50E+00	miss
		89.78	1.46	1.57E+00		5.79E+00	miss
+	Bi-214	609.32	* 45.49	7.43E-01	1.05E-01	1.05E-01	0.941
		768.36	4.89	9.21E-03		1.60E+00	0.935
		806.18	1.26	-1.88E+00		3.50E+00	0.914
		934.06	3.11	8.83E-01		2.76E+00	0.937
		1120.29	14.92	4.40E-01		8.06E-01	0.937
		1155.21	1.63	6.59E-01		6.33E+00	0.936
		1238.12	5.83	2.72E-01		1.77E+00	0.938
		1280.98	1.43	-2.27E+00		4.76E+00	0.938
		1377.67	3.99	5.17E-01		1.99E+00	1.034
		1385.31	0.79	2.42E+00		1.02E+01	0.938
		1401.52	1.33	3.15E-01		5.48E+00	0.938
		1407.99	2.39	8.92E-01		3.72E+00	0.938
		1509.21	2.13	6.69E-01		3.10E+00	0.944
		1661.27	1.05	-8.89E-01		6.42E+00	1.001
		1729.59	2.88	9.16E-01		2.75E+00	1.134
		1764.49	15.30	7.18E-01		1.06E+00	1.002
		1847.43	2.03	9.01E-02		3.35E+00	1.071
>		2118.51	1.16	0.00E+00		0.00E+00	1.046
+	Pb-214	241.99	7.25	9.37E-01	2.18E-01	1.09E+00	1.000
		295.22	* 18.42	8.04E-01		3.82E-01	1.000
		351.93	* 35.60	7.93E-01		2.18E-01	free
		785.96	1.06	1.08E+00		7.04E+00	1.000
+	Pb214-XR	74.82	* 5.80	3.77E+00	1.22E+00	2.49E+00	miss
		77.11	* 9.70	2.36E+00		1.22E+00	miss
		87.35	2.24	3.81E+00		4.44E+00	miss
		89.78	0.82	2.80E+00		1.03E+01	miss
+	Ra-226	186.21	3.64	1.63E+00	1.84E+00	1.84E+00	free
+	Ac-228	129.07	2.42	9.80E-01	2.89E-01	2.74E+00	0.937
		209.25	3.89	4.11E-01		1.51E+00	0.975
		270.24	3.46	2.18E-01		1.85E+00	0.950
		328.00	2.95	6.69E-01		2.03E+00	0.950
		338.32	* 11.27	9.65E-01		6.09E-01	0.991
		409.46	1.92	-3.67E-02		3.17E+00	0.928
		463.00	4.40	8.82E-01		1.68E+00	0.922
		794.95	4.25	1.35E+00		2.50E+00	0.935
		911.20	* 25.80	7.37E-01		2.89E-01	0.989
		964.77	4.99	2.62E-01		1.52E+00	0.978
		968.97	15.80	8.63E-01		9.18E-01	0.989
		1588.20	3.22	1.95E+00		3.61E+00	1.003
+	Pa-231	27.36	10.30	0.00E+00	2.08E-01	2.08E-01	0.996

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 01-Oct-14-10001

ESBRI003 Sediment 10/01/14 10:20 887.06 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	283.69	1.70	-3.32E-02	2.08E-01	3.39E+00	1.000
	300.07	2.47	8.16E-01		2.68E+00	1.000
	302.65	2.20	-4.81E-01		2.73E+00	1.000
	330.06	1.40	-4.70E-01		3.35E+00	1.000
+ Th-234	92.38	2.13	-7.08E-01	3.75E+00	3.75E+00	free
	92.80	2.10	3.17E+00		4.33E+00	free
	112.81	0.21	-1.30E+01		2.31E+01	free
+ U-235	143.76	10.96	-1.78E-01	1.10E-01	4.24E-01	free
	163.33	5.08	1.24E-01		9.80E-01	free
	185.71	57.20	6.46E-02		1.10E-01	free
	202.11	1.08	-1.61E-01		3.81E+00	miss
	205.31	5.01	3.29E-02		8.46E-01	free
+ Am-241	59.54	35.90	-5.63E-02	6.36E-01	6.36E-01	free

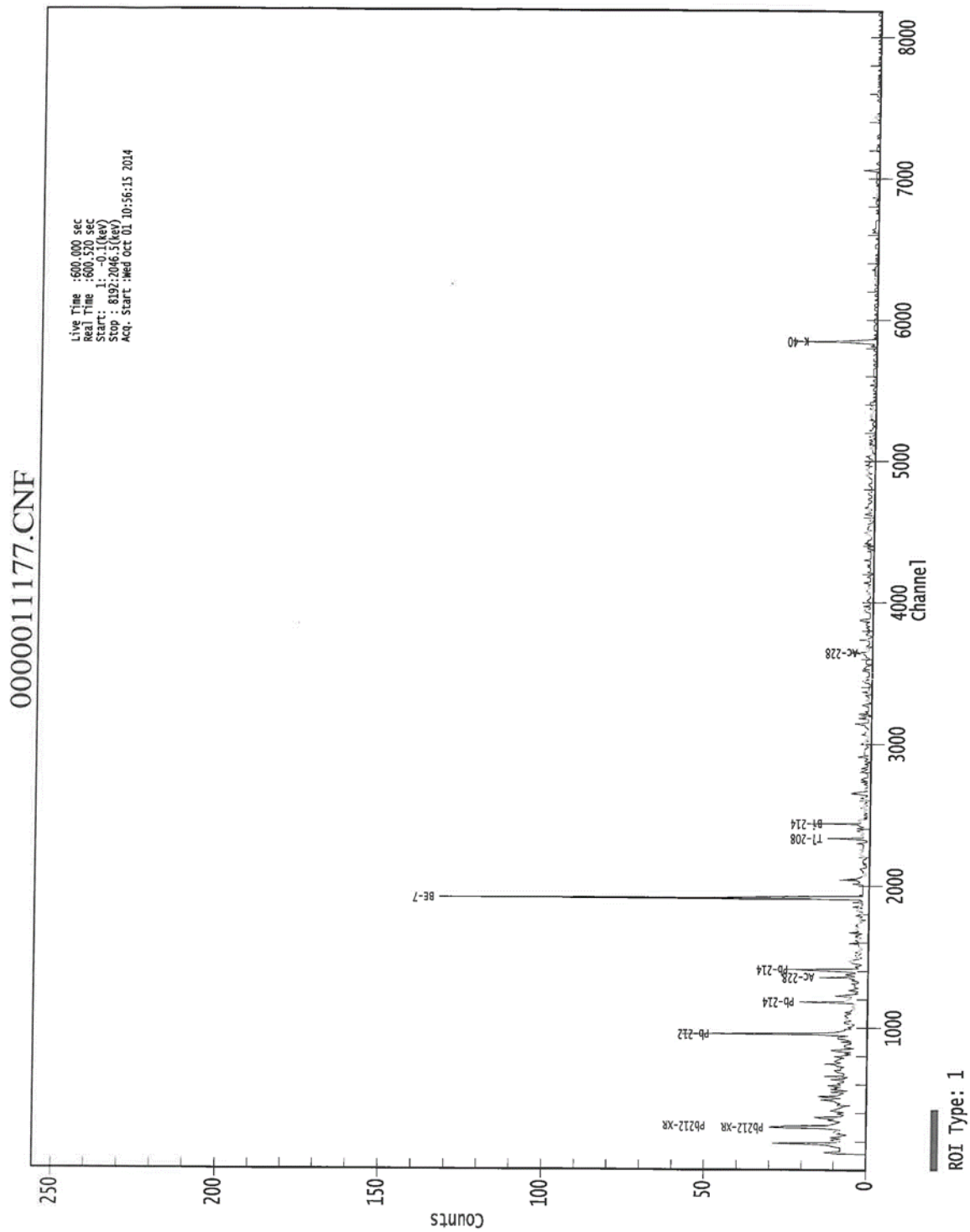
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

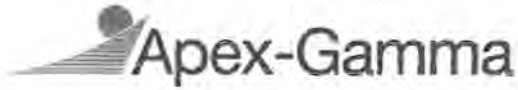
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 23-Oct-14-10001
Sample Description	: VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 10/22/2014 2:00:54PM
Acquisition Started	: 10/23/2014 9:04:46AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.8 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11293

M-B
10-23-14
Mike O'Neil
10/23/14

PEAK WITH NID REPORT

Peak Analysis Performed on : 10/23/2014 9:24:49AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	609.41	2433 -	2443	2437.29	2.57E+01	11.91	8.67E+00	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)		Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Bi-214	1.00	609.32	*	45.49	2.71E-05	1.30E-05	0.847
		768.36		4.89			
		806.18		1.26			
		934.06		3.11			
		1120.29		14.92			
		1155.21		1.63			
		1238.12		5.83			
		1280.98		1.43			
		1377.67		3.99			
		1385.31		0.79			
		1401.52		1.33			
		1407.99		2.39			
		1509.21		2.13			
		1661.27		1.05			
		1729.59		2.88			
		1764.49		15.30			
		1847.43		2.03			
		2118.51		1.16			

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
Bi-214	1.000	2.71E-05	1.30E-05	

? = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/23/2014 9:24:49AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	6.79E-05	1.49E-04	1.49E-04	miss
+	Cr-51	320.08	9.91	-3.58E-06	2.57E-05	2.57E-05	free
+	Mn-54	834.85	99.98	1.55E-06	6.29E-06	6.29E-06	miss
+	Co-58	810.76	99.45	1.89E-06	7.78E-06	7.78E-06	0.999
		1674.73	0.52	0.00E+00		4.53E-04	1.078
+	Co-60	1173.23	99.85	1.15E-07	7.49E-06	7.49E-06	0.844
		1332.49	99.98	1.78E-06		8.27E-06	0.840
+	Nb-94	702.65	99.81	-1.92E-06	5.09E-06	5.09E-06	0.833
		871.09	99.89	4.90E-07		6.07E-06	0.829
+	Sn-113	255.13	2.11	-4.92E-05	1.16E-06	1.36E-04	free
		391.70	64.97	0.00E+00		1.16E-06	free
+	Cs-134	475.36	1.48	-8.36E-05	5.46E-06	3.13E-04	miss
		563.25	8.34	-3.89E-06		7.79E-05	0.702
		569.33	15.37	-2.93E-06		2.69E-05	0.681
		604.72	97.62	8.65E-07		5.59E-06	0.796
		795.86	85.46	-6.18E-07		5.46E-06	0.795
		801.95	8.69	-8.31E-06		7.71E-05	0.702
		1038.61	0.99	1.36E-04		8.22E-04	0.822
		1167.97	1.79	-3.88E-05		2.22E-04	1.255

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	1.06E-05	5.46E-06	1.36E-04	1.374
+	Cs-137	661.66	85.10	1.75E-06	7.66E-06	7.66E-06	miss
+	Eu-152	121.78	28.67	-3.95E-06	6.78E-06	6.78E-06	0.818
		244.70	7.61	-8.52E-07		5.11E-05	0.786
		295.94	0.45	5.43E-04		1.14E-03	miss
		344.28	26.60	-6.90E-07		1.39E-05	0.874
		367.79	0.86	1.12E-04		6.55E-04	0.654
		411.12	2.24	7.21E-06		2.16E-04	0.717
		443.96	2.83	1.98E-05		1.95E-04	0.790
		488.68	0.42	-1.01E-04		8.60E-04	miss
		563.99	0.49	-5.09E-04		1.05E-03	0.790
		586.26	0.46	-1.59E-05		1.27E-03	0.807
		678.62	0.47	1.15E-04		1.55E-03	0.654
		688.67	0.86	-9.63E-05		5.36E-04	0.904
		719.35	0.28	6.94E-04		2.35E-03	miss
		778.90	12.96	1.44E-05		5.63E-05	0.815
		810.45	0.32	7.65E-04		1.93E-03	1.239
		867.37	4.26	2.90E-06		1.61E-04	0.729
		919.33	0.43	-1.71E-04		1.36E-03	0.904
		964.08	14.65	7.82E-06		4.34E-05	1.109
		1085.87	10.24	1.73E-05		6.19E-05	1.089
		1089.74	1.73	0.00E+00		3.29E-04	0.832
		1112.07	13.69	0.00E+00		1.37E-05	0.943
		1212.95	1.43	1.21E-04		7.22E-04	0.729
		1249.94	0.19	-2.73E-05		3.09E-03	1.314
		1299.14	1.63	2.40E-05		4.12E-04	0.807
		1408.01	21.07	0.00E+00		1.11E-05	0.911
		1457.64	0.50	-1.31E-04		1.57E-03	1.241
		1528.10	0.28	3.51E-04		2.85E-03	0.984
+	Eu-154	123.07	40.40	2.17E-06	6.66E-06	6.66E-06	0.820
		247.93	6.89	-4.71E-06		4.58E-05	0.772
		591.76	4.95	4.38E-06		8.06E-05	0.730
		692.42	1.78	3.59E-06		3.48E-04	0.785
		723.30	20.06	4.86E-07		2.71E-05	0.797
		756.80	4.52	-7.85E-05		1.41E-04	0.704
		873.18	12.08	-4.85E-06		4.28E-05	0.771
		996.29	10.48	-1.53E-05		4.52E-05	0.935
		1004.76	18.01	6.20E-07		3.45E-05	0.904
		1274.43	34.80	2.28E-06		1.68E-05	0.910
		1596.48	1.80	1.84E-05		2.37E-04	1.533
+	Eu-155	45.30	1.31	-1.30E-04	7.86E-06	4.59E-04	0.994
		60.01	1.22	-1.35E-04		5.07E-04	0.999
		86.55	30.70	-5.26E-06		7.86E-06	free
		105.31	21.10	-2.92E-06		9.76E-06	1.000
+	Tl-208	583.19	85.00	2.10E-06	9.00E-06	9.00E-06	0.810
+	Bi-211	351.07	13.02	1.69E-05	4.43E-05	4.43E-05	miss
+	Pb-211	404.85	3.78	1.19E-05	1.20E-04	1.20E-04	miss
		427.09	1.76	-3.39E-05		2.04E-04	miss
		832.01	3.52	1.98E-05		1.38E-04	miss
+	Bi-212	39.86	1.06	9.01E-05	9.74E-05	7.29E-04	0.995
		727.33	6.67	1.83E-05		9.74E-05	0.945

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	785.37	1.10	1.64E-04	9.74E-05	5.87E-04	0.829
	1620.50	1.47	6.00E-05		4.41E-04	1.020
+ Pb-212	115.18	0.60	1.61E-04	6.18E-06	3.84E-04	miss
	238.63	43.60	-1.07E-06		6.18E-06	free
	300.09	3.30	-4.04E-05		9.36E-05	free
+ Pb212-XR	74.82	10.28	1.06E-05	3.04E-05	4.76E-05	miss
	77.11	17.10	1.64E-05		3.04E-05	miss
	87.35	3.97	2.13E-05		7.94E-05	miss
	89.78	1.46	1.21E-05		1.77E-04	miss
+ Bi-214	609.32	* 45.49	2.71E-05	1.37E-05	1.37E-05	0.847
	768.36	4.89	3.90E-05		1.60E-04	0.820
	806.18	1.26	7.63E-05		6.28E-04	0.769
	934.06	3.11	1.12E-04		2.93E-04	0.824
	1120.29	14.92	2.10E-05		7.00E-05	0.825
	1155.21	1.63	6.44E-05		6.01E-04	0.822
	1238.12	5.83	6.30E-06		1.37E-04	0.824
	1280.98	1.43	6.14E-05		5.70E-04	0.824
	1377.67	3.99	2.76E-05		1.89E-04	1.102
	1385.31	0.79	3.48E-04		1.43E-03	0.824
	1401.52	1.33	1.67E-04		7.71E-04	0.824
	1407.99	2.39	0.00E+00		1.08E-04	0.824
	1509.21	2.13	4.71E-05		3.46E-04	0.840
	1661.27	1.05	4.38E-05		8.13E-04	1.004
	1729.59	2.88	2.06E-05		2.18E-04	1.413
	1764.49	15.30	1.90E-05		6.81E-05	1.005
	1847.43	2.03	2.86E-04		6.14E-04	1.217
>	2118.51	1.16	0.00E+00		0.00E+00	1.140
+ Pb-214	241.99	7.25	-1.02E-05	1.77E-05	4.19E-05	0.998
	295.22	18.42	2.44E-05		3.04E-05	1.001
	351.93	35.60	1.14E-05		1.77E-05	free
	785.96	1.06	7.46E-05		4.38E-04	0.998
+ Pb214-XR	74.82	5.80	1.87E-05	5.35E-05	8.43E-05	miss
	77.11	9.70	2.88E-05		5.35E-05	miss
	87.35	2.24	3.78E-05		1.41E-04	miss
	89.78	0.82	2.15E-05		3.15E-04	miss
+ Ra-226	186.21	3.64	1.39E-05	7.39E-05	7.39E-05	free
+ Ac-228	129.07	2.42	-1.52E-05	1.04E-05	1.10E-04	0.831
	209.25	3.89	-1.08E-05		6.77E-05	0.925
	270.24	3.46	5.40E-05		1.11E-04	0.869
	328.00	2.95	4.16E-05		1.54E-04	0.867
	338.32	11.27	-1.16E-05		2.88E-05	0.982
	409.46	1.92	7.47E-06		2.01E-04	0.803
	463.00	4.40	4.97E-06		1.00E-04	0.781
	794.95	4.25	3.78E-05		1.59E-04	0.801
	911.20	25.80	-1.88E-06		1.66E-05	0.967
	964.77	4.99	6.97E-06		1.35E-04	0.937
	968.97	15.80	0.00E+00		1.04E-05	0.967
	1588.20	3.22	5.43E-05		2.52E-04	1.010
+ Pa-231	27.36	10.30	0.00E+00	1.13E-05	1.13E-05	0.989
	283.69	1.70	-6.59E-06		1.85E-04	0.998
	300.07	2.47	-6.21E-05		1.16E-04	1.000

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 23-Oct-14-10001

VGR03, VGR07 EAST SERVICE BLDG ROOF 10/22/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	-3.01E-05	1.13E-05	1.31E-04	1.000
		330.06	1.40	6.36E-05		2.39E-04	1.002
+	Th-234	92.38	2.13	-1.42E-05	1.15E-04	1.15E-04	free
		92.80	2.10	3.10E-05		1.40E-04	free
		112.81	0.21	-3.02E-05		1.28E-03	free
+	U-235	143.76	10.96	1.89E-06	4.50E-06	2.39E-05	free
		163.33	5.08	-9.64E-06		3.31E-05	free
		185.71	57.20	8.15E-07		4.50E-06	free
		202.11	1.08	0.00E+00		2.20E-04	miss
		205.31	5.01	3.67E-06		4.18E-05	free
+	Am-241	59.54	35.90	-1.96E-07	1.87E-05	1.87E-05	free

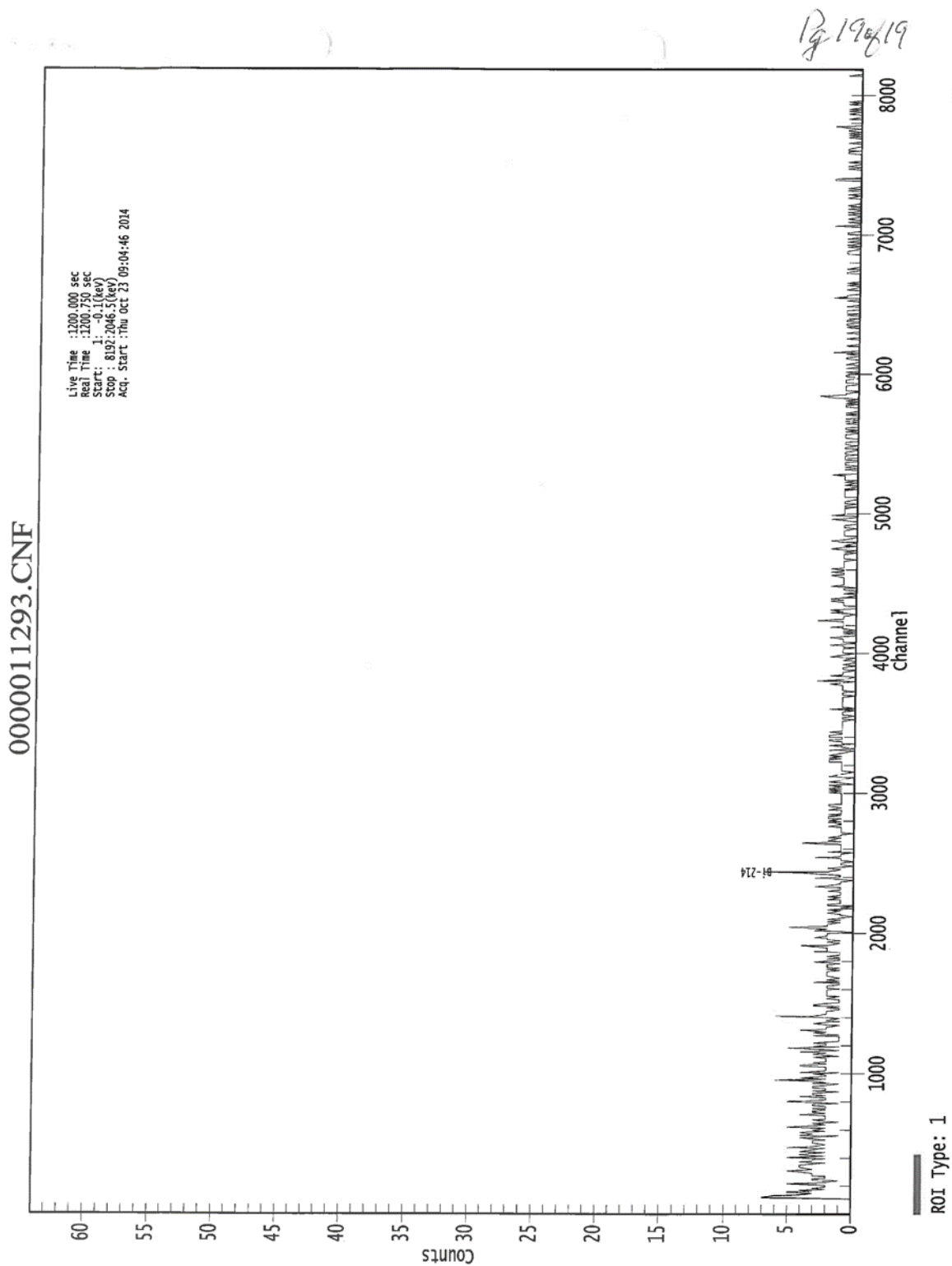
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

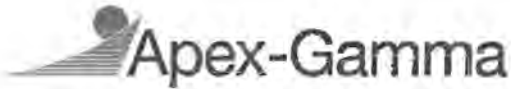
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



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Analysis Report for 28-Oct-14-10001
ESB Roof VGR02 Smear

GAMMA SPECTRUM ANALYSIS

Sample Identification : 28-Oct-14-10001
Sample Description : ESB Roof VGR02 Smear
Sample Type : Air Sample/Smears
Unit :
Sample Point :

Sample Size : 1.000E+00 units
Facility : Default

Sample Taken On : 10/28/2014 7:12:59AM
Acquisition Started : 10/28/2014 7:15:11AM

Procedure : Non Quantitative Smear
Operator : Administrator
Detector Name : DET02
Geometry : smear nqf
Live Time : 1200.0 seconds
Real Time : 1200.6 seconds

Dead Time : 0.05 %

Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM

Energy Calibration Used Done On : 12/5/2013
Efficiency Calibration Used Done On : 10/28/2014
Efficiency Calibration Description :

Sample Number : 11305

MS 10-28-14
MS 10/28/14

PEAK WITH NID REPORT

Peak Analysis Performed on : 10/28/2014 7:35:15AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001

ESB Roof VGR02 Smear

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	295.33	1178 -	1190	1183.57	3.53E+01	15.75	2.14E+01	Pb-214
2	351.94	1404 -	1417	1410.19	4.13E+01	15.23	1.54E+01	Pb-214 Pb-214 Bi-211

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Pb-214	1.00	241.99	7.25			
		295.22 *	18.42	2.80E-05	1.33E-05	1.001
		351.93 *	35.60	1.90E-05	7.65E-06	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001
ESB Roof VGR02 Smear

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
X	Bi-211	0.972			
	Pb-214	1.000	2.13E-05	6.63E-06	

- ? = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001
ESSB Roof VGR02 Smear

UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/28/2014 7:35:15AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Colinc Corr
+ K-40	1460.82	10.66	4.89E-05	7.96E-05	7.96E-05	miss
+ Cr-51	320.08	9.91	1.36E-05	3.66E-05	3.66E-05	free
+ Mn-54	834.85	99.98	2.67E-07	3.90E-06	3.90E-06	miss
+ Co-58	810.76	99.45	-1.10E-06	3.84E-06	3.84E-06	0.999
	1674.73	0.52	-1.50E-04		6.13E-04	1.126
+ Co-60	1173.23	99.85	6.27E-07	5.06E-06	5.06E-06	0.794
	1332.49	99.98	1.93E-06		6.71E-06	0.790
+ Nb-94	702.65	99.81	-1.75E-06	2.51E-06	2.51E-06	0.778
	871.09	99.89	-1.23E-07		3.67E-06	0.774
+ Sn-113	255.13	2.11	-2.34E-05	4.09E-06	8.91E-05	free
	391.70	64.97	-3.43E-07		4.09E-06	free
+ Cs-134	475.36	1.48	-5.61E-05	5.52E-06	2.06E-04	miss
	563.25	8.34	6.31E-06		7.36E-05	0.618
	569.33	15.37	2.20E-06		4.00E-05	0.592
	604.72	97.62	8.68E-09		6.06E-06	0.733
	795.86	85.46	-7.04E-07		5.52E-06	0.732
	801.95	8.69	1.17E-05		7.04E-05	0.620
	1038.61	0.99	-6.83E-05		4.23E-04	0.765
	1167.97	1.79	-2.22E-06		1.61E-04	1.385

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001
ESB Roof VGR02 Smear

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	-9.20E-06	5.52E-06	8.10E-05	1.567
+	Cs-137	661.66	85.10	1.00E-06	4.74E-06	4.74E-06	miss
+	Eu-152	121.78	28.67	-1.94E-06	7.94E-06	7.94E-06	0.767
		244.70	7.61	-2.18E-05		3.87E-05	0.733
		295.94	0.45	1.14E-03		1.11E-03	miss
		344.28	26.60	-2.79E-06		1.21E-05	0.835
		367.79	0.86	-4.89E-05		4.86E-04	0.569
		411.12	2.24	-4.14E-05		2.21E-04	0.645
		443.96	2.83	3.75E-05		1.47E-04	0.734
		488.68	0.42	-1.19E-04		5.90E-04	miss
		563.99	0.49	3.61E-05		1.00E-03	0.734
		586.26	0.46	1.53E-04		1.01E-03	0.753
		678.62	0.47	1.70E-04		1.04E-03	0.569
		688.67	0.86	1.98E-04		5.73E-04	0.885
		719.35	0.28	5.31E-05		1.45E-03	miss
		778.90	12.96	1.02E-06		3.44E-05	0.763
		810.45	0.32	-8.86E-06		1.06E-03	1.280
		867.37	4.26	1.07E-05		1.28E-04	0.671
		919.33	0.43	2.31E-04		1.18E-03	0.885
		964.08	14.65	6.96E-06		2.39E-05	1.127
		1085.87	10.24	3.84E-06		4.11E-05	1.105
		1089.74	1.73	6.00E-05		3.42E-04	0.788
		1112.07	13.69	-8.75E-06		3.03E-05	0.936
		1212.95	1.43	4.42E-05		4.28E-04	0.672
		1249.94	0.19	7.30E-04		2.15E-03	1.433
		1299.14	1.63	4.60E-05		3.90E-04	0.753
		1408.01	21.07	1.35E-05		3.37E-05	0.895
		1457.64	0.50	-3.67E-04		6.01E-04	1.335
		1528.10	0.28	2.23E-04		1.71E-03	1.007
+	Eu-154	123.07	40.40	1.66E-06	7.12E-06	7.12E-06	0.767
		247.93	6.89	-1.94E-05		4.23E-05	0.713
		591.76	4.95	-4.11E-06		9.43E-05	0.661
		692.42	1.78	-5.67E-05		2.66E-04	0.729
		723.30	20.06	6.25E-06		2.74E-05	0.738
		756.80	4.52	-3.30E-05		7.09E-05	0.639
		873.18	12.08	-3.12E-06		2.62E-05	0.711
		996.29	10.48	9.62E-06		4.30E-05	0.895
		1004.76	18.01	6.65E-06		2.79E-05	0.882
		1274.43	34.80	-3.81E-06		9.34E-06	0.890
		1596.48	1.80	3.21E-05		1.68E-04	1.864
+	Eu-155	45.30	1.31	1.21E-04	1.10E-05	7.73E-04	0.995
		60.01	1.22	5.69E-05		7.72E-04	0.999
		86.55	30.70	2.37E-06		1.11E-05	free
		105.31	21.10	-4.12E-07		1.10E-05	1.000
+	Tl-208	583.19	85.00	4.57E-07	5.11E-06	5.11E-06	0.758
+	Bi-211	351.07	* 13.02	5.20E-05	2.03E-05	2.03E-05	miss
+	Pb-211	404.85	3.78	1.75E-05	8.34E-05	8.34E-05	miss
		427.09	1.76	-3.38E-06		1.86E-04	miss
		832.01	3.52	3.16E-06		1.01E-04	miss
+	Bi-212	39.86	1.06	1.72E-04	5.74E-05	1.04E-03	0.993
		727.33	6.67	1.63E-06		5.74E-05	0.928

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001

ESB Roof VGR02 Smear

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	785.37	1.10	2.58E-05	5.74E-05	4.39E-04	0.774
	1620.50	1.47	-2.34E-05		2.90E-04	1.032
+ Pb-212	115.18	0.60	-1.57E-05	4.64E-06	3.26E-04	miss
	238.63	43.60	-8.20E-07		4.64E-06	free
	300.09	3.30	-4.40E-06		8.13E-05	free
+ Pb212-XR	74.82	10.28	2.00E-05	3.04E-05	5.85E-05	miss
	77.11	17.10	-2.91E-07		3.04E-05	miss
	87.35	3.97	1.98E-05		9.02E-05	miss
	89.78	1.46	6.33E-05		2.06E-04	miss
+ Bi-214	609.32	45.49	1.52E-05	1.98E-05	1.98E-05	0.798
	768.36	4.89	1.66E-05		1.06E-04	0.764
	806.18	1.26	2.16E-05		4.92E-04	0.701
	934.06	3.11	4.37E-05		1.76E-04	0.769
	1120.29	14.92	1.40E-05		5.50E-05	0.769
	1155.21	1.63	9.85E-06		2.74E-04	0.765
	1238.12	5.83	0.00E+00		2.33E-05	0.769
	1280.98	1.43	-5.69E-05		3.85E-04	0.769
	1377.67	3.99	1.99E-06		1.08E-04	1.160
	1385.31	0.79	3.42E-04		8.97E-04	0.769
	1401.52	1.33	8.70E-05		4.95E-04	0.769
	1407.99	2.39	1.39E-04		3.45E-04	0.769
	1509.21	2.13	0.00E+00		7.18E-05	0.791
	1661.27	1.05	-3.20E-05		3.36E-04	1.010
	1729.59	2.88	5.24E-05		1.37E-04	1.654
	1764.49	15.30	3.98E-05		6.61E-05	1.009
	1847.43	2.03	0.00E+00		5.19E-05	1.344
>	2118.51	1.16	0.00E+00		0.00E+00	1.227
+ Pb-214	241.99	7.25	1.42E-05	7.44E-06	3.99E-05	0.998
	295.22	* 18.42	2.80E-05		1.57E-05	1.001
	351.93	* 35.60	1.90E-05		7.44E-06	free
	785.96	1.06	1.08E-04		4.05E-04	0.998
+ Pb214-XR	74.82	5.80	3.55E-05	5.35E-05	1.04E-04	miss
	77.11	9.70	-5.12E-07		5.35E-05	miss
	87.35	2.24	3.51E-05		1.60E-04	miss
	89.78	0.82	1.13E-04		3.67E-04	miss
+ Ra-226	186.21	3.64	1.53E-05	6.71E-05	6.71E-05	free
+ Ac-228	129.07	2.42	1.47E-05	1.67E-05	1.22E-04	0.786
	209.25	3.89	-1.08E-05		5.07E-05	0.905
	270.24	3.46	-3.98E-06		8.06E-05	0.827
	328.00	2.95	8.24E-06		1.21E-04	0.824
	338.32	11.27	8.28E-07		2.54E-05	0.971
	409.46	1.92	-3.18E-06		2.21E-04	0.747
	463.00	4.40	-1.99E-05		8.84E-05	0.720
	794.95	4.25	5.27E-06		1.28E-04	0.748
	911.20	25.80	1.60E-06		1.67E-05	0.958
	964.77	4.99	-2.60E-05		6.66E-05	0.917
	968.97	15.80	8.62E-06		3.07E-05	0.957
	1588.20	3.22	4.18E-05		1.72E-04	1.012
+ Pa-231	27.36	10.30	-7.36E-05	1.09E-04	1.16E-04	0.987
	283.69	1.70	-3.29E-05		1.10E-04	0.999
	300.07	2.47	-5.88E-06		1.09E-04	1.000

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 28-Oct-14-10001
ESB Roof VGR02 Smear

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	9.57E-06	1.09E-04	1.32E-04	1.000
		330.06	1.40	-3.27E-05		2.19E-04	1.001
+	Th-234	92.38	2.13	-2.10E-05	1.14E-04	1.14E-04	free
		92.80	2.10	1.80E-05		1.25E-04	free
		112.81	0.21	3.40E-04		1.14E-03	free
+	U-235	143.76	10.96	-1.01E-05	3.53E-06	1.71E-05	free
		163.33	5.08	-8.36E-06		3.88E-05	free
		185.71	57.20	-1.85E-06		3.53E-06	free
		202.11	1.08	4.32E-06		1.80E-04	miss
		205.31	5.01	6.03E-06		4.42E-05	free
+	Am-241	59.54	35.90	8.06E-06	2.97E-05	2.97E-05	free

- + = 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
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

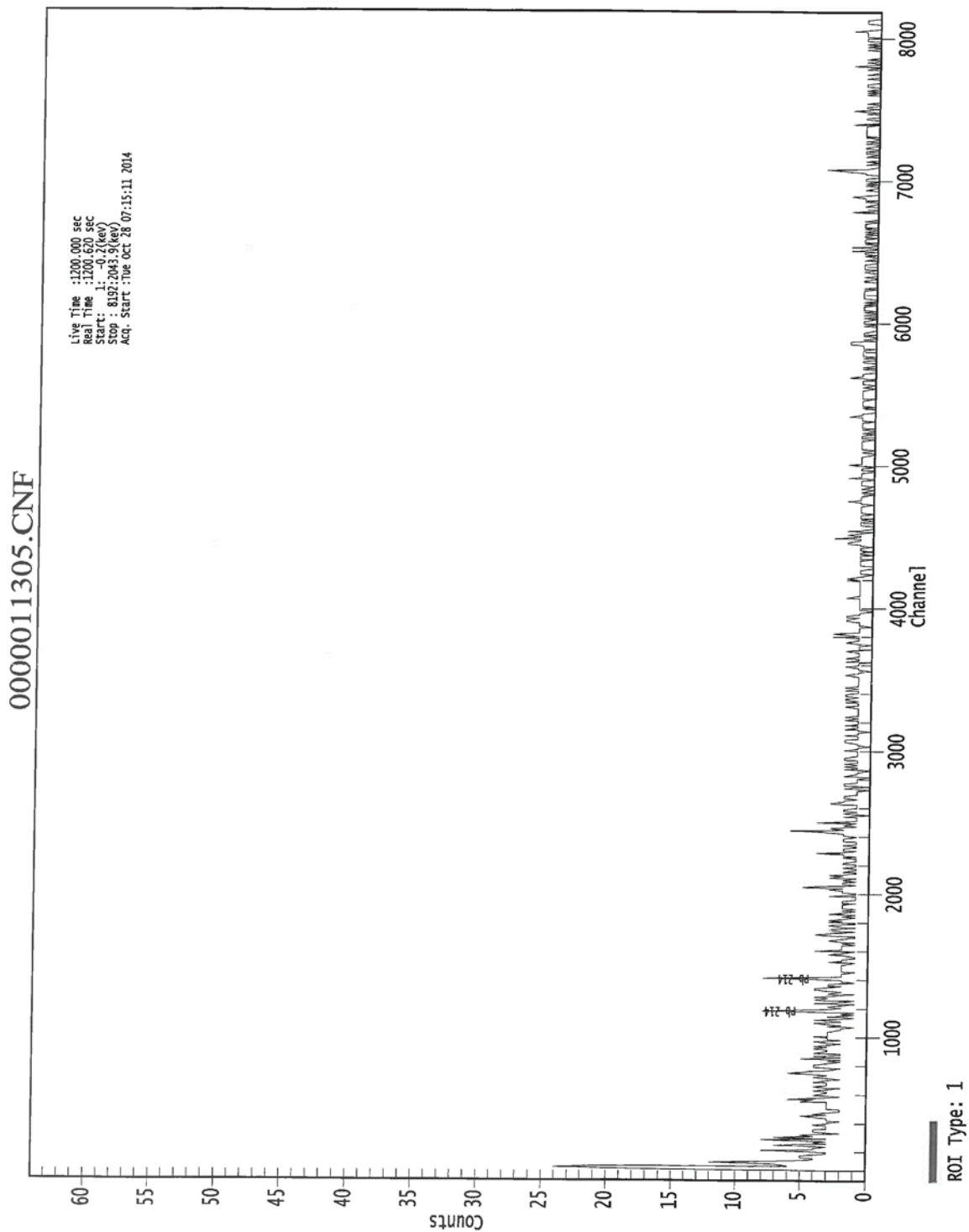
Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



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GAMMA SPECTRUM ANALYSIS

Sample Identification : 29-Oct-14-10001
Sample Description : VGR04 ESB Roof 10/28/14 13:00 7701
Sample Type : Air Sample/Smears
Unit :
Sample Point :
Sample Size : 1.000E+00 units
Facility : Default
Sample Taken On : 10/28/2014 1:00:20PM
Acquisition Started : 10/29/2014 7:19:19AM
Procedure : Non Quantitative Smear
Operator : Administrator
Detector Name : P11314X2
Geometry : smear nqf
Live Time : 1200.0 seconds
Real Time : 1200.9 seconds
Dead Time : 0.08 %
Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM
Energy Calibration Used Done On : 2/19/2014
Efficiency Calibration Used Done On : 9/11/2014
Efficiency Calibration Description :
Sample Number : 11311

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PEAK WITH NID REPORT

Peak Analysis Performed on : 10/29/2014 7:39:26AM
Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192
Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.95	1403 -	1413	1407.85	2.96E+01	12.48	8.80E+00	Pb-214
2	1460.99	5840 -	5852	5845.61	2.03E+01	9.30	1.48E+00	Bi-214 K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	1.55E-04	7.25E-05	miss
Bi-211	0.95	351.07 *	13.02	5.72E-05	2.58E-05	miss
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	2.09E-05	9.43E-06	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
	K-40	0.998	1.55E-04	7.25E-05	
?	Bi-211	0.952	5.72E-05	2.58E-05	
?	Pb-214	1.000	2.09E-05	9.43E-06	

- ? = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/29/2014 7:39:26AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	*	10.66	1.55E-04	5.01E-05	miss
+	Cr-51	320.08	9.91	-1.79E-06	3.12E-05	3.12E-05	free
+	Mn-54	834.85	99.98	1.75E-07	3.86E-06	3.86E-06	miss
+	Co-58	810.76	99.45	0.00E+00	1.40E-06	1.40E-06	0.999
		1674.73	0.52	0.00E+00		4.53E-04	1.078
+	Co-60	1173.23	99.85	1.54E-07	8.27E-06	8.69E-06	0.844
		1332.49	99.98	1.78E-06		8.27E-06	0.840
+	Nb-94	702.65	99.81	9.14E-08	4.81E-06	5.90E-06	0.833
		871.09	99.89	-5.44E-07		4.81E-06	0.829
+	Sn-113	255.13	2.11	3.23E-05	6.43E-06	1.64E-04	free
		391.70	64.97	1.02E-06		6.43E-06	free
+	Cs-134	475.36	1.48	1.33E-04	6.23E-06	3.13E-04	miss
		563.25	8.34	0.00E+00		1.76E-05	0.702
		569.33	15.37	3.84E-06		4.39E-05	0.681
		604.72	97.62	5.19E-07		6.23E-06	0.796
		795.86	85.46	7.42E-07		8.91E-06	0.795
		801.95	8.69	1.71E-05		8.94E-05	0.702
		1038.61	0.99	0.00E+00		2.07E-04	0.822
		1167.97	1.79	0.00E+00		8.16E-05	1.255

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Cs-134	1365.19	3.02	-1.85E-05	6.23E-06	1.72E-04	1.374
+ Cs-137	661.66	85.10	1.43E-06	5.49E-06	5.49E-06	miss
+ Eu-152	121.78	28.67	-1.69E-06	6.78E-06	6.78E-06	0.818
	244.70	7.61	5.37E-06		4.60E-05	0.786
	295.94	0.45	1.05E-04		1.03E-03	miss
	344.28	26.60	-4.24E-06		9.85E-06	0.874
	367.79	0.86	6.04E-05		5.58E-04	0.654
	411.12	2.24	7.21E-06		1.94E-04	0.717
	443.96	2.83	1.93E-05		1.81E-04	0.790
	488.68	0.42	-2.56E-04		9.60E-04	miss
	563.99	0.49	-2.54E-04		7.20E-04	0.790
	586.26	0.46	-2.89E-04		1.14E-03	0.807
	678.62	0.47	1.72E-04		1.33E-03	0.654
	688.67	0.86	-1.93E-05		6.22E-04	0.904
	719.35	0.28	7.55E-04		2.18E-03	miss
	778.90	12.96	0.00E+00		1.27E-05	0.815
	810.45	0.32	0.00E+00		3.48E-04	1.239
	867.37	4.26	3.47E-05		1.61E-04	0.729
	919.33	0.43	-2.44E-04		1.36E-03	0.904
	964.08	14.65	8.43E-06		3.89E-05	1.109
	1085.87	10.24	1.15E-05		5.34E-05	1.089
	1089.74	1.73	1.34E-04		4.81E-04	0.832
	1112.07	13.69	-2.53E-06		3.72E-05	0.943
	1212.95	1.43	6.70E-05		7.22E-04	0.729
	1249.94	0.19	3.28E-04		3.09E-03	1.314
	1299.14	1.63	-2.40E-05		4.12E-04	0.807
	1408.01	21.07	8.21E-06		3.81E-05	0.911
	1457.64	0.50	0.00E+00		3.53E-04	1.241
	1528.10	0.28	0.00E+00		8.30E-04	0.984
+ Eu-154	123.07	40.40	-1.38E-06	5.63E-06	5.63E-06	0.820
	247.93	6.89	-4.02E-06		4.58E-05	0.772
	591.76	4.95	-3.29E-06		1.02E-04	0.730
	692.42	1.78	-1.61E-05		4.23E-04	0.785
	723.30	20.06	-5.35E-06		2.71E-05	0.797
	756.80	4.52	2.40E-05		1.82E-04	0.704
	873.18	12.08	-5.82E-06		5.40E-05	0.771
	996.29	10.48	0.00E+00		1.66E-05	0.935
	1004.76	18.01	0.00E+00		1.01E-05	0.904
	1274.43	34.80	0.00E+00		6.18E-06	0.910
	1596.48	1.80	0.00E+00		8.71E-05	1.533
+ Eu-155	45.30	1.31	-1.19E-04	1.05E-05	3.51E-04	0.994
	60.01	1.22	3.28E-05		6.13E-04	0.999
	86.55	30.70	-1.55E-06		1.05E-05	free
	105.31	21.10	3.99E-06		1.39E-05	1.000
+ Tl-208	583.19	85.00	-1.70E-06	5.27E-06	5.27E-06	0.810
+ Bi-211	351.07	* 13.02	5.72E-05	2.46E-05	2.46E-05	miss
+ Pb-211	404.85	3.78	1.96E-05	1.20E-04	1.20E-04	miss
	427.09	1.76	-2.04E-05		1.83E-04	miss
	832.01	3.52	-1.36E-05		1.38E-04	miss
+ Bi-212	39.86	1.06	3.69E-05	6.90E-05	6.38E-04	0.995
	727.33	6.67	1.24E-06		6.90E-05	0.945

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	785.37	1.10	1.52E-04	6.90E-05	6.55E-04	0.829
		1620.50	1.47	5.14E-05		4.41E-04	1.020
+	Pb-212	115.18	0.60	-6.30E-05	6.53E-06	4.02E-04	miss
		238.63	43.60	4.12E-07		6.53E-06	free
		300.09	3.30	-5.09E-05		9.36E-05	free
+	Pb212-XR	74.82	10.28	3.82E-05	3.17E-05	6.17E-05	miss
		77.11	17.10	1.94E-05		3.17E-05	miss
		87.35	3.97	1.41E-06		7.94E-05	miss
		89.78	1.46	5.57E-05		2.10E-04	miss
+	Bi-214	609.32	45.49	1.59E-05	2.63E-05	2.63E-05	0.847
		768.36	4.89	-1.69E-05		1.31E-04	0.820
		806.18	1.26	2.11E-04		6.86E-04	0.769
		934.06	3.11	7.26E-05		2.68E-04	0.824
		1120.29	14.92	2.10E-05		7.53E-05	0.825
		1155.21	1.63	5.72E-05		5.39E-04	0.822
		1238.12	5.83	5.88E-05		1.77E-04	0.824
		1280.98	1.43	-3.95E-05		7.38E-04	0.824
		1377.67	3.99	-6.28E-06		1.63E-04	1.102
		1385.31	0.79	-9.33E-05		1.10E-03	0.824
		1401.52	1.33	2.15E-04		8.60E-04	0.824
		1407.99	2.39	7.99E-05		3.71E-04	0.824
		1509.21	2.13	0.00E+00		1.27E-04	0.840
		1661.27	1.05	0.00E+00		2.37E-04	1.004
		1729.59	2.88	2.35E-05		1.73E-04	1.413
		1764.49	15.30	1.35E-05		7.60E-05	1.005
		1847.43	2.03	4.09E-05		3.01E-04	1.217
>		2118.51	1.16	0.00E+00		0.00E+00	1.140
+	Pb-214	241.99	7.25	1.65E-05	9.01E-06	4.56E-05	0.998
		295.22	18.42	2.08E-05		2.93E-05	1.001
		351.93	* 35.60	2.09E-05		9.01E-06	free
		785.96	1.06	5.50E-05		5.07E-04	0.998
+	Pb214-XR	74.82	5.80	6.78E-05	5.58E-05	1.09E-04	miss
		77.11	9.70	3.41E-05		5.58E-05	miss
		87.35	2.24	2.49E-06		1.41E-04	miss
		89.78	0.82	9.91E-05		3.73E-04	miss
+	Ra-226	186.21	3.64	4.07E-05	8.68E-05	8.68E-05	free
+	Ac-228	129.07	2.42	6.52E-05	2.95E-05	1.37E-04	0.831
		209.25	3.89	2.47E-05		7.52E-05	0.925
		270.24	3.46	4.56E-05		1.16E-04	0.869
		328.00	2.95	2.54E-05		1.30E-04	0.867
		338.32	11.27	1.07E-05		3.30E-05	0.982
		409.46	1.92	-1.12E-05		2.01E-04	0.803
		463.00	4.40	3.73E-06		1.12E-04	0.781
		794.95	4.25	2.46E-06		1.59E-04	0.801
		911.20	25.80	7.35E-06		2.95E-05	0.967
		964.77	4.99	2.09E-06		1.17E-04	0.937
		968.97	15.80	9.42E-06		4.15E-05	0.967
		1588.20	3.22	5.43E-05		2.52E-04	1.010
+	Pa-231	27.36	10.30	0.00E+00	1.13E-05	1.13E-05	0.989
		283.69	1.70	-3.63E-05		1.61E-04	0.998
		300.07	2.47	-6.65E-05		1.25E-04	1.000

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	1.32E-05	1.13E-05	1.82E-04	1.000
		330.06	1.40	-6.86E-05		2.22E-04	1.002
+	Th-234	92.38	2.13	6.18E-05	1.51E-04	1.54E-04	free
		92.80	2.10	5.99E-05		1.51E-04	free
		112.81	0.21	4.90E-04		1.28E-03	free
+	U-235	143.76	10.96	8.65E-06	5.20E-06	2.39E-05	free
		163.33	5.08	1.12E-05		4.59E-05	free
		185.71	57.20	1.05E-06		5.20E-06	free
		202.11	1.08	-3.00E-05		1.92E-04	miss
		205.31	5.01	1.12E-05		4.79E-05	free
+	Am-241	59.54	35.90	1.85E-06	2.05E-05	2.05E-05	free

- + = 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
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

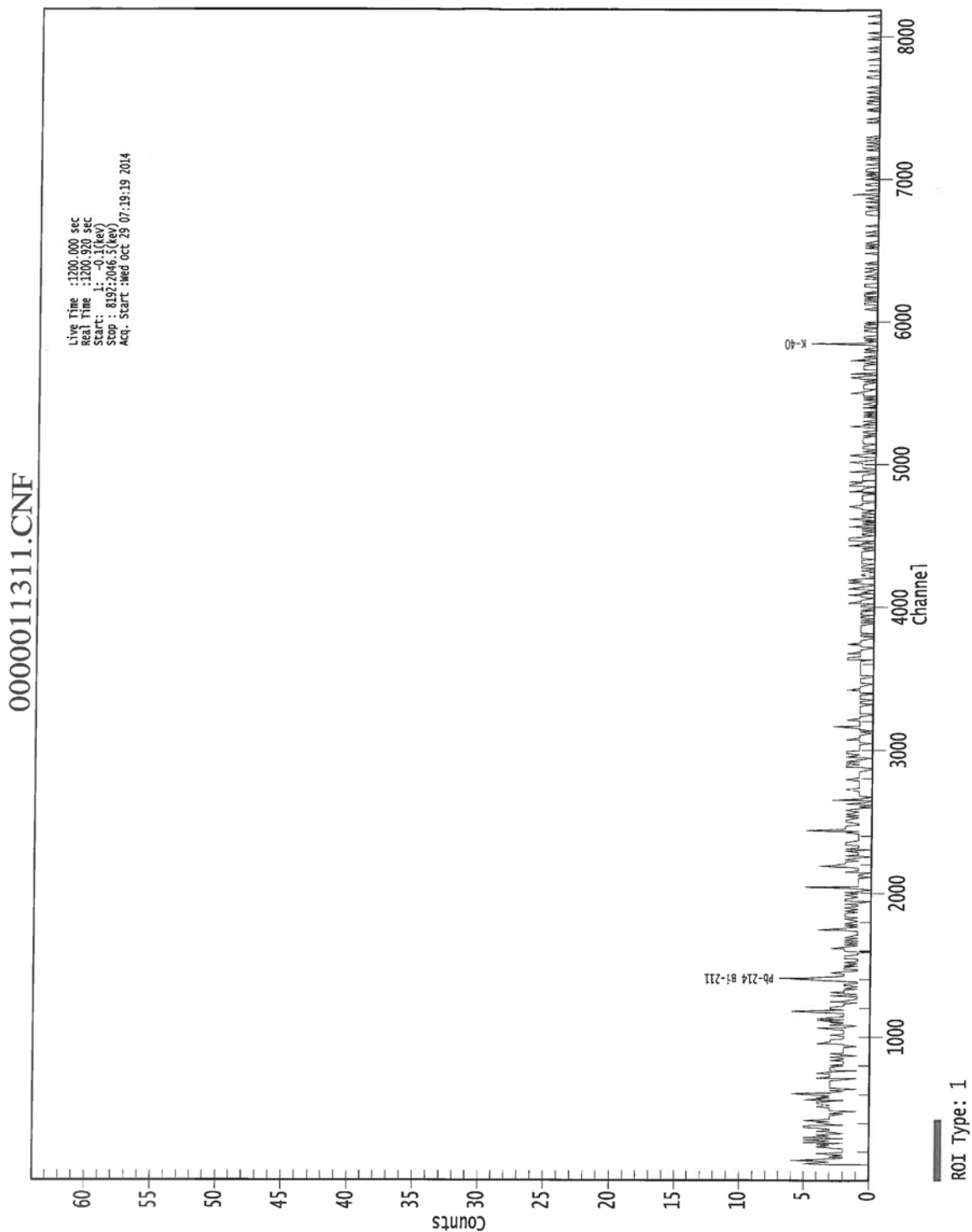
Coincidence correction performed.

free = No coincidence correction required.

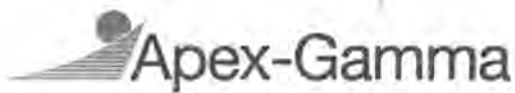
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



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Analysis Report for 29-Oct-14-10002
7701 QC ESB Roof 10/28/14 13:00

2014-0-058-138

GAMMA SPECTRUM ANALYSIS

Sample Identification : 29-Oct-14-10002
Sample Description : 7701 QC ESB Roof 10/28/14 13:00
Sample Type : Air Sample/Smears
Unit :
Sample Point :

Sample Size : 1.000E+00 units
Facility : Default

Sample Taken On : 10/28/2014 1:00:29PM
Acquisition Started : 10/29/2014 7:21:24AM

Procedure : Non Quantitative Smear
Operator : Administrator
Detector Name : DET02
Geometry : smear.nqf
Live Time : 1200.0 seconds
Real Time : 1200.7 seconds

Dead Time : 0.05 %

Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM

Energy Calibration Used Done On : 12/5/2013
Efficiency Calibration Used Done On : 10/28/2014
Efficiency Calibration Description :

Sample Number : 11312

John Sullivan 10/29/14
M-3
10-28-14

PEAK WITH NID REPORT

Peak Analysis Performed on : 10/29/2014 7:41:27AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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10/28/14

10/29/2014 7:42:08AM

Analysis Report for 29-Oct-14-10002
7701 QC ESB Roof 10/28/14 13:00

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	352.06	1405 -	1416	1410.68	2.59E+01	14.48	2.62E+01	Pb-214 Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Bi-211	0.96	351.07 *	13.02	3.27E-05	1.90E-05	miss
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	1.19E-05	6.94E-06	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

Analysis Report for 29-Oct-14-10002

7701 QC ESB Roof 10/28/14 13:00

10/29/2014 7:42:08AM

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 AR143049

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
? Bi-211	0.964	3.27E-05	1.90E-05	
? Pb-214	1.000	1.19E-05	6.94E-06	

- ? = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

Analysis Report for 29-Oct-14-10002

7701 QC ESB Roof 10/28/14 13:00

10/29/2014 7:42:08AM

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AD 163-44

UNIDENTIFIED PEAKS

Peak Locate Performed on : 10/29/2014 7:41:27AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex(Root)\Default(Library)\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	2.91E-05	6.81E-05	6.81E-05	miss
+	Cr-51	320.08	9.91	-1.59E-06	2.76E-05	2.76E-05	free
+	Mn-54	834.85	99.98	3.72E-08	3.90E-06	3.90E-06	miss
+	Co-58	810.76	99.45	4.25E-07	3.55E-06	3.55E-06	0.999
		1674.73	0.52	-5.88E-05		6.18E-04	1.126
+	Co-60	1173.23	99.85	1.57E-06	3.77E-06	6.17E-06	0.794
		1332.49	99.98	-4.55E-07		3.77E-06	0.790
+	Nb-94	702.65	99.81	-7.31E-07	4.47E-06	4.47E-06	0.778
		871.09	99.89	-1.11E-07		4.75E-06	0.774
+	Sn-113	255.13	2.11	2.07E-05	4.10E-06	1.28E-04	free
		391.70	64.97	-9.11E-08		4.10E-06	free
+	Cs-134	475.36	1.48	6.85E-06	4.38E-06	1.93E-04	miss
		563.25	8.34	-2.35E-05		5.31E-05	0.618
		569.33	15.37	4.80E-06		3.55E-05	0.592
		604.72	97.62	-2.99E-06		4.38E-06	0.733
		795.86	85.46	5.75E-08		6.03E-06	0.732
		801.95	8.69	1.17E-05		7.04E-05	0.620
		1038.61	0.99	2.28E-05		3.35E-04	0.765
		1167.97	1.79	-6.67E-06		1.39E-04	1.385

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

Analysis Report for 29-Oct-14-10002
7701 QC ESB Roof 10/28/14 13:00

10/29/2014 7:42:08AM

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	-9.69E-07	4.38E-06	9.39E-05	1.567
+	Cs-137	661.66	85.10	-6.41E-08	4.74E-06	4.74E-06	miss
+	Eu-152	121.78	28.67	1.67E-07	9.43E-06	9.43E-06	0.767
		244.70	7.61	1.07E-06		4.05E-05	0.733
		295.94	0.45	2.47E-04		7.70E-04	miss
		344.28	26.60	-4.86E-07		9.55E-06	0.835
		367.79	0.86	2.37E-04		7.55E-04	0.569
		411.12	2.24	9.96E-06		1.90E-04	0.645
		443.96	2.83	-2.48E-06		1.22E-04	0.734
		488.68	0.42	7.37E-05		5.90E-04	miss
		563.99	0.49	8.13E-05		8.29E-04	0.734
		586.26	0.46	-4.83E-05		7.27E-04	0.753
		678.62	0.47	3.30E-05		1.26E-03	0.569
		688.67	0.86	1.37E-04		4.51E-04	0.885
		719.35	0.28	1.24E-04		1.36E-03	miss
		778.90	12.96	-1.50E-06		4.04E-05	0.763
		810.45	0.32	1.11E-04		8.52E-04	1.280
		867.37	4.26	3.33E-05		1.40E-04	0.671
		919.33	0.43	2.35E-04		1.10E-03	0.885
		964.08	14.65	6.83E-07		2.39E-05	1.127
		1085.87	10.24	-2.06E-06		3.77E-05	1.105
		1089.74	1.73	8.16E-05		3.42E-04	0.788
		1112.07	13.69	-4.69E-07		2.61E-05	0.936
		1212.95	1.43	-6.63E-05		3.69E-04	0.672
		1249.94	0.19	-1.27E-04		1.33E-03	1.433
		1299.14	1.63	-1.26E-04		3.02E-04	0.753
		1408.01	21.07	-2.12E-06		2.08E-05	0.895
		1457.64	0.50	-5.25E-04		4.77E-04	1.335
		1528.10	0.28	2.31E-04		1.48E-03	1.007
+	Eu-154	123.07	40.40	-2.40E-06	6.17E-06	6.17E-06	0.767
		247.93	6.89	9.77E-06		5.52E-05	0.713
		591.76	4.95	8.22E-06		7.75E-05	0.661
		692.42	1.78	-7.24E-05		1.88E-04	0.729
		723.30	20.06	-1.22E-06		1.96E-05	0.738
		756.80	4.52	1.41E-05		1.16E-04	0.639
		873.18	12.08	1.47E-05		5.03E-05	0.711
		996.29	10.48	5.96E-06		5.05E-05	0.895
		1004.76	18.01	8.56E-06		2.79E-05	0.882
		1274.43	34.80	8.46E-07		1.37E-05	0.890
		1596.48	1.80	1.35E-05		1.50E-04	1.864
+	Eu-155	45.30	1.31	-6.25E-05	1.01E-05	8.20E-04	0.995
		60.01	1.22	-3.78E-06		7.98E-04	0.999
		86.55	30.70	2.42E-06		1.05E-05	free
		105.31	21.10	1.21E-06		1.01E-05	1.000
+	Tl-208	583.19	85.00	-5.35E-07	3.90E-06	3.90E-06	0.758
+	Bi-211	351.07	* 13.02	3.27E-05	2.48E-05	2.48E-05	miss
+	Pb-211	404.85	3.78	1.63E-05	7.98E-05	7.98E-05	miss
		427.09	1.76	7.11E-06		1.50E-04	miss
		832.01	3.52	-3.76E-06		1.26E-04	miss
+	Bi-212	39.86	1.06	-3.11E-04	3.22E-05	1.01E-03	0.993
		727.33	6.67	-1.19E-05		3.22E-05	0.928

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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10/29/2014 7:42:08AM

Analysis Report for 29-Oct-14-10002
7701 QC ESB Roof 10/28/14 13:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	785.37	1.10	0.00E+00	3.22E-05	9.05E-05	0.774
		1620.50	1.47	9.86E-05		4.09E-04	1.032
+	Pb-212	115.18	0.60	4.17E-05	5.31E-06	3.54E-04	miss
		238.63	43.60	1.11E-06		5.31E-06	free
		300.09	3.30	-4.28E-05		6.73E-05	free
+	Pb212-XR	74.82	10.28	1.61E-05	2.68E-05	5.37E-05	miss
		77.11	17.10	3.55E-06		2.68E-05	miss
		87.35	3.97	-1.29E-05		7.12E-05	miss
		89.78	1.46	-8.53E-07		1.93E-04	miss
+	Bi-214	609.32	45.49	8.21E-06	1.52E-05	1.52E-05	0.798
		768.36	4.89	1.88E-05		1.19E-04	0.764
		806.18	1.26	-1.09E-04		3.04E-04	0.701
		934.06	3.11	7.73E-06		1.76E-04	0.769
		1120.29	14.92	3.86E-06		4.45E-05	0.769
		1155.21	1.63	-8.86E-05		2.17E-04	0.765
		1238.12	5.83	2.75E-05		1.03E-04	0.769
		1280.98	1.43	0.00E+00		9.68E-05	0.769
		1377.67	3.99	9.97E-06		8.33E-05	1.160
		1385.31	0.79	5.32E-05		6.35E-04	0.769
		1401.52	1.33	-1.14E-04		3.03E-04	0.769
		1407.99	2.39	-2.17E-05		2.13E-04	0.769
		1509.21	2.13	-7.70E-05		1.95E-04	0.791
		1661.27	1.05	-7.77E-05		3.36E-04	1.010
		1729.59	2.88	1.05E-05		9.73E-05	1.654
		1764.49	15.30	1.31E-05		3.95E-05	1.009
		1847.43	2.03	4.03E-05		2.30E-04	1.344
>		2118.51	1.16	0.00E+00		0.00E+00	1.227
+	Pb-214	241.99	7.25	1.56E-05	9.06E-06	3.90E-05	0.998
		295.22	18.42	1.05E-05		1.95E-05	1.001
		351.93	35.60	1.19E-05		9.06E-06	free
		785.96	1.06	-2.70E-05		1.98E-04	0.998
+	Pb214-XR	74.82	5.80	2.86E-05	4.72E-05	9.53E-05	miss
		77.11	9.70	6.26E-06		4.72E-05	miss
		87.35	2.24	-2.29E-05		1.26E-04	miss
		89.78	0.82	-1.52E-06		3.43E-04	miss
+	Ra-226	186.21	3.64	-1.65E-05	4.32E-05	4.32E-05	free
+	Ac-228	129.07	2.42	7.17E-05	1.67E-05	1.26E-04	0.786
		209.25	3.89	1.72E-05		7.00E-05	0.905
		270.24	3.46	2.96E-05		9.42E-05	0.827
		328.00	2.95	-3.98E-05		9.68E-05	0.824
		338.32	11.27	3.55E-06		2.94E-05	0.971
		409.46	1.92	-2.47E-05		1.79E-04	0.747
		463.00	4.40	6.12E-06		9.42E-05	0.720
		794.95	4.25	-6.07E-05		9.73E-05	0.748
		911.20	25.80	1.60E-06		1.67E-05	0.958
		964.77	4.99	6.95E-06		8.62E-05	0.917
		968.97	15.80	-8.71E-07		2.86E-05	0.957
		1588.20	3.22	4.29E-06		1.33E-04	1.012
+	Pa-231	27.36	10.30	-1.85E-05	9.00E-05	1.33E-04	0.987
		283.69	1.70	3.53E-05		1.74E-04	0.999
		300.07	2.47	-5.72E-05		9.00E-05	1.000

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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 PR 10/28/14

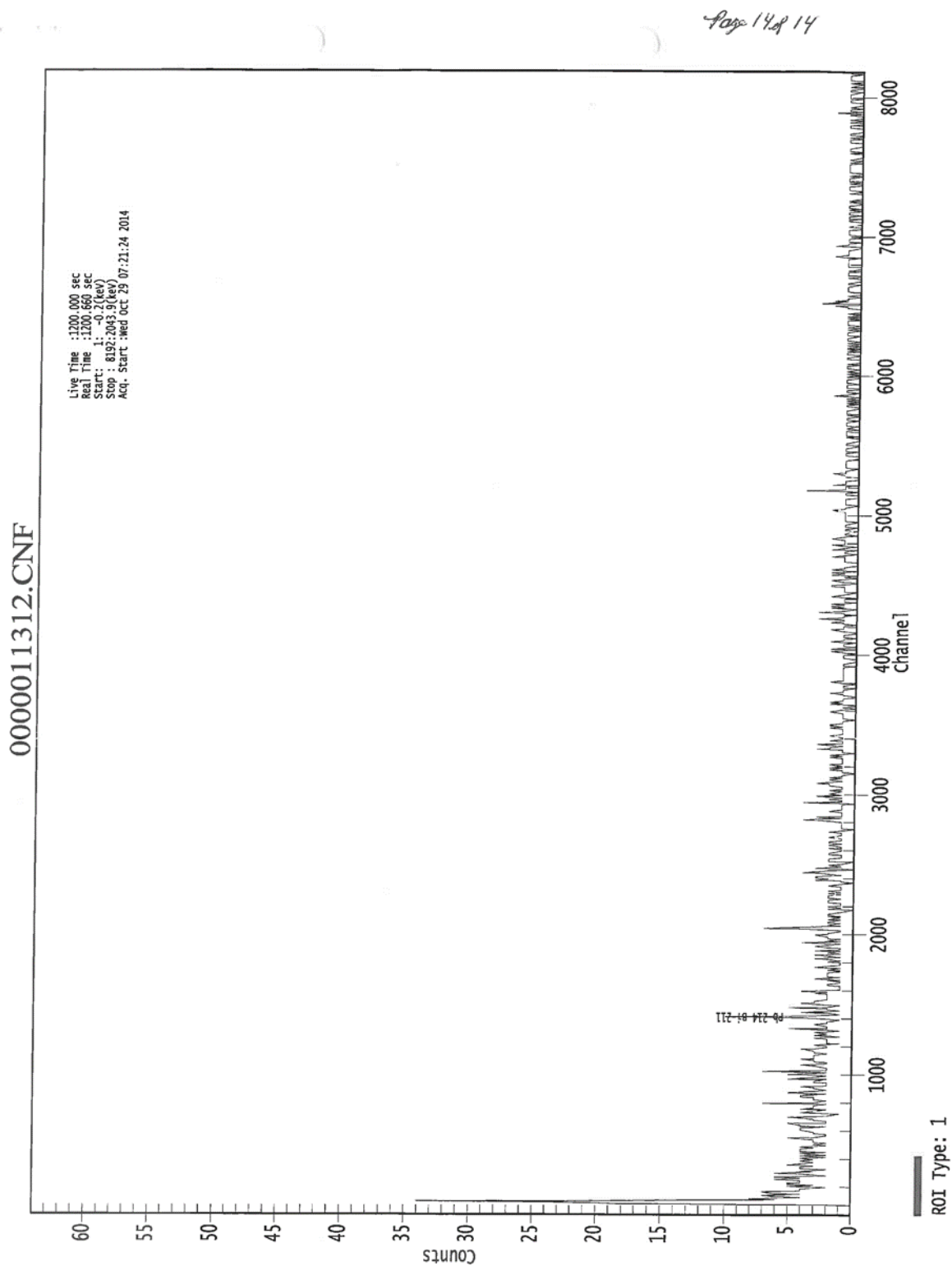
Analysis Report for 29-Oct-14-10002
7701 QC ESB Roof 10/28/14 13:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	1.89E-05	9.00E-05	1.23E-04	1.000
		330.06	1.40	1.68E-04		2.75E-04	1.001
+	Th-234	92.38	2.13	1.73E-05	1.36E-04	1.36E-04	free
		92.80	2.10	6.50E-06		1.37E-04	free
		112.81	0.21	-8.68E-05		9.65E-04	free
+	U-235	143.76	10.96	-3.07E-06	3.09E-06	1.85E-05	free
		163.33	5.08	1.76E-05		4.56E-05	free
		185.71	57.20	1.56E-07		3.09E-06	free
		202.11	1.08	-3.97E-05		1.71E-04	miss
		205.31	5.01	-1.03E-05		3.53E-05	free
+	Am-241	59.54	35.90	1.32E-06	2.71E-05	2.71E-05	free

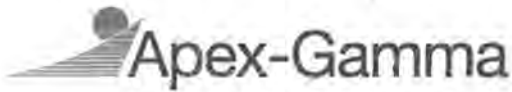
+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = MDA value not calculated
 @ = Half-life too short to be able to perform the decay correction
 ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.
 free = No coincidence correction required.
 miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



11/11/2014 7:02:31AM

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Analysis Report for 11-Nov-14-10001
VG006 ESB ROOF 11/10/14 14:00

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Nov-14-10001
Sample Description	: VG006 ESB ROOF 11/10/14 14:00
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 11/10/2014 12:00:44PM
Acquisition Started	: 11/11/2014 6:41:46AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.8 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11348

M-2 11-11-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 11/11/2014 7:01:49AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

M-2 11/12/14

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 11-Nov-14-10001

VG006 ESB ROOF 11/10/14 14:00

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.67	1402 -	1411	1406.74	1.42E+01	10.32	1.15E+01	Pb-214 Bi-211

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Bi-211	0.97	351.07 *	13.02	2.75E-05	2.04E-05	miss
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	1.01E-05	7.46E-06	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

11/11/2014 7:02:31AM

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Analysis Report for 11-Nov-14-10001

VG006 ESB ROOF 11/10/14 14:00

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
?	Bi-211	0.977	2.75E-05	2.04E-05	
?	Pb-214	0.997	1.01E-05	7.46E-06	

- ? = 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

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

11/11/2014 7:02:31AM

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Analysis Report for 11-Nov-14-10001

VG006 ESB ROOF 11/10/14 14:00

UNIDENTIFIED PEAKS

Peak Locate Performed on : 11/11/2014 7:01:49AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	1.23E-04	1.63E-04	1.63E-04	miss
+	Cr-51	320.08	9.91	2.03E-06	3.12E-05	3.12E-05	free
+	Mn-54	834.85	99.98	-8.73E-07	3.86E-06	3.86E-06	miss
+	Co-58	810.76	99.45	0.00E+00	1.40E-06	1.40E-06	0.999
		1674.73	0.52	1.67E-04		1.23E-03	1.078
+	Co-60	1173.23	99.85	3.84E-06	6.55E-06	1.14E-05	0.844
		1332.49	99.98	-2.54E-07		6.55E-06	0.840
+	Nb-94	702.65	99.81	-6.40E-07	4.81E-06	6.59E-06	0.833
		871.09	99.89	3.27E-07		4.81E-06	0.829
+	Sn-113	255.13	2.11	-1.36E-06	5.62E-06	1.19E-04	free
		391.70	64.97	1.71E-08		5.62E-06	free
+	Cs-134	475.36	1.48	-1.38E-04	5.46E-06	1.63E-04	miss
		563.25	8.34	-6.49E-07		6.02E-05	0.702
		569.33	15.37	5.85E-06		3.40E-05	0.681
		604.72	97.62	1.52E-06		6.80E-06	0.796
		795.86	85.46	-6.18E-07		5.46E-06	0.795
		801.95	8.69	-1.80E-05		8.94E-05	0.702
		1038.61	0.99	-6.36E-05		5.62E-04	0.822
		1167.97	1.79	3.02E-05		2.22E-04	1.255

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 11-Nov-14-10001
VG006 ESB ROOF 11/10/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	1.85E-05	5.46E-06	1.36E-04	1.374
+	Cs-137	661.66	85.10	0.00E+00	4.74E-06	4.74E-06	miss
+	Eu-152	121.78	28.67	-4.05E-06	7.96E-06	7.96E-06	0.818
		244.70	7.61	-1.23E-05		3.68E-05	0.786
		295.94	0.45	-1.32E-04		8.05E-04	miss
		344.28	26.60	5.31E-06		1.77E-05	0.874
		367.79	0.86	-8.98E-05		5.00E-04	0.654
		411.12	2.24	2.52E-05		2.36E-04	0.717
		443.96	2.83	3.04E-05		1.66E-04	0.790
		488.68	0.42	1.20E-04		9.60E-04	miss
		563.99	0.49	-7.05E-04		7.20E-04	0.790
		586.26	0.46	1.48E-04		1.39E-03	0.807
		678.62	0.47	0.00E+00		3.89E-04	0.654
		688.67	0.86	1.16E-04		5.36E-04	0.904
		719.35	0.28	1.94E-04		1.79E-03	miss
		778.90	12.96	-1.17E-05		5.04E-05	0.815
		810.45	0.32	8.56E-05		9.45E-04	1.239
		867.37	4.26	2.32E-05		1.61E-04	0.729
		919.33	0.43	-1.22E-04		1.08E-03	0.904
		964.08	14.65	1.50E-05		5.09E-05	1.109
		1085.87	10.24	0.00E+00		1.56E-05	1.089
		1089.74	1.73	8.94E-05		4.15E-04	0.832
		1112.07	13.69	1.01E-05		5.45E-05	0.943
		1212.95	1.43	0.00E+00		1.81E-04	0.729
		1249.94	0.19	4.10E-05		2.67E-03	1.314
		1299.14	1.63	-4.80E-05		4.12E-04	0.807
		1408.01	21.07	0.00E+00		1.11E-05	0.911
		1457.64	0.50	-1.66E-03		9.61E-04	1.241
		1528.10	0.28	0.00E+00		8.30E-04	0.984
+	Eu-154	123.07	40.40	3.54E-06	8.03E-06	8.03E-06	0.820
		247.93	6.89	2.03E-05		6.08E-05	0.772
		591.76	4.95	2.10E-05		1.44E-04	0.730
		692.42	1.78	9.86E-05		4.55E-04	0.785
		723.30	20.06	9.00E-06		4.12E-05	0.797
		756.80	4.52	-3.67E-05		1.41E-04	0.704
		873.18	12.08	2.33E-05		6.99E-05	0.771
		996.29	10.48	6.14E-06		4.52E-05	0.935
		1004.76	18.01	3.72E-06		2.74E-05	0.904
		1274.43	34.80	2.28E-06		1.68E-05	0.910
		1596.48	1.80	0.00E+00		8.71E-05	1.533
+	Eu-155	45.30	1.31	-1.03E-04	1.09E-05	3.91E-04	0.994
		60.01	1.22	8.19E-06		6.13E-04	0.999
		86.55	30.70	1.06E-06		1.09E-05	free
		105.31	21.10	4.45E-06		1.21E-05	1.000
+	Tl-208	583.19	85.00	2.27E-07	6.82E-06	6.82E-06	0.810
+	Bi-211	351.07	* 13.02	2.75E-05	2.76E-05	2.76E-05	miss
+	Pb-211	404.85	3.78	-3.32E-05	5.55E-05	5.55E-05	miss
		427.09	1.76	1.39E-04		2.96E-04	miss
		832.01	3.52	1.98E-05		1.38E-04	miss
+	Bi-212	39.86	1.06	-1.54E-04	1.05E-04	5.67E-04	0.995
		727.33	6.67	-2.48E-06		1.05E-04	0.945

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 11-Nov-14-10001

VG006 ESB ROOF 11/10/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	785.37	1.10	-3.63E-05	1.05E-04	5.87E-04	0.829
		1620.50	1.47	0.00E+00		1.62E-04	1.020
+	Pb-212	115.18	0.60	-8.92E-05	9.24E-06	4.02E-04	miss
		238.63	43.60	4.94E-06		9.24E-06	free
		300.09	3.30	2.37E-05		1.20E-04	free
+	Pb212-XR	74.82	10.28	3.26E-05	2.43E-05	5.40E-05	miss
		77.11	17.10	5.06E-06		2.43E-05	miss
		87.35	3.97	3.45E-06		7.65E-05	miss
		89.78	1.46	-2.60E-05		1.67E-04	miss
+	Bi-214	609.32	45.49	1.32E-05	2.36E-05	2.36E-05	0.847
		768.36	4.89	-8.13E-06		1.31E-04	0.820
		806.18	1.26	0.00E+00		1.42E-04	0.769
		934.06	3.11	9.31E-05		3.15E-04	0.824
		1120.29	14.92	1.78E-06		5.74E-05	0.825
		1155.21	1.63	-6.44E-05		3.68E-04	0.822
		1238.12	5.83	2.94E-05		1.37E-04	0.824
		1280.98	1.43	1.84E-04		6.61E-04	0.824
		1377.67	3.99	7.53E-06		1.29E-04	1.102
		1385.31	0.79	0.00E+00		3.21E-04	0.824
		1401.52	1.33	0.00E+00		1.94E-04	0.824
		1407.99	2.39	0.00E+00		1.08E-04	0.824
		1509.21	2.13	0.00E+00		1.27E-04	0.840
		1661.27	1.05	1.25E-05		8.13E-04	1.004
		1729.59	2.88	2.35E-05		1.73E-04	1.413
		1764.49	15.30	9.89E-06		5.88E-05	1.005
		1847.43	2.03	-4.60E-05		3.01E-04	1.217
>		2118.51	1.16	0.00E+00		0.00E+00	1.140
+	Pb-214	241.99	7.25	4.40E-06	1.01E-05	3.54E-05	0.998
		295.22	18.42	1.38E-05		2.36E-05	1.001
		351.93	* 35.60	1.01E-05		1.01E-05	free
		785.96	1.06	1.02E-04		5.66E-04	0.998
+	Pb214-XR	74.82	5.80	5.78E-05	4.28E-05	9.57E-05	miss
		77.11	9.70	8.91E-06		4.28E-05	miss
		87.35	2.24	6.12E-06		1.36E-04	miss
		89.78	0.82	-4.63E-05		2.98E-04	miss
+	Ra-226	186.21	3.64	3.26E-05	8.68E-05	8.68E-05	free
+	Ac-228	129.07	2.42	2.33E-05	2.09E-05	1.33E-04	0.831
		209.25	3.89	6.60E-06		6.77E-05	0.925
		270.24	3.46	-7.28E-06		1.06E-04	0.869
		328.00	2.95	1.08E-05		1.30E-04	0.867
		338.32	11.27	5.49E-06		3.30E-05	0.982
		409.46	1.92	-1.03E-04		1.73E-04	0.803
		463.00	4.40	-1.77E-05		8.65E-05	0.781
		794.95	4.25	1.97E-05		1.37E-04	0.801
		911.20	25.80	-7.50E-07		2.09E-05	0.967
		964.77	4.99	3.01E-05		1.65E-04	0.937
		968.97	15.80	3.86E-06		2.84E-05	0.967
		1588.20	3.22	0.00E+00		7.34E-05	1.010
+	Pa-231	27.36	10.30	0.00E+00	1.13E-05	1.13E-05	0.989
		283.69	1.70	-2.12E-05		2.05E-04	0.998
		300.07	2.47	4.21E-05		1.61E-04	1.000

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports

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Analysis Report for 11-Nov-14-10001
VG006 ESB ROOF 11/10/14 14:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	-1.79E-06	1.13E-05	1.51E-04	1.000
		330.06	1.40	-4.66E-05		2.04E-04	1.002
+	Th-234	92.38	2.13	2.63E-05	1.54E-04	1.54E-04	free
		92.80	2.10	8.47E-05		1.69E-04	free
		112.81	0.21	-7.69E-04		8.90E-04	free
+	U-235	143.76	10.96	3.30E-06	5.80E-06	1.95E-05	free
		163.33	5.08	-9.36E-06		3.61E-05	free
		185.71	57.20	3.05E-06		5.80E-06	free
		202.11	1.08	-8.77E-06		1.92E-04	miss
		205.31	5.01	-3.63E-06		5.32E-05	free
+	Am-241	59.54	35.90	4.71E-06	2.22E-05	2.22E-05	free

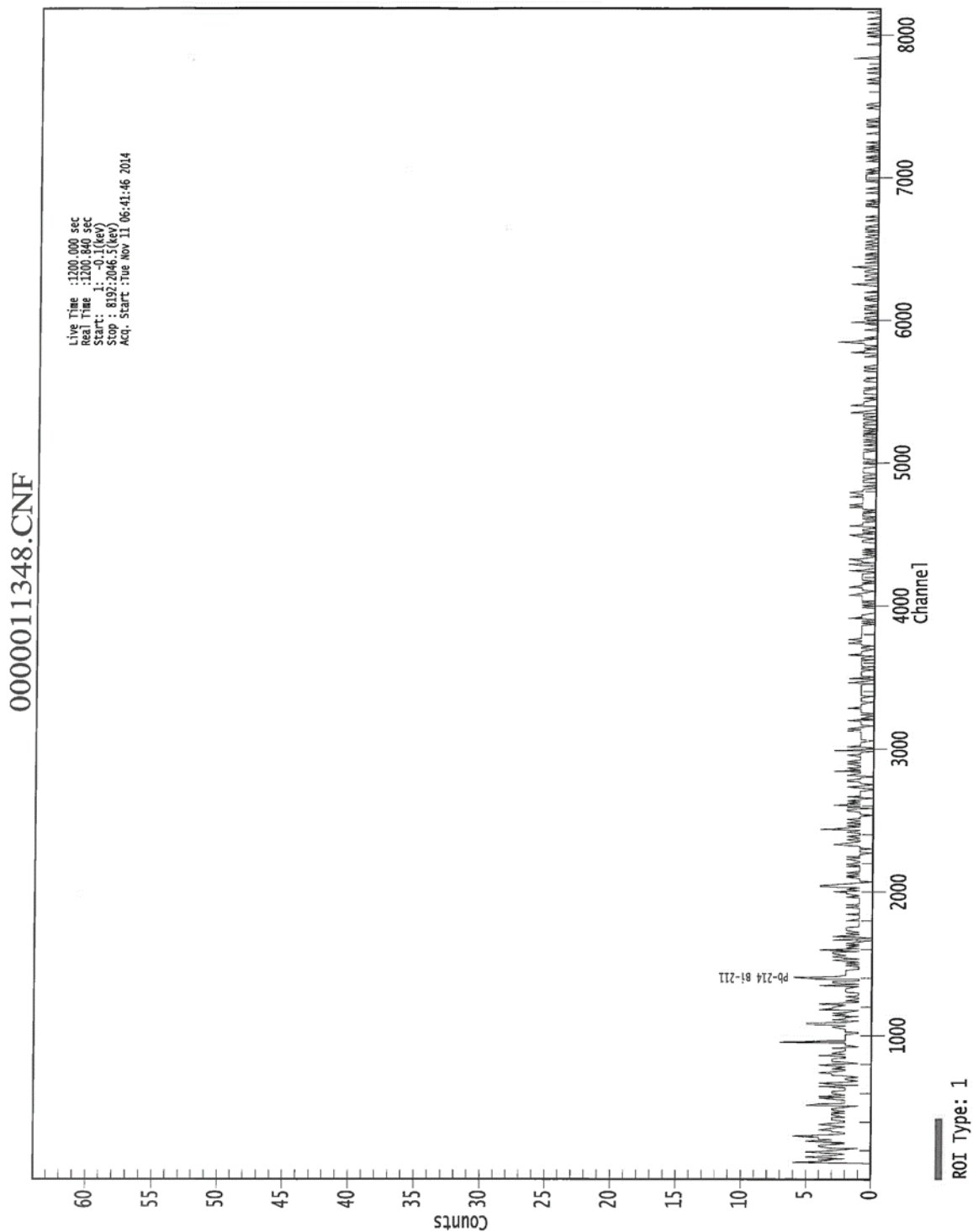
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-8 07701 Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

```
*****
***      G A M M A   S   E C T R U M   A N A L Y   I S      ***
*****

Filename: C:\Canberra\9-30-14\20140929092103.cnf

Report Generated On       : 10/1/2014   5:55:44 AM

Sample Title              : plate
Sample Description        :
Sample Identification      :
Sample Type               :
Sample Geometry           :

Peak Locate Threshold     : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size               : 1.000E+000 grams

Sample Taken On           : 9/29/2014   9:04:54 AM
Acquisition Started      : 9/29/2014   9:04:54 AM

Live Time                 : 898.0 seconds
Dead Time                 : 900.0 seconds

Background Time           : 0.22 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID              : 1M_PAVER
```

*Temp Resin Storage Facility
Roof plate
(1 of 16)
used for hydrology
Training
9/30/2014
off*

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

*Analyst JS
Date 10-1-14*

Mr. Sum 10/1/14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 10/1/2014 5:55:45 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: plate
Peak Analysis Performed on: 10/1/2014 5:55:44 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.45	38.96	1.70	2.87E+003	229.06	1.78E+003
2	1030-	1112	1071.44	801.15	1.06	3.22E+002	196.88	1.19E+003
3	1896-	2004	1950.50	1455.86	19.53	2.21E+003	152.49	5.25E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/1/2014 5:55:45 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: plate
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.950	34.70*	66.40	3.98440E+001	8.58075E+000
		788.70*	33.60	1.52209E+001	9.47249E+000
		1436.80*	66.40	8.81265E+001	9.30473E+000
K-40	0.993	1460.82*	10.66	5.48930E+002	6.08507E+001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/1/2014 5:55:45 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
LaBr3	0.950	2.874576E+001	6.359459E+000
K-40	0.993	3.698761E+002	7.020180E+001
X Co-58	0.974		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 10/1/2014 5:55:44 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report 10/1/2014 5:55:45 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: plate
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	LaBr3	34.70*	66.40	4.665E+000	4.67E+000	3.984E+001	2.314E+000
		788.70*	33.60	1.517E+001		1.522E+001	7.522E+000
		1436.80*	66.40	7.969E+000		8.813E+001	3.931E+000
+	K-40	1460.82*	10.66	4.964E+001	4.96E+001	5.489E+002	2.448E+001
	Cr-51	320.08	9.91	1.206E+001	1.21E+001	-1.274E+001	5.929E+000
	Mn-54	834.85	99.98	2.647E+000	2.65E+000	2.021E-001	1.301E+000
	Co-58	810.76*	99.45	5.126E+000	5.13E+000	5.143E+000	2.541E+000
	Co-60	1173.23	99.85	2.485E+000	1.22E+000	1.038E+000	1.213E+000
		1332.49	99.98	1.224E+000		1.120E-001	5.789E-001
	Nb-94	702.65	99.81	1.691E+000	1.69E+000	-4.858E-001	8.263E-001
		871.09	99.89	2.640E+000		9.384E-001	1.297E+000
	Sn-113	255.13	2.11	5.951E+001	1.95E+000	-7.394E+000	2.935E+001
		391.70	64.97	1.954E+000		2.101E+000	9.594E-001
	Cs-137	661.66	85.10	1.947E+000	1.95E+000	1.516E+000	9.524E-001
	Eu-152	121.78	28.67	6.181E+000	4.81E+000	-4.696E-001	3.066E+000
		244.70	7.61	1.697E+001		-1.286E+001	8.375E+000
		295.94	0.45	2.783E+002		5.090E+001	1.370E+002
		344.28	26.60	4.809E+000		2.435E+000	2.365E+000
		367.79	0.86	1.420E+002		-6.049E+001	6.971E+001
		411.12	2.24	5.472E+001		-6.803E+001	2.682E+001
		443.96	2.83	4.676E+001		-2.552E+000	2.292E+001
		488.68	0.42	3.412E+002		-5.069E+001	1.673E+002
		563.99	0.49	3.177E+002		-6.150E+001	1.556E+002
		586.26	0.46	3.656E+002		-1.324E+002	1.793E+002
		678.62	0.47	3.494E+002		2.435E+002	1.708E+002
		688.67	0.86	1.922E+002		-7.428E+001	9.394E+001
		719.35	0.28	6.090E+002		1.685E+002	2.975E+002
		778.90	12.96	1.576E+001		-9.057E-001	7.716E+000
		810.45	0.32	8.056E+002		3.686E+002	3.960E+002
		867.37	4.26	6.243E+001		4.176E+001	3.068E+001
		919.33	0.43	6.372E+002		5.099E+002	3.129E+002
		964.08	14.65	1.762E+001		8.138E+000	8.640E+000
		1085.87	10.24	2.242E+001		-1.123E+001	1.094E+001
		1089.74	1.73	1.342E+002		-4.589E+001	6.547E+001
		1112.07	13.69	1.777E+001		3.473E-001	8.679E+000
		1212.95	1.43	1.770E+002		9.691E+001	8.634E+001
		1249.94	0.19	1.162E+003		3.649E+002	5.644E+002
		1299.14	1.63	9.234E+001		-7.127E+001	4.416E+001
		1408.01	21.07	1.574E+001		-1.260E+001	7.703E+000
		1457.64	0.50	1.183E+003		6.672E+003	5.844E+002
		1528.10	0.28	2.624E+002		-1.182E+002	1.180E+002
	Eu-154	123.07	40.40	4.338E+000	4.34E+000	-6.201E+000	2.151E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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5:55:45 AM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	Eu-154	247.93	6.89	1.872E+001	4.34E+000	-3.519E+000	9.237E+000
		591.76	4.95	3.458E+001		2.683E+001	1.696E+001
		692.42	1.78	9.279E+001		-4.442E+001	4.533E+001
		723.30	20.06	8.463E+000		4.841E+000	4.134E+000
		756.80	4.52	3.709E+001		-1.597E+001	1.809E+001
		873.18	12.08	2.182E+001		5.012E+000	1.072E+001
		996.29	10.48	2.203E+001		-2.346E+000	1.077E+001
		1004.76	18.01	1.249E+001		-1.883E+000	6.100E+000
		1274.43	34.80	5.161E+000		-2.246E+000	2.488E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.137E+002	6.80E+000	-1.450E+001	1.059E+002
		60.01	1.22	2.215E+002		6.960E+001	1.097E+002
		86.55	30.70	6.803E+000		-3.141E-001	3.374E+000
		105.31	21.10	9.019E+000		-3.310E+000	4.473E+000
	Tl-208	583.19	85.00	1.953E+000	1.95E+000	-1.735E+000	9.572E-001
	Bi-211	351.07	13.02	9.798E+000	9.80E+000	4.505E+000	4.818E+000
	Pb-211	404.85	3.78	3.286E+001	3.29E+001	-9.168E+000	1.612E+001
		427.09	1.76	7.281E+001		3.767E+001	3.570E+001
		832.01	3.52	7.483E+001		5.133E+000	3.679E+001
	Bi-212	39.86	1.06	2.729E+002	2.55E+001	2.528E+003	1.353E+002
		727.33	6.67	2.552E+001		1.641E+001	1.246E+001
		785.37	1.10	1.978E+002		-5.356E+000	9.700E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	2.974E+002	3.02E+000	1.996E+001	1.475E+002
		238.63	43.60	3.022E+000		9.889E-001	1.492E+000
		300.09	3.30	3.746E+001		1.216E+001	1.845E+001
	Pb212-XR	74.82	10.28	2.262E+001	1.31E+001	1.016E+001	1.121E+001
		77.11	17.10	1.314E+001		-6.783E+000	6.516E+000
		87.35	3.97	5.201E+001		-2.255E+001	2.580E+001
		89.78	1.46	1.386E+002		-3.894E+001	6.872E+001
	Bi-214	609.32	45.49	3.780E+000	3.78E+000	3.358E+000	1.853E+000
		768.36	4.89	3.745E+001		-4.310E+000	1.830E+001
		806.18	1.26	2.027E+002		1.773E+002	9.965E+001
		934.06	3.11	8.913E+001		1.919E+001	4.377E+001
		1120.29	14.92	1.659E+001		1.813E+001	8.102E+000
		1155.21	1.63	1.524E+002		-2.148E+001	7.440E+001
		1238.12	5.83	3.920E+001		-2.619E+001	1.907E+001
		1280.98	1.43	1.241E+002		5.236E+001	5.979E+001
		1377.67	3.99	3.238E+001		-7.348E+001	1.533E+001
		1385.31	0.79	2.064E+002		-3.667E+002	9.887E+001
		1401.52	1.33	2.086E+002		-2.515E+002	1.017E+002
		1407.99	2.39	1.385E+002		-1.109E+002	6.779E+001
		1509.21	2.13	8.485E+001		-5.378E+001	4.069E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.802E+001	3.59E+000	2.699E+000	8.898E+000
		295.22	18.42	6.759E+000		-1.218E+000	3.329E+000
		351.93	35.60	3.585E+000		3.971E+000	1.763E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

10/1/2014

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Pb-214	785.96	1.06	2.074E+002	3.59E+000	-5.119E+000	1.017E+002
Pb214-XR	74.82	5.80	4.008E+001	2.32E+001	1.801E+001	1.988E+001
	77.11	9.70	2.317E+001		-1.196E+001	1.149E+001
	87.35	2.24	9.218E+001		-3.997E+001	4.572E+001
	89.78	0.82	2.467E+002		-6.932E+001	1.224E+002
Ra-226	186.21	3.64	3.985E+001	3.99E+001	4.403E+000	1.973E+001
Ac-228	129.07	2.42	7.089E+001	1.03E+001	2.595E+000	3.515E+001
	209.25	3.89	3.635E+001		5.072E+000	1.798E+001
	270.24	3.46	3.685E+001		2.208E+000	1.817E+001
	328.00	2.95	4.034E+001		-2.856E+001	1.983E+001
	338.32	11.27	1.089E+001		-7.846E-001	5.355E+000
	409.46	1.92	6.394E+001		-3.951E+001	3.134E+001
	463.00	4.40	3.073E+001		2.083E+000	1.506E+001
	794.95	4.25	5.524E+001		1.965E+001	2.712E+001
	911.20	25.80	1.033E+001		-3.676E+000	5.072E+000
	964.77	4.99	5.162E+001		3.029E+001	2.531E+001
	968.97	15.80	1.613E+001		1.256E+001	7.903E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.429E+001		3.872E+001	3.661E+001
	300.07	2.47	5.005E+001		1.624E+001	2.464E+001
	302.65	2.20	5.595E+001		3.789E+001	2.754E+001
	330.06	1.40	8.551E+001		-5.911E+001	4.204E+001
Th-234	92.38	2.13	9.318E+001	9.32E+001	3.294E+001	4.621E+001
	92.80	2.10	9.434E+001		3.335E+001	4.679E+001
	112.81	0.21	8.597E+002		1.214E+002	4.263E+002
U-235	143.76	10.96	1.456E+001	2.54E+000	-1.134E+001	7.216E+000
	163.33	5.08	2.987E+001		1.442E+001	1.479E+001
	185.71	57.20	2.537E+000		-4.180E-001	1.256E+000
	202.11	1.08	1.302E+002		7.445E+001	6.442E+001
	205.31	5.01	2.873E+001		8.401E+000	1.422E+001
Am-241	59.54	35.90	7.616E+000	7.62E+000	2.393E+000	3.773E+000

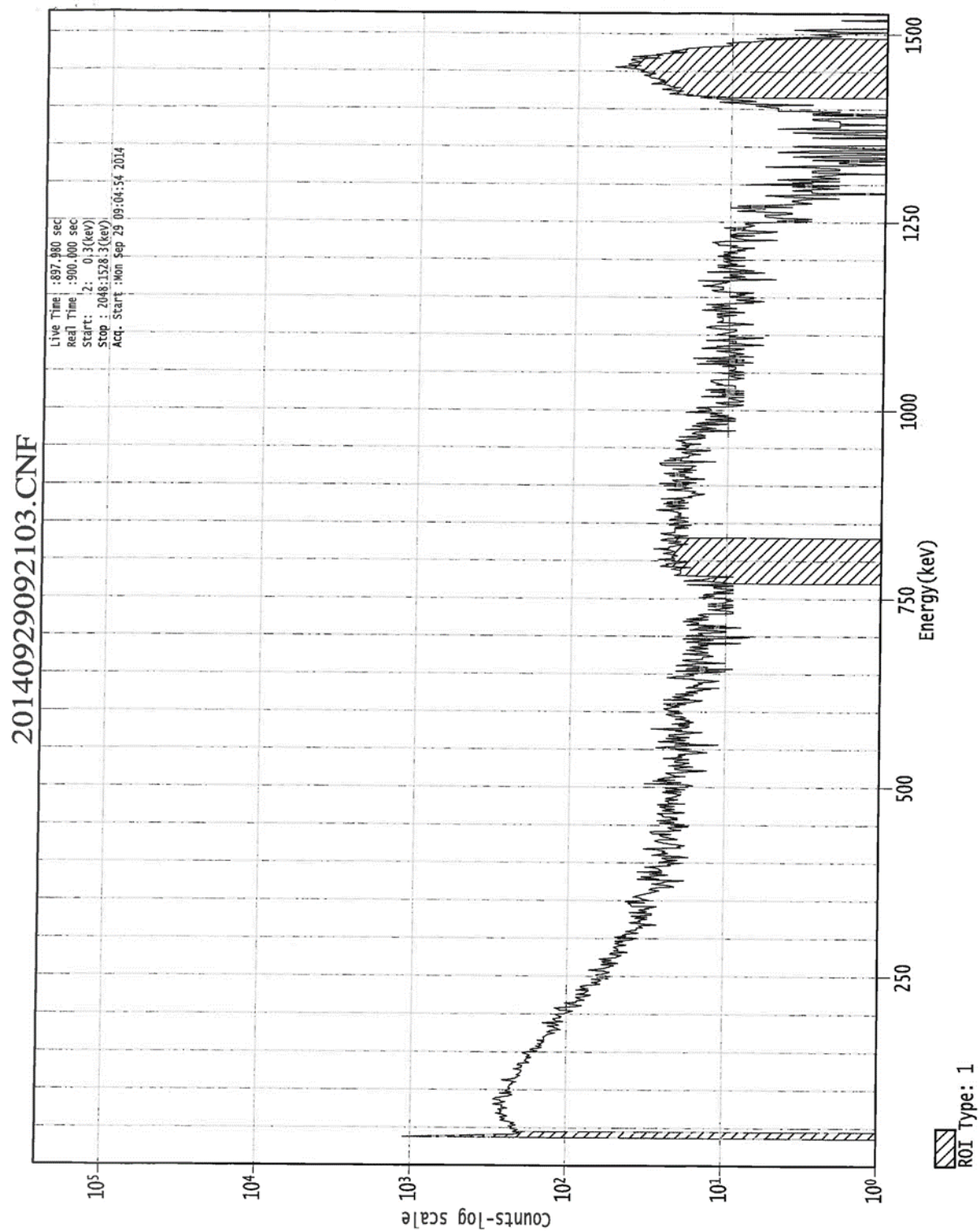
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

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*****
*****  G A M M A   S P E C T R U M   A N A L Y S I S   *****
*****

Filename: C:\GENIE2R\CAMFILES\concrete lids.CNF

Report Generated On      : 3/24/2014   1:25:14 PM

Sample Title             : Concrete Lid Stack 1
Sample Description       : Count on Concrete Lid Stack
Sample Identification    :
Sample Type              : Concrete
Sample Geometry          : Concrete Cylinde

Peak Locate Threshold    : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size              : 1.000E+000 grams (1.9512 E7 grams)

Sample Taken On          :
Acquisition Started      : 3/20/2014   12:08:42 PM

Live Time                : 1800.0 seconds
Real Time                : 1801.4 seconds

Dead Time                : 0.08 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID              : Lids Stacked Fix
```

* Report states 1 grams because weight is calculated with the efficiency. *77-15* 3-24-14

77-15
3-24-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2014 1:25:14 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Lid Stack 1
Peak Analysis Performed on: 3/24/2014 1:25:14 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	317	292.50	72.86	1.02	2.57E+002	44.75	3.76E+002
2	284-	317	300.73	74.92	1.03	4.49E+002	55.36	4.02E+002
3	284-	317	310.35	77.33	1.03	1.21E+002	39.32	4.29E+002
4	335-	345	339.76	84.70	0.88	9.50E+001	67.59	4.39E+002
5	946-	976	955.49	238.85	1.02	1.15E+002	30.15	1.43E+002
6	946-	976	968.26	242.04	1.02	5.34E+001	23.32	1.30E+002
7	1173-	1190	1181.56	295.44	1.13	7.27E+001	43.54	1.23E+002
8	1402-	1415	1408.09	352.14	1.12	1.70E+002	38.67	7.28E+001
9	2035-	2054	2042.94	511.02	0.98	1.23E+002	39.06	7.31E+001
10	2324-	2338	2332.26	583.41	1.39	7.63E+001	29.41	4.87E+001
11	2428-	2445	2437.10	609.64	1.65	1.87E+002	34.81	3.56E+001
12	3637-	3652	3644.21	911.61	0.98	4.99E+001	23.71	3.01E+001
13	3870-	3881	3875.49	969.45	0.76	2.86E+001	18.71	2.34E+001
14	4473-	4489	4480.70	1120.79	1.22	6.10E+001	21.38	1.70E+001
15	4948-	4961	4954.35	1239.21	0.61	2.85E+001	17.95	1.85E+001
16	5832-	5857	5844.65	1461.75	1.67	4.02E+002	45.60	2.83E+001
17	7052-	7070	7061.20	1765.74	1.42	6.06E+001	18.05	6.36E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 1:25:14 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Lid Stack 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.959	1460.81*	10.67	6.66601E+000	9.35894E-001
Tl-208	0.998	583.19*	84.50	1.51050E-001	6.09420E-002
PB-212	0.781	74.81*	9.60	1.00554E+001	2.36236E+000
		77.11*	17.50	1.43590E+000	5.46837E-001
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	3.85170E-001	1.17967E-001
		300.09	3.41		
BI-214	0.983	609.31*	46.30	6.78549E-001	1.50087E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	6.99571E-001	2.51494E-001
		1155.19	1.69		
		1238.11*	5.94	8.35466E-001	5.31041E-001
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	6.99516E-001	2.15653E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.894	74.81* @	6.33	1.52498E+001	3.58272E+000
		77.11* @	10.70	2.34844E+000	8.94360E-001
		87.20 @	3.70		
		89.80 @	1.03		
		241.98*	7.49	1.06278E+000	4.94306E-001
		295.21*	19.20	5.81060E-001	3.60133E-001
		351.92*	37.20	7.20035E-001	2.00091E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 1:25:14 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.999	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	3.09070E-001	1.48838E-001
		964.60	5.20		
		969.11*	16.60	2.96484E-001	1.95446E-001
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 1:25:14 PM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.959	6.666012E+000	9.358943E-001
Tl-208	0.998	1.510501E-001	6.094204E-002
X BI-211	0.320		
PB-212	0.781	4.321803E-001	1.152708E-001
BI-214	0.983	6.942635E-001	1.083050E-001
PB-214 @	0.894	7.873234E-001	1.621228E-001
AC-228	0.999	3.044505E-001	1.184119E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 1:25:14 PM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/24/2014 1:25:14 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.86	1.4278E-001	17.41	Tol.	BI-211
4	84.70	5.2799E-002	71.12	Tol.	TH-227
9	511.02	6.8294E-002	31.78		TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/24/2014

1:25:14 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylinde
Sample Title: Concrete Lid Stack 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	6.384E-001	6.38E-001	6.666E+000	2.967E-001
	MN-54	834.83	99.97	4.265E-002	4.26E-002	3.372E-003	1.902E-002
	CO-60	1173.22	100.00	4.079E-002	3.74E-002	8.761E-003	1.805E-002
		1332.49	100.00	3.740E-002		1.491E-002	1.633E-002
	NB-94	702.63	100.00	4.312E-002	4.01E-002	-2.325E-002	1.927E-002
		871.10	100.00	4.015E-002		-1.182E-002	1.776E-002
	SN-113	255.12	1.93	3.449E+000	9.16E-002	-1.642E+000	1.619E+000
		391.69	64.90	9.162E-002		1.415E-002	4.248E-002
	CS-134	475.35	1.46	3.833E+000	5.26E-002	1.136E+000	1.765E+000
		563.23	8.38	5.849E-001		-2.779E-001	2.656E-001
		569.32	15.43	2.856E-001		-9.974E-003	1.282E-001
		604.70	97.60	5.258E-002		1.122E-002	2.397E-002
		795.84	85.40	5.528E-002		-1.605E-002	2.494E-002
		801.93	8.73	4.373E-001		-1.948E-002	1.923E-001
		1038.57	1.00	3.780E+000		6.907E-001	1.656E+000
		1167.94	1.80	2.109E+000		4.251E-003	9.243E-001
		1365.15	3.04	1.299E+000		7.264E-001	5.710E-001
	CS-137	661.65	85.12	4.957E-002	4.96E-002	1.066E-002	2.210E-002
+	Tl-208	583.19*	84.50	8.234E-002	8.23E-002	1.511E-001	3.849E-002
	BI-211	72.87*	1.20	1.720E+001	6.41E-001	4.756E+001	8.347E+000
		351.10*	12.20	6.406E-001		2.196E+000	3.028E-001
		404.80	4.10	1.299E+000		1.005E-001	5.968E-001
		426.90	1.90	2.910E+000		6.771E-001	1.340E+000
		831.80	3.30	1.317E+000		5.115E-001	5.884E-001
	PB-211	404.80	3.00	1.776E+000	1.55E+000	1.374E-001	8.156E-001
		427.10	1.40	3.989E+000		1.817E+000	1.838E+000
		831.80	2.80	1.552E+000		6.028E-001	6.935E-001
	BI-212	39.86	1.10	1.384E+001	4.87E-001	4.656E+000	6.562E+000
		727.17	11.80	4.868E-001		2.424E-001	2.240E-001
		785.42	2.00	2.466E+000		-4.501E-001	1.118E+000
		1620.56	2.75	1.139E+000		4.088E-001	4.812E-001
+	PB-212	74.81*	9.60	2.149E+000	1.94E-001	1.006E+001	1.044E+000
		77.11*	17.50	1.173E+000		1.436E+000	5.706E-001
		87.20	6.30	2.631E+000		4.486E-001	1.277E+000
		89.80	1.75	8.637E+000		-8.146E-001	4.182E+000
		115.19	0.60	1.951E+001		9.633E-001	9.401E+000
		238.63*	44.60	1.944E-001		3.852E-001	9.266E-002
		300.09	3.41	1.839E+000		7.891E-002	8.587E-001
+	BI-214	609.31*	46.30	1.379E-001	1.38E-001	6.785E-001	6.406E-002
		768.36	5.04	1.154E+000		4.558E-001	5.315E-001
		806.17	1.23	3.840E+000		1.062E+000	1.733E+000
		934.06	3.21	1.389E+000		2.408E-001	6.223E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/24/2014

1:25:14 PM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	3.064E-001	1.38E-001	6.996E-001	1.377E-001
		1155.19	1.69	2.465E+000		1.170E+000	1.094E+000
		1238.11*	5.94	7.763E-001		8.355E-001	3.484E-001
		1280.96	1.47	2.734E+000		1.086E+000	1.206E+000
		1377.67	4.11	9.613E-001		1.749E-001	4.227E-001
		1385.31	0.78	4.680E+000		1.268E+000	2.034E+000
		1401.50	1.39	2.471E+000		1.173E+000	1.064E+000
		1407.98	2.48	1.431E+000		3.518E-001	6.192E-001
		1509.19	2.19	1.474E+000		8.124E-002	6.269E-001
		1661.28	1.15	2.058E+000		5.103E-001	8.168E-001
		1729.60	3.05	1.198E+000		6.106E-001	5.185E-001
		1764.49*	15.80	2.045E-001		6.995E-001	8.665E-002
		1847.44	2.12	1.842E+000		8.143E-001	8.043E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	3.259E+000	2.10E-001	1.525E+001	1.584E+000
		77.11*	10.70	1.919E+000		2.348E+000	9.331E-001
		87.20	3.70	4.480E+000		7.639E-001	2.174E+000
		89.80	1.03	1.467E+001		-1.384E+000	7.105E+000
		241.98*	7.49	1.108E+000		1.063E+000	5.269E-001
		295.21*	19.20	5.482E-001		5.811E-001	2.633E-001
		351.92*	37.20	2.101E-001		7.200E-001	9.932E-002
		785.91	1.10	4.731E+000		1.043E+000	2.156E+000
	RA-226	186.21	3.28	2.929E+000	2.93E+000	2.542E+000	1.405E+000
+	AC-228	89.95	2.10	7.081E+000	2.11E-001	-1.352E+000	3.427E+000
		93.35	3.50	4.298E+000		2.646E+000	2.082E+000
		129.08	2.80	3.832E+000		1.178E+000	1.843E+000
		209.28	4.40	1.785E+000		7.338E-001	8.473E-001
		270.23	3.60	1.981E+000		7.366E-001	9.337E-001
		327.64	3.20	2.040E+000		-2.433E-002	9.540E-001
		338.32	11.40	6.595E-001		3.803E-001	3.112E-001
		409.51	2.13	2.685E+000		8.520E-001	1.240E+000
		463.00	4.40	1.203E+000		-1.921E-001	5.513E-001
		794.70	4.60	1.117E+000		2.051E-001	5.087E-001
		911.60*	27.70	2.106E-001		3.091E-001	9.693E-002
		964.60	5.20	1.000E+000		3.474E-001	4.554E-001
		969.11*	16.60	2.899E-001		2.965E-001	1.309E-001
		1587.90	3.71	9.098E-001		-9.667E-002	3.895E-001
	PA-234M	766.36	0.29	1.499E+001	5.25E+000	-1.025E+001	6.716E+000
		1001.03	0.84	5.253E+000		1.152E+000	2.348E+000
	TH-234	92.38	2.81	5.459E+000	5.46E+000	3.228E+000	2.645E+000
		92.80	2.77	5.502E+000		3.437E+000	2.666E+000
		112.81	0.28	4.319E+001		9.021E+000	2.082E+001
	U-235	89.96	1.50	9.913E+000	1.75E-001	-1.892E+000	4.798E+000
		93.35	2.50	6.017E+000		3.705E+000	2.915E+000
		105.00	1.00	1.233E+001		2.872E-001	5.942E+000
		109.14	1.50	7.776E+000		-3.181E+000	3.743E+000
		143.76	10.50	9.159E-001		-1.353E-002	4.390E-001
		163.35	4.70	1.879E+000		3.049E-001	8.976E-001
		185.71	54.00	1.747E-001		1.244E-001	8.373E-002
		202.12	1.00	7.136E+000		-2.569E+000	3.371E+000
		205.31	4.70	1.606E+000		-8.811E-003	7.610E-001

CONCRETE LIDS.CNF

Live Time : 1800.000 sec
Real Time : 1801.360 sec
Start: 2: 0.1 (kev)
Stop: 819:2048.2 (kev)
Acq. Start: Thu Mar 20 12:08:42 2014

Counts

Energy(kev)

ROI Type: 1

ROI Type: 2

Peaks identified:

- Pb-214 PB-212
- Pb-214 PB-212
- Pb-214
- Pb-214
- Tl-208
- Bi-214
- AC-228
- AC-228
- Bi-214
- K-40

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\Concrete Cylinder 1.CNF

Report Generated On : 3/24/2014 6:50:04 AM

Sample Title : Concrete Cylinder 1
Sample Description : Count on concrete cylinder 1
Sample Identification :
Sample Type : Concrete
Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Grams (6.689856 grams)

Sample Taken On :
Acquisition Started : 3/20/2014 9:52:47 AM

Live Time : 1800.0 seconds
Real Time : 1801.2 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinder

* Report states 1 grams because weight is calculated with
the efficiency. *MT-B* 3-24-14

MT-B 3/24/14

MT-B
3-24-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2014 6:50:04 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 1
Peak Analysis Performed on: 3/24/2014 6:50:03 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	287-	306	292.37	72.83	0.79	1.13E+002	39.83	5.11E+002
2	287-	306	300.81	74.95	0.79	2.49E+002	51.22	4.85E+002
3	332-	346	340.75	84.95	0.45	1.11E+002	88.96	6.42E+002
4	949-	961	954.94	238.71	0.66	9.23E+001	42.52	1.36E+002
5	1175-	1188	1180.94	295.28	0.93	9.78E+001	38.28	9.72E+001
6	1397-	1413	1407.67	352.03	1.08	1.54E+002	42.18	9.20E+001
7	2322-	2337	2330.93	583.08	0.43	6.92E+001	26.65	3.58E+001
8	2427-	2444	2436.06	609.38	1.12	1.29E+002	36.14	6.07E+001
9	3636-	3651	3642.48	911.18	0.43	6.50E+001	21.31	1.60E+001
10	3728-	3739	3733.10	933.84	0.35	1.32E+001	13.54	1.28E+001
11	3869-	3880	3874.34	969.16	0.73	3.54E+001	18.80	2.06E+001
12	4472-	4485	4478.80	1120.32	1.24	4.67E+001	19.99	1.93E+001
13	4856-	4869	4862.91	1216.35	0.36	1.73E+001	12.87	8.74E+000
14	5829-	5854	5841.60	1460.99	1.18	3.68E+002	42.46	1.95E+001
15	7048-	7062	7055.47	1764.31	0.31	4.74E+001	16.68	7.56E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:50:04 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES
.....

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
K-40	0.998	1460.81*	10.67	1.02732E+001	1.45912E+000
Tl-208	0.999	583.19*	84.50	2.30327E-001	9.28862E-002
PB-212	0.518	74.81*	9.60	1.01586E+001	2.91553E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	5.37772E-001	2.62304E-001
		300.09	3.41		
BI-214	1.000	609.31*	46.30	7.87438E-001	2.39505E-001
		768.36	5.04		
		806.17	1.23		
		934.06*	3.21	1.18465E+000	1.21656E+000
		1120.29*	15.10	9.00397E-001	3.91912E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	9.26259E-001	3.34062E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.598	74.81* @	6.33	1.54064E+001	4.42165E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.34918E+000	5.70545E-001
		351.92*	37.20	1.11422E+000	3.53396E-001
		785.91	1.10		
AC-228	0.998	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:50:04 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
AC-228	0.998	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	6.73621E-001	2.27444E-001
		964.60	5.20		
		969.11*	16.60	6.14674E-001	3.30280E-001
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:50:04 AM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	K-40	0.998	1.027323E+001	1.459117E+000
	Tl-208	0.999	2.303270E-001	9.288619E-002
X	BI-211	0.322		
	PB-212	0.518	6.084518E-001	2.612537E-001
	BI-214	1.000	8.543757E-001	1.725676E-001
	PB-214 @	0.598	1.240508E+000	2.997472E-001
	AC-228	0.998	6.546591E-001	1.873238E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:50:04 AM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/24/2014 6:50:03 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.83	6.2618E-002	35.34	Tol.	BI-211
3	84.95	6.1889E-002	79.86	Tol.	TH-227
13	1216.35	9.5887E-003	74.57		TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report 3/24/2014 6:50:04 AM Page 7

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	K-40	1460.81*	10.67	9.144E-001	9.14E-001	1.027E+001	4.194E-001
	MN-54	834.83	99.97	7.803E-002	7.80E-002	2.295E-004	3.515E-002
	CO-60	1173.22	100.00	6.862E-002	5.92E-002	-8.025E-003	3.036E-002
		1332.49	100.00	5.924E-002		1.914E-002	2.564E-002
	NB-94	702.63	100.00	8.125E-002	6.26E-002	2.290E-005	3.678E-002
		871.10	100.00	6.258E-002		-5.423E-003	2.742E-002
	SN-113	255.12	1.93	5.753E+000	1.46E-001	4.153E-001	2.693E+000
		391.69	64.90	1.464E-001		5.254E-002	6.752E-002
	CS-134	475.35	1.46	5.415E+000	6.15E-002	-1.094E+000	2.452E+000
		563.23	8.38	1.011E+000		2.996E-001	4.604E-001
		569.32	15.43	4.549E-001		-1.304E-002	2.029E-001
		604.70	97.60	6.155E-002		-6.113E-002	2.687E-002
		795.84	85.40	8.188E-002		1.108E-002	3.642E-002
		801.93	8.73	8.012E-001		1.392E-001	3.564E-001
		1038.57	1.00	6.343E+000		1.692E+000	2.779E+000
		1167.94	1.80	3.455E+000		3.242E-001	1.508E+000
		1365.15	3.04	1.763E+000		2.761E-001	7.500E-001
	CS-137	661.65	85.12	8.001E-002	8.00E-002	-1.066E-002	3.550E-002
+	Tl-208	583.19*	84.50	1.230E-001	1.23E-001	2.303E-001	5.697E-002
	BI-211	72.87*	1.20	3.644E+001	1.30E+000	3.808E+001	1.776E+001
		351.10*	12.20	1.297E+000		3.397E+000	6.187E-001
		404.80	4.10	2.036E+000		1.995E-001	9.282E-001
		426.90	1.90	5.132E+000		1.820E+000	2.371E+000
		831.80	3.30	1.988E+000		-6.032E-002	8.772E-001
	PB-211	404.80	3.00	2.783E+000	2.34E+000	2.726E-001	1.268E+000
		427.10	1.40	6.965E+000		1.704E+000	3.218E+000
		831.80	2.80	2.344E+000		-7.110E-002	1.034E+000
	BI-212	39.86	1.10	2.636E+001	7.38E-001	-1.091E+001	1.253E+001
		727.17	11.80	7.377E-001		3.420E-001	3.363E-001
		785.42	2.00	4.363E+000		1.181E+000	1.989E+000
		1620.56	2.75	2.004E+000		5.700E-001	8.525E-001
+	PB-212	74.81*	9.60	4.292E+000	3.79E-001	1.016E+001	2.091E+000
		77.11	17.50	1.888E+000		6.570E-001	9.149E-001
		87.20	6.30	4.962E+000		2.114E+000	2.411E+000
		89.80	1.75	1.513E+001		-1.071E+001	7.318E+000
		115.19	0.60	3.576E+001		6.761E+000	1.724E+001
		238.63*	44.60	3.794E-001		5.378E-001	1.818E-001
		300.09	3.41	3.408E+000		1.883E+000	1.599E+000
+	BI-214	609.31*	46.30	2.978E-001	2.98E-001	7.874E-001	1.407E-001
		768.36	5.04	1.974E+000		7.062E-001	9.106E-001
		806.17	1.23	6.128E+000		2.265E+000	2.750E+000
		934.06*	3.21	1.925E+000		1.185E+000	8.414E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/24/2014

6:50:04 AM

Page 8

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	BI-214	1120.29*	15.10	5.145E-001	2.98E-001	9.004E-001	2.312E-001
		1155.19	1.69	4.863E+000		2.349E+000	2.198E+000
		1238.11	5.94	1.673E+000		1.220E+000	7.697E-001
		1280.96	1.47	4.259E+000		3.309E-001	1.859E+000
		1377.67	4.11	1.836E+000		9.403E-001	8.204E-001
		1385.31	0.78	8.310E+000		1.228E+000	3.641E+000
		1401.50	1.39	3.717E+000		1.333E+000	1.570E+000
		1407.98	2.48	2.814E+000		1.334E+000	1.245E+000
		1509.19	2.19	2.839E+000		1.308E+000	1.234E+000
		1661.28	1.15	4.211E+000		-2.820E-001	1.746E+000
		1729.60	3.05	2.027E+000		6.551E-001	8.773E-001
		1764.49*	15.80	3.551E-001		9.263E-001	1.511E-001
		1847.44	2.12	2.551E+000		4.100E-001	1.077E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.509E+000	4.25E-001	1.541E+001	3.171E+000
		77.11	10.70	3.088E+000		1.075E+000	1.496E+000
		87.20	3.70	8.449E+000		3.599E+000	4.105E+000
		89.80	1.03	2.571E+001		-1.820E+001	1.243E+001
		241.98	7.49	1.986E+000		1.617E+000	9.461E-001
		295.21*	19.20	7.812E-001		1.349E+000	3.719E-001
		351.92*	37.20	4.254E-001		1.114E+000	2.029E-001
		785.91	1.10	8.033E+000		3.979E+000	3.666E+000
	RA-226	186.21	3.28	4.691E+000	4.69E+000	2.060E+000	2.240E+000
+	AC-228	89.95	2.10	1.239E+001	2.66E-001	-9.725E+000	5.989E+000
		93.35	3.50	8.085E+000		5.619E+000	3.921E+000
		129.08	2.80	6.636E+000		1.034E+000	3.187E+000
		209.28	4.40	3.116E+000		2.715E-001	1.479E+000
		270.23	3.60	3.139E+000		-9.966E-001	1.471E+000
		327.64	3.20	3.361E+000		7.714E-002	1.567E+000
		338.32	11.40	1.113E+000		2.785E-001	5.249E-001
		409.51	2.13	4.346E+000		1.107E+000	1.999E+000
		463.00	4.40	2.332E+000		3.860E-001	1.081E+000
		794.70	4.60	1.666E+000		1.784E-001	7.491E-001
		911.60*	27.70	2.656E-001		6.736E-001	1.188E-001
		964.60	5.20	1.632E+000		1.235E-001	7.410E-001
		969.11*	16.60	4.630E-001		6.147E-001	2.080E-001
		1587.90	3.71	1.480E+000		2.856E-001	6.296E-001
	PA-234M	766.36	0.29	3.543E+001	8.47E+000	-8.360E-001	1.640E+001
		1001.03	0.84	8.474E+000		1.916E+000	3.770E+000
	TH-234	92.38	2.81	1.021E+001	1.02E+001	8.775E+000	4.951E+000
		92.80	2.77	1.016E+001		5.806E+000	4.926E+000
		112.81	0.28	7.512E+001		-2.064E+001	3.616E+001
	U-235	89.96	1.50	1.735E+001	2.87E-001	-1.362E+001	8.384E+000
		93.35	2.50	1.132E+001		7.866E+000	5.490E+000
		105.00	1.00	2.386E+001		7.688E+000	1.153E+001
		109.14	1.50	1.550E+001		6.058E+000	7.487E+000
		143.76	10.50	1.607E+000		1.961E-001	7.695E-001
		163.35	4.70	3.171E+000		1.139E+000	1.511E+000
		185.71	54.00	2.867E-001		1.606E-001	1.369E-001
		202.12	1.00	1.362E+001		1.176E+000	6.464E+000
		205.31	4.70	2.913E+000		8.922E-001	1.383E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
AM-241	59.54	36.30	1.086E+000	1.09E+000	2.787E-002	5.232E-001

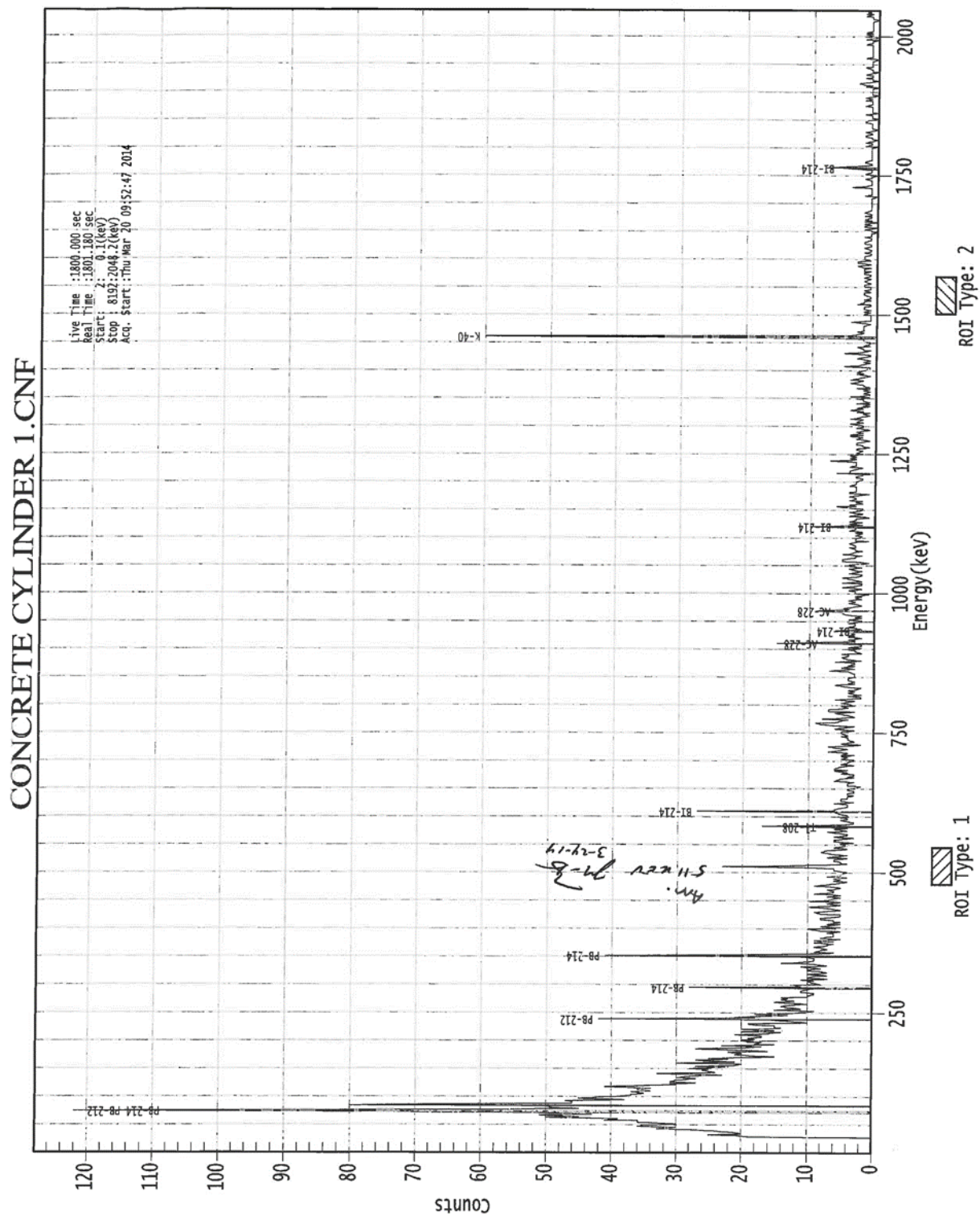
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\concrete cylinder 2.CNF

Report Generated On : 3/24/2014 6:52:37 AM

Sample Title : Concrete Cylinder 2
Sample Description : Count on concrete cylinder 2
Sample Identification :
Sample Type : Concrete
Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 Grams (6.689856 grams)

Sample Taken On :
Acquisition Started : 3/20/2014 10:35:33 AM

Live Time : 1800.0 seconds
Real Time : 1801.2 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report States 1 grams because weight is calculated with
the efficiency M-B 3-24-14

[Handwritten signature] 3/24/14

[Handwritten signature]
3-24-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2014 6:52:37 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 2
Peak Analysis Performed on: 3/24/2014 6:52:36 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	113-	120	116.81	28.87	0.93	3.91E+001	31.32	7.59E+001
2	287-	306	292.39	72.84	0.87	1.73E+002	42.26	4.29E+002
3	287-	306	300.75	74.93	0.88	3.38E+002	54.13	5.14E+002
4	368-	380	371.77	92.71	0.51	1.09E+002	66.93	3.84E+002
5	949-	961	955.55	238.86	0.78	7.90E+001	46.42	1.75E+002
6	1175-	1190	1181.33	295.38	1.04	9.28E+001	38.21	9.02E+001
7	1401-	1415	1407.16	351.90	1.05	1.22E+002	39.43	9.10E+001
8	2323-	2338	2331.54	583.23	1.15	8.90E+001	28.51	3.80E+001
9	2428-	2445	2436.17	609.41	1.41	1.59E+002	37.40	5.74E+001
10	4471-	4488	4479.36	1120.46	0.45	7.60E+001	21.13	1.10E+001
11	5829-	5854	5842.21	1461.15	1.48	3.85E+002	43.90	2.27E+001
12	7050-	7067	7058.36	1765.03	2.21	5.39E+001	17.90	8.10E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:52:37 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Gram)	Activity Uncertainty
K-40	0.995	1460.81*	10.67	1.07703E+001	1.51585E+000
Tl-208	1.000	583.19*	84.50	2.96015E-001	1.01281E-001
PB-212	0.517	74.81*	9.60	1.37856E+001	3.53377E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	4.60213E-001	2.80417E-001
		300.09	3.41		
BI-214	0.998	609.31*	46.30	9.65911E-001	2.55544E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.46488E+000	4.23706E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.05250E+000	3.59571E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.598	74.81* @	6.33	2.09071E+001	5.35927E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.27988E+000	5.65659E-001
		351.92*	37.20	8.82712E-001	3.18313E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:52:37 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Gram)	Wt mean Activity Uncertainty
	K-40	0.995	1.077031E+001	1.515852E+000
	Tl-208	1.000	2.960154E-001	1.012813E-001
X	BI-211	0.328		
	PB-212	0.517	5.393509E-001	2.795410E-001
	BI-214	0.998	1.086434E+000	1.869309E-001
	PB-214 @	0.598	1.029300E+000	2.770378E-001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2014 6:52:36 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
	1	28.87	2.1696E-002	80.20		
M	2	72.84	9.6081E-002	24.43	Tol.	BI-211
	4	92.71	6.0676E-002	61.28	Tol.	AC-228
						TH-234
						TH-234
						U-235

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report 3/24/2014 6:52:37 AM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylinde
Sample Title: Concrete Cylinder 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	K-40	1460.81*	10.67	9.793E-001	9.79E-001	1.077E+001	4.518E-001
	MN-54	834.83	99.97	7.005E-002	7.00E-002	-1.149E-002	3.116E-002
	CO-60	1173.22	100.00	6.550E-002	5.54E-002	-5.269E-004	2.880E-002
		1332.49	100.00	5.544E-002		-3.497E-003	2.373E-002
	NB-94	702.63	100.00	7.634E-002	6.26E-002	-1.841E-003	3.433E-002
		871.10	100.00	6.258E-002		-1.631E-002	2.742E-002
	SN-113	255.12	1.93	5.969E+000	1.38E-001	-6.440E-001	2.801E+000
		391.69	64.90	1.377E-001		2.219E-002	6.316E-002
	CS-134	475.35	1.46	5.571E+000	8.51E-002	-8.890E-001	2.529E+000
		563.23	8.38	1.062E+000		9.113E-002	4.860E-001
		569.32	15.43	4.369E-001		-1.054E-001	1.939E-001
		604.70	97.60	9.171E-002		3.320E-002	4.195E-002
		795.84	85.40	8.512E-002		-1.234E-002	3.804E-002
		801.93	8.73	8.172E-001		-9.124E-002	3.644E-001
		1038.57	1.00	6.814E+000		2.970E+000	3.015E+000
		1167.94	1.80	3.976E+000		-4.862E-001	1.769E+000
		1365.15	3.04	1.371E+000		-2.268E-001	5.539E-001
	CS-137	661.65	85.12	8.801E-002	8.80E-002	2.712E-002	3.950E-002
+	Tl-208	583.19*	84.50	1.260E-001	1.26E-001	2.960E-001	5.849E-002
	BI-211	72.87*	1.20	3.349E+001	1.24E+000	5.843E+001	1.629E+001
		351.10*	12.20	1.245E+000		2.692E+000	5.926E-001
		404.80	4.10	1.930E+000		-1.164E+000	8.751E-001
		426.90	1.90	4.736E+000		3.603E-002	2.173E+000
		831.80	3.30	2.246E+000		3.469E-001	1.006E+000
	PB-211	404.80	3.00	2.638E+000	2.64E+000	-1.590E+000	1.196E+000
		427.10	1.40	6.567E+000		3.779E-001	3.019E+000
		831.80	2.80	2.648E+000		4.088E-001	1.186E+000
	BI-212	39.86	1.10	3.112E+001	7.74E-001	2.002E+001	1.491E+001
		727.17	11.80	7.741E-001		5.273E-001	3.545E-001
		785.42	2.00	4.525E+000		1.129E+000	2.070E+000
		1620.56	2.75	2.080E+000		8.287E-002	8.904E-001
+	PB-212	74.81*	9.60	4.419E+000	4.27E-001	1.379E+001	2.154E+000
		77.11	17.50	1.800E+000		5.515E-001	8.708E-001
		87.20	6.30	4.871E+000		2.873E+000	2.365E+000
		89.80	1.75	1.463E+001		-8.935E+000	7.066E+000
		115.19	0.60	3.344E+001		-8.202E+000	1.608E+001
		238.63*	44.60	4.270E-001		4.602E-001	2.056E-001
		300.09	3.41	3.282E+000		1.034E+000	1.536E+000
+	BI-214	609.31*	46.30	2.934E-001	2.93E-001	9.659E-001	1.385E-001
		768.36	5.04	2.030E+000		1.630E+000	9.387E-001
		806.17	1.23	5.571E+000		-1.278E+000	2.472E+000
		934.06	3.21	2.449E+000		1.053E+000	1.103E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/24/2014

6:52:37 AM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
+	BI-214	1120.29*	15.10	4.303E-001	2.93E-001	1.465E+000	1.891E-001
		1155.19	1.69	4.789E+000		2.763E+000	2.161E+000
		1238.11	5.94	1.723E+000		1.454E+000	7.949E-001
		1280.96	1.47	5.280E+000		2.609E+000	2.370E+000
		1377.67	4.11	1.693E+000		-1.260E-002	7.490E-001
		1385.31	0.78	6.885E+000		1.337E+000	2.929E+000
		1401.50	1.39	4.789E+000		1.028E+000	2.106E+000
		1407.98	2.48	2.751E+000		1.184E+000	1.213E+000
		1509.19	2.19	2.920E+000		1.079E+000	1.275E+000
		1661.28	1.15	3.985E+000		-6.255E-001	1.633E+000
		1729.60	3.05	1.756E+000		2.520E-003	7.414E-001
		1764.49*	15.80	3.818E-001		1.053E+000	1.645E-001
		1847.44	2.12	1.759E+000		-1.016E+000	6.813E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.702E+000	4.08E-001	2.091E+001	3.267E+000
		77.11	10.70	2.944E+000		9.020E-001	1.424E+000
		87.20	3.70	8.293E+000		4.892E+000	4.027E+000
		89.80	1.03	2.485E+001		-1.518E+001	1.200E+001
		241.98	7.49	1.901E+000		9.962E-001	9.037E-001
		295.21*	19.20	7.865E-001		1.280E+000	3.746E-001
		351.92*	37.20	4.083E-001		8.827E-001	1.943E-001
		785.91	1.10	8.419E+000		5.222E+000	3.859E+000
	RA-226	186.21	3.28	4.778E+000	4.78E+000	2.485E+000	2.284E+000
	AC-228	89.95	2.10	1.214E+001	3.92E-001	-4.896E+000	5.862E+000
		93.35	3.50	8.262E+000		7.629E+000	4.009E+000
		129.08	2.80	6.684E+000		-1.000E+000	3.211E+000
		209.28	4.40	3.287E+000		1.868E+000	1.564E+000
		270.23	3.60	3.080E+000		-5.060E-001	1.441E+000
		327.64	3.20	3.337E+000		1.821E-001	1.555E+000
		338.32	11.40	1.180E+000		7.304E-001	5.581E-001
		409.51	2.13	4.604E+000		4.164E-001	2.129E+000
		463.00	4.40	2.147E+000		4.829E-001	9.888E-001
		794.70	4.60	1.693E+000		9.295E-001	7.628E-001
		911.60	27.70	3.921E-001		2.989E-001	1.820E-001
		964.60	5.20	1.782E+000		5.690E-001	8.158E-001
		969.11	16.60	5.253E-001		1.043E-001	2.391E-001
		1587.90	3.71	1.421E+000		2.734E-001	6.003E-001
	PA-234M	766.36	0.29	3.040E+001	9.13E+000	-1.491E+000	1.389E+001
		1001.03	0.84	9.131E+000		2.179E+000	4.098E+000
	TH-234	92.38	2.81	1.018E+001	1.02E+001	3.519E-001	4.937E+000
		92.80	2.77	1.025E+001		5.342E+000	4.969E+000
		112.81	0.28	7.670E+001		1.198E+001	3.695E+001
	U-235	89.96	1.50	1.699E+001	2.95E-001	-6.855E+000	8.206E+000
		93.35	2.50	1.157E+001		1.068E+001	5.613E+000
		105.00	1.00	2.370E+001		7.219E+000	1.145E+001
		109.14	1.50	1.440E+001		1.412E+000	6.936E+000
		143.76	10.50	1.701E+000		6.269E-001	8.167E-001
		163.35	4.70	3.557E+000		5.776E-001	1.704E+000
		185.71	54.00	2.954E-001		1.562E-001	1.413E-001
		202.12	1.00	1.329E+001		1.349E+000	6.296E+000
		205.31	4.70	2.913E+000		7.362E-001	1.383E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/24/2014

6:52:37 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
AM-241	59.54	36.30	1.103E+000	1.10E+000	4.196E-002	5.320E-001

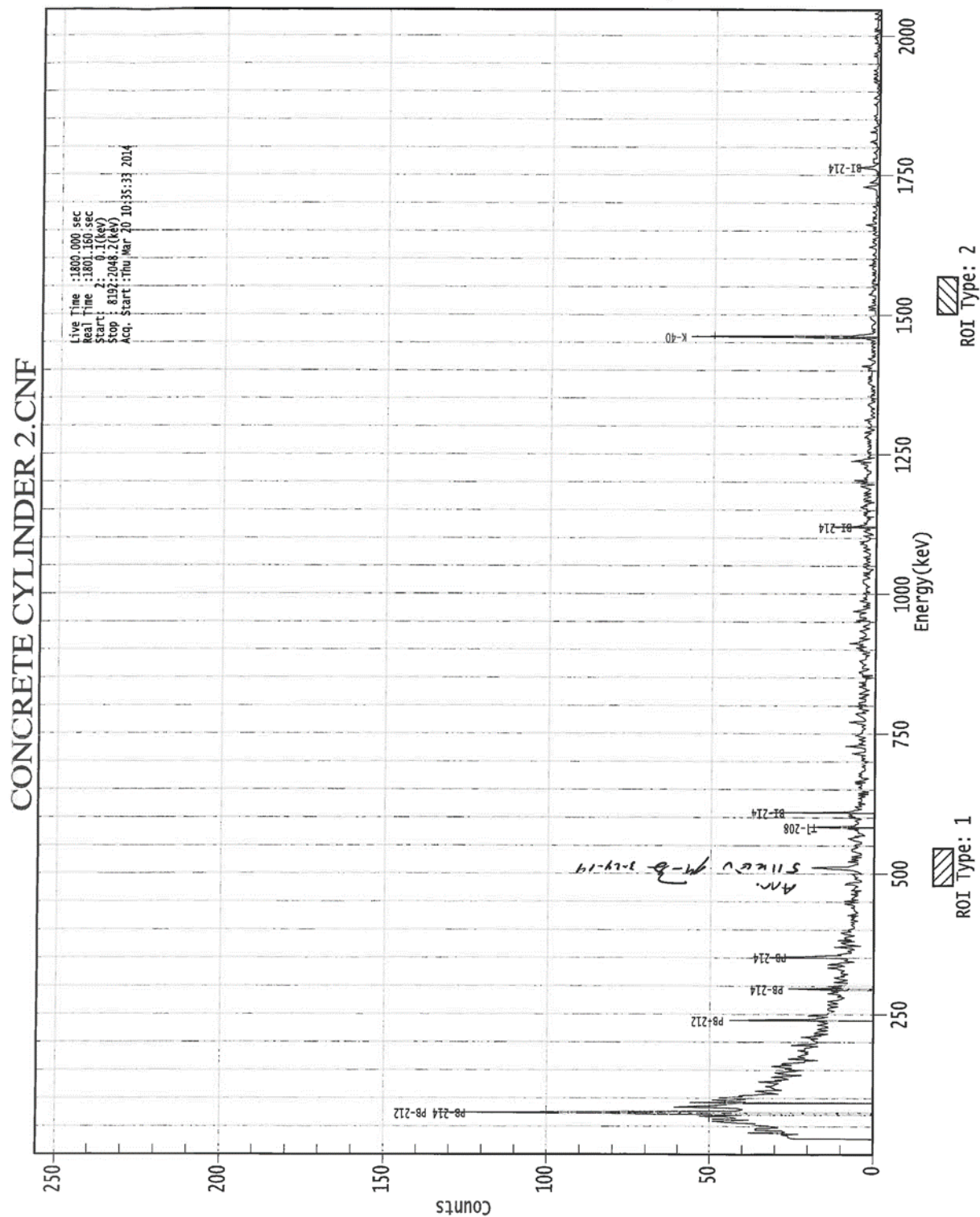
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

```
*****
***** GAMMA SPECTRUM ANALYSIS *****
*****

Filename: C:\GENIE2K\CAMFILES\concrete 3.CNF

Report Generated On      : 3/24/2014   6:53:35 AM

Sample Title             : Concrete Cylinder 3
Sample Description       : Count on concrete cylinder 3
Sample Identification    :
Sample Type              : Concrete
Sample Geometry         : Concrete Cylinde

Peak Locate Threshold   : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size             : 1.000E+000 grams (6.689856 grams)

Sample Taken On        :
Acquisition Started    : 3/20/2014   11:07:46 AM

Live Time              : 1800.0 seconds
Real Time              : 1801.2 seconds

Dead Time              : 0.07 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID           : Concrete_Cylinde
```

* Report states 1 gram because weight is calculated with the efficiency. *MB* 3-24-14

MB 3/24/14

MB
3-24-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/24/2014 6:53:35 AM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 3
Peak Analysis Performed on: 3/24/2014 6:53:35 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	179-	194	187.28	46.52	0.42	8.13E+001	64.73	3.21E+002
2	286-	315	292.24	72.80	0.94	1.98E+002	43.98	4.48E+002
3	286-	315	300.93	74.98	0.94	3.47E+002	52.13	4.38E+002
4	286-	315	309.19	77.04	0.95	1.12E+002	38.53	4.31E+002
5	331-	345	340.17	84.80	0.88	1.26E+002	84.26	5.71E+002
6	366-	378	371.83	92.73	0.74	6.50E+001	67.72	4.11E+002
7	951-	960	955.22	238.78	0.80	1.05E+002	38.44	1.12E+002
8	1172-	1192	1181.89	295.52	1.13	1.23E+002	52.27	1.54E+002
9	1399-	1413	1407.62	352.02	0.82	1.40E+002	38.80	8.23E+001
10	2324-	2340	2332.55	583.48	1.19	6.78E+001	32.27	6.12E+001
11	2427-	2444	2437.02	609.62	1.36	1.65E+002	36.23	4.97E+001
12	3870-	3882	3875.42	969.43	0.30	2.70E+001	20.18	2.80E+001
13	4474-	4489	4480.56	1120.76	0.73	5.21E+001	22.92	2.59E+001
14	5830-	5856	5843.63	1461.50	1.27	3.39E+002	45.26	3.98E+001
15	7051-	7067	7058.78	1765.14	1.48	5.62E+001	19.03	1.08E+001

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:53:35 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.978	1460.81*	10.67	9.48367E+000	1.48827E+000
Tl-208	0.996	583.19*	84.50	2.25457E-001	1.10740E-001
PB-212	0.815	74.81*	9.60	1.41637E+001	3.54237E+000
		77.11*	17.50	2.42113E+000	9.65207E-001
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.12411E-001	2.44553E-001
		300.09	3.41		
BI-214	0.994	609.31*	46.30	1.00680E+000	2.51512E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.00325E+000	4.49039E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.09753E+000	3.81759E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.769	74.81* @	6.33	2.14805E+001	5.37232E+000
		77.11* @	10.70	3.95980E+000	1.57861E+000
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.69694E+000	7.70640E-001
		351.92*	37.20	1.01037E+000	3.23951E-001
		785.91	1.10		
TH-234	1.000	92.38	2.81		
		92.80*	2.77	7.40059E+000	7.89433E+000
		112.81	0.28		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:53:35 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.978	9.483665E+000	1.488268E+000
	Tl-208	0.996	2.254574E-001	1.107399E-001
X	BI-211	0.323		
	PB-212	0.815	7.327702E-001	2.368189E-001
	BI-214	0.994	1.028696E+000	1.902463E-001
	PB-214 @	0.769	1.227512E+000	2.933506E-001
	TH-234	1.000	7.400593E+000	7.894326E+000

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2014 6:53:35 AM Page 5

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/24/2014 6:53:35 AM
 Peak Locate From Channel: 50
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	46.52	4.5164E-002	79.63		
M 2	72.80	1.1025E-001	22.16	Tol.	BI-211
5	84.80	7.0132E-002	66.74	Tol.	TH-227
					TH-231
12	969.43	1.4980E-002	74.84	Tol.	AC-228

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report 3/24/2014 6:53:35 AM Page 6

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 3
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.285E+000	1.29E+000	9.484E+000	6.047E-001
	MN-54	834.83	99.97	6.410E-002	6.41E-002	-1.908E-002	2.819E-002
	CO-60	1173.22	100.00	7.441E-002	6.61E-002	3.380E-002	3.326E-002
		1332.49	100.00	6.611E-002		1.047E-002	2.907E-002
	NB-94	702.63	100.00	7.375E-002	6.42E-002	-1.965E-002	3.303E-002
		871.10	100.00	6.417E-002		-4.145E-002	2.822E-002
	SN-113	255.12	1.93	5.826E+000	1.57E-001	1.373E+000	2.730E+000
		391.69	64.90	1.572E-001		8.303E-002	7.293E-002
	CS-134	475.35	1.46	5.941E+000	8.02E-002	-2.873E+000	2.714E+000
		563.23	8.38	8.841E-001		-3.261E-001	3.968E-001
		569.32	15.43	5.776E-001		1.025E-001	2.642E-001
		604.70	97.60	8.016E-002		-5.177E-003	3.617E-002
		795.84	85.40	1.132E-001		9.391E-002	5.209E-002
		801.93	8.73	8.482E-001		2.528E-001	3.799E-001
		1038.57	1.00	6.504E+000		3.002E+000	2.860E+000
		1167.94	1.80	2.571E+000		-1.357E+000	1.066E+000
		1365.15	3.04	1.460E+000		-7.256E-001	5.983E-001
	CS-137	661.65	85.12	7.098E-002	7.10E-002	-1.072E-002	3.099E-002
+	Tl-208	583.19*	84.50	1.609E-001	1.61E-001	2.255E-001	7.597E-002
	BI-211	72.87*	1.20	3.421E+001	1.18E+000	6.709E+001	1.665E+001
		351.10*	12.20	1.176E+000		3.081E+000	5.584E-001
		404.80	4.10	2.556E+000		9.478E-001	1.188E+000
		426.90	1.90	5.179E+000		7.864E-001	2.395E+000
	PB-211	831.80	3.30	2.325E+000		8.987E-001	1.046E+000
		404.80	3.00	3.494E+000	2.74E+000	1.295E+000	1.624E+000
		427.10	1.40	7.029E+000		9.838E-001	3.250E+000
		831.80	2.80	2.741E+000		1.059E+000	1.232E+000
	BI-212	39.86	1.10	2.616E+001	7.92E-001	1.171E+001	1.243E+001
		727.17	11.80	7.916E-001		-2.495E-002	3.632E-001
		785.42	2.00	3.830E+000		-1.032E+000	1.722E+000
		1620.56	2.75	1.448E+000		-6.629E-002	5.748E-001
+	PB-212	74.81*	9.60	4.086E+000	3.28E-001	1.416E+001	1.988E+000
		77.11*	17.50	2.151E+000		2.421E+000	1.046E+000
		87.20	6.30	4.840E+000		2.089E+000	2.350E+000
		89.80	1.75	1.545E+001		1.537E+000	7.477E+000
		115.19	0.60	3.569E+001		1.140E+001	1.720E+001
		238.63*	44.60	3.276E-001		6.124E-001	1.559E-001
		300.09	3.41	3.489E+000		2.354E+000	1.639E+000
+	BI-214	609.31*	46.30	2.721E-001	2.72E-001	1.007E+000	1.278E-001
		768.36	5.04	1.593E+000		5.518E-001	7.199E-001
		806.17	1.23	5.687E+000		5.059E-001	2.530E+000
		934.06	3.21	2.368E+000		7.168E-001	1.063E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	6.169E-001	2.72E-001	1.003E+000	2.824E-001
		1155.19	1.69	4.056E+000		6.685E-001	1.795E+000
		1238.11	5.94	1.673E+000		1.183E+000	7.697E-001
		1280.96	1.47	5.799E+000		2.647E+000	2.629E+000
		1377.67	4.11	2.060E+000		1.289E+000	9.324E-001
		1385.31	0.78	7.636E+000		1.044E+000	3.304E+000
		1401.50	1.39	4.789E+000		9.690E-001	2.106E+000
		1407.98	2.48	1.797E+000		-1.581E-001	7.365E-001
		1509.19	2.19	2.386E+000		1.134E+000	1.008E+000
		1661.28	1.15	4.996E+000		1.194E+000	2.139E+000
		1729.60	3.05	2.206E+000		1.713E+000	9.667E-001
		1764.49*	15.80	4.291E-001		1.098E+000	1.881E-001
		1847.44	2.12	2.551E+000		9.920E-001	1.077E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.197E+000	3.86E-001	2.148E+001	3.015E+000
		77.11*	10.70	3.517E+000		3.960E+000	1.711E+000
		87.20	3.70	8.240E+000		3.557E+000	4.001E+000
		89.80	1.03	2.625E+001		2.611E+000	1.270E+001
		241.98	7.49	2.054E+000		1.407E+000	9.800E-001
		295.21*	19.20	1.112E+000		1.697E+000	5.372E-001
		351.92*	37.20	3.858E-001		1.010E+000	1.831E-001
		785.91	1.10	6.606E+000		-1.870E+000	2.952E+000
	RA-226	186.21	3.28	5.138E+000	5.14E+000	2.972E+000	2.464E+000
	AC-228	89.95	2.10	1.278E+001	3.95E-001	1.119E+000	6.185E+000
		93.35	3.50	8.085E+000		6.320E+000	3.921E+000
		129.08	2.80	6.716E+000		-1.336E+000	3.227E+000
		209.28	4.40	3.263E+000		1.927E+000	1.552E+000
		270.23	3.60	3.526E+000		1.172E+000	1.664E+000
		327.64	3.20	3.811E+000		9.588E-001	1.792E+000
		338.32	11.40	1.096E+000		3.470E-001	5.163E-001
		409.51	2.13	4.964E+000		5.616E-001	2.309E+000
		463.00	4.40	2.082E+000		-1.734E-001	9.560E-001
		794.70	4.60	1.873E+000		6.352E-001	8.529E-001
		911.60	27.70	3.953E-001		3.712E-001	1.836E-001
		964.60	5.20	1.515E+000		3.604E-001	6.826E-001
		969.11	16.60	6.627E-001		1.158E-002	3.079E-001
		1587.90	3.71	1.536E+000		5.508E-001	6.576E-001
	PA-234M	766.36	0.29	2.515E+001	8.81E+000	-1.087E+001	1.127E+001
		1001.03	0.84	8.809E+000		1.252E+000	3.937E+000
+	TH-234	92.38	2.81	9.926E+000	9.93E+000	4.427E+000	4.811E+000
		92.80*	2.77	1.263E+001		7.401E+000	6.161E+000
		112.81	0.28	7.763E+001		-1.180E+001	3.742E+001
	U-235	89.96	1.50	1.790E+001	3.15E-001	1.567E+000	8.659E+000
		93.35	2.50	1.132E+001		8.848E+000	5.490E+000
		105.00	1.00	2.374E+001		-1.761E+000	1.147E+001
		109.14	1.50	1.477E+001		4.565E-001	7.124E+000
		143.76	10.50	1.663E+000		-5.750E-002	7.978E-001
		163.35	4.70	3.277E+000		-1.495E+000	1.564E+000
		185.71	54.00	3.152E-001		1.877E-001	1.512E-001
		202.12	1.00	1.411E+001		1.220E+000	6.708E+000
		205.31	4.70	2.960E+000		3.597E-001	1.406E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.064E+000	1.06E+000	-1.497E-001	5.121E-001

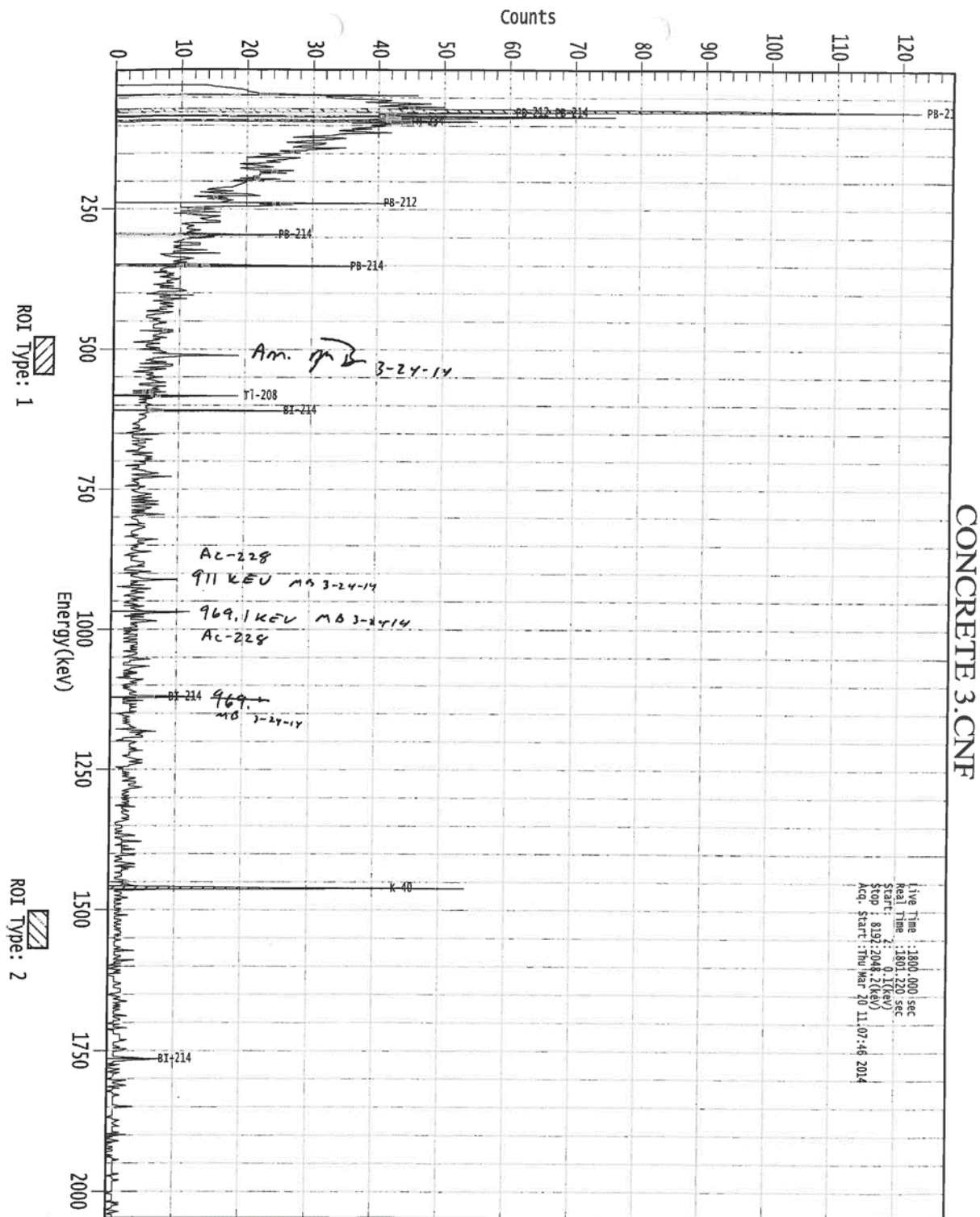
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\GENIE2K\CAMFILES\concrete lids.CNF

Report Generated On : 3/20/2014 1:51:51 PM

Sample Title : Concrete Lid Stack 1
Sample Description : Count on Concrete Lid Stack
Sample Identification :
Sample Type : Concrete
Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (1.9512E7 grams)

Sample Taken On :
Acquisition Started : 3/20/2014 12:08:42 PM

Live Time : 1800.0 seconds
Real Time : 1801.4 seconds

Dead Time : 0.08 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/20/2014
Efficiency ID : STACKED_TOGETHER

* Report states 1 grams because weight is calculated with
the efficiency. *M-B* 3-24-14

M-B 3/24/14
M-B 3-24-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/20/2014 1:51:51 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Lid Stack 1
Peak Analysis Performed on: 3/20/2014 1:51:51 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
I	1	284-	317	292.50	72.86	1.02	2.57E+002	44.75	3.76E+002
I	2	284-	317	300.73	74.92	1.03	4.49E+002	55.36	4.02E+002
I	3	284-	317	310.35	77.33	1.03	1.21E+002	39.32	4.29E+002
	4	335-	345	339.76	84.70	0.88	9.50E+001	67.59	4.39E+002
I	5	946-	976	955.49	238.85	1.02	1.15E+002	30.15	1.43E+002
I	6	946-	976	968.26	242.04	1.02	5.34E+001	23.32	1.30E+002
	7	1173-	1190	1181.56	295.44	1.13	7.27E+001	43.54	1.23E+002
	8	1402-	1415	1408.09	352.14	1.12	1.70E+002	38.67	7.28E+001
	9	2035-	2054	2042.94	511.02	0.98	1.23E+002	39.06	7.31E+001
10	2324-	2338	2332.26	583.41	1.39	7.63E+001	29.41	4.87E+001	
11	2428-	2445	2437.10	609.64	1.65	1.87E+002	34.81	3.56E+001	
12	3637-	3652	3644.21	911.61	0.98	4.99E+001	23.71	3.01E+001	
13	3870-	3881	3875.49	969.45	0.76	2.86E+001	18.71	2.34E+001	
14	4473-	4489	4480.70	1120.79	1.22	6.10E+001	21.38	1.70E+001	
15	4948-	4961	4954.35	1239.21	0.61	2.85E+001	17.95	1.85E+001	
16	5832-	5857	5844.65	1461.75	1.67	4.02E+002	45.60	2.83E+001	
17	7052-	7070	7061.20	1765.74	1.42	6.06E+001	18.05	6.36E+000	

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/20/2014 1:51:51 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Lid Stack 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.959	1460.81*	10.67	6.72818E+000	9.44622E-001
Tl-208	0.998	583.19*	84.50	1.52315E-001	6.14524E-002
PB-212	0.781	74.81*	9.60	1.01445E+001	2.38330E+000
		77.11*	17.50	1.44852E+000	5.51643E-001
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	3.88362E-001	1.18944E-001
		300.09	3.41		
BI-214	0.983	609.31*	46.30	6.84258E-001	1.51350E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	7.05940E-001	2.53783E-001
		1155.19	1.69		
		1238.11*	5.94	8.43139E-001	5.35918E-001
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	7.06135E-001	2.17694E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.894	74.81* @	6.33	1.53850E+001	3.61448E+000
		77.11* @	10.70	2.36908E+000	9.02220E-001
		87.20 @	3.70		
		89.80 @	1.03		
		241.98*	7.49	1.07158E+000	4.98400E-001
		295.21*	19.20	5.85860E-001	3.63108E-001
		351.92*	37.20	7.25969E-001	2.01740E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/20/2014 1:51:51 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.999	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	3.11805E-001	1.50155E-001
		964.60	5.20		
		969.11*	16.60	2.99132E-001	1.97191E-001
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/20/2014 1:51:51 PM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.959	6.728179E+000	9.446224E-001
	Tl-208	0.998	1.523151E-001	6.145243E-002
X	BI-211	0.320		
	PB-212	0.781	4.357596E-001	1.162284E-001
	BI-214	0.983	7.003920E-001	1.092621E-001
	PB-214 @	0.894	7.938123E-001	1.634630E-001
	AC-228	0.999	3.071535E-001	1.194631E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/20/2014 1:51:51 PM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/20/2014 1:51:51 PM
 Peak Locate From Channel: 50
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.86	1.4278E-001	17.41	Tol.	BI-211
4	84.70	5.2799E-002	71.12	Tol.	TH-227
9	511.02	6.8294E-002	31.78		TH-231

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report 3/20/2014 1:51:52 PM Page 7

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylinde
Sample Title: Concrete Lid Stack 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	6.443E-001	6.44E-001	6.728E+000	2.995E-001
	MN-54	834.83	99.97	4.302E-002	4.30E-002	3.401E-003	1.918E-002
	CO-60	1173.22	100.00	4.116E-002	3.77E-002	8.841E-003	1.821E-002
		1332.49	100.00	3.775E-002		1.505E-002	1.648E-002
	NB-94	702.63	100.00	4.349E-002	4.05E-002	-2.345E-002	1.944E-002
		871.10	100.00	4.050E-002		-1.193E-002	1.792E-002
	SN-113	255.12	1.93	3.478E+000	9.24E-002	-1.655E+000	1.633E+000
		391.69	64.90	9.238E-002		1.426E-002	4.283E-002
	CS-134	475.35	1.46	3.865E+000	5.30E-002	1.145E+000	1.780E+000
		563.23	8.38	5.898E-001		-2.802E-001	2.678E-001
		569.32	15.43	2.880E-001		-1.006E-002	1.292E-001
		604.70	97.60	5.303E-002		1.132E-002	2.417E-002
		795.84	85.40	5.576E-002		-1.619E-002	2.516E-002
		801.93	8.73	4.411E-001		-1.965E-002	1.940E-001
		1038.57	1.00	3.814E+000		6.969E-001	1.671E+000
		1167.94	1.80	2.129E+000		4.290E-003	9.327E-001
		1365.15	3.04	1.311E+000		7.331E-001	5.763E-001
	CS-137	661.65	85.12	4.999E-002	5.00E-002	1.075E-002	2.229E-002
+	Tl-208	583.19*	84.50	8.303E-002	8.30E-002	1.523E-001	3.881E-002
	BI-211	72.87*	1.20	1.735E+001	6.46E-001	4.798E+001	8.422E+000
		351.10*	12.20	6.459E-001		2.214E+000	3.053E-001
		404.80	4.10	1.310E+000		1.014E-001	6.017E-001
		426.90	1.90	2.934E+000		6.827E-001	1.351E+000
		831.80	3.30	1.328E+000		5.159E-001	5.936E-001
	PB-211	404.80	3.00	1.791E+000	1.57E+000	1.385E-001	8.223E-001
		427.10	1.40	4.022E+000		1.832E+000	1.854E+000
		831.80	2.80	1.565E+000		6.081E-001	6.996E-001
	BI-212	39.86	1.10	1.397E+001	4.91E-001	4.700E+000	6.625E+000
		727.17	11.80	4.910E-001		2.445E-001	2.259E-001
		785.42	2.00	2.488E+000		-4.540E-001	1.128E+000
		1620.56	2.75	1.150E+000		4.127E-001	4.857E-001
+	PB-212	74.81*	9.60	2.168E+000	1.96E-001	1.014E+001	1.054E+000
		77.11*	17.50	1.183E+000		1.449E+000	5.756E-001
		87.20	6.30	2.654E+000		4.525E-001	1.288E+000
		89.80	1.75	8.710E+000		-8.215E-001	4.217E+000
		115.19	0.60	1.967E+001		9.712E-001	9.478E+000
		238.63*	44.60	1.960E-001		3.884E-001	9.343E-002
		300.09	3.41	1.855E+000		7.957E-002	8.658E-001
+	BI-214	609.31*	46.30	1.391E-001	1.39E-001	6.843E-001	6.460E-002
		768.36	5.04	1.164E+000		4.598E-001	5.361E-001
		806.17	1.23	3.874E+000		1.072E+000	1.748E+000
		934.06	3.21	1.402E+000		2.429E-001	6.279E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	3.092E-001	1.39E-001	7.059E-001	1.389E-001
		1155.19	1.69	2.487E+000		1.181E+000	1.104E+000
		1238.11*	5.94	7.834E-001		8.431E-001	3.516E-001
		1280.96	1.47	2.759E+000		1.096E+000	1.217E+000
		1377.67	4.11	9.702E-001		1.765E-001	4.266E-001
		1385.31	0.78	4.723E+000		1.280E+000	2.053E+000
		1401.50	1.39	2.494E+000		1.184E+000	1.074E+000
		1407.98	2.48	1.444E+000		3.551E-001	6.249E-001
		1509.19	2.19	1.487E+000		8.200E-002	6.327E-001
		1661.28	1.15	2.078E+000		5.151E-001	8.245E-001
		1729.60	3.05	1.210E+000		6.163E-001	5.234E-001
		1764.49*	15.80	2.064E-001		7.061E-001	8.747E-002
		1847.44	2.12	1.860E+000		8.221E-001	8.119E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	3.288E+000	2.12E-001	1.539E+001	1.598E+000
		77.11*	10.70	1.936E+000		2.369E+000	9.414E-001
		87.20	3.70	4.518E+000		7.704E-001	2.193E+000
		89.80	1.03	1.480E+001		-1.396E+000	7.165E+000
		241.98*	7.49	1.117E+000		1.072E+000	5.313E-001
		295.21*	19.20	5.528E-001		5.859E-001	2.655E-001
		351.92*	37.20	2.118E-001		7.260E-001	1.001E-001
		785.91	1.10	4.772E+000		1.052E+000	2.175E+000
	RA-226	186.21	3.28	2.954E+000	2.95E+000	2.563E+000	1.417E+000
+	AC-228	89.95	2.10	7.141E+000	2.12E-001	-1.363E+000	3.456E+000
		93.35	3.50	4.334E+000		2.668E+000	2.099E+000
		129.08	2.80	3.864E+000		1.187E+000	1.858E+000
		209.28	4.40	1.799E+000		7.399E-001	8.543E-001
		270.23	3.60	1.998E+000		7.427E-001	9.414E-001
		327.64	3.20	2.056E+000		-2.453E-002	9.618E-001
		338.32	11.40	6.650E-001		3.834E-001	3.138E-001
		409.51	2.13	2.707E+000		8.591E-001	1.251E+000
		463.00	4.40	1.213E+000		-1.937E-001	5.559E-001
		794.70	4.60	1.127E+000		2.069E-001	5.131E-001
		911.60*	27.70	2.125E-001		3.118E-001	9.778E-002
		964.60	5.20	1.009E+000		3.505E-001	4.595E-001
		969.11*	16.60	2.925E-001		2.991E-001	1.321E-001
		1587.90	3.71	9.184E-001		-9.757E-002	3.932E-001
	PA-234M	766.36	0.29	1.512E+001	5.30E+000	-1.034E+001	6.774E+000
		1001.03	0.84	5.300E+000		1.163E+000	2.369E+000
	TH-234	92.38	2.81	5.505E+000	5.50E+000	3.255E+000	2.668E+000
		92.80	2.77	5.548E+000		3.466E+000	2.688E+000
		112.81	0.28	4.355E+001		9.095E+000	2.099E+001
	U-235	89.96	1.50	9.997E+000	1.76E-001	-1.908E+000	4.838E+000
		93.35	2.50	6.067E+000		3.736E+000	2.939E+000
		105.00	1.00	1.243E+001		2.896E-001	5.991E+000
		109.14	1.50	7.840E+000		-3.207E+000	3.774E+000
		143.76	10.50	9.233E-001		-1.364E-002	4.426E-001
		163.35	4.70	1.894E+000		3.074E-001	9.050E-001
		185.71	54.00	1.761E-001		1.255E-001	8.442E-002
		202.12	1.00	7.195E+000		-2.590E+000	3.399E+000
		205.31	4.70	1.619E+000		-8.884E-003	7.673E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	5.533E-001	5.53E-001	-1.058E-001	2.658E-001

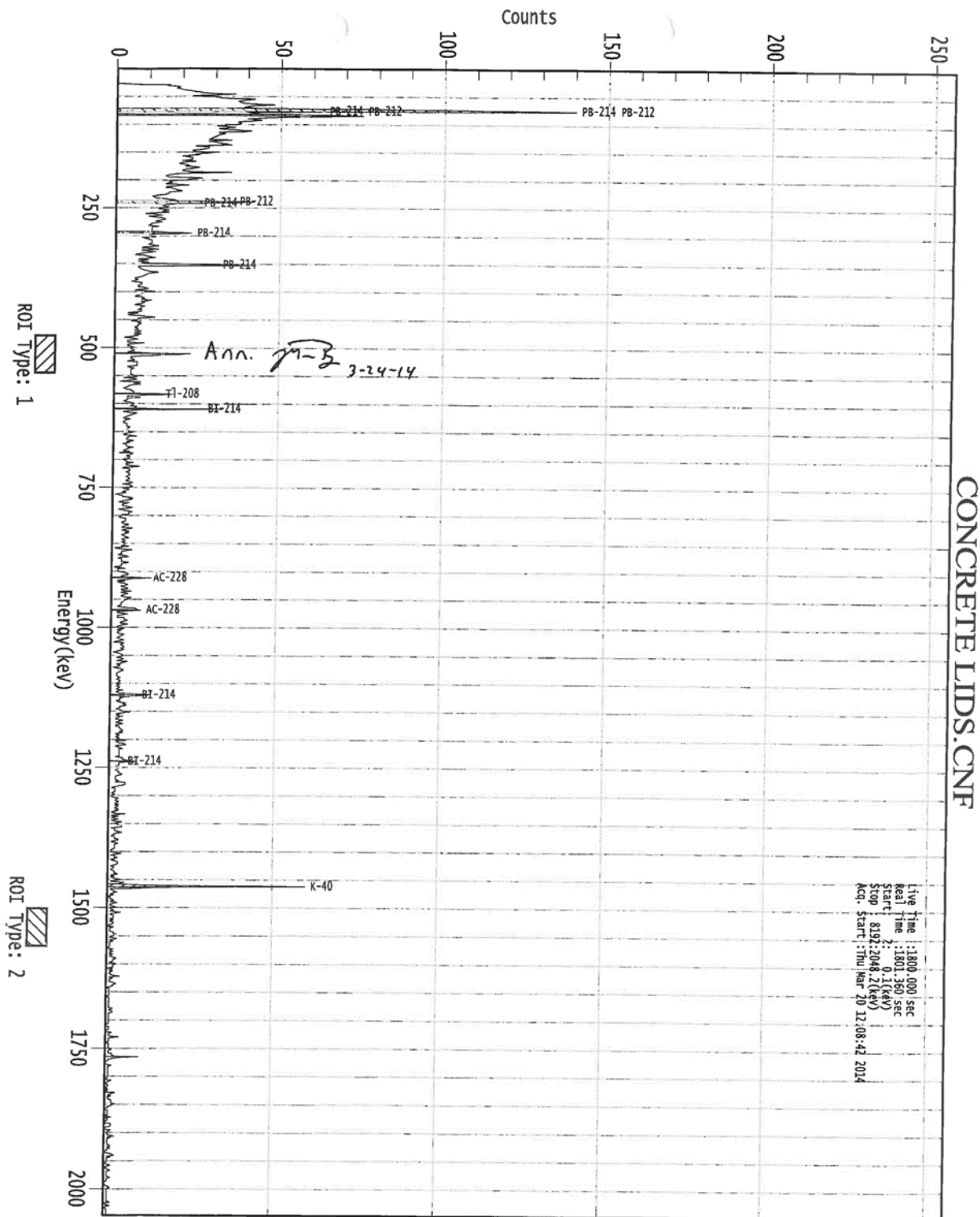
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 9:31:49 AM

Sample Title : Concrete Cylinder 1 Side 1
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylind

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.6898E6)
grams

Sample Taken On :
Acquisition Started : 3/26/2014 9:01:45 AM

Live Time : 1800.0 seconds
Real Time : 1801.0 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report states 1 grams because weight is calculated with the efficiency. M-B 3-27-14

M-B 3/27/14

M-B 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 9:31:48 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 1 Side 1
Peak Analysis Performed on: 3/26/2014 9:31:47 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	306	291.97	72.73	0.85	1.83E+002	42.61	4.62E+002
2	284-	306	300.82	74.95	0.86	3.24E+002	54.76	5.26E+002
3	949-	961	955.78	238.92	1.16	1.19E+002	42.83	1.29E+002
4	1173-	1188	1181.05	295.31	0.98	7.96E+001	41.78	1.18E+002
5	1397-	1415	1407.85	352.07	1.61	1.47E+002	43.27	9.50E+001
6	2327-	2339	2333.12	583.62	0.57	7.93E+001	27.30	4.07E+001
7	2426-	2446	2437.00	609.62	0.96	2.07E+002	35.94	3.16E+001
8	3639-	3653	3644.90	911.78	1.15	5.74E+001	22.71	2.46E+001
9	3732-	3743	3737.50	934.94	0.25	2.37E+001	15.51	1.43E+001
10	4470-	4488	4480.09	1120.64	0.47	6.32E+001	25.85	3.08E+001
11	4947-	4960	4953.45	1238.99	0.72	2.23E+001	17.82	2.07E+001
12	5830-	5856	5844.03	1461.60	1.87	3.69E+002	43.51	2.37E+001
13	6031-	6044	6037.92	1510.06	0.29	1.52E+001	9.01	1.76E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 1 Side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.971	1460.81*	10.67	1.03243E+001	1.48567E+000
Tl-208	0.991	583.19*	84.50	2.63880E-001	9.62067E-002
PB-212	0.516	74.81*	9.60	1.32336E+001	3.46437E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.91078E-001	2.73030E-001
		300.09	3.41		
BI-214	0.779	609.31*	46.30	1.26268E+000	2.66214E-001
		768.36	5.04		
		806.17	1.23		
		934.06*	3.21	2.12000E+000	1.40015E+000
		1120.29*	15.10	1.21868E+000	5.07675E-001
		1155.19	1.69		
		1238.11*	5.94	1.09768E+000	8.83469E-001
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19*	2.19	2.08728E+000	1.24630E+000
		1661.28	1.15		
		1729.60	3.05		
		1764.49	15.80		
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.597	74.81* @	6.33	2.00699E+001	5.25402E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.09899E+000	6.02667E-001
		351.92*	37.20	1.06350E+000	3.56335E-001
		785.91	1.10		
AC-228	1.000	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	1.000	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	5.95239E-001	2.40196E-001
		964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 5

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.971	1.032429E+001	1.485667E+000
Tl-208	0.991	2.638799E-001	9.620668E-002
X BI-211	0.320		
PB-212	0.516	7.638876E-001	2.721887E-001
BI-214	0.779	1.291371E+000	2.212656E-001
PB-214 @	0.597	1.133286E+000	3.062122E-001
AC-228	1.000	5.952395E-001	2.401961E-001

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 9:31:47 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.73	1.0151E-001	23.32	Tol.	BI-211

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report 3/26/2014 9:31:48 AM Page 6

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 1 Side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.014E+000	1.01E+000	1.032E+001	4.690E-001
	MN-54	834.83	99.97	7.145E-002	7.14E-002	5.277E-004	3.186E-002
	CO-60	1173.22	100.00	5.493E-002	5.49E-002	3.040E-004	2.352E-002
		1332.49	100.00	6.925E-002		4.241E-002	3.064E-002
	NB-94	702.63	100.00	8.585E-002	6.26E-002	8.823E-003	3.908E-002
		871.10	100.00	6.258E-002		2.691E-003	2.742E-002
	SN-113	255.12	1.93	6.178E+000	1.42E-001	2.676E+000	2.906E+000
		391.69	64.90	1.421E-001		-1.292E-002	6.537E-002
	CS-134	475.35	1.46	5.494E+000	7.63E-002	-1.474E+000	2.491E+000
		563.23	8.38	9.980E-001		-1.500E-001	4.538E-001
		569.32	15.43	5.638E-001		1.474E-002	2.573E-001
		604.70	97.60	7.631E-002		-1.832E-003	3.425E-002
		795.84	85.40	9.825E-002		1.206E-002	4.461E-002
		801.93	8.73	8.482E-001		5.814E-002	3.799E-001
		1038.57	1.00	6.177E+000		-2.223E+000	2.696E+000
		1167.94	1.80	3.976E+000		2.947E-001	1.769E+000
		1365.15	3.04	1.460E+000		4.096E-001	5.983E-001
	CS-137	661.65	85.12	9.801E-002	9.80E-002	-1.060E-003	4.450E-002
+	Tl-208	583.19*	84.50	1.223E-001	1.22E-001	2.639E-001	5.663E-002
	BI-211	72.87*	1.20	3.476E+001	1.36E+000	6.184E+001	1.692E+001
		351.10*	12.20	1.360E+000		3.243E+000	6.503E-001
		404.80	4.10	2.278E+000		-2.313E-001	1.049E+000
		426.90	1.90	4.469E+000		-2.249E+000	2.040E+000
		831.80	3.30	2.364E+000		3.252E-001	1.065E+000
	PB-211	404.80	3.00	3.114E+000	2.79E+000	-3.161E-001	1.434E+000
		427.10	1.40	6.357E+000		-1.961E+000	2.914E+000
		831.80	2.80	2.786E+000		3.832E-001	1.255E+000
	BI-212	39.86	1.10	2.459E+001	8.89E-001	-3.542E+000	1.164E+001
		727.17	11.80	8.889E-001		6.625E-001	4.118E-001
		785.42	2.00	3.633E+000		-4.987E-001	1.624E+000
		1620.56	2.75	1.753E+000		5.524E-001	7.270E-001
+	PB-212	74.81*	9.60	4.467E+000	3.69E-001	1.323E+001	2.179E+000
		77.11	17.50	1.935E+000		1.242E+000	9.381E-001
		87.20	6.30	4.662E+000		2.800E-001	2.261E+000
		89.80	1.75	1.528E+001		-5.970E+000	7.392E+000
		115.19	0.60	3.590E+001		6.485E+000	1.731E+001
		238.63*	44.60	3.694E-001		6.911E-001	1.768E-001
		300.09	3.41	3.107E+000		1.070E-001	1.448E+000
+	BI-214	609.31*	46.30	2.319E-001	2.32E-001	1.263E+000	1.077E-001
		768.36	5.04	2.189E+000		2.199E+000	1.018E+000
		806.17	1.23	5.571E+000		-4.030E-001	2.472E+000
		934.06*	3.21	2.023E+000		2.120E+000	8.903E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	6.983E-001	2.32E-001	1.219E+000	3.231E-001
		1155.19	1.69	4.056E+000		-4.744E-001	1.795E+000
		1238.11*	5.94	1.360E+000		1.098E+000	6.134E-001
		1280.96	1.47	5.459E+000		4.117E+000	2.459E+000
		1377.67	4.11	1.801E+000		1.365E+000	8.032E-001
		1385.31	0.78	7.636E+000		-1.803E+000	3.304E+000
		1401.50	1.39	3.717E+000		-1.910E+000	1.570E+000
		1407.98	2.48	2.994E+000		2.102E+000	1.335E+000
		1509.19*	2.19	1.387E+000		2.087E+000	5.080E-001
		1661.28	1.15	4.813E+000		1.616E+000	2.048E+000
		1729.60	3.05	2.206E+000		1.051E+000	9.667E-001
		1764.49	15.80	6.887E-001		4.895E-001	3.180E-001
		1847.44	2.12	2.323E+000		2.928E-001	9.634E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.775E+000	4.46E-001	2.007E+001	3.304E+000
		77.11	10.70	3.164E+000		2.031E+000	1.534E+000
		87.20	3.70	7.938E+000		4.767E-001	3.850E+000
		89.80	1.03	2.596E+001		-1.014E+001	1.256E+001
		241.98	7.49	1.880E+000		1.340E+000	8.928E-001
		295.21*	19.20	8.947E-001		1.099E+000	4.287E-001
		351.92*	37.20	4.461E-001		1.064E+000	2.133E-001
		785.91	1.10	6.606E+000		-1.322E-001	2.952E+000
	RA-226	186.21	3.28	5.084E+000	5.08E+000	3.286E+000	2.437E+000
+	AC-228	89.95	2.10	1.303E+001	3.17E-001	-7.234E-001	6.306E+000
		93.35	3.50	7.790E+000		3.317E+000	3.774E+000
		129.08	2.80	6.763E+000		-2.083E+000	3.250E+000
		209.28	4.40	3.116E+000		9.074E-001	1.479E+000
		270.23	3.60	3.384E+000		-6.181E-002	1.593E+000
		327.64	3.20	3.385E+000		3.267E-001	1.579E+000
		338.32	11.40	1.061E+000		7.803E-001	4.986E-001
		409.51	2.13	4.301E+000		-9.987E-001	1.977E+000
		463.00	4.40	2.104E+000		4.294E-001	9.670E-001
		794.70	4.60	1.773E+000		5.602E-001	8.027E-001
		911.60*	27.70	3.165E-001		5.952E-001	1.442E-001
		964.60	5.20	1.275E+000		-1.116E+000	5.623E-001
		969.11	16.60	6.411E-001		5.440E-001	2.970E-001
		1587.90	3.71	1.480E+000		-3.357E-001	6.296E-001
	PA-234M	766.36	0.29	2.890E+001	8.47E+000	-1.007E+001	1.314E+001
		1001.03	0.84	8.474E+000		4.813E+000	3.770E+000
	TH-234	92.38	2.81	1.018E+001	1.01E+001	8.134E+000	4.937E+000
		92.80	2.77	1.006E+001		6.153E+000	4.876E+000
		112.81	0.28	7.977E+001		2.098E+001	3.849E+001
	U-235	89.96	1.50	1.823E+001	3.09E-001	-1.013E+000	8.828E+000
		93.35	2.50	1.091E+001		4.643E+000	5.283E+000
		105.00	1.00	2.323E+001		-1.849E+000	1.122E+001
		109.14	1.50	1.419E+001		-2.322E+000	6.832E+000
		143.76	10.50	1.693E+000		3.794E-002	8.126E-001
		163.35	4.70	3.410E+000		1.188E+000	1.631E+000
		185.71	54.00	3.088E-001		1.856E-001	1.480E-001
		202.12	1.00	1.228E+001		-8.606E+000	5.794E+000
		205.31	4.70	2.890E+000		-2.424E-001	1.371E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.018E+000	1.02E+000	-1.029E-001	4.891E-001

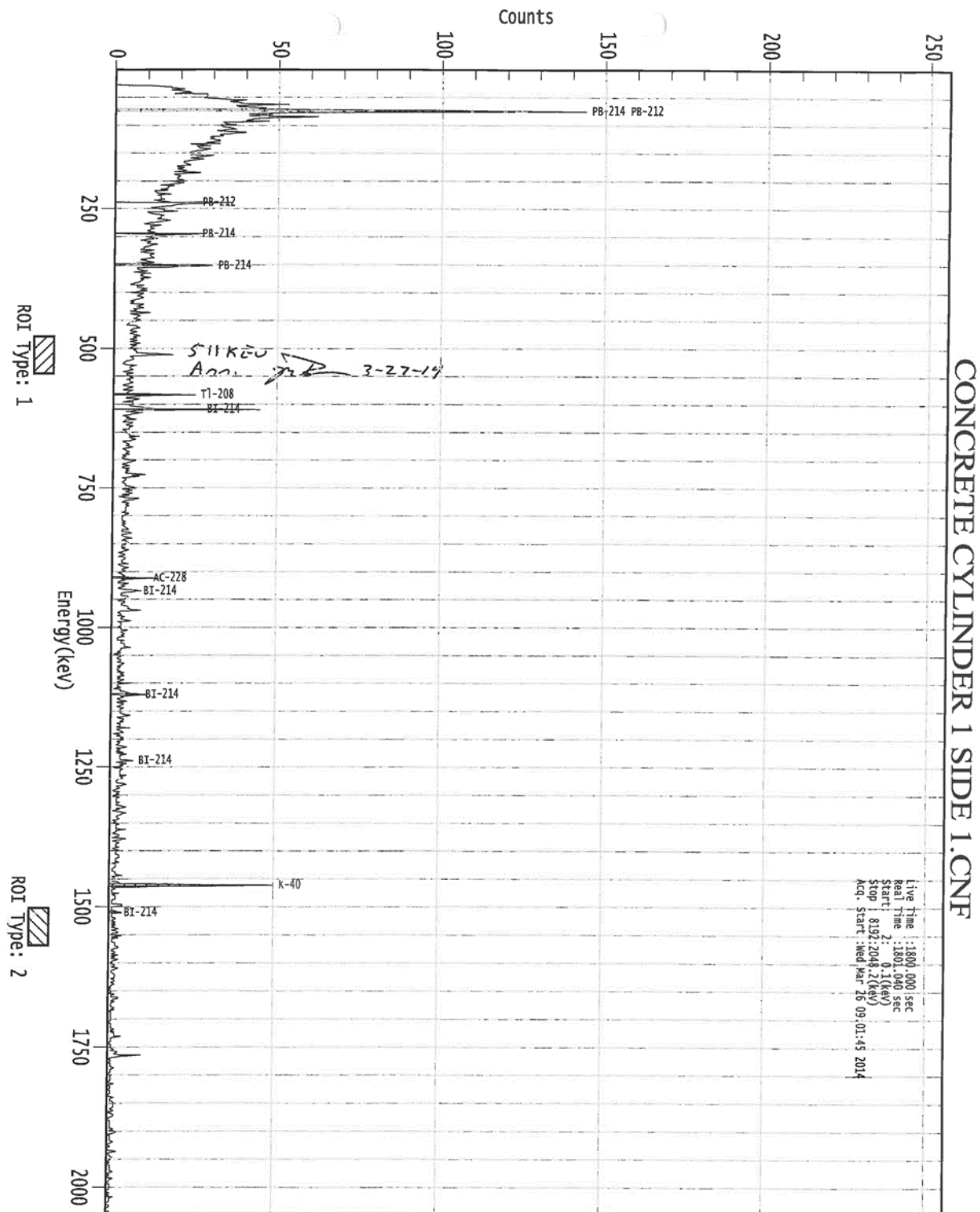
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
 the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

```
*****
***** GAMMA SPECTRUM ANALYSIS *****
*****

Filename: 5452

Report Generated On      : 3/26/2014 10:13:45 AM

Sample Title             : Concrete Cylinder 1 Side 2
Sample Description       :
Sample Identification     :
Sample Type              :
Sample Geometry          : Concrete Cylinder

Peak Locate Threshold    : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size              : 1.000E+000 grams (6.6898E-6 grams)
Sample Taken On         :
Acquisition Started     : 3/26/2014 9:43:43 AM

Live Time               : 1800.0 seconds
Real Time               : 1801.1 seconds

Dead Time               : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID             : Concrete_Cylinde
```

* Report states 1 grams because weight is calculated with the efficiency. 77-14 3-27-14

4/27/14
77-14
3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452

Sample Title: Concrete Cylinder 1 Side 2

Peak Analysis Performed on: 3/26/2014 10:13:44 AM

Peak Analysis From Channel: 50

Peak Analysis To Channel: 8192

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
I	1	284-	305	292.39	72.84	0.88	1.76E+002	42.54	4.34E+002
I	2	284-	305	300.85	74.96	0.88	3.55E+002	55.55	5.00E+002
	3	334-	345	339.95	84.75	1.13	6.56E+001	74.09	5.16E+002
I	4	947-	975	954.82	238.68	1.10	1.09E+002	30.77	1.71E+002
I	5	947-	975	968.00	241.98	1.10	6.93E+001	25.55	1.38E+002
	6	1173-	1188	1180.64	295.20	0.71	4.89E+001	43.12	1.38E+002
	7	1401-	1414	1407.80	352.06	1.13	1.55E+002	37.80	7.35E+001
	8	2032-	2055	2043.92	511.26	2.09	1.50E+002	41.35	6.92E+001
	9	2324-	2338	2332.08	583.37	1.69	7.49E+001	28.21	4.31E+001
	10	2429-	2445	2436.33	609.45	1.46	1.50E+002	35.85	5.38E+001
	11	3638-	3650	3644.40	911.65	0.97	3.90E+001	22.66	3.40E+001
	12	3870-	3881	3875.61	969.48	0.93	2.49E+001	18.84	2.51E+001
	13	5831-	5856	5843.26	1461.41	2.09	3.29E+002	43.08	3.27E+001
	14	7049-	7068	7059.02	1765.20	0.45	6.90E+001	18.60	5.00E+000

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 1 Side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.983	1460.81*	10.67	9.20446E+000	1.42428E+000
Tl-208	0.999	583.19*	84.50	2.49051E-001	9.85100E-002
PB-212	0.518	74.81*	9.60	1.45068E+001	3.68209E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.35754E-001	2.06188E-001
		300.09	3.41		
BI-214	0.785	609.31*	46.30	9.14691E-001	2.44320E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29	15.10		
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.34730E+000	3.78866E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.743	74.81* @	6.33	2.20008E+001	5.58421E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98*	7.49	2.40861E+000	9.67942E-001
		295.21*	19.20	6.74290E-001	6.04607E-001
		351.92*	37.20	1.11776E+000	3.26755E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.999	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	4.04003E-001	2.37092E-001
		964.60	5.20		
		969.11*	16.60	4.31803E-001	3.29143E-001
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.983	9.204464E+000	1.424281E+000
Tl-208	0.999	2.490514E-001	9.851004E-002
X BI-211	0.321		
PB-212	0.518	6.766845E-001	2.058665E-001
BI-214	0.785	1.041755E+000	2.053285E-001
PB-214 @	0.743	1.178464E+000	2.752313E-001
AC-228	0.999	4.135001E-001	1.923783E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

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***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 10:13:44 AM
 Peak Locate From Channel: 50
 Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.84	9.7630E-002	24.21	Tol.	BI-211
3	84.75	3.6469E-002	112.87	Tol.	TH-227
8	511.26	8.3246E-002	27.59		TH-231

M = First peak in a multiplet region
 m = Other peak in a multiplet region
 F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cyllind
Sample Title: Concrete Cylinder 1 Side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.143E+000	1.14E+000	9.204E+000	5.337E-001
	MN-54	834.83	99.97	7.282E-002	7.28E-002	-3.141E-002	3.255E-002
	CO-60	1173.22	100.00	6.221E-002	5.74E-002	6.292E-003	2.715E-002
		1332.49	100.00	5.738E-002		1.031E-002	2.470E-002
	NB-94	702.63	100.00	9.228E-002	7.01E-002	2.649E-002	4.230E-002
		871.10	100.00	7.012E-002		-2.511E-002	3.119E-002
	SN-113	255.12	1.93	6.347E+000	1.58E-001	-9.823E-001	2.990E+000
		391.69	64.90	1.585E-001		-3.046E-002	7.358E-002
	CS-134	475.35	1.46	6.012E+000	8.02E-002	-1.119E+000	2.750E+000
		563.23	8.38	1.037E+000		4.068E-002	4.734E-001
		569.32	15.43	5.352E-001		5.000E-002	2.430E-001
		604.70	97.60	8.016E-002		5.252E-003	3.617E-002
		795.84	85.40	8.823E-002		3.255E-002	3.960E-002
		801.93	8.73	9.345E-001		1.135E-001	4.231E-001
		1038.57	1.00	6.504E+000		1.980E+000	2.860E+000
		1167.94	1.80	2.940E+000		-1.256E+000	1.251E+000
		1365.15	3.04	1.763E+000		-3.734E-001	7.500E-001
	CS-137	661.65	85.12	8.001E-002	8.00E-002	-1.320E-002	3.550E-002
+	Tl-208	583.19*	84.50	1.310E-001	1.31E-001	2.491E-001	6.098E-002
	BI-211	72.87*	1.20	3.367E+001	1.09E+000	5.937E+001	1.638E+001
		351.10*	12.20	1.093E+000		3.408E+000	5.167E-001
		404.80	4.10	2.278E+000		8.059E-002	1.049E+000
		426.90	1.90	4.988E+000		-1.227E+000	2.299E+000
		831.80	3.30	2.034E+000		-3.752E-001	9.000E-001
	PB-211	404.80	3.00	3.114E+000	2.40E+000	1.101E-001	1.434E+000
		427.10	1.40	6.769E+000		-2.234E+000	3.120E+000
		831.80	2.80	2.397E+000		-4.422E-001	1.061E+000
	BI-212	39.86	1.10	2.606E+001	8.17E-001	7.353E-001	1.238E+001
		727.17	11.80	8.171E-001		4.541E-001	3.760E-001
		785.42	2.00	3.955E+000		2.272E-001	1.785E+000
		1620.56	2.75	1.753E+000		2.831E-001	7.270E-001
+	PB-212	74.81*	9.60	4.357E+000	3.70E-001	1.451E+001	2.123E+000
		77.11	17.50	1.932E+000		-8.351E-001	9.368E-001
		87.20	6.30	5.181E+000		5.986E+000	2.520E+000
		89.80	1.75	1.557E+001		-7.016E+000	7.538E+000
		115.19	0.60	3.554E+001		-4.699E+000	1.713E+001
		238.63*	44.60	3.699E-001		6.358E-001	1.770E-001
		300.09	3.41	3.303E+000		5.992E-001	1.546E+000
+	BI-214	609.31*	46.30	2.785E-001	2.78E-001	9.147E-001	1.310E-001
		768.36	5.04	1.730E+000		3.892E-001	7.886E-001
		806.17	1.23	5.204E+000		-4.505E+000	2.288E+000
		934.06	3.21	2.368E+000		-7.625E-001	1.063E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29	15.10	8.078E-001	2.78E-001	8.469E-001	3.778E-001
		1155.19	1.69	3.872E+000		4.816E-001	1.703E+000
		1238.11	5.94	1.723E+000		9.563E-001	7.949E-001
		1280.96	1.47	4.373E+000		-8.256E-001	1.916E+000
		1377.67	4.11	1.999E+000		1.304E+000	9.019E-001
		1385.31	0.78	7.636E+000		1.817E+000	3.304E+000
		1401.50	1.39	4.422E+000		1.600E+000	1.922E+000
		1407.98	2.48	2.480E+000		2.333E-001	1.078E+000
		1509.19	2.19	2.669E+000		5.822E-001	1.149E+000
		1661.28	1.15	4.623E+000		1.659E-001	1.952E+000
		1729.60	3.05	2.148E+000		1.047E+000	9.379E-001
		1764.49*	15.80	3.216E-001		1.347E+000	1.344E-001
		1847.44	2.12	2.853E+000		9.911E-001	1.228E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.607E+000	3.58E-001	2.200E+001	3.220E+000
		77.11	10.70	3.160E+000		-1.366E+000	1.532E+000
		87.20	3.70	8.822E+000		1.019E+001	4.292E+000
		89.80	1.03	2.646E+001		-1.192E+001	1.281E+001
		241.98*	7.49	1.993E+000		2.409E+000	9.497E-001
		295.21*	19.20	9.631E-001		6.743E-001	4.629E-001
		351.92*	37.20	3.585E-001		1.118E+000	1.694E-001
		785.91	1.10	7.412E+000		2.563E+000	3.355E+000
	RA-226	186.21	3.28	5.151E+000	5.15E+000	3.497E+000	2.470E+000
+	AC-228	89.95	2.10	1.328E+001	3.50E-001	4.194E-001	6.435E+000
		93.35	3.50	8.007E+000		3.477E+000	3.882E+000
		129.08	2.80	7.023E+000		2.392E-001	3.380E+000
		209.28	4.40	3.482E+000		2.004E+000	1.662E+000
		270.23	3.60	3.139E+000		-3.465E-001	1.471E+000
		327.64	3.20	3.337E+000		-4.798E-002	1.555E+000
		338.32	11.40	1.153E+000		8.836E-001	5.445E-001
		409.51	2.13	4.645E+000		9.584E-001	2.149E+000
		463.00	4.40	2.231E+000		5.734E-001	1.031E+000
		794.70	4.60	1.609E+000		6.699E-001	7.208E-001
		911.60*	27.70	3.505E-001		4.040E-001	1.612E-001
		964.60	5.20	1.563E+000		3.369E-001	7.065E-001
		969.11*	16.60	5.039E-001		4.318E-001	2.284E-001
		1587.90	3.71	1.590E+000		9.572E-001	6.845E-001
	PA-234M	766.36	0.29	2.647E+001	8.12E+000	-2.184E+001	1.192E+001
		1001.03	0.84	8.123E+000		2.418E+000	3.594E+000
	TH-234	92.38	2.81	1.018E+001	1.02E+001	3.794E+000	4.937E+000
		92.80	2.77	1.036E+001		5.522E+000	5.025E+000
		112.81	0.28	7.701E+001		-2.065E+001	3.711E+001
	U-235	89.96	1.50	1.859E+001	3.14E-001	5.871E-001	9.008E+000
		93.35	2.50	1.121E+001		4.868E+000	5.435E+000
		105.00	1.00	2.378E+001		1.748E+000	1.149E+001
		109.14	1.50	1.528E+001		-2.963E+000	7.377E+000
		143.76	10.50	1.701E+000		1.450E-001	8.167E-001
		163.35	4.70	3.557E+000		8.135E-001	1.704E+000
		185.71	54.00	3.136E-001		2.217E-001	1.504E-001
		202.12	1.00	1.357E+001		-1.107E+000	6.436E+000
		205.31	4.70	3.051E+000		8.009E-001	1.451E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/26/2014 10:13:45 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.095E+000	1.09E+000	2.261E-001	5.276E-001

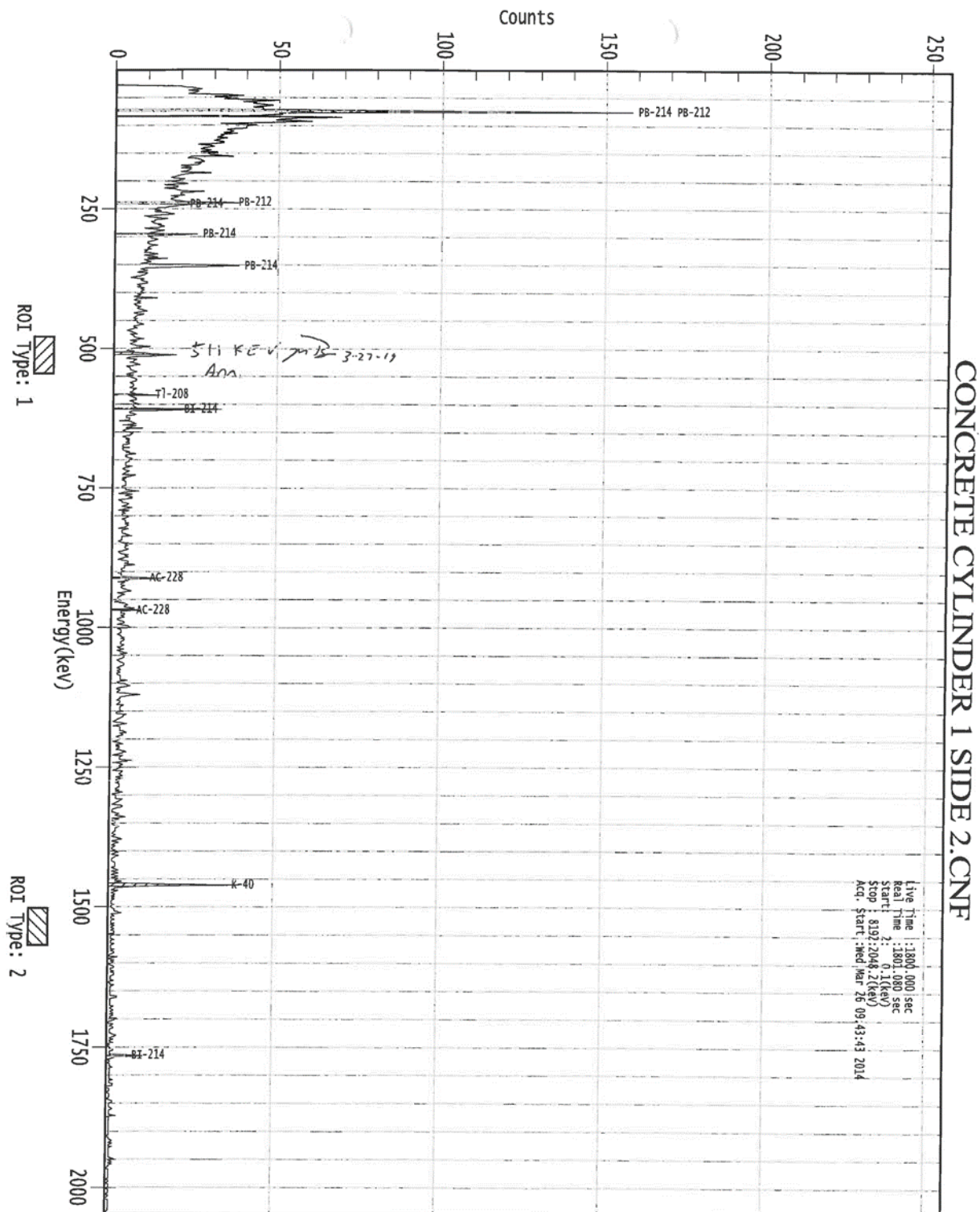
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** G A M M A S P E C T R U M A N A L Y S I S *****

Filename: 5452

Report Generated On : 3/26/2014 11:21:47 AM
Sample Title : Concrete Cylinder 2 Side 1 West
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cyliind
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams (6.6898E6 grams)
Sample Taken On :
Acquisition Started : 3/26/2014 10:51:44 AM
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report states 1 grams because weight is calculated with the
efficiency M-B 3-27-14

M-B 3/27/14

M-B 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/26/2014 11:21:47 AM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452

Sample Title: Concrete Cylinder 2 Side 1 West

Peak Analysis Performed on: 3/26/2014 11:21:46 AM

Peak Analysis From Channel: 50

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	113-	120	116.17	28.71	0.43	3.64E+001	24.43	4.26E+001
2	182-	194	186.75	46.39	0.67	4.65E+001	56.70	2.88E+002
3	285-	313	292.53	72.87	1.24	2.44E+002	47.88	4.87E+002
4	285-	313	300.73	74.93	1.25	3.67E+002	56.21	5.71E+002
5	331-	346	339.82	84.71	1.26	1.88E+002	88.10	5.83E+002
6	949-	961	954.94	238.71	1.03	1.14E+002	45.32	1.51E+002
7	1173-	1188	1181.17	295.34	0.32	1.11E+002	40.82	1.02E+002
8	1400-	1415	1407.49	351.99	1.33	1.55E+002	40.02	8.17E+001
9	2033-	2055	2043.85	511.24	1.31	1.31E+002	41.78	7.82E+001
10	2324-	2342	2331.04	583.10	0.60	7.18E+001	30.87	4.92E+001
11	2428-	2447	2436.76	609.56	1.53	1.98E+002	36.11	3.66E+001
12	3096-	3107	3101.45	775.85	0.76	1.17E+001	14.28	1.53E+001
13	3638-	3650	3643.18	911.35	0.45	4.69E+001	20.50	2.21E+001
14	4471-	4489	4478.55	1120.25	1.05	8.18E+001	22.83	1.43E+001
15	5830-	5856	5842.76	1461.28	1.68	3.79E+002	44.49	2.66E+001
16	7051-	7069	7059.33	1765.28	0.46	4.78E+001	19.02	1.22E+001

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 11:21:47 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 2 Side 1 West
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.989	1460.81*	10.67	1.06065E+001	1.52141E+000
Tl-208	1.000	583.19*	84.50	2.38772E-001	1.06634E-001
PB-212	0.518	74.81*	9.60	1.49692E+001	3.77258E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.67224E-001	2.84907E-001
		300.09	3.41		
BI-214	0.995	609.31*	46.30	1.20788E+000	2.63376E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.57564E+000	4.57677E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	9.33271E-001	3.78822E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.598	74.81* @	6.33	2.27021E+001	5.72145E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.53625E+000	6.14512E-001
		351.92*	37.20	1.12380E+000	3.40804E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 11:21:47 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.999	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	4.85862E-001	2.16062E-001
		964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 11:21:47 AM Page 5

*** INTERFERENCE CORRECTED REPORT ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.989	1.060648E+001	1.521409E+000
	Tl-208	1.000	2.387718E-001	1.066345E-001
X	BI-211	0.324		
	PB-212	0.518	7.435596E-001	2.841004E-001
	BI-214	0.995	1.201846E+000	1.955212E-001
	PB-214 @	0.598	1.275899E+000	2.976367E-001
	AC-228	0.999	4.858616E-001	2.160622E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 11:21:47 AM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 11:21:46 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	28.71	2.0218E-002	67.12		
2	46.39	2.5832E-002	121.94		
M 3	72.87	1.3559E-001	19.62	Tol.	BI-211
5	84.71	1.0454E-001	46.82	Tol.	TH-227
					TH-231
9	511.24	7.2692E-002	31.93		
12	775.85	6.5123E-003	121.83		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cyling
Sample Title: Concrete Cylinder 2 Side 1 West
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.064E+000	1.06E+000	1.061E+001	4.941E-001
	MN-54	834.83	99.97	6.251E-002	6.25E-002	-1.125E-002	2.739E-002
	CO-60	1173.22	100.00	5.870E-002	4.67E-002	4.481E-003	2.540E-002
		1332.49	100.00	4.673E-002		-3.681E-003	1.938E-002
	NB-94	702.63	100.00	7.634E-002	6.26E-002	5.490E-002	3.433E-002
		871.10	100.00	6.258E-002		1.068E-002	2.742E-002
	SN-113	255.12	1.93	5.753E+000	1.48E-001	-4.951E-001	2.693E+000
		391.69	64.90	1.478E-001		2.259E-002	6.822E-002
	CS-134	475.35	1.46	7.161E+000	8.95E-002	4.214E+000	3.324E+000
		563.23	8.38	8.841E-001		3.152E-002	3.968E-001
		569.32	15.43	5.126E-001		9.607E-002	2.317E-001
		604.70	97.60	8.953E-002		5.004E-002	4.086E-002
		795.84	85.40	9.267E-002		-1.456E-002	4.182E-002
		801.93	8.73	7.331E-001		-2.540E-002	3.224E-001
		1038.57	1.00	6.177E+000		-9.055E-003	2.696E+000
		1167.94	1.80	2.940E+000		-1.002E+000	1.251E+000
		1365.15	3.04	1.371E+000		-3.038E-001	5.539E-001
	CS-137	661.65	85.12	7.289E-002	7.29E-002	-3.335E-002	3.194E-002
+	Tl-208	583.19*	84.50	1.502E-001	1.50E-001	2.388E-001	7.062E-002
	BI-211	72.87*	1.20	3.558E+001	1.20E+000	8.241E+001	1.733E+001
		351.10*	12.20	1.196E+000		3.427E+000	5.680E-001
		404.80	4.10	2.301E+000		5.242E-001	1.061E+000
		426.90	1.90	4.736E+000		1.910E+000	2.173E+000
		831.80	3.30	1.844E+000		1.176E-001	8.050E-001
	PB-211	404.80	3.00	3.145E+000	2.17E+000	7.164E-001	1.449E+000
		427.10	1.40	6.428E+000		2.969E+000	2.949E+000
		831.80	2.80	2.173E+000		1.386E-001	9.487E-001
	BI-212	39.86	1.10	2.685E+001	7.56E-001	-8.725E-001	1.278E+001
		727.17	11.80	7.562E-001		1.617E-001	3.455E-001
		785.42	2.00	4.363E+000		9.617E-001	1.989E+000
		1620.56	2.75	1.327E+000		-5.939E-001	5.141E-001
+	PB-212	74.81*	9.60	4.650E+000	3.99E-001	1.497E+001	2.270E+000
		77.11	17.50	1.820E+000		-1.499E+000	8.810E-001
		87.20	6.30	4.694E+000		1.969E+000	2.277E+000
		89.80	1.75	1.574E+001		-9.117E-001	7.622E+000
		115.19	0.60	3.512E+001		1.137E+001	1.692E+001
		238.63*	44.60	3.988E-001		6.672E-001	1.915E-001
		300.09	3.41	3.038E+000		-6.569E-002	1.414E+000
+	BI-214	609.31*	46.30	2.428E-001	2.43E-001	1.208E+000	1.132E-001
		768.36	5.04	1.897E+000		1.415E+000	8.719E-001
		806.17	1.23	6.536E+000		2.736E+000	2.954E+000
		934.06	3.21	2.153E+000		3.808E-001	9.553E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	4.939E-001	2.43E-001	1.576E+000	2.209E-001
		1155.19	1.69	3.872E+000		5.942E-001	1.703E+000
		1238.11	5.94	1.369E+000		9.532E-001	6.179E-001
		1280.96	1.47	4.373E+000		1.607E+000	1.916E+000
		1377.67	4.11	1.801E+000		1.178E+000	8.032E-001
		1385.31	0.78	6.023E+000		-7.355E-001	2.498E+000
		1401.50	1.39	4.670E+000		2.018E+000	2.047E+000
		1407.98	2.48	2.619E+000		1.346E+000	1.148E+000
		1509.19	2.19	2.057E+000		9.589E-001	8.432E-001
		1661.28	1.15	3.479E+000		-5.308E-002	1.381E+000
		1729.60	3.05	1.897E+000		9.155E-001	8.122E-001
		1764.49*	15.80	4.724E-001		9.333E-001	2.098E-001
		1847.44	2.12	3.205E+000		1.867E+000	1.404E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	7.052E+000	3.92E-001	2.270E+001	3.442E+000
		77.11	10.70	2.977E+000		-2.452E+000	1.441E+000
		87.20	3.70	7.993E+000		3.353E+000	3.877E+000
		89.80	1.03	2.674E+001		-1.549E+000	1.295E+001
		241.98	7.49	1.979E+000		1.764E+000	9.427E-001
		295.21*	19.20	8.304E-001		1.536E+000	3.965E-001
		351.92*	37.20	3.921E-001		1.124E+000	1.863E-001
		785.91	1.10	8.131E+000		4.295E+000	3.715E+000
+	RA-226	186.21	3.28	5.016E+000	5.02E+000	4.376E+000	2.403E+000
	AC-228	89.95	2.10	1.268E+001	2.88E-001	-9.775E+000	6.134E+000
		93.35	3.50	7.836E+000		-5.867E-002	3.797E+000
		129.08	2.80	6.794E+000		1.385E+000	3.266E+000
		209.28	4.40	3.014E+000		1.400E+000	1.428E+000
		270.23	3.60	3.159E+000		-6.187E-001	1.481E+000
		327.64	3.20	3.682E+000		1.682E+000	1.728E+000
		338.32	11.40	1.049E+000		5.793E-001	4.925E-001
		409.51	2.13	4.390E+000		-1.253E-001	2.022E+000
		463.00	4.40	2.125E+000		-2.197E-001	9.780E-001
		794.70	4.60	1.638E+000		9.534E-002	7.351E-001
		911.60*	27.70	2.882E-001		4.859E-001	1.301E-001
		964.60	5.20	1.539E+000		5.502E-001	6.947E-001
		969.11	16.60	5.953E-001		3.766E-001	2.742E-001
		1587.90	3.71	1.151E+000		-2.448E-001	4.650E-001
	PA-234M	766.36	0.29	2.851E+001	7.16E+000	1.974E+000	1.294E+001
		1001.03	0.84	7.160E+000		-5.453E+000	3.113E+000
	TH-234	92.38	2.81	1.061E+001	1.06E+001	1.378E+001	5.154E+000
		92.80	2.77	1.063E+001		1.305E+001	5.163E+000
		112.81	0.28	7.591E+001		-1.662E+001	3.656E+001
	U-235	89.96	1.50	1.775E+001	3.03E-001	-1.368E+001	8.588E+000
		93.35	2.50	1.097E+001		-8.213E-002	5.315E+000
		105.00	1.00	2.133E+001		-3.789E+000	1.026E+001
		109.14	1.50	1.437E+001		-9.838E-001	6.921E+000
		143.76	10.50	1.580E+000		-2.970E-002	7.561E-001
		163.35	4.70	3.214E+000		4.399E-001	1.533E+000
		185.71	54.00	3.030E-001		2.048E-001	1.451E-001
		202.12	1.00	1.306E+001		2.139E+000	6.181E+000
		205.31	4.70	2.818E+000		8.070E-001	1.335E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.008E+000	1.01E+000	-4.729E-001	4.844E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 12:00:01 PM
Sample Title : Concrete Cylinder 2 Side 2 East
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylind
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams (6.689856 grams)
Sample Taken On :
Acquisition Started : 3/26/2014 11:29:59 AM
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report States 1 gram because weight is calculated with the efficiency. 79-5 3-27-14

79-5 3/27/14
79-5 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/26/2014 12:00:01 PM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 2 Side 2 East
Peak Analysis Performed on: 3/26/2014 12:00:00 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	306	292.28	72.81	0.85	1.51E+002	40.97	4.47E+002
2	284-	306	300.87	74.96	0.86	3.63E+002	54.84	5.07E+002
3	365-	377	371.20	92.57	0.94	9.40E+001	69.37	4.21E+002
4	949-	959	955.16	238.76	0.90	9.11E+001	42.35	1.49E+002
5	1175-	1190	1181.06	295.31	0.44	7.31E+001	40.11	1.09E+002
6	1400-	1414	1408.19	352.16	1.11	1.14E+002	42.33	1.16E+002
7	2327-	2342	2333.18	583.64	0.49	9.69E+001	29.05	3.81E+001
8	2427-	2444	2436.46	609.48	0.94	1.92E+002	35.61	3.84E+001
9	3635-	3676	3644.13	911.59	1.08	7.58E+001	41.65	5.72E+001
10	3870-	3884	3876.44	969.69	1.11	3.03E+001	20.29	2.47E+001
11	4471-	4489	4480.05	1120.63	0.85	7.02E+001	24.59	2.38E+001
12	5830-	5856	5843.95	1461.58	1.69	3.91E+002	43.71	1.98E+001
13	7050-	7068	7059.37	1765.28	0.56	5.81E+001	19.85	1.19E+001

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 12:00:01 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 2 Side 2 East
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.972	1460.81*	10.67	1.09361E+001	1.51961E+000
Tl-208	0.990	583.19*	84.50	3.22339E-001	1.04121E-001
PB-212	0.518	74.81*	9.60	1.48016E+001	3.71131E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	5.30709E-001	2.61012E-001
		300.09	3.41		
BI-214	0.995	609.31*	46.30	1.16672E+000	2.58113E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.35217E+000	4.86129E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.13426E+000	3.97999E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.597	74.81* @	6.33	2.24480E+001	5.62852E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.00815E+000	5.76505E-001
		351.92*	37.20	8.22966E-001	3.33367E-001
		785.91	1.10		
TH-234	0.999	92.38*	2.81	1.05613E+001	8.15453E+000
		92.80	2.77		
		112.81	0.28		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 12:00:01 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.972	1.093615E+001	1.519608E+000
Tl-208	0.990	3.223386E-001	1.041209E-001
X BI-211	0.316		
PB-212	0.518	5.979512E-001	2.603710E-001
BI-214	0.995	1.189409E+000	1.978180E-001
PB-214 @	0.597	9.235736E-001	2.882143E-001
TH-234	0.999	1.056127E+001	8.154535E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/26/2014 12:00:00 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.81	8.3773E-002	27.17	Tol.	BI-211
9	911.59	4.2139E-002	54.91	Tol.	AC-228
10	969.69	1.6856E-002	66.87	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylinder
Sample Title: Concrete Cylinder 2 Side 2 East
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	9.304E-001	9.30E-001	1.094E+001	4.274E-001
	MN-54	834.83	99.97	7.282E-002	7.28E-002	-1.963E-003	3.255E-002
	CO-60	1173.22	100.00	6.862E-002	5.54E-002	-2.553E-002	3.036E-002
		1332.49	100.00	5.544E-002		-8.836E-003	2.373E-002
	NB-94	702.63	100.00	7.105E-002	5.75E-002	-7.099E-003	3.168E-002
		871.10	100.00	5.750E-002		-2.032E-002	2.488E-002
	SN-113	255.12	1.93	6.110E+000	1.41E-001	-2.253E-001	2.871E+000
		391.69	64.90	1.406E-001		-1.892E-002	6.464E-002
	CS-134	475.35	1.46	5.796E+000	8.14E-002	-3.625E+000	2.642E+000
		563.23	8.38	9.709E-001		-2.091E-001	4.402E-001
		569.32	15.43	5.278E-001		4.617E-002	2.393E-001
		604.70	97.60	8.139E-002		1.420E-002	3.679E-002
		795.84	85.40	8.188E-002		-2.276E-003	3.642E-002
		801.93	8.73	6.570E-001		-4.981E-001	2.843E-001
		1038.57	1.00	7.250E+000		1.474E+000	3.233E+000
		1167.94	1.80	3.455E+000		7.369E-001	1.508E+000
		1365.15	3.04	1.830E+000		1.004E+000	7.833E-001
		661.65	85.12	7.654E-002	7.65E-002	-7.624E-003	3.377E-002
+	Tl-208	583.19*	84.50	1.260E-001	1.26E-001	3.223E-001	5.848E-002
	BI-211	72.87*	1.20	3.417E+001	1.39E+000	5.097E+001	1.663E+001
		351.10*	12.20	1.387E+000		2.509E+000	6.634E-001
		404.80	4.10	2.087E+000		-1.102E+000	9.536E-001
		426.90	1.90	4.988E+000		-9.192E-001	2.299E+000
	PB-211	831.80	3.30	2.475E+000	2.85E+000	3.969E-001	1.120E+000
		404.80	3.00	2.852E+000		-1.507E+000	1.303E+000
		427.10	1.40	6.702E+000		-1.390E+000	3.086E+000
	BI-212	831.80	2.80	2.917E+000	7.92E-001	4.678E-001	1.321E+000
		39.86	1.10	2.481E+001		5.254E-002	1.175E+001
		727.17	11.80	7.916E-001		3.532E-001	3.632E-001
	PB-212	785.42	2.00	3.423E+000	3.78E-001	-8.718E-001	1.519E+000
		1620.56	2.75	1.558E+000		2.946E-001	6.296E-001
		74.81*	9.60	4.385E+000		1.480E+001	2.137E+000
		77.11	17.50	1.786E+000		-3.281E-001	8.635E-001
		87.20	6.30	4.926E+000		2.044E+000	2.393E+000
+	BI-214	89.80	1.75	1.547E+001	2.41E-001	-2.355E+000	7.490E+000
		115.19	0.60	3.590E+001		-2.116E+000	1.731E+001
		238.63*	44.60	3.782E-001		5.307E-001	1.812E-001
		300.09	3.41	3.548E+000		1.159E+000	1.669E+000
		609.31*	46.30	2.408E-001		1.167E+000	1.122E-001
		768.36	5.04	1.897E+000		1.151E+000	8.719E-001
		806.17	1.23	6.021E+000		1.611E+000	2.697E+000
		934.06	3.21	2.673E+000		1.254E+000	1.215E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	6.229E-001	2.41E-001	1.352E+000	2.854E-001
		1155.19	1.69	4.480E+000		3.433E-001	2.007E+000
		1238.11	5.94	1.638E+000		1.392E+000	7.524E-001
		1280.96	1.47	4.900E+000		4.046E+000	2.180E+000
		1377.67	4.11	1.870E+000		1.376E+000	8.374E-001
		1385.31	0.78	7.636E+000		9.490E-001	3.304E+000
		1401.50	1.39	4.422E+000		-4.338E-001	1.922E+000
		1407.98	2.48	2.814E+000		1.732E+000	1.245E+000
		1509.19	2.19	1.932E+000		3.881E-001	7.806E-001
		1661.28	1.15	3.188E+000		-1.742E+000	1.235E+000
		1729.60	3.05	1.756E+000		4.460E-001	7.414E-001
		1764.49*	15.80	4.610E-001		1.134E+000	2.041E-001
		1847.44	2.12	2.656E+000		9.517E-001	1.130E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.650E+000	4.55E-001	2.245E+001	3.241E+000
		77.11	10.70	2.920E+000		-5.366E-001	1.412E+000
		87.20	3.70	8.387E+000		3.479E+000	4.074E+000
		89.80	1.03	2.629E+001		-4.001E+000	1.272E+001
		241.98	7.49	1.937E+000		8.588E-001	9.216E-001
		295.21*	19.20	8.610E-001		1.008E+000	4.118E-001
		351.92*	37.20	4.547E-001		8.230E-001	2.176E-001
		785.91	1.10	6.964E+000		-2.519E-001	3.131E+000
	RA-226	186.21	3.28	5.138E+000	5.14E+000	5.614E+000	2.464E+000
	AC-228	89.95	2.10	1.282E+001	4.75E-001	-2.013E+000	6.206E+000
		93.35	3.50	8.262E+000		6.230E+000	4.009E+000
		129.08	2.80	7.216E+000		4.553E+000	3.477E+000
		209.28	4.40	3.190E+000		8.061E-001	1.516E+000
		270.23	3.60	3.366E+000		1.553E+000	1.584E+000
		327.64	3.20	3.638E+000		3.419E-001	1.706E+000
		338.32	11.40	1.222E+000		1.015E+000	5.792E-001
		409.51	2.13	4.519E+000		8.746E-001	2.086E+000
		463.00	4.40	2.465E+000		1.469E+000	1.148E+000
		794.70	4.60	1.580E+000		1.820E-001	7.063E-001
		911.60	27.70	4.753E-001		6.892E-001	2.236E-001
		964.60	5.20	1.654E+000		8.807E-001	7.522E-001
		969.11	16.60	6.244E-001		-3.041E-002	2.887E-001
		1587.90	3.71	1.480E+000		7.492E-001	6.296E-001
	PA-234M	766.36	0.29	2.689E+001	8.97E+000	-1.887E+001	1.213E+001
		1001.03	0.84	8.972E+000		5.907E-001	4.018E+000
+	TH-234	92.38*	2.81	1.262E+001	1.07E+001	1.056E+001	6.156E+000
		92.80	2.77	1.071E+001		1.070E+001	5.203E+000
		112.81	0.28	7.496E+001		-2.038E+001	3.608E+001
	U-235	89.96	1.50	1.795E+001	3.04E-001	-2.818E+000	8.688E+000
		93.35	2.50	1.157E+001		8.722E+000	5.613E+000
		105.00	1.00	2.491E+001		2.201E+001	1.206E+001
		109.14	1.50	1.544E+001		1.557E-001	7.460E+000
		143.76	10.50	1.710E+000		1.128E-001	8.209E-001
		163.35	4.70	3.203E+000		-4.255E-001	1.527E+000
		185.71	54.00	3.038E-001		1.738E-001	1.455E-001
		202.12	1.00	1.259E+001		-3.468E+000	5.946E+000
		205.31	4.70	2.913E+000		-3.234E-002	1.383E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	9.963E-001	9.96E-001	-4.008E-001	4.784E-001

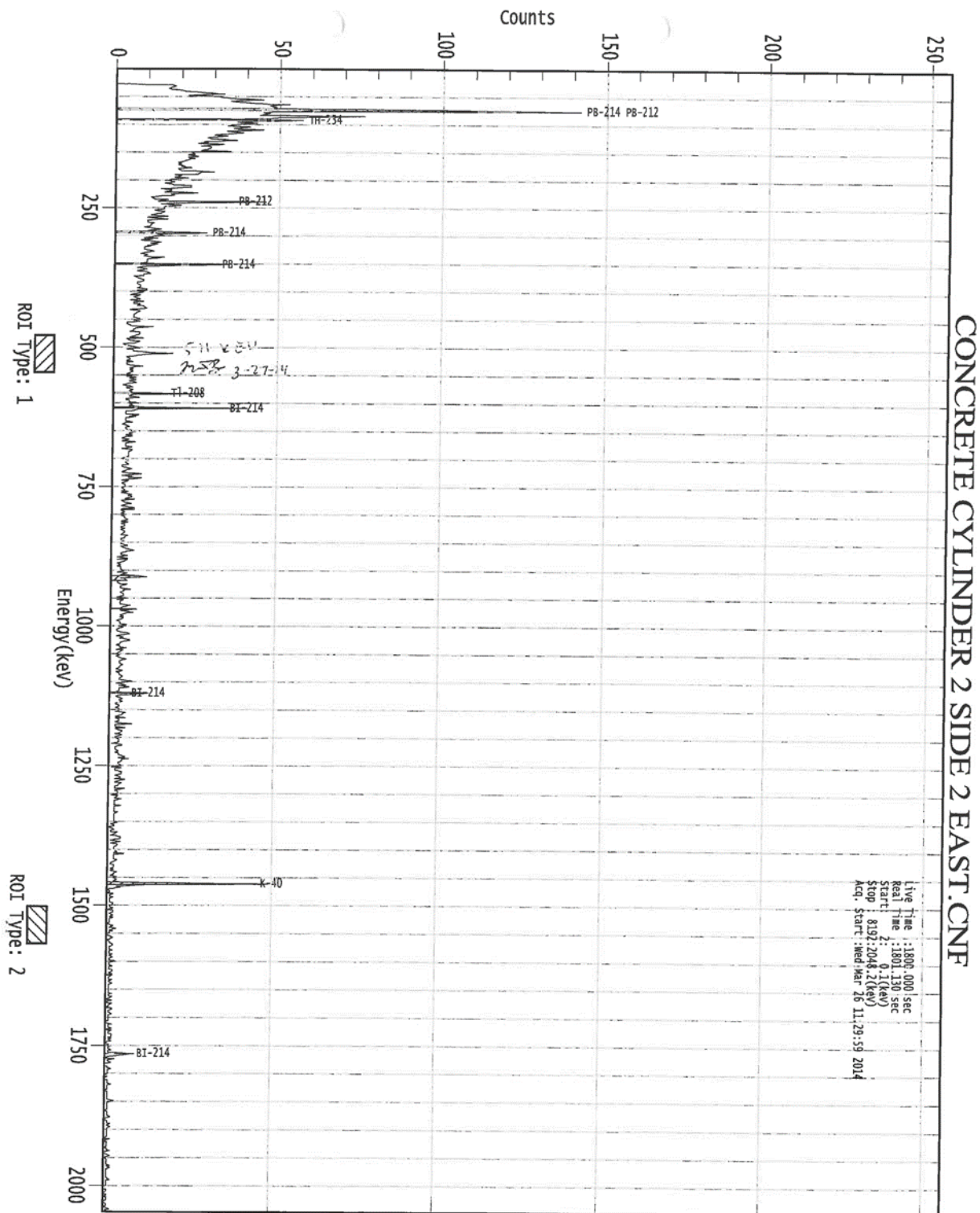
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 1:52:06 PM

Sample Title : Concrete Cylinder 3 side 1
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylind

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.6893E6 grams)

Sample Taken On :
Acquisition Started : 3/26/2014 1:22:04 PM

Live Time : 1800.0 seconds
Real Time : 1801.2 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report states 1 gram because weight is calculated with the efficiency. M-B 3-27-14

M-B 3/27/14
M-B 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 1:52:06 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 3 side 1
Peak Analysis Performed on: 3/26/2014 1:52:05 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	113-	120	116.49	28.79	0.68	3.37E+001	28.61	6.23E+001
2	284-	314	292.48	72.86	0.95	1.60E+002	41.41	4.70E+002
3	284-	314	300.62	74.90	0.95	3.16E+002	51.29	4.84E+002
4	284-	314	309.82	77.20	0.95	7.19E+001	37.43	4.21E+002
5	347-	355	350.94	87.50	0.91	6.89E+001	55.09	3.21E+002
6	949-	962	955.30	238.80	0.78	1.10E+002	43.83	1.33E+002
7	1175-	1187	1181.10	295.32	0.83	7.53E+001	38.65	1.13E+002
8	1399-	1413	1408.01	352.11	0.86	1.63E+002	36.95	6.24E+001
9	2033-	2053	2046.01	511.78	0.83	1.26E+002	40.12	7.62E+001
10	2325-	2342	2332.95	583.58	1.11	1.13E+002	27.15	2.21E+001
11	2427-	2445	2437.02	609.62	1.18	1.75E+002	39.20	6.18E+001
12	3438-	3449	3443.94	861.52	0.79	1.26E+001	12.59	1.04E+001
13	3636-	3651	3644.03	911.56	0.39	7.09E+001	23.97	2.41E+001
14	4471-	4490	4480.81	1120.82	0.97	7.87E+001	22.06	1.23E+001
15	5830-	5856	5844.01	1461.60	1.47	3.72E+002	46.94	4.05E+001
16	7053-	7067	7059.14	1765.23	2.06	5.17E+001	17.32	8.30E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 3 side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.971	1460.81*	10.67	1.04132E+001	1.56917E+000
Tl-208	0.993	583.19*	84.50	3.75794E-001	1.00973E-001
PB-212	0.930	74.81*	9.60	1.29252E+001	3.32763E+000
		77.11*	17.50	1.55347E+000	8.66722E-001
		87.20*	6.30	3.56527E+000	2.93816E+000
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.38757E-001	2.75151E-001
		300.09	3.41		
BI-214	0.993	609.31*	46.30	1.06718E+000	2.70872E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.51606E+000	4.42176E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.00950E+000	3.47757E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.833	74.81* @	6.33	1.96022E+001	5.04665E+000
		77.11* @	10.70	2.54072E+000	1.41754E+000
		87.20* @	3.70	6.07059E+000	5.00281E+000
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.03954E+000	5.58628E-001
		351.92*	37.20	1.17667E+000	3.26955E-001
		785.91	1.10		
AC-228	0.724	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.724	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	7.34671E-001	2.55337E-001
		964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.971	1.041321E+001	1.569169E+000
X	CD-109	0.987		
	Tl-208	0.993	3.757944E-001	1.009735E-001
X	BI-211	0.318		
	PB-212	0.930	7.422051E-001	2.610117E-001
	BI-214	0.993	1.134513E+000	1.924045E-001
	PB-214 @	0.833	1.211661E+000	2.765447E-001
	AC-228	0.724	7.346709E-001	2.553367E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 1:52:05 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	28.79	1.8704E-002	84.98		
M 2	72.86	8.8761E-002	25.92	Tol.	BI-211
9	511.78	6.9887E-002	31.90		
12	861.52	6.9807E-003	100.18		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report 3/26/2014 1:52:06 PM Page 7

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrrete Cylind
Sample Title: Concrete Cylinder 3 side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.304E+000	1.30E+000	1.041E+001	6.143E-001
	MN-54	834.83	99.97	5.563E-002	5.56E-002	-2.394E-002	2.395E-002
	CO-60	1173.22	100.00	6.048E-002	5.34E-002	-1.007E-002	2.629E-002
		1332.49	100.00	5.342E-002		-1.305E-002	2.272E-002
	NB-94	702.63	100.00	8.005E-002	7.29E-002	1.240E-002	3.618E-002
		871.10	100.00	7.290E-002		1.706E-002	3.258E-002
	SN-113	255.12	1.93	5.969E+000	1.45E-001	-1.029E-002	2.801E+000
		391.69	64.90	1.450E-001		-2.262E-002	6.681E-002
	CS-134	475.35	1.46	5.494E+000	6.48E-002	-1.946E+000	2.491E+000
		563.23	8.38	9.980E-001		3.345E-002	4.538E-001
		569.32	15.43	5.203E-001		4.047E-002	2.355E-001
		604.70	97.60	6.481E-002		-3.569E-002	2.850E-002
		795.84	85.40	8.188E-002		-1.828E-002	3.642E-002
		801.93	8.73	7.680E-001		-1.274E-001	3.398E-001
		1038.57	1.00	4.597E+000		-3.006E+000	1.907E+000
		1167.94	1.80	3.455E+000		-1.165E-001	1.508E+000
		1365.15	3.04	1.542E+000		-3.159E-001	6.396E-001
	CS-137	661.65	85.12	9.665E-002	9.67E-002	1.311E-002	4.382E-002
+	Tl-208	583.19*	84.50	1.015E-001	1.01E-001	3.758E-001	4.624E-002
	BI-211	72.87*	1.20	3.496E+001	1.03E+000	5.396E+001	1.703E+001
		351.10*	12.20	1.030E+000		3.588E+000	4.850E-001
		404.80	4.10	2.301E+000		-9.886E-001	1.061E+000
		426.90	1.90	4.631E+000		-1.018E+000	2.121E+000
		831.80	3.30	2.164E+000		6.431E-001	9.651E-001
	PB-211	404.80	3.00	3.145E+000	2.55E+000	-1.351E+000	1.449E+000
		427.10	1.40	6.357E+000		-1.623E+000	2.914E+000
		831.80	2.80	2.551E+000		7.580E-001	1.137E+000
	BI-212	39.86	1.10	2.554E+001	7.38E-001	-4.182E+000	1.212E+001
		727.17	11.80	7.377E-001		2.111E-001	3.363E-001
		785.42	2.00	4.136E+000		2.458E+000	1.875E+000
		1620.56	2.75	2.153E+000		7.904E-001	9.268E-001
+	PB-212	74.81*	9.60	4.291E+000	3.85E-001	1.293E+001	2.090E+000
		77.11*	17.50	2.123E+000		1.553E+000	1.032E+000
		87.20*	6.30	4.611E+000		3.565E+000	2.235E+000
		89.80	1.75	1.528E+001		-3.249E+000	7.392E+000
		115.19	0.60	3.321E+001		-4.237E+000	1.597E+001
		238.63*	44.60	3.850E-001		6.388E-001	1.846E-001
		300.09	3.41	2.944E+000		1.102E+000	1.367E+000
+	BI-214	609.31*	46.30	3.060E-001	3.06E-001	1.067E+000	1.448E-001
		768.36	5.04	1.936E+000		1.248E+000	8.915E-001
		806.17	1.23	6.730E+000		2.804E+000	3.051E+000
		934.06	3.21	2.744E+000		1.280E+000	1.251E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	4.681E-001	3.06E-001	1.516E+000	2.080E-001
		1155.19	1.69	4.316E+000		1.313E-001	1.925E+000
		1238.11	5.94	1.390E+000		6.399E-001	6.284E-001
		1280.96	1.47	4.484E+000		-6.521E-001	1.972E+000
		1377.67	4.11	1.655E+000		6.990E-001	7.300E-001
		1385.31	0.78	6.885E+000		1.984E+000	2.929E+000
		1401.50	1.39	4.548E+000		1.774E+000	1.985E+000
		1407.98	2.48	2.331E+000		6.742E-001	1.004E+000
		1509.19	2.19	2.057E+000		4.452E-001	8.432E-001
		1661.28	1.15	2.857E+000		7.962E-001	1.069E+000
		1729.60	3.05	1.828E+000		8.246E-002	7.776E-001
		1764.49*	15.80	3.631E-001		1.010E+000	1.551E-001
		1847.44	2.12	1.759E+000		-3.203E-001	6.813E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.508E+000	3.38E-001	1.960E+001	3.170E+000
		77.11*	10.70	3.472E+000		2.541E+000	1.688E+000
		87.20*	3.70	7.851E+000		6.071E+000	3.806E+000
		89.80	1.03	2.596E+001		-5.519E+000	1.256E+001
		241.98	7.49	1.828E+000		1.334E+000	8.668E-001
		295.21*	19.20	8.211E-001		1.040E+000	3.919E-001
		351.92*	37.20	3.377E-001		1.177E+000	1.591E-001
		785.91	1.10	8.033E+000		5.860E+000	3.666E+000
	RA-226	186.21	3.28	5.269E+000	5.27E+000	4.878E+000	2.529E+000
+	AC-228	89.95	2.10	1.266E+001	3.19E-001	-1.075E-001	6.124E+000
		93.35	3.50	7.732E+000		4.081E+000	3.745E+000
		129.08	2.80	6.902E+000		5.094E-001	3.320E+000
		209.28	4.40	3.310E+000		2.129E+000	1.576E+000
		270.23	3.60	3.456E+000		-2.079E-001	1.629E+000
		327.64	3.20	3.725E+000		6.765E-001	1.750E+000
		338.32	11.40	1.113E+000		4.132E-001	5.249E-001
		409.51	2.13	4.645E+000		8.543E-001	2.149E+000
		463.00	4.40	2.211E+000		0.000E+000	1.020E+000
		794.70	4.60	1.580E+000		-1.762E-001	7.063E-001
		911.60*	27.70	3.190E-001		7.347E-001	1.455E-001
		964.60	5.20	1.491E+000		5.442E-002	6.703E-001
		969.11	16.60	6.300E-001		5.009E-001	2.915E-001
		1587.90	3.71	1.691E+000		9.180E-001	7.352E-001
	PA-234M	766.36	0.29	2.851E+001	8.97E+000	-1.231E+001	1.294E+001
		1001.03	0.84	8.972E+000		5.344E+000	4.018E+000
	TH-234	92.38	2.81	9.897E+000	9.90E+000	8.487E+000	4.796E+000
		92.80	2.77	9.916E+000		7.196E+000	4.804E+000
		112.81	0.28	7.623E+001		1.599E+001	3.672E+001
	U-235	89.96	1.50	1.772E+001	3.17E-001	-1.504E-001	8.573E+000
		93.35	2.50	1.082E+001		5.713E+000	5.242E+000
		105.00	1.00	2.302E+001		-6.559E-001	1.111E+001
		109.14	1.50	1.520E+001		9.748E+000	7.336E+000
		143.76	10.50	1.651E+000		5.893E-001	7.913E-001
		163.35	4.70	3.193E+000		1.137E+000	1.522E+000
		185.71	54.00	3.168E-001		3.179E-001	1.520E-001
		202.12	1.00	1.400E+001		3.147E+000	6.654E+000
		205.31	4.70	2.994E+000		9.400E-001	1.423E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.034E+000	1.03E+000	-2.062E-001	4.973E-001

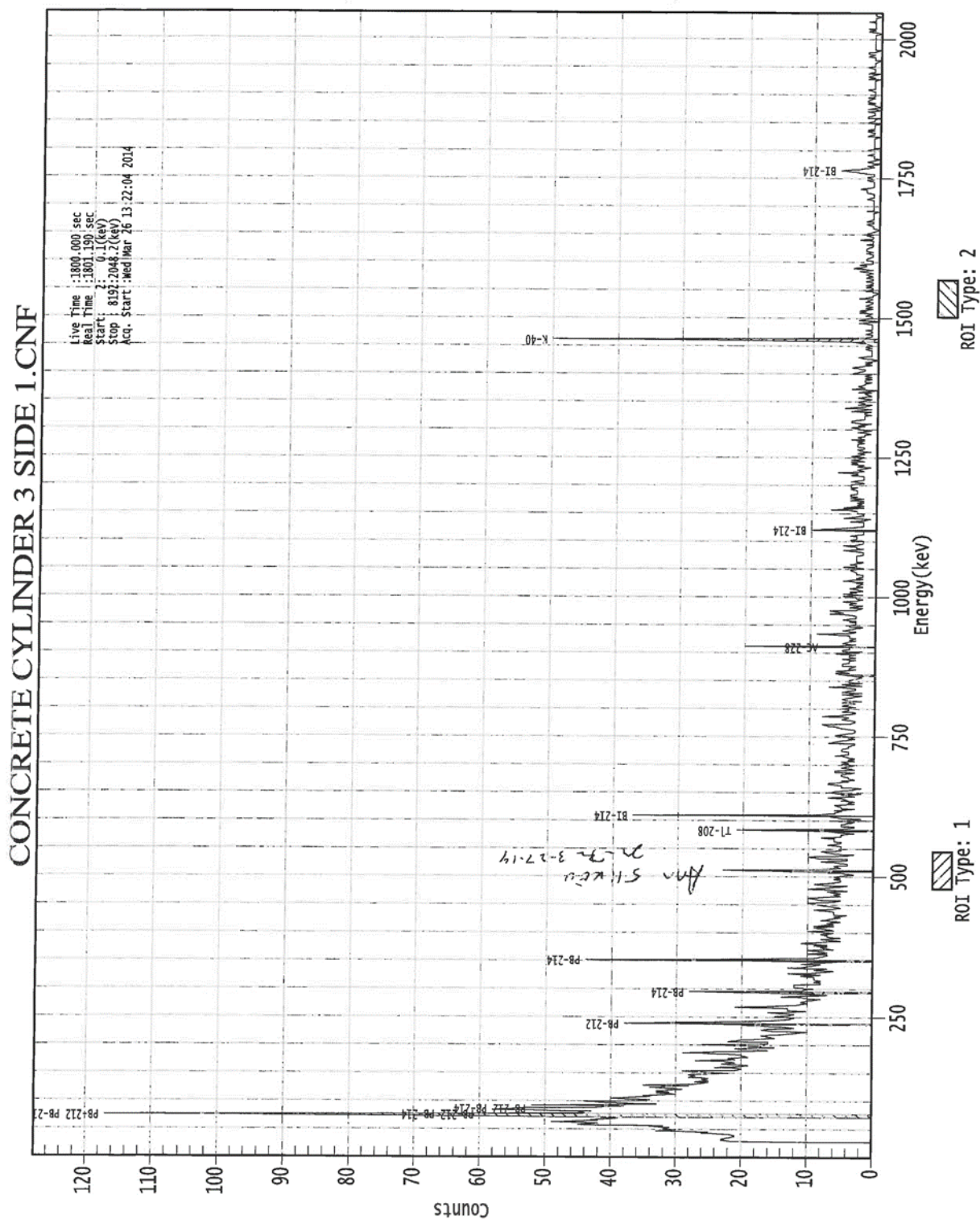
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
 the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 2:27:49 PM

Sample Title : Concrete Cylinder 3 side 2

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 50 - 8192

Peak Area Range (in channels) : 50 - 8192

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.689826 grams)

Sample Taken On :

Acquisition Started : 3/26/2014 1:57:47 PM

Live Time : 1800.0 seconds

Real Time : 1801.1 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014

Efficiency Calibration Used Done On : 3/24/2014

Efficiency ID : Concrete_Cylindr

* Report states 1 grams because weight is calculated with the efficiency. JB 3-27-14

JB 3/27/14

JB 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/26/2014 2:27:49 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452

Sample Title: Concrete Cylinder 3 side 2

Peak Analysis Performed on: 3/26/2014 2:27:48 PM

Peak Analysis From Channel: 50

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	286-	307	292.56	72.88	0.86	1.59E+002	41.93	4.50E+002
2	286-	307	300.71	74.92	0.86	3.12E+002	52.96	4.81E+002
3	333-	345	340.01	84.76	0.82	1.07E+002	78.56	5.45E+002
4	950-	962	955.35	238.81	1.20	1.26E+002	44.43	1.39E+002
5	1172-	1187	1181.20	295.34	0.45	6.41E+001	42.33	1.28E+002
6	1401-	1415	1408.40	352.21	1.11	1.55E+002	40.64	8.95E+001
7	2030-	2054	2042.92	511.01	1.10	1.35E+002	45.15	9.07E+001
8	2326-	2340	2332.71	583.52	1.20	4.66E+001	26.42	4.44E+001
9	2428-	2447	2436.90	609.59	1.21	1.73E+002	33.53	3.13E+001
10	4474-	4488	4480.54	1120.75	0.34	5.37E+001	20.91	1.93E+001
11	5505-	5518	5511.76	1378.55	1.17	1.84E+001	12.96	8.56E+000
12	5830-	5855	5843.62	1461.50	2.17	3.61E+002	44.15	2.95E+001
13	7052-	7069	7060.25	1765.51	0.29	5.94E+001	17.51	5.63E+000

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 2:27:49 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 3 side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.978	1460.81*	10.67	1.00785E+001	1.48888E+000
Tl-208	0.995	583.19*	84.50	1.54972E-001	8.98540E-002
PB-212	0.518	74.81*	9.60	1.27620E+001	3.34545E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	7.35061E-001	2.84421E-001
		300.09	3.41		
BI-214	0.989	609.31*	46.30	1.05144E+000	2.40041E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.03408E+000	4.11489E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67*	4.11	1.32723E+000	9.39093E-001
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.15928E+000	3.54184E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.596	74.81* @	6.33	1.93547E+001	5.07367E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	8.83895E-001	6.00941E-001
		351.92*	37.20	1.12495E+000	3.44754E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 2:27:49 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.978	1.007853E+001	1.488880E+000
	Tl-208	0.995	1.549720E-001	8.985396E-002
X	BI-211	0.313		
	PB-212	0.518	8.160473E-001	2.834024E-001
	BI-214	0.989	1.084496E+000	1.757731E-001
	PB-214 @	0.596	1.124289E+000	2.985244E-001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/26/2014 2:27:48 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

	Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M	1	72.88	8.8458E-002	26.33	Tol.	BI-211
	3	84.76	5.9194E-002	73.73	Tol.	TH-227
	7	511.01	7.5186E-002	33.36		TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

3/26/2014

2:27:49 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cyllind
Sample Title: Concrete Cylinder 3 side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.111E+000	1.11E+000	1.008E+001	5.179E-001
	MN-54	834.83	99.97	7.145E-002	7.14E-002	2.142E-003	3.186E-002
	CO-60	1173.22	100.00	5.493E-002	5.49E-002	-2.942E-002	2.352E-002
		1332.49	100.00	5.738E-002		9.742E-003	2.470E-002
	NB-94	702.63	100.00	7.505E-002	5.92E-002	1.447E-002	3.369E-002
		871.10	100.00	5.925E-002		-8.338E-003	2.576E-002
	SN-113	255.12	1.93	6.212E+000	1.57E-001	7.755E-001	2.923E+000
		391.69	64.90	1.572E-001		-5.236E-004	7.293E-002
	CS-134	475.35	1.46	6.012E+000	8.26E-002	8.263E-001	2.750E+000
		563.23	8.38	9.709E-001		-1.440E-001	4.402E-001
		569.32	15.43	5.843E-001		-1.534E-001	2.675E-001
		604.70	97.60	8.261E-002		5.402E-003	3.740E-002
		795.84	85.40	9.122E-002		-1.764E-002	4.109E-002
		801.93	8.73	8.012E-001		-7.063E-001	3.564E-001
		1038.57	1.00	5.829E+000		3.726E-001	2.522E+000
		1167.94	1.80	2.571E+000		-1.018E+000	1.066E+000
		1365.15	3.04	1.763E+000		8.174E-002	7.500E-001
	CS-137	661.65	85.12	8.648E-002	8.65E-002	2.960E-002	3.873E-002
	Tl-208	583.19*	84.50	1.328E-001	1.33E-001	1.550E-001	6.191E-002
	BI-211	72.87*	1.20	3.425E+001	1.22E+000	5.376E+001	1.667E+001
+		351.10*	12.20	1.224E+000		3.430E+000	5.823E-001
		404.80	4.10	2.536E+000		2.709E-001	1.178E+000
		426.90	1.90	4.788E+000		-1.420E+000	2.199E+000
		831.80	3.30	1.988E+000		-4.963E-001	8.772E-001
	PB-211	404.80	3.00	3.466E+000	2.34E+000	3.702E-001	1.610E+000
		427.10	1.40	6.567E+000		-9.025E-001	3.019E+000
		831.80	2.80	2.344E+000		-5.849E-001	1.034E+000
	BI-212	39.86	1.10	2.491E+001	7.19E-001	-1.277E+000	1.180E+001
		727.17	11.80	7.188E-001		1.513E-001	3.268E-001
		785.42	2.00	4.733E+000		1.023E+000	2.173E+000
		1620.56	2.75	1.925E+000		2.652E-001	8.128E-001
	PB-212	74.81*	9.60	4.278E+000	3.83E-001	1.276E+001	2.084E+000
		77.11	17.50	1.812E+000		5.326E-001	8.766E-001
		87.20	6.30	4.883E+000		1.826E+000	2.371E+000
		89.80	1.75	1.530E+001		-1.699E+000	7.404E+000
+		115.19	0.60	3.576E+001		6.551E+000	1.724E+001
		238.63*	44.60	3.833E-001		7.351E-001	1.838E-001
		300.09	3.41	3.038E+000		9.598E-001	1.414E+000
	BI-214	609.31*	46.30	2.251E-001	2.25E-001	1.051E+000	1.043E-001
		768.36	5.04	1.640E+000		-6.533E-002	7.435E-001
		806.17	1.23	6.128E+000		-2.332E+000	2.750E+000
		934.06	3.21	2.709E+000		2.113E+000	1.233E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	5.254E-001	2.25E-001	1.034E+000	2.366E-001
		1155.19	1.69	4.316E+000		9.057E-001	1.925E+000
		1238.11	5.94	1.851E+000		1.665E+000	8.586E-001
		1280.96	1.47	4.373E+000		1.660E+000	1.916E+000
		1377.67*	4.11	1.344E+000		1.327E+000	5.748E-001
		1385.31	0.78	8.310E+000		-6.643E-001	3.641E+000
		1401.50	1.39	4.548E+000		1.013E+000	1.985E+000
		1407.98	2.48	2.551E+000		5.684E-001	1.114E+000
		1509.19	2.19	2.756E+000		6.898E-001	1.192E+000
		1661.28	1.15	3.985E+000		1.488E+000	1.633E+000
		1729.60	3.05	2.148E+000		1.422E+000	9.379E-001
		1764.49*	15.80	3.196E-001		1.159E+000	1.334E-001
		1847.44	2.12	2.551E+000		2.196E-001	1.077E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
>							
+	PB-214	74.81*	6.33	6.487E+000	4.01E-001	1.935E+001	3.160E+000
		77.11	10.70	2.963E+000		8.711E-001	1.434E+000
		87.20	3.70	8.314E+000		3.109E+000	4.037E+000
		89.80	1.03	2.600E+001		-2.886E+000	1.258E+001
		241.98	7.49	1.790E+000		3.609E-001	8.478E-001
		295.21*	19.20	9.268E-001		8.839E-001	4.447E-001
		351.92*	37.20	4.015E-001		1.125E+000	1.910E-001
		785.91	1.10	8.605E+000		5.311E+000	3.952E+000
	RA-226	186.21	3.28	4.892E+000	4.89E+000	1.761E+000	2.341E+000
	AC-228	89.95	2.10	1.312E+001	4.08E-001	3.123E+000	6.356E+000
		93.35	3.50	8.551E+000		8.212E+000	4.154E+000
		129.08	2.80	6.963E+000		-1.355E+000	3.350E+000
		209.28	4.40	3.053E+000		1.549E+000	1.447E+000
		270.23	3.60	3.217E+000		-1.825E-001	1.510E+000
		327.64	3.20	3.456E+000		1.403E+000	1.615E+000
		338.32	11.40	1.142E+000		6.584E-001	5.390E-001
		409.51	2.13	5.226E+000		1.282E+000	2.440E+000
		463.00	4.40	2.168E+000		4.990E-001	9.995E-001
		794.70	4.60	1.693E+000		1.239E-001	7.628E-001
		911.60	27.70	4.078E-001		2.405E-001	1.899E-001
		964.60	5.20	1.332E+000		5.149E-001	5.911E-001
		969.11	16.60	6.129E-001		4.319E-001	2.830E-001
		1587.90	3.71	1.536E+000		2.074E-001	6.576E-001
	PA-234M	766.36	0.29	2.647E+001	8.64E+000	-5.085E+000	1.192E+001
		1001.03	0.84	8.643E+000		2.140E-001	3.854E+000
	TH-234	92.38	2.81	1.053E+001	1.05E+001	6.479E+000	5.114E+000
		92.80	2.77	1.094E+001		1.223E+001	5.317E+000
		112.81	0.28	7.932E+001		5.100E+000	3.826E+001
	U-235	89.96	1.50	1.837E+001	3.00E-001	4.372E+000	8.898E+000
		93.35	2.50	1.197E+001		1.150E+001	5.815E+000
		105.00	1.00	2.315E+001		1.814E+000	1.117E+001
		109.14	1.50	1.531E+001		4.798E+000	7.391E+000
		143.76	10.50	1.705E+000		1.910E-001	8.188E-001
		163.35	4.70	3.319E+000		7.870E-001	1.585E+000
		185.71	54.00	3.005E-001		1.224E-001	1.438E-001
		202.12	1.00	1.282E+001		-1.109E+000	6.065E+000
		205.31	4.70	3.073E+000		1.594E+000	1.462E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.034E+000	1.03E+000	-1.519E-001	4.973E-001

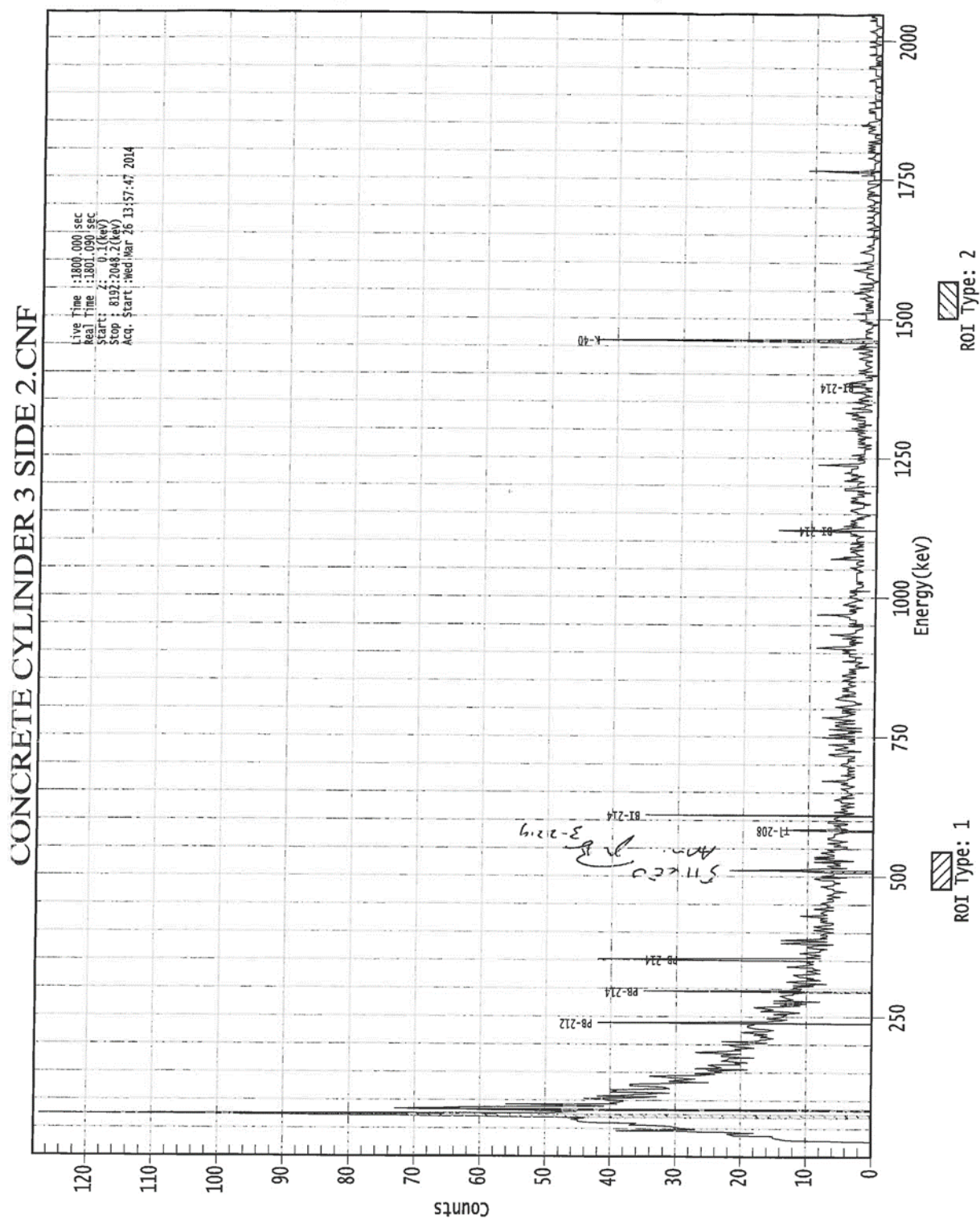
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 1 of 6

G A M M A S P E C T R U M A N A L Y S I S



Filename: C:\GENIE2K\CAMFILES\lid 1 concrete 30min.CNF

Report Generated On : 4/21/2014 5:53:37 AM
Sample Title : Concrete cylinder lids #1 4ft 30 min
Spectrum Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels): 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/9/2014 10:31:37 AM
Live Time : 1800.0 seconds
Real Time : 1801.0 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 12/9/2013
Efficiency Calibration Used Done On : 4/8/2014
Efficiency ID : 48

M. Owen 4/21/14
M-B
4-21-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 2 of 6

Report Date : 4/21/2014 5:53:37 AM
Sample Title: Concrete cylinder lids #1 4ft 30 min
Peak Analysis Performed on: 4/21/2014 5:53:36 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

PEAK ANALYSIS REPORT

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Continuum Counts
1	80	88	82.99	20.55	0.76	6.771E+001
2	2035	2050	2045.29	511.45	0.39	8.704E+001
3	2328	2339	2334.09	583.67	0.94	4.500E+001
4	2429	2447	2436.90	609.38	2.64	4.517E+001
5	5835	5859	5847.45	1461.64	2.01	2.178E+001
6	7056	7071	7063.60	1765.30	1.79	1.183E+001

Dark Orange = First peak in a multiplet region

Green = Fitted singlet

Errors quoted at 2.000 sigma

NUCLIDE IDENTIFICATION REPORT

Sample Title: Concrete cylinder lids #1 4ft 30 min
Nuclide Library Used: C:\GEM2K\ICAMFILES\Zion Lib-BNL.NLB
Report Generated: 4/21/2014 5:53:36 AM

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
		1460.82*	10.66	5.534E+000	7.16419E+001
		595.19*	45.70	2.828E+002	1.42166E+002
		609.38*	45.49	5.364E+001	1.8553E+001
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.43*	15.50	8.77E+001	2.74E+001
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found on the spectrum

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 3 of 6

! = Nuclide was corrected for parent/daughter
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.958	5.094863E+000	7.164162E-001
Tl-208	0.985	4.628878E-002	3.621878E-002
Bi-214	0.781	4.456982E-001	9.395279E-002

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

UNIDENTIFIED PEAKS

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
1	20.55	3.5718E-002	48.75
2	511.45	5.2753E-002	39.75

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

NUCLIDE MDA REPORT

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 4 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+ K-40	1460.82*	10.66	4.309E-001	4.31E-001	5.095E+000	1.982E-001
Cr-51	320.08	9.91	4.527E-001	4.53E-001	7.141E-002	2.105E-001
Mn-54	834.85	99.98	3.265E-002	3.26E-002	8.552E-003	1.456E-002
Co-58	810.76	99.45	3.009E-002	3.01E-002	3.273E-003	1.327E-002
Co-60	1173.23	99.85	3.337E-002	2.62E-002	2.653E-003	1.488E-002
	1332.49	99.98	2.618E-002		1.083E-002	1.127E-002
Nb-94	702.65	99.81	3.586E-002	3.08E-002	2.450E-004	1.618E-002
	871.09	99.89	3.080E-002		3.962E-003	1.363E-002
Sn-113	255.13	2.11	2.401E+000	5.59E-002	3.376E-002	1.129E+000
	391.70	64.97	5.585E-002		8.234E-003	2.543E-002
Cs-134	475.36	1.48	2.089E+000	3.07E-002	4.375E-001	9.316E-001
	563.25	8.34	3.862E-001		7.384E-002	1.726E-001
	569.33	15.37	2.175E-001		1.424E-001	9.760E-002
	604.72	97.62	3.067E-002		1.807E-002	1.357E-002
	795.86	85.46	4.416E-002		1.086E-002	2.002E-002
	801.95	8.69	3.673E-001		1.077E-001	1.634E-001
	1038.61	0.99	2.232E+000		3.981E-001	9.349E-001
	1167.97	1.79	1.628E+000		1.225E-001	7.136E-001
	1365.19	3.02	6.704E-001		3.954E-001	2.748E-001
Cs-137	661.66	85.10	3.303E-002	3.30E-002	1.817E-002	1.447E-002
Eu-152	121.78	28.67	2.227E-001	1.40E-001	5.013E-002	1.062E-001
	244.70	7.61	6.385E-001		2.892E-001	2.996E-001
	295.94	0.45	1.312E+001		7.834E+000	6.217E+000
	344.28	26.60	1.761E-001		3.882E-002	8.209E-002
	367.79	0.86	4.858E+000		2.123E+000	2.243E+000
	411.12	2.24	1.716E+000		2.099E-001	7.848E-001
	443.96	2.83	1.418E+000		1.799E-002	6.508E-001
	488.68	0.42	8.795E+000		1.838E+000	3.999E+000
	563.99	0.49	6.560E+000		1.624E+000	2.932E+000
	586.26	0.46	8.345E+000		1.708E+000	3.799E+000
	678.62	0.47	6.264E+000		3.980E-001	2.763E+000
	688.67	0.86	3.195E+000		1.349E+000	1.395E+000
	719.35	0.28	1.088E+001		2.777E+000	4.815E+000
	778.90	12.96	2.303E-001		8.304E-003	1.016E-001
	810.45	0.32	9.536E+000		1.409E+000	4.219E+000
	867.37	4.26	6.176E-001		2.127E-001	2.672E-001
	919.33	0.43	7.544E+000		5.431E+000	3.356E+000
	964.08	14.65	2.503E-001		6.708E-002	1.130E-001
	1085.87	10.24	2.058E-001		3.243E-002	8.535E-002
	1089.74	1.73	1.845E+000		8.547E-001	8.186E-001
	1112.07	13.69	2.333E-001		1.555E-001	1.035E-001
	1212.95	1.43	1.883E+000		1.538E-001	8.148E-001
Eu-152	1249.94	0.19	1.424E+001	1.40E-001	3.387E+000	6.160E+000
	1299.14	1.63	1.309E+000		3.920E-001	5.430E-001
	1408.01	21.07	1.404E-001		5.877E-002	6.152E-002
	1457.64	0.50	5.077E+000		6.742E-001	2.173E+000
	1528.10	0.28	5.823E+000		1.091E+000	2.255E+000
Eu-154	123.07	40.40	1.484E-001	5.43E-002	1.139E-002	7.056E-002
	247.93	6.89	6.544E-001		1.764E-001	3.055E-001
	591.76	4.95	6.902E-001		9.627E-002	3.103E-001
	692.42	1.78	1.778E+000		2.026E-001	7.909E-001
	723.30	20.06	1.335E-001		6.794E-002	5.802E-002
	756.80	4.52	7.032E-001		5.343E-002	3.128E-001
	873.18	12.08	2.039E-001		6.680E-002	8.729E-002

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 5 of 8

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	996.29	10.48	2.541E-001		-8.730E-002	1.100E-001
	1004.76	18.01	1.104E-001		-7.906E-002	4.527E-002
	1274.43	34.80	5.428E-002		-4.298E-002	2.193E-002
	1596.48	1.80	1.335E+000		6.053E-001	5.637E-001
Eu-155	45.30	1.31	7.625E+000	3.13E-001	-6.458E-001	3.603E+000
	60.01	1.22	1.040E+001		1.097E+000	4.976E+000
	86.55	30.70	3.131E-001		-1.486E-001	1.509E-001
	105.31	21.10	3.726E-001		1.194E-001	1.788E-001
	183.19	13.00	2.617E-002	5.62E-002	4.629E-002	2.607E-002
Bi-211	351.07	13.02	4.815E-001	4.82E-001	1.417E-001	2.285E-001
Pb-211	404.85	3.78	9.644E-001	7.90E-001	-1.208E-001	4.391E-001
	427.09	1.76	2.004E+000		2.136E-001	9.084E-001
	832.01	3.52	7.898E-001		2.895E-003	3.448E-001
Bi-212	39.86	1.06	8.433E+000	5.70E-001	-2.021E+000	3.958E+000
	727.33	6.67	5.703E-001		4.756E-002	2.589E-001
	785.37	1.10	2.832E+000		-1.264E+000	1.257E+000
	1620.50	1.47	1.011E+000		-1.252E-001	3.783E-001
Pb-212	115.18	0.60	1.162E+001	1.76E-001	3.416E+000	5.556E+000
	238.63	43.60	1.758E-001		2.008E-001	8.447E-002
	300.09	3.30	1.555E+000		4.916E-001	7.305E-001
Pb212-XR	74.82	10.28	1.488E+000	6.61E-001	1.512E+000	7.239E-001
	77.11	17.10	6.613E-001		-2.502E-001	3.190E-001
	87.35	3.97	2.406E+000		2.109E-001	1.160E+000
	89.78	1.46	6.086E+000		2.364E-001	2.927E+000
	609.32	43.49	1.214E-001	1.81E-001	4.185E-001	3.693E-001
	768.36	4.89	6.759E-001		-5.328E-002	3.021E-001
	806.18	1.26	2.421E+000		-2.059E-001	1.071E+000
	934.06	3.11	9.521E-001		2.121E-002	4.186E-001
	1120.29	14.92	3.426E-001		2.549E-001	1.593E-001
	1155.21	1.63	2.039E+000		7.735E-001	9.094E-001
	1238.12	5.83	7.362E-001		6.868E-001	3.371E-001
	1280.98	1.43	1.759E+000		-6.365E-001	7.530E-001
	1377.67	3.99	7.772E-001		7.029E-002	3.428E-001
	1385.31	0.79	2.699E+000		2.552E-001	1.119E+000
	1401.52	1.33	2.280E+000		1.033E+000	1.002E+000
	1407.99	2.39	1.236E+000		5.172E-001	5.415E-001
	1509.21	2.13	9.617E-001		3.202E-002	3.942E-001
	1661.27	1.05	1.590E+000		-2.482E-001	6.159E-001
	1729.59	2.88	7.691E-001		1.469E-001	3.190E-001
	1847.43	2.03	1.261E+000		2.432E-001	5.362E-001
Pb-214	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	7.983E-001	2.02E-001	-2.166E-001	3.786E-001
	295.22	18.42	3.078E-001		4.659E-002	1.455E-001
	351.93	35.60	2.019E-001		2.575E-001	9.645E-002
	785.96	1.06	3.183E+000		3.983E-001	1.426E+000
Pb214-XR	74.82	5.80	2.637E+000	1.17E+000	2.680E+000	1.283E+000
	77.11	9.70	1.166E+000		-4.411E-001	5.624E-001
	87.35	2.24	4.264E+000		3.737E-001	2.055E+000
	89.78	0.82	1.084E+001		4.208E-001	5.211E+000
Ra-226	186.21	3.64	1.704E+000	1.70E+000	9.097E-001	8.129E-001
Ac-228	129.07	2.42	2.727E+000	1.91E-001	6.035E-001	1.303E+000
	209.25	3.89	1.539E+000		8.741E-001	7.321E-001
	270.24	3.46	1.512E+000		4.786E-001	7.122E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 6 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	328.00	2.95	1.551E+000		3.268E-001	7.221E-001
	338.32	11.27	4.462E-001		5.950E-002	2.091E-001
	409.46	1.92	2.240E+000		7.505E-001	1.035E+000
	463.00	4.40	1.021E+000		9.023E-001	4.730E-001
	794.95	4.25	8.493E-001		1.701E-001	3.832E-001
	911.20	25.80	1.913E-001		1.157E-001	8.876E-002
	964.77	4.99	7.898E-001		3.504E-001	3.591E-001
	968.97	15.80	2.807E-001		1.528E-001	1.291E-001
	1588.20	3.22	9.590E-001		3.151E-001	4.217E-001
Pa-231	27.36	10.30	8.575E-001	8.57E-001	1.991E-001	4.021E-001
	283.69	1.70	2.918E+000		1.280E+000	1.369E+000
	300.07	2.47	2.077E+000		6.568E-001	9.760E-001
	302.65	2.20	1.987E+000		8.569E-001	9.230E-001
	330.06	1.40	3.369E+000		1.077E-001	1.572E+000
Th-234	92.38	2.13	4.156E+000	4.16E+000	6.035E-001	1.999E+000
	92.80	2.10	4.325E+000		2.540E+000	2.083E+000
	112.81	0.21	3.426E+001		4.215E+000	1.640E+001
U-235	143.76	10.96	5.232E-001	1.10E-001	2.251E-001	2.485E-001
	163.33	5.08	1.033E+000		3.445E-001	4.886E-001
	185.71	57.20	1.105E-001		6.102E-002	5.276E-002
	202.11	1.08	4.678E+000		2.189E-001	2.205E+000
	205.31	5.01	9.412E-001		9.693E-002	4.417E-001
Am-241	59.54	35.90	3.454E-001	3.45E-001	6.377E-003	1.651E-001

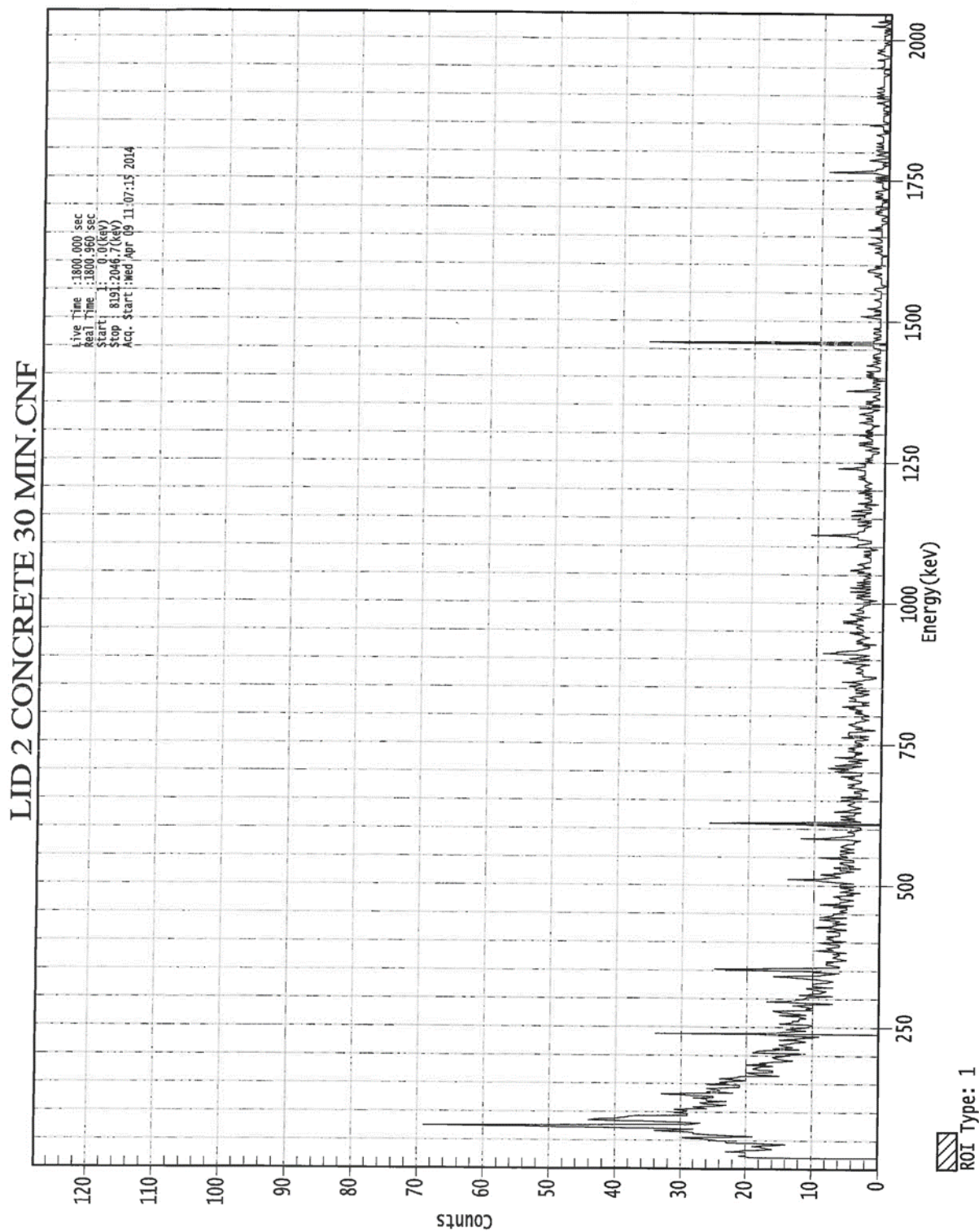
+ = Nuclide identified during the nuclide identification

* = Energy Line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 1 of 6

G A M M A S P E C T R U M A N A L Y S I S



Filename: C:\GENIE2K\CAMFILES\lid 2 concrete 30 min.CNF

Report Generated On : 4/21/2014 5:54:42 AM

Sample Title : Concrete cylinder lids #2 4ft 30 min
Spectrum Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/9/2014 11:07:15 AM

Live Time : 1800.0 seconds
Real Time : 1801.0 seconds
Dead Time : 0.05 %

Energy Calibration Used Done On : 12/9/2013
Efficiency Calibration Used Done On : 4/8/2014
Efficiency ID : 48

Handwritten signatures and dates:
4/21/14
4-21-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 2 of 6

Report Date : 4/21/2014 5:54:43 AM
Sample Title: Concrete cylinder lids #2 4ft 30 min
Peak Analysis Performed on: 4/21/2014 5:54:42 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

PEAK ANALYSIS REPORT

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Continuum Counts
1	947	962	954.03	238.50	0.60	1.571E+002
2	2428	2446	2439.44	610.02	1.40	3.822E+001
3	5833	5860	5847.02	1461.54	2.58	1.049E+001

Dark Orange = First peak in a multiplet region

Light Orange = Other peak in a multiplet region

Green = Fitted singlet

Errors quoted at 2.000 sigma

NUCLIDE IDENTIFICATION REPORT

Sample Title: Concrete cylinder lids #2 4ft 30 min
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB
Report Generated: 4/21/2014 5:54:43 AM

..... IDENTIFIED NUCLIDES					
Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.968	1460.82*	10.66	4.75476E+000	6.65845E-001
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	3.04411E-001	1.32112E-001
		300.09	3.30		
Bi-214	0.561	609.32*	45.49	4.64421E-001	1.11338E-001
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 3 of 6

Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.968	4.754758E+000	6.658452E-001
Pb-212	0.999	3.044106E-001	1.321115E-001
Bi-214	0.561	4.644211E-001	1.113385E-001

? = 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 2.000 sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on: 4/21/2014 5:54:42 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
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All peaks were identified.

NUCLIDE MDA REPORT

Detector Name: 5456
Sample Geometry:
Sample Title: Concrete cylinder lids #2 4ft 30 min
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB
Report Generated on: 4/21/2014 5:54:43 AM

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+ K-40	1460.82*	10.66	3.230E-001	3.23E-001	4.755E+000	1.443E-001
Cr-51	320.08	9.91	4.348E-001	4.35E-001	1.822E-001	2.016E-001
Mn-54	834.85	99.98	3.327E-002	3.33E-002	3.167E-003	1.487E-002
Co-58	810.76	99.45	2.713E-002	2.71E-002	-9.600E-004	1.179E-002
Co-60	1173.23	99.85	2.994E-002	2.02E-002	1.100E-002	1.317E-002
	1332.49	99.98	2.018E-002		-8.062E-003	8.270E-003
Nb-94	702.65	99.81	3.232E-002	2.79E-002	3.341E-003	1.441E-002
	871.09	99.89	2.792E-002		1.015E-002	1.219E-002

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 4 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Sn-113	255.13	2.11	2.361E+000	5.36E-002	1.094E+000	1.109E+000
	391.70	64.97	5.362E-002		-1.504E-002	2.431E-002
Cs-134	475.36	1.48	2.168E+000	3.42E-002	-7.932E-002	9.713E-001
	563.25	8.34	3.934E-001		5.832E-002	1.762E-001
	569.33	15.37	2.422E-001		2.119E-002	1.100E-001
	604.72	97.62	3.564E-002		1.274E-002	1.606E-002
	795.86	85.46	3.415E-002		1.297E-002	1.502E-002
	801.95	8.69	3.278E-001		-3.942E-002	1.436E-001
	1038.61	0.99	2.776E+000		5.358E-001	1.207E+000
	1167.97	1.79	1.542E+000		8.741E-001	6.703E-001
	1365.19	3.02	5.853E-001		-6.697E-002	2.322E-001
	661.66	85.10	3.303E-002	3.30E-002	-7.544E-003	1.447E-002
Cs-137	121.78	28.67	2.089E-001		-8.842E-002	9.929E-002
Eu-152	244.70	7.61	6.231E-001	1.16E-001	-2.900E-001	2.919E-001
	295.94	0.45	1.260E+001		8.397E+000	5.957E+000
	344.28	26.60	1.465E-001		-8.821E-003	6.729E-002
	367.79	0.86	4.374E+000		3.019E-001	2.001E+000
	411.12	2.24	1.696E+000		7.748E-002	7.747E-001
	443.96	2.83	1.217E+000		1.597E-001	5.500E-001
	488.68	0.42	7.655E+000		-1.562E+000	3.429E+000
	563.99	0.49	6.681E+000		1.585E+000	2.992E+000
	586.26	0.46	8.870E+000		-5.320E+000	4.061E+000
	678.62	0.47	7.077E+000		3.439E+000	3.170E+000
	688.67	0.86	3.822E+000		-4.559E-001	1.708E+000
	719.35	0.28	9.866E+000		-6.111E+000	4.307E+000
	778.90	12.96	2.249E-001		5.816E-002	9.888E-002
	810.45	0.32	8.878E+000		2.433E+000	3.890E+000
	867.37	4.26	4.871E-001		-7.867E-002	2.020E-001
	919.33	0.43	5.358E+000		-9.227E-002	2.263E+000
	964.08	14.65	2.256E-001		2.744E-003	1.006E-001
	1085.87	10.24	2.259E-001		-5.059E-002	9.542E-002
	1089.74	1.73	1.083E+000		-2.655E-001	4.376E-001
	1112.07	13.69	1.828E-001		-1.457E-002	7.825E-002
	1212.95	1.43	1.698E+000		-1.872E-001	7.223E-001
	1249.94	0.19	1.332E+001	1.16E-001	3.981E-001	5.703E+000
	1299.14	1.63	1.852E+000		9.376E-001	8.146E-001
	1408.01	21.07	1.163E-001		2.172E-002	4.949E-002
	1457.64	0.50	4.494E+000		-8.934E-001	1.882E+000
	1528.10	0.28	6.355E+000		1.697E-001	2.522E+000
Eu-154	123.07	40.40	1.539E-001	6.98E-002	2.237E-002	7.330E-002
	247.93	6.89	6.589E-001		-1.834E-001	3.078E-001
	591.76	4.95	6.423E-001		2.567E-002	2.864E-001
	692.42	1.78	1.848E+000		-4.477E-001	8.260E-001
	723.30	20.06	1.445E-001		-3.381E-002	6.356E-002
	756.80	4.52	6.888E-001		9.522E-002	3.056E-001
	873.18	12.08	2.039E-001		-6.025E-002	8.729E-002
	996.29	10.48	2.201E-001		-1.023E-001	9.294E-002
	1004.76	18.01	9.642E-002		-4.266E-002	3.826E-002
	1274.43	34.80	6.981E-002		1.749E-004	2.970E-002
	1596.48	1.80	1.151E+000		3.858E-001	4.716E-001
	45.30	1.31	7.589E+000	3.00E-001	-1.813E+000	3.585E+000
Eu-155	60.01	1.22	9.539E+000		2.203E+000	4.548E+000
	86.55	30.70	2.996E-001		-2.091E-002	1.441E-001
	105.31	21.10	3.466E-001		1.630E-001	1.658E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 5 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Tl-208	583.19	85.00	6.771E-002	6.77E-002	5.169E-002	3.183E-002
Bi-211	351.07	13.02	4.698E-001	4.70E-001	1.784E-001	2.226E-001
Pb-211	404.85	3.78	1.013E+000	8.52E-001	2.554E-001	4.635E-001
	427.09	1.76	2.243E+000		2.694E-002	1.028E+000
	832.01	3.52	8.517E-001		-1.107E-001	3.757E-001
Bi-212	39.86	1.06	9.556E+000	5.29E-001	7.601E+000	4.519E+000
	727.33	6.67	5.294E-001		1.905E-001	2.385E-001
	785.37	1.10	3.169E+000		1.870E+000	1.425E+000
	1620.50	1.47	1.011E+000		-3.286E-001	3.783E-001
+ Pb-212	115.18	0.60	1.131E+001	1.87E-001	3.585E-001	5.399E+000
	238.63*	43.60	1.868E-001		3.044E-001	8.998E-002
	300.09	3.30	1.246E+000		-1.125E-001	5.761E-001
Pb212-XR	74.82	10.28	1.476E+000	6.32E-001	1.871E+000	7.181E-001
	77.11	17.10	6.319E-001		-2.878E-001	3.043E-001
	87.35	3.97	2.298E+000		4.452E-001	1.105E+000
	89.78	1.46	5.453E+000		-1.582E+000	2.610E+000
+ Bi-214	609.32*	45.49	1.126E-001	1.13E-001	4.644E-001	5.251E-002
	768.36	4.89	6.883E-001		1.148E-001	3.083E-001
	806.18	1.26	2.576E+000		5.640E-001	1.149E+000
	934.06	3.11	9.042E-001		-1.379E-001	3.947E-001
	1120.29	14.92	3.114E-001		1.852E-001	1.436E-001
	1155.21	1.63	2.154E+000		1.176E+000	9.669E-001
	1238.12	5.83	7.192E-001		3.826E-001	3.286E-001
	1280.98	1.43	2.148E+000		5.717E-001	9.475E-001
	1377.67	3.99	9.089E-001		6.915E-001	4.087E-001
	1385.31	0.79	2.963E+000		8.889E-001	1.252E+000
	1401.52	1.33	2.105E+000		1.034E+000	9.151E-001
	1407.99	2.39	1.024E+000		1.912E-001	4.356E-001
	1509.21	2.13	1.288E+000		3.854E-001	5.575E-001
	1661.27	1.05	1.867E+000		5.516E-002	7.543E-001
	1729.59	2.88	9.444E-001		3.552E-001	4.066E-001
+ Bi-214	1764.49	15.30	3.103E-001	1.13E-001	2.211E-001	1.428E-001
	1847.43	2.03	1.211E+000		3.145E-001	5.113E-001
>	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	7.147E-001	1.98E-001	-1.409E-001	3.368E-001
	295.22	18.42	3.272E-001		3.420E-001	1.552E-001
	351.93	35.60	1.981E-001		2.906E-001	9.459E-002
	785.96	1.06	3.183E+000		6.447E-001	1.426E+000
Pb214-XR	74.82	5.80	2.617E+000	1.11E+000	3.315E+000	1.273E+000
	77.11	9.70	1.114E+000		-5.073E-001	5.365E-001
	87.35	2.24	4.072E+000		7.891E-001	1.959E+000
	89.78	0.82	9.709E+000		-2.817E+000	4.648E+000
Ra-226	186.21	3.64	1.502E+000	1.50E+000	4.260E-001	7.120E-001
Ac-228	129.07	2.42	2.529E+000	2.02E-001	-8.625E-001	1.204E+000
	209.25	3.89	1.339E+000		3.220E-001	6.324E-001
	270.24	3.46	1.488E+000		7.637E-001	7.001E-001
	328.00	2.95	1.563E+000		2.957E-001	7.279E-001
	338.32	11.27	4.233E-001		6.381E-002	1.976E-001
	409.46	1.92	1.998E+000		1.186E-001	9.139E-001
	463.00	4.40	7.753E-001		1.627E-001	3.499E-001
	794.95	4.25	6.696E-001		1.957E-001	2.934E-001
	911.20	25.80	2.021E-001		1.648E-001	9.415E-002
	964.77	4.99	8.208E-001		7.611E-001	3.746E-001
	968.97	15.80	2.561E-001		1.471E-001	1.167E-001

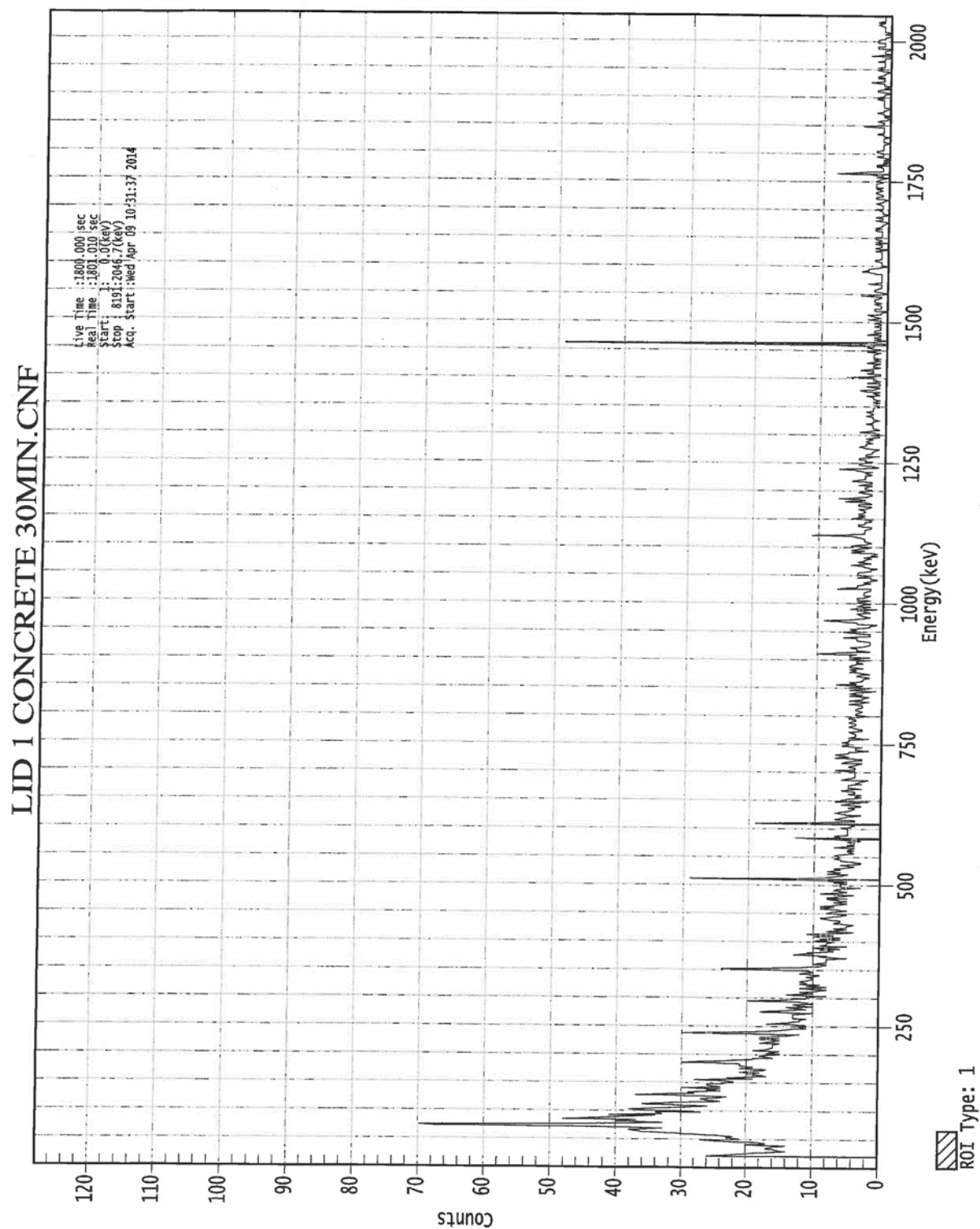
Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 6 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
	1588.20	3.22	6.415E-001		-1.526E-002	2.630E-001
Pa-231	27.36	10.30	8.832E-001	8.83E-001	-9.488E-002	4.149E-001
	283.69	1.70	2.756E+000		1.343E+000	1.288E+000
	300.07	2.47	1.665E+000		-1.503E-001	7.697E-001
	302.65	2.20	2.095E+000		4.051E-001	9.771E-001
	330.06	1.40	3.015E+000		4.478E-001	1.395E+000
Th-234	92.38	2.13	4.147E+000	4.04E+000	2.888E+000	1.995E+000
	92.80	2.10	4.037E+000		1.277E+000	1.939E+000
	112.81	0.21	2.905E+001		-7.842E+000	1.380E+001
U-235	143.76	10.96	5.510E-001	9.47E-002	2.030E-001	2.624E-001
	163.33	5.08	1.084E+000		5.103E-001	5.141E-001
	185.71	57.20	9.474E-002		7.061E-003	4.488E-002
	202.11	1.08	4.276E+000		9.570E-001	2.004E+000
	205.31	5.01	9.011E-001		-1.442E-001	4.217E-001
Am-241	59.54	35.90	3.227E-001	3.23E-001	4.692E-002	1.537E-001

+ = 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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 1 of 6

G A M M A S P E C T R U M A N A L Y S I S



Filename: C:\GENIE2K\CAMFILES\lid 3 concrete 30 min.CNF

Report Generated On : 4/21/2014 5:55:29 AM

Sample Title : Concrete cylinder lids #3 4ft 30 min
Spectrum Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/9/2014 11:46:04 AM
Live Time : 1800.0 seconds
Real Time : 1801.0 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 12/9/2013
Efficiency Calibration Used Done On : 4/8/2014
Efficiency ID : 48

[Handwritten signature] 4/21/14
[Handwritten signature] 4-21-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 2 of 6

Report Date : 4/21/2014 5:55:29 AM
Sample Title: Concrete cylinder lids #3 4ft 30 min
Peak Analysis Performed on: 4/21/2014 5:55:28 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

P E A K A N A L Y S I S R E P O R T

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Continuum Counts
1	1348	1359	1351.74	337.99	0.94	6.550E+001
2	2035	2053	2043.64	511.04	1.48	7.316E+001
3	2326	2340	2333.71	583.58	0.52	5.479E+001
4	2429	2446	2436.14	609.19	0.86	6.021E+001
5	3638	3651	3644.54	911.28	0.99	2.288E+001
6	5832	5858	5844.90	1461.01	2.55	1.000E+001

Dark Orange = First peak in a multiplet region
Light Orange = Other peak in a multiplet region
Green = Fitted singlet
Errors quoted at 2.000 sigma

NUCLIDE IDENTIFICATION REPORT

Sample Title: Concrete cylinder lids #3 4ft 30 min
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB
Report Generated: 4/21/2014 5:55:29 AM

..... IDENTIFIED NUCLIDES					
Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.998	1460.82*	10.66	4.59518E+000	6.49107E-001
Tl-208	0.990	583.19*	85.00	8.54270E-002	4.51408E-002
Bi-214	0.573	609.32*	45.49	5.06396E-001	1.24571E-001
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Ac-228	0.707	129.07	2.42		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 3 of 6

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
		270.24	3.46		
		328.00	2.95		
		338.32*	11.27	3.68304E-00	3.02224E-00
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20*	25.80	2.45368E-00	1.09854E-00
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

! = Nuclide was corrected for parent/daughter

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.998	4.595177E+000	6.491071E-001
Tl-208	0.990	8.542699E-002	4.514085E-002
Bi-214	0.573	5.063960E-001	1.245708E-001
Ac-228	0.707	2.597149E-001	1.032448E-001

? = 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 2.000 sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on: 4/21/2014 5:55:28 AM

Peak Locate From Channel: 50

Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
2	511.04	7.0469E-002	30.48

Am.

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 4 of 5

Errors quoted at 2.000 sigma

NUCLIDE MDA REPORT

Detector Name: 5456
Sample Geometry: Concrete cylinder lids #3 4ft 30 min
Sample Title: Concrete cylinder lids #3 4ft 30 min
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB
Report Generated on: 4/21/2014 5:55:29 AM

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
K-40	1460.82	10.66	3.104E-001	3.10E-001	4.595E+000	1.380E-001
Cr-51	320.08	9.91	4.348E-001	4.35E-001	-6.771E-002	2.016E-001
Mn-54	834.85	99.98	2.999E-002	3.00E-002	-3.829E-003	1.323E-002
Co-58	810.76	99.45	2.866E-002	2.87E-002	-1.059E-003	1.256E-002
Co-60	1173.23	99.85	2.765E-002	2.34E-002	7.558E-004	1.202E-002
	1332.49	99.98	2.341E-002		-1.344E-003	9.885E-003
Nb-94	702.65	99.81	3.294E-002	2.87E-002	6.108E-003	1.472E-002
	871.09	99.89	2.867E-002		-2.196E-003	1.256E-002
Sn-113	255.13	2.11	2.334E+000	5.59E-002	1.097E+000	1.096E+000
	391.70	64.97	5.585E-002		-2.356E-002	2.543E-002
Cs-134	475.36	1.48	2.744E+000	3.62E-002	1.528E+000	1.259E+000
	563.25	8.34	4.003E-001		1.253E-002	1.797E-001
	569.33	15.37	2.613E-001		1.450E-002	1.195E-001
	604.72	97.62	3.621E-002		-1.573E-002	1.634E-002
	795.86	85.46	4.416E-002		1.179E-002	2.002E-002
	801.95	8.69	3.012E-001		-4.706E-002	1.303E-001
	1038.61	0.99	2.430E+000		-1.948E-001	1.034E+000
	1167.97	1.79	1.496E+000		3.162E-001	6.476E-001
	1365.19	3.02	5.363E-001		1.284E-001	2.077E-001
Cs-137	661.66	85.10	4.317E-002	4.32E-002	5.281E-003	1.954E-002
Eu-152	121.78	28.67	2.121E-001	1.25E-001	-8.589E-003	1.009E-001
	244.70	7.61	6.788E-001		1.627E-001	3.198E-001
	295.94	0.45	1.254E+001		4.061E+000	5.927E+000
	344.28	26.60	1.541E-001		1.753E-002	7.109E-002
	367.79	0.86	4.765E+000		4.212E-001	2.196E+000
	411.12	2.24	1.696E+000		-1.322E-001	7.747E-001
	443.96	2.83	1.101E+000		-6.560E-001	4.919E-001
	488.68	0.42	8.310E+000		6.043E-001	3.756E+000
	563.99	0.49	7.030E+000		2.573E-001	3.167E+000
	586.26	0.46	8.236E+000		-2.231E+000	3.744E+000
	678.62	0.47	6.547E+000		1.849E-001	2.905E+000
	688.67	0.86	4.412E+000		2.693E+000	2.003E+000
	719.35	0.28	1.158E+001		-4.125E+000	5.164E+000
	778.90	12.96	2.303E-001		-5.457E-002	1.016E-001
	810.45	0.32	9.323E+000		1.014E+000	4.113E+000
	867.37	4.26	6.891E-001		-1.228E-001	3.030E-001
	919.33	0.43	6.556E+000		-2.682E+000	2.862E+000
	964.08	14.65	2.464E-001		5.949E-002	1.110E-001
	1085.87	10.24	2.442E-001		2.432E-002	1.045E-001
	1089.74	1.73	1.591E+000		2.304E-001	6.918E-001
	1112.07	13.69	2.283E-001		-6.069E-002	1.010E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 5 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
Eu-152	1212.95	1.43	1.824E+000		2.142E-001	7.852E-001
	1249.94	0.19	1.379E+001	1.25E-001	4.083E-002	5.936E+000
	1299.14	1.63	1.239E+000		-9.049E-001	5.080E-001
	1408.01	21.07	1.250E-001		4.256E-002	5.380E-002
	1457.64	0.50	6.054E+000		-1.281E+000	2.662E+000
Eu-154	1528.10	0.28	6.355E+000		3.878E-001	2.522E+000
	123.07	40.40	1.561E-001	6.41E-002	5.470E-002	7.437E-002
	247.93	6.89	7.193E-001		4.182E-001	3.380E-001
	591.76	4.95	7.557E-001		7.060E-002	3.431E-001
	692.42	1.78	1.916E+000		6.621E-001	8.598E-001
	723.30	20.06	1.611E-001		-3.024E-002	7.185E-002
	756.80	4.52	6.888E-001		6.484E-003	3.056E-001
	873.18	12.08	1.965E-001		-9.478E-002	8.358E-002
	996.29	10.48	2.291E-001		-7.609E-002	9.747E-002
	1004.76	18.01	1.226E-001		-2.615E-002	5.133E-002
	1274.43	34.80	6.414E-002		2.031E-003	2.686E-002
	1596.48	1.80	1.004E+000		2.950E-001	3.986E-001
	45.30	1.31	8.113E+000	3.03E-001	-8.864E-002	3.847E+000
	60.01	1.22	9.792E+000		2.748E+000	4.674E+000
	86.55	30.70	3.029E-001		1.059E-002	1.458E-001
+ Tl-208	105.31	21.10	3.516E-001		1.810E-001	1.683E-001
	583.19*	85.00	6.607E-002	6.61E-002	8.543E-002	3.102E-002
	351.07	13.02	5.133E-001	5.13E-001	3.177E-001	2.444E-001
Bi-211	404.85	3.78	1.048E+000	8.71E-001	-8.735E-002	4.810E-001
	427.09	1.76	2.087E+000		-1.031E-001	9.501E-001
	832.01	3.52	8.712E-001		1.176E-001	3.855E-001
Bi-212	39.86	1.06	8.230E+000	5.62E-001	-4.251E+000	3.856E+000
	727.33	6.67	5.624E-001		3.360E-001	2.550E-001
	785.37	1.10	3.061E+000		6.778E-001	1.371E+000
	1620.50	1.47	1.565E+000		-9.911E-002	6.553E-001
Pb-212	115.18	0.60	1.068E+001	1.71E-001	2.189E-001	5.088E+000
	238.63	43.60	1.708E-001		1.895E-001	8.200E-002
	300.09	3.30	1.364E+000		2.149E-001	6.352E-001
Pb212-XR	74.82	10.28	1.334E+000	6.12E-001	7.436E-001	6.471E-001
	77.11	17.10	6.119E-001		-2.866E-001	2.943E-001
	87.35	3.97	2.257E+000		9.552E-001	1.085E+000
	89.78	1.46	5.603E+000		1.988E-001	2.686E+000
+ Bi-214	609.32*	45.49	1.365E-001	1.36E-001	5.064E-001	6.444E-002
	768.36	4.89	7.583E-001		2.112E-001	3.433E-001
	806.18	1.26	2.768E+000		1.907E-001	1.245E+000
	934.06	3.11	1.196E+000		4.736E-001	5.405E-001
	1120.29	14.92	3.808E-001		3.276E-001	1.784E-001
	1155.21	1.63	1.874E+000		2.124E-001	8.266E-001
	1238.12	5.83	6.556E-001		1.521E-001	2.968E-001
	1280.98	1.43	2.383E+000		9.694E-001	1.065E+000
	1377.67	3.99	7.207E-001		3.893E-001	3.146E-001
	1385.31	0.79	2.963E+000		5.954E-001	1.252E+000
	1401.52	1.33	2.105E+000		8.599E-001	9.151E-001
	1407.99	2.39	1.100E+000		3.745E-001	4.735E-001
	1509.21	2.13	1.248E+000		4.163E-001	5.372E-001
	1661.27	1.05	1.988E+000		0.000E+000	8.148E-001
	1729.59	2.88	9.125E-001		4.343E-001	3.907E-001
	1764.49	15.30	3.197E-001	1.36E-001	2.865E-001	1.475E-001
	1847.43	2.03	7.481E-001		-8.340E-001	2.800E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 6 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
>	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	7.950E-001	2.08E-001	2.901E-001	3.770E-001
	295.22	18.42	3.163E-001		1.070E-001	1.498E-001
	351.93	35.60	2.085E-001		2.791E-001	9.977E-002
	785.96	1.06	3.066E+000		3.943E-001	1.367E+000
Pb214-XR	74.82	5.80	2.365E+000	1.08E+000	1.318E+000	1.147E+000
	77.11	9.70	1.079E+000		-5.052E-001	5.188E-001
	87.35	2.24	4.000E+000		1.693E+000	1.923E+000
	89.78	0.82	9.977E+000		3.539E-001	4.782E+000
Ra-226	186.21	3.64	1.515E+000	1.51E+000	6.565E-001	7.183E-001
+ Ac-228	129.07	2.42	2.465E+000	1.48E-001	-3.405E-001	1.172E+000
	209.25	3.89	1.384E+000		1.619E-001	6.548E-001
	270.24	3.46	1.447E+000		6.517E-001	6.794E-001
	328.00	2.95	1.551E+000		3.252E-001	7.221E-001
	338.32*	11.27	4.708E-001		3.683E-001	2.214E-001
	409.46	1.92	2.021E+000		-6.059E-001	9.255E-001
	463.00	4.40	9.276E-001		2.239E-001	4.260E-001
	794.95	4.25	8.753E-001		6.143E-002	3.962E-001
	911.20*	25.80	1.476E-001		2.454E-001	6.690E-002
	964.77	4.99	6.875E-001		7.359E-002	3.079E-001
	968.97	15.80	2.593E-001		1.536E-001	1.183E-001
	1588.20	3.22	8.323E-001		1.027E-001	3.584E-001
Pa-231	27.36	10.30	9.698E-001	9.70E-001	-8.342E-002	4.582E-001
	283.69	1.70	2.479E+000		5.518E-001	1.150E+000
	300.07	2.47	1.823E+000		2.871E-001	8.487E-001
	302.65	2.20	1.971E+000		-4.318E-001	9.150E-001
	330.06	1.40	3.068E+000		4.204E-001	1.422E+000
Th-234	92.38	2.13	4.147E+000	4.15E+000	1.979E+000	1.995E+000
	92.80	2.10	4.198E+000		2.137E+000	2.019E+000
	112.81	0.21	3.061E+001		3.055E+000	1.457E+001
U-235	143.76	10.96	5.253E-001	9.60E-002	1.411E-002	2.495E-001
	163.33	5.08	1.014E+000		-6.956E-002	4.790E-001
	185.71	57.20	9.596E-002		4.765E-002	4.549E-002
	202.11	1.08	4.276E+000		3.654E-001	2.004E+000
	205.31	5.01	8.591E-001		-1.976E-001	4.006E-001
Am-241	59.54	35.90	3.423E-001	3.42E-001	1.319E-001	1.635E-001

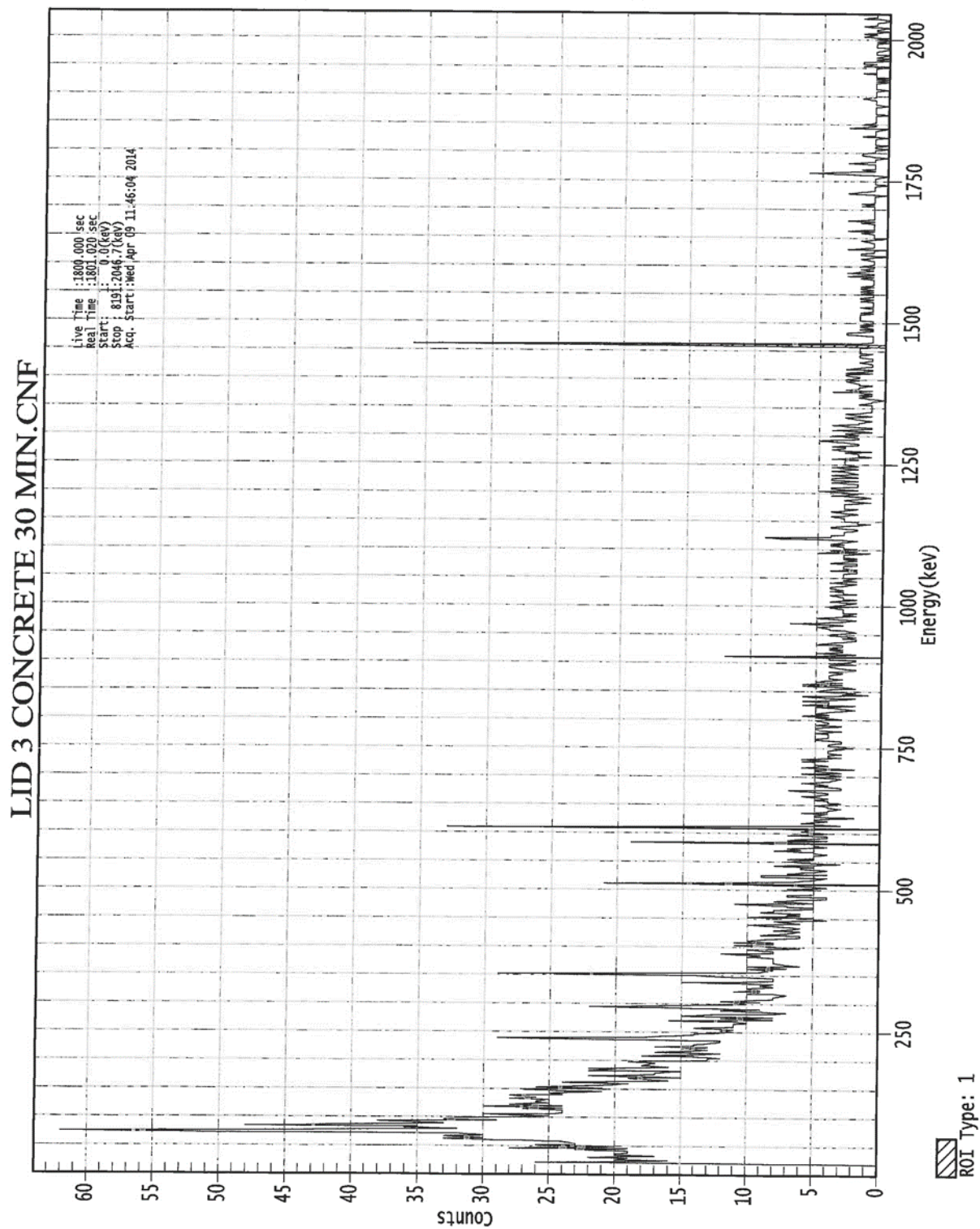
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

GAMMA SPECTRUM ANALYSIS

Page 1 of 6



The accuracy of this count CAN NOT be
ensured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.

Analyst JD
Date 5-6-14

Filename: C:\Canberra\Roof Samples\20140506105757.cnf

Report Generated On : 5/6/2014 10:02:37 AM

Sample Title : FTB Lower Roof #59
Spectrum Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 2048
Peak Area Range (in channels) : 50 - 2048
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 Grams

Sample Taken On : 5/6/2014 10:42:24 AM
Acquisition Started : 5/6/2014 10:42:24 AM

Live Time : 898.0 seconds
Real Time : 900.0 seconds
Dead Time : 0.22 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 4/29/2014
Efficiency ID : Well 7 Inch Drai

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Page 2 of 6

Report Date: 5/6/2014 10:02:37 AM
Sample Title: FTB Lower Roof #59
Peak Analysis Performed on: 5/6/2014 10:02:36 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 2048

PEAK ANALYSIS REPORT

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Continuum Counts
1	47	64	53.37	38.90	1.77	1.253E+003
2	1913	1999	1951.76	1456.80	9.84	1.100E+003

Dark Orange = First peak in a multiplet region
Light Orange = Other peak in a multiplet region
Green = Fitted singlet
Errors quoted at 2.000 sigma

NUCLIDE IDENTIFICATION REPORT

Sample Title: FTB Lower Roof #59
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N
Report Generated: 5/6/2014 10:02:37 AM

..... IDENTIFIED NUCLIDES					
Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi / Gram)	Activity Uncertainty
LaBr3	0.532	34.70*	66.40	2.62949E+001	5.47703E+000
		788.70	33.60		
		1436.80*	66.40	7.56040E+000	1.45175E+000

* = Energy line found in the spectrum
@ = Energy line not used for Weighted Mean Activity
! = Nuclide was corrected for parent/daughter
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	W mean Activity (pCi / Gram)	W mean Activity Uncertainty
LaBr3	0.532	8.790235E+000	1.403289E+000
X K-40	0.996		

? = nuclide is part of an undetermined solution
X = nuclide rejected by the interference analysis

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 3 of 6

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

Errors quoted at 2.000 sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on: 5/6/2014 10:02:36 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
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All peaks were identified.

NUCLIDE MDA REPORT

Detector Name: Sgc_LaBr_1R5x1R5
Sample Geometry:
Sample Title: FTB Lower Roof #59
Nuclide Library Used: C:\GENI E2K\CAMFILES\Zion Lib-BNL_LaBr3.N
Report Generated on: 5/6/2014 10:02:38 AM

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi / Gram)	Nuclide MDA (pCi / Gram)	Activity (pCi / Gram)	Dec. Level (pCi / Gram)
+ LaBr3	34.70*	66.40	1.990E+000	9.47E-001	2.629E+001	9.833E-001
	788.70	33.60	9.471E-001		1.350E-001	4.645E-001
	1436.80*	66.40	2.079E+000		7.560E+000	1.032E+000
K-40	1460.82*	10.66	1.295E+001	1.29E+001	4.709E+001	6.427E+000
Cr-51	320.08	9.91	1.681E+000	1.68E+000	6.599E-001	8.261E-001
Mn-54	834.85	99.98	3.724E-001	3.72E-001	4.108E-001	1.830E-001
Co-58	810.76	99.45	3.755E-001	3.75E-001	9.166E-002	1.846E-001
Co-60	1173.23	99.85	3.468E-001	1.92E-001	2.737E-001	1.692E-001
	1332.49	99.98	1.917E-001		2.388E-001	9.121E-002
Nb-94	702.65	99.81	2.332E-001	2.33E-001	1.870E-001	1.139E-001
	871.09	99.89	3.825E-001		2.964E-001	1.879E-001
Sn-113	255.13	2.11	7.987E+000	2.56E-001	4.043E+000	3.933E+000
	391.70	64.97	2.563E-001		2.962E-002	1.256E-001
Cs-134	475.36	1.48	1.298E+001	2.50E-001	2.798E+000	6.360E+000
	563.25	8.34	2.617E+000		7.045E-002	1.282E+000
	569.33	15.37	1.433E+000		2.321E-001	7.015E-001
	604.72	97.62	2.504E-001		1.290E-001	1.228E-001
	795.86	85.46	4.013E-001		2.355E-001	1.971E-001
	801.95	8.69	4.161E+000		6.381E+000	2.045E+000
	1038.61	0.99	3.174E+001		4.820E+000	1.549E+001
	1167.97	1.79	1.950E+001		4.796E+000	9.514E+000
	1365.19	3.02	5.149E+000		6.686E+000	2.417E+000
Cs-137	661.66	85.10	2.758E-001	2.76E-001	2.624E-001	1.348E-001
Eu-152	121.78	28.67	1.095E+000	6.60E-001	6.664E-001	5.423E-001
	244.70	7.61	2.316E+000		5.892E-001	1.142E+000
	295.94	0.45	3.693E+001		8.465E+000	1.816E+001
	344.28	26.60	6.600E-001		9.622E-001	3.244E-001
	367.79	0.86	1.932E+001		5.620E+000	9.478E+000
	411.12	2.24	7.724E+000		3.039E+000	3.785E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 4 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi / Gram)	Nuclide MDA (pCi / Gram)	Activity (pCi / Gram)	Dec. Level (pCi / Gram)
	443.96	2.83	6.497E+000		7.387E+000	3.183E+000
	488.68	0.42	4.659E+001		2.408E+001	2.282E+001
	563.99	0.49	4.447E+001		1.017E+000	2.178E+001
	586.26	0.46	5.063E+001		1.543E+001	2.481E+001
	678.62	0.47	4.828E+001		1.343E+001	2.358E+001
	688.67	0.86	2.701E+001		4.440E+000	1.319E+001
	719.35	0.28	8.547E+001		6.561E+001	4.173E+001
	778.90	12.96	2.200E+000		1.546E+000	1.077E+000
	810.45	0.32	1.163E+002		2.839E+001	5.718E+001
	867.37	4.26	8.952E+000		5.086E+000	4.399E+000
	919.33	0.43	8.832E+001		4.232E+001	4.335E+001
	964.08	14.65	2.514E+000		9.082E-001	1.233E+000
	1085.87	10.24	3.044E+000		7.441E-001	1.483E+000
Eu-152	1089.74	1.73	1.805E+001	6.60E-001	2.190E+000	8.796E+000
	1112.07	13.69	2.443E+000		5.857E-001	1.192E+000
	1212.95	1.43	2.510E+001		5.943E+000	1.225E+001
	1249.94	0.19	1.594E+002		1.428E+001	7.737E+001
	1299.14	1.63	1.353E+001		9.177E-001	6.486E+000
	1408.01	21.07	2.059E+000		1.055E+000	1.006E+000
	1457.64	0.50	1.659E+002		7.054E+002	8.197E+001
	1528.10	0.28	4.669E+001		3.485E+001	2.150E+001
Eu-154	123.07	40.40	7.650E-001	7.04E-001	2.217E-001	3.788E-001
	247.93	6.89	2.559E+000		1.499E+000	1.261E+000
	591.76	4.95	4.803E+000		3.315E+000	2.354E+000
	692.42	1.78	1.299E+001		9.831E+000	6.344E+000
	723.30	20.06	1.176E+000		1.760E-001	5.738E-001
	756.80	4.52	5.209E+000		1.629E+000	2.540E+000
	873.18	12.08	3.173E+000		3.573E+000	1.559E+000
	996.29	10.48	3.229E+000		1.107E+000	1.580E+000
	1004.76	18.01	1.844E+000		2.818E-001	9.015E-001
	1274.43	34.80	7.038E-001		2.435E-001	3.390E-001
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.151E+002	1.75E+000	1.253E+001	5.697E+001
	60.01	1.22	1.082E+002		8.388E+000	5.346E+001
	86.55	30.70	1.755E+000		1.305E+000	8.684E-001
	105.31	21.10	1.882E+000		3.741E-003	9.220E-001
Tl-208	583.19	85.00	2.701E-001	2.70E-001	2.572E-001	1.323E-001
Bi-211	351.07	13.02	1.325E+000	1.32E+000	2.875E-001	6.506E-001
Pb-211	404.85	3.78	4.534E+000	4.53E+000	4.753E-001	2.222E+000
	427.09	1.76	1.007E+001		2.218E+000	4.933E+000
	832.01	3.52	1.055E+001		8.353E+000	5.188E+000
Bi-212	39.86	1.06	1.621E+002	3.54E+000	1.639E+003	8.034E+001
	727.33	6.67	3.544E+000		3.399E-001	1.730E+000
	785.37	1.10	2.770E+001		4.433E+000	1.358E+001
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	5.588E+001	4.14E-001	1.012E+001	2.766E+001
	238.63	43.60	4.144E-001		2.939E-001	2.044E-001
	300.09	3.30	5.037E+000		2.561E+000	2.476E+000
Pb212-XR	74.82	10.28	7.475E+000	4.15E+000	2.070E+000	3.698E+000
	77.11	17.10	4.145E+000		4.480E-001	2.051E+000
	87.35	3.97	1.326E+001		7.551E+000	6.564E+000
	89.78	1.46	3.425E+001		1.597E+001	1.695E+001
Bi-214	609.32	45.49	5.387E-001	5.39E-001	1.884E-001	2.641E-001
	768.36	4.89	5.145E+000		1.212E+001	2.512E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 5 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Gram)	Nuclide MDA (pCi/Gram)	Activity (pCi/Gram)	Dec. Level (pCi/Gram)
	806.18	1.26	2.911E+001		3.679E+001	1.431E+001
	934.06	3.11	1.219E+001		2.722E+000	5.982E+000
	1120.29	14.92	2.229E+000		6.207E-001	1.087E+000
	1155.21	1.63	2.111E+001		4.528E-001	1.030E+001
	1238.12	5.83	5.647E+000		8.997E+000	2.748E+000
	1280.98	1.43	1.624E+001		1.266E+001	7.808E+000
	1377.67	3.99	4.559E+000		9.570E+000	2.160E+000
	1385.31	0.79	2.744E+001		1.719E+001	1.312E+001
	1401.52	1.33	2.675E+001		3.821E+001	1.301E+001
	1407.99	2.39	1.812E+001		9.284E+000	8.858E+000
Bi-214	1509.21	2.13	1.443E+001	5.39E-001	8.707E+000	6.974E+000
>	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	2.451E+000	4.83E-001	1.663E-001	1.209E+000
	295.22	18.42	8.954E-001		2.093E-001	4.402E-001
	351.93	35.60	4.828E-001		1.325E-002	2.371E-001
	785.96	1.06	2.917E+001		1.170E+001	1.430E+001
Pb214-XR	74.82	5.80	1.325E+001	7.31E+000	3.668E+000	6.554E+000
	77.11	9.70	7.308E+000		7.898E-001	3.616E+000
	87.35	2.24	2.350E+001		1.338E+001	1.163E+001
	89.78	0.82	6.097E+001		2.844E+001	3.018E+001
Ra-226	186.21	3.64	5.617E+000	5.62E+000	1.502E+000	2.777E+000
Ac-228	129.07	2.42	1.195E+001	1.45E+000	1.585E+000	5.918E+000
	209.25	3.89	4.875E+000		2.594E+000	2.407E+000
	270.24	3.46	4.756E+000		7.921E-001	2.340E+000
	328.00	2.95	5.587E+000		5.320E+000	2.744E+000
	338.32	11.27	1.500E+000		5.580E-001	7.368E-001
	409.46	1.92	9.033E+000		1.741E+000	4.427E+000
	463.00	4.40	4.274E+000		1.089E+000	2.093E+000
	794.95	4.25	7.898E+000		7.943E+000	3.877E+000
	911.20	25.80	1.454E+000		2.430E-001	7.140E-001
	964.77	4.99	7.395E+000		6.728E+000	3.626E+000
	968.97	15.80	2.313E+000		1.959E+000	1.134E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	1.512E-001	1.51E-001	0.000E+000	0.000E+000
	283.69	1.70	9.592E+000		5.005E+000	4.717E+000
	300.07	2.47	6.729E+000		3.422E+000	3.308E+000
	302.65	2.20	7.561E+000		1.264E+000	3.717E+000
	330.06	1.40	1.184E+001		3.646E+000	5.817E+000
Th-234	92.38	2.13	2.223E+001	2.22E+001	6.233E+000	1.100E+001
	92.80	2.10	2.238E+001		6.274E+000	1.107E+001
	112.81	0.21	1.657E+002		6.432E+001	8.206E+001
U-235	143.76	10.96	2.261E+000	3.59E-001	9.127E-001	1.119E+000
	163.33	5.08	4.397E+000		1.498E+000	2.175E+000
	185.71	57.20	3.592E-001		1.386E-001	1.776E-001
	202.11	1.08	1.745E+001		5.238E+000	8.615E+000
	205.31	5.01	3.817E+000		3.582E+000	1.885E+000
Am-241	59.54	35.90	3.769E+000	3.77E+000	2.923E-001	1.863E+000

+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum

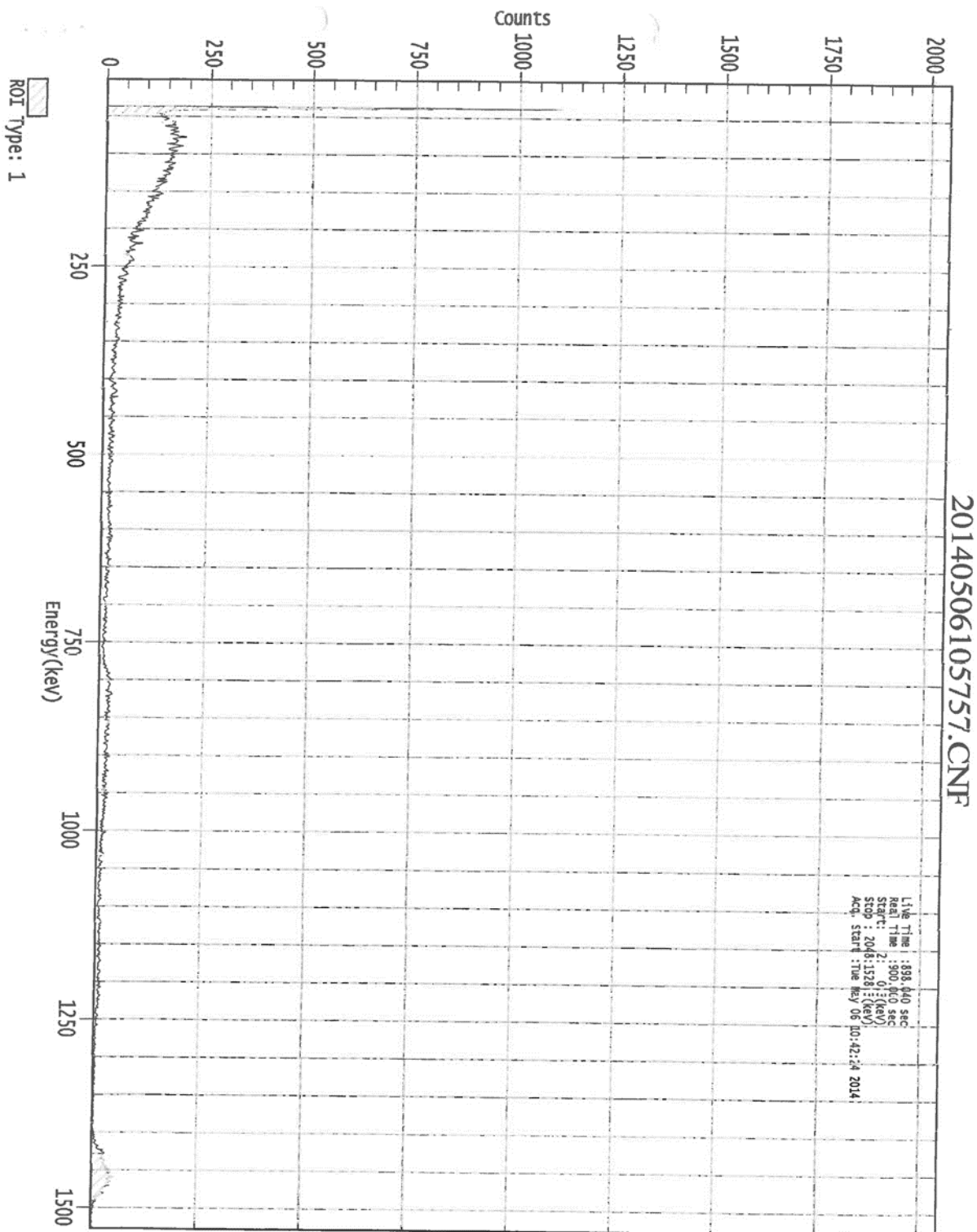
Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report Page 6 of 6

> = MDA value not calculated

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 9:31:48 AM

Sample Title : Concrete Cylinder 1 Side 1
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.689856)
grams

Sample Taken On :
Acquisition Started : 3/26/2014 9:01:45 AM

Live Time : 1800.0 seconds
Real Time : 1801.0 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinder

* Report states 1 grams because weight is calculated with the efficiency. M-B 3-27-14

M-B 3/27/14

M-B 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 9:31:48 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 1 Side 1
Peak Analysis Performed on: 3/26/2014 9:31:47 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	306	291.97	72.73	0.85	1.83E+002	42.61	4.62E+002
2	284-	306	300.82	74.95	0.86	3.24E+002	54.76	5.26E+002
3	949-	961	955.78	238.92	1.16	1.19E+002	42.83	1.29E+002
4	1173-	1188	1181.05	295.31	0.98	7.96E+001	41.78	1.18E+002
5	1397-	1415	1407.85	352.07	1.61	1.47E+002	43.27	9.50E+001
6	2327-	2339	2333.12	583.62	0.57	7.93E+001	27.30	4.07E+001
7	2426-	2446	2437.00	609.62	0.96	2.07E+002	35.94	3.16E+001
8	3639-	3653	3644.90	911.78	1.15	5.74E+001	22.71	2.46E+001
9	3732-	3743	3737.50	934.94	0.25	2.37E+001	15.51	1.43E+001
10	4470-	4488	4480.09	1120.64	0.47	6.32E+001	25.85	3.08E+001
11	4947-	4960	4953.45	1238.99	0.72	2.23E+001	17.82	2.07E+001
12	5830-	5856	5844.03	1461.60	1.87	3.69E+002	43.51	2.37E+001
13	6031-	6044	6037.92	1510.06	0.29	1.52E+001	9.01	1.76E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 1 Side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.971	1460.81*	10.67	1.03243E+001	1.48567E+000
Tl-208	0.991	583.19*	84.50	2.63880E-001	9.62067E-002
PB-212	0.516	74.81*	9.60	1.32336E+001	3.46437E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.91078E-001	2.73030E-001
		300.09	3.41		
BI-214	0.779	609.31*	46.30	1.26268E+000	2.66214E-001
		768.36	5.04		
		806.17	1.23		
		934.06*	3.21	2.12000E+000	1.40015E+000
		1120.29*	15.10	1.21868E+000	5.07675E-001
		1155.19	1.69		
		1238.11*	5.94	1.09768E+000	8.83469E-001
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19*	2.19	2.08728E+000	1.24630E+000
		1661.28	1.15		
		1729.60	3.05		
		1764.49	15.80		
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.597	74.81* @	6.33	2.00699E+001	5.25402E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.09899E+000	6.02667E-001
		351.92*	37.20	1.06350E+000	3.56335E-001
		785.91	1.10		
AC-228	1.000	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	1.000	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	5.95239E-001	2.40196E-001
		964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 9:31:48 AM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.971	1.032429E+001	1.485667E+000
	Tl-208	0.991	2.638799E-001	9.620668E-002
X	BI-211	0.320		
	PB-212	0.516	7.638876E-001	2.721887E-001
	BI-214	0.779	1.291371E+000	2.212656E-001
	PB-214 @	0.597	1.133286E+000	3.062122E-001
	AC-228	1.000	5.952395E-001	2.401961E-001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/26/2014 9:31:47 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.73	1.0151E-001	23.32	Tol.	BI-211

M = First peak in a multiplet region

m = Other peak in a multiplet region

F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

3/26/2014 9:31:48 AM Page 6

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 1 Side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.014E+000	1.01E+000	1.032E+001	4.690E-001
	MN-54	834.83	99.97	7.145E-002	7.14E-002	5.277E-004	3.186E-002
	CO-60	1173.22	100.00	5.493E-002	5.49E-002	3.040E-004	2.352E-002
		1332.49	100.00	6.925E-002		4.241E-002	3.064E-002
	NB-94	702.63	100.00	8.585E-002	6.26E-002	8.823E-003	3.908E-002
		871.10	100.00	6.258E-002		2.691E-003	2.742E-002
	SN-113	255.12	1.93	6.178E+000	1.42E-001	2.676E+000	2.906E+000
		391.69	64.90	1.421E-001		-1.292E-002	6.537E-002
	CS-134	475.35	1.46	5.494E+000	7.63E-002	-1.474E+000	2.491E+000
		563.23	8.38	9.980E-001		-1.500E-001	4.538E-001
		569.32	15.43	5.638E-001		1.474E-002	2.573E-001
		604.70	97.60	7.631E-002		-1.832E-003	3.425E-002
		795.84	85.40	9.825E-002		1.206E-002	4.461E-002
		801.93	8.73	8.482E-001		5.814E-002	3.799E-001
		1038.57	1.00	6.177E+000		-2.223E+000	2.696E+000
		1167.94	1.80	3.976E+000		2.947E-001	1.769E+000
		1365.15	3.04	1.460E+000		4.096E-001	5.983E-001
	CS-137	661.65	85.12	9.801E-002	9.80E-002	-1.060E-003	4.450E-002
+	Tl-208	583.19*	84.50	1.223E-001	1.22E-001	2.639E-001	5.663E-002
	BI-211	72.87*	1.20	3.476E+001	1.36E+000	6.184E+001	1.692E+001
		351.10*	12.20	1.360E+000		3.243E+000	6.503E-001
		404.80	4.10	2.278E+000		-2.313E-001	1.049E+000
		426.90	1.90	4.469E+000		-2.249E+000	2.040E+000
		831.80	3.30	2.364E+000		3.252E-001	1.065E+000
	PB-211	404.80	3.00	3.114E+000	2.79E+000	-3.161E-001	1.434E+000
		427.10	1.40	6.357E+000		-1.961E+000	2.914E+000
		831.80	2.80	2.786E+000		3.832E-001	1.255E+000
	BI-212	39.86	1.10	2.459E+001	8.89E-001	-3.542E+000	1.164E+001
		727.17	11.80	8.889E-001		6.625E-001	4.118E-001
		785.42	2.00	3.633E+000		-4.987E-001	1.624E+000
		1620.56	2.75	1.753E+000		5.524E-001	7.270E-001
+	PB-212	74.81*	9.60	4.467E+000	3.69E-001	1.323E+001	2.179E+000
		77.11	17.50	1.935E+000		1.242E+000	9.381E-001
		87.20	6.30	4.662E+000		2.800E-001	2.261E+000
		89.80	1.75	1.528E+001		-5.970E+000	7.392E+000
		115.19	0.60	3.590E+001		6.485E+000	1.731E+001
		238.63*	44.60	3.694E-001		6.911E-001	1.768E-001
		300.09	3.41	3.107E+000		1.070E-001	1.448E+000
+	BI-214	609.31*	46.30	2.319E-001	2.32E-001	1.263E+000	1.077E-001
		769.36	5.04	2.189E+000		2.199E+000	1.018E+000
		896.17	1.23	5.571E+000		-4.030E-001	2.472E+000
		934.06*	3.21	2.023E+000		2.120E+000	8.903E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	6.983E-001	2.32E-001	1.219E+000	3.231E-001
		1155.19	1.69	4.056E+000		-4.744E-001	1.795E+000
		1238.11*	5.94	1.360E+000		1.098E+000	6.134E-001
		1280.96	1.47	5.459E+000		4.117E+000	2.459E+000
		1377.67	4.11	1.801E+000		1.365E+000	8.032E-001
		1385.31	0.78	7.636E+000		-1.803E+000	3.304E+000
		1401.50	1.39	3.717E+000		-1.910E+000	1.570E+000
		1407.98	2.48	2.994E+000		2.102E+000	1.335E+000
		1509.19*	2.19	1.387E+000		2.087E+000	5.080E-001
		1661.28	1.15	4.813E+000		1.616E+000	2.048E+000
		1729.60	3.05	2.206E+000		1.051E+000	9.667E-001
		1764.49	15.80	6.887E-001		4.895E-001	3.180E-001
		1847.44	2.12	2.323E+000		2.928E-001	9.634E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.775E+000	4.46E-001	2.007E+001	3.304E+000
		77.11	10.70	3.164E+000		2.031E+000	1.534E+000
		87.20	3.70	7.938E+000		4.767E-001	3.850E+000
		89.80	1.03	2.596E+001		-1.014E+001	1.256E+001
		241.98	7.49	1.880E+000		1.340E+000	8.928E-001
		295.21*	19.20	8.947E-001		1.099E+000	4.287E-001
		351.92*	37.20	4.461E-001		1.064E+000	2.133E-001
		785.91	1.10	6.606E+000		-1.322E-001	2.952E+000
	RA-226	186.21	3.28	5.084E+000	5.08E+000	3.286E+000	2.437E+000
+	AC-228	89.95	2.10	1.303E+001	3.17E-001	-7.234E-001	6.306E+000
		93.35	3.50	7.790E+000		3.317E+000	3.774E+000
		129.08	2.80	6.763E+000		-2.083E+000	3.250E+000
		209.28	4.40	3.116E+000		9.074E-001	1.479E+000
		270.23	3.60	3.384E+000		-6.181E-002	1.593E+000
		327.64	3.20	3.385E+000		3.267E-001	1.579E+000
		338.32	11.40	1.061E+000		7.803E-001	4.986E-001
		409.51	2.13	4.301E+000		-9.987E-001	1.977E+000
		463.00	4.40	2.104E+000		4.294E-001	9.670E-001
		794.70	4.60	1.773E+000		5.602E-001	8.027E-001
		911.60*	27.70	3.165E-001		5.952E-001	1.442E-001
		964.60	5.20	1.275E+000		-1.116E+000	5.623E-001
		969.11	16.60	6.411E-001		5.440E-001	2.970E-001
		1587.90	3.71	1.480E+000		-3.357E-001	6.296E-001
	PA-234M	766.36	0.29	2.890E+001	8.47E+000	-1.007E+001	1.314E+001
		1001.03	0.84	8.474E+000		4.813E+000	3.770E+000
	TH-234	92.38	2.81	1.018E+001	1.01E+001	8.134E+000	4.937E+000
		92.80	2.77	1.006E+001		6.153E+000	4.876E+000
		112.81	0.28	7.977E+001		2.098E+001	3.849E+001
	U-235	89.96	1.50	1.823E+001	3.09E-001	-1.013E+000	8.828E+000
		93.35	2.50	1.091E+001		4.643E+000	5.283E+000
		105.00	1.00	2.323E+001		-1.849E+000	1.122E+001
		109.14	1.50	1.419E+001		-2.322E+000	6.832E+000
		143.76	10.50	1.693E+000		3.794E-002	8.126E-001
		163.35	4.70	3.410E+000		1.188E+000	1.631E+000
		185.71	54.00	3.088E-001		1.856E-001	1.480E-001
		202.12	1.00	1.228E+001		-8.606E+000	5.794E+000
		205.31	4.70	2.890E+000		-2.424E-001	1.371E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.018E+000	1.02E+000	-1.029E-001	4.891E-001

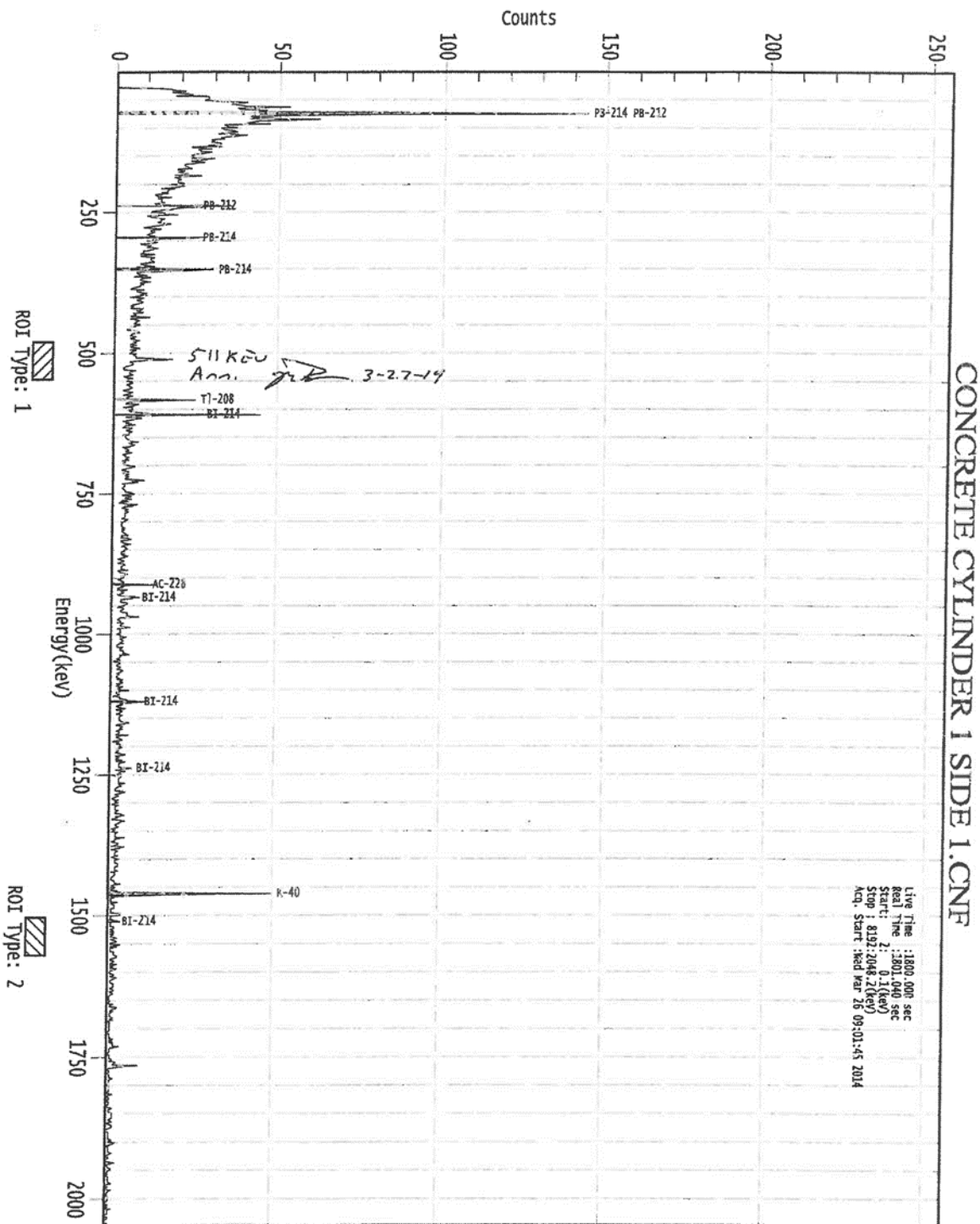
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 10:13:45 AM

Sample Title : Concrete Cylinder 1 Side 2
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylinder

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.6898E6 grams)

Sample Taken On :
Acquisition Started : 3/26/2014 9:43:43 AM

Live Time : 1800.0 seconds
Real Time : 1801.1 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinder

* Report states 1 gram because weight is calculated with
the efficiency. *m-b* 3-27-14

4/27/14
m-b
3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 10:13:45 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 1 Side 2
Peak Analysis Performed on: 3/26/2014 10:13:44 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	305	292.39	72.84	0.88	1.76E+002	42.54	4.34E+002
2	284-	305	300.85	74.96	0.88	3.55E+002	55.55	5.00E+002
3	334-	345	339.95	84.75	1.13	6.56E+001	74.09	5.16E+002
4	947-	975	954.82	238.68	1.10	1.09E+002	30.77	1.71E+002
5	947-	975	968.00	241.98	1.10	6.93E+001	25.55	1.38E+002
6	1173-	1188	1180.64	295.20	0.71	4.89E+001	43.12	1.38E+002
7	1401-	1414	1407.80	352.06	1.13	1.55E+002	37.80	7.35E+001
8	2032-	2055	2043.92	511.26	2.09	1.50E+002	41.35	6.92E+001
9	2324-	2338	2332.08	583.37	1.69	7.49E+001	28.21	4.31E+001
10	2429-	2445	2436.33	609.45	1.46	1.50E+002	35.85	5.38E+001
11	3638-	3650	3644.40	911.65	0.97	3.90E+001	22.66	3.40E+001
12	3870-	3881	3875.61	969.48	0.93	2.49E+001	18.84	2.51E+001
13	5831-	5856	5843.26	1461.41	2.09	3.29E+002	43.08	3.27E+001
14	7049-	7068	7059.02	1765.20	0.45	6.90E+001	18.60	5.00E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 1 Side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NIB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.983	1460.81*	10.67	9.20446E+000	1.42428E+000
Tl-208	0.999	583.19*	84.50	2.49051E-001	9.85100E-002
PB-212	0.518	74.81*	9.60	1.45068E+001	3.68209E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.35754E-001	2.06188E-001
		300.09	3.41		
BI-214	0.785	609.31*	46.30	9.14691E-001	2.44320E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29	15.10		
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.34730E+000	3.78866E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.743	74.81* @	6.33	2.20008E+001	5.58421E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98*	7.49	2.40861E+000	9.67942E-001
		295.21*	19.20	6.74290E-001	6.04607E-001
		351.92*	37.20	1.11776E+000	3.26755E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.999	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	4.04003E-001	2.37092E-001
		964.60	5.20		
		969.11*	16.60	4.31803E-001	3.29143E-001
		1587.90	3.71		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.983	9.204464E+000	1.424281E+000
	Tl-208	0.999	2.490514E-001	9.851004E-002
X	Bi-211	0.321		
	Pb-212	0.518	6.766845E-001	2.058665E-001
	Bi-214	0.785	1.041755E+000	2.053285E-001
	Pb-214 @	0.743	1.178464E+000	2.752313E-001
	Ac-228	0.999	4.135001E-001	1.923783E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 10:13:45 AM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 10:13:44 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS Uncertainty	Peak Type	Tol. Nuclide
M 1	72.84	9.7630E-002	24.21	Tol.	BI-211
3	84.75	3.6469E-002	112.87	Tol.	TH-227
8	511.26	8.3246E-002	27.59		TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/26/2014 10:13:45 AM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 1 Side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.143E+000	1.14E+000	9.204E+000	5.337E-001
	MN-54	834.83	99.97	7.282E-002	7.28E-002	-3.141E-002	3.255E-002
	CO-60	1173.22	100.00	6.221E-002	5.74E-002	6.292E-003	2.715E-002
		1332.49	100.00	5.738E-002		1.031E-002	2.470E-002
	NB-94	702.63	100.00	9.228E-002	7.01E-002	2.649E-002	4.230E-002
		871.10	100.00	7.012E-002		-2.511E-002	3.119E-002
	SN-113	255.12	1.93	6.347E+000	1.58E-001	-9.873E-001	2.990E+000
		391.69	64.90	1.585E-001		-3.046E-002	7.358E-002
	CS-134	475.35	1.46	6.012E+000	8.02E-002	-1.119E+000	2.750E+000
		563.23	8.38	1.037E+000		4.068E-002	4.734E-001
		569.32	15.43	5.352E-001		5.000E-002	2.430E-001
		604.70	97.60	8.016E-002		5.252E-003	3.617E-002
		795.84	85.40	8.823E-002		3.255E-002	3.960E-002
		801.93	8.73	9.345E-001		1.135E-001	4.231E-001
		1038.57	1.00	6.504E+000		1.980E+000	2.860E+000
		1167.94	1.80	2.940E+000		-1.256E+000	1.251E+000
		1365.15	3.04	1.763E+000		-3.734E-001	7.500E-001
	CS-137	661.65	85.12	8.001E-002	8.00E-002	-1.320E-002	3.550E-002
+	Tl-208	583.19*	84.50	1.310E-001	1.31E-001	2.491E-001	6.098E-002
	BI-211	72.87*	1.20	3.367E+001	1.09E+000	5.937E+001	1.638E+001
		351.10*	12.20	1.093E+000		3.408E+000	5.167E-001
		404.80	4.10	2.278E+000		8.059E-002	1.049E+000
		426.90	1.90	4.988E+000		-1.227E+000	2.299E+000
		831.80	3.30	2.034E+000		-3.752E-001	9.000E-001
	PB-211	404.80	3.00	3.114E+000	2.40E+000	1.101E-001	1.434E+000
		427.10	1.40	6.769E+000		-2.234E+000	3.120E+000
		831.80	2.80	2.397E+000		-4.422E-001	1.061E+000
	BI-212	39.86	1.10	2.606E+001	8.17E-001	7.353E-001	1.238E+001
		727.17	11.80	8.171E-001		4.541E-001	3.760E-001
		785.42	2.00	3.955E+000		2.272E-001	1.785E+000
		1620.56	2.75	1.753E+000		2.831E-001	7.270E-001
+	PB-212	74.81*	9.60	4.357E+000	3.70E-001	1.451E+001	2.123E+000
		77.11	17.50	1.932E+000		-8.351E-001	9.368E-001
		87.20	6.30	5.181E+000		5.986E+000	2.520E+000
		89.80	1.75	1.557E+001		-7.016E+000	7.538E+000
		115.19	0.60	3.554E+001		-4.699E+000	1.713E+001
		238.63*	44.60	3.699E-001		6.358E-001	1.770E-001
		300.09	3.41	3.303E+000		5.992E-001	1.546E+000
+	BI-214	609.31*	46.30	2.785E-001	2.78E-001	9.147E-001	1.310E-001
		768.36	5.04	1.730E+000		3.892E-001	7.886E-001
		806.17	1.23	5.204E+000		-4.505E+000	2.288E+000
		934.06	3.21	2.368E+000		-7.625E-001	1.063E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29	15.10	8.078E-001	2.78E-001	8.469E-001	3.778E-001
		1155.19	1.69	3.872E+000		4.816E-001	1.703E+000
		1238.11	5.94	1.723E+000		9.563E-001	7.949E-001
		1280.96	1.47	4.373E+000		-8.256E-001	1.916E+000
		1377.67	4.11	1.999E+000		1.304E+000	9.019E-001
		1385.31	0.78	7.636E+000		1.817E+000	3.304E+000
		1401.50	1.39	4.422E+000		1.600E+000	1.922E+000
		1407.98	2.48	2.480E+000		2.333E-001	1.078E+000
		1509.19	2.19	2.669E+000		5.822E-001	1.149E+000
		1661.28	1.15	4.623E+000		1.659E-001	1.952E+000
		1729.60	3.05	2.148E+000		1.047E+000	9.379E-001
		1764.49*	15.80	3.216E-001		1.347E+000	1.344E-001
		1847.44	2.12	2.853E+000		9.911E-001	1.228E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.607E+000	3.58E-001	2.200E+001	3.220E+000
		77.11	10.70	3.160E+000		-1.366E+000	1.532E+000
		87.20	3.70	8.822E+000		1.019E+001	4.292E+000
		89.80	1.03	2.646E+001		-1.192E+001	1.281E+001
		241.98*	7.49	1.993E+000		2.409E+000	9.497E-001
		295.21*	19.20	9.631E-001		6.743E-001	4.629E-001
		351.92*	37.20	3.585E-001		1.118E+000	1.694E-001
		785.91	1.10	7.412E+000		2.563E+000	3.355E+000
	RA-226	186.21	3.28	5.151E+000	5.15E+000	3.497E+000	2.470E+000
+	AC-228	89.95	2.10	1.328E+001	3.50E-001	4.194E-001	6.435E+000
		93.35	3.50	8.007E+000		3.477E+000	3.882E+000
		129.08	2.80	7.023E+000		2.392E-001	3.380E+000
		209.28	4.40	3.482E+000		2.004E+000	1.662E+000
		270.23	3.60	3.139E+000		-3.465E-001	1.471E+000
		327.64	3.20	3.337E+000		-4.798E-002	1.555E+000
		338.32	11.40	1.153E+000		8.836E-001	5.445E-001
		409.51	2.13	4.645E+000		9.584E-001	2.149E+000
		463.00	4.40	2.231E+000		5.734E-001	1.031E+000
		794.70	4.60	1.609E+000		6.699E-001	7.208E-001
		911.60*	27.70	3.505E-001		4.040E-001	1.612E-001
		964.60	5.20	1.563E+000		3.369E-001	7.065E-001
		969.11*	16.60	5.039E-001		4.318E-001	2.284E-001
		1587.90	3.71	1.590E+000		9.572E-001	6.845E-001
	PA-234M	766.36	0.29	2.647E+001	8.12E+000	-2.184E+001	1.192E+001
		1001.03	0.84	8.123E+000		2.418E+000	3.594E+000
	TH-234	92.38	2.81	1.018E+001	1.02E+001	3.794E+000	4.937E+000
		92.80	2.77	1.036E+001		5.522E+000	5.025E+000
		112.81	0.28	7.701E+001		-2.065E+001	3.711E+001
	U-235	89.96	1.50	1.859E+001	3.14E-001	5.871E-001	9.008E+000
		93.35	2.50	1.121E+001		4.868E+000	5.435E+000
		105.00	1.00	2.378E+001		1.748E+000	1.149E+001
		109.14	1.50	1.528E+001		-2.963E+000	7.377E+000
		143.76	10.50	1.701E+000		1.450E-001	8.167E-001
		163.35	4.70	3.557E+000		8.135E-001	1.704E+000
		185.71	54.00	3.136E-001		2.217E-001	1.504E-001
		202.12	1.00	1.357E+001		-1.107E+000	6.436E+000
		205.31	4.70	3.051E+000		8.009E-001	1.451E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.095E+000	1.09E+000	2.261E-001	5.276E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 11:21:47 AM
Sample Title : Concrete Cylinder 2 Side 1 West
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylinder
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 9192
Peak Area Range (in channels) : 50 - 9192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams (6.6898E6 grams)
Sample Taken On :
Acquisition Started : 3/26/2014 10:51:44 AM
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinder

* Report states 1 gram because weight is calculated with the
efficiency M-B 3-27-14

M-B 3/27/14

M-B 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 11:21:47 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 2 Side 1 West
Peak Analysis Performed on: 3/26/2014 11:21:46 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	113-	120	116.17	28.71	0.43	3.64E+001	24.43	4.26E+001
2	182-	194	186.75	46.39	0.67	4.65E+001	56.70	2.88E+002
3	285-	313	292.53	72.87	1.24	2.44E+002	47.88	4.87E+002
4	285-	313	300.73	74.93	1.25	3.67E+002	56.21	5.71E+002
5	331-	346	339.82	84.71	1.26	1.88E+002	88.10	5.83E+002
6	949-	961	954.94	238.71	1.03	1.14E+002	45.32	1.51E+002
7	1173-	1188	1181.17	295.34	0.32	1.11E+002	40.82	1.02E+002
8	1400-	1415	1407.49	351.99	1.33	1.55E+002	40.02	8.17E+001
9	2033-	2055	2043.85	511.24	1.31	1.31E+002	41.78	7.82E+001
10	2324-	2342	2331.04	583.10	0.60	7.18E+001	30.87	4.92E+001
11	2428-	2447	2436.76	609.56	1.53	1.98E+002	36.11	3.66E+001
12	3096-	3107	3101.45	775.85	0.76	1.17E+001	14.28	1.53E+001
13	3638-	3650	3643.18	911.35	0.45	4.69E+001	20.50	2.21E+001
14	4471-	4489	4478.55	1120.25	1.05	8.18E+001	22.83	1.43E+001
15	5830-	5856	5842.76	1461.28	1.68	3.79E+002	44.49	2.66E+001
16	7051-	7069	7059.33	1765.28	0.46	4.78E+001	19.02	1.22E+001

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 11:21:47 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 2 Side 1 West
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.989	1460.81*	10.67	1.06065E+001	1.52141E+000
Tl-208	1.000	583.19*	84.50	2.38772E-001	1.06634E-001
PB-212	0.518	74.81*	9.60	1.49692E+001	3.77258E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.67224E-001	2.84907E-001
		300.09	3.41		
BI-214	0.995	609.31*	46.30	1.20788E+000	2.63376E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.57564E+000	4.57677E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	9.33271E-001	3.78822E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.598	74.81* @	6.33	2.27021E+001	5.72145E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.53625E+000	6.14512E-001
		351.92*	37.20	1.12380E+000	3.40804E-001
		785.91	1.10		
AC-228	0.999	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 2 Side 1 West
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.064E+000	1.06E+000	1.061E+001	4.941E-001
	MN-54	834.83	99.97	6.251E-002	6.25E-002	-1.125E-002	2.739E-002
	CO-60	1173.22	100.00	5.870E-002	4.67E-002	4.481E-003	2.540E-002
		1332.49	100.00	4.673E-002		-3.681E-003	1.938E-002
	NB-94	702.63	100.00	7.634E-002	6.26E-002	5.490E-002	3.433E-002
		871.10	100.00	6.258E-002		1.068E-002	2.742E-002
	SN-113	255.12	1.93	5.753E+000	1.48E-001	-4.951E-001	2.693E+000
		391.69	64.90	1.478E-001		2.259E-002	6.822E-002
	CS-134	475.35	1.46	7.161E+000	8.95E-002	4.214E+000	3.324E+000
		563.23	8.38	8.841E-001		3.152E-002	3.968E-001
		569.32	15.43	5.126E-001		9.607E-002	2.317E-001
		604.70	97.60	8.953E-002		5.004E-002	4.086E-002
		795.84	85.40	9.267E-002		-1.456E-002	4.182E-002
		801.93	8.73	7.331E-001		-2.540E-002	3.224E-001
		1038.57	1.00	6.177E+000		-9.055E-003	2.696E+000
		1167.94	1.80	2.940E+000		-1.002E+000	1.251E+000
		1365.15	3.04	1.371E+000		-3.038E-001	5.539E-001
	CS-137	661.65	85.12	7.289E-002	7.29E-002	-3.335E-002	3.194E-002
+	Tl-208	583.19*	84.50	1.502E-001	1.50E-001	2.388E-001	7.062E-002
	BI-211	72.87*	1.20	3.558E+001	1.20E+000	8.241E+001	1.733E+001
		351.10*	12.20	1.196E+000		3.427E+000	5.680E-001
		404.80	4.10	2.301E+000		5.242E-001	1.061E+000
		426.90	1.90	4.736E+000		1.910E+000	2.173E+000
		831.80	3.30	1.844E+000		1.176E-001	8.050E-001
	PB-211	404.80	3.00	3.145E+000	2.17E+000	7.164E-001	1.449E+000
		427.10	1.40	6.428E+000		2.969E+000	2.949E+000
		831.80	2.80	2.173E+000		1.386E-001	9.487E-001
	BI-212	39.86	1.10	2.685E+001	7.56E-001	-8.725E-001	1.278E+001
		727.17	11.80	7.562E-001		1.617E-001	3.455E-001
		785.42	2.00	4.363E+000		9.617E-001	1.989E+000
		1620.56	2.75	1.327E+000		-5.939E-001	5.141E-001
+	PB-212	74.81*	9.60	4.650E+000	3.99E-001	1.497E+001	2.270E+000
		77.11	17.50	1.820E+000		-1.499E+000	8.810E-001
		87.20	6.30	4.694E+000		1.969E+000	2.277E+000
		89.80	1.75	1.574E+001		-9.117E-001	7.622E+000
		115.19	0.60	3.512E+001		1.137E+001	1.692E+001
		238.63*	44.60	3.988E-001		6.672E-001	1.915E-001
		300.09	3.41	3.038E+000		-6.569E-002	1.414E+000
+	BI-214	609.31*	46.30	2.428E-001	2.43E-001	1.208E+000	1.132E-001
		768.36	5.04	1.897E+000		1.415E+000	8.719E-001
		806.17	1.23	6.536E+000		2.736E+000	2.954E+000
		934.06	3.21	2.153E+000		3.808E-001	9.553E-001

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	4.939E-001	2.43E-001	1.576E+000	2.209E-001
		1155.19	1.69	3.872E+000		5.942E-001	1.703E+000
		1238.11	5.94	1.369E+000		9.532E-001	6.179E-001
		1280.96	1.47	4.373E+000		1.607E+000	1.916E+000
		1377.67	4.11	1.801E+000		1.178E+000	8.032E-001
		1385.31	0.78	6.023E+000		-7.355E-001	2.498E+000
		1401.50	1.39	4.670E+000		2.018E+000	2.047E+000
		1407.98	2.48	2.619E+000		1.346E+000	1.148E+000
		1509.19	2.19	2.057E+000		9.589E-001	8.432E-001
		1661.28	1.15	3.479E+000		-5.308E-002	1.381E+000
		1729.60	3.05	1.897E+000		9.155E-001	8.122E-001
		1764.49*	15.80	4.724E-001		9.333E-001	2.098E-001
		1847.44	2.12	3.205E+000		1.867E+000	1.404E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
		74.81*	6.33	7.052E+000	3.92E-001	2.270E+001	3.442E+000
		77.11	10.70	2.977E+000		-2.452E+000	1.441E+000
		87.20	3.70	7.993E+000		3.353E+000	3.877E+000
		89.80	1.03	2.674E+001		-1.549E+000	1.295E+001
		241.98	7.49	1.979E+000		1.764E+000	9.427E-001
		295.21*	19.20	8.304E-001		1.536E+000	3.965E-001
		351.92*	37.20	3.921E-001		1.124E+000	1.863E-001
		785.91	1.10	8.131E+000		4.295E+000	3.715E+000
		186.21	3.28	5.016E+000	5.02E+000	4.376E+000	2.403E+000
		89.95	2.10	1.268E+001		-9.775E+000	6.134E+000
+	AC-228	93.35	3.50	7.836E+000		-5.867E-002	3.797E+000
		129.08	2.80	6.794E+000		1.385E+000	3.266E+000
		209.28	4.40	3.014E+000		1.400E+000	1.428E+000
		270.23	3.60	3.159E+000		-6.187E-001	1.481E+000
		327.64	3.20	3.682E+000		1.682E+000	1.728E+000
		338.32	11.40	1.049E+000		5.793E-001	4.925E-001
		409.51	2.13	4.390E+000		-1.253E-001	2.022E+000
		463.00	4.40	2.125E+000		-2.197E-001	9.780E-001
		794.70	4.60	1.638E+000		9.534E-002	7.351E-001
		911.60*	27.70	2.882E-001		4.859E-001	1.301E-001
	PA-234M	964.60	5.20	1.539E+000	7.16E+000	5.502E-001	6.947E-001
		969.11	16.60	5.953E-001		3.766E-001	2.742E-001
		1587.90	3.71	1.151E+000		-2.448E-001	4.650E-001
		766.36	0.29	2.851E+001		1.974E+000	1.294E+001
		1001.03	0.84	7.160E+000		-5.453E+000	3.113E+000
	TH-234	92.38	2.81	1.061E+001	1.06E+001	1.378E+001	5.154E+000
		92.80	2.77	1.063E+001		1.305E+001	5.163E+000
		112.81	0.28	7.591E+001		-1.662E+001	3.656E+001
	U-235	89.96	1.50	1.775E+001	3.03E-001	-1.368E+001	8.588E+000
		93.35	2.50	1.097E+001		-8.213E-002	5.315E+000
		105.00	1.00	2.133E+001		-3.789E+000	1.026E+001
		109.14	1.50	1.437E+001		-9.838E-001	6.921E+000
		143.76	10.50	1.580E+000		-2.970E-002	7.561E-001
		163.35	4.70	3.214E+000		4.399E-001	1.533E+000
		185.71	54.00	3.030E-001		2.048E-001	1.451E-001
		202.12	1.00	1.306E+001		2.139E+000	6.181E+000
		205.31	4.70	2.818E+000		8.070E-001	1.335E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.008E+000	1.01E+000	-4.729E-001	4.844E-001

+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum
@ = Half-life too short to be able to perform the decay correction

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 12:00:01 PM
Sample Title : Concrete Cylinder 2 Side 2 East
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylinder
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams (6.6898E6 grams)
Sample Taken On :
Acquisition Started : 3/26/2014 11:29:59 AM
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinder

* Report states 1 grams because weight is calculated with the efficiency. 77-5 3-27-14

77-5 3/27/14
77-5 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report

3/26/2014 12:00:01 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 2 Side 2 East
Peak Analysis Performed on: 3/26/2014 12:00:00 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	284-	306	292.28	72.81	0.85	1.51E+002	40.97	4.47E+002
2	284-	306	300.87	74.96	0.86	3.63E+002	54.84	5.07E+002
3	365-	377	371.20	92.57	0.94	9.40E+001	69.37	4.21E+002
4	949-	959	955.16	238.76	0.90	9.11E+001	42.35	1.49E+002
5	1175-	1190	1181.06	295.31	0.44	7.31E+001	40.11	1.09E+002
6	1400-	1414	1408.19	352.16	1.11	1.14E+002	42.33	1.16E+002
7	2327-	2342	2333.18	583.64	0.49	9.69E+001	29.05	3.81E+001
8	2427-	2444	2436.46	609.48	0.94	1.92E+002	35.61	3.84E+001
9	3635-	3676	3644.13	911.59	1.08	7.58E+001	41.65	5.72E+001
10	3870-	3884	3876.44	969.69	1.11	3.03E+001	20.29	2.47E+001
11	4471-	4489	4480.05	1120.63	0.85	7.02E+001	24.59	2.38E+001
12	5830-	5856	5843.95	1461.58	1.69	3.91E+002	43.71	1.98E+001
13	7050-	7068	7059.37	1765.28	0.56	5.81E+001	19.85	1.19E+001

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 12:00:01 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 2 Side 2 East
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.972	1460.81*	10.67	1.09361E+001	1.51961E+000
Tl-208	0.990	583.19*	84.50	3.22339E-001	1.04121E-001
PB-212	0.518	74.81*	9.60	1.48016E+001	3.71131E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	5.30709E-001	2.61012E-001
		300.09	3.41		
BI-214	0.995	609.31*	46.30	1.16672E+000	2.58113E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.35217E+000	4.86129E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.13426E+000	3.97999E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.597	74.81* @	6.33	2.24480E+001	5.62852E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.00815E+000	5.76505E-001
		351.92*	37.20	8.22966E-001	3.33367E-001
		785.91	1.10		
TH-234	0.999	92.38*	2.81	1.05613E+001	8.15453E+000
		92.80	2.77		
		112.81	0.28		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 12:00:01 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.972	1.093615E+001	1.519608E+000
	Tl-208	0.990	3.223386E-001	1.041209E-001
X	BI-211	0.316		
	PB-212	0.518	5.979512E-001	2.603710E-001
	BI-214	0.995	1.189409E+000	1.978180E-001
	PB-214 @	0.597	9.235736E-001	2.882143E-001
	TH-234	0.999	1.056127E+001	8.154535E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/26/2014 12:00:00 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.81	8.3773E-002	27.17	Tol.	BI-211
9	911.59	4.2139E-002	54.91	Tol.	AC-228
10	969.69	1.6856E-002	66.87	Tol.	AC-228

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

iclude MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 2 Side 2 East
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	9.304E-001	9.30E-001	1.094E+001	4.274E-001
	MN-54	834.83	99.97	7.282E-002	7.28E-002	-1.963E-003	3.255E-002
	CO-60	1173.22	100.00	6.862E-002	5.54E-002	-2.553E-002	3.036E-002
		1332.49	100.00	5.544E-002		-8.836E-003	2.373E-002
	NB-94	702.63	100.00	7.105E-002	5.75E-002	-7.099E-003	3.168E-002
		871.10	100.00	5.750E-002		-2.032E-002	2.488E-002
	SN-113	255.12	1.93	6.110E+000	1.41E-001	-2.253E-001	2.871E+000
		391.69	64.90	1.406E-001		-1.892E-002	6.464E-002
	CS-134	475.35	1.46	5.796E+000	8.14E-002	-3.625E+000	2.642E+000
		563.23	8.38	9.709E-001		-2.091E-001	4.402E-001
		569.32	15.43	5.278E-001		4.617E-002	2.393E-001
		604.70	97.60	8.139E-002		1.420E-002	3.679E-002
		795.84	85.40	8.188E-002		-2.276E-003	3.642E-002
		801.93	8.73	6.570E-001		-4.981E-001	2.843E-001
		1038.57	1.00	7.250E+000		1.474E+000	3.233E+000
		1167.94	1.80	3.455E+000		7.369E-001	1.508E+000
		1365.15	3.04	1.830E+000		1.004E+000	7.833E-001
	CS-137	661.65	85.12	7.654E-002	7.65E-002	-7.624E-003	3.377E-002
+	Tl-208	583.19*	84.50	1.260E-001	1.26E-001	3.223E-001	5.848E-002
	BI-211	72.87*	1.20	3.417E+001	1.39E+000	5.097E+001	1.663E+001
		351.10*	12.20	1.387E+000		2.509E+000	6.634E-001
		404.80	4.10	2.087E+000		-1.102E+000	9.536E-001
		426.90	1.90	4.988E+000		-9.192E-001	2.299E+000
		831.80	3.30	2.475E+000		3.969E-001	1.120E+000
	PB-211	404.80	3.00	2.852E+000	2.85E+000	-1.507E+000	1.303E+000
		427.10	1.40	6.702E+000		-1.390E+000	3.086E+000
		831.80	2.80	2.917E+000		4.678E-001	1.321E+000
	BI-212	39.86	1.10	2.481E+001	7.92E-001	5.254E-002	1.175E+001
		727.17	11.80	7.916E-001		3.532E-001	3.632E-001
		785.42	2.00	3.423E+000		-8.718E-001	1.519E+000
		1620.56	2.75	1.558E+000		2.946E-001	6.296E-001
+	PB-212	74.81*	9.60	4.385E+000	3.78E-001	1.480E+001	2.137E+000
		77.11	17.50	1.786E+000		-3.281E-001	8.635E-001
		87.20	6.30	4.926E+000		2.044E+000	2.393E+000
		89.80	1.75	1.547E+001		-2.355E+000	7.490E+000
		115.19	0.60	3.590E+001		-2.116E+000	1.731E+001
		238.63*	44.60	3.782E-001		5.307E-001	1.812E-001
		300.09	3.41	3.548E+000		1.159E+000	1.669E+000
+	BI-214	609.31*	46.30	2.408E-001	2.41E-001	1.167E+000	1.122E-001
		768.36	5.04	1.897E+000		1.151E+000	8.719E-001
		806.17	1.23	6.021E+000		1.611E+000	2.697E+000
		934.06	3.21	2.673E+000		1.254E+000	1.215E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	6.229E-001	2.41E-001	1.352E+000	2.854E-001
		1155.19	1.69	4.480E+000		3.433E-001	2.007E+000
		1238.11	5.94	1.638E+000		1.392E+000	7.524E-001
		1280.96	1.47	4.900E+000		4.046E+000	2.180E+000
		1377.67	4.11	1.870E+000		1.376E+000	8.374E-001
		1385.31	0.78	7.636E+000		9.490E-001	3.304E+000
		1401.50	1.39	4.422E+000		-4.338E-001	1.922E+000
		1407.98	2.48	2.814E+000		1.732E+000	1.245E+000
		1509.19	2.19	1.932E+000		3.981E-001	7.806E-001
		1661.28	1.15	3.188E+000		-1.742E+000	1.235E+000
		1729.60	3.05	1.756E+000		4.460E-001	7.414E-001
		1764.49*	15.80	4.610E-001		1.134E+000	2.041E-001
		1847.44	2.12	2.656E+000		9.517E-001	1.130E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
		74.81*	6.33	6.650E+000	4.55E-001	2.245E+001	3.241E+000
		77.11	10.70	2.920E+000		-5.366E-001	1.412E+000
		87.20	3.70	8.387E+000		3.479E+000	4.074E+000
		89.80	1.03	2.629E+001		-4.001E+000	1.272E+001
		241.98	7.49	1.937E+000		8.588E-001	9.216E-001
		295.21*	19.20	8.610E-001		1.008E+000	4.118E-001
		351.92*	37.20	4.547E-001		8.230E-001	2.176E-001
		785.91	1.10	6.964E+000		-2.519E-001	3.131E+000
		186.21	3.28	5.138E+000	5.14E+000	5.614E+000	2.464E+000
		89.95	2.10	1.282E+001		-2.013E+000	6.206E+000
	AC-228	93.35	3.50	8.262E+000	4.75E-001	6.230E+000	4.009E+000
		129.08	2.80	7.216E+000		4.553E+000	3.477E+000
		209.28	4.40	3.190E+000		8.061E-001	1.516E+000
		270.23	3.60	3.366E+000		1.553E+000	1.584E+000
		327.64	3.20	3.638E+000		3.419E-001	1.706E+000
		338.32	11.40	1.222E+000		1.015E+000	5.792E-001
		409.51	2.13	4.519E+000		8.746E-001	2.086E+000
		463.00	4.40	2.465E+000		1.469E+000	1.148E+000
		794.70	4.60	1.580E+000		1.820E-001	7.063E-001
		911.60	27.70	4.753E-001		6.892E-001	2.236E-001
		964.60	5.20	1.654E+000		8.807E-001	7.522E-001
		969.11	16.60	6.244E-001		-3.041E-002	2.887E-001
		1587.90	3.71	1.480E+000		7.492E-001	6.296E-001
		766.36	0.29	2.689E+001	8.97E+000	-1.887E+001	1.213E+001
		1001.03	0.84	8.972E+000		5.907E-001	4.018E+000
+	TH-234	92.38*	2.81	1.262E+001	1.07E+001	1.056E+001	6.156E+000
		92.80	2.77	1.071E+001		1.070E+001	5.203E+000
	U-235	112.81	0.28	7.496E+001	3.04E-001	-2.038E+001	3.608E+001
		89.96	1.50	1.795E+001		-2.818E+000	8.688E+000
		93.35	2.50	1.157E+001		8.722E+000	5.613E+000
		105.00	1.00	2.491E+001		2.201E+001	1.206E+001
		109.14	1.50	1.544E+001		1.557E-001	7.460E+000
		143.76	10.50	1.710E+000		1.128E-001	8.209E-001
		163.35	4.70	3.203E+000		-4.255E-001	1.527E+000
		185.71	54.00	3.038E-001		1.738E-001	1.455E-001
		202.12	1.00	1.259E+001		-3.468E+000	5.946E+000
		205.31	4.70	2.913E+000		-3.234E-002	1.383E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

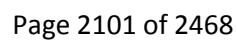
iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	9.963E-001	9.96E-001	-4.008E-001	4.784E-001

+ = Nuclide identified during the nuclide identification
* = Energy line found in the spectrum
> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum
@ = Half-life too short to be able to perform the decay correction

CONCRETE CYLINDER 2 SIDE 2 EAST.CNF



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 1:52:06 PM

Sample Title : Concrete Cylinder 3 side 1

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry : Concrete Cylind

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 50 - 9192

Peak Area Range (in channels) : 50 - 9192

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams (6.689BE6 grams)

Sample Taken On :

Acquisition Started : 3/26/2014 1:22:04 PM

Live Time : 1800.0 seconds

Real Time : 1801.2 seconds

Dead Time : 0.07 %

Energy Calibration Used Done On : 1/16/2014

Efficiency Calibration Used Done On : 3/24/2014

Efficiency ID : Concrete_Cylinde

* Report States 1 grams because weight is calculated with the
efficiency. MD 3-27-14

MD 3/27/14
MD 3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 1:52:06 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

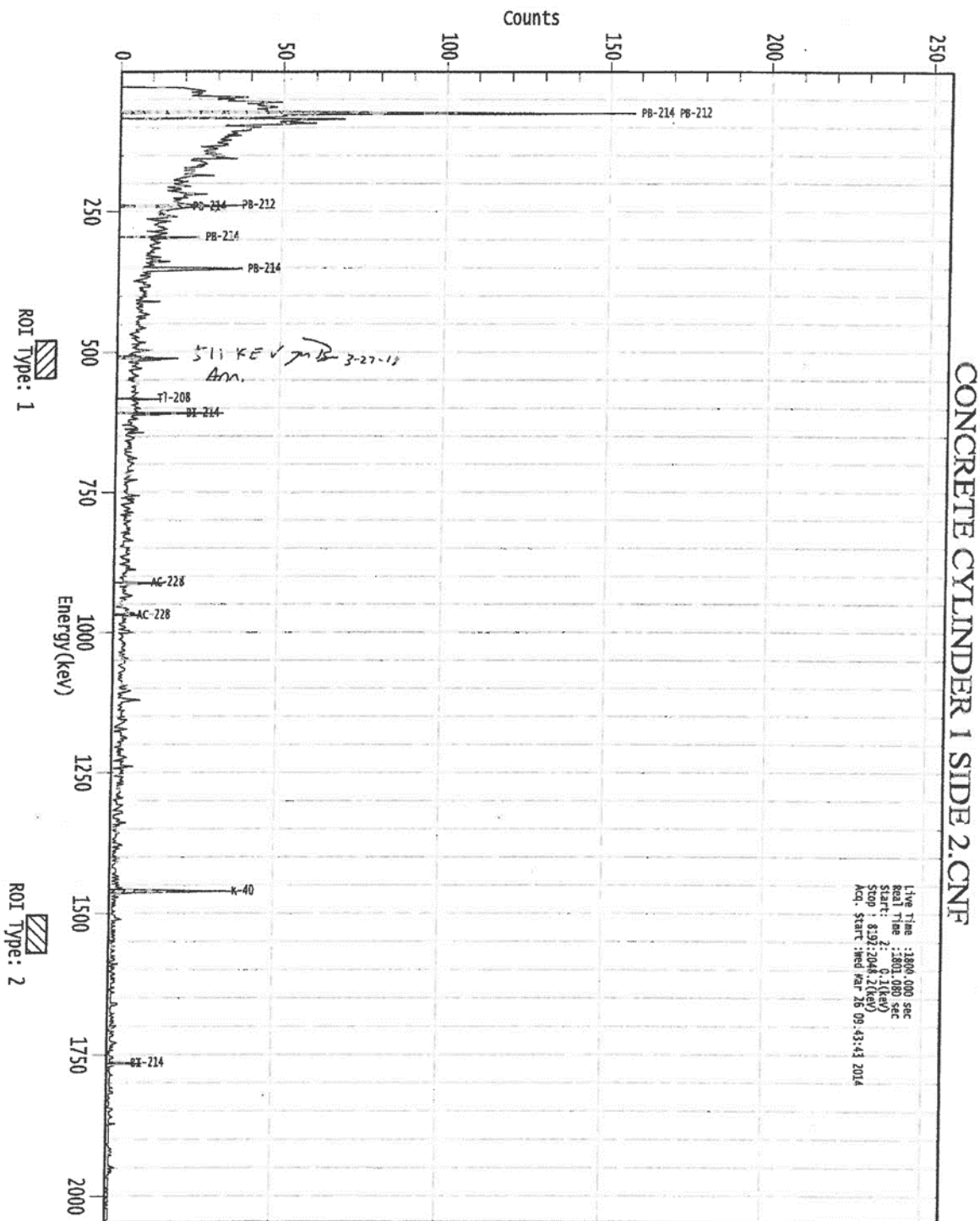
Detector Name: 5452
Sample Title: Concrete Cylinder 3 side 1
Peak Analysis Performed on: 3/26/2014 1:52:05 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	113-	120	116.49	28.79	0.68	3.37E+001	28.61	6.23E+001
2	284-	314	292.48	72.86	0.95	1.60E+002	41.41	4.70E+002
3	284-	314	300.62	74.90	0.95	3.16E+002	51.29	4.84E+002
4	284-	314	309.82	77.20	0.95	7.19E+001	37.43	4.21E+002
5	347-	355	350.94	87.50	0.91	6.89E+001	55.09	3.21E+002
6	949-	962	955.30	238.80	0.78	1.10E+002	43.83	1.33E+002
7	1175-	1187	1181.10	295.32	0.83	7.53E+001	38.65	1.13E+002
8	1399-	1413	1408.01	352.11	0.86	1.63E+002	36.95	6.24E+001
9	2033-	2053	2046.01	511.78	0.83	1.26E+002	40.12	7.62E+001
10	2325-	2342	2332.95	583.58	1.11	1.13E+002	27.15	2.21E+001
11	2427-	2445	2437.02	609.62	1.18	1.75E+002	39.20	6.18E+001
12	3438-	3449	3443.94	861.52	0.79	1.26E+001	12.59	1.04E+001
13	3636-	3651	3644.03	911.56	0.39	7.09E+001	23.97	2.41E+001
14	4471-	4490	4480.81	1120.82	0.97	7.87E+001	22.06	1.23E+001
15	5830-	5856	5844.01	1461.60	1.47	3.72E+002	46.94	4.05E+001
16	7053-	7067	7059.14	1765.23	2.06	5.17E+001	17.32	8.30E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 3 side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.971	1460.81*	10.67	1.04132E+001	1.56917E+000
Tl-208	0.993	583.19*	84.50	3.75794E-001	1.00973E-001
Pb-212	0.930	74.81*	9.60	1.29252E+001	3.32763E+000
		77.11*	17.50	1.55347E+000	8.66722E-001
		87.20*	6.30	3.56527E+000	2.93816E+000
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	6.38757E-001	2.75151E-001
		300.09	3.41		
Bi-214	0.993	609.31*	46.30	1.06718E+000	2.70872E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.51606E+000	4.42176E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.00950E+000	3.47757E-001
		1847.44	2.12		
		2118.54	1.21		
Pb-214	0.833	74.81* @	6.33	1.96022E+001	5.04665E+000
		77.11* @	10.70	2.54072E+000	1.41754E+000
		87.20* @	3.70	6.07059E+000	5.00281E+000
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	1.03954E+000	5.58628E-001
		351.92*	37.20	1.17667E+000	3.26955E-001
		785.91	1.10		
Ac-228	0.724	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.724	409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	7.34671E-001	2.55337E-001
		964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.971	1.041321E+001	1.569169E+000
X	CD-109	0.987		
	Tl-208	0.993	3.757944E-001	1.009735E-001
X	BI-211	0.318		
	PB-212	0.930	7.422051E-001	2.610117E-001
	BI-214	0.993	1.134513E+000	1.924045E-001
	PB-214 @	0.833	1.211661E+000	2.765447E-001
	AC-228	0.724	7.346709E-001	2.553367E-001

? = 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 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 1:52:06 PM Page 6

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 3/26/2014 1:52:05 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS ± Uncertainty	Peak Type	Tol. Nuclide
1	28.79	1.8704E-002	84.98		
M 2	72.86	8.8761E-002	25.92	Tol.	BI-211
9	511.78	6.9887E-002	31.90		
12	861.52	6.9807E-003	100.13		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/26/2014

1:52:06 PM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	4.681E-001	3.06E-001	1.516E+000	2.080E-001
		1155.19	1.69	4.316E+000		1.313E-001	1.925E+000
		1238.11	5.94	1.390E+000		6.399E-001	6.284E-001
		1280.96	1.47	4.484E+000		-6.521E-001	1.972E+000
		1377.67	4.11	1.655E+000		6.990E-001	7.300E-001
		1385.31	0.78	6.885E+000		1.984E+000	2.929E+000
		1401.50	1.39	4.548E+000		1.774E+000	1.985E+000
		1407.98	2.48	2.331E+000		6.742E-001	1.004E+000
		1509.19	2.19	2.057E+000		4.452E-001	8.432E-001
		1661.28	1.15	2.857E+000		7.962E-001	1.069E+000
		1729.60	3.05	1.828E+000		8.246E-002	7.776E-001
		1764.49*	15.80	3.631E-001		1.010E+000	1.551E-001
		1847.44	2.12	1.759E+000		-3.203E-001	6.813E-001
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.508E+000	3.38E-001	1.960E+001	3.170E+000
		77.11*	10.70	3.472E+000		2.541E+000	1.688E+000
		87.20*	3.70	7.851E+000		6.071E+000	3.806E+000
		89.80	1.03	2.596E+001		-5.519E+000	1.256E+001
		241.98	7.49	1.828E+000		1.334E+000	8.668E-001
		295.21*	19.20	8.211E-001		1.040E+000	3.919E-001
		351.92*	37.20	3.377E-001		1.177E+000	1.591E-001
		785.91	1.10	8.033E+000		5.860E+000	3.666E+000
	RA-226	186.21	3.28	5.269E+000	5.27E+000	4.878E+000	2.529E+000
+	AC-228	89.95	2.10	1.266E+001	3.19E-001	-1.075E-001	6.124E+000
		93.35	3.50	7.732E+000		4.081E+000	3.745E+000
		129.08	2.80	6.902E+000		5.094E-001	3.320E+000
		209.28	4.40	3.310E+000		2.129E+000	1.576E+000
		270.23	3.60	3.456E+000		-2.079E-001	1.629E+000
		327.64	3.20	3.725E+000		6.765E-001	1.750E+000
		338.32	11.40	1.113E+000		4.132E-001	5.249E-001
		409.51	2.13	4.645E+000		8.543E-001	2.149E+000
		463.00	4.40	2.211E+000		0.000E+000	1.020E+000
		794.70	4.60	1.580E+000		-1.762E-001	7.063E-001
		911.60*	27.70	3.190E-001		7.347E-001	1.455E-001
		964.60	5.20	1.491E+000		5.442E-002	6.703E-001
		969.11	16.60	6.300E-001		5.009E-001	2.915E-001
		1587.90	3.71	1.691E+000		9.180E-001	7.352E-001
	PA-234M	766.36	0.29	2.851E+001	8.97E+000	-1.231E+001	1.294E+001
		1001.03	0.84	8.972E+000		5.344E+000	4.018E+000
	TH-234	92.38	2.81	9.897E+000	9.90E+000	8.487E+000	4.796E+000
		92.80	2.77	9.916E+000		7.196E+000	4.804E+000
		112.81	0.28	7.623E+001		1.599E+001	3.672E+001
	U-235	89.96	1.50	1.772E+001	3.17E-001	-1.504E-001	8.573E+000
		93.35	2.50	1.082E+001		5.713E+000	5.242E+000
		105.00	1.00	2.302E+001		-6.559E-001	1.111E+001
		109.14	1.50	1.520E+001		9.748E+000	7.336E+000
		143.76	10.50	1.651E+000		5.893E-001	7.913E-001
		163.35	4.70	3.193E+000		1.137E+000	1.522E+000
		185.71	54.00	3.168E-001		3.179E-001	1.520E-001
		202.12	1.00	1.400E+001		3.147E+000	6.654E+000
		205.31	4.70	2.994E+000		9.400E-001	1.423E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

3/26/2014

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.034E+000	1.03E+000	-2.062E-001	4.973E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

CONCRETE CYLINDER 3 SIDE 1.CNF

Live Time : 1800.000 sec
 Real Time : 1801.190 sec
 Start : 0.1 (keV)
 Stop : 8192.2048.2 (keV)
 Acq. Start : wed Mar 26 13:22:04 2024

Counts

Energy(keV)

Pb-212 1120
 Pb-214 242
 Pb-214 295
 Pb-214 352
 Tl-208 2614
 Bi-214 2204
 Bi-214 2204

Am 511 keV

ROI Type: 1

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

***** GAMMA SPECTRUM ANALYSIS *****

Filename: 5452

Report Generated On : 3/26/2014 2:27:49 PM
Sample Title : Concrete Cylinder 3 side 2
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry : Concrete Cylinder
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams (6.684856 grams)
Sample Taken On :
Acquisition Started : 3/26/2014 1:57:47 PM
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds
Dead Time : 0.06 %

Energy Calibration Used Done On : 1/16/2014
Efficiency Calibration Used Done On : 3/24/2014
Efficiency ID : Concrete_Cylinde

* Report states 1 gram because weight is calculated with the efficiency. *JP* 3-27-14

JP 3/27/14

JP
3-27-14

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report

3/26/2014

1:52:06 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 3 side 1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.304E+000	1.30E+000	1.041E+001	6.143E-001
	MN-54	834.83	99.97	5.563E-002	5.56E-002	-2.394E-002	2.395E-002
	CO-60	1173.22	100.00	6.048E-002	5.34E-002	-1.007E-002	2.629E-002
		1332.49	100.00	5.342E-002		-1.305E-002	2.272E-002
	NB-94	702.63	100.00	8.005E-002	7.29E-002	1.240E-002	3.618E-002
		871.10	100.00	7.290E-002		1.706E-002	3.258E-002
	SN-113	255.12	1.93	5.969E+000	1.45E-001	-1.029E-002	2.801E+000
		391.69	64.90	1.450E-001		-2.262E-002	6.681E-002
	CS-134	475.35	1.46	5.494E+000	6.48E-002	-1.946E+000	2.491E+000
		563.23	8.38	9.980E-001		3.345E-002	4.538E-001
		569.32	15.43	5.203E-001		4.047E-002	2.355E-001
		604.70	97.60	6.481E-002		-3.569E-002	2.850E-002
		795.84	85.40	8.188E-002		-1.828E-002	3.642E-002
		801.93	8.73	7.680E-001		-1.274E-001	3.398E-001
		1038.57	1.00	4.597E+000		-3.006E+000	1.907E+000
		1167.94	1.80	3.455E+000		-1.165E-001	1.508E+000
		1365.15	3.04	1.542E+000		-3.159E-001	6.396E-001
	CS-137	661.65	85.12	9.665E-002	9.67E-002	1.311E-002	4.382E-002
+	Tl-208	583.19*	84.50	1.015E-001	1.01E-001	3.758E-001	4.624E-002
	BI-211	72.87*	1.20	3.496E+001	1.03E+000	5.396E+001	1.703E+001
		351.10*	12.20	1.030E+000		3.588E+000	4.850E-001
		404.80	4.10	2.301E+000		-9.886E-001	1.061E+000
		426.90	1.90	4.631E+000		-1.018E+000	2.121E+000
		831.80	3.30	2.164E+000		6.431E-001	9.651E-001
	PB-211	404.80	3.00	3.145E+000	2.55E+000	-1.351E+000	1.449E+000
		427.10	1.40	6.357E+000		-1.623E+000	2.914E+000
		831.80	2.80	2.551E+000		7.580E-001	1.137E+000
	BI-212	39.86	1.10	2.554E+001	7.38E-001	-4.182E+000	1.212E+001
		727.17	11.80	7.377E-001		2.111E-001	3.363E-001
		785.42	2.00	4.136E+000		2.458E+000	1.875E+000
		1620.56	2.75	2.153E+000		7.904E-001	9.268E-001
+	PB-212	74.81*	9.60	4.291E+000	3.85E-001	1.293E+001	2.090E+000
		77.11*	17.50	2.123E+000		1.553E+000	1.032E+000
		87.20*	6.30	4.611E+000		3.565E+000	2.235E+000
		89.80	1.75	1.528E+001		-3.249E+000	7.392E+000
		115.19	0.60	3.321E+001		-4.237E+000	1.597E+001
		238.63*	44.60	3.850E-001		6.388E-001	1.846E-001
		300.09	3.41	2.944E+000		1.102E+000	1.367E+000
+	BI-214	609.31*	46.30	3.060E-001	3.06E-001	1.067E+000	1.448E-001
		768.36	5.04	1.936E+000		1.248E+000	8.915E-001
		806.17	1.23	6.730E+000		2.804E+000	3.051E+000
		934.06	3.21	2.744E+000		1.280E+000	1.251E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Peak Analysis Report 3/26/2014 2:27:49 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: Concrete Cylinder 3 side 2
Peak Analysis Performed on: 3/26/2014 2:27:48 PM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	286-	307	292.56	72.88	0.86	1.59E+002	41.93	4.50E+002
2	286-	307	300.71	74.92	0.86	3.12E+002	52.96	4.81E+002
3	333-	345	340.01	84.76	0.82	1.07E+002	78.56	5.45E+002
4	950-	962	955.35	238.81	1.20	1.26E+002	44.43	1.39E+002
5	1172-	1187	1181.20	295.34	0.45	6.41E+001	42.33	1.28E+002
6	1401-	1415	1408.40	352.21	1.11	1.55E+002	40.64	8.95E+001
7	2030-	2054	2042.92	511.01	1.10	1.35E+002	45.15	9.07E+001
8	2326-	2340	2332.71	583.52	1.20	4.66E+001	26.42	4.44E+001
9	2428-	2447	2436.90	609.59	1.21	1.73E+002	33.53	3.13E+001
10	4474-	4488	4480.54	1120.75	0.34	5.37E+001	20.91	1.93E+001
11	5505-	5518	5511.76	1378.55	1.17	1.84E+001	12.96	8.56E+000
12	5830-	5855	5843.62	1461.50	2.17	3.61E+002	44.15	2.95E+001
13	7052-	7069	7060.25	1765.51	0.29	5.94E+001	17.51	5.63E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 2:27:49 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Concrete Cylinder 3 side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.978	1460.81*	10.67	1.00785E+001	1.48888E+000
Tl-208	0.995	583.19*	84.50	1.54972E-001	8.98540E-002
PB-212	0.518	74.81*	9.60	1.27620E+001	3.34545E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	7.35061E-001	2.84421E-001
		300.09	3.41		
BI-214	0.989	609.31*	46.30	1.05144E+000	2.40041E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.03408E+000	4.11489E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67*	4.11	1.32723E+000	9.39093E-001
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.15928E+000	3.54184E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.596	74.81* @	6.33	1.93547E+001	5.07367E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	8.83895E-001	6.00941E-001
		351.92*	37.20	1.12495E+000	3.44754E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/26/2014 2:27:49 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.978	1.007853E+001	1.488880E+000
	Tl-208	0.995	1.549720E-001	8.985396E-002
X	BI-211	0.313		
	PB-212	0.518	8.160473E-001	2.834024E-001
	BI-214	0.989	1.084496E+000	1.757731E-001
	PB-214 @	0.596	1.124289E+000	2.985244E-001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/26/2014 2:27:48 PM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.88	8.8458E-002	26.33	Tol.	BI-211
3	84.76	5.9194E-002	73.73	Tol.	TH-227
7	511.01	7.5186E-002	33.36		TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

nuclide MDA Report 3/26/2014 2:27:49 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: Concrete Cylind
Sample Title: Concrete Cylinder 3 side 2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.111E+000	1.11E+000	1.008E+001	5.179E-001
	MN-54	834.83	99.97	7.145E-002	7.14E-002	2.142E-003	3.186E-002
	CO-60	1173.22	100.00	5.493E-002	5.49E-002	-2.942E-002	2.352E-002
		1332.49	100.00	5.738E-002		9.742E-003	2.470E-002
	NB-94	702.63	100.00	7.505E-002	5.92E-002	1.447E-002	3.369E-002
		871.10	100.00	5.925E-002		-8.338E-003	2.576E-002
	SN-113	255.12	1.93	6.212E+000	1.57E-001	7.755E-001	2.923E+000
		391.69	64.90	1.572E-001		-5.236E-004	7.293E-002
	CS-134	475.35	1.46	6.012E+000	8.26E-002	8.263E-001	2.750E+000
		563.23	8.38	9.709E-001		-1.440E-001	4.402E-001
		569.32	15.43	5.843E-001		-1.534E-001	2.675E-001
		604.70	97.60	8.261E-002		5.402E-003	3.740E-002
		795.84	85.40	9.122E-002		-1.764E-002	4.109E-002
		801.93	8.73	8.012E-001		-7.063E-001	3.564E-001
		1038.57	1.00	5.829E+000		3.726E-001	2.522E+000
		1167.94	1.80	2.571E+000		-1.018E+000	1.066E+000
		1365.15	3.04	1.763E+000		8.174E-002	7.500E-001
	CS-137	661.65	85.12	8.648E-002	8.65E-002	2.960E-002	3.873E-002
+	Tl-208	583.19*	84.50	1.328E-001	1.33E-001	1.550E-001	6.191E-002
	BI-211	72.87*	1.20	3.425E+001	1.22E+000	5.376E+001	1.667E+001
		351.10*	12.20	1.224E+000		3.430E+000	5.823E-001
		404.80	4.10	2.536E+000		2.709E-001	1.178E+000
		426.90	1.90	4.788E+000		-1.420E+000	2.199E+000
		831.80	3.30	1.988E+000		-4.963E-001	8.772E-001
	PB-211	404.80	3.00	3.466E+000	2.34E+000	3.702E-001	1.610E+000
		427.10	1.40	6.567E+000		-9.025E-001	3.019E+000
		831.80	2.80	2.344E+000		-5.849E-001	1.034E+000
	BI-212	39.86	1.10	2.491E+001	7.19E-001	-1.277E+000	1.180E+001
		727.17	11.80	7.188E-001		1.513E-001	3.268E-001
		785.42	2.00	4.733E+000		1.023E+000	2.173E+000
		1620.56	2.75	1.925E+000		2.652E-001	8.128E-001
+	PB-212	74.81*	9.60	4.278E+000	3.83E-001	1.276E+001	2.084E+000
		77.11	17.50	1.812E+000		5.326E-001	8.766E-001
		87.20	6.30	4.883E+000		1.826E+000	2.371E+000
		89.80	1.75	1.530E+001		-1.699E+000	7.404E+000
		115.19	0.60	3.576E+001		6.551E+000	1.724E+001
		238.63*	44.60	3.833E-001		7.351E-001	1.838E-001
		300.09	3.41	3.038E+000		9.598E-001	1.414E+000
+	BI-214	609.31*	46.30	2.251E-001	2.25E-001	1.051E+000	1.043E-001
		768.36	5.04	1.640E+000		-6.533E-002	7.435E-001
		806.17	1.23	6.128E+000		-2.332E+000	2.750E+000
		934.06	3.21	2.709E+000		2.113E+000	1.233E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	5.254E-001	2.25E-001	1.034E+000	2.366E-001
		1155.19	1.69	4.316E+000		9.057E-001	1.925E+000
		1238.11	5.94	1.851E+000		1.665E+000	8.586E-001
		1280.96	1.47	4.373E+000		1.660E+000	1.916E+000
		1377.67*	4.11	1.344E+000		1.327E+000	5.748E-001
		1385.31	0.78	8.310E+000		-6.643E-001	3.641E+000
		1401.50	1.39	4.548E+000		1.013E+000	1.985E+000
		1407.98	2.48	2.551E+000		5.684E-001	1.114E+000
		1509.19	2.19	2.756E+000		6.898E-001	1.192E+000
		1661.28	1.15	3.985E+000		1.488E+000	1.633E+000
		1729.60	3.05	2.148E+000		1.422E+000	9.379E-001
		1764.49*	15.80	3.196E-001		1.159E+000	1.334E-001
		1847.44	2.12	2.551E+000		2.196E-001	1.077E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	6.487E+000	4.01E-001	1.935E+001	3.160E+000
		77.11	10.70	2.963E+000		8.711E-001	1.434E+000
		87.20	3.70	8.314E+000		3.109E+000	4.037E+000
		89.80	1.03	2.600E+001		-2.886E+000	1.258E+001
		241.98	7.49	1.790E+000		3.609E-001	8.478E-001
		295.21*	19.20	9.268E-001		8.839E-001	4.447E-001
		351.92*	37.20	4.015E-001		1.125E+000	1.910E-001
		785.91	1.10	8.605E+000		5.311E+000	3.952E+000
	RA-226	186.21	3.28	4.892E+000	4.89E+000	1.761E+000	2.341E+000
	AC-228	89.95	2.10	1.312E+001	4.08E-001	3.123E+000	6.356E+000
		93.35	3.50	8.551E+000		8.212E+000	4.154E+000
		129.08	2.80	6.963E+000		-1.355E+000	3.350E+000
		209.28	4.40	3.053E+000		1.549E+000	1.447E+000
		270.23	3.60	3.217E+000		-1.825E-001	1.510E+000
		327.64	3.20	3.456E+000		1.403E+000	1.615E+000
		338.32	11.40	1.142E+000		6.584E-001	5.390E-001
		409.51	2.13	5.226E+000		1.282E+000	2.440E+000
		463.00	4.40	2.168E+000		4.990E-001	9.995E-001
		794.70	4.60	1.693E+000		1.239E-001	7.628E-001
		911.60	27.70	4.078E-001		2.405E-001	1.899E-001
		964.60	5.20	1.332E+000		5.149E-001	5.911E-001
		969.11	16.60	6.129E-001		4.319E-001	2.830E-001
		1587.90	3.71	1.536E+000		2.074E-001	6.576E-001
	PA-234M	766.36	0.29	2.647E+001	8.64E+000	-5.085E+000	1.192E+001
		1001.03	0.84	8.643E+000		2.140E-001	3.854E+000
	TH-234	92.38	2.81	1.053E+001	1.05E+001	6.479E+000	5.114E+000
		92.80	2.77	1.094E+001		1.223E+001	5.317E+000
		112.81	0.28	7.932E+001		5.100E+000	3.826E+001
	U-235	89.96	1.50	1.837E+001	3.00E-001	4.372E+000	8.898E+000
		93.35	2.50	1.197E+001		1.150E+001	5.815E+000
		105.00	1.00	2.315E+001		1.814E+000	1.117E+001
		109.14	1.50	1.531E+001		4.798E+000	7.391E+000
		143.76	10.50	1.705E+000		1.910E-001	8.188E-001
		163.35	4.70	3.319E+000		7.870E-001	1.585E+000
		185.71	54.00	3.005E-001		1.224E-001	1.438E-001
		202.12	1.00	1.282E+001		-1.109E+000	6.065E+000
		205.31	4.70	3.073E+000		1.594E+000	1.462E+000

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	1.034E+000	1.03E+000	-1.519E-001	4.973E-001

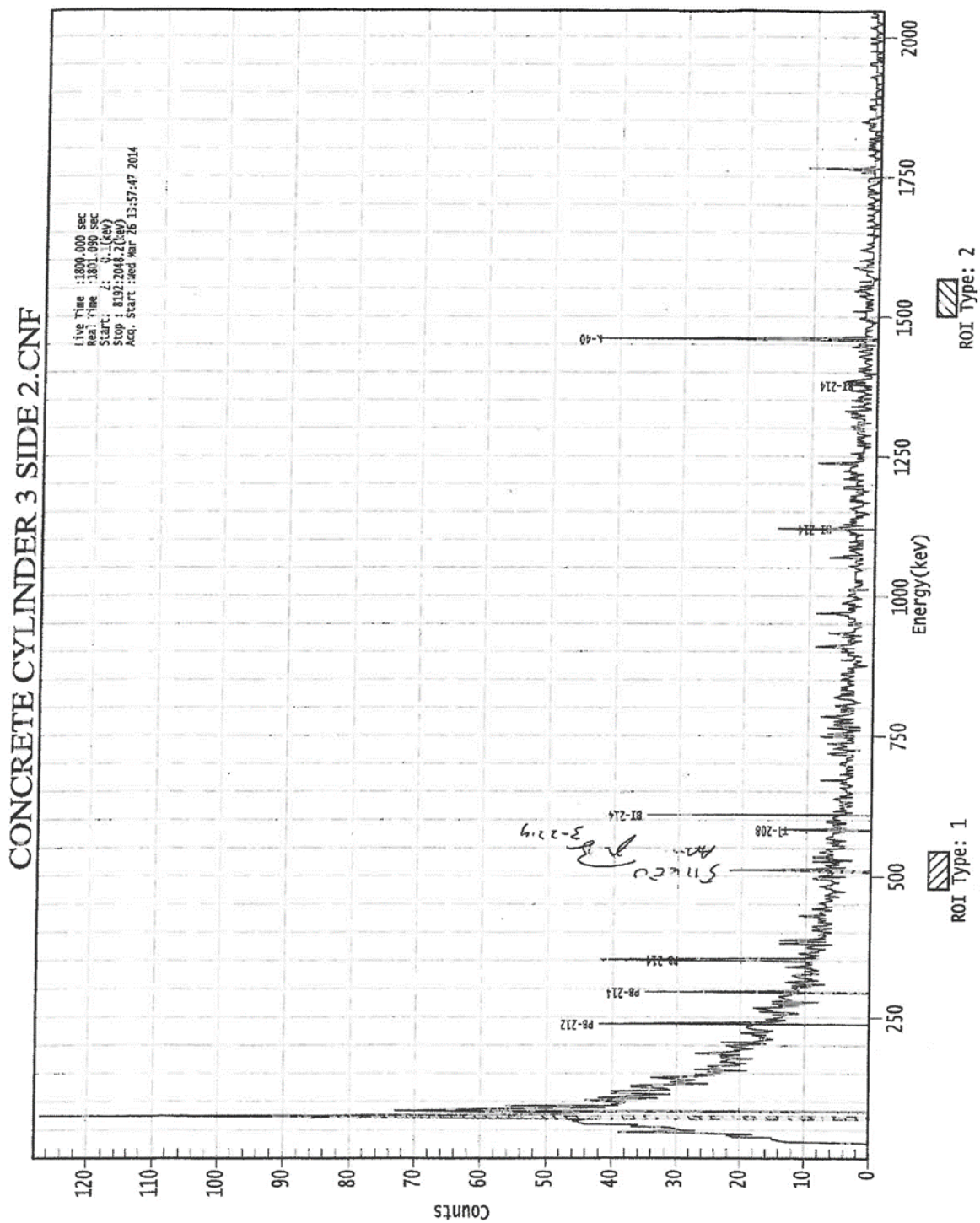
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-9 09601A Gamma Spectroscopy Reports



Attachment Figure 2-10 09501A Gamma Spectroscopy Reports



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Analysis Report for 31-Mar-14-10003
ISRF 9501A Crane Oil Sample 988.26 grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 31-Mar-14-10003
Sample Description	: ISRF 9501A Crane Oil Sample 988.26 grams
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 9.883E+02 grams
Facility	: Default
Sample Taken On	: 3/27/2014 11:15:00AM
Acquisition Started	: 3/31/2014 9:44:18AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 2700.0 seconds
Real Time	: 2701.5 seconds
Dead Time	: 0.06 %
Peak Locate Threshold	: 2.50
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 2/19/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10004

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3/31/14

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3-31-14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/31/2014 11:15:53AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10003

ISRF 9501A Crane Oil Sample 988.26 grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	421.81	1683 -	1691	1687.12	9.02E+00	10.40	1.60E+01	..... 57%
2	511.42	2038 -	2050	2045.43	4.14E+01	19.13	4.32E+01	..... Ann.
3	1460.42	5838 -	5849	5843.36	1.40E+01	10.89	1.60E+01	K-40

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	1.66E-01	1.30E-01	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10003

ISRF 9501A Crane Oil Sample 988.26 grams

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.990	1.66E-01	1.30E-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

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10003

ISRF 9501A Crane Oil Sample 988.26 grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/31/2014 11:15:53AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	421.81	3.34205E-03	57.61		
2	511.42	1.53275E-02	23.12		

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	*	10.66	1.66E-01	1.86E-01	miss
+	Cr-51	320.08		9.91	2.15E-02	1.07E-01	free
+	Mn-54	834.85		99.98	1.72E-03	1.21E-02	miss
+	Co-58	810.76		99.45	-3.64E-03	1.14E-02	1.14E-02 1.000
+	Co-60	1173.23		99.85	3.84E-03	9.22E-03	1.51E-02 0.940
		1332.49		99.98	-5.91E-03	9.22E-03	0.940
+	Nb-94	702.65		99.81	-1.98E-03	1.23E-02	1.35E-02 0.937
		871.09		99.89	4.38E-04	1.23E-02	0.937
+	Sn-113	255.13		2.11	-5.60E-03	1.10E-02	4.07E-01 free
		391.70		64.97	-2.03E-03	1.10E-02	free
+	Cs-134	475.36		1.48	1.03E-01	1.37E-02	5.83E-01 miss
		563.25		8.34	0.00E+00	2.38E-02	0.882
		569.33		15.37	1.46E-02	8.48E-02	0.873
		604.72		97.62	3.08E-03	1.43E-02	0.922
		795.86		85.46	4.12E-03	1.37E-02	0.924
		801.95		8.69	-4.12E-03	1.62E-01	0.884
		1038.61		0.99	-7.18E-02	1.00E+00	0.935

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

Analysis Report for 31-Mar-14-10003
ISRF 9501A Crane Oil Sample 988.26 grams

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Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	1167.97	1.79	6.30E-02	1.37E-02	5.93E-01	1.094
	1365.19	3.02	-4.47E-02		2.56E-01	1.146
+ Cs-137	661.66	85.10	-3.12E-03	9.17E-03	9.17E-03	miss
+ Eu-152	121.78	28.67	-2.29E-03	2.57E-02	2.57E-02	0.928
	244.70	7.61	3.10E-02		1.08E-01	0.922
	295.94	0.45	5.29E-01		2.13E+00	miss
	344.28	26.60	-3.65E-03		3.69E-02	0.952
	367.79	0.86	2.69E-02		1.00E+00	0.868
	411.12	2.24	-1.18E-01		4.08E-01	0.895
	443.96	2.83	-4.17E-03		3.13E-01	0.922
	488.68	0.42	3.55E-01		2.31E+00	miss
	563.99	0.49	2.85E-02		1.33E+00	0.923
	586.26	0.46	-8.26E-01		1.67E+00	0.933
	678.62	0.47	9.58E-02		2.53E+00	0.870
	688.67	0.86	-3.87E-01		9.60E-01	0.973
	719.35	0.28	-1.24E+00		2.56E+00	miss
	778.90	12.96	2.36E-02		1.00E-01	0.937
	810.45	0.32	-4.47E-01		3.44E+00	1.066
	867.37	4.26	-3.76E-02		2.71E-01	0.911
	919.33	0.43	-8.59E-01		2.63E+00	0.973
	964.08	14.65	2.10E-02		9.39E-02	1.030
	1085.87	10.24	1.30E-02		1.17E-01	1.024
	1089.74	1.73	-1.26E-01		5.84E-01	0.944
	1112.07	13.69	1.61E-02		9.26E-02	0.986
	1212.95	1.43	-9.70E-02		9.14E-01	0.912
	1249.94	0.19	2.15E+00		6.45E+00	1.110
	1299.14	1.63	2.26E-01		9.15E-01	0.935
	1408.01	21.07	1.14E-03		6.43E-02	0.976
	1457.64	0.50	-2.21E+00		3.03E+00	1.085
	1528.10	0.28	6.62E-02		4.30E+00	1.003
+ Eu-154	123.07	40.40	1.02E-02	1.98E-02	1.98E-02	0.927
	247.93	6.89	-1.86E-02		9.90E-02	0.915
	591.76	4.95	5.41E-02		2.50E-01	0.900
	692.42	1.78	-1.82E-01		3.35E-01	0.924
	723.30	20.06	-1.19E-02		5.45E-02	0.925
	756.80	4.52	1.29E-01		3.56E-01	0.898
	873.18	12.08	7.59E-03		9.52E-02	0.919
	996.29	10.48	1.27E-02		1.24E-01	0.971
	1004.76	18.01	4.32E-03		5.98E-02	0.971
	1274.43	34.80	7.21E-03		4.04E-02	0.975
	1596.48	1.80	0.00E+00		1.71E-01	1.196
+ Eu-155	45.30	1.31	-2.87E-01	3.28E-02	1.64E+00	0.998
	60.01	1.22	4.11E-01		1.91E+00	1.000
	86.55	30.70	-8.19E-03		3.28E-02	free
	105.31	21.10	5.76E-03		3.76E-02	1.000
+ Tl-208	583.19	85.00	3.81E-03	1.47E-02	1.47E-02	0.924
+ Bi-211	351.07	13.02	1.33E-02	7.27E-02	7.27E-02	miss
+ Pb-211	404.85	3.78	-5.38E-02	1.90E-01	1.90E-01	miss
	427.09	1.76	1.78E-01		5.85E-01	miss
	832.01	3.52	5.06E-02		3.62E-01	miss
+ Bi-212	39.86	1.06	7.11E-01	1.88E-01	2.21E+00	0.998

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10003

ISRF 9501A Crane Oil Sample 988.26 grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	727.33	6.67	2.39E-02	1.88E-01	1.88E-01	0.980
	785.37	1.10	2.73E-01		1.19E+00	0.936
	1620.50	1.47	1.85E-01		8.61E-01	1.007
+ Pb-212	115.18	0.60	-1.19E-01	2.25E-02	1.15E+00	miss
	238.63	43.60	1.49E-02		2.25E-02	free
	300.09	3.30	3.62E-02		2.07E-01	free
+ Pb212-XR	74.82	10.28	1.02E-01	7.45E-02	1.78E-01	miss
	77.11	17.10	1.45E-02		7.45E-02	miss
	87.35	3.97	6.11E-02		2.76E-01	miss
	89.78	1.46	1.77E-01		7.13E-01	miss
+ Bi-214	609.32	45.49	4.79E-03	3.31E-02	3.31E-02	0.941
	768.36	4.89	8.80E-03		2.48E-01	0.934
	806.18	1.26	-2.40E-01		8.66E-01	0.912
	934.06	3.11	8.29E-02		3.42E-01	0.936
	1120.29	14.92	4.99E-03		9.81E-02	0.936
	1155.21	1.63	-2.70E-01		7.52E-01	0.935
	1238.12	5.83	-4.10E-02		2.68E-01	0.936
	1280.98	1.43	7.31E-02		1.02E+00	0.936
	1377.67	3.99	-2.51E-02		2.72E-01	1.035
	1385.31	0.79	9.33E-02		1.52E+00	0.937
	1401.52	1.33	-9.82E-02		7.23E-01	0.937
	1407.99	2.39	1.04E-02		5.90E-01	0.937
	1509.21	2.13	1.69E-01		6.95E-01	0.943
	1661.27	1.05	0.00E+00		3.61E-01	1.001
	1729.59	2.88	1.84E-01		5.79E-01	1.137
	1764.49	15.30	5.95E-02		1.60E-01	1.002
	1847.43	2.03	0.00E+00		1.88E-01	1.073
>	2118.51	1.16	0.00E+00		0.00E+00	1.047
+ Pb-214	241.99	7.25	4.10E-02	2.88E-02	1.12E-01	0.999
	295.22	18.42	2.58E-02		5.49E-02	1.000
	351.93	35.60	1.48E-02		2.88E-02	free
	785.96	1.06	-1.00E-01		1.01E+00	0.999
+ Pb214-XR	74.82	5.80	1.81E-01	1.31E-01	3.15E-01	miss
	77.11	9.70	2.55E-02		1.31E-01	miss
	87.35	2.24	1.08E-01		4.89E-01	miss
	89.78	0.82	3.15E-01		1.27E+00	miss
+ Ra-226	186.21	3.64	5.66E-02	2.27E-01	2.27E-01	free
+ Ac-228	129.07	2.42	0.00E+00	5.34E-02	3.19E-01	0.937
	209.25	3.89	2.30E-02		1.72E-01	0.974
	270.24	3.46	-1.08E-01		2.60E-01	0.950
	328.00	2.95	3.89E-02		3.32E-01	0.949
	338.32	11.27	-1.13E-02		7.22E-02	0.991
	409.46	1.92	2.27E-01		5.97E-01	0.926
	463.00	4.40	-9.68E-03		2.19E-01	0.921
	794.95	4.25	1.85E-02		2.24E-01	0.933
	911.20	25.80	3.90E-03		5.34E-02	0.989
	964.77	4.99	5.38E-02		2.73E-01	0.978
	968.97	15.80	-5.05E-03		6.53E-02	0.988
	1588.20	3.22	0.00E+00		1.13E-01	1.003
+ Pa-231	27.36	10.30	0.00E+00	2.89E-02	2.89E-02	0.997
	283.69	1.70	-1.35E-01		4.20E-01	1.000

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

Analysis Report for 31-Mar-14-10003 3/31/2014 11:20:17AM Page 7 of 7

ISRF 9501A Crane Oil Sample 988.26 grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	300.07	2.47	7.21E-02	2.89E-02	2.89E-01	1.000
	302.65	2.20	-1.12E-01		2.64E-01	1.000
	330.06	1.40	-1.30E-01		5.88E-01	1.001
+ Th-234	92.38	2.13	3.79E-01	6.45E-01	6.45E-01	free
	92.80	2.10	5.83E-01		6.88E-01	free
	112.81	0.21	-1.46E+00		3.51E+00	free
+ U-235	143.76	10.96	9.95E-03	1.51E-02	6.77E-02	free
	163.33	5.08	-1.62E-02		1.27E-01	free
	185.71	57.20	5.87E-03		1.51E-02	free
	202.11	1.08	-3.47E-01		5.32E-01	miss
	205.31	5.01	4.94E-02		1.47E-01	free
+ Am-241	59.54	35.90	7.34E-04	6.84E-02	6.84E-02	free

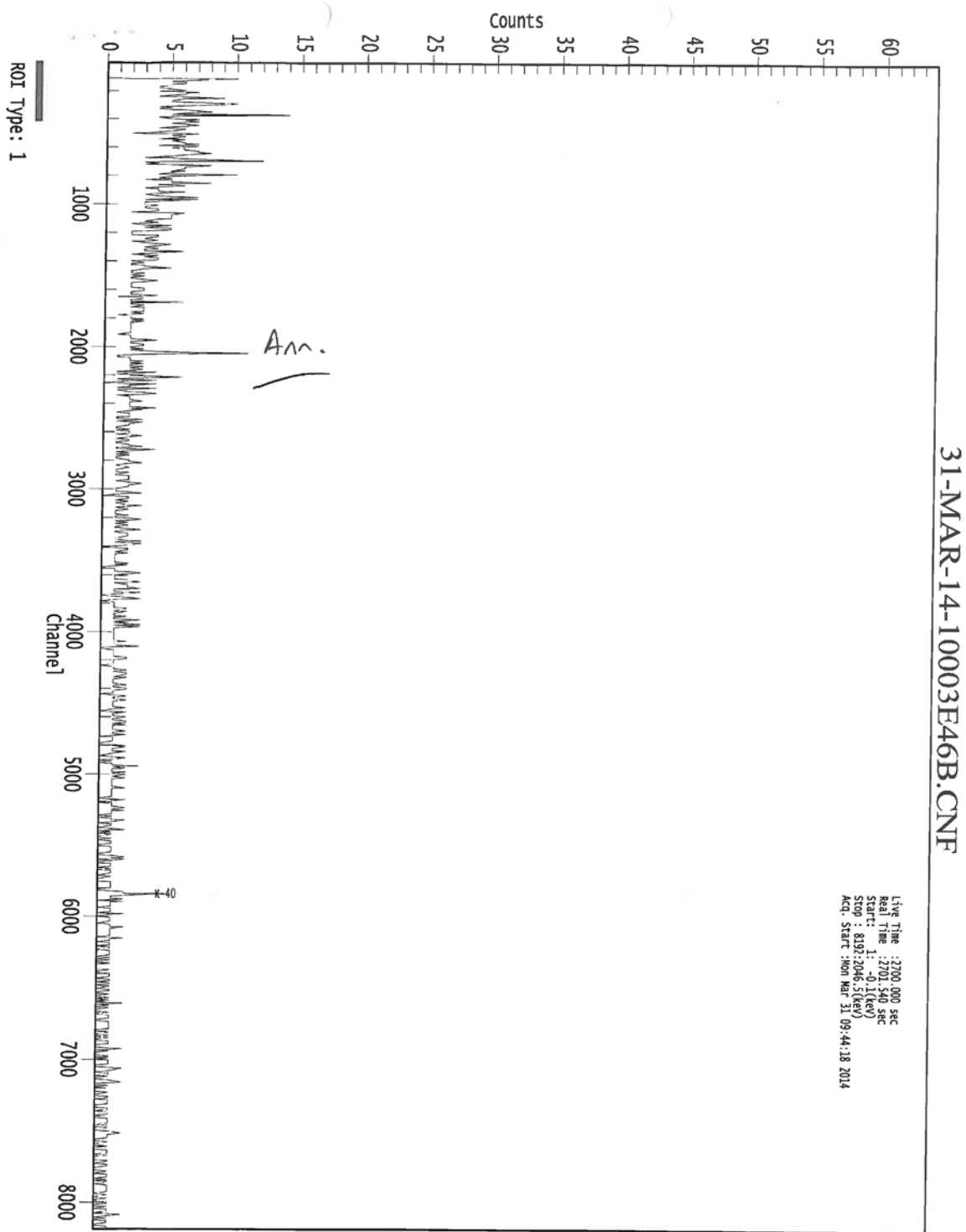
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports



Attachment Figure 2-10 09501A Gamma Spectroscopy Reports



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Analysis Report for 31-Mar-14-10001
ISRF 9501A Door Oil Sample 290.25 Grams

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 31-Mar-14-10001
Sample Description	: ISRF 9501A Door Oil Sample 290.25 Grams
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 2.903E+02 grams
Facility	: Default
Sample Taken On	: 3/27/2014 1:15:00PM
Acquisition Started	: 3/31/2014 8:11:15AM
Procedure	: Oil Taral 160z 475ml
Operator	: Administrator
Detector Name	: DET02
Geometry	: Oil Taral 160z 475ml
Live Time	: 1800.0 seconds
Real Time	: 1801.4 seconds
Dead Time	: 0.08 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/5/2013
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 10001

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3-31-14
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3/31/14

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/31/2014 8:41:22AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.97	1402 -	1418	1410.31	4.46E+01	19.56	4.08E+01	Pb-214
2	510.66	2039 -	2055	2045.64	5.37E+01	20.04	3.85E+01	Bi-211
3	609.15	2434 -	2447	2440.02	2.69E+01	14.04	2.22E+01	Bi-214
4	1461.13	5847 -	5862	5854.11	2.81E+01	10.94	1.89E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	1.25E+00	4.98E-01	miss
Bi-211	0.97	351.07 *	13.02	7.42E-01	3.47E-01	miss
Bi-214	1.00	609.32 *	45.49	1.94E-01	1.04E-01	0.923
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	1.00	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	2.71E-01	1.27E-01	free

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Pb-214	1.00	785.96	1.06			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.996	1.25E+00	4.98E-01	
? Bi-211	0.970	7.42E-01	3.47E-01	
Bi-214	1.000	1.94E-01	1.04E-01	
? Pb-214	1.000	2.71E-01	1.27E-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

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/31/2014 8:41:22AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	510.66	2.98491E-02	18.65		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	* 10.66	1.25E+00	3.20E-01	3.20E-01	miss
+	Cr-51	320.08	9.91	6.26E-02	4.75E-01	4.75E-01	free
+	Mn-54	834.85	99.98	-9.62E-03	4.20E-02	4.20E-02	miss
+	Co-58	810.76	99.45	6.83E-03	5.03E-02	5.03E-02	1.000
+	Co-60	1173.23	99.85	1.74E-02	3.55E-02	6.78E-02	0.923
		1332.49	99.98	-2.04E-02		3.55E-02	0.923
+	Nb-94	702.65	99.81	1.30E-02	5.80E-02	6.27E-02	0.918
		871.09	99.89	4.83E-03		5.80E-02	0.919
+	Sn-113	255.13	2.11	-9.58E-01	5.74E-02	1.74E+00	free
		391.70	64.97	-1.96E-03		5.74E-02	free
+	Cs-134	475.36	1.48	8.23E-01	6.21E-02	3.49E+00	miss
		563.25	8.34	1.27E-01		7.51E-01	0.846
		569.33	15.37	1.72E-02		4.01E-01	0.834
		604.72	97.62	3.30E-02		7.85E-02	0.898
		795.86	85.46	4.40E-03		6.21E-02	0.902
		801.95	8.69	-1.41E-01		6.50E-01	0.851
		1038.61	0.99	-1.27E+00		5.18E+00	0.917
		1167.97	1.79	1.48E-01		2.47E+00	1.132

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Cs-134	1365.19	3.02	0.00E+00	6.21E-02	3.38E-01	1.204
+	Cs-137	661.66	85.10	-8.49E-03	4.33E-02	4.33E-02	miss
+	Eu-152	121.78	28.67	6.80E-02	1.49E-01	1.49E-01	0.903
		244.70	7.61	9.17E-02		6.09E-01	0.894
		295.94	0.45	1.44E+01		1.42E+01	miss
		344.28	26.60	7.58E-03		1.73E-01	0.937
		367.79	0.86	-1.66E+00		5.87E+00	0.827
		411.12	2.24	6.26E-01		2.75E+00	0.863
		443.96	2.83	6.60E-01		2.01E+00	0.896
		488.68	0.42	2.10E+00		1.16E+01	miss
		563.99	0.49	9.26E-01		1.20E+01	0.898
		586.26	0.46	3.49E+00		1.37E+01	0.914
		678.62	0.47	-5.04E+00		1.04E+01	0.832
		688.67	0.86	-1.26E-01		5.35E+00	0.962
		719.35	0.28	1.86E+00		2.00E+01	miss
		778.90	12.96	1.86E-01		5.09E-01	0.919
		810.45	0.32	1.64E+00		1.39E+01	1.083
		867.37	4.26	-2.94E-01		1.33E+00	0.884
		919.33	0.43	-2.03E+00		1.07E+01	0.963
		964.08	14.65	1.14E-01		3.92E-01	1.038
		1085.87	10.24	-1.04E-01		4.07E-01	1.031
		1089.74	1.73	-4.79E-01		3.26E+00	0.930
		1112.07	13.69	-1.41E-01		2.80E-01	0.981
		1212.95	1.43	1.02E+00		5.03E+00	0.886
		1249.94	0.19	-5.12E+00		1.47E+01	1.137
		1299.14	1.63	7.79E-01		3.86E+00	0.917
		1408.01	21.07	0.00E+00		2.72E-01	0.968
		1457.64	0.50	-2.46E+01		7.89E+00	1.107
		1528.10	0.28	-4.47E+00		1.27E+01	1.007
+	Eu-154	123.07	40.40	-5.69E-02	7.97E-02	7.97E-02	0.902
		247.93	6.89	-8.93E-02		5.60E-01	0.885
		591.76	4.95	-2.50E-01		1.07E+00	0.868
		692.42	1.78	-8.43E-02		2.95E+00	0.899
		723.30	20.06	-1.74E-02		2.51E-01	0.901
		756.80	4.52	3.60E-02		1.33E+00	0.867
		873.18	12.08	-4.53E-02		4.65E-01	0.893
		996.29	10.48	-1.42E-02		3.52E-01	0.963
		1004.76	18.01	-8.41E-02		2.39E-01	0.961
		1274.43	34.80	-1.01E-02		1.83E-01	0.965
		1596.48	1.80	-3.52E-01		1.62E+00	1.272
+	Eu-155	45.30	1.31	3.08E+00	1.44E-01	1.24E+01	0.998
		60.01	1.22	1.83E-02		1.11E+01	1.000
		86.55	30.70	-6.36E-02		1.46E-01	free
		105.31	21.10	-2.21E-02		1.44E-01	1.000
+	Tl-208	583.19	85.00	1.74E-02	7.50E-02	7.50E-02	0.903
+	Bi-211	351.07	* 13.02	7.42E-01	4.36E-01	4.36E-01	miss
+	Pb-211	404.85	3.78	1.86E-01	1.21E+00	1.21E+00	miss
		427.09	1.76	-4.11E-01		2.48E+00	miss
		832.01	3.52	-1.70E-01		1.29E+00	miss
+	Bi-212	39.86	1.06	-7.45E-01	7.88E-01	1.38E+01	0.998
		727.33	6.67	1.19E-01		7.88E-01	0.974

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	785.37	1.10	2.28E+00	7.88E-01	5.27E+00	0.918
	1620.50	1.47	4.10E-01		3.17E+00	1.010
+ Pb-212	115.18	0.60	-7.28E-01	6.79E-02	5.69E+00	miss
	238.63	43.60	-1.03E-02		6.79E-02	free
	300.09	3.30	8.60E-01		1.51E+00	free
+ Pb212-XR	74.82	10.28	4.28E-02	5.13E-01	8.40E-01	miss
	77.11	17.10	1.79E-01		5.13E-01	miss
	87.35	3.97	-1.50E-01		1.26E+00	miss
	89.78	1.46	-6.21E-01		2.71E+00	miss
+ Bi-214	609.32	* 45.49	1.94E-01	1.28E-01	1.28E-01	0.923
	768.36	4.89	9.54E-01		1.62E+00	0.914
	806.18	1.26	4.64E-01		5.06E+00	0.887
	934.06	3.11	-2.27E-01		1.56E+00	0.917
	1120.29	14.92	2.17E-01		5.96E-01	0.918
	1155.21	1.63	-1.10E+00		3.31E+00	0.917
	1238.12	5.83	6.38E-01		1.33E+00	0.919
	1280.98	1.43	1.06E+00		5.25E+00	0.919
	1377.67	3.99	9.66E-02		1.42E+00	1.050
	1385.31	0.79	-1.74E+00		7.53E+00	0.919
	1401.52	1.33	4.18E-02		3.50E+00	0.919
	1407.99	2.39	0.00E+00		2.52E+00	0.919
	1509.21	2.13	7.34E-02		2.27E+00	0.928
	1661.27	1.05	2.30E+00		7.79E+00	1.003
	1729.59	2.88	3.90E-01		1.66E+00	1.195
	1764.49	15.30	1.18E-01		5.26E-01	1.003
	1847.43	2.03	-4.67E-01		1.81E+00	1.106
>	2118.51	1.16	0.00E+00		0.00E+00	1.070
+ Pb-214	241.99	7.25	3.61E-01	1.60E-01	6.97E-01	0.999
	295.22	18.42	1.89E-01		3.21E-01	1.000
	351.93	* 35.60	2.71E-01		1.60E-01	free
	785.96	1.06	2.54E+00		5.03E+00	0.999
+ Pb214-XR	74.82	5.80	7.59E-02	9.04E-01	1.49E+00	miss
	77.11	9.70	3.15E-01		9.04E-01	miss
	87.35	2.24	-2.66E-01		2.24E+00	miss
	89.78	0.82	-1.10E+00		4.82E+00	miss
+ Ra-226	186.21	3.64	-3.05E-02	9.62E-01	9.62E-01	free
+ Ac-228	129.07	2.42	-1.80E-02	1.72E-01	1.57E+00	0.915
	209.25	3.89	2.72E-01		1.12E+00	0.965
	270.24	3.46	1.21E-01		1.28E+00	0.933
	328.00	2.95	-3.29E-01		1.53E+00	0.933
	338.32	11.27	-1.98E-02		3.71E-01	0.988
	409.46	1.92	9.83E-01		3.27E+00	0.901
	463.00	4.40	-5.71E-02		1.07E+00	0.892
	794.95	4.25	2.22E-01		1.14E+00	0.914
	911.20	25.80	-3.40E-02		1.72E-01	0.986
	964.77	4.99	-7.16E-02		1.02E+00	0.972
	968.97	15.80	-1.06E-02		2.90E-01	0.985
	1588.20	3.22	-4.65E-01		1.14E+00	1.004
+ Pa-231	27.36	10.30	-7.79E-01	1.79E+00	1.79E+00	0.996
	283.69	1.70	4.04E-02		2.23E+00	1.000
	300.07	2.47	1.15E+00		2.02E+00	1.000

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports

3/31/2014 8:42:34AM

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Analysis Report for 31-Mar-14-10001

ISRF 9501A Door Oil Sample 290.25 Grams

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pa-231	302.65	2.20	-9.99E-01	1.79E+00	1.83E+00	1.000
	330.06	1.40	1.03E+00		3.28E+00	1.001
+ Th-234	92.38	2.13	-4.69E-01	2.29E+00	2.29E+00	free
	92.80	2.10	-1.16E-01		2.43E+00	free
+ U-235	112.81	0.21	3.17E+00		2.10E+01	free
	143.76	10.96	1.44E-01	5.96E-02	3.72E-01	free
	163.33	5.08	3.61E-01		7.59E-01	free
	185.71	57.20	-2.03E-02		5.96E-02	free
	202.11	1.08	-1.03E+00		3.18E+00	miss
	205.31	5.01	-1.27E-01		7.29E-01	free
+ Am-241	59.54	35.90	9.80E-02	3.88E-01	3.88E-01	free

+ = 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

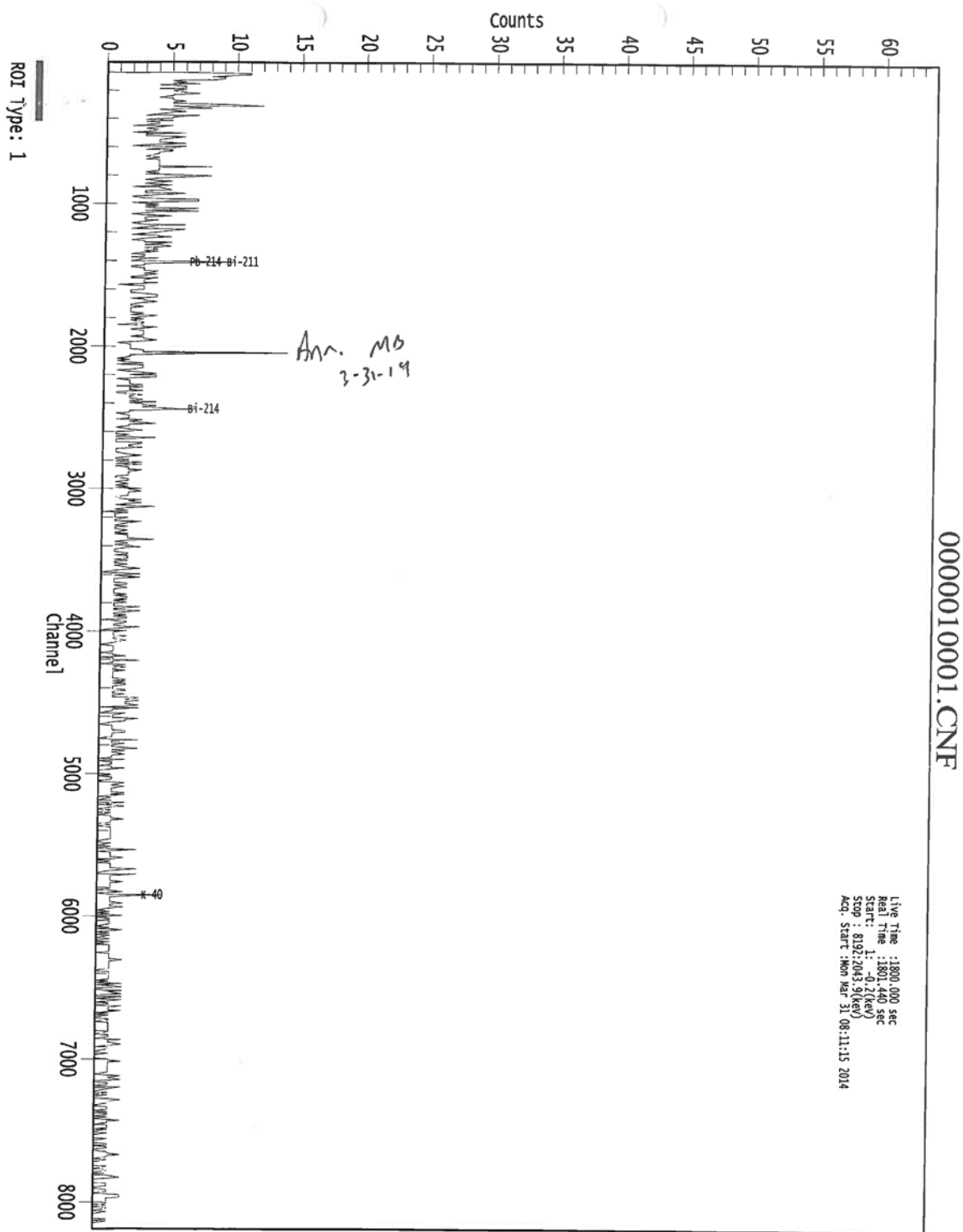
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-10 09501A Gamma Spectroscopy Reports



Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

GAMMA SPECTRUM ANALYSIS

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The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst JD
Date 5-6-14

Filename: C:\Canberra\Roof Samples\20140506104214.cnf

Report Generated On : 5/6/2014 10:02:59 AM

Sample Title : MMTC Roof 41
Spectrum Description :
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 2048
Peak Area Range (in channels) : 50 - 2048
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 grams

Sample Taken On : 5/6/2014 10:06:20 AM
Acquisition Started : 5/6/2014 10:06:20 AM

Live Time : 898.0 seconds
Real Time : 900.0 seconds
Dead Time : 0.22 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 4/29/2014
Efficiency ID : Well 7 Inch Drai

Handwritten signature and date: 5/7/14

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

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Report Date: 5/6/2014 10:03:00 AM
Sample Title: MMTC Roof 41
Peak Analysis Performed on: 5/6/2014 10:02:59 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 2048

PEAK ANALYSIS REPORT

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Continuum Counts
1	47	65	53.45	38.96	1.80	1.313E+003
2	794	839	816.41	610.61	1.06	6.796E+002
3	1919	2002	1953.60	1458.16	6.53	1.180E+003

Dark Orange = First peak in a multiplet region

Light Orange = Other peak in a multiplet region

Green = Fitted singlet

Errors quoted at 2.000 sigma

NUCLIDE IDENTIFICATION REPORT

Sample Title: MMTC Roof 41
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N
Report Generated: 5/6/2014 10:03:00 AM

IDENTIFIED NUCLIDES					
Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
LaBr3	0.526	34.70*	66.40	2.53704E+001	5.31086E+000
		788.70	33.60		
		1436.80*	66.40	6.13105E+000	1.41910E+000
Ru-106	0.970	621.93*	9.93	2.01781E+000	2.47846E+000
		1050.41	1.56		
Sb-125	0.410	176.31	6.84		
		380.45	1.52		
		427.87	29.60		
		463.36	10.49		
		600.60	17.65		
		606.71*	4.98	4.02347E+000	4.93913E+000
		635.95	11.22		
		671.44	1.79		
Cs-134	0.996	475.36	1.48		
		563.25	8.34		
		569.33	15.37		
		604.72*	97.62	2.05254E-001	2.51932E-001
		795.86	85.46	← No ID in Peak Analysis	
		801.95	8.69		
		1038.61	0.99		
		1167.97	1.79		
		1365.19	3.02		
Bi-214	1.000	609.32*	45.49	4.40468E-001	5.40646E-001
		768.36	4.89		

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 3 of 6

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi / gram)	Activity Uncertainty
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum

@ = Energy line not used for Weighted Mean Activity

! = Nuclide was corrected for parent/daughter

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	W mean Activity (pCi / gram)	W mean Activity Uncertainty
LaBr3	0.526	7.413186E+000	1.370997E+000
X K-40	0.998		
? Ru-106	0.970	2.017813E+000	2.478459E+000
? Sb-125	0.410	4.923470E+000	4.939132E+000
? Cs-134	0.996	2.052538E-001	2.519322E-001
? Bi-214	1.000	4.404678E-001	5.406461E-001

? = 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 2.000 sigma

UNIDENTIFIED PEAKS

Peak Locate Performed on: 5/6/2014 10:02:59 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 2048

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

Interference Corrected Activities Report Page 4 of 6

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty
----------	--------------	--------------------------------	------------------------

All peaks were identified.

NUCLIDE MDA REPORT

Detector Name: Sgc_LaBr_1R5x1R5
Sample Geometry:
Sample Title: MMTC Roof 41
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N
Report Generated on: 5/6/2014 10:03:00 AM

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi / gram)	Nuclide MDA (pCi / gram)	Activity (pCi / gram)	Dec. Level (pCi / gram)
+ LaBr3	34.70*	66.40	2.091E+000	9.17E-001	2.537E+001	1.034E+000
	788.70	33.60	9.172E-001		1.029E-001	4.496E-001
	1436.80*	66.40	2.120E+000		6.131E+000	1.052E+000
K-40	1460.82*	10.66	1.320E+001	1.32E+001	3.819E+001	6.555E+000
Cr-51	320.08	9.91	1.593E+000	1.59E+000	3.296E-002	7.820E-001
Mn-54	834.85	99.98	3.791E-001	3.79E-001	1.541E-001	1.864E-001
Co-58	810.76	99.45	3.738E-001	3.74E-001	4.576E-001	1.838E-001
Co-60	1173.23	99.85	3.571E-001	1.85E-001	1.871E-001	1.743E-001
	1332.49	99.98	1.846E-001		1.180E-001	8.763E-002
Nb-94	702.65	99.81	2.330E-001	2.33E-001	1.371E-002	1.138E-001
	871.09	99.89	3.643E-001		3.863E-001	1.789E-001
Sn-113	255.13	2.11	7.675E+000	2.60E-001	5.593E+000	3.777E+000
	391.70	64.97	2.602E-001		1.459E-001	1.276E-001
+ Cs-134	475.36	1.48	1.274E+001	3.95E-001	3.750E-001	6.237E+000
	563.25	8.34	2.589E+000		5.650E-001	1.267E+000
	569.33	15.37	1.406E+000		2.305E-004	6.880E-001
	604.72*	97.62	4.124E-001		2.053E-001	2.037E-001
	795.86	85.46	3.951E-001		6.611E-001	1.940E-001
	801.95	8.69	4.053E+000		1.707E+000	1.991E+000
	1038.61	0.99	3.185E+001		1.177E+001	1.554E+001
	1167.97	1.79	1.988E+001		1.436E+001	9.707E+000
	1365.19	3.02	5.298E+000		2.846E+000	2.492E+000
Cs-137	661.66	85.10	2.586E-001	2.59E-001	1.677E-001	1.263E-001
Eu-152	121.78	28.67	1.080E+000	6.44E-001	8.843E-003	5.346E-001
	244.70	7.61	2.220E+000		2.438E-001	1.094E+000
	295.94	0.45	3.588E+001		2.599E+001	1.763E+001
	344.28	26.60	6.438E-001		7.033E-001	3.162E-001
	367.79	0.86	1.909E+001		2.795E+001	9.363E+000
	411.12	2.24	7.691E+000		3.347E+000	3.768E+000
	443.96	2.83	6.438E+000		8.589E-001	3.154E+000
	488.68	0.42	4.623E+001		4.965E+000	2.264E+001
	563.99	0.49	4.410E+001		1.872E+001	2.159E+001
	586.26	0.46	4.812E+001		4.351E+001	2.356E+001
	678.62	0.47	4.773E+001		5.347E+001	2.330E+001
	688.67	0.86	2.626E+001		4.111E+001	1.282E+001
	719.35	0.28	8.490E+001		8.547E+001	4.145E+001
	778.90	12.96	2.168E+000		1.510E+000	1.061E+000
	810.45	0.32	1.158E+002		1.417E+002	5.691E+001
	867.37	4.26	8.549E+000		7.011E+000	4.198E+000

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

Nuclide MDA Report Page 5 of 6

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi / gram)	Nuclide MDA (pCi / gram)	Activity (pCi / gram)	Dec. Level (pCi / gram)
	919.33	0.43	8.716E+001		1.559E+000	4.277E+001
	964.08	14.65	2.450E+000		9.163E-001	1.201E+000
	1085.87	10.24	3.055E+000		1.442E+000	1.489E+000
Eu-152	1089.74	1.73	1.829E+001	6.44E-001	3.064E+000	8.918E+000
	1112.07	13.69	2.430E+000		7.322E-001	1.186E+000
	1212.95	1.43	2.482E+001		1.271E+001	1.211E+001
	1249.94	0.19	1.575E+002		5.873E+001	7.642E+001
	1299.14	1.63	1.335E+001		3.253E+000	6.396E+000
	1408.01	21.07	1.923E+000		1.069E+000	9.385E-001
	1457.64	0.50	1.633E+002		6.773E+000	8.066E+001
	1528.10	0.28	4.622E+001		8.743E+000	2.126E+001
Eu-154	123.07	40.40	7.533E-001	7.28E-001	3.182E-002	3.730E-001
	247.93	6.89	2.450E+000		1.264E+000	1.207E+000
	591.76	4.95	4.598E+000		1.216E+000	2.252E+000
	692.42	1.78	1.288E+001		1.801E+000	6.291E+000
	723.30	20.06	1.176E+000		1.220E-001	5.738E-001
	756.80	4.52	5.324E+000		4.390E+000	2.597E+000
	873.18	12.08	3.027E+000		2.016E-002	1.486E+000
	996.29	10.48	3.293E+000		1.502E+000	1.612E+000
	1004.76	18.01	1.887E+000		1.628E-001	9.227E-001
	1274.43	34.80	7.280E-001		8.951E-002	3.511E-001
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.134E+002	1.82E+000	7.245E+000	5.611E+001
	80.01	1.22	1.074E+002		1.588E+001	5.306E+001
	86.55	30.70	1.817E+000		4.235E-001	8.999E-001
	105.31	21.10	1.870E+000		1.685E-001	9.260E-001
Tl-208	583.19	85.00	2.596E-001	2.60E-001	3.070E-001	1.271E-001
Bi-211	351.07	13.02	1.335E+000	1.34E+000	1.473E+000	6.558E-001
Pb-211	404.85	3.78	4.531E+000	4.53E+000	3.348E+000	2.220E+000
	427.09	1.76	1.017E+001		7.020E+000	4.985E+000
	832.01	3.52	1.075E+001		3.319E+000	5.286E+000
Bi-212	39.86	1.06	1.593E+002	3.57E+000	1.590E+003	7.889E+001
	727.33	6.67	3.565E+000		2.887E+000	1.740E+000
	785.37	1.10	2.709E+001		1.086E+000	1.327E+001
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	5.627E+001	3.98E-001	3.973E+001	2.786E+001
	238.63	43.60	3.978E-001		2.387E-001	1.961E-001
	300.09	3.30	4.823E+000		3.546E+000	2.369E+000
Pb212-XR	74.82	10.28	7.739E+000	4.30E+000	2.818E-002	3.830E+000
	77.11	17.10	4.300E+000		5.095E-001	2.128E+000
	87.35	3.97	1.370E+001		3.805E+000	6.785E+000
	89.78	1.46	3.532E+001		3.952E+001	1.749E+001
Bi-214	609.32	45.49	8.851E-001	8.85E-001	4.405E-001	4.372E-001
	768.36	4.89	5.179E+000		1.296E+001	2.529E+000
	806.18	1.26	2.875E+001		4.396E+001	1.413E+001
	934.06	3.11	1.206E+001		1.077E+001	5.916E+000
	1120.29	14.92	2.257E+000		1.650E+000	1.101E+000
	1155.21	1.63	2.185E+001		1.322E+001	1.087E+001
	1238.12	5.83	5.530E+000		7.272E+000	2.690E+000
	1280.98	1.43	1.669E+001		2.583E+001	8.029E+000
	1377.67	3.99	4.399E+000		7.178E+000	2.080E+000
	1385.31	0.79	2.652E+001		4.469E+001	1.265E+001
	1401.52	1.33	2.500E+001		1.813E+001	1.214E+001
	1407.99	2.39	1.693E+001		9.410E+000	8.260E+000

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports

Nuclide MDA Report Page 6 of 8

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi / gram)	Nuclide MDA (pCi / gram)	Activity (pCi / gram)	Dec. Level (pCi / gram)
+ Bi-214	1509.21	2.13	1.520E+001	8.85E-001	8.953E+000	7.359E+000
>	1681.27	1.05	0.000E+000		0.000E+000	0.000E+000
>	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
Pb-214	241.99	7.25	2.361E+000	4.87E-001	4.125E-001	1.164E+000
	295.22	18.42	8.699E-001		3.634E-001	4.275E-001
	351.93	35.60	4.867E-001		3.601E-001	2.391E-001
	785.98	1.06	2.830E+001		8.047E+000	1.387E+001
Pb214-XR	74.82	5.80	1.372E+001	7.58E+000	4.995E-002	6.788E+000
	77.11	9.70	7.580E+000		8.983E-001	3.752E+000
	87.35	2.24	2.429E+001		6.744E+000	1.203E+001
	89.78	0.82	6.289E+001		7.036E+001	3.114E+001
Ra-226	186.21	3.64	5.456E+000	5.46E+000	8.922E-001	2.696E+000
Ac-228	129.07	2.42	1.180E+001	1.44E+000	1.810E+000	5.840E+000
	209.25	3.89	4.922E+000		1.989E+000	2.431E+000
	270.24	3.46	4.631E+000		5.040E-003	2.278E+000
	328.00	2.95	5.368E+000		7.935E-001	2.634E+000
	338.32	11.27	1.454E+000		1.638E-002	7.140E-001
	409.46	1.92	8.974E+000		1.009E+000	4.397E+000
	463.00	4.40	4.160E+000		1.432E+000	2.037E+000
	794.95	4.25	7.736E+000		7.606E+000	3.796E+000
	911.20	25.80	1.444E+000		1.148E+000	7.088E-001
	964.77	4.99	7.190E+000		2.636E+000	3.523E+000
	968.97	15.80	2.248E+000		2.703E-001	1.101E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	1.512E-001	1.51E-001	0.000E+000	0.000E+000
	283.69	1.70	9.414E+000		1.241E-002	4.828E+000
	300.07	2.47	6.443E+000		4.738E+000	3.165E+000
	302.65	2.20	7.189E+000		2.258E-001	3.531E+000
	330.06	1.40	1.134E+001		5.915E+000	5.565E+000
Th-234	92.38	2.13	2.265E+001	2.27E+001	1.343E+001	1.121E+001
	92.80	2.10	2.280E+001		1.352E+001	1.129E+001
	112.81	0.21	1.649E+002		1.707E+001	8.162E+001
U-235	143.76	10.96	2.231E+000	3.49E-001	4.275E-002	1.104E+000
	163.33	5.08	4.354E+000		9.054E-001	2.153E+000
	185.71	57.20	3.487E-001		4.222E-002	1.723E-001
	202.11	1.08	1.726E+001		1.393E+001	8.519E+000
	205.31	5.01	3.861E+000		2.751E+000	1.907E+000
Am-241	59.54	35.90	3.742E+000	3.74E+000	5.534E-001	1.849E+000

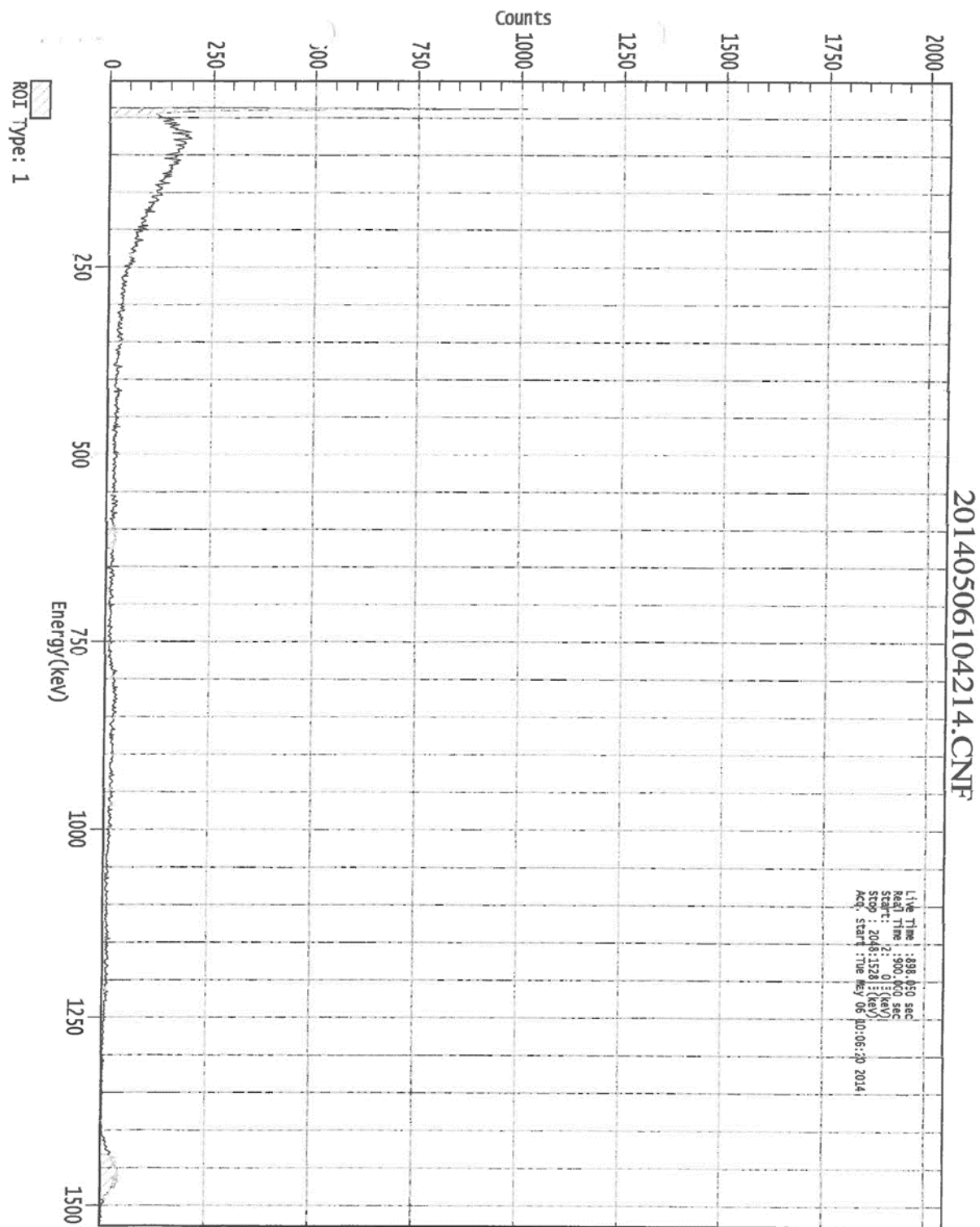
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-11 09400 Gamma Spectroscopy Reports



Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

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***** GAMMA SPECTRUM ANALYSIS *****

Filename: C:\Canberra\9-20-17\20170920105733.cnf

Report Generated On : 9/20/2017 10:48:08 AM

Sample Title : SUID 09800 NGet Pad
Sample Description : Grid 3 B109800VJFC015
Sample Identification : 09800
Sample Type :
Sample Geometry : SOIL
Sample Location : B109800AVJFC015

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 512
Peak Area Range (in channels) : 85 - 512
Identification Energy Tolerance : 1.000 keV

Sample Size : 1.000E+000 GRAMS

Sample Taken On : 9/20/2017 10:38:43 AM
Acquisition Started : 9/20/2017 10:38:43 AM

Live Time : 596.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.55 %

Energy Calibration Used Done On : 9/30/2015
Efficiency Calibration Used Done On : 7/26/2017
Efficiency ID : UTES_AT_6_INCHES

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst Deby Billman

Date 9-20-17

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

SURVEY # 2017-URS-0-025

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~~Page 2~~

Peak Analysis Report

9/20/2017 10:48:08 AM

***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc_LaBr_1R5x1R5
Sample Title: SUID 09800 NGet Pad
Peak Analysis Performed on: 9/20/2017 10:48:08 AM
Peak Analysis From Channel: 85
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	148-	165	153.35	458.91	27.60	2.56E+003	408.53	1.15E+004
2	205-	235	220.60	660.68	24.16	6.42E+004	575.33	3.82E+003
3	464-	504	485.98	1456.92	45.70	1.92E+003	103.71	1.27E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

SURVEY#2017-URS-0-025

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Interference Corrected Activity Report 9/20/2017 10:48:08 AM Page 3

***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: SUID 09800 NGet Pad
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/GRAM)	Activity Uncertainty
Cs-137	0.858	661.66*	85.10	5.19225E+007	6.25285E+006

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

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

SURVEY# 2017 - URS - 0 - 025 Page 10 of 12
Interference Corrected Activity Report 9/20/2017 10:48:08 AM Page 4

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/GRAM)	Wt mean Activity Uncertainty
Cs-137	0.858	5.192253E+007	6.252846E+006

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 9/20/2017 10:48:08 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	458.91	4.2876E+000	15.97		
3	1456.92	3.2132E+000	5.41		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Nuclide MDA Report
5

SURVEY# 2017-URS-0-025
9/20/2017 10:48:08 AM

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Page

NUCLIDE MDA REPORT

Detector Name: Sgc_LaBr_1R5x1R5
Sample Geometry: SOIL
Sample Title: SUID 09800 NGet Pad
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

Level	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GRAM)	Nuclide MDA (pCi/GRAM)	Activity (pCi/GRAM)	Dec.
006	K-40	1460.82	10.66	2.261E+006	2.26E+006	1.732E+007	1.117E+
004	Co-60	1173.23	99.85	1.884E+005	1.85E+005	6.523E+005	9.285E+
004		1332.49	99.98	1.851E+005		-2.250E+005	9.114E+
005	Nb-94	702.65	99.81	8.772E+005	2.21E+005	-3.187E+005	4.376E+
005		871.09	99.89	2.206E+005		5.423E+005	1.092E+
005	Ag-108m	433.90	90.50	5.352E+005	5.35E+005	5.229E+006	2.668E+
005		614.30	89.80	9.263E+005		-3.217E+005	4.622E+
005		722.90	90.80	9.696E+005		-2.562E+005	4.837E+
005	Cs-134	604.72	97.62	8.341E+005	2.29E+005	-4.567E+005	4.161E+
005		795.86	85.46	2.288E+005		8.919E+003	1.132E+
005	Cs-137	661.66*	85.10	3.654E+005	3.65E+005	5.192E+007	1.816E+
005	Eu-152	121.78	28.67	1.634E+006	1.16E+006	4.032E+006	8.150E+
005		344.28	26.60	1.622E+006		-3.740E+006	8.088E+
005		1408.01	21.07	1.160E+006		9.327E+006	5.731E+
005	Eu-154	123.07	40.40	1.153E+006	4.60E+005	2.333E+006	5.753E+
006		723.30	20.06	4.390E+006		-1.160E+006	2.190E+
005		1274.43	34.80	4.603E+005		-7.092E+005	2.262E+
005	Eu-155	86.55	30.70	1.392E+006	1.39E+006	9.009E+006	6.944E+

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Page

005		105.31	21.10	2.048E+006		5.980E+006	1.
006	Tl-208	583.19	85.00	6.659E+005	6.66E+005	-1.196E+006	3.319E+
005	Bi-212	727.33	6.67	1.317E+007	1.32E+007	-3.361E+006	6.568E+
006	Pb-212	238.63	43.60	1.033E+006	1.03E+006	3.791E+006	5.152E+
005	Bi-214	609.32	45.49	1.818E+006	1.29E+006	-8.707E+005	9.069E+
005		1120.29	14.92	1.293E+006		7.582E+005	6.378E+
005	>	1764.49	15.30	0.000E+000		0.000E+000	0.000E+
000	Pb-214	295.22	18.42	2.289E+006	1.21E+006	-8.834E+006	1.141E+
006		351.93	35.60	1.214E+006		-3.561E+006	6.051E+
005	Ra-226	186.21	3.64	1.287E+007	1.29E+007	8.418E+007	6.419E+
006	Ac-228	338.32	11.27	3.830E+006	8.48E+005	-8.204E+006	1.910E+
006		911.20	25.80	8.478E+005		1.342E+006	4.195E+
005		968.97	15.80	1.342E+006		8.446E+005	6.634E+
005	Am-241	59.54	35.90	9.703E+005	9.70E+005	1.573E+007	4.837E+
005							

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or
 the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Survey# 2017-URS-O-026

***** GAMMA SPECTRUM ANALYSIS *****

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Filename: C:\Canberra\9-20-17\20170920105733.cnf

Report Generated On : 9/20/2017 10:48:08 AM

Sample Title : SUID 09800 NGet Pad
Sample Description : Grid 3 B109800VJFC015
Sample Identification : 09800
Sample Type :
Sample Geometry : SOIL
Sample Location : B109800AVJFC015

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 85 - 512
Peak Area Range (in channels) : 85 - 512
Identification Energy Tolerance : 1.000 keV

Sample Size : 1.000E+000 GRAMS

Sample Taken On : 9/20/2017 10:38:43 AM
Acquisition Started : 9/20/2017 10:38:43 AM

Live Time : 596.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.55 %

Energy Calibration Used Done On : 9/30/2015
Efficiency Calibration Used Done On : 7/26/2017
Efficiency ID : UTES_AT_6_INCHES

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst Jicky Baldwin
Date 9-20-17

COPY

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Peak Analysis Report

SURVEY # 2017-URS-0-026
Page 2
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9/20/2017 10:48:08 AM

***** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc_LaBr_1R5x1R5
Sample Title: SUID 09800 NGet Pad
Peak Analysis Performed on: 9/20/2017 10:48:08 AM
Peak Analysis From Channel: 85
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	148-	165	153.35	458.91	27.60	2.56E+003	408.53	1.15E+004
2	205-	235	220.60	660.68	24.16	6.42E+004	575.33	3.82E+003
3	464-	504	485.98	1456.92	45.70	1.92E+003	103.71	1.27E+002

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

COPY

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Survey # 2017-URS-0-026

Interference Corrected Activity Report 9/20/2017 10:48:08 AM Page 3

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***** N U C L I D E I D E N T I F I C A T I O N R E P O R T *****

Sample Title: SUID 09800 NGet Pad
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

***** IDENTIFIED NUCLIDES *****

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/GRAM)	Activity Uncertainty
Cs-137	0.858	661.66*	85.10	5.19225E+007	6.25285E+006

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

GOF7

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

SURVEY # 2017-URS-0-026

Interference Corrected Activity Report 9/20/2017 10:48:08 AM ~~Page 4~~

PAGE 15 OF 17

***** INTERFERENCE CORRECTED REPORT *****

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/GRAM)	Wt mean Activity Uncertainty
Cs-137	0.858	5.192253E+007	6.252846E+006

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 9/20/2017 10:48:08 AM
Peak Locate From Channel: 85
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
1	458.91	4.2876E+000	15.97		
3	1456.92	3.2132E+000	5.41		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

CONFIDENTIAL

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

Nuclide MDA Report
5

SURVEY # 2017-URS-0-026
9/20/2017 10:48:08 AM Page

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NUCLIDE MDA REPORT

Detector Name: Sgc LaBr_1R5x1R5
Sample Geometry: SOIL
Sample Title: SUID 09800 NGet Pad
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL.NLB

Level	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/GRAM)	Nuclide MDA (pCi/GRAM)	Activity (pCi/GRAM)	Dec-
006	K-40	1460.82	10.66	2.261E+006	2.26E+006	1.732E+007	1.117E+
004	Co-60	1173.23	99.85	1.884E+005	1.85E+005	6.523E+005	9.285E+
004		1332.49	99.98	1.851E+005		-2.250E+005	9.114E+
005	Nb-94	702.65	99.81	8.772E+005	2.21E+005	-3.187E+005	4.376E+
005		871.09	99.89	2.206E+005		5.423E+005	1.092E+
005	Ag-108m	433.90	90.50	5.352E+005	5.35E+005	5.229E+006	2.668E+
005		614.30	89.80	9.263E+005		-3.217E+005	4.622E+
005		722.90	90.80	9.696E+005		-2.562E+005	4.837E+
005	Cs-134	604.72	97.62	8.341E+005	2.29E+005	-4.567E+005	4.161E+
005		795.86	85.46	2.288E+005		8.919E+003	1.132E+
005	Cs-137	661.66*	85.10	3.654E+005	3.65E+005	5.192E+007	1.816E+
005	Eu-152	121.78	28.67	1.634E+006	1.16E+006	4.032E+006	8.150E+
005		344.28	26.60	1.622E+006		-3.740E+006	8.088E+
005		1408.01	21.07	1.160E+006		9.327E+006	5.731E+
005	Eu-154	123.07	40.40	1.153E+006	4.60E+005	2.333E+006	5.753E+
006		723.30	20.06	4.390E+006		-1.160E+006	2.190E+
005		1274.43	34.80	4.603E+005		-7.092E+005	2.262E+
005	Eu-155	86.55	30.70	1.392E+006	1.39E+006	9.009E+006	6.944E+

Attachment Figure 2-12 09800 Gamma Spectroscopy Reports

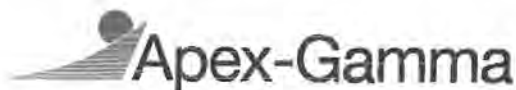
SURVEY # 2017-URS-0-026
PAGE 17 OF 17

005		105.31	21.10	2.048E+006		5.980E+006	1.022E+
006							
005	Tl-208	583.19	85.00	6.659E+005	6.66E+005	-1.196E+006	3.319E+
006							
005	Bi-212	727.33	6.67	1.317E+007	1.32E+007	-3.361E+006	6.568E+
006							
005	Pb-212	238.63	43.60	1.033E+006	1.03E+006	3.791E+006	5.152E+
006							
005	Bi-214	609.32	45.49	1.818E+006	1.29E+006	-8.707E+005	9.069E+
006							
005		1120.29	14.92	1.293E+006		7.582E+005	6.378E+
006							
000	>	1764.49	15.30	0.000E+000		0.000E+000	0.000E+
006							
005	Pb-214	295.22	18.42	2.269E+006	1.21E+006	-8.834E+006	1.141E+
006							
005		351.93	35.60	1.214E+006		-3.561E+006	6.051E+
006							
005	Ra-226	186.21	3.64	1.287E+007	1.29E+007	8.418E+007	6.419E+
006							
006	Ac-228	338.32	11.27	3.830E+006	8.48E+005	-8.204E+006	1.910E+
005							
006		911.20	25.80	8.478E+005		1.342E+006	4.195E+
005							
006		968.97	15.80	1.342E+006		8.446E+005	6.634E+
005							
006	Am-241	59.54	35.90	9.703E+005	9.70E+005	1.573E+007	4.837E+

+ = Nuclide identified during the nuclide identification
 * = Energy line found in the spectrum
 > = Calculated MDA is zero due to zero counts in the region, or the region is outside the spectrum, or MDA has not been calculated
 @ = Half-life too short to be able to perform the decay correction

COPY

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports



7/15/2015 10:55:12AM

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Analysis Report for 15-Jul-15-10008
0220BIS1VS01 NOT DRIED

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 15-Jul-15-10008
Sample Description	: 0220BIS1VS01 NOT DRIED ← & 7/15/2015
Sample Type	: Miscellaneous
Unit	:
Sample Point	:
Sample Size	: 1.327E+03 grams
Facility	: Default
Sample Taken On	: 7/14/2015 2:00:00PM
Acquisition Started	: 7/15/2015 10:24:36AM
Procedure	: 130G Oil
Operator	: Administrator
Detector Name	: P40818B
Geometry	: 130G Oil
Live Time	: 1800.0 seconds
Real Time	: 1800.6 seconds
Dead Time	: 0.03 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/9/2014
Efficiency Calibration Used Done On	: 1/5/2015
Efficiency Calibration Description	:
Sample Number	: 12678

Handwritten notes:
4/20/2015 7-15-15
10-20-15 7/15/15
J.P. Wald 7-15-15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 7/15/2015 10:54:39AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Handwritten notes:
Cs-137 4.51E-02 pCi/gram

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10008
0220BIS1VS01 NOT DRIED

	Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
M	1	75.00	298 -	315	300.84	3.20E+01	18.83	1.47E+02	Pb214-XR
m	2	77.23	298 -	315	309.74	5.88E+01	22.96	1.77E+02	Pb212-XR
	3	185.93	739 -	750	744.05	4.18E+01	39.01	2.70E+02	Pb214-XR
									Pb212-XR
									U-235
M	4	238.83	948 -	972	955.48	2.10E+02	33.35	1.65E+02	Ra-226
m	5	242.02	948 -	972	968.21	4.39E+01	18.64	1.26E+02	Pb-212
	6	295.35	1175 -	1186	1181.34	9.22E+01	30.50	1.12E+02	Pb-214
									Eu-152
	7	352.09	1401 -	1414	1408.11	1.73E+02	33.68	9.22E+01	Pb-214
									Bi-211
	8	511.13	2039 -	2053	2043.93	6.09E+01	26.48	9.02E+01	.....
	9	583.45	2327 -	2342	2333.11	7.83E+01	22.98	4.15E+01	Tl-208
	10	609.68	2429 -	2446	2437.98	1.19E+02	27.93	5.41E+01	Bi-214
	11	662.17	2642 -	2655	2647.90	4.28E+01	18.37	3.43E+01	Cs-137
	12	912.17	3640 -	3655	3647.93	5.02E+01	17.15	1.96E+01	Ac-228
	13	1461.65	5836 -	5858	5847.54	3.79E+02	40.03	1.64E+01	K-40
	14	1765.94	7060 -	7074	7066.57	3.02E+01	11.25	1.52E+00	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
K-40	0.95	1460.82 *	10.66	5.57E+00	7.62E-01	miss
Cs-137	0.98	661.66 *	85.10	4.51E-02	2.01E-02	miss
Tl-208	0.99	583.19 *	85.00	7.55E-02	2.39E-02	miss
Pb-212	0.99	115.18	0.60			
		238.63 *	43.60	2.11E-01	4.78E-02	miss
		300.09	3.30			
Pb212-XR	0.99	74.82 *	10.28	3.78E-01	2.36E-01	miss
		77.11 *	17.10	3.75E-01	1.65E-01	miss
		87.35	3.97			

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10008
0220BIS1VS01 NOT DRIED

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	CoInc Corr
Pb212-XR	0.99	89.78	1.46			
Bi-214	0.97	609.32 *	45.49	2.21E-01	5.83E-02	miss
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	3.60E-01	1.37E-01	miss
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.99	241.99 *	7.25	2.68E-01	1.21E-01	miss
		295.22 *	18.42	2.53E-01	9.29E-02	miss
		351.93 *	35.60	2.76E-01	6.95E-02	miss
		785.96	1.06			
Ra-226	0.99	186.21 *	3.64	4.43E-01	4.20E-01	miss
Ac-228	0.46	129.07	2.42			
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32	11.27			
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20 *	25.80	2.19E-01	7.70E-02	miss
		964.77	4.99			
		968.97	15.80			
		1588.20	3.22			
U-235	0.99	143.76	10.96			
		163.33	5.08			
		185.71 *	57.20	2.82E-02	2.67E-02	miss
		202.11	1.08			
		205.31	5.01			

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

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

7/15/2015 10:55:12AM

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Analysis Report for 15-Jul-15-10008

0220BIS1VS01 NOT DRIED

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.957	5.57E+00	7.62E-01	
Cs-137	0.983	4.51E-02	2.01E-02	
Tl-208	0.995	7.55E-02	2.39E-02	
X Bi-211	0.936			
Pb-212	0.998	2.11E-01	4.78E-02	
Pb212-XR	0.999	3.76E-01	1.35E-01	
Bi-214	0.978	2.42E-01	5.37E-02	
Pb-214	0.999	2.68E-01	5.06E-02	
X Pb214-XR	0.999			
? Ra-226	0.995	4.43E-01	4.20E-01	
As-228	0.465	2.19E-01	7.70E-02	
? U-235	0.998	2.82E-02	2.67E-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

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

7/15/2015 10:55:12AM

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Analysis Report for 15-Jul-15-10008
0220BIS1VS01 NOT DRIED

UNIDENTIFIED PEAKS

Peak Locate Performed on : 7/15/2015 10:54:39AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
8	511.13	3.38470E-02	21.73		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	*	10.66	5.57E+00	2.65E-01	2.65E-01 miss
+	Cr-51	320.08		9.91	-3.43E-03	1.59E-01	1.59E-01 free
+	Mn-54	834.85		99.98	-6.75E-04	1.99E-02	1.99E-02 miss
+	Co-58	810.76		99.45	-8.11E-03	1.26E-02	1.26E-02 miss
		1674.73		0.52	1.26E+00	4.80E+00	miss
+	Co-60	1173.23		99.85	1.19E-02	1.75E-02	3.22E-02 miss
		1332.49		99.98	-5.52E-03	1.75E-02	miss
+	Nb-94	702.65		99.81	2.90E-03	1.81E-02	1.94E-02 miss
		871.09		99.89	2.90E-03	1.81E-02	miss
+	Sn-113	255.13		2.11	-8.57E-03	2.38E-02	6.60E-01 free
		391.70		64.97	6.28E-03	2.38E-02	free
+	Cs-134	475.36		1.48	-2.30E-01	1.68E-02	9.02E-01 miss
		563.25		8.34	4.28E-02	2.15E-01	miss
		569.33		15.37	8.24E-03	1.05E-01	miss
		604.72		97.62	1.90E-03	1.68E-02	miss
		795.86		85.46	6.91E-03	2.74E-02	miss
		801.95		8.69	1.73E-02	1.97E-01	miss
		1038.61		0.99	6.84E-01	2.25E+00	miss

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

Analysis Report for		15-Jul-15-10008		7/15/2015 10:55:12AM		Page 6 of 8	
0220BIS1VS01 NOT DRIED							
	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Cs-134	1167.97	1.79	-1.66E-01	1.68E-02	1.30E+00	miss
		1365.19	3.02	-1.55E-01		5.31E-01	miss
+	Cs-137	661.66	* 85.10	4.51E-02	2.52E-02	2.52E-02	miss
+	Eu-152	121.78	28.67	3.34E-02	5.84E-02	6.96E-02	miss
		244.70	7.61	1.22E-01		1.99E-01	miss
		295.94	0.45	-6.77E-01		6.20E+00	miss
		344.28	26.60	-2.97E-02		5.84E-02	miss
		367.79	0.86	2.95E-01		1.77E+00	miss
		411.12	2.24	2.03E-01		7.78E-01	miss
		443.96	2.83	6.60E-02		6.18E-01	miss
		488.68	0.42	-5.27E-02		3.56E+00	miss
		563.99	0.49	-1.14E+00		3.28E+00	miss
		586.26	0.46	-5.25E-01		3.37E+00	miss
		678.62	0.47	1.67E-01		3.77E+00	miss
		688.67	0.86	4.79E-01		2.52E+00	miss
		719.35	0.28	4.15E+00		8.18E+00	miss
		778.90	12.96	4.52E-03		1.23E-01	miss
		810.45	0.32	3.06E-02		4.83E+00	miss
		867.37	4.26	4.13E-02		4.03E-01	miss
		919.33	0.43	1.85E+00		5.63E+00	miss
		964.08	14.65	-4.21E-02		1.55E-01	miss
		1085.87	10.24	3.52E-02		2.33E-01	miss
		1089.74	1.73	2.25E-01		1.52E+00	miss
		1112.07	13.69	-9.72E-03		1.64E-01	miss
		1212.95	1.43	-3.24E-02		1.74E+00	miss
		1249.94	0.19	-9.32E-01		1.39E+01	miss
		1299.14	1.63	-5.54E-02		1.54E+00	miss
		1408.01	21.07	3.10E-03		1.02E-01	miss
		1457.64	0.50	-6.75E+00		4.93E+00	miss
		1528.10	0.28	-2.06E-01		6.92E+00	miss
+	Eu-154	123.07	40.40	-1.43E-02	4.62E-02	4.62E-02	miss
		247.93	6.89	1.03E-01		2.26E-01	miss
		591.76	4.95	1.12E-02		3.47E-01	miss
		692.42	1.78	9.55E-02		1.01E+00	miss
		723.30	20.06	-2.62E-02		9.26E-02	miss
		756.80	4.52	1.34E-01		4.89E-01	miss
		873.18	12.08	-1.05E-02		1.43E-01	miss
		996.29	10.48	2.89E-02		1.99E-01	miss
		1004.76	18.01	1.59E-04		1.00E-01	miss
		1274.43	34.80	-1.29E-02		5.33E-02	miss
		1596.48	1.80	-2.27E-01		1.01E+00	miss
+	Eu-155	45.30	1.31	-4.89E-01	9.82E-02	7.72E+00	miss
		60.01	1.22	5.48E+00		1.12E+01	miss
		86.55	30.70	1.56E-03		1.05E-01	miss
		105.31	21.10	-2.99E-02		9.82E-02	miss
+	Tl-208	583.19	* 85.00	7.55E-02	2.59E-02	2.59E-02	miss
+	Bi-211	351.07	* 13.02	7.54E-01	1.63E-01	1.63E-01	miss
+	Pb-211	404.85	3.78	2.29E-02	4.55E-01	4.55E-01	miss
		427.09	1.76	-1.49E-02		8.55E-01	miss
		832.01	3.52	-7.22E-02		5.62E-01	miss
+	Bi-212	39.86	1.06	6.04E-01	3.45E-01	9.65E+00	miss

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10008

0220BIS1VS01 NOT DRIED

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Bi-212	727.33	6.67	1.33E-01	3.45E-01	3.45E-01	miss
	785.37	1.10	2.06E-01		1.73E+00	miss
	1620.50	1.47	1.74E-01		1.07E+00	miss
+ Pb-212	115.18	0.60	-9.60E-01	4.52E-02	3.40E+00	miss
	238.63	* 43.60	2.11E-01		4.52E-02	miss
	300.09	3.30	3.01E-01		5.95E-01	miss
+ Pb212-XR	74.82	* 10.28	3.78E-01	2.96E-01	5.03E-01	miss
	77.11	* 17.10	3.75E-01		2.96E-01	miss
	87.35	3.97	5.20E-01		8.28E-01	miss
	89.78	1.46	6.96E-01		1.99E+00	miss
+ Bi-214	609.32	* 45.49	2.21E-01	5.84E-02	5.84E-02	miss
	768.36	4.89	2.07E-01		5.18E-01	miss
	806.18	1.26	4.07E-01		1.59E+00	miss
	934.06	3.11	2.35E-01		6.67E-01	miss
	1120.29	14.92	2.16E-01		2.69E-01	miss
	1155.21	1.63	1.30E-01		1.77E+00	miss
	1238.12	5.83	3.73E-02		5.59E-01	miss
	1280.98	1.43	6.87E-02		1.49E+00	miss
	1377.67	3.99	1.78E-01		7.06E-01	miss
	1385.31	0.79	2.48E-01		2.67E+00	miss
	1401.52	1.33	-1.30E-01		1.23E+00	miss
	1407.99	2.39	2.73E-02		8.97E-01	miss
	1509.21	2.13	-3.24E-02		1.13E+00	miss
	1661.27	1.05	7.89E-03		1.78E+00	miss
	1729.59	2.88	2.63E-01		9.88E-01	miss
	1764.49	* 15.30	3.60E-01		7.82E-02	miss
	1847.43	2.03	8.11E-02		8.60E-01	miss
>	2118.51	1.16	0.00E+00		0.00E+00	miss
+ Pb-214	241.99	* 7.25	2.68E-01	5.95E-02	2.41E-01	miss
	295.22	* 18.42	2.53E-01		1.14E-01	miss
	351.93	* 35.60	2.76E-01		5.95E-02	miss
	785.96	1.06	-3.97E-01		1.59E+00	miss
+ Pb214-XR	74.82	* 5.80	6.70E-01	5.22E-01	8.92E-01	miss
	77.11	* 9.70	6.61E-01		5.22E-01	miss
	87.35	2.24	9.21E-01		1.47E+00	miss
	89.78	0.82	1.24E+00		3.55E+00	miss
+ Ra-226	186.21	* 3.64	4.43E-01	6.71E-01	6.71E-01	miss
+ Ac-228	129.07	2.42	6.18E-03	8.10E-02	6.90E-01	miss
	209.25	3.89	1.02E-01		4.42E-01	miss
	270.24	3.46	1.18E-01		5.41E-01	miss
	328.00	2.95	3.79E-01		6.48E-01	miss
	338.32	11.27	1.88E-01		2.07E-01	miss
	409.46	1.92	1.96E-02		8.59E-01	miss
	463.00	4.40	5.57E-02		4.24E-01	miss
	794.95	4.25	3.32E-01		5.64E-01	miss
	911.20	* 25.80	2.19E-01		8.10E-02	miss
	964.77	4.99	-1.62E-01		4.71E-01	miss
	968.97	15.80	3.55E-02		2.03E-01	miss
	1588.20	3.22	1.11E-01		6.82E-01	miss
+ Pa-231	27.36	10.30	2.56E-01	6.96E-01	1.10E+00	miss
	283.69	1.70	-3.40E-01		9.61E-01	miss

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 15-Jul-15-10008
0220BIS1VS01 NOT DRIED

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
	Pa-231	300.07	2.47	4.02E-01	6.96E-01	7.94E-01	miss
		302.65	2.20	-2.27E-01		6.96E-01	miss
		330.06	1.40	-4.49E-01		1.14E+00	miss
+	Th-234	92.38	2.13	1.53E-01	1.45E+00	1.45E+00	miss
		92.80	2.10	8.38E-01		1.53E+00	miss
		112.81	0.21	1.28E+00		9.65E+00	miss
+	U-235	143.76	10.96	9.53E-03	4.27E-02	1.68E-01	miss
		163.33	5.08	8.12E-02		3.31E-01	miss
		185.71	* 57.20	2.82E-02		4.27E-02	miss
		202.11	1.08	-1.03E+00		1.23E+00	miss
		205.31	5.01	-7.07E-02		2.99E-01	miss
+	Am-241	59.54	35.90	1.53E-02	3.69E-01	3.69E-01	miss

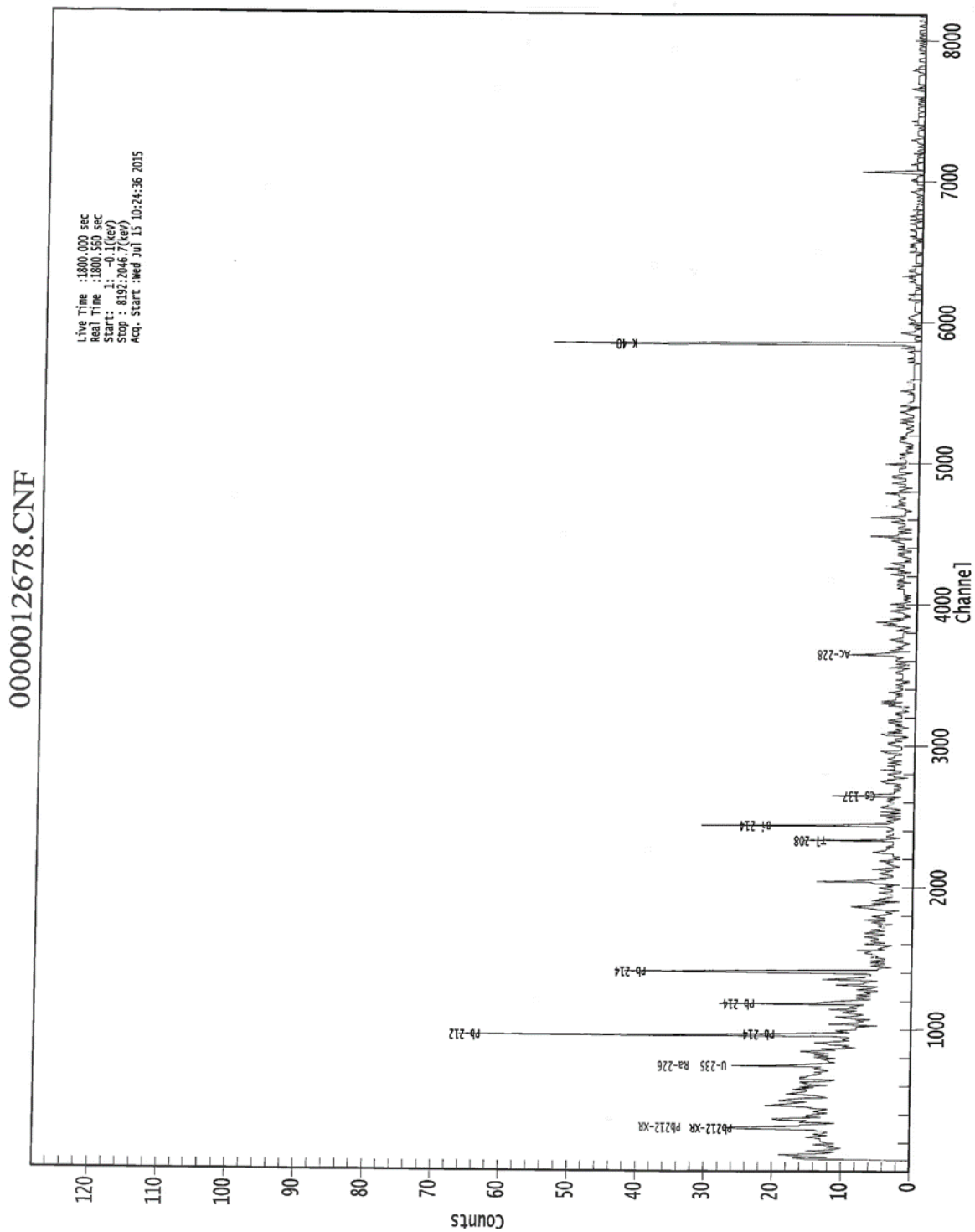
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports



Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports



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Analysis Report for 04-Aug-15-10001
0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

GAMMA SPECTRUM ANALYSIS

Sample Identification : 04-Aug-15-10001
Sample Description : 0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION
Sample Type : Miscellaneous
Unit :
Sample Point :

8/4/2015

Sample Size : 2.091E+02 grams
Facility : Default

Sample Taken On : 7/14/2015 10:00:00AM
Acquisition Started : 8/4/2015 6:19:14AM

Procedure : 538G Soil
Operator : Administrator
Detector Name : DET02
Geometry : 538G Soil 2
Live Time : 1800.0 seconds
Real Time : 1801.1 seconds

MEG 8/4/15

Dead Time : 0.06 %

Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM

8-4-15

Energy Calibration Used Done On : 12/3/2014
Efficiency Calibration Used Done On : 12/12/2012
Efficiency Calibration Description :

Sample Number : 12775

CS-137 1.81E-01 pCi/gram

PEAK WITH NID REPORT

Peak Analysis Performed on : 8/4/2015 6:49:18AM

Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 04-Aug-15-10001

0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	230.00	917 -	924	920.76	1.51E+01	17.36	6.58E+01	.....
2	238.49	946 -	961	954.72	1.73E+02	41.01	1.88E+02	Pb-212
3	295.18	1175 -	1187	1181.31	1.20E+02	29.64	8.64E+01	Pb-214
								Eu-152
4	338.37	1348 -	1359	1354.01	3.26E+01	21.41	8.08E+01	Ac-228
5	351.91	1399 -	1415	1408.14	1.65E+02	33.35	9.32E+01	Pb-214
								Bi-211
6	510.56	2036 -	2050	2042.45	6.10E+01	25.55	9.00E+01	.....
7	583.02	2325 -	2338	2332.25	5.71E+01	22.54	6.99E+01	Tl-208
8	609.23	2429 -	2445	2437.09	1.49E+02	31.09	8.34E+01	Bi-214
9	661.36	2639 -	2653	2645.57	6.05E+01	20.32	4.09E+01	Cs-137
10	860.06	3434 -	3447	3440.44	1.56E+01	12.16	2.27E+01	.....
11	911.12	3637 -	3654	3644.74	6.68E+01	19.07	2.25E+01	Ac-228
12	968.54	3868 -	3881	3874.52	3.17E+01	16.36	3.67E+01	Ac-228
13	1120.06	4474 -	4487	4480.89	3.08E+01	16.13	3.84E+01	Bi-214
14	1460.59	5830 -	5857	5844.23	5.06E+02	46.74	3.10E+01	K-40
15	1764.29	7052 -	7069	7060.67	2.25E+01	12.27	1.50E+01	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	CoInc Corr
K-40	0.99	1460.82 *	10.66	1.84E+01	2.33E+00	miss
Cs-137	0.99	661.66 *	85.10	1.81E-01	6.45E-02	miss
Tl-208	0.99	583.19 *	85.00	1.85E-01	7.63E-02	0.896
Pb-212	0.99	115.18	0.60			
		238.63 *	43.60	6.15E-01	1.76E-01	free
		300.09	3.30			
Bi-214	0.99	609.32 *	45.49	8.93E-01	2.15E-01	0.918
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29 *	14.92	7.78E-01	4.12E-01	0.914

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 04-Aug-15-10001

0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/grams)	Activity Uncertainty	Coinc Corr
Bi-214	0.99	1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	6.41E-01	3.54E-01	1.003
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.80	241.99	7.25			
		295.22 *	18.42	1.10E+00	3.25E-01	1.000
		351.93 *	35.60	8.48E-01	2.18E-01	free
		785.96	1.06			
Ac-228	0.99	129.07	2.42			
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32 *	11.27	5.30E-01	3.59E-01	0.986
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20 *	25.80	7.91E-01	2.36E-01	0.985
		964.77	4.99			
		968.97 *	15.80	6.33E-01	3.32E-01	0.985
		1588.20	3.22			

* = Energy line found in the spectrum.
 - = Manually added nuclide.
 ? = Manually edited nuclide.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000sigma
 Coincidence correction performed.
 free = No coincidence correction required.
 miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 04-Aug-15-10001

0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/grams)	Wt mean Activity Uncertainty	Comments
K-40	0.998	1.84E+01	2.33E+00	
Cs-137	0.997	1.81E-01	6.45E-02	
Tl-208	0.999	1.85E-01	7.63E-02	
X Bi-211	0.974			
Pb-212	0.999	6.15E-01	1.76E-01	
Bi-214	0.999	8.17E-01	1.68E-01	
Pb-214	0.802	9.28E-01	1.81E-01	
Ac-228	0.999	6.91E-01	1.69E-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

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

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Analysis Report for 04-Aug-15-10001

0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

UNIDENTIFIED PEAKS

Peak Locate Performed on : 8/4/2015 6:49:18AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	230.00	8.38889E-03	57.49		
6	510.56	3.38889E-02	20.94		
10	860.06	8.68313E-03	38.91		

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	K-40	1460.82	* 10.66	1.84E+01	8.50E-01	8.50E-01	miss
+	Cr-51	320.08	9.91	-7.76E-02	8.41E-01	8.41E-01	free
+	Mn-54	834.85	99.98	3.96E-02	7.77E-02	7.77E-02	miss
+	Co-58	810.76	99.45	1.89E-02	7.40E-02	7.40E-02	1.000
		1674.73	0.52	-6.47E-01		1.15E+01	1.044
+	Co-60	1173.23	99.85	-3.76E-03	6.03E-02	7.56E-02	0.916
		1332.49	99.98	-9.75E-03		6.03E-02	0.915
+	Nb-94	702.65	99.81	-1.23E-02	5.96E-02	5.96E-02	0.913
		871.09	99.89	2.04E-02		6.81E-02	0.914
+	Sn-113	255.13	2.11	-1.86E-01	7.37E-02	2.59E+00	free
		391.70	64.97	-3.65E-02		7.37E-02	free
+	Cs-134	475.36	1.48	-4.42E-01	7.98E-02	3.39E+00	miss
		563.25	8.34	1.88E-01		9.25E-01	0.843
		569.33	15.37	-4.37E-02		4.20E-01	0.831
		604.72	97.62	-2.44E-02		7.98E-02	0.894

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

Analysis Report for		04-Aug-15-10001		8/4/2015	6:54:24AM	Page 6 of 8
0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION						
Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Cs-134	795.86	85.46	2.28E-02	7.98E-02	8.71E-02	0.898
	801.95	8.69	-1.33E-01		7.31E-01	0.846
	1038.61	0.99	-3.58E-01		8.56E+00	0.913
	1167.97	1.79	-3.19E-01		2.83E+00	1.141
	1365.19	3.02	4.93E-01		1.77E+00	1.228
+ Cs-137	661.66	* 85.10	1.81E-01	7.23E-02	7.23E-02	miss
+ Eu-152	121.78	28.67	1.05E-01	2.03E-01	2.68E-01	0.902
	244.70	7.61	-6.31E-01		5.62E-01	0.902
	295.94	0.45	-8.36E-01		2.26E+01	miss
	344.28	26.60	-1.28E-02		2.03E-01	0.935
	367.79	0.86	-1.84E+00		6.66E+00	0.832
	411.12	2.24	-8.01E-01		2.66E+00	0.866
	443.96	2.83	4.01E-01		2.22E+00	0.898
	488.68	0.42	8.43E-01		1.29E+01	miss
	563.99	0.49	-1.00E-01		1.38E+01	0.899
	586.26	0.46	-1.44E+01		1.58E+01	0.915
	678.62	0.47	6.08E+00		1.54E+01	0.835
	688.67	0.86	-1.56E-01		6.64E+00	0.971
	719.35	0.28	-2.72E+00		2.03E+01	miss
	778.90	12.96	5.57E-02		4.81E-01	0.919
	810.45	0.32	3.59E+00		1.76E+01	1.067
	867.37	4.26	4.36E-02		1.72E+00	0.896
	919.33	0.43	2.09E+00		1.55E+01	0.971
	964.08	14.65	2.35E-01		5.95E-01	1.031
	1085.87	10.24	1.76E-01		6.32E-01	1.023
	1089.74	1.73	-3.97E-01		4.37E+00	0.930
	1112.07	13.69	-1.88E-01		4.10E-01	0.989
	1212.95	1.43	-1.31E+00		6.40E+00	0.897
	1249.94	0.19	2.16E+01		4.07E+01	1.151
	1299.14	1.63	-1.62E+00		2.91E+00	0.916
	1408.01	21.07	7.69E-02		2.77E-01	0.976
	1457.64	0.50	-1.71E+01		3.66E+01	1.119
	1528.10	0.28	1.78E+00		1.67E+01	1.017
+ Eu-154	123.07	40.40	1.67E-02	1.84E-01	1.89E-01	0.900
	247.93	6.89	-4.95E-02		7.88E-01	0.893
	591.76	4.95	-4.81E-01		1.22E+00	0.873
	692.42	1.78	-5.60E-02		3.56E+00	0.904
	723.30	20.06	-3.47E-02		2.97E-01	0.901
	756.80	4.52	-7.30E-02		1.38E+00	0.878
	873.18	12.08	-2.45E-01		4.30E-01	0.897
	996.29	10.48	-6.06E-02		5.96E-01	0.951
	1004.76	18.01	-1.04E-01		3.54E-01	0.967
	1274.43	34.80	-1.05E-01		1.84E-01	0.973
	1596.48	1.80	1.42E-01		2.27E+00	1.324
+ Eu-155	45.30	1.31	8.60E+00	3.73E-01	4.82E+01	0.998
	60.01	1.22	1.43E+01		4.83E+01	1.000
	86.55	30.70	-8.29E-02		3.79E-01	free
	105.31	21.10	-2.16E-02		3.73E-01	1.000
+ Tl-208	583.19	* 85.00	1.85E-01	9.43E-02	9.43E-02	0.896
+ Bi-211	351.07	* 13.02	2.32E+00	5.28E-01	5.28E-01	miss
+ Pb-211	404.85	3.78	-7.72E-01	1.22E+00	1.22E+00	miss

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

Analysis Report for 04-Aug-15-10001 8/4/2015 6:54:24AM Page 7 of 8

0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
Pb-211	427.09	1.76	-7.96E-01	1.22E+00	2.45E+00	miss
	832.01	3.52	-8.68E-01		1.47E+00	miss
+ Bi-212	39.86	1.06	-2.55E+01	1.21E+00	5.71E+01	0.997
	727.33	6.67	1.03E+00		1.21E+00	0.972
	785.37	1.10	2.68E+00		7.27E+00	0.913
	1620.50	1.47	8.07E-01		4.42E+00	1.011
+ Pb-212	115.18	0.60	-5.44E+00	1.94E-01	1.14E+01	miss
	238.63	* 43.60	6.15E-01		1.94E-01	free
	300.09	3.30	2.87E-01		1.72E+00	free
+ Pb212-XR	74.82	10.28	-8.93E-01	1.33E+00	2.16E+00	miss
	77.11	17.10	1.09E+00		1.33E+00	miss
	87.35	3.97	1.09E+00		2.98E+00	miss
	89.78	1.46	1.73E+00		7.40E+00	miss
+ Bi-214	609.32	* 45.49	8.93E-01	2.00E-01	2.00E-01	0.918
	768.36	4.89	4.61E-01		1.71E+00	0.911
	806.18	1.26	1.10E+00		5.78E+00	0.883
	934.06	3.11	-2.32E-02		2.46E+00	0.914
	1120.29	* 14.92	7.78E-01		5.36E-01	0.914
	1155.21	1.63	1.34E+00		5.79E+00	0.913
	1238.12	5.83	1.24E+00		2.09E+00	0.914
	1280.98	1.43	-1.57E+00		4.74E+00	0.914
	1377.67	3.99	6.99E-01		1.99E+00	1.054
	1385.31	0.79	1.64E+00		6.76E+00	0.915
	1401.52	1.33	3.44E-01		3.33E+00	0.915
	1407.99	2.39	7.20E-01		2.59E+00	0.915
	1509.21	2.13	1.50E+00		3.50E+00	0.924
	1661.27	1.05	7.88E-01		6.68E+00	1.003
	1729.59	2.88	7.17E-01		2.05E+00	1.219
	1764.49	* 15.30	6.41E-01		4.42E-01	1.003
	1847.43	2.03	-1.78E-01		1.46E+00	1.117
>	2118.51	1.16	0.00E+00		0.00E+00	1.077
+ Pb-214	241.99	7.25	1.04E+00	1.93E-01	1.03E+00	1.000
	295.22	* 18.42	1.10E+00		3.28E-01	1.000
	351.93	* 35.60	8.48E-01		1.93E-01	free
	785.96	1.06	1.95E+00		6.79E+00	1.000
+ Pb214-XR	74.82	5.80	-1.58E+00	2.35E+00	3.82E+00	miss
	77.11	9.70	1.92E+00		2.35E+00	miss
	87.35	2.24	1.93E+00		5.28E+00	miss
	89.78	0.82	3.09E+00		1.32E+01	miss
+ Ra-226	186.21	3.64	1.95E+00	1.99E+00	1.99E+00	free
+ Ac-228	129.07	2.42	4.71E-01	2.22E-01	2.72E+00	0.917
	209.25	3.89	2.29E-01		1.39E+00	0.968
	270.24	3.46	-5.46E-01		1.51E+00	0.931
	328.00	2.95	1.83E-01		2.19E+00	0.930
	338.32	* 11.27	5.30E-01		5.25E-01	0.986
	409.46	1.92	1.07E+00		3.49E+00	0.903
	463.00	4.40	1.23E+00		1.75E+00	0.897
	794.95	4.25	3.14E-01		1.65E+00	0.916
	911.20	* 25.80	7.91E-01		2.22E-01	0.985
	964.77	4.99	-3.47E-01		1.77E+00	0.971
	968.97	* 15.80	6.33E-01		4.42E-01	0.985

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports

Analysis Report for 04-Aug-15-10001
0220BIS1VS01 DRIED SEDIMENT FROM OLD LIFT STATION

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/grams)	Nuclide MDA (pCi/grams)	Line MDA (pCi/grams)	Coinc Corr
+	Ac-228	1588.20	3.22	8.35E-01	2.22E-01	2.38E+00	1.003
	Pa-231	27.36	10.30	-9.77E-01	2.30E+00	7.43E+00	0.993
		283.69	1.70	-5.48E-01		2.97E+00	1.000
		300.07	2.47	3.83E-01		2.30E+00	1.000
		302.65	2.20	5.67E-01		2.32E+00	1.000
+	Th-234	330.06	1.40	-2.96E-01		3.98E+00	1.000
		92.38	2.13	1.80E+00	8.77E+00	8.87E+00	free
		92.80	2.10	7.26E-01		8.77E+00	free
		112.81	0.21	5.84E+00		5.71E+01	free
+	U-235	143.76	10.96	1.32E-01	1.29E-01	5.39E-01	free
		163.33	5.08	-3.00E-01		1.07E+00	free
		185.71	57.20	1.37E-01		1.29E-01	free
		202.11	1.08	5.79E-01		4.85E+00	miss
		205.31	5.01	5.88E-01		1.14E+00	free
+	Am-241	59.54	35.90	1.62E-01	1.63E+00	1.63E+00	free

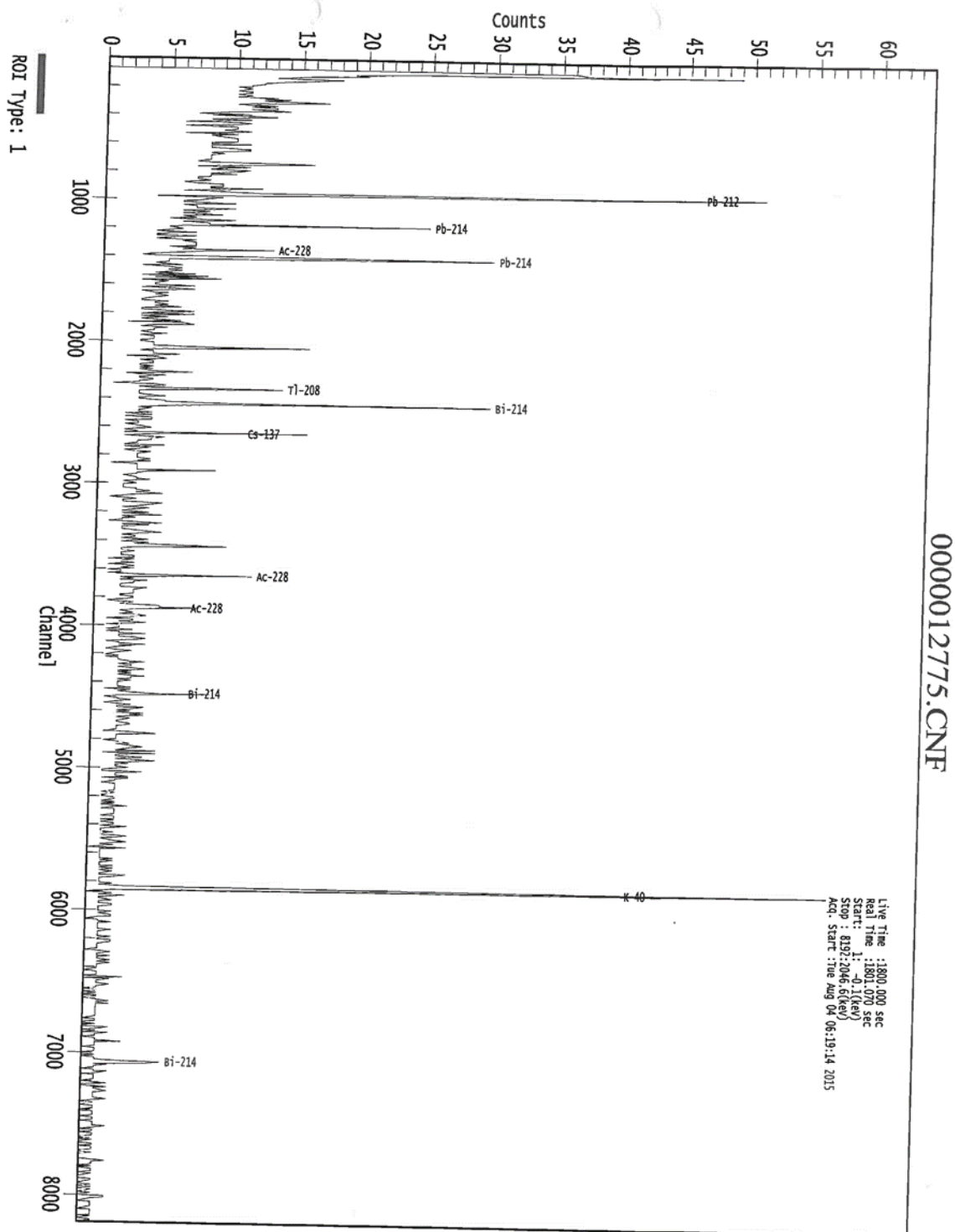
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-13 10220BA Gamma Spectroscopy Reports



Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\20150817091050.cnf

Report Generated On : 8/17/2015 12:13:16 PM

Sample Title : BRANDENBURG 65224
Sample Description : TRAILER AT TRUCK MONITOR
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 1

Sample Taken On : 8/17/2015 11:00:00 AM
Acquisition Started : 8/17/2015 8:59:51 AM

Live Time : 598.7 seconds
Dead Time : 600.0 seconds

Bad Time : 0.22 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVEN

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst B. J. Colwell

Date 8-17-15

Survey # 2015-MVC-0-0042

Co-60 identified in
Background - Truck
released.

cf. J. Colwell
8/17/2015

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Peak Analysis Report 8/17/2015 12:13:16 F Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: BRANDENBURG 65224
Peak Analysis Performed on: 8/17/2015 12:13:15 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	380-	404	392.28	1170.66	10.57	2.78E+002	129.14	5.38E+002
2	431-	457	444.38	1325.52	23.34	1.78E+002	73.45	1.54E+002
3	474-	501	487.99	1455.01	48.92	1.46E+003	131.28	3.63E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/17/2015 1 13:16 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: BRANDENBURG 65224
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/l)	Activity Uncertainty
K-40	0.991	1460.82*	10.66	5.44646E+002	6.79719E+001
Co-60	0.992	1173.23*	99.85	9.17246E+000	4.32469E+000
		1332.49*	99.98	6.55793E+000	2.75210E+000

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/17/2015 13:16 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/l)	Wt mean Activity Uncertainty
K-40	0.991	5.446457E+002	6.797195E+001
Co-60	0.992	7.311541E+000	2.321833E+000
X Cu-64	0.891		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/17/2015 12:13:15 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

iclude MDA Report

8/17/2015 12: 3:16 PM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: BRANDENBURG 65224
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/l)	Nuclide MDA (pCi/l)	Activity (pCi/l)	Dec. Level (pCi/l)
	LaBr3	34.70	66.40	4.604E+000	4.60E+000	3.086E+001	2.274E+000
		788.70	33.60	9.397E+000		7.052E+000	4.604E+000
		1436.80	66.40	1.031E+001		3.271E+001	5.077E+000
+	K-40	1460.82*	10.66	6.625E+001	6.63E+001	5.446E+002	3.262E+001
	Cr-51	320.08	9.91	1.720E+001	1.72E+001	-1.557E+001	8.449E+000
	Mn-54	834.85	99.98	3.586E+000	3.59E+000	1.710E+000	1.760E+000
	Co-58	810.76	99.45	3.560E+000	3.56E+000	1.077E+000	1.747E+000
+	Co-60	1173.23*	99.85	6.863E+000	4.24E+000	9.172E+000	3.387E+000
		1332.49*	99.98	4.240E+000		6.558E+000	2.070E+000
	Nb-94	702.65	99.81	2.322E+000	2.32E+000	1.192E-002	1.132E+000
		871.09	99.89	3.481E+000		-9.562E-001	1.706E+000
	Sn-113	255.13	2.11	9.020E+001	3.03E+000	3.465E+001	4.450E+001
		391.70	64.97	3.035E+000		2.617E+000	1.491E+000
	Cs-137	661.66	85.10	2.965E+000	2.97E+000	1.031E+000	1.451E+000
	Eu-152	121.78	28.67	8.407E+000	7.41E+000	4.168E+000	4.166E+000
		244.70	7.61	2.581E+001		1.966E+001	1.274E+001
		295.94	0.45	4.079E+002		2.984E+002	2.008E+002
		344.28	26.60	7.408E+000		6.876E+000	3.645E+000
		367.79	0.86	2.240E+002		4.087E+001	1.101E+002
		411.12	2.24	8.503E+001		-7.651E+001	4.171E+001
		443.96	2.83	6.977E+001		4.812E+001	3.420E+001
		488.68	0.42	4.751E+002		2.563E+002	2.325E+002
		563.99	0.49	4.634E+002		-3.007E+002	2.269E+002
		586.26	0.46	5.137E+002		-6.502E+001	2.515E+002
		678.62	0.47	5.139E+002		9.370E+000	2.511E+002
		688.67	0.86	2.709E+002		-1.117E+002	1.322E+002
		719.35	0.28	8.852E+002		-3.393E+002	4.321E+002
		778.90	12.96	2.238E+001		-2.497E+001	1.095E+001
		810.45	0.32	1.103E+003		3.337E+002	5.416E+002
		867.37	4.26	8.297E+001		4.635E+001	4.068E+001
		919.33	0.43	8.310E+002		6.191E+002	4.070E+002
		964.08	14.65	2.415E+001		1.910E+001	1.182E+001
		1085.87	10.24	3.142E+001		5.261E-001	1.530E+001
		1089.74	1.73	1.867E+002		7.884E+001	9.094E+001
		1112.07	13.69	2.396E+001		4.071E+000	1.167E+001
		1212.95	1.43	2.247E+002		9.139E+001	1.091E+002
		1249.94	0.19	1.534E+003		9.752E+002	7.420E+002
		1299.14	1.63	1.715E+002		6.535E+000	8.276E+001
		1408.01	21.07	2.019E+001		-1.664E+001	9.848E+000
		1457.64	0.50	1.439E+003		6.298E+003	7.088E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.954E+000	5.95E+000	2.952E+000	2.950E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/l)	Nuclide MDA (pCi/l)	Activity (pCi/l)	Dec. Level (pCi/l)
Eu-154	247.93	6.89	2.838E+001	5.95E+000	6.599E+000	1.401E+001
	591.76	4.95	4.837E+001		4.154E+001	2.369E+001
	692.42	1.78	1.312E+002		-2.260E+001	6.402E+001
	723.30	20.06	1.231E+001		4.590E-002	6.007E+000
	756.80	4.52	5.518E+001		-5.086E+001	2.691E+001
	873.18	12.08	2.885E+001		-7.923E+000	1.414E+001
	996.29	10.48	3.152E+001		1.198E+001	1.539E+001
	1004.76	18.01	1.786E+001		-5.687E+000	8.712E+000
	1274.43	34.80	7.337E+000		1.850E+000	3.530E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	>					
	Eu-155	45.30	3.012E+002		2.133E+003	1.492E+002
		60.01	2.753E+002		-9.739E+001	1.361E+002
		86.55	30.70		7.918E+000	3.918E+000
Tl-208	105.31	21.10	1.238E+001	2.76E+000	-3.554E+000	6.137E+000
	583.19	85.00	2.756E+000		-8.903E-001	1.349E+000
	351.07	13.02	1.488E+001		1.49E+001	8.784E-001
Bi-211	404.85	3.78	5.167E+001	5.17E+001	6.978E+001	2.537E+001
	427.09	1.76	1.079E+002		-2.977E+001	5.289E+001
Bi-212	832.01	3.52	1.025E+002	3.72E+001	5.414E+001	5.030E+001
	39.86	1.06	3.458E+002		2.292E+003	1.711E+002
	727.33	6.67	3.717E+001		-1.241E+001	1.814E+001
	785.37	1.10	2.803E+002		1.396E+002	1.373E+002
>	1620.50	1.47	0.000E+000	4.47E+000	0.000E+000	0.000E+000
	Pb-212	115.18	0.60		4.456E+002	2.075E+002
		238.63	43.60		4.529E-001	2.207E+000
Pb-212	300.09	3.30	5.431E+001	1.59E+001	2.715E+001	2.672E+001
	Pb212-XR	74.82	10.28		1.724E+001	1.350E+001
		77.11	17.10		-2.092E-001	7.858E+000
Bi-214	87.35	3.97	6.090E+001	5.33E+000	1.202E+001	3.014E+001
	89.78	1.46	1.922E+002		-8.613E+001	9.527E+001
	609.32	45.49	5.326E+000		5.930E-001	2.608E+000
	768.36	4.89	5.455E+001		-6.216E+001	2.664E+001
	806.18	1.26	2.761E+002		1.507E+002	1.355E+002
	934.06	3.11	1.113E+002		-7.619E+001	5.448E+001
	1120.29	14.92	2.249E+001		8.565E+000	1.095E+001
	1155.21	1.63	2.282E+002		4.059E+001	1.114E+002
	1238.12	5.83	5.253E+001		5.098E+001	2.546E+001
	1280.98	1.43	1.765E+002		-1.808E+001	8.488E+001
	1377.67	3.99	5.004E+001		-5.101E+001	2.373E+001
	1385.31	0.79	3.096E+002		-6.746E+002	1.483E+002
	1401.52	1.33	2.782E+002		-3.153E+002	1.352E+002
	1407.99	2.39	1.777E+002		-1.464E+002	8.668E+001
>	1509.21	2.13	1.149E+002	5.45E+000	-1.469E+000	5.485E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	>					
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	>					
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	>					
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	>					
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25		4.822E-001	1.327E+001
		295.22	18.42		7.246E+000	4.877E+000
		351.93	35.60		3.218E-001	2.681E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/l)	Nuclide MDA (pCi/l)	Activity (pCi/l)	Dec. Level (pCi/l)
Pb-214	785.96	1.06	2.916E+002	5.45E+000	1.452E+002	1.428E+002
Pb214-XR	74.82	5.80	4.837E+001	2.80E+001	3.055E+001	2.393E+001
	77.11	9.70	2.799E+001		-3.689E-001	1.385E+001
	87.35	2.24	1.079E+002		2.130E+001	5.341E+001
	89.78	0.82	3.422E+002		-1.534E+002	1.696E+002
Ra-226	186.21	3.64	5.323E+001	5.32E+001	-1.176E+000	2.632E+001
Ac-228	129.07	2.42	9.687E+001	1.36E+001	3.473E+001	4.799E+001
	209.25	3.89	5.432E+001		-1.286E+001	2.686E+001
	270.24	3.46	5.233E+001		-6.827E+001	2.579E+001
	328.00	2.95	6.384E+001		-2.318E+001	3.141E+001
	338.32	11.27	1.721E+001		-2.591E+000	8.468E+000
	409.46	1.92	1.009E+002		5.206E+001	4.949E+001
	463.00	4.40	4.458E+001		-1.884E+001	2.183E+001
	794.95	4.25	7.740E+001		6.033E+001	3.795E+001
	911.20	25.80	1.365E+001		-1.968E+000	6.684E+000
	964.77	4.99	7.094E+001		5.612E+001	3.471E+001
	968.97	15.80	2.203E+001		-3.860E+000	1.078E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.64E-001	0.000E+000	0.000E+000
	283.69	1.70	1.067E+002		-3.244E+001	5.254E+001
	300.07	2.47	7.255E+001		3.627E+001	3.570E+001
	302.65	2.20	8.194E+001		4.096E+001	4.032E+001
	330.06	1.40	1.350E+002		-4.062E+001	6.644E+001
Th-234	92.38	2.13	1.301E+002	1.30E+002	1.130E+002	6.449E+001
	92.80	2.10	1.317E+002		1.144E+002	6.529E+001
	112.81	0.21	1.198E+003		5.570E+002	5.934E+002
U-235	143.76	10.96	2.010E+001	3.43E+000	-4.684E+000	9.951E+000
	163.33	5.08	4.051E+001		-9.672E+000	2.005E+001
	185.71	57.20	3.427E+000		1.038E+000	1.694E+000
	202.11	1.08	1.976E+002		-3.316E+001	9.776E+001
	205.31	5.01	4.260E+001		4.611E+001	2.107E+001
Am-241	59.54	35.90	9.466E+000	9.47E+000	-3.349E+000	4.681E+000

+ = 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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: C:\Canberra\20150817110217.cnf

Report Generated On : 8/17/2015 1:12:19 PM

Sample Title : B BURG
Sample Description : TRUCK MONITOR BKGD
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 8/17/2015 12:50:00 AM
Acquisition Started : 8/17/2015 10:51:25 AM

Live Time : 598.7 seconds
Dead Time : 600.0 seconds
Dead Time : 0.22 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst *RJ Research*

Date *8-17-15*

Survey # *2015-MVC-0-0042*

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Peak Analysis Report 8/17/2015 1:12:19 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: B BURG
Peak Analysis Performed on: 8/17/2015 1:12:19 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	380-	404	392.54	1171.43	17.45	2.54E+002	133.16	5.77E+002
2	433-	459	446.40	1331.52	13.08	1.38E+002	76.18	1.71E+002
3	476-	503	489.71	1460.10	40.24	1.32E+003	140.06	4.53E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/17/2015 12:19 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: B BURG
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	1.000	1460.82*	10.66	4.93029E+002	6.75396E+001
Co-60	0.999	1173.23*	99.85	8.37696E+000	4.44878E+000
		1332.49*	99.98	5.08028E+000	2.84306E+000

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/17/2015 12:19 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	1.000	4.930288E+002	6.753961E+001
Co-60	0.999	6.036237E+000	2.395646E+000
X Cu-64	0.941		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/17/2015 1:12:19 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: B BURG
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	LaBr3	34.70	66.40	4.831E+000	4.83E+000	3.255E+001	2.387E+000
		788.70	33.60	8.901E+000		-2.448E+000	4.356E+000
		1436.80	66.40	9.492E+000		-5.101E-001	4.666E+000
+	K-40	1460.82*	10.66	7.445E+001	7.45E+001	4.930E+002	3.672E+001
	Cr-51	320.08	9.91	1.659E+001	1.66E+001	9.556E+000	8.146E+000
	Mn-54	834.85	99.98	3.602E+000	3.60E+000	-6.703E-001	1.767E+000
	Co-58	810.76	99.45	3.522E+000	3.52E+000	1.320E+000	1.728E+000
+	Co-60	1173.23*	99.85	7.114E+000	4.50E+000	8.377E+000	3.512E+000
		1332.49*	99.98	4.504E+000		5.080E+000	2.202E+000
	Nb-94	702.65	99.81	2.272E+000	2.27E+000	-9.680E-001	1.107E+000
		871.09	99.89	3.564E+000		4.650E-001	1.747E+000
	Sn-113	255.13	2.11	8.060E+001	2.71E+000	-7.145E+001	3.970E+001
		391.70	64.97	2.705E+000		-7.147E-001	1.326E+000
	Cs-137	661.66	85.10	2.800E+000	2.80E+000	2.560E-001	1.368E+000
	Eu-152	121.78	28.67	8.357E+000	6.84E+000	-5.929E+000	4.141E+000
		244.70	7.61	2.360E+001		1.482E+001	1.164E+001
		295.94	0.45	3.788E+002		-7.684E+001	1.863E+002
		344.28	26.60	6.840E+000		1.346E+000	3.361E+000
		367.79	0.86	2.089E+002		2.845E+001	1.025E+002
		411.12	2.24	7.910E+001		-2.948E+001	3.874E+001
		443.96	2.83	6.538E+001		-5.059E+001	3.201E+001
		488.68	0.42	4.531E+002		-7.053E+002	2.216E+002
		563.99	0.49	4.545E+002		1.699E+002	2.224E+002
		586.26	0.46	5.009E+002		-2.264E+002	2.451E+002
		678.62	0.47	5.123E+002		1.037E+002	2.502E+002
		688.67	0.86	2.726E+002		-3.168E+001	1.330E+002
		719.35	0.28	8.647E+002		-2.223E+002	4.218E+002
		778.90	12.96	2.131E+001		-1.099E+001	1.041E+001
		810.45	0.32	1.087E+003		4.072E+002	5.331E+002
		867.37	4.26	8.321E+001		-6.702E+001	4.080E+001
		919.33	0.43	8.168E+002		-1.130E+002	3.999E+002
		964.08	14.65	2.453E+001		1.978E-001	1.201E+001
		1085.87	10.24	3.027E+001		-3.073E+000	1.473E+001
		1089.74	1.73	1.779E+002		-1.650E+002	8.654E+001
		1112.07	13.69	2.404E+001		1.665E+001	1.171E+001
		1212.95	1.43	2.213E+002		-9.246E+001	1.074E+002
		1249.94	0.19	1.516E+003		6.172E+002	7.332E+002
		1299.14	1.63	1.605E+002		-1.556E+001	7.725E+001
		1408.01	21.07	1.694E+001		-5.296E+000	8.220E+000
		1457.64	0.50	1.435E+003		5.764E+003	7.067E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.918E+000	5.92E+000	-4.199E+000	2.932E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Eu-154	247.93	6.89	2.570E+001	5.92E+000	2.172E+000	1.267E+001
	591.76	4.95	4.753E+001		2.698E+001	2.327E+001
	692.42	1.78	1.309E+002		6.111E+000	6.385E+001
	723.30	20.06	1.201E+001		-6.450E+000	5.858E+000
	756.80	4.52	5.323E+001		-4.289E+001	2.594E+001
	873.18	12.08	2.953E+001		3.854E+000	1.448E+001
	996.29	10.48	3.184E+001		2.186E+001	1.555E+001
	1004.76	18.01	1.805E+001		6.383E-001	8.809E+000
	1274.43	34.80	7.305E+000		-2.557E+000	3.514E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	>					
	Eu-155	45.30	1.31	8.78E+000	2.216E+003	1.599E+002
		60.01	1.22		2.275E+002	1.567E+002
		86.55	30.70		5.960E+000	4.347E+000
		105.31	21.10		3.923E+000	6.280E+000
Tl-208	583.19	85.00	2.716E+000	2.72E+000	1.437E+000	1.330E+000
Bi-211	351.07	13.02	1.395E+001	1.39E+001	6.408E+000	6.852E+000
Pb-211	404.85	3.78	4.675E+001	4.67E+001	-2.323E+001	2.290E+001
	427.09	1.76	1.014E+002		-8.449E+001	4.962E+001
	832.01	3.52	1.027E+002		4.608E+001	5.040E+001
Bi-212	39.86	1.06	3.686E+002	3.61E+001	2.490E+003	1.825E+002
	727.33	6.67	3.613E+001		-6.864E+000	1.762E+001
	785.37	1.10	2.659E+002		3.883E+001	1.301E+002
>	1620.50	1.47	0.000E+000	4.21E+000	0.000E+000	0.000E+000
	Pb-212	115.18	0.60		-5.209E+001	2.072E+002
		238.63	43.60		5.259E-001	2.079E+000
	300.09	3.30	5.043E+001	1.78E+001	1.221E+001	2.478E+001
Pb212-XR	74.82	10.28	3.020E+001		-1.004E+001	1.496E+001
	77.11	17.10	1.777E+001		1.663E+001	8.804E+000
	87.35	3.97	6.637E+001		-6.622E+000	3.287E+001
Bi-214	89.78	1.46	2.106E+002	5.31E+000	1.958E+002	1.045E+002
	609.32	45.49	5.312E+000		5.823E+000	2.601E+000
	768.36	4.89	5.079E+001		-9.346E+001	2.476E+001
	806.18	1.26	2.700E+002		6.556E+001	1.325E+002
	934.06	3.11	1.125E+002		-5.206E+001	5.508E+001
	1120.29	14.92	2.253E+001		6.548E+000	1.098E+001
	1155.21	1.63	2.332E+002		7.816E+001	1.139E+002
	1238.12	5.83	5.185E+001		-3.744E+000	2.512E+001
	1280.98	1.43	1.741E+002		-5.833E+000	8.369E+001
	1377.67	3.99	4.594E+001		-3.172E+001	2.168E+001
	1385.31	0.79	2.559E+002		-3.882E+002	1.214E+002
	1401.52	1.33	2.301E+002		-1.833E+002	1.111E+002
	1407.99	2.39	1.490E+002		-4.661E+001	7.234E+001
	1509.21	2.13	1.521E+002		-3.592E+001	7.348E+001
>	1661.27	1.05	0.000E+000	5.11E+000	0.000E+000	0.000E+000
	>	1729.59	2.88		0.000E+000	0.000E+000
	>	1764.49	15.30		0.000E+000	0.000E+000
	>	1847.43	2.03		0.000E+000	0.000E+000
	>	2118.51	1.16		0.000E+000	0.000E+000
Pb-214	241.99	7.25	2.513E+001	5.11E+000	1.402E+001	1.240E+001
	295.22	18.42	9.198E+000		-1.866E+000	4.523E+000
	351.93	35.60	5.110E+000		2.348E+000	2.510E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.766E+002	5.11E+000	4.040E+001	1.353E+002
Pb214-XR	74.82	5.80	5.353E+001	3.13E+001	-1.779E+001	2.652E+001
	77.11	9.70	3.133E+001		2.932E+001	1.552E+001
	87.35	2.24	1.176E+002		-1.174E+001	5.826E+001
	89.78	0.82	3.750E+002		3.487E+002	1.860E+002
Ra-226	186.21	3.64	5.023E+001	5.02E+001	3.410E+001	2.481E+001
Ac-228	129.07	2.42	9.669E+001	1.38E+001	4.860E+000	4.790E+001
	209.25	3.89	5.116E+001		-1.755E+001	2.528E+001
	270.24	3.46	4.862E+001		9.445E+000	2.393E+001
	328.00	2.95	5.985E+001		-5.610E+001	2.941E+001
	338.32	11.27	1.594E+001		-1.074E+001	7.834E+000
	409.46	1.92	9.287E+001		-4.721E+000	4.550E+001
	463.00	4.40	4.333E+001		1.030E+001	2.121E+001
	794.95	4.25	7.442E+001		8.536E+001	3.646E+001
	911.20	25.80	1.382E+001		3.154E+000	6.770E+000
	964.77	4.99	7.206E+001		5.810E-001	3.527E+001
	968.97	15.80	2.259E+001		6.035E+000	1.106E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.64E-001	0.000E+000	0.000E+000
	283.69	1.70	1.005E+002		5.391E+001	4.944E+001
	300.07	2.47	6.737E+001		1.631E+001	3.311E+001
	302.65	2.20	7.609E+001		1.842E+001	3.739E+001
	330.06	1.40	1.274E+002		2.910E+000	6.261E+001
Th-234	92.38	2.13	1.426E+002	1.43E+002	5.802E+001	7.071E+001
	92.80	2.10	1.443E+002		5.874E+001	7.159E+001
	112.81	0.21	1.224E+003		3.529E+002	6.066E+002
U-235	143.76	10.96	1.967E+001	3.22E+000	1.146E+001	9.736E+000
	163.33	5.08	3.881E+001		2.026E+001	1.919E+001
	185.71	57.20	3.222E+000		-1.036E+000	1.592E+000
	202.11	1.08	1.865E+002		-4.089E+001	9.219E+001
	205.31	5.01	4.019E+001		3.049E+001	1.987E+001
Am-241	59.54	35.90	1.088E+001	1.09E+001	7.823E+000	5.389E+000

+ = 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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: C:\Users\Zion Solutions\AppData\Local\VirtualStore\2015081808

Report Generated On : 8/18/2015 9:02:40 AM

Sample Title : 65224
Sample Description : truck monitor
Sample Identification :
Sample Type :
Sample Geometry :

*Response to Truck claim
Oranburg - Security
Gatehouse roof debris*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 8/18/2015 8:26:52 AM
Acquisition Started : 8/18/2015 8:26:52 AM

Live Time : 598.8 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVEN

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *RD Belasich*

Date *8-18-15*

2015-MVC-0-0043

CA 8/18/2015

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Peak Analysis Report 8/18/2015 9:02:40 AM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 65224
Peak Analysis Performed on: 8/18/2015 9:02:39 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	474-	501	487.66	1454.03	38.86	1.46E+003	137.51	4.19E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 02:40 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 65224
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	0.987	1460.82*	10.66	5.43699E+002	6.95709E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 9:02:40 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	0.987	5.436995E+002	6.957092E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/18/2015 9:02:39 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: 65224
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
LaBr3	34.70	66.40	4.540E+000	4.54E+000	3.125E+001	2.242E+000
	788.70	33.60	9.002E+000		2.665E+000	4.407E+000
	1436.80	66.40	1.060E+001		2.820E+001	5.218E+000
+ K-40	1460.82*	10.66	7.085E+001	7.09E+001	5.437E+002	3.492E+001
Cr-51	320.08	9.91	1.523E+001	1.52E+001	-8.805E+000	7.464E+000
Mn-54	834.85	99.98	3.498E+000	3.50E+000	6.400E-001	1.715E+000
Co-58	810.76	99.45	3.371E+000	3.37E+000	1.282E+000	1.653E+000
Co-60	1173.23	99.85	3.135E+000	1.96E+000	-4.080E-001	1.523E+000
	1332.49	99.98	1.960E+000		-1.715E-001	9.298E-001
Nb-94	702.65	99.81	2.097E+000	2.10E+000	8.132E-002	1.020E+000
	871.09	99.89	3.502E+000		-3.478E-001	1.716E+000
Sn-113	255.13	2.11	7.425E+001	2.58E+000	-4.283E+001	3.652E+001
	391.70	64.97	2.584E+000		-2.669E-002	1.266E+000
Cs-137	661.66	85.10	2.533E+000	2.53E+000	1.556E+000	1.235E+000
Eu-152	121.78	28.67	7.216E+000	6.41E+000	-3.348E+000	3.570E+000
	244.70	7.61	2.190E+001		1.817E+001	1.079E+001
	295.94	0.45	3.576E+002		1.912E+002	1.757E+002
	344.28	26.60	6.414E+000		-1.052E+000	3.148E+000
	367.79	0.86	1.953E+002		-1.270E+001	9.576E+001
	411.12	2.24	7.505E+001		-1.650E+000	3.672E+001
	443.96	2.83	6.037E+001		-2.173E+001	2.950E+001
	488.68	0.42	4.330E+002		3.379E+001	2.115E+002
	563.99	0.49	4.280E+002		-1.816E+002	2.092E+002
	586.26	0.46	4.799E+002		3.797E+001	2.346E+002
	678.62	0.47	4.487E+002		-1.744E+001	2.185E+002
	688.67	0.86	2.399E+002		-1.010E+002	1.167E+002
	719.35	0.28	8.274E+002		6.532E+001	4.032E+002
	778.90	12.96	2.190E+001		1.097E+001	1.071E+001
	810.45	0.32	1.044E+003		3.970E+002	5.119E+002
	867.37	4.26	8.215E+001		-2.543E+001	4.027E+001
	919.33	0.43	7.913E+002		1.634E+002	3.872E+002
	964.08	14.65	2.314E+001		4.634E+000	1.131E+001
	1085.87	10.24	2.993E+001		-8.773E+000	1.456E+001
	1089.74	1.73	1.797E+002		6.520E+001	8.743E+001
	1112.07	13.69	2.331E+001		1.060E+001	1.134E+001
	1212.95	1.43	2.107E+002		7.678E+001	1.021E+002
	1249.94	0.19	1.425E+003		-7.608E+002	6.876E+002
	1299.14	1.63	1.413E+002		-6.905E+001	6.763E+001
	1408.01	21.07	2.025E+001		-5.952E+000	9.875E+000
	1457.64	0.50	1.472E+003		7.000E+003	7.252E+002
> Eu-154	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	123.07	40.40	5.110E+000	5.11E+000	-2.371E+000	2.528E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.791E+002	4.86E+000	1.442E+002	1.366E+002
Pb214-XR	74.82	5.80	4.361E+001	2.55E+001	1.355E+001	2.156E+001
	77.11	9.70	2.548E+001		1.330E+001	1.260E+001
	87.35	2.24	9.474E+001		-4.305E+001	4.682E+001
	89.78	0.82	3.029E+002		-5.058E+001	1.500E+002
Ra-226	186.21	3.64	4.684E+001	4.68E+001	-1.010E+001	2.312E+001
Ac-228	129.07	2.42	8.367E+001	1.33E+001	2.175E+001	4.139E+001
	209.25	3.89	4.672E+001		4.679E+000	2.306E+001
	270.24	3.46	4.462E+001		-1.405E+001	2.193E+001
	328.00	2.95	5.707E+001		-5.152E-001	2.803E+001
	338.32	11.27	1.510E+001		2.784E+000	7.413E+000
	409.46	1.92	8.769E+001		3.705E+001	4.291E+001
	463.00	4.40	4.015E+001		3.736E+001	1.962E+001
	794.95	4.25	7.432E+001		5.208E+001	3.641E+001
	911.20	25.80	1.330E+001		-4.029E+000	6.513E+000
	964.77	4.99	6.799E+001		1.361E+001	3.324E+001
	968.97	15.80	2.131E+001		1.572E+001	1.041E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.337E+001		7.900E+001	4.588E+001
	300.07	2.47	6.342E+001		-2.878E-001	3.114E+001
	302.65	2.20	7.162E+001		-3.251E-001	3.516E+001
	330.06	1.40	1.207E+002		3.438E+001	5.925E+001
Th-234	92.38	2.13	1.144E+002	1.14E+002	1.050E+000	5.662E+001
	92.80	2.10	1.158E+002		1.063E+000	5.733E+001
	112.81	0.21	1.039E+003		8.863E+002	5.142E+002
U-235	143.76	10.96	1.759E+001	3.02E+000	4.632E+000	8.700E+000
	163.33	5.08	3.498E+001		-2.137E+001	1.728E+001
	185.71	57.20	3.022E+000		-9.314E-002	1.492E+000
	202.11	1.08	1.712E+002		1.508E+002	8.455E+001
	205.31	5.01	3.637E+001		-1.137E+001	1.796E+001
Am-241	59.54	35.90	8.500E+000	8.50E+000	3.272E+000	4.198E+000

+ = 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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: C:\Canberra\8-18-15\20150818120554.cnf

Report Generated On : 8/18/2015 1:31:52 PM

Sample Title : Truck Monitor-2
Sample Description :
Sample Identification : 65224
Sample Type :
Sample Geometry :
Sample Location : truck monitor

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 8/18/2015 11:55:11 AM
Acquisition Started : 8/18/2015 11:55:11 AM

Live Time : 598.8 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

*Brundenburg Truck
Roll-off Sevinny
Bldg waste*

Survey # 2015-MVC-0-0043

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst *A. Rehner*
Date 8-18-15

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Peak Analysis Report 8/18/2015 1:31:52 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Truck Monitor-2
Peak Analysis Performed on: 8/18/2015 1:31:52 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	470-	497	484.19	1443.73	44.15	1.39E+003	138.61	4.29E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 3:31:52 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Truck Monitor-2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	0.921	1460.82*	10.66	5.13382E+002	6.78881E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 1:31:52 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	0.921	5.133823E+002	6.788808E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/18/2015 1:31:52 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Truck Monitor-2
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	LaBr3	34.70	66.40	4.371E+000	4.37E+000	2.800E+001	2.157E+000
		788.70	33.60	9.098E+000		6.425E+000	4.454E+000
		1436.80	66.40	1.089E+001		4.419E+001	5.364E+000
+	K-40	1460.82*	10.66	7.200E+001	7.20E+001	5.134E+002	3.550E+001
	Cr-51	320.08	9.91	1.464E+001	1.46E+001	-1.676E+001	7.170E+000
	Mn-54	834.85	99.98	3.365E+000	3.36E+000	6.737E-001	1.649E+000
	Co-58	810.76	99.45	3.352E+000	3.35E+000	4.262E-001	1.643E+000
	Co-60	1173.23	99.85	3.216E+000	1.69E+000	1.695E+000	1.563E+000
		1332.49	99.98	1.685E+000		7.508E-001	7.925E-001
	Nb-94	702.65	99.81	2.009E+000	2.01E+000	-9.556E-001	9.758E-001
		871.09	99.89	3.326E+000		-4.344E-001	1.628E+000
	Sn-113	255.13	2.11	7.515E+001	2.53E+000	-5.196E+001	3.697E+001
		391.70	64.97	2.529E+000		-3.116E+000	1.238E+000
	Cs-137	661.66	85.10	2.402E+000	2.40E+000	1.680E+000	1.169E+000
	Eu-152	121.78	28.67	7.244E+000	6.19E+000	-2.367E+000	3.584E+000
		244.70	7.61	2.196E+001		2.252E+000	1.082E+001
		295.94	0.45	3.496E+002		2.481E+002	1.716E+002
		344.28	26.60	6.187E+000		2.669E+000	3.035E+000
		367.79	0.86	1.932E+002		9.892E+001	9.469E+001
		411.12	2.24	7.394E+001		2.344E+001	3.616E+001
		443.96	2.83	6.041E+001		-1.848E+001	2.952E+001
		488.68	0.42	4.138E+002		-1.133E+002	2.019E+002
		563.99	0.49	4.406E+002		6.235E+000	2.155E+002
		586.26	0.46	4.977E+002		-5.181E+001	2.435E+002
		678.62	0.47	4.280E+002		-5.329E+001	2.081E+002
		688.67	0.86	2.394E+002		3.853E+001	1.164E+002
		719.35	0.28	7.868E+002		3.029E+002	3.829E+002
		778.90	12.96	2.190E+001		-8.890E+000	1.071E+001
		810.45	0.32	1.038E+003		1.320E+002	5.089E+002
		867.37	4.26	7.836E+001		2.589E+001	3.837E+001
		919.33	0.43	7.869E+002		6.288E+002	3.849E+002
		964.08	14.65	2.306E+001		7.267E+000	1.127E+001
		1085.87	10.24	2.914E+001		-1.444E+001	1.416E+001
		1089.74	1.73	1.742E+002		-3.304E+001	8.470E+001
		1112.07	13.69	2.313E+001		8.390E+000	1.125E+001
		1212.95	1.43	2.040E+002		1.709E+002	9.875E+001
		1249.94	0.19	1.304E+003		-4.704E+002	6.272E+002
		1299.14	1.63	1.217E+002		5.376E+001	5.782E+001
		1408.01	21.07	2.466E+001		-6.635E+000	1.208E+001
		1457.64	0.50	1.350E+003		5.461E+003	6.645E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.130E+000	5.13E+000	-1.677E+000	2.538E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
> Eu-154	247.93	6.89	2.409E+001	5.13E+000	1.751E+001	1.186E+001
	591.76	4.95	4.676E+001		1.454E+001	2.288E+001
	692.42	1.78	1.147E+002		-1.189E+001	5.574E+001
	723.30	20.06	1.086E+001		3.062E+000	5.285E+000
	756.80	4.52	5.097E+001		-3.494E+001	2.481E+001
	873.18	12.08	2.756E+001		-3.600E+000	1.349E+001
	996.29	10.48	2.952E+001		-7.356E+000	1.439E+001
	1004.76	18.01	1.692E+001		1.491E+001	8.242E+000
	1274.43	34.80	6.169E+000		6.435E-001	2.947E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	> Eu-155	45.30	1.31	7.27E+000	1.821E+003	1.399E+002
		60.01	1.22		2.703E+001	1.264E+002
		86.55	30.70		1.441E+000	3.593E+000
		105.31	21.10		4.968E+000	5.431E+000
Tl-208	583.19	85.00	2.655E+000	2.66E+000	-4.548E-001	1.299E+000
Bi-211	351.07	13.02	1.264E+001	1.26E+001	-2.826E+000	6.198E+000
Pb-211	404.85	3.78	4.281E+001	4.28E+001	-3.238E+001	2.093E+001
	427.09	1.76	9.555E+001		-3.970E+001	4.671E+001
	832.01	3.52	9.523E+001		2.568E+001	4.667E+001
Bi-212	39.86	1.06	3.267E+002	3.28E+001	2.190E+003	1.616E+002
	727.33	6.67	3.280E+001		5.347E+000	1.596E+001
	785.37	1.10	2.731E+002		3.180E+002	1.337E+002
> Pb-212	1620.50	1.47	0.000E+000	3.90E+000	0.000E+000	0.000E+000
	115.18	0.60	3.621E+002		-6.086E+001	1.792E+002
	238.63	43.60	3.900E+000		2.762E+000	1.922E+000
Pb212-XR	300.09	3.30	4.652E+001	1.47E+001	2.508E+001	2.283E+001
	74.82	10.28	2.508E+001		1.144E+001	1.240E+001
	77.11	17.10	1.470E+001		3.660E+000	7.267E+000
Bi-214	87.35	3.97	5.519E+001	4.94E+000	-3.354E+001	2.728E+001
	89.78	1.46	1.760E+002		3.737E+001	8.714E+001
	609.32	45.49	4.943E+000		5.165E+000	2.416E+000
	768.36	4.89	5.240E+001		2.270E+001	2.556E+001
	806.18	1.26	2.620E+002		7.630E+001	1.284E+002
	934.06	3.11	1.062E+002		-1.501E+001	5.190E+001
	1120.29	14.92	2.138E+001		3.987E-001	1.040E+001
	1155.21	1.63	1.920E+002		-6.465E+001	9.329E+001
	1238.12	5.83	4.553E+001		1.966E+001	2.196E+001
	1280.98	1.43	1.471E+002		4.149E+001	7.018E+001
	1377.67	3.99	6.326E+001		-1.036E+002	3.034E+001
	1385.31	0.79	4.047E+002		-3.444E+002	1.958E+002
	1401.52	1.33	3.425E+002		-1.383E+002	1.673E+002
	1407.99	2.39	2.170E+002		-5.840E+001	1.063E+002
	1509.21	2.13	8.352E+001		-1.674E+001	3.916E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1764.49	15.30	0.000E+000	4.63E+000	0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.332E+001		1.351E+001	1.149E+001
	295.22	18.42	8.487E+000		6.025E+000	4.168E+000
	351.93	35.60	4.630E+000		-1.035E+000	2.270E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

nuclide MDA Report

8/18/2015 1 1:52 PM Page 7

Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.841E+002	4.63E+000	3.308E+002	1.391E+002
Pb214-XR	74.82	5.80	4.446E+001	2.59E+001	2.028E+001	2.198E+001
	77.11	9.70	2.591E+001		6.452E+000	1.281E+001
	87.35	2.24	9.781E+001		-5.945E+001	4.835E+001
	89.78	0.82	3.133E+002		6.654E+001	1.551E+002
Ra-226	186.21	3.64	4.657E+001	4.66E+001	3.141E+001	2.299E+001
Ac-228	129.07	2.42	8.430E+001	1.30E+001	5.789E+000	4.170E+001
	209.25	3.89	4.558E+001		-2.427E+001	2.249E+001
	270.24	3.46	4.477E+001		-2.929E+001	2.201E+001
	328.00	2.95	5.525E+001		-1.955E+001	2.712E+001
	338.32	11.27	1.461E+001		-1.672E+001	7.171E+000
	409.46	1.92	8.573E+001		-4.489E+001	4.193E+001
	463.00	4.40	3.889E+001		3.562E+000	1.899E+001
	794.95	4.25	7.400E+001		1.169E+001	3.625E+001
	911.20	25.80	1.301E+001		1.041E+000	6.365E+000
	964.77	4.99	6.773E+001		2.135E+001	3.311E+001
	968.97	15.80	2.124E+001		1.970E+001	1.038E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.224E+001		-4.651E+001	4.532E+001
	300.07	2.47	6.215E+001		3.350E+001	3.050E+001
	302.65	2.20	7.020E+001		3.784E+001	3.445E+001
	330.06	1.40	1.164E+002		-5.546E+001	5.711E+001
Th-234	92.38	2.13	1.184E+002	1.18E+002	2.257E+001	5.864E+001
	92.80	2.10	1.199E+002		2.285E+001	5.937E+001
	112.81	0.21	1.044E+003		-7.122E+001	5.166E+002
U-235	143.76	10.96	1.766E+001	2.99E+000	8.105E+000	8.733E+000
	163.33	5.08	3.538E+001		-6.321E+000	1.748E+001
	185.71	57.20	2.994E+000		7.209E-001	1.478E+000
	202.11	1.08	1.678E+002		2.369E+001	8.285E+001
	205.31	5.01	3.582E+001		1.605E+001	1.768E+001
Am-241	59.54	35.90	8.795E+000	8.79E+000	9.297E-001	4.345E+000

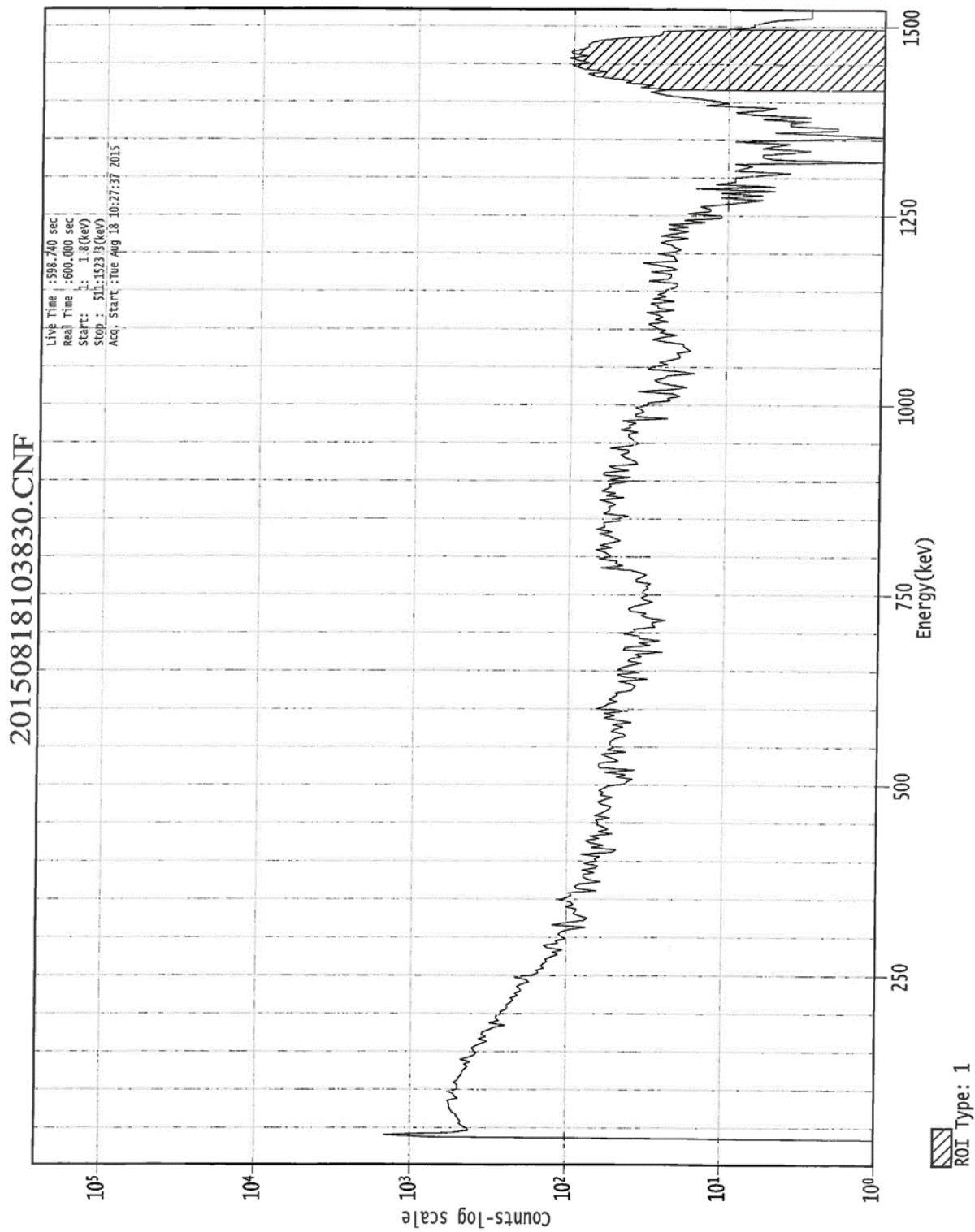
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: C:\Canberra\8-18-15\20150818103830.cnf

Report Generated On : 8/18/2015 1:24:56 PM

Sample Title : Truck Monitor
Sample Description :
Sample Identification : 65223
Sample Type :
Sample Geometry :
Sample Location : truck monitor

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000

Sample Taken On : 8/18/2015 10:27:37 AM
Acquisition Started : 8/18/2015 10:27:37 AM

Live Time : 598.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

Brandsburg Truck
Roll up - Security
Blkg waste

Survey # 2015-MVC-0-0043

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst RJ Beland
Date 8-18-15

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Peak Analysis Report 8/18/2015 1:24:56 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Truck Monitor
Peak Analysis Performed on: 8/18/2015 1:24:56 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	475-	502	488.68	1457.05	42.93	1.34E+003	145.99	5.03E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 12:24:56 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Truck Monitor
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	0.996	1460.82*	10.66	4.97376E+002	6.94179E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Interference Corrected Activity Report 8/18/2015 1:24:56 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
K-40	0.996	4.973757E+002	6.941787E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 8/18/2015 1:24:56 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

8/18/2015 1:56 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Truck Monitor
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	LaBr3	34.70	66.40	4.624E+000	4.62E+000	3.152E+001	2.284E+000
		788.70	33.60	8.924E+000		4.454E+000	4.367E+000
		1436.80	66.40	9.938E+000		2.441E-001	4.889E+000
+	K-40	1460.82*	10.66	7.839E+001	7.84E+001	4.974E+002	3.869E+001
	Cr-51	320.08	9.91	1.507E+001	1.51E+001	-5.974E+000	7.384E+000
	Mn-54	834.85	99.98	3.375E+000	3.37E+000	-8.009E-001	1.654E+000
	Co-58	810.76	99.45	3.311E+000	3.31E+000	-9.057E-002	1.623E+000
	Co-60	1173.23	99.85	3.238E+000	1.79E+000	-5.977E-001	1.574E+000
		1332.49	99.98	1.793E+000		5.836E-001	8.467E-001
	Nb-94	702.65	99.81	2.085E+000	2.09E+000	-1.468E+000	1.014E+000
		871.09	99.89	3.467E+000		1.098E+000	1.699E+000
	Sn-113	255.13	2.11	7.911E+001	2.60E+000	2.917E+001	3.896E+001
		391.70	64.97	2.596E+000		-4.098E-001	1.271E+000
	Cs-137	661.66	85.10	2.555E+000	2.56E+000	5.538E-001	1.246E+000
	Eu-152	121.78	28.67	7.483E+000	6.59E+000	-2.735E+000	3.704E+000
		244.70	7.61	2.280E+001		2.006E+001	1.124E+001
		295.94	0.45	3.533E+002		1.649E+002	1.735E+002
		344.28	26.60	6.589E+000		1.215E+001	3.236E+000
		367.79	0.86	2.002E+002		-5.666E+001	9.820E+001
		411.12	2.24	7.610E+001		1.971E+001	3.724E+001
		443.96	2.83	6.193E+001		-3.381E+001	3.028E+001
		488.68	0.42	4.323E+002		4.531E+002	2.112E+002
		563.99	0.49	4.267E+002		1.555E+002	2.085E+002
		586.26	0.46	4.795E+002		9.232E+001	2.344E+002
		678.62	0.47	4.459E+002		-3.448E+002	2.170E+002
		688.67	0.86	2.477E+002		7.775E+001	1.206E+002
		719.35	0.28	8.338E+002		-4.591E+001	4.064E+002
		778.90	12.96	2.145E+001		-7.201E+000	1.048E+001
		810.45	0.32	1.025E+003		-2.805E+001	5.026E+002
		867.37	4.26	8.080E+001		-3.051E+001	3.959E+001
		919.33	0.43	7.896E+002		-4.075E+002	3.863E+002
		964.08	14.65	2.378E+001		4.647E+000	1.163E+001
		1085.87	10.24	2.897E+001		-1.320E+001	1.408E+001
		1089.74	1.73	1.738E+002		-1.657E-001	8.450E+001
		1112.07	13.69	2.361E+001		-1.728E+000	1.149E+001
		1212.95	1.43	2.233E+002		-4.149E+001	1.084E+002
		1249.94	0.19	1.511E+003		8.149E+002	7.306E+002
		1299.14	1.63	1.319E+002		8.244E+001	6.292E+001
		1408.01	21.07	1.913E+001		-1.320E+000	9.317E+000
		1457.64	0.50	1.474E+003		6.982E+003	7.261E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.299E+000	5.30E+000	-1.937E+000	2.623E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Eu-154	247.93	6.89	2.497E+001	5.30E+000	1.055E+001	1.231E+001
	591.76	4.95	4.516E+001		-9.420E+000	2.208E+001
	692.42	1.78	1.193E+002		6.013E+001	5.805E+001
	723.30	20.06	1.153E+001		-4.465E+000	5.618E+000
	756.80	4.52	5.338E+001		-4.286E+001	2.601E+001
	873.18	12.08	2.872E+001		9.097E+000	1.408E+001
	996.29	10.48	3.050E+001		7.514E+000	1.488E+001
	1004.76	18.01	1.692E+001		-1.312E+001	8.243E+000
	1274.43	34.80	6.975E+000		9.417E-001	3.350E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	2.976E+002	7.40E+000	2.105E+003	1.474E+002
	60.01	1.22	2.586E+002		4.105E+001	1.278E+002
	86.55	30.70	7.396E+000		4.505E-001	3.657E+000
	105.31	21.10	1.129E+001		4.524E+000	5.592E+000
Tl-208	583.19	85.00	2.552E+000	2.55E+000	-1.198E+000	1.247E+000
Bi-211	351.07	13.02	1.351E+001	1.35E+001	7.507E+000	6.632E+000
Pb-211	404.85	3.78	4.393E+001	4.39E+001	-3.854E+001	2.149E+001
	427.09	1.76	9.647E+001		-6.591E+001	4.718E+001
	832.01	3.52	9.517E+001		-5.608E+001	4.664E+001
Bi-212	39.86	1.06	3.452E+002	3.47E+001	2.552E+003	1.709E+002
	727.33	6.67	3.475E+001		-1.701E+001	1.693E+001
	785.37	1.10	2.642E+002		1.876E+001	1.292E+002
> Pb-212	1620.50	1.47	0.000E+000	4.03E+000	0.000E+000	0.000E+000
	115.18	0.60	3.764E+002		1.873E+002	1.863E+002
	238.63	43.60	4.030E+000		3.530E+000	1.987E+000
Pb212-XR	300.09	3.30	4.686E+001	1.50E+001	-5.433E+001	2.300E+001
	74.82	10.28	2.547E+001		7.236E-001	1.260E+001
	77.11	17.10	1.504E+001		2.887E+000	7.435E+000
Bi-214	87.35	3.97	5.634E+001	5.00E+000	-3.583E+001	2.786E+001
	89.78	1.46	1.796E+002		9.084E+001	8.896E+001
	609.32	45.49	5.004E+000		2.198E+000	2.446E+000
	768.36	4.89	5.230E+001		-2.596E+001	2.552E+001
	806.18	1.26	2.589E+002		1.885E+002	1.269E+002
	934.06	3.11	1.064E+002		-9.007E+001	5.202E+001
	1120.29	14.92	2.199E+001		8.796E+000	1.071E+001
	1155.21	1.63	1.983E+002		4.782E+000	9.647E+001
	1238.12	5.83	5.326E+001		6.433E+001	2.583E+001
	1280.98	1.43	1.650E+002		1.525E+001	7.916E+001
	1377.67	3.99	4.983E+001		-1.316E+002	2.363E+001
	1385.31	0.79	3.220E+002		-6.893E+001	1.545E+002
	1401.52	1.33	2.616E+002		-4.287E+001	1.269E+002
	1407.99	2.39	1.684E+002		-1.162E+001	8.200E+001
	1509.21	2.13	1.441E+002		-4.018E+001	6.943E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1764.49	15.30	0.000E+000	4.95E+000	0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.403E+001		6.628E+000	1.185E+001
	295.22	18.42	8.578E+000		4.004E+000	4.213E+000
	351.93	35.60	4.948E+000		2.750E+000	2.430E+000

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.748E+002	4.95E+000	1.952E+001	1.344E+002
Pb214-XR	74.82	5.80	4.515E+001	2.65E+001	1.282E+000	2.232E+001
	77.11	9.70	2.651E+001		5.090E+000	1.311E+001
	87.35	2.24	9.986E+001		-6.349E+001	4.937E+001
	89.78	0.82	3.198E+002		1.617E+002	1.584E+002
Ra-226	186.21	3.64	4.658E+001	4.66E+001	-1.628E+001	2.299E+001
Ac-228	129.07	2.42	8.615E+001	1.33E+001	-8.058E+001	4.263E+001
	209.25	3.89	4.802E+001		1.501E+001	2.372E+001
	270.24	3.46	4.540E+001		-3.262E+001	2.232E+001
	328.00	2.95	5.616E+001		-2.265E+001	2.757E+001
	338.32	11.27	1.506E+001		-7.092E+000	7.395E+000
	409.46	1.92	8.763E+001		-4.711E+001	4.288E+001
	463.00	4.40	4.089E+001		7.757E+000	1.999E+001
	794.95	4.25	7.302E+001		5.933E+001	3.576E+001
	911.20	25.80	1.332E+001		-9.401E-001	6.522E+000
	964.77	4.99	6.985E+001		1.365E+001	3.417E+001
	968.97	15.80	2.170E+001		-7.120E+000	1.061E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.325E+001		4.000E+001	4.582E+001
	300.07	2.47	6.260E+001		-7.259E+001	3.073E+001
	302.65	2.20	7.070E+001		-8.198E+001	3.470E+001
	330.06	1.40	1.200E+002		-3.273E+001	5.890E+001
Th-234	92.38	2.13	1.207E+002	1.21E+002	3.141E+001	5.979E+001
	92.80	2.10	1.222E+002		3.180E+001	6.054E+001
	112.81	0.21	1.084E+003		4.639E+002	5.365E+002
U-235	143.76	10.96	1.808E+001	3.01E+000	1.342E+000	8.941E+000
	163.33	5.08	3.634E+001		-8.660E+000	1.796E+001
	185.71	57.20	3.005E+000		-1.508E+000	1.484E+000
	202.11	1.08	1.745E+002		-1.180E+001	8.622E+001
	205.31	5.01	3.746E+001		8.976E+000	1.850E+001
Am-241	59.54	35.90	8.894E+000	8.89E+000	1.412E+000	4.395E+000

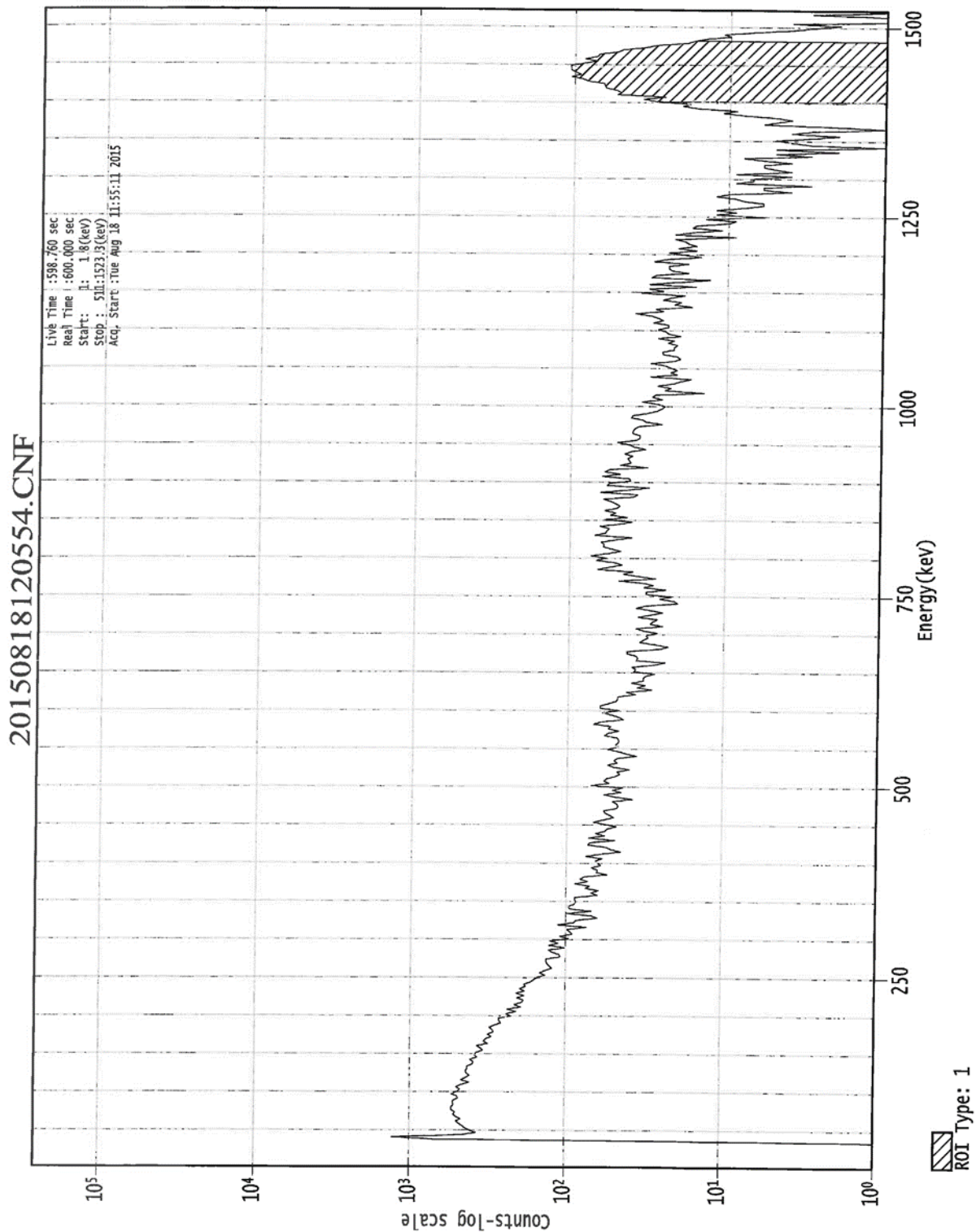
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



8/11/2015 11:24:12AM

Page 1 of 7

Analysis Report for 11-Aug-15-10005

09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Aug-15-10005
Sample Description	: 09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 6.579E+02 mL
Facility	: Default
Sample Taken On	: 8/10/2015 2:00:00PM
Acquisition Started	: 8/11/2015 10:00:14AM
Procedure	: 130G Oil
Operator	: HTomlin
Detector Name	: P11314X2
Geometry	: 130G Oil
Live Time	: 5000.0 seconds
Real Time	: 5003.3 seconds
Dead Time	: 0.07 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 3/31/2014
Efficiency Calibration Description	:
Sample Number	: 12851

Handwritten signature: M. Tomlin 8/11/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 8/11/2015 11:23:42AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Handwritten signature: H. Tomlin 8-11-15

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

8/11/2015 11:24:12AM

Page 2 of 7

Analysis Report for 11-Aug-15-10005

09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.90	1403 -	1413	1407.22	3.04E+01	20.66	7.11E+01	Pb-214
2	582.91	2326 -	2336	2330.57	1.56E+01	12.53	2.09E+01	Bi-211
3	609.43	2430 -	2444	2436.58	6.87E+01	21.63	3.86E+01	Tl-208
4	1120.34	4475 -	4486	4480.14	2.72E+01	12.34	1.17E+01	Bi-214
5	1461.11	5834 -	5851	5844.20	5.01E+01	15.37	7.76E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	4.82E-01	1.54E-01	miss
Tl-208	0.99	583.19 *	85.00	9.83E-03	8.00E-03	miss
Bi-211	0.95	351.07 *	13.02	8.67E-02	6.05E-02	miss
Bi-214	1.00	609.32 *	45.49	8.37E-02	2.82E-02	miss
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29 *	14.92	1.54E-01	7.12E-02	miss
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	1.00	241.99	7.25			

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-10005

09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
Pb-214	1.00	295.22	18.42			
		351.93 *	35.60	3.17E-02	2.21E-02	miss
		785.96	1.06			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.995	4.82E-01	1.54E-01	
Tl-208	0.995	9.83E-03	8.00E-03	
? Bi-211	0.959	8.67E-02	6.05E-02	
Bi-214	1.000	9.33E-02	2.62E-02	
? Pb-214	1.000	3.17E-02	2.21E-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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-10005
09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2
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UNIDENTIFIED PEAKS

Peak Locate Performed on : 8/11/2015 11:23:42AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+ K-40	1460.82	* 10.66	4.82E-01	1.21E-01	1.21E-01	miss
+ Cr-51	320.08	9.91	3.32E-02	1.04E-01	1.04E-01	free
+ Mn-54	834.85	99.98	-1.65E-04	1.04E-02	1.04E-02	miss
+ Co-58	810.76	99.45	1.03E-03	1.14E-02	1.14E-02	miss
	1674.73	0.52	1.33E+00		3.34E+00	miss
+ Co-60	1173.23	99.85	5.01E-04	1.15E-02	1.24E-02	miss
	1332.49	99.98	2.73E-04		1.15E-02	miss
+ Nb-94	702.65	99.81	-2.20E-03	9.74E-03	9.74E-03	miss
	871.09	99.89	-1.76E-03		1.24E-02	miss
+ Sn-113	255.13	2.11	9.79E-02	1.95E-02	4.10E-01	free
	391.70	64.97	1.03E-02		1.95E-02	free
+ Cs-134	475.36	1.48	2.13E-02	1.30E-02	7.04E-01	miss
	563.25	8.34	2.34E-02		1.38E-01	miss
	569.33	15.37	3.11E-02		7.90E-02	miss
	604.72	97.62	-6.72E-04		1.30E-02	miss
	795.86	85.46	4.36E-03		1.57E-02	miss
	801.95	8.69	-3.61E-02		1.35E-01	miss
	1038.61	0.99	-2.85E-01		9.78E-01	miss
	1167.97	1.79	-2.79E-02		6.39E-01	miss

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	CoInc Corr
+ Cs-134	1365.19	3.02	6.12E-02	1.30E-02	4.84E-01	miss
+ Cs-137	661.66	85.10	8.98E-04	1.20E-02	1.20E-02	miss
+ Eu-152	121.78	28.67	-2.03E-02	2.51E-02	2.51E-02	miss
	244.70	7.61	-5.70E-02		9.82E-02	miss
	295.94	0.45	-6.69E-01		2.28E+00	miss
	344.28	26.60	7.00E-03		3.63E-02	miss
	367.79	0.86	-3.23E-02		9.49E-01	miss
	411.12	2.24	5.30E-02		4.66E-01	miss
	443.96	2.83	1.12E-01		4.05E-01	miss
	488.68	0.42	1.99E-01		2.46E+00	miss
	563.99	0.49	-8.15E-01		1.94E+00	miss
	586.26	0.46	-1.34E+00		2.21E+00	miss
	678.62	0.47	-1.33E+00		1.66E+00	miss
	688.67	0.86	4.90E-01		1.54E+00	miss
	719.35	0.28	-5.99E-01		3.72E+00	miss
	778.90	12.96	6.98E-03		8.06E-02	miss
	810.45	0.32	-1.66E-01		3.17E+00	miss
	867.37	4.26	6.11E-02		3.02E-01	miss
	919.33	0.43	9.91E-01		3.14E+00	miss
	964.08	14.65	-3.35E-02		6.28E-02	miss
	1085.87	10.24	1.34E-02		1.58E-01	miss
	1089.74	1.73	1.62E-01		8.38E-01	miss
	1112.07	13.69	-1.57E-03		1.03E-01	miss
	1212.95	1.43	-2.06E-01		8.85E-01	miss
	1249.94	0.19	-4.69E-01		6.34E+00	miss
	1299.14	1.63	7.75E-02		7.56E-01	miss
	1408.01	21.07	1.08E-02		6.67E-02	miss
	1457.64	0.50	-1.87E+00		2.87E+00	miss
	1528.10	0.28	9.51E-01		5.31E+00	miss
+ Eu-154	123.07	40.40	5.96E-03	1.95E-02	1.95E-02	miss
	247.93	6.89	-6.03E-03		1.40E-01	miss
	591.76	4.95	-7.68E-03		2.06E-01	miss
	692.42	1.78	-3.74E-01		5.13E-01	miss
	723.30	20.06	2.85E-02		6.27E-02	miss
	756.80	4.52	-1.67E-02		2.27E-01	miss
	873.18	12.08	1.48E-02		1.03E-01	miss
	996.29	10.48	1.64E-02		1.12E-01	miss
	1004.76	18.01	-6.93E-03		6.94E-02	miss
	1274.43	34.80	-1.29E-02		2.47E-02	miss
	1596.48	1.80	3.50E-02		7.35E-01	miss
+ Eu-155	45.30	1.31	1.94E-01	3.97E-02	2.06E+00	miss
	60.01	1.22	3.95E-01		2.49E+00	miss
	86.55	30.70	1.91E-02		3.97E-02	miss
	105.31	21.10	2.72E-02		4.49E-02	miss
+ Tl-208	583.19	* 85.00	9.83E-03	1.18E-02	1.18E-02	miss
+ Bi-211	351.07	* 13.02	8.67E-02	8.96E-02	8.96E-02	miss
+ Pb-211	404.85	3.78	-2.80E-02	2.51E-01	2.51E-01	miss
	427.09	1.76	7.79E-02		6.21E-01	miss
	832.01	3.52	4.29E-02		2.94E-01	miss
+ Bi-212	39.86	1.06	2.35E-01	1.77E-01	2.33E+00	miss
	727.33	6.67	5.32E-02		1.77E-01	miss

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
Bi-212	785.37	1.10	-8.46E-02	1.77E-01	1.00E+00	miss
	1620.50	1.47	1.57E-01		9.92E-01	miss
+ Pb-212	115.18	0.60	7.36E-01	2.22E-02	1.51E+00	miss
	238.63	43.60	8.99E-03		2.22E-02	miss
	300.09	3.30	3.79E-02		2.92E-01	miss
+ Pb212-XR	74.82	10.28	7.51E-02	8.45E-02	1.91E-01	miss
	77.11	17.10	-1.74E-02		8.45E-02	miss
	87.35	3.97	7.92E-02		3.02E-01	miss
	89.78	1.46	-1.11E-01		6.24E-01	miss
+ Bi-214	609.32	* 45.49	8.37E-02	3.11E-02	3.11E-02	miss
	768.36	4.89	1.16E-01		3.13E-01	miss
	806.18	1.26	8.45E-02		9.29E-01	miss
	934.06	3.11	1.36E-01		4.85E-01	miss
	1120.29	* 14.92	1.54E-01		7.72E-02	miss
	1155.21	1.63	7.89E-02		9.98E-01	miss
	1238.12	5.83	1.44E-01		3.22E-01	miss
	1280.98	1.43	3.42E-01		1.13E+00	miss
	1377.67	3.99	5.17E-02		3.90E-01	miss
	1385.31	0.79	-9.74E-02		1.75E+00	miss
	1401.52	1.33	1.93E-01		1.12E+00	miss
	1407.99	2.39	9.51E-02		5.87E-01	miss
	1509.21	2.13	-9.41E-03		5.32E-01	miss
	1661.27	1.05	4.82E-01		1.63E+00	miss
	1729.59	2.88	2.55E-01		7.38E-01	miss
	1764.49	15.30	1.37E-01		1.87E-01	miss
	1847.43	2.03	2.04E-01		9.09E-01	miss
>	2118.51	1.16	0.00E+00		0.00E+00	miss
+ Pb-214	241.99	7.25	4.39E-02	3.28E-02	1.28E-01	miss
	295.22	18.42	4.78E-02		6.22E-02	miss
	351.93	* 35.60	3.17E-02		3.28E-02	miss
	785.96	1.06	-6.04E-02		1.09E+00	miss
+ Pb214-XR	74.82	5.80	1.33E-01	1.49E-01	3.39E-01	miss
	77.11	9.70	-3.06E-02		1.49E-01	miss
	87.35	2.24	1.40E-01		5.36E-01	miss
	89.78	0.82	-1.97E-01		1.11E+00	miss
+ Ra-226	186.21	3.64	1.96E-02	2.06E-01	2.06E-01	miss
+ Ac-228	129.07	2.42	-1.52E-01	5.74E-02	2.91E-01	miss
	209.25	3.89	-1.01E-02		2.01E-01	miss
	270.24	3.46	-1.19E-01		2.44E-01	miss
	328.00	2.95	1.90E-01		3.80E-01	miss
	338.32	11.27	3.88E-02		9.93E-02	miss
	409.46	1.92	-4.60E-02		4.98E-01	miss
	463.00	4.40	-3.01E-02		2.26E-01	miss
	794.95	4.25	3.56E-02		2.96E-01	miss
	911.20	25.80	2.68E-02		5.74E-02	miss
	964.77	4.99	-2.12E-02		2.30E-01	miss
	968.97	15.80	-3.78E-03		8.10E-02	miss
	1588.20	3.22	-1.94E-01		2.50E-01	miss
+ Pa-231	27.36	10.30	0.00E+00	2.34E-02	2.34E-02	miss
	283.69	1.70	-3.28E-02		4.79E-01	miss
	300.07	2.47	5.06E-02		3.90E-01	miss

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-10005

09140VEqVS01 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT2

Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+ Pa-231	302.65	2.20	1.12E-01	2.34E-02	4.53E-01	miss
	330.06	1.40	-4.98E-01		6.46E-01	miss
	92.38	2.13	4.64E-01	6.13E-01	6.13E-01	miss
+ Th-234	92.80	2.10	6.09E-01		6.28E-01	miss
	112.81	0.21	4.19E-03		4.04E+00	miss
	143.76	10.96	3.61E-03	1.41E-02	6.42E-02	miss
+ U-235	163.33	5.08	4.75E-02		1.54E-01	miss
	185.71	57.20	4.89E-03		1.41E-02	miss
	202.11	1.08	-2.78E-01		6.61E-01	miss
+ Am-241	205.31	5.01	-2.46E-02		1.39E-01	miss
	59.54	35.90	1.15E-02	8.72E-02	8.72E-02	miss

+ = 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

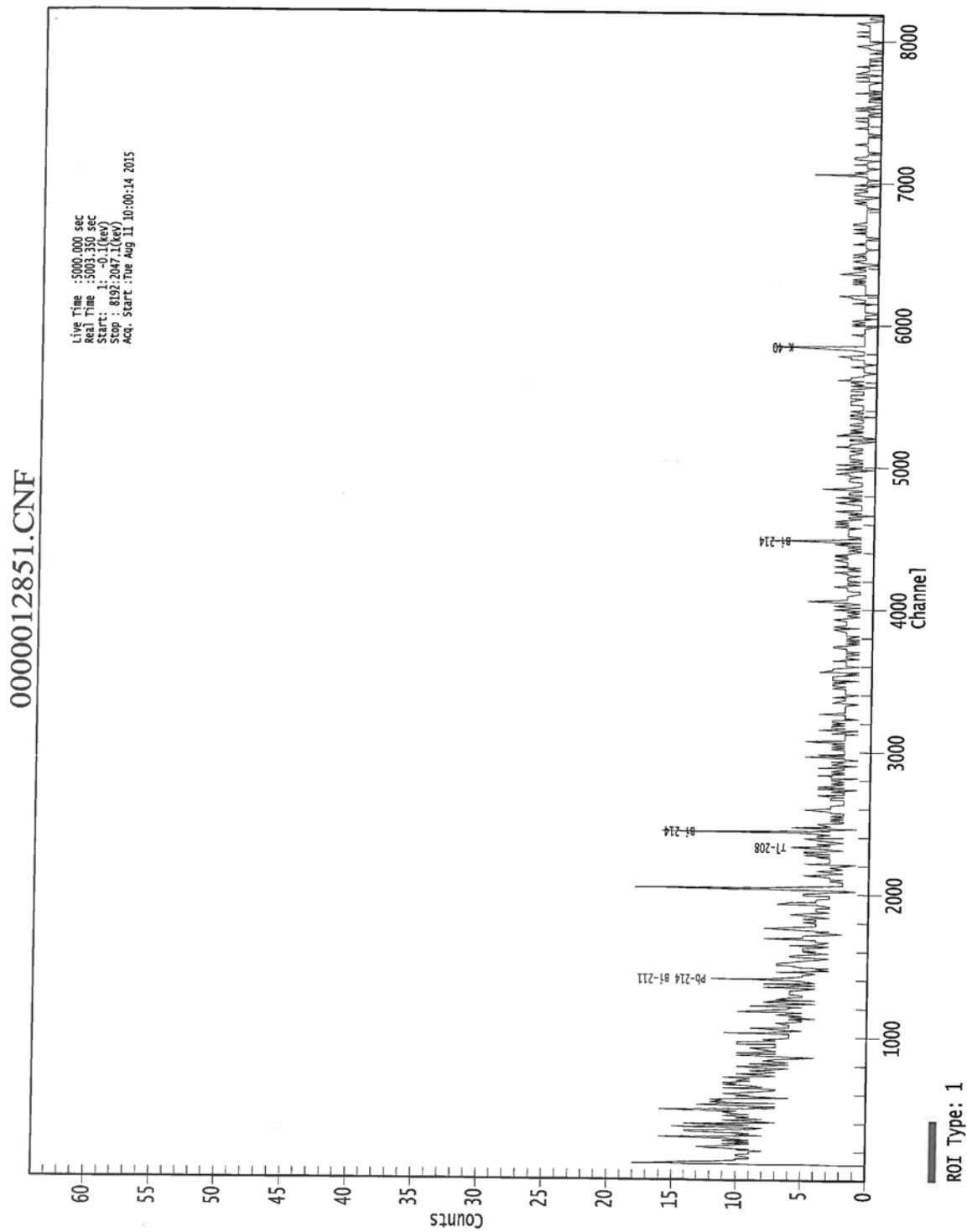
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

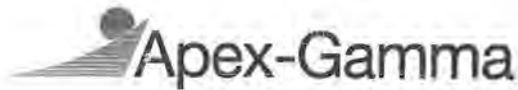
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



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Analysis Report for 11-Aug-15-10006

09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 11-Aug-15-10006
Sample Description	: 09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 2.787E+02 mL
Facility	: Default
Sample Taken On	: 8/10/2015 8:15:00PM
Acquisition Started	: 8/11/2015 10:06:47AM
Procedure	: 130G Oil
Operator	: HTomlin
Detector Name	: P40818B
Geometry	: 130G Oil
Live Time	: 10000.0 seconds
Real Time	: 10002.4 seconds
Dead Time	: 0.02 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/9/2014
Efficiency Calibration Used Done On	: 1/5/2015
Efficiency Calibration Description	:
Sample Number	: 12852

Handwritten signature: HTomlin 8/11/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 8/11/2015 12:53:34PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Handwritten signature: HTomlin 8-11-15

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-10006

09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	609.36	2430 -	2441	2436.69	3.87E+01	23.36	8.86E+01	Bi-214
2	1460.53	5835 -	5851	5843.05	7.98E+01	21.78	3.45E+01	K-40
3	1764.26	7053 -	7066	7059.86	1.85E+01	12.09	1.91E+01	Bi-214

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	1.01E+00	2.88E-01	miss
Bi-214	1.00	609.32 *	45.49	6.16E-02	3.79E-02	miss
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49 *	15.30	1.88E-01	1.24E-01	miss
		1847.43	2.03			
		2118.51	1.16			

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-10006

09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

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

Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.994	1.01E+00	2.88E-01	
Bi-214	1.000	7.24E-02	3.63E-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

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-10006
09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 8/11/2015 12:53:34PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	* 10.66	1.01E+00	2.92E-01	2.92E-01	miss
+	Cr-51	320.08	9.91	-1.21E-01	2.16E-01	2.16E-01	free
+	Mn-54	834.85	99.98	-4.01E-03	2.35E-02	2.35E-02	miss
+	Co-58	810.76	99.45	-1.40E-03	2.49E-02	2.49E-02	miss
		1674.73	0.52	5.57E-01		5.06E+00	miss
+	Co-60	1173.23	99.85	3.41E-03	3.00E-02	3.08E-02	miss
		1332.49	99.98	1.31E-02		3.00E-02	miss
+	Nb-94	702.65	99.81	5.05E-03	2.14E-02	2.52E-02	miss
		871.09	99.89	2.30E-03		2.14E-02	miss
+	Sn-113	255.13	2.11	6.07E-01	3.13E-02	1.12E+00	free
		391.70	64.97	-7.49E-03		3.13E-02	free
+	Cs-134	475.36	1.48	1.72E-01	2.37E-02	1.52E+00	miss
		563.25	8.34	8.32E-02		2.42E-01	miss
		569.33	15.37	1.13E-02		1.46E-01	miss
		604.72	97.62	9.37E-03		2.37E-02	miss
		795.86	85.46	5.32E-03		2.66E-02	miss
		801.95	8.69	8.04E-02		2.89E-01	miss
		1038.61	0.99	-3.20E-01		1.69E+00	miss
		1167.97	1.79	-5.61E-01		1.20E+00	miss

0.03

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-10006
09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Cs-134	1365.19	3.02	-3.47E-02	2.37E-02	6.70E-01	miss
+	Cs-137	661.66	85.10	-2.45E-03	2.80E-02	2.80E-02	miss
+	Eu-152	121.78	28.67	-1.15E-02	8.25E-02	8.25E-02	miss
		244.70	7.61	-5.25E-02		2.70E-01	miss
		295.94	0.45	2.15E+00		5.40E+00	miss
		344.28	26.60	-1.03E-02		8.71E-02	miss
		367.79	0.86	8.50E-01		2.68E+00	miss
		411.12	2.24	1.51E-01		1.04E+00	miss
		443.96	2.83	-7.86E-02		8.02E-01	miss
		488.68	0.42	1.92E+00		5.57E+00	miss
		563.99	0.49	1.61E-02		3.69E+00	miss
		586.26	0.46	1.14E-01		5.15E+00	miss
		678.62	0.47	-5.33E-01		4.53E+00	miss
		688.67	0.86	-9.50E-01		2.16E+00	miss
		719.35	0.28	7.16E-01		8.71E+00	miss
		778.90	12.96	4.75E-02		1.82E-01	miss
		810.45	0.32	-1.36E+00		7.53E+00	miss
		867.37	4.26	-3.27E-02		4.51E-01	miss
		919.33	0.43	6.39E-01		5.20E+00	miss
		964.08	14.65	-4.08E-02		1.50E-01	miss
		1085.87	10.24	3.58E-02		2.26E-01	miss
		1089.74	1.73	2.73E-01		1.45E+00	miss
		1112.07	13.69	-2.80E-02		1.67E-01	miss
		1212.95	1.43	1.56E-01		1.75E+00	miss
		1249.94	0.19	-1.13E+00		1.27E+01	miss
		1299.14	1.63	4.98E-01		1.47E+00	miss
		1408.01	21.07	-1.29E-03		1.21E-01	miss
		1457.64	0.50	-5.52E+00		5.53E+00	miss
		1528.10	0.28	8.11E-01		7.83E+00	miss
+	Eu-154	123.07	40.40	2.26E-02	6.11E-02	6.11E-02	miss
		247.93	6.89	-5.05E-02		2.92E-01	miss
		591.76	4.95	8.25E-02		3.92E-01	miss
		692.42	1.78	1.01E+00		1.54E+00	miss
		723.30	20.06	4.03E-02		1.22E-01	miss
		756.80	4.52	-1.03E-01		4.76E-01	miss
		873.18	12.08	-2.34E-03		1.89E-01	miss
		996.29	10.48	-4.96E-02		1.97E-01	miss
		1004.76	18.01	-3.60E-03		1.28E-01	miss
		1274.43	34.80	6.20E-03		7.22E-02	miss
		1596.48	1.80	-2.52E-01		8.64E-01	miss
+	Eu-155	45.30	1.31	2.07E+00	1.18E-01	1.08E+01	miss
		60.01	1.22	3.84E+00		1.21E+01	miss
		86.55	30.70	5.18E-02		1.18E-01	miss
		105.31	21.10	-2.74E-02		1.35E-01	miss
+	Tl-208	583.19	85.00	1.07E-02	2.97E-02	2.97E-02	miss
+	Bi-211	351.07	13.02	-1.20E-02	1.80E-01	1.80E-01	miss
+	Pb-211	404.85	3.78	4.59E-02	5.83E-01	5.83E-01	miss
		427.09	1.76	5.17E-01		1.26E+00	miss
		832.01	3.52	-1.45E-01		6.02E-01	miss
+	Bi-212	39.86	1.06	1.99E-01	4.04E-01	1.35E+01	miss
		727.33	6.67	8.67E-02		4.04E-01	miss

0.028

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-10006
09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Bi-212	785.37	1.10	1.49E-01	4.04E-01	2.04E+00	miss
		1620.50	1.47	-9.28E-02		1.80E+00	miss
+	Pb-212	115.18	0.60	5.21E-01	5.12E-02	4.30E+00	miss
		238.63	43.60	1.84E-02		5.12E-02	miss
		300.09	3.30	-1.61E-02		6.56E-01	miss
+	Pb212-XR	74.82	10.28	1.15E-01	3.04E-01	5.68E-01	miss
		77.11	17.10	1.06E-01		3.04E-01	miss
		87.35	3.97	-1.92E-01		8.42E-01	miss
		89.78	1.46	4.50E-01		2.21E+00	miss
+	Bi-214	609.32	* 45.49	6.16E-02	5.61E-02	5.61E-02	miss
		768.36	4.89	2.89E-01		5.47E-01	miss
		806.18	1.26	3.62E-01		1.97E+00	miss
		934.06	3.11	4.86E-01		8.89E-01	miss
		1120.29	14.92	1.13E-01		1.97E-01	miss
		1155.21	1.63	-5.65E-01		1.52E+00	miss
		1238.12	5.83	2.99E-02		4.10E-01	miss
		1280.98	1.43	5.91E-01		1.90E+00	miss
		1377.67	3.99	-4.87E-02		5.60E-01	miss
		1385.31	0.79	4.57E-01		3.17E+00	miss
		1401.52	1.33	4.19E-02		1.84E+00	miss
		1407.99	2.39	-1.14E-02		1.06E+00	miss
		1509.21	2.13	-1.23E-01		1.03E+00	miss
		1661.27	1.05	1.48E+00		3.03E+00	miss
		1729.59	2.88	1.55E-01		9.30E-01	miss
		1764.49	* 15.30	1.88E-01		1.70E-01	miss
		1847.43	2.03	1.73E-01		1.32E+00	miss
>		2118.51	1.16	0.00E+00		0.00E+00	miss
+	Pb-214	241.99	7.25	3.78E-02	7.16E-02	2.77E-01	miss
		295.22	18.42	4.81E-02		1.29E-01	miss
		351.93	35.60	5.88E-02		7.16E-02	miss
		785.96	1.06	-9.02E-02		2.08E+00	miss
+	Pb214-XR	74.82	5.80	2.03E-01	5.36E-01	1.01E+00	miss
		77.11	9.70	1.88E-01		5.36E-01	miss
		87.35	2.24	-3.40E-01		1.49E+00	miss
		89.78	0.82	8.01E-01		3.93E+00	miss
+	Ra-226	186.21	3.64	9.80E-03	5.75E-01	5.75E-01	miss
+	Ac-228	129.07	2.42	-3.38E-01	1.11E-01	9.66E-01	miss
		209.25	3.89	-2.28E-01		5.23E-01	miss
		270.24	3.46	3.93E-01		7.11E-01	miss
		328.00	2.95	2.85E-02		7.22E-01	miss
		338.32	11.27	7.07E-02		2.12E-01	miss
		409.46	1.92	5.72E-01		1.26E+00	miss
		463.00	4.40	1.65E-01		5.40E-01	miss
		794.95	4.25	-1.27E-01		4.72E-01	miss
		911.20	25.80	3.60E-02		1.11E-01	miss
		964.77	4.99	7.03E-02		4.72E-01	miss
		968.97	15.80	1.13E-01		1.79E-01	miss
		1588.20	3.22	2.36E-01		8.09E-01	miss
+	Pa-231	27.36	10.30	-7.15E-01	8.76E-01	1.31E+00	miss
		283.69	1.70	2.09E-01		1.33E+00	miss
		300.07	2.47	-2.14E-02		8.76E-01	miss

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-10006

09140VEqVS02 OIL FROM GATEHOUSE 2ND FLOOR COMPRESSOR RECOUNT 1

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Pa-231	302.65	2.20	1.00E-01	8.76E-01	9.99E-01	miss
		330.06	1.40	3.01E-01		1.55E+00	miss
+	Th-234	92.38	2.13	1.21E+00	1.63E+00	1.63E+00	miss
		92.80	2.10	3.16E-01		1.63E+00	miss
		112.81	0.21	-3.39E+00		1.23E+01	miss
+	U-235	143.76	10.96	2.44E-02	3.84E-02	2.10E-01	miss
		163.33	5.08	1.10E-01		4.43E-01	miss
		185.71	57.20	1.69E-02		3.84E-02	miss
		202.11	1.08	-7.12E-01		1.81E+00	miss
		205.31	5.01	1.30E-01		4.29E-01	miss
+	Am-241	59.54	35.90	1.47E-02	4.20E-01	4.20E-01	miss

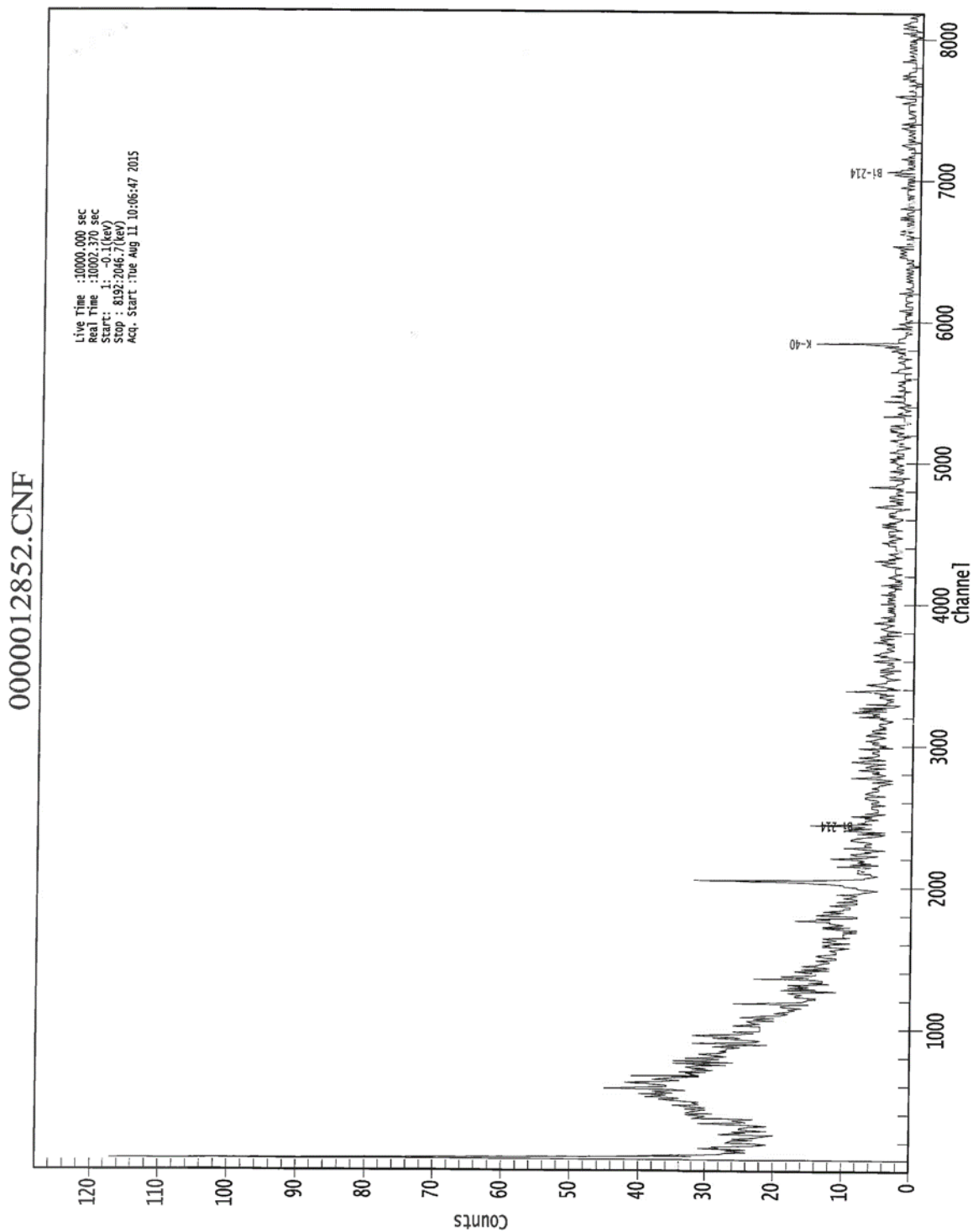
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-14 09140 Gamma Spectroscopy Reports



Attachment Figure 2-15 06000B Gamma Spectroscopy Reports



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Analysis Report for 11-May-15-10001
Sample #06000BIOSM01 05-05-15

GAMMA SPECTRUM ANALYSIS

Sample Identification : 11-May-15-10001
Sample Description : Sample #06000BIOSM01 05-05-15
Sample Type : Hot Count Lab
Unit :
Sample Point :

Sample Size : 1.000E+00 units
Facility : Default

Sample Taken On : 5/11/2015 1:00:00PM
Acquisition Started : 5/11/2015 12:33:48PM

Procedure : 03 POINT
Operator : Administrator
Detector Name : P11314X2
Geometry : resin test
Live Time : 1000.0 seconds
Real Time : 1000.5 seconds

Dead Time : 0.05 %

Peak Locate Threshold : 2.80
Peak Locate Range (in channels) : 120 - 8192
Peak Area Range (in channels) : 120 - 8192
Identification Energy Tolerance : 1.000FWHM

Energy Calibration Used Done On : 12/3/2014
Efficiency Calibration Used Done On : 9/11/2014
Efficiency Calibration Description :

Sample Number : 12311

Co-60 spec in point
Location # 25

PEAK WITH NID REPORT

Peak Analysis Performed on : 5/11/2015 12:50:31PM
Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

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Analysis Report for 11-May-15-10001

Sample #06000BIOSM01 05-05-15

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	968.72	3867 -	3879	3873.46	1.59E+01	14.15	3.01E+01	Ac-228
2	1172.88	4679 -	4702	4690.40	6.74E+02	53.43	2.96E+01	Co-60
3	1332.02	5314 -	5339	5327.36	5.53E+02	47.91	1.49E+01	Co-60

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Co-60	0.98	1173.23 *	99.85	3.22E-03	3.62E-04	0.972
		1332.49 *	99.98			
Ac-228	0.73	129.07	2.42	4.11E-04	3.67E-04	0.994
		209.25	3.89			
		270.24	3.46			
		328.00	2.95			
		338.32	11.27			
		409.46	1.92			
		463.00	4.40			
		794.95	4.25			
		911.20	25.80			
		964.77	4.99			
		968.97 *	15.80			
		1588.20	3.22			

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

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

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Analysis Report for 11-May-15-10001

Sample #06000BIOSM01 05-05-15

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
Co-60	0.989	3.04E-03	2.48E-04	
Ac-228	0.735	4.11E-04	3.67E-04	

? = 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

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

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Analysis Report for 11-May-15-10001

Sample #06000BIOSM01 05-05-15

UNIDENTIFIED PEAKS

Peak Locate Performed on : 5/11/2015 12:50:31PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	3.35E-04	9.26E-04	9.26E-04	miss
+	Cr-51	320.08	9.91	-1.04E-05	2.51E-04	2.51E-04	free
+	Mn-54	834.85	99.98	-3.44E-06	7.73E-05	7.73E-05	miss
+	Co-58	810.76	99.45	-1.34E-06	7.61E-05	7.61E-05	1.000
		1674.73	0.52	0.00E+00		3.13E-03	1.013
+	Co-60	1173.23	* 99.85	3.22E-03	9.33E-05	1.11E-04	0.972
		1332.49	* 99.98	2.88E-03		9.33E-05	0.972
+	Nb-94	702.65	99.81	-9.50E-07	5.99E-05	5.99E-05	0.971
		871.09	99.89	2.54E-06		9.07E-05	0.970
+	Sn-113	255.13	2.11	-5.45E-04	5.98E-05	1.12E-03	free
		391.70	64.97	1.57E-05		5.98E-05	free
+	Cs-134	475.36	1.48	6.06E-04	5.07E-05	2.94E-03	miss
		563.25	8.34	1.64E-04		6.94E-04	0.945
		569.33	15.37	-2.00E-05		2.84E-04	0.941
		604.72	97.62	-3.67E-05		5.07E-05	0.964
		795.86	85.46	-2.44E-05		9.30E-05	0.964
		801.95	8.69	1.61E-04		1.01E-03	0.945
		1038.61	0.99	5.54E-03		1.04E-02	0.970
		1167.97	1.79	-2.83E-03		4.78E-03	1.049

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

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Analysis Report for 11-May-15-10001

Sample #06000BBIOSM01 05-05-15

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	-2.64E-04	5.07E-05	1.71E-03	1.077
+	Cs-137	661.66	85.10	-1.88E-05	5.71E-05	5.71E-05	miss
+	Eu-152	121.78	28.67	1.41E-05	7.81E-05	7.81E-05	0.967
		244.70	7.61	-9.62E-05		3.42E-04	0.963
		295.94	0.45	1.67E-03		9.45E-03	miss
		344.28	26.60	-7.58E-07		1.57E-04	0.978
		367.79	0.86	9.03E-04		5.44E-03	0.939
		411.12	2.24	9.41E-04		2.20E-03	0.951
		443.96	2.83	-7.46E-04		1.32E-03	0.963
		488.68	0.42	2.21E-03		1.05E-02	miss
		563.99	0.49	1.96E-03		1.23E-02	0.963
		586.26	0.46	3.01E-03		1.41E-02	0.969
		678.62	0.47	4.17E-03		1.54E-02	0.939
		688.67	0.86	8.14E-04		8.15E-03	0.985
		719.35	0.28	-4.08E-03		2.55E-02	miss
		778.90	12.96	-5.37E-06		6.00E-04	0.970
		810.45	0.32	-3.03E-03		2.21E-02	1.035
		867.37	4.26	-3.89E-04		1.78E-03	0.956
		919.33	0.43	1.08E-03		2.22E-02	0.985
		964.08	14.65	3.84E-05		6.37E-04	1.016
		1085.87	10.24	3.28E-04		1.10E-03	1.012
		1089.74	1.73	-1.47E-03		5.08E-03	0.974
		1112.07	13.69	1.10E-04		8.20E-04	0.992
		1212.95	1.43	-2.73E-04		4.17E-03	0.956
		1249.94	0.19	9.70E-03		2.91E-02	1.054
		1299.14	1.63	-1.04E-03		2.32E-03	0.969
		1408.01	21.07	-6.54E-05		1.87E-04	0.986
		1457.64	0.50	-2.27E-03		1.46E-02	1.041
		1528.10	0.28	6.35E-03		2.62E-02	0.999
+	Eu-154	123.07	40.40	-1.51E-05	4.80E-05	4.80E-05	0.967
		247.93	6.89	2.20E-05		4.93E-04	0.960
		591.76	4.95	-1.89E-05		1.13E-03	0.952
		692.42	1.78	2.60E-04		3.72E-03	0.963
		723.30	20.06	-3.06E-05		3.60E-04	0.964
		756.80	4.52	-1.18E-04		1.63E-03	0.950
		873.18	12.08	6.08E-04		8.97E-04	0.961
		996.29	10.48	-1.05E-04		8.94E-04	0.989
		1004.76	18.01	-2.55E-05		4.85E-04	0.985
		1274.43	34.80	-1.43E-05		1.32E-04	0.987
		1596.48	1.80	0.00E+00		8.01E-04	1.098
+	Eu-155	45.30	1.31	1.64E-03	7.96E-05	4.66E-03	0.999
		60.01	1.22	4.37E-04		5.21E-03	1.000
		86.55	30.70	7.05E-07		7.96E-05	free
		105.31	21.10	3.56E-05		1.23E-04	1.000
+	Tl-208	583.19	85.00	2.94E-05	7.25E-05	7.25E-05	0.964
+	Bi-211	351.07	13.02	3.25E-04	4.33E-04	4.33E-04	miss
+	Pb-211	404.85	3.78	6.05E-04	1.23E-03	1.23E-03	miss
		427.09	1.76	-5.09E-04		2.36E-03	miss
		832.01	3.52	5.35E-05		2.19E-03	miss
+	Bi-212	39.86	1.06	9.18E-04	9.34E-04	5.48E-03	0.999
		727.33	6.67	2.07E-05		9.34E-04	0.990

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

Analysis Report for 11-May-15-10001
Sample #06000BIOSM01 05-05-15

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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	785.37	1.10	2.14E-03	9.34E-04	8.86E-03	0.970
	1620.50	1.47	-4.01E-04		2.95E-03	1.003
+ Pb-212	115.18	0.60	-1.05E-03	7.44E-05	3.62E-03	miss
	238.63	43.60	2.56E-05		7.44E-05	free
	300.09	3.30	-3.95E-04		9.22E-04	free
+ Pb212-XR	74.82	10.28	1.46E-04	2.03E-04	3.90E-04	miss
	77.11	17.10	7.20E-05		2.03E-04	miss
	87.35	3.97	2.15E-05		5.61E-04	miss
	89.78	1.46	-6.85E-05		1.49E-03	miss
+ Bi-214	609.32	45.49	2.79E-05	1.43E-04	1.43E-04	0.973
	768.36	4.89	4.13E-05		1.62E-03	0.969
	806.18	1.26	-1.83E-04		5.68E-03	0.959
	934.06	3.11	7.20E-04		3.52E-03	0.970
	1120.29	14.92	2.46E-05		6.22E-04	0.970
	1155.21	1.63	3.71E-04		4.81E-03	0.969
	1238.12	5.83	4.38E-04		1.35E-03	0.970
	1280.98	1.43	2.52E-04		2.60E-03	0.970
	1377.67	3.99	6.13E-04		1.81E-03	1.017
	1385.31	0.79	9.20E-04		6.29E-03	0.970
	1401.52	1.33	-6.99E-04		3.79E-03	0.970
	1407.99	2.39	-5.85E-04		1.67E-03	0.970
	1509.21	2.13	-4.62E-04		1.98E-03	0.973
	1661.27	1.05	0.00E+00		1.56E-03	1.000
	1729.59	2.88	8.36E-04		3.04E-03	1.068
	1764.49	15.30	1.05E-04		4.45E-04	1.001
	1847.43	2.03	3.11E-04		2.29E-03	1.035
>	2118.51	1.16	0.00E+00		0.00E+00	1.023
+ Pb-214	241.99	7.25	5.90E-05	1.57E-04	4.31E-04	0.999
	295.22	18.42	9.22E-05		2.38E-04	1.000
	351.93	35.60	9.15E-05		1.57E-04	free
	785.96	1.06	8.40E-04		8.66E-03	0.999
+ Pb214-XR	74.82	5.80	2.59E-04	3.58E-04	6.92E-04	miss
	77.11	9.70	1.27E-04		3.58E-04	miss
	87.35	2.24	3.80E-05		9.94E-04	miss
	89.78	0.82	-1.22E-04		2.65E-03	miss
+ Ra-226	186.21	3.64	2.79E-04	7.71E-04	7.71E-04	free
+ Ac-228	129.07	2.42	-6.64E-05	3.29E-04	8.97E-04	0.971
	209.25	3.89	2.12E-04		8.41E-04	0.988
	270.24	3.46	3.52E-04		1.10E-03	0.977
	328.00	2.95	-3.58E-04		1.09E-03	0.977
	338.32	11.27	2.22E-05		3.29E-04	0.996
	409.46	1.92	-2.54E-04		2.25E-03	0.965
	463.00	4.40	-3.31E-04		9.23E-04	0.962
	794.95	4.25	6.45E-05		1.91E-03	0.968
	911.20	25.80	9.02E-05		4.26E-04	0.995
	964.77	4.99	4.53E-04		1.96E-03	0.989
	968.97	* 15.80	4.11E-04		5.64E-04	0.994
	1588.20	3.22	2.83E-04		1.68E-03	1.001
+ Pa-231	27.36	10.30	0.00E+00	6.97E-05	6.97E-05	0.998
	283.69	1.70	-1.66E-04		1.90E-03	1.000
	300.07	2.47	-5.28E-04		1.23E-03	1.000

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports

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Analysis Report for 11-May-15-10001

Sample #06000BIOSM01 05-05-15

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	-2.24E-05	6.97E-05	1.45E-03	1.000
		330.06	1.40	8.16E-04		2.59E-03	1.001
+	Th-234	92.38	2.13	4.06E-04	1.53E-03	1.53E-03	free
		92.80	2.10	7.94E-04		1.62E-03	free
		112.81	0.21	3.44E-03		1.28E-02	free
+	U-235	143.76	10.96	7.24E-05	5.21E-05	2.45E-04	free
		163.33	5.08	1.92E-04		5.02E-04	free
		185.71	57.20	2.17E-05		5.21E-05	free
		202.11	1.08	-6.24E-04		1.85E-03	miss
		205.31	5.01	-5.73E-05		4.24E-04	free
+	Am-241	59.54	35.90	4.96E-05	1.81E-04	1.81E-04	free

+ = 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

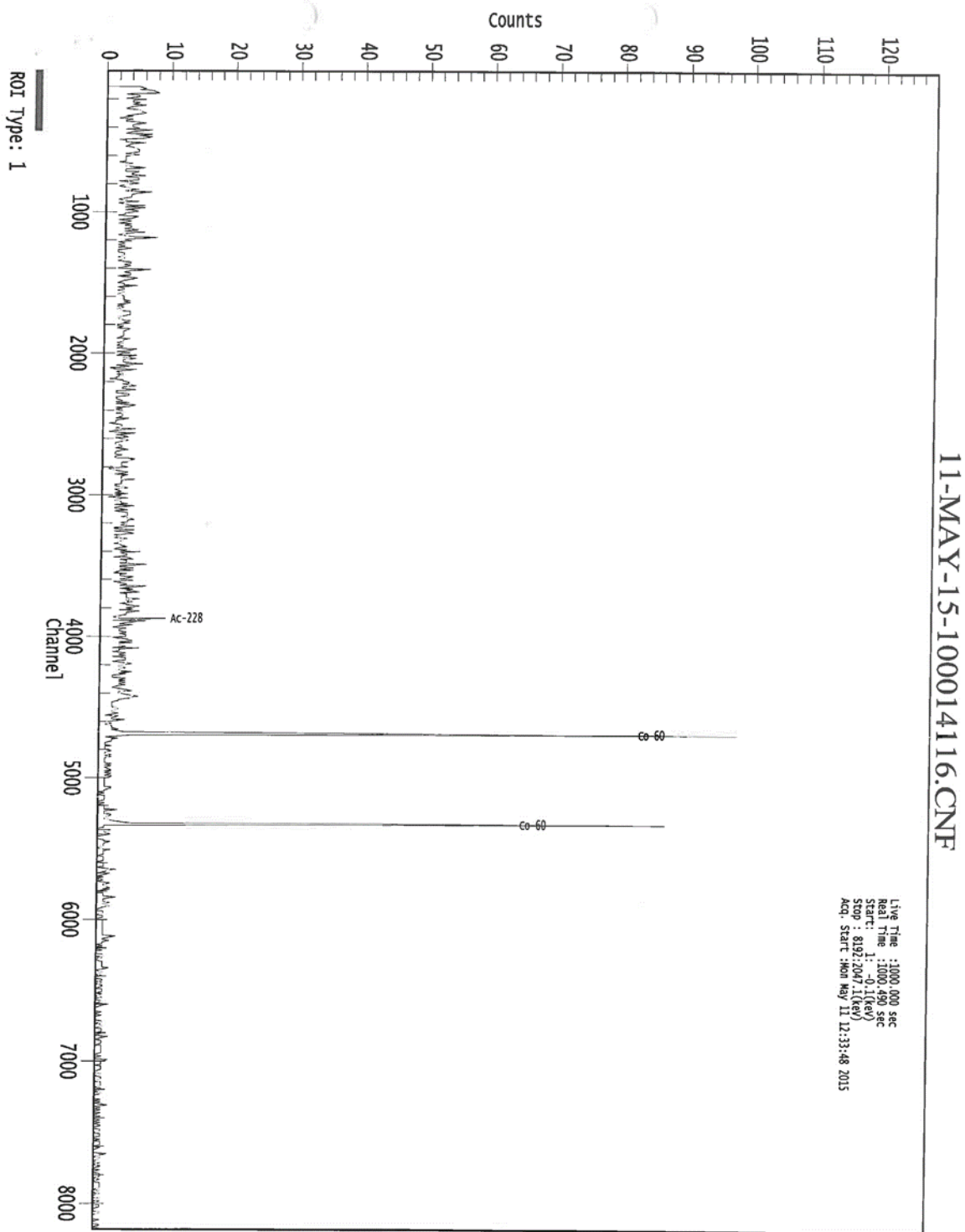
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-15 06000B Gamma Spectroscopy Reports



Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

*****:*****:*****
*** G A M M A S P E C T R U M A N A L Y S I S *****

.lename: C:\Canberra\3-11-15\20150311151533.cnf

Report Generated On : 3/11/2015 2:05:37 PM

Sample Title : InSpector 1000 spectrum East wall

Sample Description : Tbl 592 East Wall

Sample Identification :

506310C

Sample Type :

CF-00

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 3/11/2015 2:59:34 PM

Acquisition Started : 3/11/2015 2:59:34 PM

Live Time : 897.9 seconds

Real Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVEN

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst AS Redmond

Date 3-11-15

AS Redmond 3/11/15

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Peak Analysis Report

3/11/2015 2:05:37 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: InSpector 1000 spectrum East wall
Peak Analysis Performed on: 3/11/2015 2:05:37 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.38	38.91	1.68	3.17E+003	197.44	1.12E+003
2	299-	345	322.60	240.90	1.20	6.92E+002	323.89	3.72E+003
3	440-	495	468.35	350.13	3.22	4.49E+002	267.76	2.19E+003
4	782-	853	817.98	611.78	2.26	3.93E+002	201.54	1.40E+003
5	1904-	2012	1958.54	1461.84	17.87	2.29E+003	171.17	7.15E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/11/2015 2:00:37 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: InSpector 1000 spectrum East wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.617	34.70*	66.40	4.41075E+001	9.23821E+000
		788.70	33.60		
		1436.80*	66.40	9.16530E+001	1.00276E+001
K-40	1.000	1460.82*	10.66	5.70897E+002	6.53686E+001
Pb-212	0.999	115.18	0.60		
		238.63*	43.60	9.52770E+000	4.71937E+000
		300.09	3.30		
Bi-214	0.999	609.32*	45.49	1.08041E+001	5.69528E+000
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		
Pb-214	0.511	241.99*	7.25	5.72897E+001	2.83481E+001
		295.22	18.42		
		351.93*	35.60	9.79782E+000	6.05359E+000
		785.96	1.06		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/11/2015 2:05:37 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
	LaBr3	0.617	4.410746E+001	9.238213E+000
	K-40	1.000	2.961559E+002	8.492728E+001
X	Ba-133	0.995		
X	Bi-211	1.000		
	Pb-212	0.999	7.898252E+000	4.820606E+000
	Bi-214	0.999	1.080413E+001	5.695280E+000
	Pb-214	0.511	9.797822E+000	6.053465E+000
X	Th-227	0.424		
X	Ac-228	0.339		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/11/2015 2:05:37 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

3/11/2015

2:05.3 PM

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*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: InSpector 1000 spectrum East wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	3.743E+000	3.74E+000	4.411E+001	1.853E+000
		788.70	33.60	6.910E+000		9.892E+000	3.392E+000
		1436.80*	66.40	9.434E+000		9.165E+001	4.663E+000
+	K-40	1460.82*	10.66	5.876E+001	5.88E+001	5.709E+002	2.904E+001
	Cr-51	320.08	9.91	1.417E+001	1.42E+001	-6.197E+000	6.987E+000
	Mn-54	834.85	99.98	2.804E+000	2.80E+000	1.407E+000	1.380E+000
	Co-58	810.76	99.45	2.722E+000	2.72E+000	2.733E+000	1.339E+000
	Co-60	1173.23	99.85	2.746E+000	1.70E+000	-9.538E-001	1.343E+000
		1332.49	99.98	1.700E+000		-1.486E+000	8.167E-001
	Nb-94	702.65	99.81	1.873E+000	1.87E+000	-2.710E-001	9.173E-001
		871.09	99.89	2.796E+000		-4.324E-001	1.375E+000
	Sn-113	255.13	2.11	6.959E+001	2.17E+000	-7.811E+000	3.440E+001
		391.70	64.97	2.165E+000		-5.889E-001	1.065E+000
	Cs-137	661.66	85.10	2.193E+000	2.19E+000	1.447E+000	1.075E+000
	Eu-152	121.78	28.67	6.472E+000	6.00E+000	6.937E-002	3.211E+000
		244.70	7.61	2.068E+001		4.018E+001	1.023E+001
		295.94	0.45	3.253E+002		2.919E+002	1.605E+002
		344.28	26.60	6.000E+000		7.333E+000	2.961E+000
		367.79	0.86	1.723E+002		3.180E-001	8.486E+001
		411.12	2.24	6.363E+001		-2.274E+001	3.128E+001
		443.96	2.83	5.369E+001		-2.260E+001	2.639E+001
		488.68	0.42	3.800E+002		-1.354E+002	1.867E+002
		563.99	0.49	3.600E+002		1.711E+002	1.768E+002
		586.26	0.46	4.242E+002		3.878E+001	2.085E+002
		678.62	0.47	3.857E+002		-5.218E+001	1.889E+002
		688.67	0.86	2.202E+002		2.084E+001	1.079E+002
		719.35	0.28	6.671E+002		-2.774E+001	3.265E+002
		778.90	12.96	1.621E+001		-1.001E+001	7.944E+000
		810.45	0.32	8.429E+002		8.464E+002	4.147E+002
		867.37	4.26	6.548E+001		-4.586E-001	3.220E+001
		919.33	0.43	6.745E+002		1.697E+002	3.316E+002
		964.08	14.65	1.981E+001		6.875E+000	9.731E+000
		1085.87	10.24	2.451E+001		1.503E-001	1.198E+001
		1089.74	1.73	1.447E+002		1.248E+001	7.075E+001
		1112.07	13.69	1.898E+001		3.214E+000	9.285E+000
		1212.95	1.43	1.875E+002		-6.574E+001	9.158E+001
		1249.94	0.19	1.276E+003		-7.670E+002	6.213E+002
		1299.14	1.63	1.284E+002		1.022E+002	6.218E+001
		1408.01	21.07	1.384E+001		-2.029E+001	6.754E+000
		1457.64	0.50	1.245E+003		6.369E+003	6.156E+002
		1528.10	0.28	4.526E+002		-3.466E+002	2.131E+002
	Eu-154	123.07	40.40	4.573E+000	4.57E+000	9.468E-001	2.269E+000

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

3/11/2015

2:05.3 PM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.249E+001	4.57E+000	-1.623E+000	1.112E+001
		591.76	4.95	4.104E+001		4.532E+000	2.019E+001
		692.42	1.78	1.053E+002		-4.879E+001	5.157E+001
		723.30	20.06	9.342E+000		3.391E+000	4.573E+000
		756.80	4.52	4.165E+001		1.468E+001	2.037E+001
		873.18	12.08	2.301E+001		-4.619E+000	1.131E+001
		996.29	10.48	2.545E+001		9.684E+000	1.248E+001
		1004.76	18.01	1.438E+001		2.409E+000	7.045E+000
		1274.43	34.80	6.446E+000		-5.510E-001	3.131E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.879E+002	6.89E+000	-3.022E+001	9.299E+001
		60.01	1.22	1.965E+002		1.231E+002	9.726E+001
		86.55	30.70	6.893E+000		-3.263E+000	3.419E+000
		105.31	21.10	9.203E+000		-8.602E+000	4.565E+000
	Tl-208	583.19	85.00	2.259E+000	2.26E+000	-2.518E-001	1.110E+000
	Bi-211	351.07*	13.02	2.613E+001	2.61E+001	2.679E+001	1.298E+001
	Pb-211	404.85	3.78	3.778E+001	3.78E+001	5.447E-001	1.858E+001
		427.09	1.76	8.239E+001		3.254E+001	4.049E+001
		832.01	3.52	7.921E+001		-2.271E+000	3.898E+001
	Bi-212	39.86	1.06	2.637E+002	2.77E+001	2.698E+003	1.307E+002
		727.33	6.67	2.771E+001		-2.177E+001	1.356E+001
		785.37	1.10	2.022E+002		-5.207E+001	9.917E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.103E+002	7.28E+000	-5.552E+000	1.539E+002
		238.63*	43.60	7.278E+000		9.528E+000	3.620E+000
		300.09	3.30	4.378E+001		3.102E+001	2.161E+001
	Pb212-XR	74.82	10.28	2.215E+001	1.31E+001	7.885E+000	1.098E+001
		77.11	17.10	1.312E+001		1.444E+001	6.505E+000
		87.35	3.97	5.292E+001		-9.915E-001	2.625E+001
		89.78	1.46	1.419E+002		1.558E+002	7.038E+001
+	Bi-214	609.32*	45.49	9.018E+000	9.02E+000	1.080E+001	4.472E+000
		768.36	4.89	3.948E+001		-6.765E+001	1.932E+001
		806.18	1.26	2.071E+002		6.714E+001	1.018E+002
		934.06	3.11	9.417E+001		-1.224E+002	4.629E+001
		1120.29	14.92	1.748E+001		-3.970E+000	8.548E+000
		1155.21	1.63	1.693E+002		6.896E+001	8.287E+001
		1238.12	5.83	4.278E+001		-2.716E+001	2.085E+001
		1280.98	1.43	1.560E+002		1.606E+002	7.574E+001
		1377.67	3.99	4.218E+001		-2.747E+001	2.023E+001
		1385.31	0.79	2.293E+002		-2.652E+002	1.103E+002
		1401.52	1.33	1.866E+002		-3.794E+002	9.071E+001
		1407.99	2.39	1.218E+002		-1.786E+002	5.945E+001
		1509.21	2.13	1.406E+002		-4.542E+001	6.858E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99*	7.25	4.376E+001	7.93E+000	5.729E+001	2.177E+001
		295.22	18.42	7.933E+000		8.997E+000	3.916E+000
		351.93*	35.60	9.556E+000		9.798E+000	4.749E+000

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	Pb-214	785.96	1.06	2.121E+002	7.93E+000	6.506E+001	1.041E+002
	Pb214-XR	74.82	5.80	3.926E+001	2.31E+001	1.398E+001	1.946E+001
		77.11	9.70	2.313E+001		2.546E+001	1.147E+001
		87.35	2.24	9.380E+001		-1.757E+000	4.653E+001
		89.78	0.82	2.526E+002		2.774E+002	1.253E+002
	Ra-226	186.21	3.64	4.432E+001	4.43E+001	-1.896E+001	2.196E+001
	Ac-228	129.07	2.42	7.472E+001	1.10E+001	-9.032E+000	3.706E+001
		209.25	3.89	4.047E+001		2.206E+001	2.004E+001
		270.24	3.46	4.184E+001		-1.972E+001	2.067E+001
		328.00	2.95	4.787E+001		-1.857E+001	2.359E+001
		338.32*	11.27	3.019E+001		3.095E+001	1.500E+001
		409.46	1.92	7.391E+001		-2.255E+001	3.633E+001
		463.00	4.40	3.598E+001		1.857E+001	1.769E+001
		794.95	4.25	5.674E+001		2.144E+001	2.787E+001
		911.20	25.80	1.104E+001		-6.474E+000	5.429E+000
		964.77	4.99	5.794E+001		2.422E+001	2.847E+001
		968.97	15.80	1.799E+001		-3.493E+000	8.837E+000
		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
>	Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
		283.69	1.70	8.440E+001		-9.715E+001	4.166E+001
		300.07	2.47	5.849E+001		4.144E+001	2.886E+001
		302.65	2.20	6.584E+001		1.249E+002	3.249E+001
		330.06	1.40	1.020E+002		-1.324E+001	5.027E+001
	Th-234	92.38	2.13	9.487E+001	9.49E+001	2.840E+000	4.706E+001
		92.80	2.10	9.605E+001		2.875E+000	4.764E+001
		112.81	0.21	8.977E+002		8.273E+002	4.453E+002
	U-235	143.76	10.96	1.553E+001	2.83E+000	6.764E+000	7.699E+000
		163.33	5.08	3.224E+001		-4.036E+001	1.598E+001
@		185.71	57.20	2.834E+000		2.441E+000	1.404E+000
		202.11	1.08	1.440E+002		9.270E+000	7.128E+001
		205.31	5.01	3.168E+001		-2.682E+001	1.569E+001
	Am-241	59.54	35.90	6.759E+000	6.76E+000	4.234E+000	3.345E+000

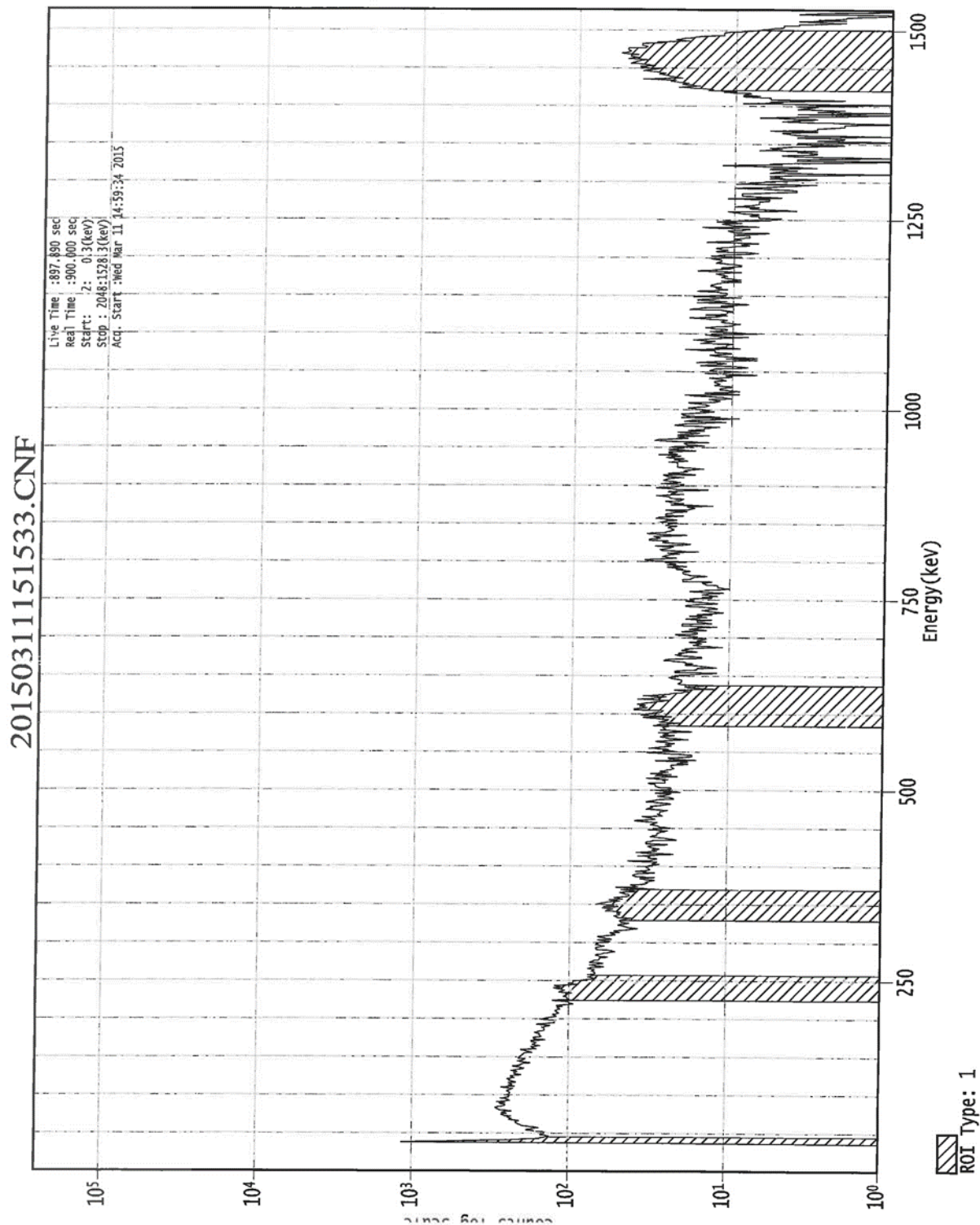
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports



Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\3-11-15\20150311125214.cnf

Report Generated On : 3/11/2015 1:56:16 PM
Sample Title : Inspector 1000 west block wall
Sample Description : Tbl 592 west block wall
Sample Identification :
Sample Type :
Sample Geometry : units

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

SU6310C
C/A

Sample Size : 1.000E+000 units
Sample Taken On : 3/11/2015 12:36:26 PM
Acquisition Started : 3/11/2015 12:36:26 PM
Live Time : 897.7 seconds
Real Time : 900.0 seconds
Dead Time : 0.25 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst RJ Bohanuel

Date 3-11-15

[Handwritten signature and date 3/11/15]

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Peak Analysis Report 3/11/2015 1:56:16 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Inspector 1000 west block wall
Peak Analysis Performed on: 3/11/2015 1:56:15 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.41	38.92	1.56	2.31E+003	222.05	1.75E+003
2	431-	486	459.01	343.13	0.92	5.15E+002	301.96	2.79E+003
3	763-	833	798.38	597.13	1.20	3.31E+002	221.76	1.73E+003
4	1870-	1977	1923.83	1436.05	9.55	1.91E+003	179.98	8.96E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/11/2015 1:16 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Inspector 1000 west block wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.684	34.70*	66.40	3.21395E+001	7.13026E+000
		788.70	33.60		
K-40	0.841	1436.80*	66.40	7.50324E+001	9.28746E+000
		1460.82*	10.66	4.67369E+002	5.99651E+001
Eu-152	0.573	121.78	28.67		
		244.70	7.61		
		295.94	0.45		
		344.28*	26.60	1.48464E+001	9.03977E+000
		367.79	0.86		
		411.12	2.24		
		443.96	2.83		
		488.68	0.42		
		563.99	0.49		
		586.26*	0.46	8.81126E+002	6.00871E+002
		678.62	0.47		
		688.67	0.86		
		719.35	0.28		
		778.90	12.96		
		810.45	0.32		
		867.37	4.26		
		919.33	0.43		
		964.08	14.65		
		1085.87	10.24		
		1089.74	1.73		
		1112.07	13.69		
		1212.95	1.43		
		1249.94	0.19		
		1299.14	1.63		
		1408.01	21.07		
		1457.64*	0.50	9.90487E+003	1.24173E+003
		1528.10	0.28		
		609.32*	45.49	8.91004E+000	6.07035E+000
Bi-214	0.978	768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/11/2015 1:16 PM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
Bi-214	0.978	1407.99*	2.39	2.08110E+003	2.57884E+002
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/11/2015 1:56:16 PM Page 5

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
	LaBr3	0.684	3.213947E+001	7.130265E+000
	K-40	0.841	2.645075E+002	7.294714E+001
X	Ba-133	0.978		
	Eu-152	0.573	1.484640E+001	9.022528E+000
X	Tl-208	0.947		
X	Bi-211	0.982		
	Bi-214	0.978	8.759913E+000	6.070710E+000
X	Pb-214	0.500		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/11/2015 1:56:15 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: units
Sample Title: Inspector 1000 west block wall
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	4.613E+000	4.61E+000	3.214E+001	2.288E+000
		788.70	33.60	7.907E+000		1.176E+001	3.890E+000
		1436.80*	66.40	1.030E+001		7.503E+001	5.097E+000
+	K-40	1460.82*	10.66	6.417E+001	6.42E+001	4.674E+002	3.175E+001
	Cr-51	320.08	9.91	1.646E+001	1.65E+001	-2.228E+000	8.129E+000
	Mn-54	834.85	99.98	2.844E+000	2.84E+000	3.368E-001	1.400E+000
	Co-58	810.76	99.45	2.834E+000	2.83E+000	7.912E-002	1.395E+000
	Co-60	1173.23	99.85	2.717E+000	1.85E+000	1.588E+000	1.329E+000
		1332.49	99.98	1.847E+000		1.499E-001	8.901E-001
	Nb-94	702.65	99.81	2.000E+000	2.00E+000	5.641E-001	9.809E-001
		871.09	99.89	2.905E+000		-1.026E+000	1.429E+000
	Sn-113	255.13	2.11	7.979E+001	2.46E+000	8.307E+001	3.950E+001
		391.70	64.97	2.460E+000		4.285E-001	1.212E+000
	Cs-137	661.66	85.10	2.298E+000	2.30E+000	5.926E-002	1.128E+000
+	Eu-152	121.78	28.67	7.976E+000	7.98E+000	1.755E+000	3.963E+000
		244.70	7.61	2.293E+001		-4.057E-002	1.136E+001
		295.94	0.45	3.740E+002		7.791E+001	1.849E+002
		344.28*	26.60	1.423E+001		1.485E+001	7.078E+000
		367.79	0.86	1.869E+002		-6.478E+000	9.216E+001
		411.12	2.24	7.210E+001		3.550E+001	3.551E+001
		443.96	2.83	5.953E+001		1.286E+001	2.931E+001
		488.68	0.42	4.078E+002		-1.614E+002	2.006E+002
		563.99	0.49	3.936E+002		-2.262E+002	1.936E+002
		586.26*	0.46	9.661E+002		8.811E+002	4.794E+002
		678.62	0.47	4.119E+002		-2.408E+002	2.020E+002
		688.67	0.86	2.319E+002		2.430E+001	1.138E+002
		719.35	0.28	7.005E+002		-3.012E+002	3.433E+002
		778.90	12.96	1.954E+001		2.014E+001	9.607E+000
		810.45	0.32	8.778E+002		2.450E+001	4.322E+002
		867.37	4.26	6.754E+001		-6.815E+001	3.323E+001
		919.33	0.43	6.854E+002		-9.581E+001	3.370E+002
		964.08	14.65	1.933E+001		1.326E+001	9.491E+000
		1085.87	10.24	2.518E+001		-4.568E+000	1.232E+001
		1089.74	1.73	1.487E+002		-5.969E+001	7.275E+001
		1112.07	13.69	1.915E+001		-6.280E+000	9.368E+000
		1212.95	1.43	1.819E+002		8.638E+000	8.879E+001
		1249.94	0.19	1.164E+003		-2.445E+002	5.653E+002
		1299.14	1.63	1.159E+002		4.298E+001	5.594E+001
		1408.01	21.07	2.355E+001		-2.641E+000	1.161E+001
		1457.64*	0.50	1.360E+003		9.905E+003	6.729E+002
		1528.10	0.28	3.174E+002		2.604E+001	1.455E+002
	Eu-154	123.07	40.40	5.637E+000	5.57E+000	5.361E+000	2.800E+000

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.493E+001	5.57E+000	-1.480E+001	1.234E+001
		591.76	4.95	4.504E+001		4.218E+001	2.219E+001
		692.42	1.78	1.125E+002		1.427E+001	5.521E+001
		723.30	20.06	9.719E+000		-1.313E+000	4.762E+000
		756.80	4.52	4.736E+001		-2.119E+001	2.323E+001
		873.18	12.08	2.408E+001		-6.710E+000	1.185E+001
		996.29	10.48	2.387E+001		-1.703E+001	1.169E+001
		1004.76	18.01	1.360E+001		-1.123E+001	6.656E+000
		1274.43	34.80	5.569E+000		-3.590E+000	2.692E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.059E+002	8.48E+000	-6.243E+001	1.020E+002
		60.01	1.22	2.482E+002		1.661E+002	1.231E+002
		86.55	30.70	8.480E+000		2.206E+000	4.213E+000
		105.31	21.10	1.136E+001		-5.881E+000	5.643E+000
	Tl-208	583.19*	85.00	5.228E+000	5.23E+000	4.768E+000	2.595E+000
	Bi-211	351.07*	13.02	2.908E+001	2.91E+001	3.033E+001	1.446E+001
	Pb-211	404.85	3.78	4.228E+001	4.23E+001	4.297E+000	2.083E+001
		427.09	1.76	9.215E+001		3.140E+001	4.537E+001
		832.01	3.52	8.087E+001		-7.686E+000	3.980E+001
	Bi-212	39.86	1.06	2.542E+002	2.93E+001	1.934E+003	1.259E+002
		727.33	6.67	2.927E+001		-1.205E+001	1.434E+001
		785.37	1.10	2.352E+002		1.652E+002	1.157E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.833E+002	4.11E+000	-2.214E+001	1.904E+002
		238.63	43.60	4.105E+000		4.674E+000	2.034E+000
		300.09	3.30	5.037E+001		3.021E+001	2.490E+001
	Pb212-XR	74.82	10.28	2.749E+001	1.61E+001	1.772E+001	1.365E+001
		77.11	17.10	1.613E+001		-5.563E-001	8.008E+000
		87.35	3.97	6.489E+001		-3.883E+001	3.224E+001
		89.78	1.46	1.739E+002		2.054E+002	8.641E+001
+	Bi-214	609.32*	45.49	9.769E+000	9.77E+000	8.910E+000	4.848E+000
		768.36	4.89	4.740E+001		-3.445E+001	2.327E+001
		806.18	1.26	2.228E+002		1.288E+002	1.097E+002
		934.06	3.11	9.434E+001		-6.520E+001	4.638E+001
		1120.29	14.92	1.735E+001		-5.843E+000	8.485E+000
		1155.21	1.63	1.610E+002		-7.792E+001	7.868E+001
		1238.12	5.83	4.009E+001		8.842E+000	1.951E+001
		1280.98	1.43	1.330E+002		-9.797E+001	6.425E+001
		1377.67	3.99	7.132E+001		-1.191E+002	3.480E+001
		1385.31	0.79	4.275E+002		-3.729E+002	2.094E+002
		1401.52	1.33	3.356E+002		-6.531E+001	1.652E+002
		1407.99*	2.39	2.857E+002		2.081E+003	1.414E+002
		1509.21	2.13	6.562E+001		-3.464E+000	3.108E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.451E+001	9.09E+000	2.293E+001	1.214E+001
		295.22	18.42	9.085E+000		6.370E-001	4.492E+000
		351.93*	35.60	1.064E+001		1.109E+001	5.289E+000

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.460E+002	9.09E+000	2.920E+002	1.210E+002
Pb214-XR	74.82	5.80	4.872E+001	2.84E+001	3.141E+001	2.419E+001
	77.11	9.70	2.843E+001		-9.807E-001	1.412E+001
	87.35	2.24	1.150E+002		-6.882E+001	5.713E+001
	89.78	0.82	3.097E+002		3.656E+002	1.538E+002
Ra-226	186.21	3.64	5.126E+001	5.13E+001	2.429E+001	2.543E+001
Ac-228	129.07	2.42	9.146E+001	1.16E+001	-4.434E+001	4.543E+001
	209.25	3.89	4.691E+001		-2.004E+001	2.326E+001
	270.24	3.46	4.783E+001		-2.407E+001	2.366E+001
	328.00	2.95	5.575E+001		-4.801E+000	2.754E+001
	338.32	11.27	1.524E+001		1.642E+001	7.527E+000
	409.46	1.92	8.366E+001		2.263E+000	4.121E+001
	463.00	4.40	3.802E+001		2.124E+001	1.871E+001
	794.95	4.25	6.353E+001		-3.937E-002	3.126E+001
	911.20	25.80	1.158E+001		1.111E+001	5.697E+000
	964.77	4.99	5.667E+001		4.844E+001	2.783E+001
	968.97	15.80	1.767E+001		1.501E+001	8.674E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	9.887E+001		1.065E+002	4.890E+001
	300.07	2.47	6.729E+001		4.037E+001	3.326E+001
	302.65	2.20	7.492E+001		1.702E+001	3.703E+001
	330.06	1.40	1.196E+002		1.155E+001	5.906E+001
Th-234	92.38	2.13	1.170E+002	1.17E+002	2.416E+001	5.811E+001
	92.80	2.10	1.184E+002		2.446E+001	5.884E+001
	112.81	0.21	1.105E+003		4.061E+002	5.489E+002
U-235	143.76	10.96	1.860E+001	3.27E+000	1.241E+001	9.234E+000
	163.33	5.08	3.853E+001		3.237E+001	1.913E+001
	185.71	57.20	3.270E+000		1.153E+000	1.622E+000
	202.11	1.08	1.662E+002		4.118E+000	8.239E+001
	205.31	5.01	3.680E+001		5.686E+000	1.825E+001
Am-241	59.54	35.90	8.537E+000	8.54E+000	5.711E+000	4.234E+000

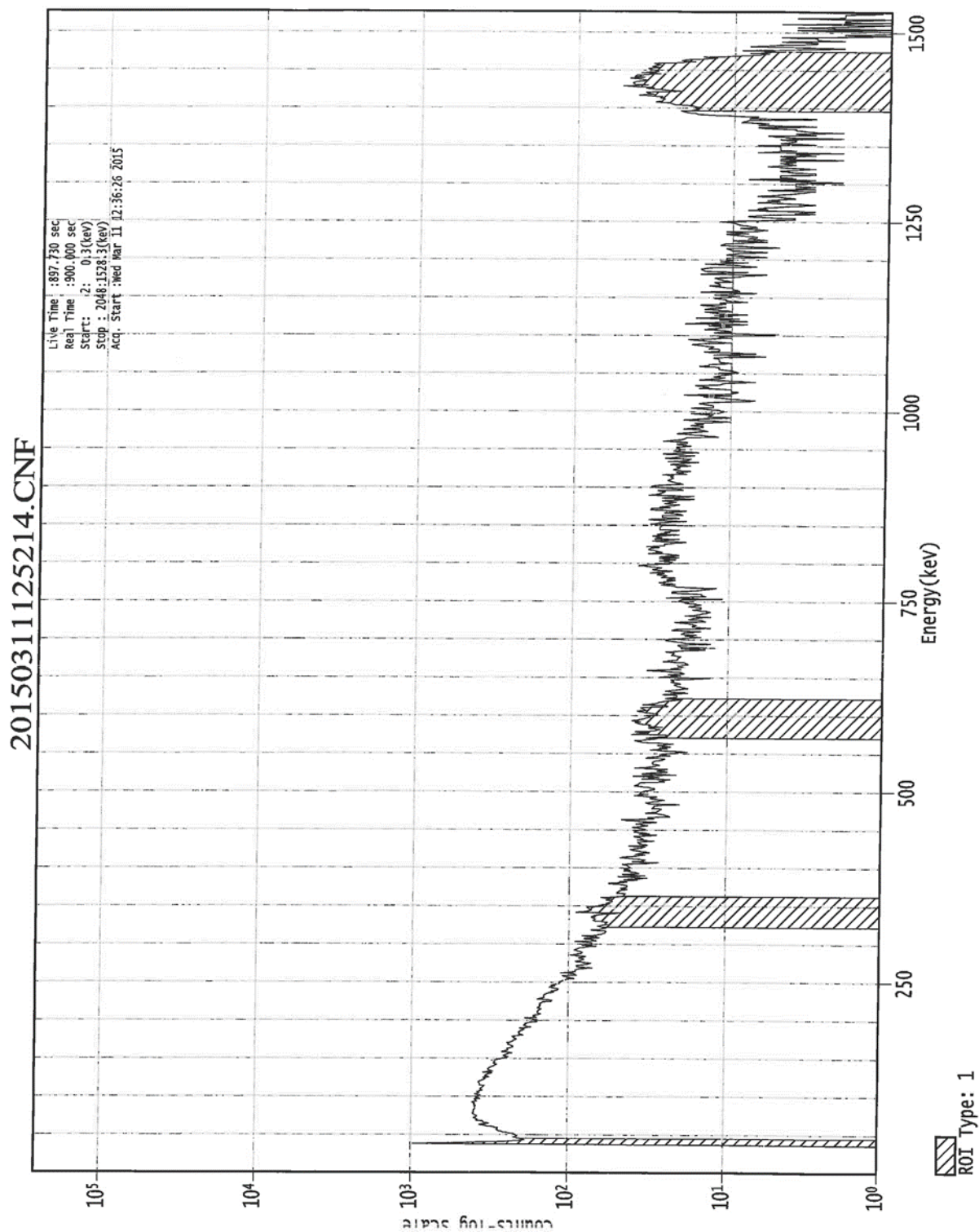
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-16 06310C Gamma Spectroscopy Reports



Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

```
*****
***      G A M M A   S   E C T R U M   A N A L Y S I S      ***
*****
```

Filename: 5452

Report Generated On : 4/7/2015 11:00:15 AM

Sample Title : 6310d-75
Sample Description : unit2 592 drain
Sample Identification :
Sample Type :
Sample Geometry : 1.2 meter turbin

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/7/2015 10:45:14 AM

Live Time : 900.0 seconds
Dead Time : 900.4 seconds

Rad Time : 0.04 %

Energy Calibration Used Done On : 1/13/2015
Efficiency Calibration Used Done On : 6/3/2014
Efficiency ID : 5CM_TURBINE


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Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Peak Analysis Report

4/7/2015 11:00:15 AM

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*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: 6310d-75
Peak Analysis Performed on: 4/7/2015 11:00:15 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	298-	307	301.96	75.14	1.20	9.65E+001	47.76	2.08E+002
2	333-	347	342.07	85.19	0.51	5.65E+001	52.36	2.17E+002
3	952-	963	957.03	239.11	1.08	5.44E+001	32.78	8.46E+001
4	1177-	1188	1183.38	295.76	0.70	3.79E+001	23.95	4.21E+001
5	1401-	1417	1409.68	352.39	1.21	7.66E+001	28.50	4.04E+001
6	2432-	2446	2439.04	609.94	1.59	8.25E+001	26.74	3.35E+001
7	5836-	5857	5848.63	1462.42	1.82	1.83E+002	28.37	5.11E+000
8	7057-	7071	7064.48	1766.19	0.75	2.89E+001	14.88	9.08E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 11:10:15 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6310d-75
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.870	1460.81*	10.67	8.91220E+000	1.56627E+000
PB-212	0.501	74.81*	9.60	3.64036E+000	1.94280E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	3.35658E-001	2.09308E-001
		300.09	3.41		
BI-214	0.971	609.31*	46.30	6.76132E-001	2.33643E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29	15.10		
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49*	15.80	1.04521E+000	5.44302E-001
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.591	74.81* @	6.33	5.52093E+000	2.94643E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	5.83195E-001	3.80023E-001
		351.92*	37.20	6.44085E-001	2.60940E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 11:00:15 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.870	8.912196E+000	1.566266E+000
X	BI-211	0.662		
	PB-212	0.501	3.686766E-001	2.081102E-001
	BI-214	0.971	7.335573E-001	2.146990E-001
	PB-214 @	0.591	6.475707E-001	2.145473E-001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 4/7/2015 11:00:15 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	85.19	6.2773E-002	92.68	Tol.	TH-227 TH-231

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Nuclide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry: 1.2 meter turbin
Sample Title: 6310d-75
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	8.179E-001	8.18E-001	8.912E+000	3.430E-001
	MN-54	834.83	99.97	5.522E-002	5.52E-002	-6.739E-002	2.191E-002
	CO-60	1173.22	100.00	8.270E-002	5.37E-002	-2.374E-004	3.493E-002
		1332.49	100.00	5.369E-002		-2.120E-002	2.010E-002
	NB-94	702.63	100.00	7.219E-002	7.22E-002	-6.422E-003	3.071E-002
		871.10	100.00	7.744E-002		-1.261E-003	3.294E-002
	SN-113	255.12	1.93	4.518E+000	1.20E-001	-6.311E-001	2.062E+000
		391.69	64.90	1.202E-001		-2.913E-002	5.335E-002
	CS-134	475.35	1.46	5.075E+000	8.48E-002	-4.539E-001	2.216E+000
		563.23	8.38	9.125E-001		1.211E-001	3.967E-001
		569.32	15.43	4.518E-001		9.001E-002	1.934E-001
		604.70	97.60	8.483E-002		2.867E-002	3.717E-002
		795.84	85.40	9.137E-002		1.820E-002	3.912E-002
		801.93	8.73	5.718E-001		-2.707E-001	2.215E-001
		1038.57	1.00	9.426E+000		2.365E+000	4.098E+000
		1167.94	1.80	3.954E+000		-5.643E-002	1.621E+000
		1365.15	3.04	2.174E+000		2.902E-001	8.627E-001
	CS-137	661.65	85.12	1.029E-001	1.03E-001	1.949E-002	4.525E-002
	Tl-208	583.19	84.50	1.544E-001	1.54E-001	1.281E-001	7.124E-002
	BI-211	72.87	1.20	1.863E+001	1.02E+000	9.025E-001	8.897E+000
		351.10*	12.20	1.018E+000		1.964E+000	4.745E-001
		404.80	4.10	1.754E+000		-1.251E+000	7.686E-001
		426.90	1.90	4.408E+000		-9.115E-001	1.966E+000
		831.80	3.30	2.483E+000		1.243E+000	1.069E+000
	PB-211	404.80	3.00	2.397E+000	2.40E+000	-1.710E+000	1.050E+000
		427.10	1.40	6.098E+000		-9.565E-001	2.725E+000
		831.80	2.80	2.926E+000		1.464E+000	1.260E+000
	BI-212	39.86	1.10	1.291E+001	8.02E-001	3.639E+000	5.897E+000
		727.17	11.80	8.021E-001		2.452E-001	3.549E-001
		785.42	2.00	3.439E+000		1.152E+000	1.440E+000
		1620.56	2.75	2.390E+000		5.347E-001	9.257E-001
+	PB-212	74.81*	9.60	2.803E+000	3.14E-001	3.640E+000	1.350E+000
		77.11	17.50	1.149E+000		3.211E-001	5.472E-001
		87.20	6.30	2.749E+000		1.064E+000	1.304E+000
		89.80	1.75	8.844E+000		3.233E-001	4.174E+000
		115.19	0.60	2.214E+001		-3.111E+000	1.045E+001
		238.63*	44.60	3.139E-001		3.357E-001	1.486E-001
		300.09	3.41	1.905E+000		-1.443E+000	8.346E-001
+	BI-214	609.31*	46.30	2.866E-001	2.87E-001	6.761E-001	1.322E-001
		768.36	5.04	1.954E+000		9.728E-001	8.668E-001
		806.17	1.23	5.896E+000		1.083E+000	2.490E+000
		934.06	3.21	2.275E+000		1.365E-001	9.527E-001

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29	15.10	1.070E+000	2.87E-001	7.240E-001	4.933E-001
		1155.19	1.69	5.791E+000		8.847E-001	2.517E+000
		1238.11	5.94	1.691E+000		5.400E-001	7.353E-001
		1280.96	1.47	4.381E+000		-5.012E-001	1.738E+000
		1377.67	4.11	1.954E+000		5.851E-001	8.105E-001
		1385.31	0.78	8.530E+000		-5.205E+000	3.384E+000
		1401.50	1.39	5.176E+000		1.835E-001	2.091E+000
		1407.98	2.48	3.095E+000		2.282E-001	1.269E+000
		1509.19	2.19	4.201E+000		1.676E+000	1.774E+000
		1661.28	1.15	6.315E+000		2.408E+000	2.506E+000
		1729.60	3.05	2.613E+000		6.639E-001	1.056E+000
		1764.49*	15.80	7.093E-001		1.045E+000	3.057E-001
		1847.44	2.12	2.953E+000		-2.034E+000	1.105E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	4.251E+000	3.34E-001	5.521E+000	2.048E+000
		77.11	10.70	1.880E+000		5.251E-001	8.950E-001
		87.20	3.70	4.681E+000		1.811E+000	2.221E+000
		89.80	1.03	1.503E+001		5.494E-001	7.092E+000
		241.98	7.49	1.441E+000		1.676E-001	6.704E-001
		295.21*	19.20	5.614E-001		5.832E-001	2.599E-001
		351.92*	37.20	3.340E-001		6.441E-001	1.556E-001
		785.91	1.10	5.636E+000		-8.176E-001	2.310E+000
	RA-226	186.21	3.28	3.459E+000	3.46E+000	2.014E+000	1.623E+000
	AC-228	89.95	2.10	7.362E+000	4.42E-001	2.692E-001	3.475E+000
		93.35	3.50	4.742E+000		2.168E+000	2.250E+000
		129.08	2.80	4.568E+000		9.701E-001	2.157E+000
		209.28	4.40	2.048E+000		-1.011E+000	9.422E-001
		270.23	3.60	2.529E+000		-3.772E-001	1.157E+000
		327.64	3.20	2.434E+000		-3.241E-001	1.088E+000
		338.32	11.40	7.157E-001		-6.926E-002	3.212E-001
		409.51	2.13	4.431E+000		2.855E+000	2.006E+000
		463.00	4.40	2.069E+000		2.010E-001	9.285E-001
		794.70	4.60	1.501E+000		-4.103E-001	6.287E-001
		911.60	27.70	4.422E-001		2.085E-001	1.999E-001
		964.60	5.20	2.004E+000		7.414E-001	8.866E-001
		969.11	16.60	7.423E-001		2.614E-001	3.350E-001
		1587.90	3.71	1.914E+000		1.825E-001	7.595E-001
	PA-234M	766.36	0.29	2.210E+001	9.73E+000	-1.641E+001	9.164E+000
		1001.03	0.84	9.728E+000		1.853E+000	4.138E+000
	TH-234	92.38	2.81	5.871E+000	5.87E+000	1.603E+000	2.784E+000
		92.80	2.77	6.086E+000		3.090E+000	2.890E+000
		112.81	0.28	4.784E+001		-2.773E+001	2.256E+001
	U-235	89.96	1.50	1.031E+001	2.14E-001	3.768E-001	4.865E+000
		93.35	2.50	6.638E+000		3.036E+000	3.150E+000
		105.00	1.00	1.544E+001		3.768E+000	7.326E+000
		109.14	1.50	9.719E+000		-1.343E+000	4.603E+000
		143.76	10.50	1.144E+000		3.296E-001	5.390E-001
		163.35	4.70	2.348E+000		5.954E-001	1.101E+000
		185.71	54.00	2.137E-001		1.071E-001	1.004E-001
		202.12	1.00	9.458E+000		-4.436E+000	4.373E+000
		205.31	4.70	1.907E+000		-8.201E-001	8.776E-001

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	4.860E-001	4.86E-001	1.974E-002	2.262E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or the region is outside the spectrum

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

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

*** G A M M A S I C T R U M A N A L Y S - S ***

lename: 5452

Report Generated On : 4/7/2015 10:14:50 AM

Sample Title : 6310d-78
Sample Description : unit2 592 trench
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/7/2015 9:59:48 AM

Live Time : 900.0 seconds
Dead Time : 900.5 seconds

Background Time : 0.06 %

Energy Calibration Used Done On : 1/13/2015
Efficiency Calibration Used Done On : 6/3/2014
Efficiency ID : 5CM_TURBINE


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Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Peak Analysis Report

4/7/2015 10:14:50 AM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452

Sample Title: 6310d-78

Peak Analysis Performed on: 4/7/2015 10:14:49 AM

Peak Analysis From Channel: 50

Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	287-	307	292.54	72.78	0.89	9.35E+001	30.15	1.95E+002
2	287-	307	300.62	74.81	0.89	1.35E+002	35.37	2.33E+002
3	335-	345	339.74	84.60	0.83	6.06E+001	48.21	2.14E+002
4	951-	962	956.17	238.90	1.07	5.23E+001	29.86	6.77E+001
5	1222-	1231	1226.80	306.63	0.60	1.99E+001	18.77	3.01E+001
6	1403-	1413	1408.68	352.14	0.43	6.96E+001	26.12	4.24E+001
7	2433-	2446	2438.49	609.80	1.25	9.39E+001	25.09	2.31E+001
8	3642-	3653	3647.55	912.20	0.36	1.92E+001	16.89	2.08E+001
9	4475-	4491	4483.14	1121.13	0.44	5.97E+001	16.40	2.27E+000
10	5839-	5859	5848.18	1462.31	1.93	1.72E+002	28.98	1.13E+001

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 10:4:50 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6310d-78
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.887	1460.81*	10.67	8.32626E+000	1.56458E+000
BI-211	0.339	72.87*	1.20	2.82340E+001	1.07111E+001
		351.10*	12.20	1.76328E+000	7.19011E-001
		404.80	4.10		
		426.90	1.90		
		831.80	3.30		
PB-212	0.503	74.81*	9.60	4.98197E+000	1.63988E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	3.19833E-001	1.89468E-001
		300.09	3.41		
BI-214	0.990	609.31*	46.30	7.70351E-001	2.25652E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29*	15.10	1.84641E+000	5.28172E-001
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49	15.80		
		1847.44	2.12		
		2118.54	1.21		
AC-228	0.994	89.95	2.10		
		93.35	3.50		
		129.08	2.80		
		209.28	4.40		
		270.23	3.60		
		327.64	3.20		
		338.32	11.40		
		409.51	2.13		
		463.00	4.40		
		794.70	4.60		
		911.60*	27.70	3.02213E-001	2.66779E-001

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 10:11:50 AM Page 4

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
AC-228	0.994	964.60	5.20		
		969.11	16.60		
		1587.90	3.71		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 10:14:50 AM Page 5

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.887	8.326265E+000	1.564583E+000
BI-211	0.339	1.882024E+000	7.173961E-001
PB-212	0.503	3.812484E-001	1.882163E-001
BI-214	0.990	9.364456E-001	2.075077E-001
AC-228	0.994	3.022126E-001	2.667788E-001

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 4/7/2015 10:14:49 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
3	84.60	6.7376E-002	79.51	Tol.	TH-227
5	306.63	2.2089E-002	94.40	Tol.	TH-231 RH-105

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Slide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry:
Sample Title: 6310d-78
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	1.118E+000	1.12E+000	8.326E+000	4.932E-001
	MN-54	834.83	99.97	7.968E-002	7.97E-002	1.455E-002	3.411E-002
	CO-60	1173.22	100.00	1.140E-001	1.00E-001	4.557E-002	5.057E-002
		1332.49	100.00	1.001E-001		2.435E-002	4.331E-002
	NB-94	702.63	100.00	7.517E-002	7.52E-002	-2.379E-002	3.218E-002
		871.10	100.00	8.361E-002		-6.437E-003	3.600E-002
	SN-113	255.12	1.93	5.257E+000	1.40E-001	-1.006E+000	2.434E+000
		391.69	64.90	1.397E-001		-1.239E-003	6.313E-002
	CS-134	475.35	1.46	6.375E+000	8.04E-002	2.106E+000	2.867E+000
		563.23	8.38	9.885E-001		-3.976E-001	4.346E-001
		569.32	15.43	5.520E-001		-4.012E-002	2.435E-001
		604.70	97.60	8.043E-002		2.134E-003	3.496E-002
		795.84	85.40	8.846E-002		-1.341E-002	3.763E-002
		801.93	8.73	9.004E-001		-2.711E-001	3.855E-001
		1038.57	1.00	9.695E+000		4.264E-001	4.232E+000
		1167.94	1.80	3.710E+000		-9.537E-001	1.499E+000
		1365.15	3.04	1.985E+000		-1.229E+000	7.690E-001
	CS-137	661.65	85.12	1.127E-001	1.13E-001	3.190E-002	5.013E-002
	Tl-208	583.19	84.50	1.372E-001	1.37E-001	9.546E-002	6.260E-002
+	BI-211	72.87*	1.20	2.041E+001	9.05E-001	2.823E+001	9.799E+000
		351.10*	12.20	9.053E-001		1.763E+000	4.184E-001
		404.80	4.10	2.170E+000		-7.729E-002	9.776E-001
		426.90	1.90	4.702E+000		1.619E-001	2.114E+000
		831.80	3.30	2.323E+000		-3.493E-002	9.883E-001
	PB-211	404.80	3.00	2.966E+000	2.74E+000	-1.056E-001	1.336E+000
		427.10	1.40	6.382E+000		4.396E-001	2.870E+000
		831.80	2.80	2.738E+000		-4.117E-002	1.165E+000
	BI-212	39.86	1.10	2.437E+001	8.40E-001	6.553E+000	1.119E+001
		727.17	11.80	8.399E-001		2.436E-001	3.736E-001
		785.42	2.00	4.539E+000		9.483E-001	1.989E+000
		1620.56	2.75	3.136E+000		4.200E-001	1.301E+000
+	PB-212	74.81*	9.60	2.716E+000	2.79E-001	4.982E+000	1.308E+000
		77.11	17.50	1.121E+000		2.889E-001	5.338E-001
		87.20	6.30	3.009E+000		2.285E+000	1.437E+000
		89.80	1.75	9.729E+000		2.657E+000	4.627E+000
		115.19	0.60	2.400E+001		-1.084E+001	1.138E+001
		238.63*	44.60	2.790E-001		3.198E-001	1.312E-001
		300.09	3.41	2.750E+000		-1.348E-001	1.259E+000
+	BI-214	609.31*	46.30	2.373E-001	2.37E-001	7.704E-001	1.075E-001
		768.36	5.04	2.196E+000		1.379E+000	9.873E-001
		806.17	1.23	6.626E+000		6.802E-001	2.853E+000
		934.06	3.21	2.665E+000		-1.413E+000	1.147E+000

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

nuclide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29*	15.10	3.629E-001	2.37E-001	1.846E+000	1.396E-001
		1155.19	1.69	5.254E+000		2.722E+000	2.249E+000
		1238.11	5.94	1.477E+000		-6.663E-002	6.283E-001
		1280.96	1.47	5.806E+000		-2.083E+000	2.452E+000
		1377.67	4.11	2.045E+000		2.659E-001	8.565E-001
		1385.31	0.78	1.028E+001		3.079E+000	4.265E+000
		1401.50	1.39	6.366E+000		2.028E+000	2.689E+000
		1407.98	2.48	2.691E+000		-9.544E-001	1.068E+000
		1509.19	2.19	4.670E+000		2.217E+000	2.011E+000
		1661.28	1.15	6.754E+000		-4.789E-001	2.729E+000
		1729.60	3.05	2.421E+000		4.617E-002	9.606E-001
		1764.49	15.80	9.197E-001		2.893E-001	4.110E-001
		1847.44	2.12	3.900E+000		-4.609E-001	1.576E+000
>		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
	PB-214	74.81	6.33	4.545E+000	4.24E-001	6.946E+000	2.197E+000
		77.11	10.70	1.833E+000		4.726E-001	8.731E-001
		87.20	3.70	5.124E+000		3.891E+000	2.447E+000
		89.80	1.03	1.653E+001		4.515E+000	7.861E+000
		241.98	7.49	1.570E+000		6.764E-001	7.355E-001
		295.21	19.20	6.817E-001		6.085E-001	3.204E-001
		351.92	37.20	4.239E-001		6.652E-001	2.007E-001
		785.91	1.10	8.668E+000		4.565E+000	3.824E+000
	RA-226	186.21	3.28	3.941E+000	3.94E+000	2.507E+000	1.863E+000
+	AC-228	89.95	2.10	8.099E+000	4.16E-001	2.212E+000	3.852E+000
		93.35	3.50	4.767E+000		1.313E+000	2.268E+000
		129.08	2.80	5.450E+000		3.390E-001	2.597E+000
		209.28	4.40	2.453E+000		6.890E-001	1.145E+000
		270.23	3.60	2.575E+000		-4.115E-001	1.182E+000
		327.64	3.20	2.651E+000		2.508E-002	1.198E+000
		338.32	11.40	8.178E-001		1.183E-001	3.728E-001
		409.51	2.13	4.263E+000		1.947E+000	1.924E+000
		463.00	4.40	2.129E+000		4.674E-001	9.590E-001
		794.70	4.60	1.763E+000		-3.655E-002	7.591E-001
		911.60*	27.70	4.161E-001		3.022E-001	1.868E-001
		964.60	5.20	1.962E+000		1.118E+000	8.654E-001
		969.11	16.60	8.095E-001		5.891E-001	3.685E-001
		1587.90	3.71	2.178E+000		-1.813E-001	8.926E-001
	PA-234M	766.36	0.29	3.290E+001	1.14E+001	8.464E+000	1.455E+001
		1001.03	0.84	1.144E+001		5.334E+000	4.995E+000
	TH-234	92.38	2.81	6.019E+000	6.02E+000	1.412E-001	2.864E+000
		92.80	2.77	6.023E+000		9.990E-002	2.864E+000
		112.81	0.28	5.607E+001		2.304E+000	2.670E+001
	U-235	89.96	1.50	1.134E+001	2.49E-001	3.097E+000	5.392E+000
		93.35	2.50	6.674E+000		1.839E+000	3.175E+000
		105.00	1.00	1.644E+001		1.312E+000	7.836E+000
		109.14	1.50	1.067E+001		-2.943E+000	5.085E+000
		143.76	10.50	1.364E+000		6.775E-001	6.484E-001
		163.35	4.70	2.599E+000		2.388E-003	1.225E+000
		185.71	54.00	2.491E-001		2.415E-001	1.180E-001
		202.12	1.00	1.003E+001		-7.527E+000	4.661E+000
		205.31	4.70	2.257E+000		3.570E-001	1.053E+000

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	5.439E-001	5.44E-001	-1.609E-001	2.553E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

*** G A M M A S I C T R U M A N A L Y S I S ***

Filename: 5452

Report Generated On : 4/7/2015 10:38:51 AM

Sample Title : 6310d-76
Sample Description : unit2 592 drain
Sample Identification :
Sample Type :
Sample Geometry : 1.2 meter turbin

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 50 - 8192
Peak Area Range (in channels) : 50 - 8192
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On :
Acquisition Started : 4/7/2015 10:23:49 AM

Live Time : 900.0 seconds
Dead Time : 900.5 seconds

Background Time : 0.06 %

Energy Calibration Used Done On : 1/13/2015
Efficiency Calibration Used Done On : 6/3/2014
Efficiency ID : 5CM_TURBINE

HP
4/7/15

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Peak Analysis Report 4/7/2015 10:38:51 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: 6310d-76
Peak Analysis Performed on: 4/7/2015 10:38:50 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	288-	306	293.10	72.93	1.00	8.33E+001	29.43	2.01E+002
2	288-	306	301.70	75.08	1.00	1.57E+002	37.69	2.38E+002
3	1177-	1190	1182.94	295.65	1.02	5.94E+001	26.07	3.96E+001
4	1401-	1416	1410.08	352.49	0.42	1.01E+002	29.35	3.81E+001
5	1863-	1873	1868.26	467.14	0.38	9.61E+000	12.92	1.34E+001
6	2431-	2446	2439.29	610.00	1.42	1.16E+002	27.47	2.41E+001
7	5836-	5859	5848.28	1462.33	1.87	1.68E+002	28.47	8.68E+000

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 10:38:51 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6310d-76
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_Lib.NLB

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.883	1460.81*	10.67	8.16254E+000	1.53660E+000
BI-214	0.587	609.31*	46.30	9.50834E-001	2.52638E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29	15.10		
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49	15.80		
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.571	74.81* @	6.33	8.72967E+000	2.72950E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	8.99167E-001	4.19709E-001
		351.92*	37.20	8.38573E-001	2.78314E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

Interference Corrected Activity Report 4/7/2015 10:38:51 AM Page 4

*** INTERFERENCE CORRECTED REPORT ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
K-40	0.883	8.162542E+000	1.536597E+000
BI-214	0.587	9.508343E-001	2.526377E-001
PB-214 @	0.571	8.570793E-001	2.319511E-001

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 4/7/2015 10:38:50 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
M 1	72.93	9.2566E-002	35.33	Tol.	BI-211
5	467.14	1.0676E-002	134.46		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

include MDA Report

4/7/2015

10:35:51 AM

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	BI-214	1120.29	15.10	7.581E-001	2.52E-001	-1.644E-001	3.372E-001
		1155.19	1.69	5.254E+000		-2.791E-001	2.249E+000
		1238.11	5.94	1.533E+000		-7.261E-001	6.562E-001
		1280.96	1.47	5.005E+000		-9.285E-001	2.052E+000
		1377.67	4.11	2.045E+000		3.068E-001	8.565E-001
		1385.31	0.78	9.732E+000		2.430E+000	3.989E+000
		1401.50	1.39	3.934E+000		9.746E-001	1.473E+000
		1407.98	2.48	3.256E+000		1.924E-001	1.350E+000
		1509.19	2.19	3.599E+000		2.226E-001	1.475E+000
		1661.28	1.15	5.753E+000		-3.472E+000	2.228E+000
		1729.60	3.05	2.773E+000		5.804E-001	1.137E+000
		1764.49	15.80	9.197E-001		1.724E-001	4.110E-001
		1847.44	2.12	3.321E+000		-1.797E+000	1.287E+000
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000
+	PB-214	74.81*	6.33	4.147E+000	3.15E-001	8.730E+000	1.998E+000
		77.11	10.70	1.963E+000		-2.122E-001	9.381E-001
		87.20	3.70	4.744E+000		2.732E-001	2.257E+000
		89.80	1.03	1.512E+001		-3.078E+000	7.154E+000
		241.98	7.49	1.425E+000		5.197E-001	6.633E-001
		295.21*	19.20	5.639E-001		8.992E-001	2.615E-001
		351.92*	37.20	3.149E-001		8.386E-001	1.462E-001
		785.91	1.10	8.254E+000		3.793E+000	3.617E+000
	RA-226	186.21	3.28	3.431E+000	3.43E+000	2.327E-001	1.608E+000
	AC-228	89.95	2.10	7.406E+000	4.75E-001	-1.508E+000	3.505E+000
		93.35	3.50	4.803E+000		5.813E-001	2.285E+000
		129.08	2.80	4.557E+000		-1.472E+000	2.151E+000
		209.28	4.40	2.521E+000		8.832E-001	1.179E+000
		270.23	3.60	2.791E+000		1.372E-001	1.289E+000
		327.64	3.20	2.916E+000		1.089E+000	1.331E+000
		338.32	11.40	9.241E-001		5.673E-001	4.259E-001
		409.51	2.13	4.642E+000		1.638E+000	2.113E+000
		463.00	4.40	2.059E+000		8.420E-001	9.242E-001
		794.70	4.60	1.577E+000		3.055E-001	6.658E-001
		911.60	27.70	4.754E-001		2.563E-001	2.164E-001
		964.60	5.20	1.769E+000		3.243E-001	7.689E-001
		969.11	16.60	7.198E-001		4.321E-001	3.237E-001
		1587.90	3.71	1.742E+000		-1.088E-001	6.747E-001
	PA-234M	766.36	0.29	2.537E+001	1.01E+001	-6.423E+000	1.079E+001
		1001.03	0.84	1.010E+001		2.952E+000	4.326E+000
	TH-234	92.38	2.81	6.213E+000	6.21E+000	4.246E+000	2.961E+000
		92.80	2.77	6.242E+000		2.761E+000	2.974E+000
		112.81	0.28	5.149E+001		-2.108E+001	2.441E+001
	U-235	89.96	1.50	1.037E+001	2.16E-001	-2.111E+000	4.907E+000
		93.35	2.50	6.724E+000		8.138E-001	3.199E+000
		105.00	1.00	1.605E+001		-4.611E-001	7.640E+000
		109.14	1.50	1.018E+001		-2.428E+000	4.841E+000
		143.76	10.50	1.140E+000		-1.373E-001	5.367E-001
		163.35	4.70	2.420E+000		-4.023E-001	1.136E+000
		185.71	54.00	2.159E-001		4.049E-002	1.015E-001
		202.12	1.00	9.789E+000		-6.442E+000	4.538E+000
		205.31	4.70	1.961E+000		-1.272E+000	9.045E-001

Attachment Figure 2-17 06310D Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	4.857E-001	4.86E-001	-1.614E-001	2.261E-001

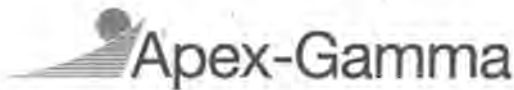
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or the region is outside the spectrum

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

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports



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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-lbm-1008 heater fanotv-044

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 12-Feb-15-10001
Sample Description	: Survey # 20k-2015-lbm-1008 heater fanotv-044
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 2/11/2015 1:38:20PM
Acquisition Started	: 2/12/2015 1:10:15PM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.6 seconds
Dead Time	: 0.05 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11863

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2-12-15
duh
2/12/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 2/12/2015 1:30:21PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001
Survey # 20k-2015-tbm-1008 heater fanotv-044

No peak analysis results available for reporting purposes.

NUCLIDE IDENTIFICATION REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
-----------------	------------------	-----------------	----------	-------------------------	-------------------------	---------------

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
-----------------	-----------------------------	------------------------------------	------------------------------------	----------

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-lbm-1008 heater fanotv-044

- ? = 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

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-tbm-1008 heater fanotv-044

No peak search results available for nuclide analysis.

NUCLIDE MDA REPORT

Nuclide Library Used : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	8.76E-06	9.20E-05	9.20E-05	miss
+	Cr-51	320.08	9.91	2.93E-06	3.99E-05	3.99E-05	free
+	Mn-54	834.85	99.98	-2.45E-06	4.87E-06	4.87E-06	miss
+	Co-58	810.76	99.45	-1.73E-07	3.82E-06	3.82E-06	0.999
		1674.73	0.52	0.00E+00		4.53E-04	1.078
+	Co-60	1173.23	99.85	-1.96E-06	5.94E-06	5.94E-06	0.844
		1332.49	99.98	6.36E-07		8.27E-06	0.840
+	Nb-94	702.65	99.81	-9.14E-07	5.09E-06	5.09E-06	0.833
		871.09	99.89	1.09E-06		6.07E-06	0.829
+	Sn-113	255.13	2.11	-4.54E-07	5.62E-06	1.58E-04	free
		391.70	64.97	1.05E-06		5.62E-06	free
+	Cs-134	475.36	1.48	4.44E-05	6.89E-06	2.91E-04	miss
		563.25	8.34	-1.49E-05		7.79E-05	0.702
		569.33	15.37	8.49E-06		4.80E-05	0.681
		604.72	97.62	3.49E-06		8.65E-06	0.796
		795.86	85.46	1.48E-06		6.89E-06	0.795
		801.95	8.69	-1.25E-05		6.11E-05	0.702
		1038.61	0.99	7.63E-05		5.62E-04	0.822
		1167.97	1.79	-1.38E-04		2.22E-04	1.255
		1365.19	3.02	-1.32E-05		1.36E-04	1.374
+	Cs-137	661.66	85.10	-2.98E-07	4.74E-06	4.74E-06	miss
+	Eu-152	121.78	28.67	-5.83E-06	8.96E-06	8.96E-06	0.818
		244.70	7.61	-8.94E-06		3.30E-05	0.786
		295.94	0.45	4.17E-04		9.72E-04	miss
		344.28	26.60	6.79E-07		1.39E-05	0.874
		367.79	0.86	7.43E-05		6.98E-04	0.654
		411.12	2.24	1.01E-05		2.36E-04	0.717
		443.96	2.83	6.08E-05		2.07E-04	0.790
		488.68	0.42	1.60E-05		7.42E-04	miss
		563.99	0.49	-1.45E-04		1.28E-03	0.790
		586.26	0.46	3.65E-04		1.27E-03	0.807
		673.62	0.47	-2.63E-04		1.06E-03	0.654
		688.67	0.86	1.32E-04		6.22E-04	0.904
		719.35	0.28	3.88E-04		2.18E-03	miss

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-tbm-1008 heater fanotv-044

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Eu-152	778.90	12.96	0.00E+00	8.96E-06	1.27E-05	0.815
	810.45	0.32	-3.00E-04		9.45E-04	1.239
	867.37	4.26	3.47E-05		1.61E-04	0.729
	919.33	0.43	-6.90E-05		2.06E-03	0.904
	964.08	14.65	4.21E-06		3.89E-05	1.109
	1085.87	10.24	0.00E+00		1.56E-05	1.089
	1089.74	1.73	-3.83E-05		3.29E-04	0.832
	1112.07	13.69	7.23E-07		4.70E-05	0.943
	1212.95	1.43	0.00E+00		1.81E-04	0.729
	1249.94	0.19	8.61E-04		3.09E-03	1.314
	1299.14	1.63	2.80E-04		7.34E-04	0.807
	1408.01	21.07	0.00E+00		1.11E-05	0.911
	1457.64	0.50	3.62E-04		1.71E-03	1.241
	1528.10	0.28	0.00E+00		8.30E-04	0.984
+ Eu-154	123.07	40.40	3.20E-06	8.28E-06	8.28E-06	0.820
	247.93	6.89	3.20E-06		4.92E-05	0.772
	591.76	4.95	-1.64E-05		1.02E-04	0.730
	692.42	1.78	1.08E-04		4.23E-04	0.785
	723.30	20.06	-1.95E-06		2.71E-05	0.797
	756.80	4.52	-4.98E-05		1.64E-04	0.704
	873.18	12.08	2.33E-05		6.99E-05	0.771
	996.29	10.48	4.60E-06		5.70E-05	0.935
	1004.76	18.01	0.00E+00		1.01E-05	0.904
	1274.43	34.80	-1.31E-06		2.12E-05	0.910
	1596.48	1.80	3.22E-05		2.99E-04	1.533
	1596.48	1.80	3.22E-05		2.99E-04	1.533
+ Eu-155	45.30	1.31	-3.69E-04	9.28E-06	2.40E-04	0.994
	60.01	1.22	-5.79E-05		5.07E-04	0.999
	86.55	30.70	-2.85E-06		9.28E-06	free
	105.31	21.10	-3.35E-06		9.76E-06	1.000
+ Tl-208	583.19	85.00	-9.46E-07	6.11E-06	6.11E-06	0.810
+ Bi-211	351.07	13.02	1.67E-06	2.72E-05	2.72E-05	miss
+ Pb-211	404.85	3.78	-5.28E-06	1.06E-04	1.06E-04	miss
	427.09	1.76	-5.97E-05		2.22E-04	miss
	832.01	3.52	4.94E-06		1.60E-04	miss
+ Bi-212	39.86	1.06	-8.42E-05	2.01E-05	6.04E-04	0.995
	727.33	6.67	0.00E+00		2.01E-05	0.945
	785.37	1.10	-8.18E-05		6.55E-04	0.829
	1620.50	1.47	5.25E-05		4.41E-04	1.020
+ Pb-212	115.18	0.60	8.34E-05	8.54E-06	3.46E-04	miss
	238.63	43.60	4.43E-06		8.54E-06	free
	300.09	3.30	1.45E-05		9.97E-05	free
+ Pb212-XR	74.82	10.28	-1.82E-06	2.43E-05	4.89E-05	miss
	77.11	17.10	6.56E-06		2.43E-05	miss
	87.35	3.97	1.55E-05		7.94E-05	miss
	89.78	1.46	3.34E-05		1.94E-04	miss
+ Bi-214	609.32	45.49	7.37E-06	1.58E-05	1.58E-05	0.847
	768.36	4.89	4.06E-05		1.72E-04	0.820
	806.18	1.26	-1.39E-04		3.85E-04	0.769
	934.06	3.11	-3.73E-06		2.41E-04	0.824
	1120.29	14.92	2.18E-05		7.00E-05	0.825
	1155.21	1.63	5.96E-05		5.39E-04	0.822

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-tbm-1008 heater fanotv-044

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-214	1238.12	5.83	4.41E-05	1.58E-05	1.58E-04	0.824
	1280.98	1.43	3.07E-05		5.70E-04	0.824
	1377.67	3.99	0.00E+00		4.75E-05	1.102
	1385.31	0.79	2.26E-04		1.28E-03	0.824
	1401.52	1.33	1.87E-04		7.71E-04	0.824
	1407.99	2.39	0.00E+00		1.08E-04	0.824
	1509.21	2.13	4.71E-05		3.46E-04	0.840
	1661.27	1.05	0.00E+00		2.37E-04	1.004
	1729.59	2.88	0.00E+00		6.36E-05	1.413
	1764.49	15.30	1.24E-05		6.81E-05	1.005
	1847.43	2.03	2.04E-05		3.01E-04	1.217
	2118.51	1.16	0.00E+00		0.00E+00	1.140
	> + Pb-214	241.99	7.25		3.99E-05	0.998
		295.22	18.42		2.36E-05	1.001
+ Pb214-XR		351.93	35.60	4.28E-05	9.26E-06	free
		785.96	1.06		5.66E-04	0.998
		74.82	5.80		8.67E-05	miss
		77.11	9.70		4.28E-05	miss
		87.35	2.24		1.41E-04	miss
+ Ra-226		89.78	0.82	6.79E-05	3.45E-04	miss
		186.21	3.64		6.79E-05	free
+ Ac-228		129.07	2.42	1.04E-05	1.24E-04	0.831
		209.25	3.89		5.91E-05	0.925
		270.24	3.46		9.38E-05	0.869
		328.00	2.95		1.47E-04	0.867
		338.32	11.27		2.36E-05	0.982
		409.46	1.92		2.01E-04	0.803
		463.00	4.40		8.65E-05	0.781
		794.95	4.25		1.09E-04	0.801
		911.20	25.80		2.09E-05	0.967
		964.77	4.99		1.17E-04	0.937
		968.97	15.80		1.04E-05	0.967
		1588.20	3.22		2.00E-04	1.010
	+ Pa-231	27.36	10.30		1.13E-05	0.989
		283.69	1.70		2.05E-04	0.998
+ Th-234		300.07	2.47	1.40E-04	1.33E-04	1.000
		302.65	2.20		1.20E-04	1.000
		330.06	1.40		2.69E-04	1.002
		92.38	2.13		1.40E-04	free
+ U-235		92.80	2.10	4.50E-06	1.57E-04	free
		112.81	0.21		1.19E-03	free
		143.76	10.96		1.73E-05	free
		163.33	5.08		4.80E-05	free
		185.71	57.20		4.50E-06	free
+ Am-241		202.11	1.03	1.96E-05	2.65E-04	miss
		205.31	5.01		5.56E-05	free
		59.54	35.90		1.96E-05	free

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10001

Survey # 20k-2015-tbm-1008 heater fanotv-044

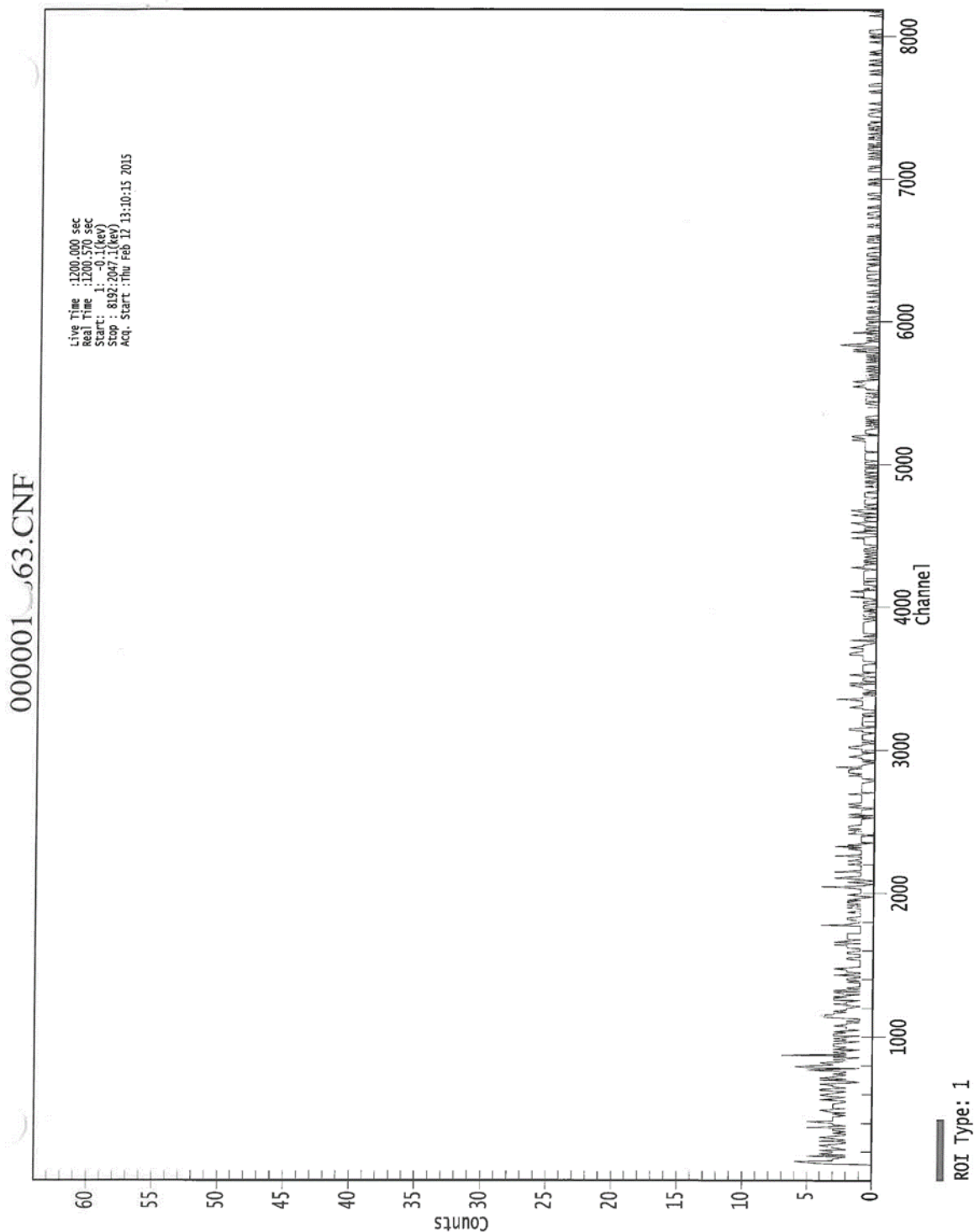
-
- + = Nuclide identified during the nuclide identification
 - * = Energy line found in the spectrum
 - > = MDA value not calculated
 - @ = Half-life too short to be able to perform the decay correction
 - ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports



Attachment Figure 2-18 06310E Gamma Spectroscopy Reports



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Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 12-Feb-15-10002
Sample Description	: Survey # 2015 TBM-1-007 Heater Fan OTV-045
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 2/11/2015 1:38:36PM
Acquisition Started	: 2/12/2015 1:12:34PM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: DET02
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1201.0 seconds
Dead Time	: 0.08 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 10/28/2014
Efficiency Calibration Description	:
Sample Number	: 11864

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2/12/15

PEAK WITH NID REPORT

Peak Analysis Performed on : 2/12/2015 1:32:37PM

Peak Analysis From Channel : 120

Peak Analysis To Channel : 8192

Tentative NID Library : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Peak Match Tolerance : 1.000FWHM

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1460.44	5836	5851	5843.64	1.50E+01	7.75	0.00E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82 *	10.66	6.13E-05	3.21E-05	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

UNIDENTIFIED PEAKS

Peak Locate Performed on : 2/12/2015 1:32:37PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)		Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	*	10.66	6.13E-05	1.11E-05	1.11E-05	miss
+	Cr-51	320.08		9.91	-1.26E-06	2.53E-05	2.53E-05	free
+	Mn-54	834.85		99.98	2.79E-07	3.58E-06	3.58E-06	miss
+	Cc-58	810.76		99.45	-9.25E-08	2.75E-06	2.75E-06	0.999
		1674.73		0.52	-1.35E-04		7.82E-04	1.126
+	Co-60	1173.23		99.85	6.90E-07	5.51E-06	6.17E-06	0.794
		1332.49		99.98	1.71E-07		5.51E-06	0.790
+	Nb-94	702.65		99.81	-4.87E-07	4.25E-06	4.47E-06	0.778
		871.09		99.89	-1.60E-06		4.25E-06	0.774
+	Sn-113	255.13		2.11	2.80E-05	4.56E-06	1.01E-04	free
		391.70		64.97	1.28E-06		4.56E-06	free
+	Cs-134	475.36		1.48	4.11E-05	4.95E-06	2.18E-04	miss
		563.25		8.34	5.69E-06		5.80E-05	0.618
		569.33		15.37	5.04E-07		3.30E-05	0.592
		604.72		97.62	1.09E-07		5.02E-06	0.733
		795.86		85.46	-2.88E-07		4.95E-06	0.732
		801.95		8.69	1.85E-05		8.07E-05	0.620
		1038.61		0.99	0.00E+00		1.23E-04	0.765
		1167.97		1.79	4.59E-05		1.80E-04	1.385

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	-7.17E-05	4.95E-06	8.10E-05	1.567
+	Cs-137	661.66	85.10	1.70E-06	5.42E-06	5.42E-06	miss
+	Eu-152	121.78	28.67	-3.03E-06	8.72E-06	8.72E-06	0.767
		244.70	7.61	-2.23E-05		3.28E-05	0.733
		295.94	0.45	4.08E-04		8.50E-04	miss
		344.28	26.60	-7.77E-07		1.27E-05	0.835
		367.79	0.86	-3.68E-05		6.01E-04	0.569
		411.12	2.24	8.45E-06		2.01E-04	0.645
		443.96	2.83	1.24E-05		1.22E-04	0.734
		488.68	0.42	-1.45E-04		5.90E-04	miss
		563.99	0.49	-2.53E-04		6.81E-04	0.734
		586.26	0.46	-5.12E-04		8.12E-04	0.753
		678.62	0.47	-2.62E-04		7.09E-04	0.569
		688.67	0.86	1.67E-04		6.24E-04	0.885
		719.35	0.28	2.01E-04		1.45E-03	miss
		778.90	12.96	-1.64E-06		3.76E-05	0.763
		810.45	0.32	-2.04E-04		5.22E-04	1.280
		867.37	4.26	6.77E-05		1.93E-04	0.671
		919.33	0.43	-5.77E-04		6.17E-04	0.885
		964.08	14.65	3.91E-06		2.99E-05	1.127
		1085.87	10.24	-2.35E-06		3.38E-05	1.105
		1089.74	1.73	1.31E-05		2.42E-04	0.788
		1112.07	13.69	-5.78E-06		2.61E-05	0.936
		1212.95	1.43	0.00E+00		3.69E-04	0.672
		1249.94	0.19	3.03E-04		1.72E-03	1.433
		1299.14	1.63	1.20E-06		3.50E-04	0.753
		1408.01	21.07	-1.12E-05		2.41E-05	0.895
		1457.64	0.50	0.00E+00		4.77E-04	1.335
		1528.10	0.28	0.00E+00		4.31E-04	1.007
+	Eu-154	123.07	40.40	-3.98E-07	6.67E-06	6.67E-06	0.767
		247.93	6.89	-1.05E-05		4.23E-05	0.713
		591.76	4.95	-5.78E-05		8.64E-05	0.661
		692.42	1.78	4.92E-05		3.38E-04	0.729
		723.30	20.06	5.73E-06		2.39E-05	0.738
		756.80	4.52	-6.88E-06		1.04E-04	0.639
		873.18	12.08	-2.23E-06		4.28E-05	0.711
		996.29	10.48	2.96E-05		5.96E-05	0.895
		1004.76	18.01	-1.86E-06		1.57E-05	0.882
		1274.43	34.80	-4.94E-06		9.34E-06	0.890
		1596.48	1.80	0.00E+00		3.78E-05	1.864
+	Eu-155	45.30	1.31	-1.64E-04	9.07E-06	6.70E-04	0.995
		60.01	1.22	2.30E-04		3.68E-04	0.999
		86.55	30.70	-5.99E-07		9.07E-06	free
		105.31	21.10	-4.21E-06		9.58E-06	1.000
+	Tl-208	583.19	85.00	1.29E-06	6.57E-06	6.57E-06	0.758
+	Bi-211	351.07	13.02	8.16E-06	2.61E-05	2.61E-05	miss
+	Pb-211	404.85	3.78	-8.77E-06	5.75E-05	5.75E-05	miss
		427.09	1.76	-3.56E-06		1.60E-04	miss
		832.01	3.52	3.47E-05		1.19E-04	miss
+	Bi-212	39.86	1.06	-3.00E-05	4.07E-05	1.07E-03	0.993
		727.33	6.67	-1.13E-05		4.07E-05	0.928

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

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Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	785.37	1.10	-6.48E-05	4.07E-05	3.11E-04	0.774
		1620.50	1.47	1.87E-05		2.30E-04	1.032
+	Pb-212	115.18	0.60	-6.68E-05	5.31E-06	3.26E-04	miss
		238.63	43.60	1.11E-06		5.31E-06	free
		300.09	3.30	2.69E-06		9.56E-05	free
+	Pb212-XR	74.82	10.28	-1.24E-05	2.75E-05	4.70E-05	miss
		77.11	17.10	-3.07E-06		2.75E-05	miss
		87.35	3.97	-8.17E-06		6.54E-05	miss
		89.78	1.46	-2.18E-05		1.44E-04	miss
+	Bi-214	609.32	45.49	7.29E-06	1.41E-05	1.41E-05	0.798
		768.36	4.89	-1.93E-05		8.09E-05	0.764
		806.18	1.26	4.09E-06		3.53E-04	0.701
		934.06	3.11	5.51E-05		1.76E-04	0.769
		1120.29	14.92	-8.77E-08		3.79E-05	0.769
		1155.21	1.63	-5.25E-05		2.17E-04	0.765
		1238.12	5.83	1.82E-05		1.03E-04	0.769
		1280.98	1.43	1.17E-04		4.29E-04	0.769
		1377.67	3.99	9.97E-07		8.33E-05	1.160
		1385.31	0.79	1.67E-05		8.97E-04	0.769
		1401.52	1.33	4.12E-05		3.03E-04	0.769
		1407.99	2.39	-1.15E-04		2.47E-04	0.769
		1509.21	2.13	1.59E-05		2.86E-04	0.791
		1661.27	1.05	4.57E-05		3.36E-04	1.010
		1729.59	2.88	1.05E-05		7.71E-05	1.654
		1764.49	15.30	1.41E-05		4.31E-05	1.009
		1847.43	2.03	0.00E+00		5.19E-05	1.344
>		2118.51	1.16	0.00E+00		0.00E+00	1.227
+	Pb-214	241.99	7.25	8.54E-06	1.01E-05	3.35E-05	0.998
		295.22	18.42	1.21E-05		2.10E-05	1.001
		351.93	35.60	4.88E-06		1.01E-05	free
		785.96	1.06	3.54E-05		3.24E-04	0.998
+	Pb214-XR	74.82	5.80	-2.19E-05	4.85E-05	8.34E-05	miss
		77.11	9.70	-5.41E-06		4.85E-05	miss
		87.35	2.24	-1.45E-05		1.16E-04	miss
		89.78	0.82	-3.87E-05		2.57E-04	miss
+	Ra-226	186.21	3.64	-4.72E-06	5.97E-05	5.97E-05	free
+	Ac-228	129.07	2.42	-5.02E-05	1.19E-05	9.10E-05	0.786
		209.25	3.89	4.44E-06		5.07E-05	0.905
		270.24	3.46	-1.34E-05		7.26E-05	0.827
		328.00	2.95	-1.75E-05		7.75E-05	0.824
		338.32	11.27	5.53E-06		2.54E-05	0.971
		409.46	1.92	-2.76E-05		1.91E-04	0.747
		463.00	4.40	-8.71E-06		8.84E-05	0.720
		794.95	4.25	-1.32E-05		9.73E-05	0.748
		911.20	25.80	-1.76E-06		1.19E-05	0.958
		964.77	4.99	-1.08E-05		1.01E-04	0.917
		968.97	15.80	9.53E-06		2.86E-05	0.957
		1588.20	3.22	-7.15E-06		1.33E-04	1.012
+	Pa-231	27.36	10.30	8.40E-06	1.28E-04	1.33E-04	0.987
		283.69	1.70	3.81E-06		1.74E-04	0.999
		300.07	2.47	3.59E-06		1.28E-04	1.000

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

2/12/2015 1:33:19PM Page 7 of 7

Analysis Report for 12-Feb-15-10002

Survey # 2015 TBM-1-007 Heater Fan OTV-045

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	1.09E-05	1.28E-04	1.32E-04	1.000
		330.06	1.40	-3.14E-05		1.47E-04	1.001
+	Th-234	92.38	2.13	-2.83E-05	1.05E-04	1.05E-04	free
		92.80	2.10	-3.09E-05		1.06E-04	free
		112.81	0.21	2.21E-04		1.10E-03	free
+	U-235	143.76	10.96	-2.66E-06	3.92E-06	1.78E-05	free
		163.33	5.08	-1.54E-05		3.56E-05	free
		185.71	57.20	-4.29E-07		3.92E-06	free
		202.11	1.08	-8.75E-05		1.30E-04	miss
		205.31	5.01	-4.14E-06		4.26E-05	free
+	Am-241	59.54	35.90	9.38E-06	3.20E-05	3.20E-05	free

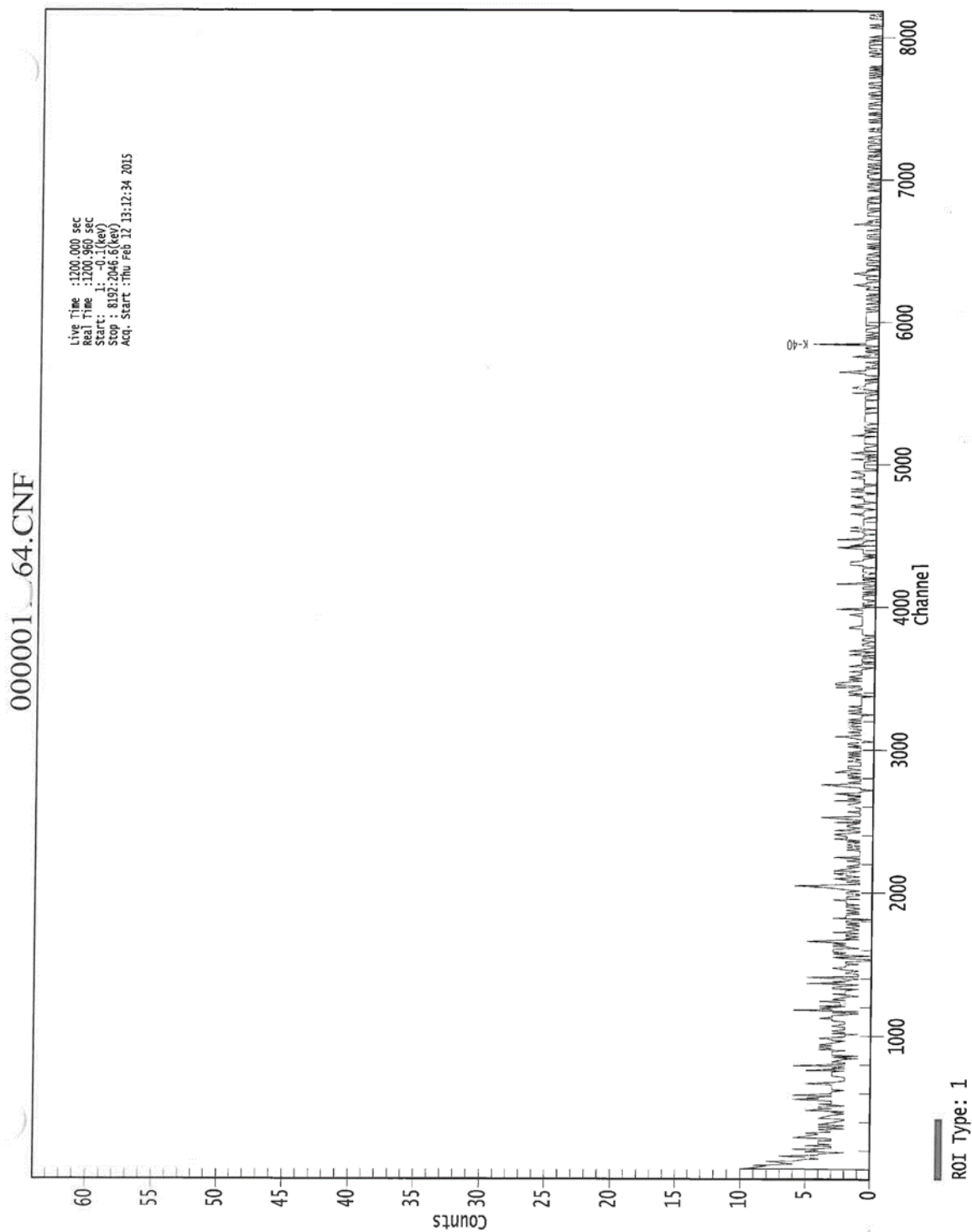
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports



Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\2-12-15\20150211175217.cnf

Report Generated On : 2/12/2015 8:39:08 AM

Sample Title : Heater fan blade A-29

Sample Description :

Sample Identification :

Sample Type :

Sample Geometry :

↑
column TB 592

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 2/11/2015 5:36:36 PM

Acquisition Started : 2/11/2015 5:36:36 PM

Live Time : 898.1 seconds

Dead Time : 900.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVER

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst [Signature]

Date 2-12-15

[Signature] 2/12/15

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

Peak Analysis Report 2/12/2015 8:39:08 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Heater fan blade A-29
Peak Analysis Performed on: 2/12/2015 8:39:08 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.41	38.93	1.78	3.33E+003	173.76	7.13E+002
2	785-	856	820.94	613.99	1.06	1.52E+002	164.45	9.45E+002
3	1903-	2012	1958.12	1461.52	2.02	2.10E+003	160.14	6.05E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/12/2015 8:39:08 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Heater fan blade A-29
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.618	34.70*	66.40	4.61985E+001	9.54980E+000
		788.70	33.60		
		1436.80*	66.40	8.38049E+001	9.26681E+000
K-40	1.000	1460.82*	10.66	5.22012E+002	6.03540E+001
Bi-214	0.997	609.32*	45.49	4.20556E+000	4.56596E+000
		768.36	4.89		
		806.18	1.26		
		934.06	3.11		
		1120.29	14.92		
		1155.21	1.63		
		1238.12	5.83		
		1280.98	1.43		
		1377.67	3.99		
		1385.31	0.79		
		1401.52	1.33		
		1407.99	2.39		
		1509.21	2.13		
		1661.27	1.05		
		1729.59	2.88		
		1764.49	15.30		
		1847.43	2.03		
		2118.51	1.16		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/12/2015 8:39:08 AM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.618	4.619846E+001	9.549802E+000
K-40	1.000	2.342465E+002	8.288701E+001
Bi-214	0.997	4.205563E+000	4.565965E+000

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 2/12/2015 8:39:08 AM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

iclude_MDA Report 2/12/2015 8:39:08 AM Page 5

*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Heater fan blade A-29
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	3.008E+000	3.01E+000	4.620E+001	1.485E+000
		788.70	33.60	6.359E+000		1.837E+000	3.117E+000
		1436.80*	66.40	8.740E+000		8.380E+001	4.316E+000
+	K-40	1460.82*	10.66	5.444E+001	5.44E+001	5.220E+002	2.688E+001
	Cr-51	320.08	9.91	1.092E+001	1.09E+001	-1.564E+000	5.360E+000
	Mn-54	834.85	99.98	2.562E+000	2.56E+000	-1.037E+000	1.259E+000
	Co-58	810.76	99.45	2.530E+000	2.53E+000	2.067E+000	1.243E+000
	Co-60	1173.23	99.85	2.439E+000	1.30E+000	-1.510E+000	1.189E+000
		1332.49	99.98	1.296E+000		2.440E-001	6.146E-001
	Nb-94	702.65	99.81	1.581E+000	1.58E+000	-6.854E-001	7.711E-001
		871.09	99.89	2.634E+000		-1.659E-002	1.294E+000
	Sn-113	255.13	2.11	5.102E+001	1.82E+000	-7.181E+001	2.511E+001
		391.70	64.97	1.823E+000		-4.536E-001	8.937E-001
	Cs-137	661.66	85.10	1.910E+000	1.91E+000	1.161E+000	9.338E-001
	Eu-152	121.78	28.67	4.733E+000	4.45E+000	-5.396E-001	2.341E+000
		244.70	7.61	1.494E+001		6.400E+000	7.363E+000
		295.94	0.45	2.428E+002		-1.048E+002	1.193E+002
		344.28	26.60	4.453E+000		-9.176E-001	2.187E+000
		367.79	0.86	1.359E+002		-6.263E+001	6.670E+001
		411.12	2.24	5.407E+001		1.441E+001	2.650E+001
		443.96	2.83	4.510E+001		2.207E+001	2.209E+001
		488.68	0.42	3.101E+002		-2.915E+002	1.517E+002
		563.99	0.49	3.123E+002		4.451E+002	1.529E+002
		586.26	0.46	3.357E+002		-4.546E+001	1.643E+002
		678.62	0.47	3.362E+002		2.440E+002	1.642E+002
		688.67	0.86	1.855E+002		-5.665E+001	9.055E+001
		719.35	0.28	5.851E+002		1.149E+001	2.855E+002
		778.90	12.96	1.490E+001		2.293E+000	7.287E+000
		810.45	0.32	7.837E+002		6.402E+002	3.851E+002
		867.37	4.26	6.189E+001		3.680E+000	3.041E+001
		919.33	0.43	6.274E+002		3.444E+002	3.080E+002
		964.08	14.65	1.793E+001		1.249E+000	8.794E+000
		1085.87	10.24	2.281E+001		2.142E+001	1.113E+001
		1089.74	1.73	1.349E+002		5.367E+001	6.581E+001
		1112.07	13.69	1.767E+001		1.470E+000	8.627E+000
		1212.95	1.43	1.810E+002		1.333E+002	8.836E+001
		1249.94	0.19	1.169E+003		2.195E+002	5.680E+002
		1299.14	1.63	9.831E+001		-2.068E+000	4.715E+001
		1408.01	21.07	1.232E+001		-1.120E+001	5.993E+000
		1457.64	0.50	1.171E+003		5.360E+003	5.783E+002
		1528.10	0.28	4.197E+002		-1.402E+002	1.967E+002
	Eu-154	123.07	40.40	3.334E+000	3.33E+000	-1.660E+000	1.649E+000

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

Nuclide MDA Report		2/12/2015 8:39:08 AM		Page 6		
Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
> Eu-154	247.93	6.89	1.628E+001	3.33E+000	4.227E-001	8.022E+000
	591.76	4.95	3.164E+001		-1.182E+000	1.549E+001
	692.42	1.78	8.956E+001		3.676E+000	4.372E+001
	723.30	20.06	8.205E+000		3.230E+000	4.005E+000
	756.80	4.52	3.627E+001		-1.492E+001	1.769E+001
	873.18	12.08	2.195E+001		1.198E+001	1.078E+001
	996.29	10.48	2.430E+001		1.302E+001	1.190E+001
	1004.76	18.01	1.370E+001		-1.015E+000	6.705E+000
	1274.43	34.80	5.240E+000		-4.370E-001	2.528E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	1.712E+002	4.71E+000	1.006E+000	8.463E+001
	60.01	1.22	1.447E+002		9.028E+001	7.134E+001
	86.55	30.70	4.709E+000		-2.703E+000	2.327E+000
	105.31	21.10	6.651E+000		2.257E+000	3.289E+000
Tl-208	583.19	85.00	1.792E+000	1.79E+000	-1.412E+000	8.771E-001
Bi-211	351.07	13.02	9.174E+000	9.17E+000	7.420E+000	4.506E+000
Pb-211	404.85	3.78	3.207E+001	3.21E+001	1.118E+001	1.572E+001
	427.09	1.76	6.941E+001		3.097E+001	3.400E+001
	832.01	3.52	7.285E+001		-1.923E+001	3.580E+001
Bi-212	39.86	1.06	2.568E+002	2.45E+001	2.821E+003	1.272E+002
	727.33	6.67	2.448E+001		-9.255E+000	1.194E+001
	785.37	1.10	1.860E+002		2.568E+000	9.110E+001
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
> Pb-212	115.18	0.60	2.252E+002	2.66E+000	-5.984E+001	1.114E+002
	238.63	43.60	2.663E+000		1.203E+000	1.313E+000
	300.09	3.30	3.271E+001		2.817E+001	1.607E+001
	74.82	10.28	1.513E+001	8.94E+000	8.795E+000	7.470E+000
Pb212-XR	77.11	17.10	8.939E+000		8.509E+000	4.415E+000
	87.35	3.97	3.623E+001		1.081E+001	1.791E+001
	89.78	1.46	9.709E+001		4.611E+000	4.799E+001
+ Bi-214	609.32*	45.49	7.455E+000	7.45E+000	4.206E+000	3.690E+000
	768.36	4.89	3.549E+001		-3.736E+001	1.732E+001
	806.18	1.26	1.934E+002		6.846E+001	9.498E+001
	934.06	3.11	8.690E+001		7.208E+001	4.266E+001
	1120.29	14.92	1.619E+001		-1.357E+001	7.904E+000
	1155.21	1.63	1.508E+002		1.430E+001	7.362E+001
	1238.12	5.83	4.060E+001		2.041E+001	1.976E+001
	1280.98	1.43	1.250E+002		1.037E+002	6.028E+001
	1377.67	3.99	3.047E+001		-4.539E+000	1.438E+001
	1385.31	0.79	1.643E+002		-3.888E+002	7.780E+001
	1401.52	1.33	1.598E+002		-2.413E+002	7.728E+001
	1407.99	2.39	1.084E+002		-9.856E+001	5.274E+001
	1509.21	2.13	1.382E+002		-1.837E+001	6.739E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
> Pb-214	241.99	7.25	1.594E+001	3.36E+000	1.884E+001	7.856E+000
	295.22	18.42	5.952E+000		2.469E+000	2.925E+000
	351.93	35.60	3.361E+000		2.768E+000	1.651E+000

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	1.949E+002	3.36E+000	-1.944E+001	9.545E+001
Pb214-XR	74.82	5.80	2.681E+001	1.58E+001	1.559E+001	1.324E+001
	77.11	9.70	1.576E+001		1.500E+001	7.783E+000
	87.35	2.24	6.421E+001		1.916E+001	3.173E+001
	89.78	0.82	1.729E+002		8.209E+000	8.544E+001
Ra-226	186.21	3.64	3.333E+001	3.33E+001	-1.381E+001	1.647E+001
Ac-228	129.07	2.42	5.511E+001	1.01E+001	-1.679E+001	2.726E+001
	209.25	3.89	3.092E+001		2.498E+001	1.526E+001
	270.24	3.46	3.179E+001		1.248E+001	1.564E+001
	328.00	2.95	3.684E+001		-1.992E+001	1.808E+001
	338.32	11.27	1.006E+001		-5.413E+000	4.940E+000
	409.46	1.92	6.311E+001		2.556E+001	3.093E+001
	463.00	4.40	2.986E+001		2.543E+001	1.463E+001
	794.95	4.25	5.342E+001		5.860E+001	2.621E+001
	911.20	25.80	1.037E+001		-9.697E+001	5.092E+000
	964.77	4.99	5.256E+001		2.107E+000	2.578E+001
	968.97	15.80	1.655E+001		-3.768E+000	8.115E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.423E+001	2.42E+001	0.000E+000	0.000E+000
	283.69	1.70	6.495E+001		-3.432E+001	3.194E+001
	300.07	2.47	4.370E+001		3.763E+001	2.147E+001
	302.65	2.20	4.834E+001		-3.169E+001	2.374E+001
	330.06	1.40	7.951E+001		5.781E+001	3.903E+001
Th-234	92.38	2.13	6.621E+001	6.62E+001	6.400E+001	3.273E+001
	92.80	2.10	6.704E+001		6.480E+001	3.313E+001
	112.81	0.21	6.499E+002		3.504E+002	3.214E+002
U-235	143.76	10.96	1.157E+001	2.13E+000	7.817E+000	5.720E+000
	163.33	5.08	2.418E+001		-1.430E+001	1.195E+001
	185.71	57.20	2.125E+000		-1.062E+000	1.050E+000
	202.11	1.08	1.089E+002		3.016E+001	5.374E+001
	205.31	5.01	2.401E+001		-1.853E+001	1.186E+001
Am-241	59.54	35.90	4.976E+000	4.98E+000	3.104E+000	2.453E+000

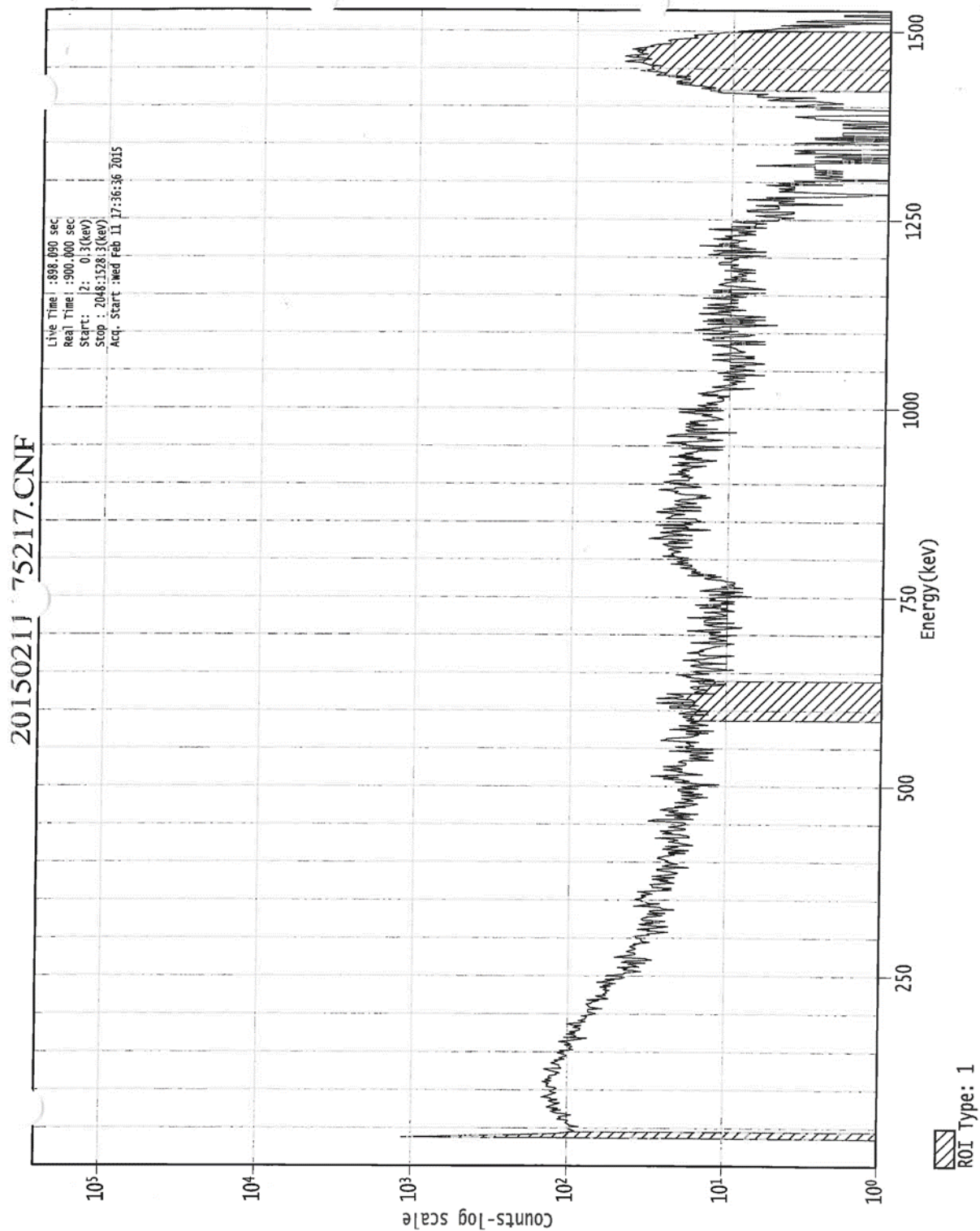
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-18 06310E Gamma Spectroscopy Reports



Attachment Figure 2-19 06310F Gamma Spectroscopy Reports



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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 23-Feb-15-10007
Sample Description	: SMEAR #72 FAN #OTV-042 2/19/15 15:00
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 2/19/2015 3:00:05PM
Acquisition Started	: 2/23/2015 8:48:58AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.5 seconds
Dead Time	: 0.04 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11939

71-D
2-22-15
MSD
2/23/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 2/23/2015 9:20:12AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1460.03	5834	5845	5839.38	1.55E+01	8.98	5.05E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.96	1460.82 *	10.66	1.19E-04	6.96E-05	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
K-40	0.962	1.19E-04	6.96E-05	

? = 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

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

UNIDENTIFIED PEAKS

Peak Locate Performed on : 2/23/2015 9:20:12AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	*	10.66	1.19E-04	7.54E-05	miss
+	Cr-51	320.08		9.91	6.42E-07	3.85E-05	free
+	Mn-54	834.85		99.98	6.15E-07	5.68E-06	miss
+	Co-58	810.76		99.45	2.22E-06	7.52E-06	0.999
		1674.73		0.52	0.00E+00	4.66E-04	1.078
+	Co-60	1173.23		99.85	1.15E-07	6.56E-06	7.50E-06 0.844
		1332.49		99.98	8.91E-07	6.56E-06	0.840
+	Nb-94	702.65		99.81	1.14E-06	4.81E-06	6.59E-06 0.833
		871.09		99.89	-7.62E-07	4.81E-06	0.829
+	Sn-113	255.13		2.11	-7.38E-05	5.24E-06	1.21E-04 free
		391.70		64.97	-3.93E-07	5.24E-06	free
+	Cs-134	475.36		1.48	-4.45E-06	6.82E-06	2.07E-04 miss
		563.25		8.34	0.00E+00	7.00E-05	0.702
		569.33		15.37	4.16E-06	3.95E-05	0.681
		604.72		97.62	-3.12E-07	6.82E-06	0.796
		795.86		85.46	-1.24E-07	6.91E-06	0.795
		801.95		8.69	-1.67E-05	6.13E-05	0.702
		1039.61		0.99	0.00E+00	2.07E-04	0.822
		1167.97		1.79	-2.59E-05	2.23E-04	1.255

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Analysis Report for 23-Feb-15-10007
SMEAR #72 FAN #OTV-042 2/19/15 15:00

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	0.00E+00	6.82E-06	5.01E-05	1.374
+	Cs-137	661.66	85.10	2.77E-07	6.13E-06	6.13E-06	miss
+	Eu-152	121.78	28.67	2.26E-06	1.02E-05	1.02E-05	0.818
		244.70	7.61	4.60E-06		4.02E-05	0.786
		295.94	0.45	4.63E-04		1.06E-03	miss
		344.28	26.60	5.66E-06		1.77E-05	0.874
		367.79	0.86	-1.67E-04		5.00E-04	0.654
		411.12	2.24	-1.87E-04		1.33E-04	0.717
		443.96	2.83	4.59E-05		2.19E-04	0.790
		488.68	0.42	-7.03E-04		7.42E-04	miss
		563.99	0.49	3.92E-04		1.18E-03	0.790
		586.26	0.46	4.23E-05		1.14E-03	0.807
		678.62	0.47	3.99E-05		1.55E-03	0.654
		688.67	0.86	-1.16E-04		6.22E-04	0.904
		719.35	0.28	8.33E-04		2.18E-03	miss
		778.90	12.96	5.73E-06		5.05E-05	0.815
		810.45	0.32	1.11E-04		1.68E-03	1.239
		867.37	4.26	8.69E-05		2.28E-04	0.729
		919.33	0.43	0.00E+00		3.96E-04	0.904
		964.08	14.65	4.82E-06		3.35E-05	1.109
		1085.87	10.24	2.22E-05		7.54E-05	1.089
		1089.74	1.73	-1.09E-04		3.29E-04	0.832
		1112.07	13.69	0.00E+00		3.73E-05	0.943
		1212.95	1.43	1.05E-04		6.23E-04	0.729
		1249.94	0.19	-2.87E-04		2.67E-03	1.314
		1299.14	1.63	5.60E-05		4.12E-04	0.807
		1408.01	21.07	-7.63E-06		3.02E-05	0.911
		1457.64	0.50	-4.67E-05		1.57E-03	1.241
		1528.10	0.28	0.00E+00		8.31E-04	0.984
+	Eu-154	123.07	40.40	-1.78E-06	5.64E-06	5.64E-06	0.820
		247.93	6.89	5.24E-06		4.93E-05	0.772
		591.76	4.95	-6.58E-06		8.07E-05	0.730
		692.42	1.78	-2.15E-05		3.48E-04	0.785
		723.30	20.06	1.17E-05		3.51E-05	0.797
		756.80	4.52	0.00E+00		4.11E-05	0.704
		873.18	12.08	9.70E-06		6.27E-05	0.771
		996.29	10.48	0.00E+00		1.66E-05	0.935
		1004.76	13.01	1.49E-05		4.47E-05	0.904
		1274.43	34.80	2.12E-06		2.12E-05	0.910
		1596.48	1.80	0.00E+00		8.72E-05	1.533
+	Eu-155	45.30	1.31	-1.20E-04	7.31E-06	4.27E-04	0.994
		60.01	1.22	1.69E-05		5.37E-04	0.999
		86.55	30.70	-2.04E-06		7.31E-06	free
		105.31	21.10	4.56E-06		1.44E-05	1.000
+	Tl-208	583.19	85.00	8.51E-07	8.00E-06	8.00E-06	0.810
+	Bi-211	351.07	13.02	1.58E-05	4.53E-05	4.53E-05	miss
+	Pb-211	404.85	3.78	3.87E-05	1.26E-04	1.26E-04	miss
		427.09	1.76	1.78E-05		2.04E-04	miss
		832.01	3.52	-1.85E-06		1.78E-04	miss
+	Bi-212	39.86	1.06	1.34E-05	8.00E-05	6.04E-04	0.995
		727.33	6.67	2.23E-05		8.00E-05	0.945

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Analysis Report for 23-Feb-15-10007
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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	785.37	1.10	-9.09E-05	8.00E-05	5.06E-04	0.829
	1620.50	1.47	0.00E+00		1.62E-04	1.020
+ Pb-212	115.18	0.60	-6.15E-05	8.02E-06	2.14E-04	miss
	238.63	43.60	3.98E-06		8.02E-06	free
	300.09	3.30	4.98E-06		8.70E-05	free
+ Pb212-XR	74.82	10.28	3.44E-05	2.90E-05	6.27E-05	miss
	77.11	17.10	8.58E-06		2.90E-05	miss
	87.35	3.97	-1.83E-05		5.53E-05	miss
	89.78	1.46	4.39E-06		2.02E-04	miss
+ Bi-214	609.32	45.49	1.43E-05	2.42E-05	2.42E-05	0.847
	768.36	4.89	5.69E-06		1.60E-04	0.820
	806.18	1.26	-8.72E-05		4.86E-04	0.769
	934.06	3.11	4.84E-05		2.68E-04	0.824
	1120.29	14.92	3.46E-05		8.01E-05	0.825
	1155.21	1.63	5.01E-05		3.68E-04	0.822
	1238.12	5.83	-8.41E-06		1.08E-04	0.824
	1280.98	1.43	1.84E-04		6.61E-04	0.824
	1377.67	3.99	3.51E-05		1.63E-04	1.102
	1385.31	0.79	5.94E-05		1.10E-03	0.824
	1401.52	1.33	7.16E-05		5.27E-04	0.824
	1407.99	2.39	-7.42E-05		2.94E-04	0.824
	1509.21	2.13	-1.01E-04		4.37E-04	0.840
	1661.27	1.05	1.75E-04		8.13E-04	1.004
	1729.59	2.88	7.05E-05		2.53E-04	1.413
	1764.49	15.30	2.53E-05		7.60E-05	1.005
	1847.43	2.03	8.17E-05		3.79E-04	1.217
>	2118.51	1.16	0.00E+00		0.00E+00	1.140
+ Pb-214	241.99	7.25	2.14E-05	1.83E-05	4.73E-05	0.998
	295.22	18.42	1.96E-05		2.99E-05	1.001
	351.93	35.60	1.37E-05		1.83E-05	free
	785.96	1.06	4.71E-05		5.07E-04	0.998
+ Pb214-XR	74.82	5.80	6.10E-05	5.11E-05	1.11E-04	miss
	77.11	9.70	1.51E-05		5.11E-05	miss
	87.35	2.24	-3.24E-05		9.80E-05	miss
	89.78	0.82	7.81E-06		3.60E-04	miss
+ Ra-226	186.21	3.64	-4.15E-06	7.93E-05	7.93E-05	free
+ Ac-228	129.07	2.42	-1.20E-05	1.04E-05	1.05E-04	0.831
	209.25	3.89	3.38E-06		6.36E-05	0.925
	270.24	3.46	-1.07E-05		1.21E-04	0.869
	328.00	2.95	-4.63E-06		1.11E-04	0.867
	338.32	11.27	9.17E-06		3.83E-05	0.982
	409.46	1.92	2.36E-05		2.01E-04	0.803
	463.00	4.40	1.83E-05		1.22E-04	0.781
	794.95	4.25	3.20E-05		1.78E-04	0.801
	911.20	25.80	1.13E-06		1.66E-05	0.967
	964.77	4.99	1.26E-05		9.24E-05	0.937
	968.97	15.80	0.00E+00		1.04E-05	0.967
	1588.20	3.22	-3.88E-05		2.00E-04	1.010
+ Pa-231	27.36	10.30	0.00E+00	1.13E-05	1.13E-05	0.989
	283.69	1.70	2.31E-05		1.48E-04	0.998
	300.07	2.47	6.65E-06		1.16E-04	1.000

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	2.97E-05	1.13E-05	1.51E-04	1.000
		330.06	1.40	5.93E-05		2.69E-04	1.002
+	Th-234	92.38	2.13	1.11E-05	1.62E-04	1.62E-04	free
		92.80	2.10	9.10E-05		1.80E-04	free
		112.81	0.21	6.44E-04		1.49E-03	free
+	U-235	143.76	10.96	4.91E-06	4.50E-06	2.23E-05	free
		163.33	5.08	-1.91E-06		4.59E-05	free
		185.71	57.20	-1.14E-06		4.50E-06	free
		202.11	1.08	9.14E-06		2.06E-04	miss
		205.31	5.01	2.99E-07		5.06E-05	free
+	Am-241	59.54	35.90	-5.89E-06	1.54E-05	1.54E-05	free

+ = 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

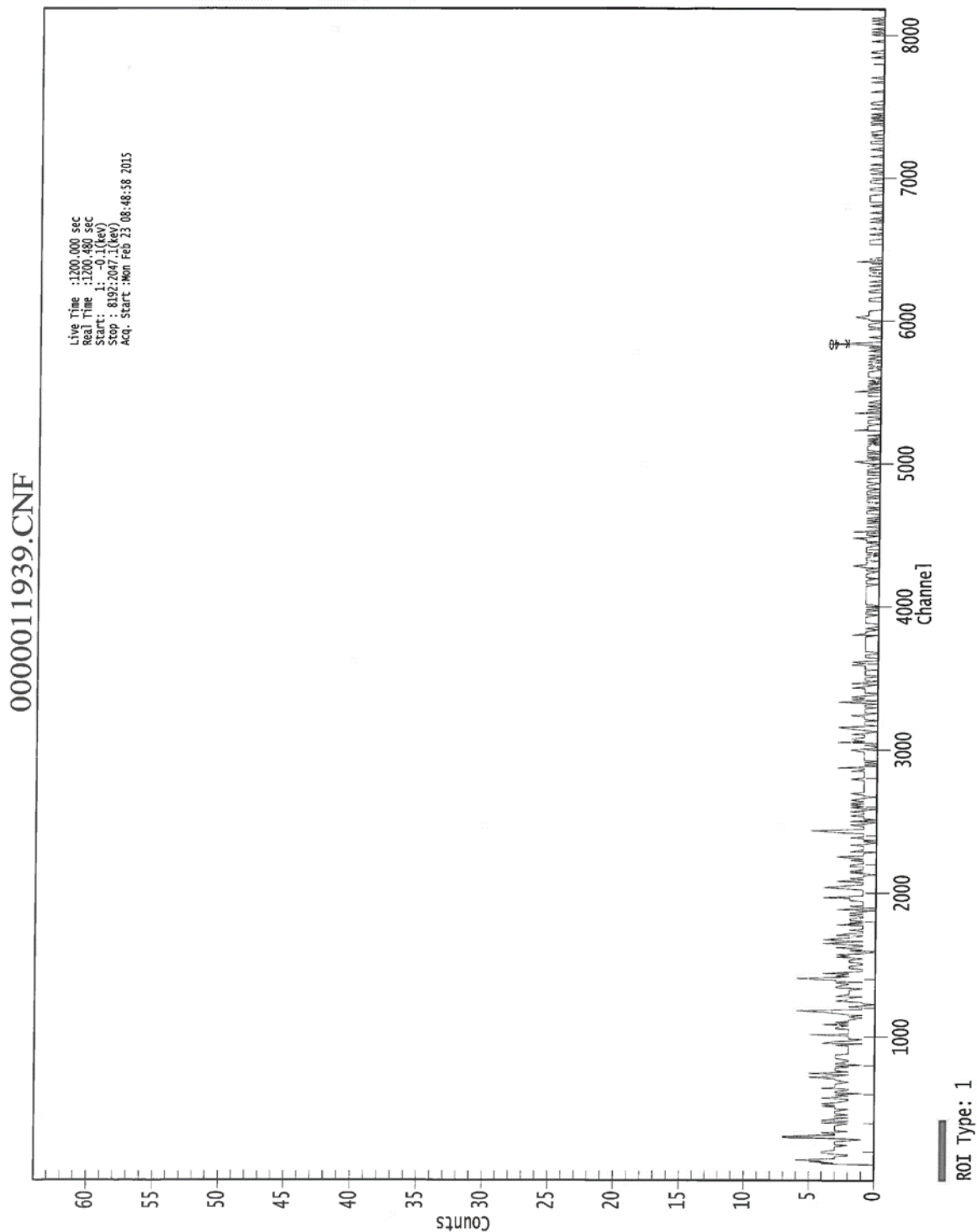
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports



Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

*** G A M M A S F C T R U M A N A L Y S S ***

Filename: C:\Canberra\2-25-15\20150219171555.cnf

Report Generated On : 2/25/2015 11:06:17 AM

Sample Title : Tb 592 SU6311F Grid 72 Heater fan
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :
*Inspector
Collect
No Plant debris
Radioisotopes
JL
2/25/15*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 2/19/2015 5:00:12 PM
Acquisition Started : 2/19/2015 5:00:12 PM

Live Time : 898.1 seconds
Dead Time : 900.0 seconds

Background Time : 0.21 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVAR

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst JL

Date 2-25-15

JL 2/25/15

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Peak Analysis Report

2/25/2015 11:06:17 AM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Tb 592 SU6311F Grid 72 Heater fan
Peak Analysis Performed on: 2/25/2015 11:06:17 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.30	38.85	1.66	3.17E+003	175.34	7.57E+002
2	1902-	2011	1957.08	1460.75	11.08	2.18E+003	151.19	4.96E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/25/2015 11:06:17 AM Page 3

 *** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Tb 592 SU6311F Grid 72 Heater fan
 Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.622	34.70*	66.40	4.39840E+001	9.12781E+000
		788.70	33.60		
		1436.80*	66.40	8.70485E+001	9.21627E+000
K-40	1.000	1460.82*	10.66	5.42216E+002	6.02568E+001

* = Energy line found in the spectrum.
 @ = Energy line not used for Weighted Mean Activity
 Energy Tolerance : 1.000 FWHM
 Nuclide confidence index threshold = 0.30
 Errors quoted at 2.000 sigma

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/25/2015 11:06:17 AM Page 4

 *** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.622	4.398402E+001	9.127810E+000
K-40	1.000	2.682442E+002	8.079730E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 2/25/2015 11:06:17 AM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Slide MDA Report

2/25/2015 11:06:17 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Tb 592 SU6311F Grid 72 Heater fan
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	3.110E+000	3.11E+000	4.398E+001	1.536E+000
		788.70	33.60	6.233E+000		2.460E+000	3.054E+000
		1436.80*	66.40	7.918E+000		8.705E+001	3.905E+000
+	K-40	1460.82*	10.66	4.932E+001	4.93E+001	5.422E+002	2.432E+001
	Cr-51	320.08	9.91	1.097E+001	1.10E+001	3.462E+000	5.385E+000
	Mn-54	834.85	99.98	2.621E+000	2.62E+000	-1.454E+000	1.288E+000
	Co-58	810.76	99.45	2.543E+000	2.54E+000	2.501E+000	1.250E+000
	Co-60	1173.23	99.85	2.603E+000	1.44E+000	3.545E+000	1.272E+000
		1332.49	99.98	1.437E+000		3.006E-001	6.853E-001
	Nb-94	702.65	99.81	1.639E+000	1.64E+000	-2.617E-001	8.001E-001
		871.09	99.89	2.687E+000		1.237E+000	1.321E+000
	Sn-113	255.13	2.11	5.002E+001	1.80E+000	-4.129E+001	2.461E+001
		391.70	64.97	1.804E+000		-1.301E+000	8.843E-001
	Cs-137	661.66	85.10	2.022E+000	2.02E+000	9.933E-001	9.896E-001
	Eu-152	121.78	28.67	4.686E+000	4.38E+000	-1.527E+000	2.318E+000
		244.70	7.61	1.447E+001		-2.092E+000	7.126E+000
		295.94	0.45	2.461E+002		1.399E+001	1.210E+002
		344.28	26.60	4.382E+000		4.572E+000	2.152E+000
		367.79	0.86	1.337E+002		9.749E+000	6.558E+001
		411.12	2.24	5.348E+001		-6.741E+000	2.620E+001
		443.96	2.83	4.565E+001		-1.022E+001	2.237E+001
		488.68	0.42	3.205E+002		2.868E+001	1.569E+002
		563.99	0.49	3.083E+002		-7.093E+001	1.509E+002
		586.26	0.46	3.570E+002		-6.006E+001	1.749E+002
		678.62	0.47	3.528E+002		-2.598E+002	1.725E+002
		688.67	0.86	1.974E+002		3.021E+001	9.652E+001
		719.35	0.28	5.956E+002		1.334E+002	2.908E+002
		778.90	12.96	1.447E+001		-1.076E+001	7.072E+000
		810.45	0.32	7.875E+002		7.747E+002	3.870E+002
		867.37	4.26	6.351E+001		4.191E+001	3.121E+001
		919.33	0.43	6.153E+002		3.541E+002	3.020E+002
		964.08	14.65	1.803E+001		1.841E+001	8.844E+000
		1085.87	10.24	2.135E+001		-9.370E+000	1.040E+001
		1089.74	1.73	1.261E+002		-1.291E+002	6.145E+001
		1112.07	13.69	1.726E+001		1.362E+001	8.425E+000
		1212.95	1.43	1.677E+002		-6.050E+001	8.169E+001
		1249.94	0.19	1.147E+003		4.644E+002	5.571E+002
		1299.14	1.63	1.003E+002		-7.210E+001	4.815E+001
		1408.01	21.07	1.155E+001		-6.315E+000	5.610E+000
		1457.64	0.50	1.176E+003		6.110E+003	5.810E+002
		1528.10	0.28	3.897E+002		-1.899E+002	1.817E+002
	Eu-154	123.07	40.40	3.327E+000	3.33E+000	-1.233E-001	1.646E+000

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Eu-154	247.93	6.89	1.587E+001	3.33E+000	6.969E+000	7.817E+000
	591.76	4.95	3.358E+001		-7.661E+000	1.646E+001
	692.42	1.78	9.373E+001		-6.958E+001	4.580E+001
	723.30	20.06	8.163E+000		-2.082E+000	3.983E+000
	756.80	4.52	3.603E+001		-2.673E+001	1.757E+001
	873.18	12.08	2.216E+001		3.410E+000	1.089E+001
	996.29	10.48	2.273E+001		-5.943E+000	1.112E+001
	1004.76	18.01	1.288E+001		7.928E+000	6.295E+000
	1274.43	34.80	5.482E+000		-1.085E+000	2.649E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.662E+002	4.71E+000	-1.291E+000	8.213E+001
	60.01	1.22	1.374E+002		-8.643E+001	6.770E+001
	86.55	30.70	4.709E+000		-1.919E+000	2.327E+000
	105.31	21.10	6.661E+000		1.884E+000	3.294E+000
Tl-208	583.19	85.00	1.927E+000	1.93E+000	1.236E+000	9.446E+001
Bi-211	351.07	13.02	9.049E+000	9.05E+000	9.670E+000	4.443E+000
Pb-211	404.85	3.78	3.162E+001	3.16E+001	-5.360E+000	1.549E+001
	427.09	1.76	6.920E+001		-3.591E+001	3.389E+001
	832.01	3.52	7.438E+001		-7.019E+001	3.656E+001
Bi-212	39.86	1.06	2.533E+002	2.45E+001	2.758E+003	1.255E+002
	727.33	6.67	2.452E+001		5.144E-001	1.196E+001
	785.37	1.10	1.800E+002		-1.425E+002	8.808E+001
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	2.249E+002	2.60E+000	5.692E+001	1.112E+002
	238.63	43.60	2.599E+000		1.174E+000	1.281E+000
	300.09	3.30	3.310E+001		1.582E+001	1.626E+001
Pb212-XR	74.82	10.28	1.471E+001	8.76E+000	-1.027E+001	7.263E+000
	77.11	17.10	8.758E+000		4.611E+000	4.324E+000
	87.35	3.97	3.623E+001		9.647E+000	1.791E+001
	89.78	1.46	9.724E+001		3.660E+001	4.806E+001
Bi-214	609.32	45.49	3.740E+000	3.74E+000	1.362E+000	1.833E+000
	768.36	4.89	3.506E+001		-5.148E+001	1.711E+001
	806.18	1.26	1.957E+002		2.442E+002	9.615E+001
	934.06	3.11	8.677E+001		4.845E+001	4.260E+001
	1120.29	14.92	1.583E+001		-3.605E+000	7.723E+000
	1155.21	1.63	1.554E+002		4.670E+000	7.592E+001
	1238.12	5.83	3.902E+001		3.289E+000	1.898E+001
	1280.98	1.43	1.280E+002		-4.523E+001	6.174E+001
	1377.67	3.99	2.908E+001		-8.246E+001	1.368E+001
	1385.31	0.79	1.614E+002		-3.401E+002	7.636E+001
Pb-214	1401.52	1.33	1.442E+002	3.30E+000	-1.312E+002	6.947E+001
	1407.99	2.39	1.017E+002		-5.558E+001	4.938E+001
	1509.21	2.13	1.340E+002		-2.489E+001	6.526E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	1.542E+001		6.481E+000	7.595E+000
	295.22	18.42	5.994E+000		5.935E+001	2.946E+000
	351.93	35.60	3.302E+000		1.772E+000	1.621E+000

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports

nuclide MDA Report

2/25/2015 11:06:17 AM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	1.886E+002	3.30E+000	-1.405E+002	9.233E+001
Pb214-XR	74.82	5.80	2.608E+001	1.54E+001	-1.821E+001	1.287E+001
	77.11	9.70	1.544E+001		8.129E+000	7.623E+000
	87.35	2.24	6.422E+001		1.710E+001	3.174E+001
	89.78	0.82	1.731E+002		6.517E+001	8.558E+001
Ra-226	186.21	3.64	3.299E+001	3.30E+001	7.234E+000	1.630E+001
Ac-228	129.07	2.42	5.474E+001	9.89E+000	8.752E-001	2.707E+001
	209.25	3.89	3.106E+001		2.366E+001	1.534E+001
	270.24	3.46	3.135E+001		-1.974E+001	1.542E+001
	328.00	2.95	3.682E+001		-2.101E+001	1.807E+001
	338.32	11.27	9.891E+000		-7.769E-001	4.855E+000
	409.46	1.92	6.217E+001		-3.380E+001	3.046E+001
	463.00	4.40	2.945E+001		1.304E+000	1.442E+001
	794.95	4.25	5.247E+001		5.157E+001	2.573E+001
	911.20	25.80	1.016E+001		2.051E+000	4.985E+000
	964.77	4.99	5.271E+001		4.293E+001	2.585E+001
	968.97	15.80	1.651E+001		8.920E+000	8.096E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.423E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	6.569E+001		2.664E+001	3.231E+001
	300.07	2.47	4.422E+001		2.113E+001	2.173E+001
	302.65	2.20	4.892E+001		-2.042E+001	2.403E+001
	330.06	1.40	7.844E+001		-4.820E+001	3.850E+001
Th-234	92.38	2.13	6.569E+001	6.57E+001	-5.703E+001	3.247E+001
	92.80	2.10	6.651E+001		-5.774E+001	3.287E+001
	112.81	0.21	6.440E+002		-6.608E+001	3.185E+002
U-235	143.76	10.96	1.168E+001	2.10E+000	9.266E+000	5.774E+000
	163.33	5.08	2.497E+001		2.366E+000	1.234E+001
	185.71	57.20	2.104E+000		4.321E-001	1.039E+000
	202.11	1.08	1.095E+002		4.629E+000	5.404E+001
	205.31	5.01	2.422E+001		3.676E+000	1.196E+001
Am-241	59.54	35.90	4.725E+000	4.73E+000	-2.972E+000	2.328E+000

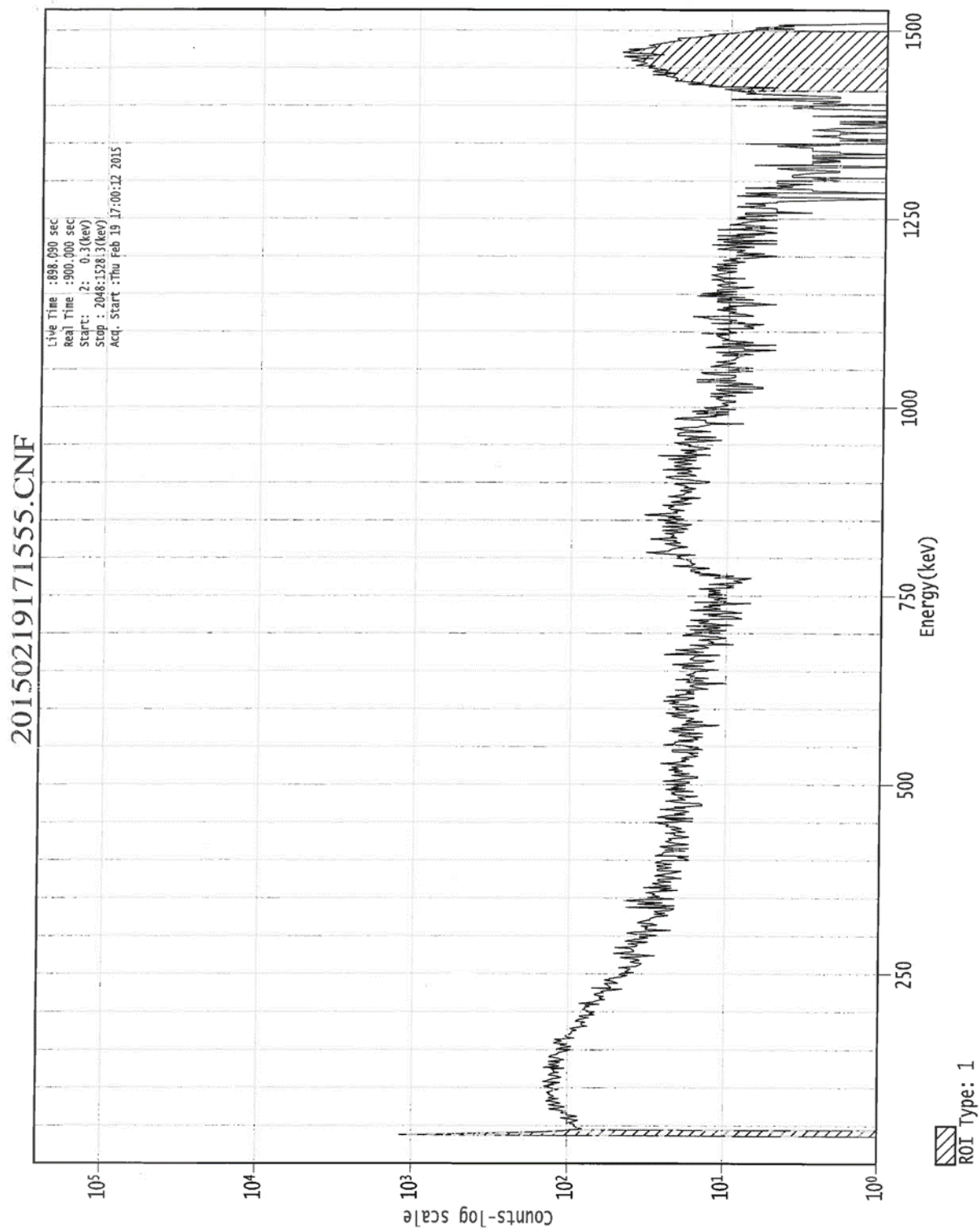
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-19 06310F Gamma Spectroscopy Reports



Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: C:\Canberra\9-21-15\20150921135917.cnf

port Generated On : 9/21/2015 2:58:37 PM

umple Title : 6311AISTVS-001
umple Description : No skid paint
umple Identification : SU6311A
umple Type :
umple Geometry : LaBr Paver

ak Locate Threshold : 3.00
ak Locate Range (in channels) : 1 - 512
ak Area Range (in channels) : 1 - 512
entification Energy Tolerance : 1.000 FWHM

umple Size : 1.000E+000

umple Taken On : 9/21/2015 1:30:04 PM
quisition Started : 9/21/2015 1:30:04 PM

ve Time : 598.7 seconds
al Time : 600.0 seconds

ad Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst Dan Hips

Date 10/5/2015

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

Peak Analysis Report

9/21/2015 2:58:37 PM

Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 6311AISTVS-001
Peak Analysis Performed on: 9/21/2015 2:58:37 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	110-	124	117.59	351.17	15.36	2.70E+002	220.23	1.39E+003
2	428-	454	441.83	1317.94	3.67	1.05E+002	78.72	1.87E+002
3	473-	500	486.68	1451.10	37.94	1.44E+003	144.36	4.82E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/21/2015 5:58:37 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6311AISTVS-001
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/)	Activity Uncertainty
K-40	0.974	1460.82*	10.66	5.35524E+002	7.09281E+001
Eu-152	0.570	121.78	28.67		
		244.70	7.61		
		295.94	0.45		
		344.28*	26.60	1.18637E+001	9.86672E+000
		367.79	0.86		
		411.12	2.24		
		443.96	2.83		
		488.68	0.42		
		563.99	0.49		
		586.26	0.46		
		678.62	0.47		
		688.67	0.86		
		719.35	0.28		
		778.90	12.96		
		810.45	0.32		
		867.37	4.26		
		919.33	0.43		
		964.08	14.65		
		1085.87	10.24		
		1089.74	1.73		
		1112.07	13.69		
		1212.95	1.43		
		1249.94	0.19		
		1299.14*	1.63	2.36737E+002	1.78344E+002
		1408.01	21.07		
		1457.64*	0.50	1.13493E+004	1.47089E+003
		1528.10	0.28		

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/21/2015 2:58:37 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/)	Wt mean Activity Uncertainty
	K-40	0.974	5.349321E+002	6.858519E+001
X	Cu-64	0.804		
X	Ba-133	0.997		
	Eu-152	0.570	1.254910E+001	9.841597E+000
X	Bi-211	1.000		
X	Pb-214	1.000		
X	Ac-228	0.339		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/21/2015 2:58:37 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

iclude MDA Report

9/21/2015 2:37 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: LaBr Paver
Sample Title: 6311AISTVS-001
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
	LaBr3	34.70	66.40	4.328E+000	4.33E+000	2.887E+001	2.136E+000
		788.70	33.60	9.210E+000		3.939E+000	4.511E+000
		1436.80	66.40	1.089E+001		3.306E+001	5.366E+000
+	K-40	1460.82*	10.66	7.591E+001	7.59E+001	5.355E+002	3.745E+001
	Cr-51	320.08	9.91	1.611E+001	1.61E+001	-1.526E+001	7.904E+000
	Mn-54	834.85	99.98	3.534E+000	3.53E+000	1.149E+000	1.734E+000
	Co-58	810.76	99.45	3.432E+000	3.43E+000	2.611E+001	1.683E+000
	Co-60	1173.23	99.85	3.710E+000	2.60E+000	4.136E+000	1.811E+000
		1332.49	99.98	2.603E+000		1.377E+001	1.252E+000
	Nb-94	702.65	99.81	2.320E+000	2.32E+000	-1.895E+001	1.131E+000
		871.09	99.89	3.423E+000		-3.228E+000	1.677E+000
	Sn-113	255.13	2.11	8.320E+001	2.67E+000	-1.040E+002	4.100E+001
		391.70	64.97	2.674E+000		-2.071E+000	1.311E+000
	Cs-137	661.66	85.10	2.809E+000	2.81E+000	2.960E+000	1.372E+000
+	Eu-152	121.78	28.67	7.773E+000	7.77E+000	-7.151E+002	3.849E+000
		244.70	7.61	2.518E+001		2.457E+001	1.243E+001
		295.94	0.45	3.911E+002		2.371E+002	1.924E+002
		344.28*	26.60	1.585E+001		1.186E+001	7.866E+000
		367.79	0.86	2.156E+002		1.262E+001	1.059E+002
		411.12	2.24	7.809E+001		-3.836E+001	3.824E+001
		443.96	2.83	6.618E+001		8.696E+001	3.241E+001
		488.68	0.42	4.544E+002		1.043E+001	2.222E+002
		563.99	0.49	4.479E+002		-5.351E+002	2.192E+002
		586.26	0.46	5.255E+002		-3.329E+002	2.574E+002
		678.62	0.47	4.989E+002		-3.594E+001	2.436E+002
		688.67	0.86	2.694E+002		2.675E+001	1.314E+002
		719.35	0.28	8.837E+002		7.140E+002	4.313E+002
		778.90	12.96	2.239E+001		-9.833E+000	1.095E+001
		810.45	0.32	1.063E+003		8.087E+001	5.213E+002
		867.37	4.26	8.090E+001		-4.882E+001	3.964E+001
		919.33	0.43	8.408E+002		-2.333E+002	4.119E+002
		964.08	14.65	2.482E+001		5.540E+000	1.215E+001
		1085.87	10.24	3.113E+001		5.958E+000	1.515E+001
		1089.74	1.73	1.850E+002		2.944E+001	9.007E+001
		1112.07	13.69	2.445E+001		1.827E+001	1.191E+001
		1212.95	1.43	2.278E+002		9.180E+001	1.107E+002
		1249.94	0.19	1.516E+003		1.215E+003	7.331E+002
		1299.14*	1.63	2.876E+002		2.367E+002	1.408E+002
		1408.01	21.07	2.233E+001		-6.579E+000	1.091E+001
		1457.64*	0.50	1.609E+003		1.135E+004	7.938E+002
>	Eu-154	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
		123.07	40.40	5.504E+000	5.50E+000	-5.064E+002	2.725E+000

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Eu-154	247.93	6.89	2.755E+001	5.50E+000	5.396E+001	1.360E+001
	591.76	4.95	5.025E+001		2.033E+001	2.463E+001
	692.42	1.78	1.304E+002		1.977E+001	6.360E+001
	723.30	20.06	1.213E+001		-2.967E+000	5.916E+000
	756.80	4.52	5.457E+001		-2.178E+001	2.660E+001
	873.18	12.08	2.836E+001		-2.675E+001	1.389E+001
	996.29	10.48	3.186E+001		-1.381E+001	1.556E+001
	1004.76	18.01	1.813E+001		1.230E+001	8.847E+000
	1274.43	34.80	7.109E+000		3.623E+000	3.416E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	2.711E+002	7.74E+000	1.754E+003	1.341E+002
	60.01	1.22	2.456E+002		-8.265E+001	1.213E+002
	86.55	30.70	7.736E+000		2.034E+001	3.827E+000
	105.31	21.10	1.164E+001		2.370E+001	5.765E+000
Tl-208	583.19	85.00	2.824E+000	2.82E+000	1.901E+000	1.383E+000
Bi-211	351.07*	13.02	3.238E+001	3.24E+001	2.424E+001	1.607E+001
Pb-211	404.85	3.78	4.689E+001	4.69E+001	2.590E+001	2.297E+001
	427.09	1.76	9.979E+001		-1.347E+002	4.884E+001
	832.01	3.52	9.998E+001		1.135E+001	4.904E+001
Bi-212	39.86	1.06	3.165E+002	3.66E+001	2.248E+003	1.565E+002
	727.33	6.67	3.655E+001		-1.755E+000	1.783E+001
	785.37	1.10	2.778E+002		1.767E+002	1.360E+002
> Pb-212	1620.50	1.47	0.000E+000	4.45E+000	0.000E+000	0.000E+000
	115.18	0.60	3.885E+002		-1.409E+002	1.924E+002
	238.63	43.60	4.451E+000		6.197E+000	2.198E+000
Pb212-XR	300.09	3.30	5.145E+001	1.54E+001	2.517E+001	2.529E+001
	74.82	10.28	2.631E+001		8.680E+000	1.301E+001
	77.11	17.10	1.545E+001		-3.106E+000	7.641E+000
Bi-214	87.35	3.97	5.901E+001	5.48E+000	2.509E+001	2.919E+001
	89.78	1.46	1.859E+002		-3.907E+001	9.211E+001
	609.32	45.49	5.478E+000		7.454E+000	2.683E+000
	768.36	4.89	5.400E+001		-2.540E+001	2.637E+001
	806.18	1.26	2.680E+002		2.155E+002	1.314E+002
	934.06	3.11	1.142E+002		-4.141E+001	5.590E+001
	1120.29	14.92	2.257E+001		3.369E+000	1.100E+001
	1155.21	1.63	2.245E+002		1.615E+002	1.095E+002
	1238.12	5.83	5.290E+001		2.002E+001	2.565E+001
	1280.98	1.43	1.705E+002		4.092E+001	8.186E+001
	1377.67	3.99	5.750E+001		-7.955E+001	2.746E+001
	1385.31	0.79	3.557E+002		-3.642E+002	1.714E+002
	1401.52	1.33	3.140E+002		-1.151E+002	1.531E+002
	1407.99	2.39	1.965E+002		-5.790E+001	9.606E+001
	1509.21	2.13	1.097E+002		-5.382E+001	5.224E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1764.49	15.30	0.000E+000	9.50E+000	0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.668E+001		4.174E+001	1.317E+001
	295.22	18.42	9.496E+000		5.757E+000	4.672E+000
	351.93*	35.60	1.184E+001		8.864E+000	5.878E+000

Attachment Figure 2-20 06311A Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/)	Nuclide MDA (pCi/)	Activity (pCi/)	Dec. Level (pCi/)
Pb-214	785.96	1.06	2.890E+002	9.50E+000	1.839E+002	1.415E+002
Pb214-XR	74.82	5.80	4.663E+001	2.72E+001	1.538E+001	2.306E+001
	77.11	9.70	2.723E+001		-5.476E+000	1.347E+001
	87.35	2.24	1.046E+002		4.446E+001	5.174E+001
	89.78	0.82	3.310E+002		-6.957E+001	1.640E+002
Ra-226	186.21	3.64	4.877E+001	4.88E+001	1.154E+001	2.408E+001
Ac-228	129.07	2.42	8.998E+001	1.41E+001	-5.172E+001	4.455E+001
	209.25	3.89	5.114E+001		4.779E+001	2.528E+001
	270.24	3.46	4.945E+001		-2.367E+001	2.434E+001
	328.00	2.95	6.117E+001		-2.734E+001	3.007E+001
	338.32*	11.27	3.741E+001		2.800E+001	1.857E+001
	409.46	1.92	9.200E+001		6.013E+001	4.506E+001
	463.00	4.40	4.242E+001		1.402E+001	2.076E+001
	794.95	4.25	7.515E+001		5.519E+001	3.682E+001
	911.20	25.80	1.410E+001		1.163E+001	6.912E+000
	964.77	4.99	7.291E+001		1.627E+001	3.570E+001
	968.97	15.80	2.284E+001		3.576E+000	1.118E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.64E-001	0.000E+000	0.000E+000
	283.69	1.70	1.036E+002		-1.017E+001	5.097E+001
	300.07	2.47	6.873E+001		3.363E+001	3.379E+001
	302.65	2.20	7.763E+001		3.798E+001	3.817E+001
	330.06	1.40	1.311E+002		-1.829E+001	6.446E+001
Th-234	92.38	2.13	1.255E+002	1.26E+002	9.155E+000	6.218E+001
	92.80	2.10	1.271E+002		9.269E+000	6.296E+001
	112.81	0.21	1.122E+003		1.736E+002	5.559E+002
U-235	143.76	10.96	1.914E+001	3.10E+000	1.848E+001	9.475E+000
	163.33	5.08	3.793E+001		1.891E+001	1.875E+001
	185.71	57.20	3.099E+000		-2.714E+000	1.531E+000
	202.11	1.08	1.858E+002		8.100E+001	9.185E+001
	205.31	5.01	3.985E+001		2.807E+001	1.970E+001
Am-241	59.54	35.90	8.447E+000	8.45E+000	-2.842E+000	4.171E+000

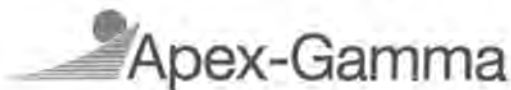
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports



2/26/2015 12:18:16PM

Page 1 of 7

Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311ciolqol-01 2/26/15 10:35

Turbine lube oil

U

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 26-Feb-15-10002
Sample Description	: Unit 2 Turbine Bldg 06311ciolqol-01 2/26/15 10:35
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 1.000E+03 mL
Facility	: Default
Sample Taken On	: 2/26/2015 11:35:24AM
Acquisition Started	: 2/26/2015 11:41:54AM
Procedure	: 538G Water
Operator	: Administrator
Detector Name	: DET02
Geometry	: 538G water 719ml
Live Time	: 2000.0 seconds
Real Time	: 2001.8 seconds
Dead Time	: 0.09 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/18/2013
Efficiency Calibration Description	:
Sample Number	: 11971

Handwritten signature and date 2/26/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 2/26/2015 12:15:19PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311C10101-01 2/26/15 10:35

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.76	1403 -	1415	1407.51	3.27E+01	17.69	4.26E+01	Pb-214
2	608.97	2430 -	2442	2436.04	3.89E+01	15.54	2.23E+01	Bi-214
3	1460.08	5835 -	5850	5842.20	2.21E+01	12.19	1.57E+01	K-40

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.98	1460.82 *	10.66	1.36E-01	7.61E-02	miss
Bi-211	0.98	351.07 *	13.02	7.62E-02	4.30E-02	miss
Bi-214	0.99	609.32 *	45.49	3.90E-02	1.63E-02	0.913
		768.36	4.89			
		806.18	1.26			
		934.06	3.11			
		1120.29	14.92			
		1155.21	1.63			
		1238.12	5.83			
		1280.98	1.43			
		1377.67	3.99			
		1385.31	0.79			
		1401.52	1.33			
		1407.99	2.39			
		1509.21	2.13			
		1661.27	1.05			
		1729.59	2.88			
		1764.49	15.30			
		1847.43	2.03			
		2118.51	1.16			
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	2.79E-02	1.57E-02	free
		785.96	1.06			

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311C10101-01 2/26/15 10:35

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
K-40	0.980	1.36E-01	7.61E-02	
? Bi-211	0.983	7.62E-02	4.30E-02	
Bi-214	0.998	3.90E-02	1.63E-02	
? Pb-214	0.999	2.79E-02	1.57E-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

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002
Unit 2 Turbine Bldg 06311ciolqol-01 2/26/15 10:35

UNIDENTIFIED PEAKS

Peak Locate Performed on : 2/26/2015 12:15:19PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	*	10.66	1.36E-01	9.53E-02	miss
+	Cr-51	320.08		9.91	1.48E-02	7.06E-02	free
+	Mn-54	834.85		99.98	1.69E-03	8.73E-03	miss
+	Co-58	810.76		99.45	-3.88E-03	3.51E-03	1.000
		1674.73		0.52	1.33E-02	1.23E+00	1.047
+	Co-60	1173.23		99.85	-4.38E-04	8.34E-03	0.910
		1332.49		99.98	1.62E-03	8.92E-03	0.909
+	Nb-94	702.65		99.81	4.66E-04	7.65E-03	0.907
		871.09		99.89	-3.32E-03	7.65E-03	0.908
+	Sn-113	255.13		2.11	9.82E-02	9.95E-03	free
		391.70		64.97	-1.66E-03	9.95E-03	free
+	Cs-134	475.36		1.48	-2.05E-01	7.41E-03	miss
		563.25		8.34	3.80E-02	1.10E-01	0.832
		569.33		15.37	6.29E-03	5.44E-02	0.819
		604.72		97.62	2.50E-03	9.44E-03	0.887
		795.86		85.46	-2.74E-03	7.41E-03	0.891
		801.95		8.69	-1.75E-02	8.51E-02	0.836
		1038.61		0.99	1.36E-01	8.52E-01	0.906
		1167.97		1.79	-1.12E-01	3.36E-01	1.153

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311ciolqol-01 2/26/15 10:35

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Cs-134	1365.19	3.02	1.17E-01	7.41E-03	2.51E-01	1.247
+	Cs-137	661.66	85.10	2.66E-03	1.10E-02	1.10E-02	miss
+	Eu-152	121.78	28.67	5.53E-03	2.77E-02	2.77E-02	0.896
		244.70	7.61	-8.19E-03		8.33E-02	0.895
		295.94	0.45	9.75E-01		1.72E+00	miss
		344.28	26.60	3.04E-03		2.79E-02	0.931
		367.79	0.86	-1.39E-01		7.97E-01	0.820
		411.12	2.24	1.72E-01		4.05E-01	0.856
		443.96	2.83	-5.37E-02		2.47E-01	0.891
		488.68	0.42	-4.39E-01		1.68E+00	miss
		563.99	0.49	-4.60E-01		1.34E+00	0.892
		586.26	0.46	3.58E-01		1.86E+00	0.908
		678.62	0.47	-5.68E-01		1.67E+00	0.823
		688.67	0.86	3.89E-01		1.02E+00	0.968
		719.35	0.28	-1.14E+00		1.92E+00	miss
		778.90	12.96	1.84E-02		7.12E-02	0.913
		810.45	0.32	-9.63E-01		1.28E+00	1.074
		867.37	4.26	4.55E-02		2.06E-01	0.887
		919.33	0.43	5.36E-01		2.13E+00	0.969
		964.08	14.65	3.23E-02		6.70E-02	1.034
		1085.87	10.24	1.07E-02		6.93E-02	1.026
		1089.74	1.73	1.38E-01		4.56E-01	0.924
		1112.07	13.69	-9.24E-03		4.48E-02	0.987
		1212.95	1.43	1.14E-01		6.09E-01	0.888
		1249.94	0.19	3.02E-02		2.52E+00	1.165
		1299.14	1.63	1.53E-02		5.82E-01	0.909
		1408.01	21.07	1.24E-02		4.10E-02	0.973
		1457.64	0.50	-8.51E-01		2.46E+00	1.130
		1528.10	0.28	1.01E+00		3.33E+00	1.018
+	Eu-154	123.07	40.40	-9.05E-03	1.66E-02	1.66E-02	0.894
		247.93	6.89	-2.35E-02		9.11E-02	0.885
		591.76	4.95	-1.48E-02		1.64E-01	0.863
		692.42	1.78	3.84E-02		4.97E-01	0.897
		723.30	20.06	7.21E-03		3.96E-02	0.894
		756.80	4.52	-3.56E-02		1.85E-01	0.868
		873.18	12.08	3.61E-02		8.32E-02	0.890
		996.29	10.48	-3.24E-02		4.96E-02	0.948
		1004.76	18.01	-6.71E-03		3.69E-02	0.964
		1274.43	34.80	-2.14E-03		2.84E-02	0.970
		1596.48	1.80	5.74E-03		2.11E-01	1.352
+	Eu-155	45.30	1.31	4.66E-01	4.08E-02	5.45E+00	0.998
		60.01	1.22	-8.76E-01		5.00E+00	1.000
		86.55	30.70	8.58E-03		4.52E-02	free
		105.31	21.10	-3.90E-04		4.08E-02	1.000
+	Tl-208	583.19	85.00	2.84E-03	1.21E-02	1.21E-02	0.890
+	Bi-211	351.07	* 13.02	7.62E-02	5.81E-02	5.81E-02	miss
+	Pb-211	404.85	3.78	7.94E-03	1.63E-01	1.63E-01	miss
		427.09	1.76	-1.37E-01		3.73E-01	miss
		832.01	3.52	-2.05E-02		2.17E-01	miss
+	Bi-212	39.86	1.06	3.18E+00	1.21E-01	7.36E+00	0.997
		727.33	6.67	4.88E-02		1.21E-01	0.970

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311cicqol-01 2/26/15 10:35

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Bi-212	785.37	1.10	-6.66E-03	1.21E-01	7.01E-01	0.907
		1620.50	1.47	-1.89E-02		4.39E-01	1.012
+	Pb-212	115.18	0.60	1.31E-01	1.68E-02	1.36E+00	miss
		238.63	43.60	3.66E-03		1.68E-02	free
		300.09	3.30	5.48E-02		2.02E-01	free
+	Pb212-XR	74.82	10.28	9.93E-04	1.31E-01	2.23E-01	miss
		77.11	17.10	5.43E-02		1.31E-01	miss
		87.35	3.97	3.76E-02		3.18E-01	miss
		89.78	1.46	-1.61E-01		7.43E-01	miss
+	Bi-214	609.32	* 45.49	3.90E-02	1.77E-02	1.77E-02	0.913
		768.36	4.89	-1.16E-02		1.89E-01	0.905
		806.18	1.26	-9.93E-03		6.42E-01	0.875
		934.06	3.11	1.44E-01		3.16E-01	0.908
		1120.29	14.92	2.96E-02		7.55E-02	0.908
		1155.21	1.63	1.72E-01		5.82E-01	0.906
		1238.12	5.83	5.71E-02		1.87E-01	0.908
		1280.98	1.43	-3.51E-01		3.42E-01	0.908
		1377.67	3.99	6.66E-02		2.61E-01	1.058
		1385.31	0.79	1.84E-01		1.15E+00	0.908
		1401.52	1.33	1.26E-01		6.36E-01	0.908
		1407.99	2.39	1.17E-01		3.87E-01	0.908
		1509.21	2.13	1.82E-01		5.15E-01	0.918
		1661.27	1.05	-7.50E-02		6.33E-01	1.003
		1729.59	2.88	6.19E-02		2.22E-01	1.238
		1764.49	15.30	4.19E-02		9.76E-02	1.003
		1847.43	2.03	-1.57E-01		2.46E-01	1.126
>		2118.51	1.16	0.00E+00		0.00E+00	1.084
+	Pb-214	241.99	7.25	2.75E-02	2.12E-02	9.72E-02	1.000
		295.22	18.42	1.40E-02		4.10E-02	1.000
		351.93	* 35.60	2.79E-02		2.12E-02	free
		785.96	1.06	-5.50E-02		6.21E-01	1.000
+	Pb214-XR	74.82	5.80	1.76E-03	2.30E-01	3.95E-01	miss
		77.11	9.70	9.57E-02		2.30E-01	miss
		87.35	2.24	6.67E-02		5.64E-01	miss
		89.78	0.82	-2.86E-01		1.32E+00	miss
+	Ra-226	186.21	3.64	4.78E-02	1.99E-01	1.99E-01	free
+	Ac-228	129.07	2.42	-5.07E-02	3.16E-02	3.05E-01	0.911
		209.25	3.89	-2.64E-02		1.28E-01	0.966
		270.24	3.46	7.61E-02		1.94E-01	0.927
		328.00	2.95	5.50E-02		2.53E-01	0.926
		338.32	11.27	1.20E-02		6.86E-02	0.985
		409.46	1.92	6.59E-02		3.97E-01	0.896
		463.00	4.40	-3.99E-03		1.50E-01	0.890
		794.95	4.25	3.54E-02		2.02E-01	0.909
		911.20	25.80	5.41E-03		3.16E-02	0.984
		964.77	4.99	2.67E-02		1.80E-01	0.968
		968.97	15.80	6.30E-03		4.74E-02	0.984
		1588.20	3.22	7.14E-02		2.82E-01	1.003
+	Pa-231	27.36	10.30	3.63E-01	2.70E-01	8.82E-01	0.994
		283.69	1.70	7.69E-03		3.99E-01	1.000
		300.07	2.47	7.32E-02		2.70E-01	1.000

Attachment Figure 2-21 06311C Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10002

Unit 2 Turbine Bldg 06311C10101 2/26/15 10:35

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Pa-231	302.65	2.20	-5.12E-02	2.70E-01	2.83E-01	1.000
		330.06	1.40	-7.24E-03		4.62E-01	1.000
+	Th-234	92.38	2.13	1.99E-01	5.90E-01	5.90E-01	free
		92.80	2.10	1.71E-01		5.94E-01	free
		112.81	0.21	-1.75E-01		3.21E+00	free
+	U-235	143.76	10.96	-4.00E-03	1.27E-02	5.26E-02	free
		163.33	5.08	2.10E-02		1.25E-01	free
		185.71	57.20	4.49E-03		1.27E-02	free
		202.11	1.08	-3.79E-02		5.68E-01	miss
		205.31	5.01	-3.69E-02		1.02E-01	free
+	Am-241	59.54	35.90	-1.78E-01	1.58E-01	1.58E-01	free

+ = 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

? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports



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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

< 6311DAR1QLQ01 >

Turb. Lube Oil

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 26-Feb-15-10003
Sample Description	: Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10
Sample Type	: Oil
Unit	:
Sample Point	:
Sample Size	: 1.000E+03 mL
Facility	: Default
Sample Taken On	: 2/26/2015 11:10:15AM
Acquisition Started	: 2/26/2015 12:16:12PM
Procedure	: 538G Water
Operator	: Administrator
Detector Name	: DET02
Geometry	: 538G water 719ml
Live Time	: 4000.0 seconds
Real Time	: 4003.4 seconds
Dead Time	: 0.08 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/18/2013
Efficiency Calibration Description	:
Sample Number	: 11973

2/26/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 2/26/2015 1:22:58PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311d\oiqol-01 2/26/15 11:10

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	241.77	963 -	974	967.83	3.15E+01	23.73	9.69E+01	Pb-214
2	295.01	1176 -	1188	1180.65	5.35E+01	24.20	7.30E+01	Pb-214
3	351.78	1400 -	1414	1407.61	8.15E+01	26.66	8.50E+01	Eu-152
4	510.82	2030 -	2054	2043.51	1.14E+02	33.15	1.04E+02	Pb-214
5	609.04	2429 -	2445	2436.30	1.02E+02	26.64	6.81E+01	Bi-214
6	1119.79	4473 -	4486	4479.80	3.02E+01	14.14	2.16E+01	Bi-214
7	1460.66	5837 -	5853	5844.49	4.23E+01	14.63	1.13E+01	K-40

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
K-40	0.99	1460.82	*	10.66	1.30E-01	4.65E-02
Bi-214	0.99	609.32	*	45.49	5.12E-02	1.47E-02
		768.36		4.89		
		806.18		1.26		
		934.06		3.11		
		1120.29	*	14.92	6.45E-02	3.06E-02
		1155.21		1.63		
		1238.12		5.83		
		1280.98		1.43		
		1377.67		3.99		
		1385.31		0.79		
		1401.52		1.33		
		1407.99		2.39		
		1509.21		2.13		
		1661.27		1.05		
		1729.59		2.88		
		1764.49		15.30		
		1847.43		2.03		
		2118.51		1.16		

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (pCi/mL)	Activity Uncertainty	Coinc Corr
Pb-214	0.99	241.99 *	7.25	5.61E-02	4.31E-02	1.000
		295.22 *	18.42	4.08E-02	1.96E-02	1.000
		351.93 *	35.60	3.47E-02	1.27E-02	free
		785.96	1.06			

* = Energy line found in the spectrum.

- = Manually added nuclide.

? = Manually edited nuclide.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000sigma

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/mL)	Wt mean Activity Uncertainty	Comments
X	K-40	0.999	1.30E-01	4.65E-02
	Bi-211	0.981		
	Bi-214	0.998	5.36E-02	1.33E-02
	Pb-214	0.999	3.77E-02	1.03E-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

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003
Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

UNIDENTIFIED PEAKS

Peak Locate Performed on : 2/26/2015 1:22:58PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
4	510.82	2.84709E-02	14.55		

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
+	K-40	1460.82	*	10.66	1.30E-01	4.23E-02	miss
+	Cr-51	320.08	9.91	1.56E-03	4.56E-02	4.56E-02	free
+	Mn-54	834.85	99.98	-3.05E-03	4.19E-03	4.19E-03	miss
+	Co-58	810.76	99.45	-4.28E-04	4.49E-03	4.49E-03	1.000
		1674.73	0.52	-1.28E-01		1.05E+00	1.047
+	Co-60	1173.23	99.85	7.28E-04	5.54E-03	5.54E-03	0.910
		1332.49	99.98	-7.22E-04		5.67E-03	0.909
+	Nb-94	702.65	99.81	-1.71E-03	4.74E-03	4.74E-03	0.907
		871.09	99.89	-3.08E-03		5.11E-03	0.908
+	Sn-113	255.13	2.11	-2.54E-02	7.58E-03	1.87E-01	free
		391.70	64.97	3.17E-03		7.58E-03	free
+	Cs-134	475.36	1.48	-2.98E-02	5.99E-03	2.84E-01	miss
		563.25	8.34	7.67E-03		6.17E-02	0.832
		569.33	15.37	4.28E-03		3.91E-02	0.819
		604.72	97.62	-1.80E-03		5.99E-03	0.887
		795.86	85.46	5.01E-04		6.93E-03	0.891
		801.95	8.69	8.36E-03		6.73E-02	0.836
		1038.61	0.99	4.67E-02		6.08E-01	0.906

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Cs-134	1167.97	1.79	9.31E-03	5.99E-03	2.33E-01	1.153
		1365.19	3.02	3.18E-02		1.39E-01	1.247
+	Cs-137	661.66	35.10	3.48E-03	7.17E-03	7.17E-03	miss
+	Eu-152	121.78	28.67	9.74E-04	1.81E-02	2.02E-02	0.896
		244.70	7.61	-9.37E-03		5.52E-02	0.895
		295.94	0.45	1.48E+00		1.33E+00	miss
		344.28	26.60	1.27E-03		1.81E-02	0.931
		367.79	0.86	-7.20E-02		5.60E-01	0.820
		411.12	2.24	1.36E-02		1.93E-01	0.856
		443.96	2.83	-2.94E-02		1.67E-01	0.891
		488.68	0.42	-2.31E-01		1.06E+00	miss
		563.99	0.49	1.24E-01		9.78E-01	0.892
		586.26	0.46	-2.11E-01		1.10E+00	0.908
		678.62	0.47	-8.83E-01		9.28E-01	0.823
		688.67	0.86	-2.49E-01		4.36E-01	0.968
		719.35	0.28	9.13E-02		1.70E+00	miss
		778.90	12.96	1.46E-02		5.10E-02	0.913
		810.45	0.32	5.36E-02		1.34E+00	1.074
		867.37	4.26	1.32E-01		1.72E-01	0.887
		919.33	0.43	-3.00E-01		1.15E+00	0.969
		964.08	14.65	-4.92E-04		3.46E-02	1.034
		1085.87	10.24	1.34E-02		5.48E-02	1.026
		1089.74	1.73	-3.48E-02		3.27E-01	0.924
		1112.07	13.69	1.25E-02		4.43E-02	0.987
		1212.95	1.43	-7.65E-02		4.21E-01	0.888
		1249.94	0.19	7.17E-02		2.15E+00	1.165
		1299.14	1.63	2.14E-01		4.40E-01	0.909
		1408.01	21.07	6.08E-03		2.72E-02	0.973
		1457.64	0.50	-1.15E+00		1.23E+00	1.130
		1528.10	0.28	-3.22E-01		1.66E+00	1.018
+	Eu-154	123.07	40.40	-4.33E-03	1.39E-02	1.39E-02	0.894
		247.93	6.89	-1.03E-02		6.54E-02	0.885
		591.76	4.95	-2.26E-03		1.00E-01	0.863
		692.42	1.78	-7.37E-02		3.08E-01	0.897
		723.30	20.06	-6.79E-03		2.58E-02	0.894
		756.80	4.52	2.31E-02		1.10E-01	0.868
		873.18	12.08	1.26E-02		5.27E-02	0.890
		996.29	10.48	4.34E-03		4.84E-02	0.948
		1004.76	18.01	-6.95E-03		2.43E-02	0.964
		1274.43	34.80	1.16E-03		1.68E-02	0.970
		1596.48	1.80	1.54E-02		2.28E-01	1.352
+	Eu-155	45.30	1.31	-1.49E+00	2.33E-02	3.62E+00	0.998
		60.01	1.22	-9.56E-01		3.56E+00	1.000
		86.55	30.70	7.91E-03		3.24E-02	free
		105.31	21.10	-7.40E-03		2.33E-02	1.000
+	Tl-208	583.19	85.00	1.77E-03	7.31E-03	7.31E-03	0.890
+	Bi-211	351.07	*	9.50E-02	4.08E-02	4.08E-02	miss
+	Pb-211	404.85	3.78	1.51E-02	1.29E-01	1.29E-01	miss
		427.09	1.76	5.24E-02		2.61E-01	miss
		832.01	3.52	3.55E-02		1.49E-01	miss
+	Bi-212	39.86	1.06	-1.02E+00	7.78E-02	4.85E+00	0.997

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Bi-212	727.33	6.67	4.95E-03	7.78E-02	7.78E-02	0.970
		785.37	1.10	-1.15E-01		5.11E-01	0.907
		1620.50	1.47	-2.60E-02		2.84E-01	1.012
+	Pb-212	115.18	0.60	-1.85E-01	1.14E-02	8.25E-01	miss
		238.63	43.60	7.87E-03		1.14E-02	free
		300.09	3.30	1.56E-02		1.21E-01	free
+	Pb212-XR	74.82	10.28	6.15E-02	9.94E-02	1.72E-01	miss
		77.11	17.10	7.95E-02		9.94E-02	miss
		87.35	3.97	2.32E-02		2.31E-01	miss
		89.78	1.46	1.78E-01		5.67E-01	miss
+	Bi-214	609.32	* 45.49	5.12E-02	1.54E-02	1.54E-02	0.913
		768.36	4.89	5.19E-02		1.38E-01	0.905
		806.18	1.26	-1.32E-01		3.72E-01	0.875
		934.06	3.11	6.97E-02		2.04E-01	0.908
		1120.29	* 14.92	6.45E-02		3.61E-02	0.908
		1155.21	1.63	7.22E-02		3.51E-01	0.906
		1238.12	5.83	6.42E-02		1.29E-01	0.908
		1280.98	1.43	1.44E-01		4.38E-01	0.908
		1377.67	3.99	1.69E-02		1.36E-01	1.058
		1385.31	0.79	2.24E-02		6.61E-01	0.908
		1401.52	1.33	1.96E-01		4.98E-01	0.908
		1407.99	2.39	5.74E-02		2.57E-01	0.908
		1509.21	2.13	1.53E-01		3.45E-01	0.918
		1661.27	1.05	1.87E-02		4.80E-01	1.003
		1729.59	2.88	3.09E-03		1.45E-01	1.238
		1764.49	15.30	3.79E-02		5.95E-02	1.003
		1847.43	2.03	-2.51E-02		2.65E-01	1.126
>		2118.51	1.16	0.00E+00		0.00E+00	1.084
+	Pb-214	241.99	* 7.25	5.61E-02	1.49E-02	6.59E-02	1.000
		295.22	* 18.42	4.08E-02		2.63E-02	1.000
		351.93	* 35.60	3.47E-02		1.49E-02	free
		785.96	1.06	-6.88E-02		4.94E-01	1.000
+	Pb214-XR	74.82	5.80	1.09E-01	1.75E-01	3.06E-01	miss
		77.11	9.70	1.40E-01		1.75E-01	miss
		87.35	2.24	4.12E-02		4.10E-01	miss
		89.78	0.82	3.16E-01		1.01E+00	miss
+	Ra-226	186.21	3.64	3.32E-02	1.14E-01	1.14E-01	free
+	Ac-228	129.07	2.42	-1.08E-01	1.80E-02	1.85E-01	0.911
		209.25	3.89	3.00E-02		1.12E-01	0.966
		270.24	3.46	-1.20E-02		1.10E-01	0.927
		328.00	2.95	5.39E-02		1.79E-01	0.926
		338.32	11.27	7.57E-03		4.22E-02	0.985
		409.46	1.92	1.80E-02		2.25E-01	0.896
		463.00	4.40	9.37E-03		1.17E-01	0.890
		794.95	4.25	-8.31E-03		1.29E-01	0.909
		911.20	25.80	-2.11E-03		1.80E-02	0.984
		964.77	4.99	-2.97E-02		1.02E-01	0.968
		968.97	15.80	9.91E-03		3.68E-02	0.984
		1583.20	3.22	-1.70E-02		1.61E-01	1.003
+	Pa-231	27.36	10.30	-2.15E-01	1.62E-01	5.27E-01	0.994
		283.69	1.70	8.51E-03		2.58E-01	1.000

Attachment Figure 2-22 06311D Gamma Spectroscopy Reports

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Analysis Report for 26-Feb-15-10003

Unit2 Turbine Bldg. 06311diolqol-01 2/26/15 11:10

	Nuclide Name	Energy (keV)	Yield(%)	Activity (pCi/mL)	Nuclide MDA (pCi/mL)	Line MDA (pCi/mL)	Coinc Corr
	Pa-231	300.07	2.47	2.08E-02	1.62E-01	1.62E-01	1.000
		302.65	2.20	3.09E-02		2.00E-01	1.000
		330.06	1.40	-2.43E-02		3.23E-01	1.000
+	Th-234	92.38	2.13	1.19E-01	3.45E-01	3.59E-01	free
		92.80	2.10	2.13E-02		3.45E-01	free
		112.81	0.21	2.01E+00		2.88E+00	free
+	U-235	143.76	10.96	5.55E-03	6.88E-03	4.02E-02	free
		163.33	5.08	-8.88E-03		8.68E-02	free
		185.71	57.20	-1.08E-03		6.88E-03	free
		202.11	1.08	6.31E-03		3.29E-01	miss
		205.31	5.01	1.14E-03		7.33E-02	free
+	Am-241	59.54	35.90	-8.59E-03	1.31E-01	1.31E-01	free

- + = 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
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Survey # 2015-TBM-1-014



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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 23-Feb-15-10007
Sample Description	: SMEAR #72 FAN #OTV-042 2/19/15 15:00
Sample Type	: Air Sample/Smears
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 2/19/2015 3:00:05PM
Acquisition Started	: 2/23/2015 8:48:58AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P11314X2
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1200.5 seconds
Dead Time	: 0.04 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 9/11/2014
Efficiency Calibration Description	:
Sample Number	: 11939

71-D
2-22-15
MSD
2/23/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 2/23/2015 9:20:12AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1460.03	5834	5845	5839.38	1.55E+01	8.98	5.05E+00	K-40

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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.96	1460.82 *	10.66	1.19E-04	6.96E-05	miss

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
K-40	0.962	1.19E-04	6.96E-05	

- ? = 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

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

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Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

UNIDENTIFIED PEAKS

Peak Locate Performed on : 2/23/2015 9:20:12AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Default\Library\ZION LIB-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	*	10.66	1.19E-04	7.54E-05	miss
+	Cr-51	320.08		9.91	6.42E-07	3.85E-05	free
+	Mn-54	834.85		99.98	6.15E-07	5.68E-06	miss
+	Co-58	810.76		99.45	2.22E-06	7.52E-06	0.999
		1674.73		0.52	0.00E+00	4.66E-04	1.078
+	Co-60	1173.23		99.85	1.15E-07	6.56E-06	7.50E-06 0.844
		1332.49		99.98	8.91E-07	6.56E-06	0.840
+	Nb-94	702.65		99.81	1.14E-06	4.81E-06	6.59E-06 0.833
		871.09		99.89	-7.62E-07	4.81E-06	0.829
+	Sn-113	255.13		2.11	-7.38E-05	5.24E-06	1.21E-04 free
		391.70		64.97	-3.93E-07	5.24E-06	free
+	Cs-134	475.36		1.48	-4.45E-06	6.82E-06	2.07E-04 miss
		563.25		8.34	0.00E+00	7.00E-05	0.702
		569.33		15.37	4.16E-06	3.95E-05	0.681
		604.72		97.62	-3.12E-07	6.82E-06	0.796
		795.86		85.46	-1.24E-07	6.91E-06	0.795
		801.95		8.69	-1.67E-05	6.13E-05	0.702
		1039.61		0.99	0.00E+00	2.07E-04	0.822
		1167.97		1.79	-2.59E-05	2.23E-04	1.255

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Analysis Report for 23-Feb-15-10007
SMEAR #72 FAN #OTV-042 2/19/15 15:00
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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1365.19	3.02	0.00E+00	6.82E-06	5.01E-05	1.374
+	Cs-137	661.66	85.10	2.77E-07	6.13E-06	6.13E-06	miss
+	Eu-152	121.78	28.67	2.26E-06	1.02E-05	1.02E-05	0.818
		244.70	7.61	4.60E-06		4.02E-05	0.786
		295.94	0.45	4.63E-04		1.06E-03	miss
		344.28	26.60	5.66E-06		1.77E-05	0.874
		367.79	0.86	-1.67E-04		5.00E-04	0.654
		411.12	2.24	-1.87E-04		1.33E-04	0.717
		443.96	2.83	4.59E-05		2.19E-04	0.790
		488.68	0.42	-7.03E-04		7.42E-04	miss
		563.99	0.49	3.92E-04		1.18E-03	0.790
		586.26	0.46	4.23E-05		1.14E-03	0.807
		678.62	0.47	3.99E-05		1.55E-03	0.654
		688.67	0.86	-1.16E-04		6.22E-04	0.904
		719.35	0.28	8.33E-04		2.18E-03	miss
		778.90	12.96	5.73E-06		5.05E-05	0.815
		810.45	0.32	1.11E-04		1.68E-03	1.239
		867.37	4.26	8.69E-05		2.28E-04	0.729
		919.33	0.43	0.00E+00		3.96E-04	0.904
		964.08	14.65	4.82E-06		3.35E-05	1.109
		1085.87	10.24	2.22E-05		7.54E-05	1.089
		1089.74	1.73	-1.09E-04		3.29E-04	0.832
		1112.07	13.69	0.00E+00		3.73E-05	0.943
		1212.95	1.43	1.05E-04		6.23E-04	0.729
		1249.94	0.19	-2.87E-04		2.67E-03	1.314
		1299.14	1.63	5.60E-05		4.12E-04	0.807
		1408.01	21.07	-7.63E-06		3.02E-05	0.911
		1457.64	0.50	-4.67E-05		1.57E-03	1.241
		1528.10	0.28	0.00E+00		8.31E-04	0.984
+	Eu-154	123.07	40.40	-1.78E-06	5.64E-06	5.64E-06	0.820
		247.93	6.89	5.24E-06		4.93E-05	0.772
		591.76	4.95	-6.58E-06		8.07E-05	0.730
		692.42	1.78	-2.15E-05		3.48E-04	0.785
		723.30	20.06	1.17E-05		3.51E-05	0.797
		756.80	4.52	0.00E+00		4.11E-05	0.704
		873.18	12.08	9.70E-06		6.27E-05	0.771
		996.29	10.48	0.00E+00		1.66E-05	0.935
		1004.76	13.01	1.49E-05		4.47E-05	0.904
		1274.43	34.80	2.12E-06		2.12E-05	0.910
		1596.48	1.80	0.00E+00		8.72E-05	1.533
+	Eu-155	45.30	1.31	-1.20E-04	7.31E-06	4.27E-04	0.994
		60.01	1.22	1.69E-05		5.37E-04	0.999
		86.55	30.70	-2.04E-06		7.31E-06	free
		105.31	21.10	4.56E-06		1.44E-05	1.000
+	Tl-208	583.19	85.00	8.51E-07	8.00E-06	8.00E-06	0.810
+	Bi-211	351.07	13.02	1.58E-05	4.53E-05	4.53E-05	miss
+	Pb-211	404.85	3.78	3.87E-05	1.26E-04	1.26E-04	miss
		427.09	1.76	1.78E-05		2.04E-04	miss
		832.01	3.52	-1.85E-06		1.78E-04	miss
+	Bi-212	39.86	1.06	1.34E-05	8.00E-05	6.04E-04	0.995
		727.33	6.67	2.23E-05		8.00E-05	0.945

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Analysis Report for 23-Feb-15-10007
SMEAR #72 FAN #OTV-042 2/19/15 15:00
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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	785.37	1.10	-9.09E-05	8.00E-05	5.06E-04	0.829
	1620.50	1.47	0.00E+00		1.62E-04	1.020
+ Pb-212	115.18	0.60	-6.15E-05	8.02E-06	2.14E-04	miss
	238.63	43.60	3.98E-06		8.02E-06	free
	300.09	3.30	4.98E-06		8.70E-05	free
+ Pb212-XR	74.82	10.28	3.44E-05	2.90E-05	6.27E-05	miss
	77.11	17.10	8.58E-06		2.90E-05	miss
	87.35	3.97	-1.83E-05		5.53E-05	miss
	89.78	1.46	4.39E-06		2.02E-04	miss
+ Bi-214	609.32	45.49	1.43E-05	2.42E-05	2.42E-05	0.847
	768.36	4.89	5.69E-06		1.60E-04	0.820
	806.18	1.26	-8.72E-05		4.86E-04	0.769
	934.06	3.11	4.84E-05		2.68E-04	0.824
	1120.29	14.92	3.46E-05		8.01E-05	0.825
	1155.21	1.63	5.01E-05		3.68E-04	0.822
	1238.12	5.83	-8.41E-06		1.08E-04	0.824
	1280.98	1.43	1.84E-04		6.61E-04	0.824
	1377.67	3.99	3.51E-05		1.63E-04	1.102
	1385.31	0.79	5.94E-05		1.10E-03	0.824
	1401.52	1.33	7.16E-05		5.27E-04	0.824
	1407.99	2.39	-7.42E-05		2.94E-04	0.824
	1509.21	2.13	-1.01E-04		4.37E-04	0.840
	1661.27	1.05	1.75E-04		8.13E-04	1.004
	1729.59	2.88	7.05E-05		2.53E-04	1.413
	1764.49	15.30	2.53E-05		7.60E-05	1.005
	1847.43	2.03	8.17E-05		3.79E-04	1.217
>	2118.51	1.16	0.00E+00		0.00E+00	1.140
+ Pb-214	241.99	7.25	2.14E-05	1.83E-05	4.73E-05	0.998
	295.22	18.42	1.96E-05		2.99E-05	1.001
	351.93	35.60	1.37E-05		1.83E-05	free
	785.96	1.06	4.71E-05		5.07E-04	0.998
+ Pb214-XR	74.82	5.80	6.10E-05	5.11E-05	1.11E-04	miss
	77.11	9.70	1.51E-05		5.11E-05	miss
	87.35	2.24	-3.24E-05		9.80E-05	miss
	89.78	0.82	7.81E-06		3.60E-04	miss
+ Ra-226	186.21	3.64	-4.15E-06	7.93E-05	7.93E-05	free
+ Ac-228	129.07	2.42	-1.20E-05	1.04E-05	1.05E-04	0.831
	209.25	3.89	3.38E-06		6.36E-05	0.925
	270.24	3.46	-1.07E-05		1.21E-04	0.869
	328.00	2.95	-4.63E-06		1.11E-04	0.867
	338.32	11.27	9.17E-06		3.83E-05	0.982
	409.46	1.92	2.36E-05		2.01E-04	0.803
	463.00	4.40	1.83E-05		1.22E-04	0.781
	794.95	4.25	3.20E-05		1.78E-04	0.801
	911.20	25.80	1.13E-06		1.66E-05	0.967
	964.77	4.99	1.26E-05		9.24E-05	0.937
	968.97	15.80	0.00E+00		1.04E-05	0.967
	1588.20	3.22	-3.88E-05		2.00E-04	1.010
+ Pa-231	27.36	10.30	0.00E+00	1.13E-05	1.13E-05	0.989
	283.69	1.70	2.31E-05		1.48E-04	0.998
	300.07	2.47	6.65E-06		1.16E-04	1.000

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

2/23/2015 9:21:03AM

Page 7 of 7

Analysis Report for 23-Feb-15-10007

SMEAR #72 FAN #OTV-042 2/19/15 15:00

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	302.65	2.20	2.97E-05	1.13E-05	1.51E-04	1.000
		330.06	1.40	5.93E-05		2.69E-04	1.002
+	Th-234	92.38	2.13	1.11E-05	1.62E-04	1.62E-04	free
		92.80	2.10	9.10E-05		1.80E-04	free
		112.81	0.21	6.44E-04		1.49E-03	free
+	U-235	143.76	10.96	4.91E-06	4.50E-06	2.23E-05	free
		163.33	5.08	-1.91E-06		4.59E-05	free
		185.71	57.20	-1.14E-06		4.50E-06	free
		202.11	1.08	9.14E-06		2.06E-04	miss
		205.31	5.01	2.99E-07		5.06E-05	free
+	Am-241	59.54	35.90	-5.89E-06	1.54E-05	1.54E-05	free

+ = 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

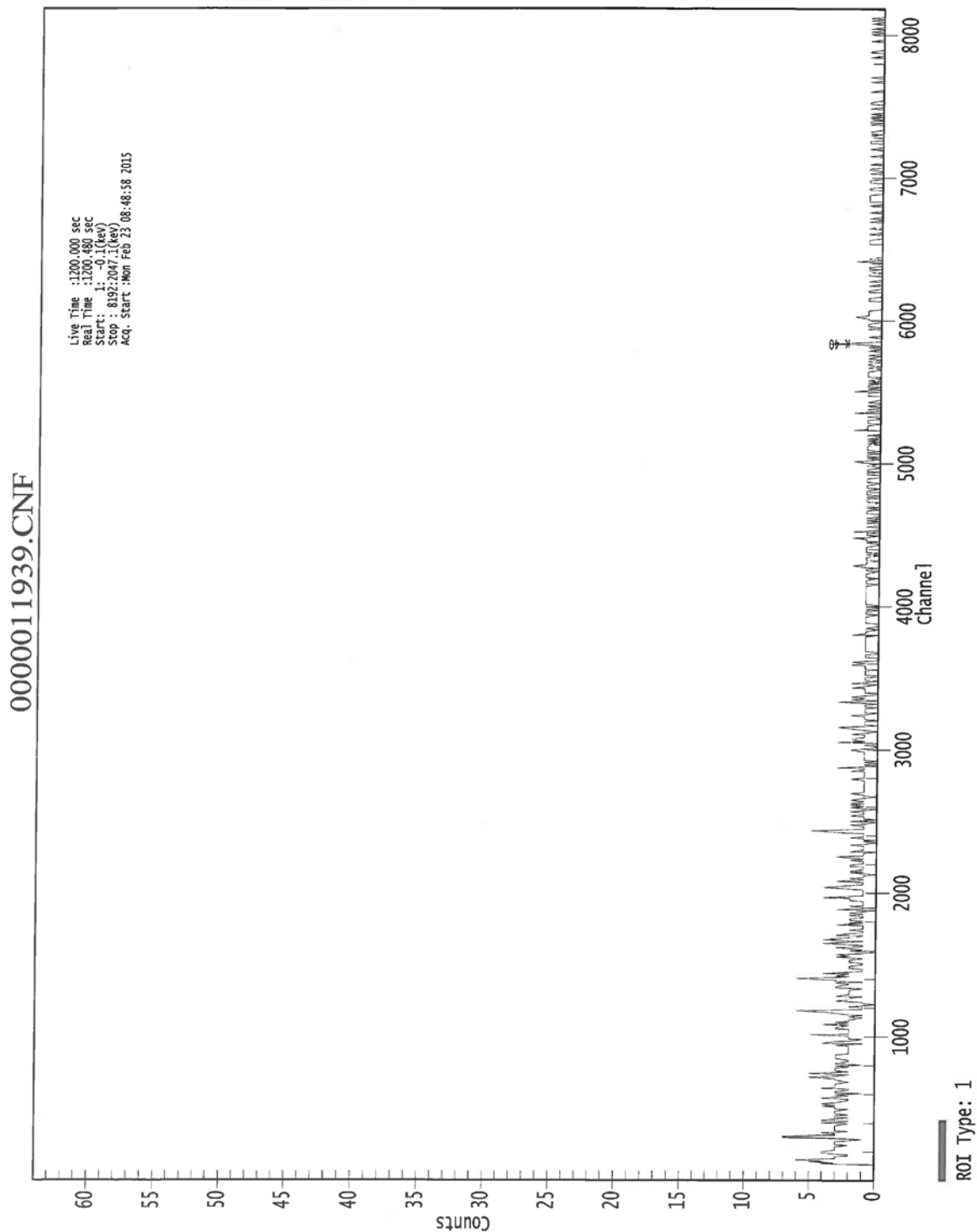
? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports



Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

*** G A M M A S F C T R U M A N A L Y S S ***

Filename: C:\Canberra\2-25-15\20150219171555.cnf

Report Generated On : 2/25/2015 11:06:17 AM

Sample Title : Tb 592 SU6311F Grid 72 Heater fan
Sample Description :
Sample Identification :
Sample Type :
Sample Geometry :
*Inspector
Collect
No Plant debris
Radioanalyticals
JL
2/25/15*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 2/19/2015 5:00:12 PM
Acquisition Started : 2/19/2015 5:00:12 PM

Live Time : 898.1 seconds
Dead Time : 900.0 seconds

Background Time : 0.21 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVAR

**The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.**

Analyst JL

Date 2-25-15

JL 2/25/15

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Peak Analysis Report

2/25/2015 11:06:17 AM

Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Tb 592 SU6311F Grid 72 Heater fan
Peak Analysis Performed on: 2/25/2015 11:06:17 AM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	42-	63	53.30	38.85	1.66	3.17E+003	175.34	7.57E+002
2	1902-	2011	1957.08	1460.75	11.08	2.18E+003	151.19	4.96E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/25/2015 11:06:17 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Tb 592 SU6311F Grid 72 Heater fan
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.622	34.70*	66.40	4.39840E+001	9.12781E+000
		788.70	33.60		
		1436.80*	66.40	8.70485E+001	9.21627E+000
K-40	1.000	1460.82*	10.66	5.42216E+002	6.02568E+001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Interference Corrected Activity Report 2/25/2015 11:06:17 AM Page 4

 *** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.622	4.398402E+001	9.127810E+000
K-40	1.000	2.682442E+002	8.079730E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 2/25/2015 11:06:17 AM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Slide MDA Report

2/25/2015 11:06:17 AM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Tb 592 SU6311F Grid 72 Heater fan
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	3.110E+000	3.11E+000	4.398E+001	1.536E+000
		788.70	33.60	6.233E+000		2.460E+000	3.054E+000
		1436.80*	66.40	7.918E+000		8.705E+001	3.905E+000
+	K-40	1460.82*	10.66	4.932E+001	4.93E+001	5.422E+002	2.432E+001
	Cr-51	320.08	9.91	1.097E+001	1.10E+001	3.462E+000	5.385E+000
	Mn-54	834.85	99.98	2.621E+000	2.62E+000	-1.454E+000	1.288E+000
	Co-58	810.76	99.45	2.543E+000	2.54E+000	2.501E+000	1.250E+000
	Co-60	1173.23	99.85	2.603E+000	1.44E+000	3.545E+000	1.272E+000
		1332.49	99.98	1.437E+000		3.006E-001	6.853E-001
	Nb-94	702.65	99.81	1.639E+000	1.64E+000	-2.617E-001	8.001E-001
		871.09	99.89	2.687E+000		1.237E+000	1.321E+000
	Sn-113	255.13	2.11	5.002E+001	1.80E+000	-4.129E+001	2.461E+001
		391.70	64.97	1.804E+000		-1.301E+000	8.843E-001
	Cs-137	661.66	85.10	2.022E+000	2.02E+000	9.933E-001	9.896E-001
	Eu-152	121.78	28.67	4.686E+000	4.38E+000	-1.527E+000	2.318E+000
		244.70	7.61	1.447E+001		-2.092E+000	7.126E+000
		295.94	0.45	2.461E+002		1.399E+001	1.210E+002
		344.28	26.60	4.382E+000		4.572E+000	2.152E+000
		367.79	0.86	1.337E+002		9.749E+000	6.558E+001
		411.12	2.24	5.348E+001		-6.741E+000	2.620E+001
		443.96	2.83	4.565E+001		-1.022E+001	2.237E+001
		488.68	0.42	3.205E+002		2.868E+001	1.569E+002
		563.99	0.49	3.083E+002		-7.093E+001	1.509E+002
		586.26	0.46	3.570E+002		-6.006E+001	1.749E+002
		678.62	0.47	3.528E+002		-2.598E+002	1.725E+002
		688.67	0.86	1.974E+002		3.021E+001	9.652E+001
		719.35	0.28	5.956E+002		1.334E+002	2.908E+002
		778.90	12.96	1.447E+001		-1.076E+001	7.072E+000
		810.45	0.32	7.875E+002		7.747E+002	3.870E+002
		867.37	4.26	6.351E+001		4.191E+001	3.121E+001
		919.33	0.43	6.153E+002		3.541E+002	3.020E+002
		964.08	14.65	1.803E+001		1.841E+001	8.844E+000
		1085.87	10.24	2.135E+001		-9.370E+000	1.040E+001
		1089.74	1.73	1.261E+002		-1.291E+002	6.145E+001
		1112.07	13.69	1.726E+001		1.362E+001	8.425E+000
		1212.95	1.43	1.677E+002		-6.050E+001	8.169E+001
		1249.94	0.19	1.147E+003		4.644E+002	5.571E+002
		1299.14	1.63	1.003E+002		-7.210E+001	4.815E+001
		1408.01	21.07	1.155E+001		-6.315E+000	5.610E+000
		1457.64	0.50	1.176E+003		6.110E+003	5.810E+002
		1528.10	0.28	3.897E+002		-1.899E+002	1.817E+002
	Eu-154	123.07	40.40	3.327E+000	3.33E+000	-1.233E-001	1.646E+000

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Eu-154	247.93	6.89	1.587E+001	3.33E+000	6.969E+000	7.817E+000
	591.76	4.95	3.358E+001		-7.661E+000	1.646E+001
	692.42	1.78	9.373E+001		-6.958E+001	4.580E+001
	723.30	20.06	8.163E+000		-2.082E+000	3.983E+000
	756.80	4.52	3.603E+001		-2.673E+001	1.757E+001
	873.18	12.08	2.216E+001		3.410E+000	1.089E+001
	996.29	10.48	2.273E+001		-5.943E+000	1.112E+001
	1004.76	18.01	1.288E+001		7.928E+000	6.295E+000
	1274.43	34.80	5.482E+000		-1.085E+000	2.649E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
Eu-155	45.30	1.31	1.662E+002	4.71E+000	-1.291E+000	8.213E+001
	60.01	1.22	1.374E+002		-8.643E+001	6.770E+001
	86.55	30.70	4.709E+000		-1.919E+000	2.327E+000
	105.31	21.10	6.661E+000		1.884E+000	3.294E+000
Tl-208	583.19	85.00	1.927E+000	1.93E+000	1.236E+000	9.446E-001
Bi-211	351.07	13.02	9.049E+000	9.05E+000	9.670E+000	4.443E+000
Pb-211	404.85	3.78	3.162E+001	3.16E+001	-5.360E+000	1.549E+001
	427.09	1.76	6.920E+001		-3.591E+001	3.389E+001
	832.01	3.52	7.438E+001		-7.019E+001	3.656E+001
Bi-212	39.86	1.06	2.533E+002	2.45E+001	2.758E+003	1.255E+002
	727.33	6.67	2.452E+001		5.144E-001	1.196E+001
	785.37	1.10	1.800E+002		-1.425E+002	8.808E+001
	1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
Pb-212	115.18	0.60	2.249E+002	2.60E+000	5.692E+001	1.112E+002
	238.63	43.60	2.599E+000		1.174E+000	1.281E+000
	300.09	3.30	3.310E+001		1.582E+001	1.626E+001
Pb212-XR	74.82	10.28	1.471E+001	8.76E+000	-1.027E+001	7.263E+000
	77.11	17.10	8.758E+000		4.611E+000	4.324E+000
	87.35	3.97	3.623E+001		9.647E+000	1.791E+001
	89.78	1.46	9.724E+001		3.660E+001	4.806E+001
Bi-214	609.32	45.49	3.740E+000	3.74E+000	1.362E+000	1.833E+000
	768.36	4.89	3.506E+001		-5.148E+001	1.711E+001
	806.18	1.26	1.957E+002		2.442E+002	9.615E+001
	934.06	3.11	8.677E+001		4.845E+001	4.260E+001
	1120.29	14.92	1.583E+001		-3.605E+000	7.723E+000
	1155.21	1.63	1.554E+002		4.670E+000	7.592E+001
	1238.12	5.83	3.902E+001		3.289E+000	1.898E+001
	1280.98	1.43	1.280E+002		-4.523E+001	6.174E+001
	1377.67	3.99	2.908E+001		-8.246E+001	1.368E+001
	1385.31	0.79	1.614E+002		-3.401E+002	7.636E+001
	1401.52	1.33	1.442E+002		-1.312E+002	6.947E+001
	1407.99	2.39	1.017E+002		-5.558E+001	4.938E+001
	1509.21	2.13	1.340E+002		-2.489E+001	6.526E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
Pb-214	1729.59	2.88	0.000E+000	3.30E+000	0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	1.542E+001		6.481E+000	7.595E+000
	295.22	18.42	5.994E+000		5.935E-001	2.946E+000
	351.93	35.60	3.302E+000		1.772E+000	1.621E+000

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	1.886E+002	3.30E+000	-1.405E+002	9.233E+001
Pb214-XR	74.82	5.80	2.608E+001	1.54E+001	-1.821E+001	1.287E+001
	77.11	9.70	1.544E+001		8.129E+000	7.623E+000
	87.35	2.24	6.422E+001		1.710E+001	3.174E+001
	89.78	0.82	1.731E+002		6.517E+001	8.558E+001
Ra-226	186.21	3.64	3.299E+001	3.30E+001	7.234E+000	1.630E+001
Ac-228	129.07	2.42	5.474E+001	9.89E+000	8.752E-001	2.707E+001
	209.25	3.89	3.106E+001		2.366E+001	1.534E+001
	270.24	3.46	3.135E+001		-1.974E+001	1.542E+001
	328.00	2.95	3.682E+001		-2.101E+001	1.807E+001
	338.32	11.27	9.891E+000		-7.769E-001	4.855E+000
	409.46	1.92	6.217E+001		-3.380E+001	3.046E+001
	463.00	4.40	2.945E+001		1.304E+000	1.442E+001
	794.95	4.25	5.247E+001		5.157E+001	2.573E+001
	911.20	25.80	1.016E+001		2.051E+000	4.985E+000
	964.77	4.99	5.271E+001		4.293E+001	2.585E+001
	968.97	15.80	1.651E+001		8.920E+000	8.096E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.423E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	6.569E+001		2.664E+001	3.231E+001
	300.07	2.47	4.422E+001		2.113E+001	2.173E+001
	302.65	2.20	4.892E+001		-2.042E+001	2.403E+001
	330.06	1.40	7.844E+001		-4.820E+001	3.850E+001
Th-234	92.38	2.13	6.569E+001	6.57E+001	-5.703E+001	3.247E+001
	92.80	2.10	6.651E+001		-5.774E+001	3.287E+001
	112.81	0.21	6.440E+002		-6.608E+001	3.185E+002
U-235	143.76	10.96	1.168E+001	2.10E+000	9.266E+000	5.774E+000
	163.33	5.08	2.497E+001		2.366E+000	1.234E+001
	185.71	57.20	2.104E+000		4.321E-001	1.039E+000
	202.11	1.08	1.095E+002		4.629E+000	5.404E+001
	205.31	5.01	2.422E+001		3.676E+000	1.196E+001
Am-241	59.54	35.90	4.725E+000	4.73E+000	-2.972E+000	2.328E+000

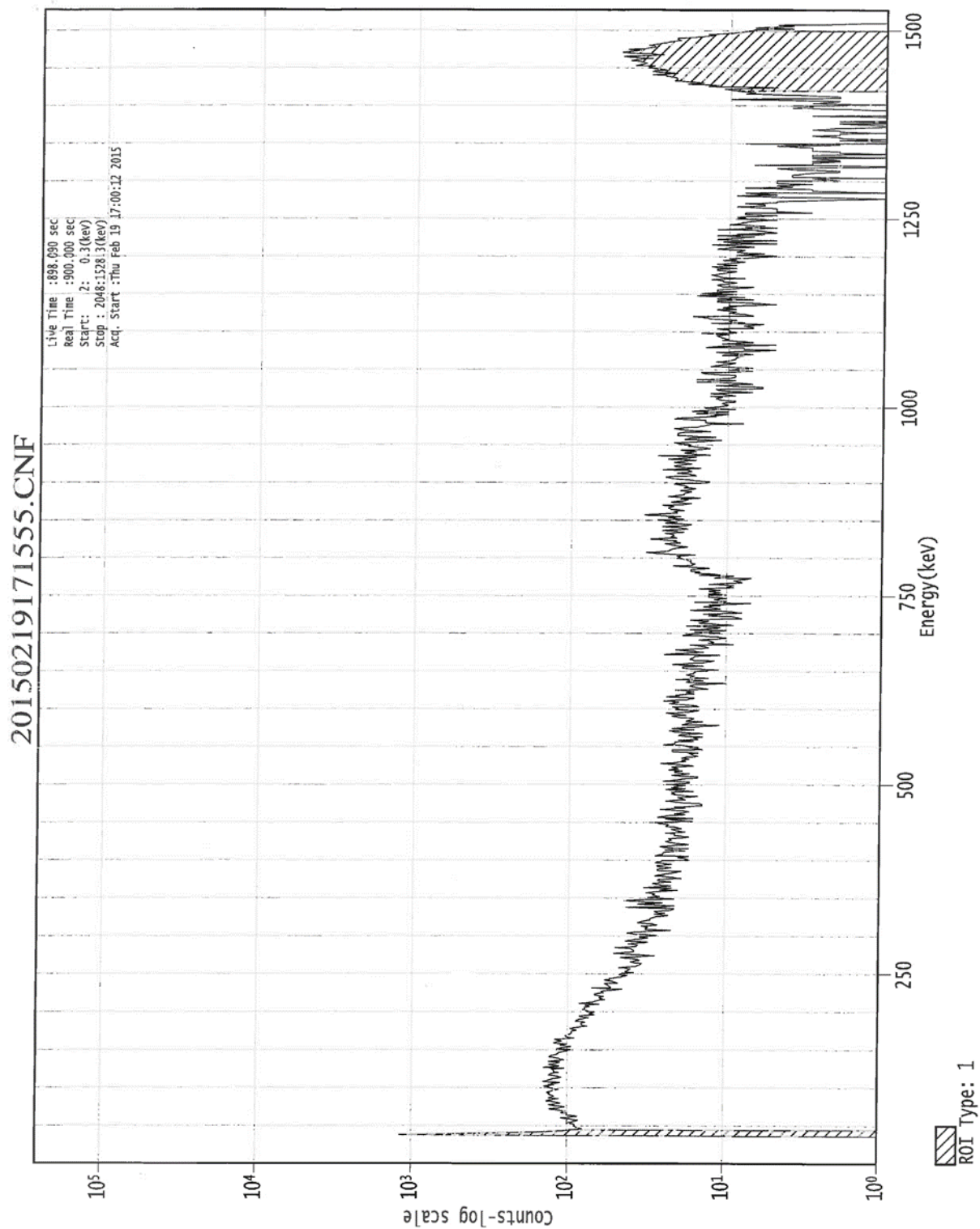
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

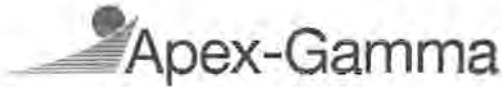
> = MDA value not calculated

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

Attachment Figure 2-23 06311F Gamma Spectroscopy Reports



Attachment Figure 2-24 06312E Gamma Spectroscopy Reports



3/3/2015 9:30:27AM

Page 1 of 7

Analysis Report for 03-Mar-15-200002
SMEAR # 075 6312E HEATER UNIT NORTH END

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 03-Mar-15-200002
Sample Description	: SMEAR # 075 6312E HEATER UNIT NORTH END
Sample Type	: Miscellaneous Sample
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 grams
Facility	: Zion_Solutions
Sample Taken On	: 3/2/2015 2:00:00PM
Acquisition Started	: 3/3/2015 9:09:40AM
Procedure	: NQF Smear Bottom Shelf
Operator	: Administrator
Detector Name	: DET04
Geometry	: Smear NQF Bottom Shelf
Live Time	: 1200.0 seconds
Real Time	: 1200.4 seconds
Dead Time	: 0.03 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.250 keV
Energy Calibration Used Done On	: 12/4/2014
Efficiency Calibration Used Done On	: 1/28/2015
Efficiency Calibration Description	:
Sample Number	: 4530

The accuracy of this count CAN NOT be assured because the physical and calibration geometries of the count did not match. This is a QUALITATIVE identification only.

Analyst *[Signature]*
Date *3-3-15*

4/6/15
7/4/15
Mund...
3/4/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/3/2015 9:29:43AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.250 keV

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002

SMEAR # 075 6312E HEATER UNIT NORTH END

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	351.77	1403 -	1411	1407.23	2.37E+01	13.68	2.25E+01	Pb-214
2	465.52	1858 -	1867	1862.07	9.89E+00	9.03	1.02E+01	Bi-211
							

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 : C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/grams)	Activity Uncertainty	Coinc Corr
Bi-211	0.95	351.07 *	13.02	2.06E-04	1.23E-04	miss
Pb-214	0.99	241.99	7.25			
		295.22	18.42			
		351.93 *	35.60	7.53E-05	4.50E-05	free
		785.96	1.06			

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.250 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002

SMEAR # 075 6312E HEATER UNIT NORTH END

INTERFERENCE CORRECTED REPORT

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/grams)	Wt mean Activity Uncertainty	Comments
?	Bi-211	0.951	2.06E-04	1.23E-04	
?	Pb-214	0.999	7.53E-05	4.50E-05	

? = 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

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002
SMEAR # 075 6312E HEATER UNIT NORTH END

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/3/2015 9:29:43AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
2	465.52	8.24444E-03	45.62		

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 : C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	5.14E-06	3.93E-04	3.93E-04	miss
+	Cr-51	320.08	9.91	2.01E-05	2.11E-04	2.11E-04	free
+	Mn-54	834.85	99.98	-8.67E-07	2.84E-05	2.84E-05	miss
+	Co-58	810.76	99.45	-1.31E-06	2.31E-05	2.31E-05	1.000
		1674.73	0.52	1.79E-03		7.32E-03	1.017
+	Co-60	1173.23	99.85	1.23E-05	3.73E-05	3.73E-05	0.961
		1332.49	99.98	1.66E-05		4.91E-05	0.961
+	Nb-94	702.65	99.81	-2.65E-06	1.85E-05	1.85E-05	0.960
		871.09	99.89	4.01E-06		2.51E-05	0.960
+	Ru-106	621.93	9.93	7.90E-05	2.93E-04	2.93E-04	miss
		1050.41	1.56	-1.75E-04		1.96E-03	miss
+	Sn-113	255.13	2.11	-3.81E-04	3.31E-05	8.74E-04	free
		391.70	64.97	-6.39E-06		3.31E-05	free
+	Sb-125	176.31	6.84	-2.15E-05	6.27E-05	2.69E-04	free
		380.45	1.52	1.20E-04		1.44E-03	free
		427.87	29.60	-1.91E-05		6.27E-05	1.000
		463.36	10.49	-7.65E-05		2.00E-04	1.000
		600.60	17.65	-2.06E-05		1.53E-04	1.000

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002

SMEAR # 075 6312E HEATER UNIT NORTH END

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	CoInc Corr
+	Sb-125	606.71	4.98	-2.67E-04	6.27E-05	5.72E-04 1.000
		635.95	11.22	-1.05E-05		1.70E-04 1.000
		671.44	1.79	3.09E-04		1.35E-03 1.000
		475.36	1.48	-7.55E-04	2.92E-05	1.45E-03 miss
+	Cs-134	563.25	8.34	-6.29E-05		3.15E-04 0.926
		569.33	15.37	3.43E-05		1.73E-04 0.920
		604.72	97.62	-4.33E-06		2.92E-05 0.951
		795.86	85.46	-5.78E-06		3.09E-05 0.951
		801.95	8.69	-4.79E-05		3.14E-04 0.926
		1038.61	0.99	3.80E-05		2.86E-03 0.959
		1167.97	1.79	2.04E-05		1.33E-03 1.065
		1365.19	3.02	-1.30E-05		6.72E-04 1.101
	Cs-137	661.66	85.10	1.87E-05	4.31E-05	4.31E-05 miss
	Eu-152	121.78	28.67	-2.05E-05	4.06E-05	6.06E-05 0.955
+		244.70	7.61	-8.65E-05		2.73E-04 0.949
		295.94	0.45	-7.30E-05		5.20E-03 miss
		344.28	26.60	-2.24E-06		8.92E-05 0.970
		367.79	0.86	4.01E-04		2.68E-03 0.918
		411.12	2.24	4.89E-05		9.69E-04 0.934
		443.96	2.83	-5.90E-05		7.56E-04 0.949
		488.68	0.42	-6.30E-04		6.03E-03 miss
		563.99	0.49	-1.31E-04		5.79E-03 0.949
		586.26	0.46	-1.10E-04		6.00E-03 0.958
		678.62	0.47	-2.00E-03		5.62E-03 0.918
		688.67	0.86	3.34E-04		2.68E-03 0.980
		719.35	0.28	3.91E-03		1.21E-02 miss
		778.90	12.96	4.74E-05		2.17E-04 0.960
		810.45	0.32	-1.47E-03		5.84E-03 1.048
		867.37	4.26	1.76E-04		7.29E-04 0.940
		919.33	0.43	-1.52E-03		5.15E-03 0.980
		964.08	14.65	-2.67E-06		1.49E-04 1.022
		1085.87	10.24	-3.56E-05		2.32E-04 1.017
		1089.74	1.73	-1.11E-04		1.68E-03 0.964
		1112.07	13.69	-2.51E-05		1.43E-04 0.989
		1212.95	1.43	2.38E-04		2.24E-03 0.940
		1249.94	0.19	1.61E-03		1.51E-02 1.072
		1299.14	1.63	6.17E-04		2.26E-03 0.958
		1408.01	21.07	0.00E+00		4.06E-05 0.982
		1457.64	0.50	2.28E-03		7.88E-03 1.055
		1528.10	0.28	2.35E-03		1.09E-02 0.999
	Eu-154	123.07	40.40	1.58E-05	5.01E-05	5.01E-05 0.956
+		247.93	6.89	8.70E-05		3.33E-04 0.946
		591.76	4.95	-2.12E-05		4.36E-04 0.935
		692.42	1.78	-7.44E-05		1.46E-03 0.950
		723.30	20.06	3.99E-05		1.62E-04 0.952
		756.80	4.52	0.00E+00		1.29E-04 0.933
		873.18	12.08	-6.52E-06		1.44E-04 0.947
		996.29	10.48	3.06E-05		2.86E-04 0.984
		1004.76	18.01	-1.40E-05		1.68E-04 0.980
		1274.43	34.80	-1.09E-05		6.22E-05 0.982
		1596.48	1.80	4.64E-04		1.82E-03 1.130

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002

SMEAR # 075 6312E HEATER UNIT NORTH END

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+	Eu-155	45.30	1.31	-3.86E-04	6.66E-05	2.47E-03	0.998
		60.01	1.22	3.99E-04		2.74E-03	1.000
		86.55	30.70	2.72E-05		6.66E-05	free
		105.31	21.10	1.47E-05		8.15E-05	1.000
+	Tl-208	583.19	85.00	1.91E-05	4.38E-05	4.38E-05	0.950
+	Bi-211	351.07	* 13.02	2.06E-04	1.60E-04	1.60E-04	miss
+	Pb-211	404.85	3.78	-9.74E-05	5.81E-04	5.81E-04	miss
		427.09	1.76	-1.29E-04		1.05E-03	miss
		832.01	3.52	1.47E-04		9.21E-04	miss
+	Bi-212	39.86	1.06	6.51E-04	4.71E-04	3.32E-03	0.999
		727.33	6.67	1.39E-04		4.71E-04	0.987
		785.37	1.10	-8.15E-05		1.82E-03	0.960
		1620.50	1.47	0.00E+00		6.35E-04	1.004
+	Pb-212	115.18	0.60	5.67E-04	6.34E-05	3.11E-03	miss
		238.63	43.60	4.85E-05		6.34E-05	free
		300.09	3.30	2.24E-04		7.13E-04	free
+	Pb212-XR	74.82	10.28	-1.06E-05	1.59E-04	2.43E-04	miss
		77.11	17.10	6.88E-05		1.59E-04	miss
		87.35	3.97	1.03E-04		4.70E-04	miss
		89.78	1.46	-4.15E-04		1.02E-03	miss
+	Bi-214	609.32	45.49	4.06E-05	9.00E-05	9.00E-05	0.962
		768.36	4.89	-2.10E-04		4.03E-04	0.958
		806.18	1.26	7.66E-05		2.32E-03	0.944
		934.06	3.11	-2.63E-04		5.80E-04	0.959
		1120.29	14.92	1.03E-04		2.94E-04	0.959
		1155.21	1.63	5.76E-05		1.86E-03	0.958
		1238.12	5.83	2.79E-04		8.03E-04	0.959
		1280.98	1.43	1.50E-04		1.55E-03	0.959
		1377.67	3.99	0.00E+00		8.06E-04	1.023
		1385.31	0.79	1.67E-03		5.69E-03	0.959
		1401.52	1.33	9.70E-04		2.91E-03	0.959
		1407.99	2.39	0.00E+00		3.66E-04	0.959
		1509.21	2.13	-7.99E-05		1.48E-03	0.963
		1661.27	1.05	0.00E+00		9.13E-04	1.001
		1729.59	2.88	1.16E-04		8.54E-04	1.092
		1764.49	15.30	2.84E-05		3.17E-04	1.001
		1847.43	2.03	1.05E-04		1.94E-03	1.048
>		2118.51	1.16	0.00E+00		0.00E+00	1.031
+	Pb-214	241.99	7.25	8.43E-05	5.87E-05	3.10E-04	0.999
		295.22	18.42	5.82E-05		1.39E-04	1.000
		351.93	* 35.60	7.53E-05		5.87E-05	free
		785.96	1.06	-1.47E-04		1.81E-03	0.999
+	Pb214-XR	74.82	5.80	-1.87E-05	2.80E-04	4.31E-04	miss
		77.11	9.70	1.21E-04		2.80E-04	miss
		87.35	2.24	1.82E-04		8.33E-04	miss
		89.78	0.82	-7.38E-04		1.82E-03	miss
+	Ra-226	186.21	3.64	5.39E-05	5.44E-04	5.44E-04	free
+	Ac-228	129.07	2.42	-2.38E-04	1.08E-04	7.44E-04	0.961
		209.25	3.89	-5.04E-07		4.74E-04	0.983
		270.24	3.46	1.76E-04		7.41E-04	0.969

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports

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Analysis Report for 03-Mar-15-200002

SMEAR # 075 6312E HEATER UNIT NORTH END

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Ac-228	328.00	2.95	1.99E-04	1.08E-04	7.77E-04	0.969
	338.32	11.27	1.12E-04		2.45E-04	0.995
	409.46	1.92	1.39E-04		1.10E-03	0.953
	463.00	4.40	1.12E-04		5.31E-04	0.949
	794.95	4.25	2.33E-04		7.70E-04	0.957
	911.20	25.80	-3.01E-05		1.08E-04	0.993
	964.77	4.99	-1.63E-04		3.59E-04	0.986
	968.97	15.80	6.20E-05		2.01E-04	0.992
	1588.20	3.22	2.12E-04		9.82E-04	1.002
+ Pa-231	27.36	10.30	1.17E-04	3.67E-04	3.67E-04	0.998
	283.69	1.70	2.53E-04		1.27E-03	0.999
	300.07	2.47	1.09E-04		9.10E-04	1.000
	302.65	2.20	-1.93E-04		7.98E-04	1.000
	330.06	1.40	-3.76E-04		1.22E-03	1.001
+ Th-234	92.38	2.13	4.91E-05	8.98E-04	8.98E-04	free
	92.80	2.10	5.34E-06		9.25E-04	free
	112.81	0.21	1.99E-04		9.52E-03	free
+ U-235	143.76	10.96	4.02E-05	3.71E-05	1.57E-04	free
	163.33	5.08	-2.88E-05		3.64E-04	free
	185.71	57.20	1.33E-05		3.71E-05	free
	202.11	1.08	1.62E-03		2.46E-03	miss
	205.31	5.01	6.90E-05		4.15E-04	free
+ Am-241	59.54	35.90	2.26E-05	9.51E-05	9.51E-05	free

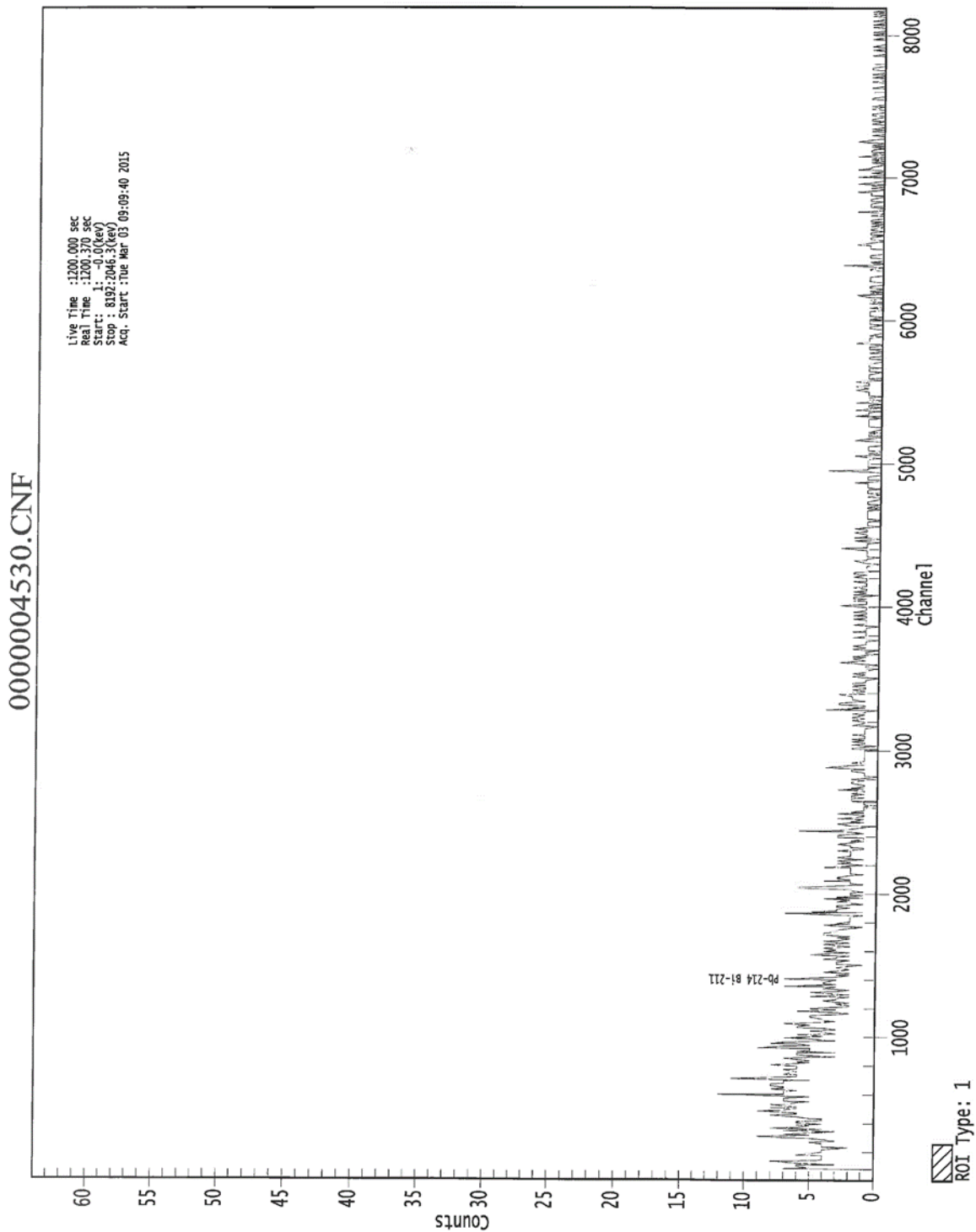
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-24 06312E Gamma Spectroscopy Reports



Attachment Figure 2-25 06506D Gamma Spectroscopy Results

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: 5452

Report Generated On : 4/23/2015 7:30:57 AM

Sample Title : 6506 D # 66-1

Sample Description : NGET bkg — Response to ALARM survey # 2015-TBA-1-0089

Sample Identification : 6506 D -66

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 50 - 8192

Peak Area Range (in channels) : 50 - 8192

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 grams

Sample Taken On : 1/30/2012 12:00:00 PM

Acquisition Started : 4/23/2015 7:15:55 AM

Live Time : 900.0 seconds

Real Time : 900.6 seconds

Dead Time : 0.06 %

Energy Calibration Used Done On : 1/13/2015

Efficiency Calibration Used Done On : 5/30/2013

Efficiency ID : 1M90DDRYDIRT

Ckt
4-23-15

4/23/15

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Peak Analysis Report 4/23/2015 7:30:57 AM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: 5452
Sample Title: 6506 D # 66-1
Peak Analysis Performed on: 4/23/2015 7:30:56 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8192

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	296-	306	301.36	74.99	0.83	1.01E+002	45.01	1.70E+002
2	334-	343	338.58	84.31	0.98	5.60E+001	34.69	1.08E+002
3	948-	961	955.11	238.63	0.84	5.82E+001	30.46	6.18E+001
4	1175-	1186	1181.91	295.39	1.44	6.31E+001	23.48	2.99E+001
5	1400-	1416	1408.61	352.12	1.31	9.24E+001	29.31	3.86E+001
6	2326-	2339	2332.97	583.40	0.58	4.11E+001	19.55	1.89E+001
7	2429-	2444	2437.36	609.52	0.37	8.21E+001	23.31	1.79E+001
8	5834-	5854	5843.51	1461.14	1.40	1.24E+002	26.31	1.40E+001

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Interference Corrected Activity Report 4/23/2015 7:30:57 AM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6506 D # 66-1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/gram)	Activity Uncertainty
K-40	0.994	1460.81*	10.67	4.16901E+000	9.49309E-001
PB-212	0.499	74.81*	9.60	2.96992E+000	1.44912E+000
		77.11	17.50		
		87.20	6.30		
		89.80	1.75		
		115.19	0.60		
		238.63*	44.60	2.95699E-001	1.61965E-001
		300.09	3.41		
BI-214	0.999	609.31*	46.30	5.11399E-001	1.57662E-001
		768.36	5.04		
		806.17	1.23		
		934.06	3.21		
		1120.29	15.10		
		1155.19	1.69		
		1238.11	5.94		
		1280.96	1.47		
		1377.67	4.11		
		1385.31	0.78		
		1401.50	1.39		
		1407.98	2.48		
		1509.19	2.19		
		1661.28	1.15		
		1729.60	3.05		
		1764.49	15.80		
		1847.44	2.12		
		2118.54	1.21		
PB-214	0.595	74.81* @	6.33	4.51045E+000	2.20079E+000
		77.11 @	10.70		
		87.20 @	3.70		
		89.80 @	1.03		
		241.98	7.49		
		295.21*	19.20	7.88827E-001	3.19596E-001
		351.92*	37.20	6.23870E-001	2.21709E-001
		785.91	1.10		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Interference Corrected Activity Report 4/23/2015 7:30:57 AM Page 4

*** INTERFERENCE CORRECTED REPORT ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/gram)	Wt mean Activity Uncertainty
	K-40	0.994	4.169005E+000	9.493085E-001
X	BI-211	0.465		
	PB-212	0.499	3.230048E-001	1.609693E-001
	BI-214	0.999	5.113992E-001	1.576618E-001
	PB-214 @	0.595	7.002079E-001	1.815538E-001

? = 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 2.000 sigma

***** UNIDENTIFIED PEAKS *****

Peak Locate Performed on: 4/23/2015 7:30:56 AM
Peak Locate From Channel: 50
Peak Locate To Channel: 8192

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	84.31	6.2199E-002	61.96	Tol.	TH-231
6	583.40	4.5634E-002	47.61	Tol.	Tl-208

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Nuclide MDA Report

4/23/2015

7:00:57 AM

Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: 5452
Sample Geometry:
Sample Title: 6506 D # 66-1
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion_LiB.NLB

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
+	K-40	1460.81*	10.67	8.659E-001	8.66E-001	4.169E+000	3.874E-001
	MN-54	834.83	99.97	6.687E-001	6.69E-001	-7.375E-002	2.773E-001
	CO-60	1173.22	100.00	5.518E-002	5.52E-002	-2.520E-002	2.066E-002
		1332.49	100.00	6.388E-002		-1.130E-002	2.474E-002
	NB-94	702.63	100.00	6.679E-002	5.43E-002	3.422E-002	2.937E-002
		871.10	100.00	5.432E-002		-3.742E-003	2.294E-002
	SN-113	255.12	1.93	3.891E+003	9.69E+001	-1.299E+003	1.750E+003
		391.69	64.90	9.687E+001		-4.437E+001	4.192E+001
	CS-134	475.35	1.46	1.347E+001	1.70E-001	7.052E-001	5.992E+000
		563.23	8.38	2.295E+000		7.881E-001	1.012E+000
		569.32	15.43	9.859E-001		-5.189E-002	4.194E-001
		604.70	97.60	1.699E-001		2.867E-002	7.313E-002
		795.84	85.40	2.598E-001		1.587E-001	1.156E-001
		801.93	8.73	1.730E+000		1.759E-001	7.244E-001
		1038.57	1.00	1.447E+001		-3.373E+000	5.932E+000
		1167.94	1.80	8.269E+000		-6.490E-001	3.389E+000
		1365.15	3.04	4.100E+000		7.467E-001	1.588E+000
	CS-137	661.65	85.12	8.340E-002	8.34E-002	2.203E-002	3.667E-002
@	Tl-208	583.19	84.50	1.000E+026	1.00E+026	1.000E+026	1.000E+020
	BI-211	72.87	1.20	1.277E+001	8.04E-001	2.196E+000	6.056E+000
		351.10*	12.20	8.042E-001		1.900E+000	3.743E-001
		404.80	4.10	1.588E+000		-1.670E-001	7.083E-001
		426.90	1.90	2.877E+000		-6.826E-001	1.251E+000
		831.80	3.30	1.484E+000		-3.157E-001	6.155E-001
	PB-211	404.80	3.00	2.171E+000	1.75E+000	-2.282E-001	9.680E-001
		427.10	1.40	4.125E+000		-6.207E-001	1.807E+000
		831.80	2.80	1.749E+000		-3.720E-001	7.254E-001
	BI-212	39.86	1.10	8.590E+000	5.42E-001	2.183E+000	3.847E+000
		727.17	11.80	5.415E-001		2.572E-001	2.364E-001
		785.42	2.00	3.584E+000		1.248E+000	1.586E+000
		1620.56	2.75	1.781E+000		4.756E-001	7.069E-001
+	PB-212	74.81*	9.60	2.025E+000	2.34E-001	2.970E+000	9.726E-001
		77.11	17.50	7.264E-001		6.340E-002	3.420E-001
		87.20	6.30	1.777E+000		6.817E-001	8.364E-001
		89.80	1.75	5.836E+000		2.630E-001	2.733E+000
		115.19	0.60	1.565E+001		4.206E-001	7.327E+000
		238.63*	44.60	2.343E-001		2.957E-001	1.103E-001
		300.09	3.41	2.106E+000		-1.505E-001	9.575E-001
+	BI-214	609.31*	46.30	1.671E-001	1.67E-001	5.114E-001	7.514E-002
		768.36	5.04	1.448E+000		4.334E-001	6.426E-001
		806.17	1.23	3.272E+000		1.248E-001	1.298E+000
		934.06	3.21	1.865E+000		6.377E-001	7.984E-001

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Nuclide MDA Report			4/23/2015		7:30:57 AM		Page 6	
	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)	
+	BI-214	1120.29	15.10	6.200E-001	1.67E-001	3.768E-001	2.803E-001	
		1155.19	1.69	3.299E+000		6.324E-001	1.382E+000	
		1238.11	5.94	1.155E+000		5.383E-001	4.998E-001	
		1280.96	1.47	3.072E+000		-7.849E-001	1.219E+000	
		1377.67	4.11	1.876E+000		1.457E+000	8.221E-001	
		1385.31	0.78	7.540E+000		4.072E+000	3.158E+000	
		1401.50	1.39	3.341E+000		-5.989E-001	1.326E+000	
		1407.98	2.48	2.384E+000		1.788E-001	9.985E-001	
		1509.19	2.19	2.343E+000		-2.077E-002	9.468E-001	
		1661.28	1.15	3.947E+000		1.314E+000	1.529E+000	
		1729.60	3.05	1.997E+000		8.064E-001	8.283E-001	
		1764.49	15.80	7.008E-001		6.255E-001	3.172E-001	
		1847.44	2.12	2.429E+000		9.264E-001	9.639E-001	
		2118.54	1.21	0.000E+000		0.000E+000	0.000E+000	
+	PB-214	74.81*	6.33	3.075E+000	2.64E-001	4.510E+000	1.477E+000	
		77.11	10.70	1.190E+000		1.038E-001	5.602E-001	
		87.20	3.70	3.030E+000		1.162E+000	1.426E+000	
		89.80	1.03	9.930E+000		4.475E-001	4.650E+000	
		241.98	7.49	1.132E+000		5.198E-001	5.250E-001	
		295.21*	19.20	3.896E-001		7.888E-001	1.779E-001	
		351.92*	37.20	2.641E-001		6.239E-001	1.229E-001	
		785.91	1.10	6.075E+000		8.204E-001	2.662E+000	
		RA-226	186.21	3.28	2.663E+000	2.66E+000	8.513E-001	1.243E+000
		AC-228	89.95	2.10	4.861E+000	3.35E-001	2.190E-001	2.276E+000
			93.35	3.50	2.843E+000		6.024E-001	1.330E+000
			129.08	2.80	3.329E+000		-3.180E-001	1.561E+000
			209.28	4.40	1.828E+000		2.024E-001	8.462E-001
			270.23	3.60	1.915E+000		-3.253E-002	8.696E-001
>	PA-234M	327.64	3.20	1.962E+000		1.154E-001	8.771E-001	
		338.32	11.40	6.232E-001		4.202E-001	2.821E-001	
		409.51	2.13	2.817E+000		5.451E-001	1.243E+000	
		463.00	4.40	1.470E+000		4.785E-001	6.522E-001	
		794.70	4.60	1.454E+000		4.172E-001	6.373E-001	
		911.60	27.70	3.355E-001		2.943E-001	1.523E-001	
		964.60	5.20	1.199E+000		4.000E-001	5.162E-001	
		969.11	16.60	5.602E-001		4.903E-001	2.540E-001	
		1587.90	3.71	1.585E+000		5.058E-001	6.575E-001	
		766.36	0.29	2.009E+001	7.51E+000	-1.289E+000	8.650E+000	
		1001.03	0.84	7.515E+000		2.507E+000	3.235E+000	
		TH-234	92.38	2.81	2.013E+015	1.98E+015	6.905E+014	9.463E+014
			92.80	2.77	1.981E+015		3.527E+014	9.292E+014
			112.81	0.28	1.786E+016		-3.895E+015	8.356E+015
U-235	89.96	1.50	6.805E+000	1.64E-001	3.067E-001	3.187E+000		
	93.35	2.50	3.981E+000		8.433E-001	1.863E+000		
	105.00	1.00	9.500E+000		2.482E+000	4.444E+000		
	109.14	1.50	6.251E+000		-3.791E+000	2.924E+000		
	143.76	10.50	8.223E-001		1.100E-001	3.839E-001		
	163.35	4.70	1.604E+000		-4.843E-001	7.410E-001		
	185.71	54.00	1.636E-001		6.433E-002	7.647E-002		
	202.12	1.00	7.544E+000		9.474E-001	3.477E+000		
	205.31	4.70	1.479E+000		-3.226E-001	6.764E-001		

Attachment Figure 2-25 06506D Gamma Spectroscopy Results

Nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/gram)	Nuclide MDA (pCi/gram)	Activity (pCi/gram)	Dec. Level (pCi/gram)
AM-241	59.54	36.30	3.584E-001	3.58E-001	4.388E-002	1.656E-001

+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = Calculated MDA is zero due to zero counts in the region or
the region is outside the spectrum

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

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

.lename: E:\20150728101231.cnf

Report Generated On : 7/28/2015 12:53:40 PM

Sample Title : TB2 630 6601
Sample Description : LIGHT FIXTURE → location #28
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 1

Sample Taken On : 7/28/2015 10:01:48 AM
Acquisition Started : 7/28/2015 10:01:48 AM

Live Time : 598.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst B. Rebernd
Date 7-28-15

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

Peak Analysis Report 7/28/2015 12:53:40 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: TB2 630 6601
Peak Analysis Performed on: 7/28/2015 12:53:40 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	474-	501	488.29	1455.89	37.41	1.50E+003	129.06	3.36E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2015 1:53:40 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: TB2 630 6601
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/l)	Activity Uncertainty
K-40	0.993	1460.82*	10.66	5.57104E+002	6.81574E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

Interference Corrected Activity Report 7/28/2015 12:53:40 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/l)	Wt mean Activity Uncertainty
K-40	0.993	5.571039E+002	6.815744E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 7/28/2015 12:53:40 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS & Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

Slide MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: TB2 630 6601
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/1)	Nuclide MDA (pCi/1)	Activity (pCi/1)	Dec. Level (pCi/1)
	LaBr3	34.70	66.40	4.494E+000	4.49E+000	3.338E+001	2.219E+000
		788.70	33.60	8.784E+000		4.513E+000	4.297E+000
		1436.80	66.40	1.019E+001		2.925E+001	5.017E+000
+	K-40	1460.82*	10.66	6.421E+001	6.42E+001	5.571E+002	3.160E+001
	Cr-51	320.08	9.91	1.560E+001	1.56E+001	-3.196E+000	7.648E+000
	Mn-54	834.85	99.98	3.375E+000	3.37E+000	-8.863E-002	1.654E+000
	Co-58	810.76	99.45	3.334E+000	3.33E+000	2.241E+000	1.634E+000
	Co-60	1173.23	99.85	3.291E+000	1.89E+000	-9.108E-001	1.601E+000
		1332.49	99.98	1.887E+000		2.094E-001	8.934E-001
	Nb-94	702.65	99.81	2.029E+000	2.03E+000	7.631E-002	9.857E-001
		871.09	99.89	3.365E+000		-1.396E+000	1.648E+000
	Sn-113	255.13	2.11	8.007E+001	2.55E+000	1.773E+001	3.943E+001
		391.70	64.97	2.554E+000		-2.816E-001	1.251E+000
	Cs-137	661.66	85.10	2.486E+000	2.49E+000	7.176E-001	1.211E+000
	Eu-152	121.78	28.67	7.908E+000	6.73E+000	7.194E+000	3.916E+000
		244.70	7.61	2.335E+001		2.138E+001	1.151E+001
		295.94	0.45	3.619E+002		2.677E+002	1.778E+002
		344.28	26.60	6.726E+000		2.330E+000	3.304E+000
		367.79	0.86	1.981E+002		5.382E+001	9.716E+001
		411.12	2.24	7.599E+001		5.636E+001	3.719E+001
		443.96	2.83	6.046E+001		8.562E+000	2.955E+001
		488.68	0.42	4.178E+002		-3.241E+001	2.039E+002
		563.99	0.49	4.234E+002		-1.809E+002	2.069E+002
		586.26	0.46	4.654E+002		9.858E+001	2.274E+002
		678.62	0.47	4.435E+002		3.381E+001	2.159E+002
		688.67	0.86	2.399E+002		-1.285E+002	1.167E+002
		719.35	0.28	7.599E+002		-8.189E+002	3.695E+002
		778.90	12.96	2.127E+001		6.010E+000	1.039E+001
		810.45	0.32	1.033E+003		6.940E+002	5.062E+002
		867.37	4.26	7.927E+001		1.793E+001	3.882E+001
		919.33	0.43	7.885E+002		6.596E+001	3.858E+002
		964.08	14.65	2.390E+001		-1.705E+000	1.169E+001
		1085.87	10.24	2.904E+001		3.798E-001	1.411E+001
		1089.74	1.73	1.707E+002		-3.673E+001	8.294E+001
		1112.07	13.69	2.254E+001		3.862E+000	1.096E+001
		1212.95	1.43	2.241E+002		-1.296E+001	1.088E+002
		1249.94	0.19	1.516E+003		1.322E+003	7.331E+002
		1299.14	1.63	1.352E+002		1.207E+002	6.460E+001
		1408.01	21.07	1.899E+001		-8.180E+000	9.248E+000
		1457.64	0.50	1.462E+003		6.971E+003	7.203E+002
>	Eu-154	1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
		123.07	40.40	5.600E+000	5.60E+000	5.094E+000	2.773E+000

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/1)	Nuclide MDA (pCi/1)	Activity (pCi/1)	Dec. Level (pCi/1)
Eu-154	247.93	6.89	2.544E+001	5.60E+000	-5.490E+000	1.254E+001
	591.76	4.95	4.432E+001		1.290E+001	2.166E+001
	692.42	1.78	1.173E+002		1.000E+001	5.707E+001
	723.30	20.06	1.073E+001		-8.643E+000	5.219E+000
	756.80	4.52	5.146E+001		-1.544E+001	2.505E+001
	873.18	12.08	2.788E+001		-1.156E+001	1.365E+001
	996.29	10.48	3.178E+001		1.724E+001	1.552E+001
	1004.76	18.01	1.760E+001		4.172E+000	8.583E+000
	1274.43	34.80	7.109E+000		-6.302E+000	3.416E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
> Eu-155	45.30	1.31	2.762E+002	7.30E+000	1.990E+003	1.367E+002
	60.01	1.22	2.291E+002		-2.822E+001	1.130E+002
	86.55	30.70	7.299E+000		5.363E-001	3.609E+000
	105.31	21.10	1.154E+001		-2.333E+000	5.714E+000
Tl-208	583.19	85.00	2.509E+000	2.51E+000	-9.291E-001	1.226E+000
Bi-211	351.07	13.02	1.349E+001	1.35E+001	5.795E+000	6.622E+000
Pb-211	404.85	3.78	4.463E+001	4.46E+001	1.648E+001	2.184E+001
	427.09	1.76	9.633E+001		8.870E+000	4.710E+001
	832.01	3.52	9.591E+001		2.586E+001	4.701E+001
Bi-212	39.86	1.06	3.236E+002	3.24E+001	2.425E+003	1.600E+002
	727.33	6.67	3.243E+001		-1.058E+001	1.577E+001
	785.37	1.10	2.606E+002		4.825E+001	1.274E+002
> Pb-212	1620.50	1.47	0.000E+000	4.13E+000	0.000E+000	0.000E+000
	115.18	0.60	3.896E+002		-8.286E+001	1.929E+002
	238.63	43.60	4.128E+000		5.763E-001	2.036E+000
Pb212-XR	300.09	3.30	4.794E+001	1.44E+001	2.814E+001	2.354E+001
	74.82	10.28	2.401E+001		-7.606E+000	1.187E+001
	77.11	17.10	1.435E+001		1.223E+001	7.093E+000
Bi-214	87.35	3.97	5.600E+001	4.89E+000	-4.936E-001	2.769E+001
	89.78	1.46	1.772E+002		1.802E+001	8.776E+001
	609.32	45.49	4.886E+000		2.191E+000	2.387E+000
	768.36	4.89	5.011E+001		-1.130E+002	2.442E+001
	806.18	1.26	2.603E+002		2.596E+002	1.276E+002
	934.06	3.11	1.069E+002		-4.101E+001	5.226E+001
	1120.29	14.92	2.076E+001		-3.649E+000	1.009E+001
	1155.21	1.63	1.999E+002		8.165E+001	9.725E+001
	1238.12	5.83	5.245E+001		2.885E+001	2.542E+001
	1280.98	1.43	1.680E+002		-1.482E+002	8.062E+001
	1377.67	3.99	4.639E+001		-9.696E+001	2.191E+001
	1385.31	0.79	2.766E+002		-4.906E+002	1.318E+002
	1401.52	1.33	2.533E+002		-1.915E+002	1.227E+002
	1407.99	2.39	1.671E+002		-7.199E+001	8.139E+001
	1509.21	2.13	1.253E+002		-5.604E+001	6.005E+001
	1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
> Pb-214	1729.59	2.88	0.000E+000	4.94E+000	0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	2.463E+001		5.752E+000	1.215E+001
	295.22	18.42	8.786E+000		6.500E+000	4.317E+000
	351.93	35.60	4.941E+000		2.123E+000	2.426E+000

Attachment Figure 2-26 06601A Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/l)	Nuclide MDA (pCi/l)	Activity (pCi/l)	Dec. Level (pCi/l)
Pb-214	785.96	1.06	2.711E+002	4.94E+000	5.019E+001	1.325E+002
Pb214-XR	74.82	5.80	4.256E+001	2.53E+001	-1.348E+001	2.103E+001
	77.11	9.70	2.530E+001		2.157E+001	1.250E+001
	87.35	2.24	9.925E+001		-8.749E-001	4.907E+001
	89.78	0.82	3.155E+002		3.208E+001	1.563E+002
Ra-226	186.21	3.64	4.859E+001	4.86E+001	-8.028E+000	2.400E+001
Ac-228	129.07	2.42	9.081E+001	1.31E+001	6.286E+001	4.496E+001
	209.25	3.89	4.986E+001		-1.359E+000	2.463E+001
	270.24	3.46	4.698E+001		-2.017E+001	2.311E+001
	328.00	2.95	5.908E+001		2.984E+001	2.903E+001
	338.32	11.27	1.585E+001		1.184E+001	7.787E+000
	409.46	1.92	8.763E+001		-8.241E+000	4.288E+001
	463.00	4.40	4.009E+001		2.057E+001	1.959E+001
	794.95	4.25	7.284E+001		4.448E+001	3.567E+001
	911.20	25.80	1.310E+001		2.478E+000	6.410E+000
	964.77	4.99	7.020E+001		-5.008E+000	3.434E+001
	968.97	15.80	2.213E+001		-9.204E-001	1.082E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.562E+001		4.359E+001	4.701E+001
	300.07	2.47	6.404E+001		3.759E+001	3.145E+001
	302.65	2.20	7.233E+001		4.246E+001	3.552E+001
	330.06	1.40	1.245E+002		2.436E+001	6.118E+001
Th-234	92.38	2.13	1.202E+002	1.20E+002	-4.353E+001	5.955E+001
	92.80	2.10	1.217E+002		-4.408E+001	6.029E+001
	112.81	0.21	1.123E+003		1.811E+002	5.560E+002
U-235	143.76	10.96	1.864E+001	3.11E+000	-6.422E+000	9.225E+000
	163.33	5.08	3.759E+001		7.458E+000	1.859E+001
	185.71	57.20	3.109E+000		-1.816E+000	1.535E+000
	202.11	1.08	1.790E+002		5.950E+001	8.848E+001
	205.31	5.01	3.862E+001		7.325E+000	1.908E+001
Am-241	59.54	35.90	7.877E+000	7.88E+000	-9.703E-001	3.887E+000

+ = 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

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports



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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 26-Mar-15-10004
Sample Description	: 6708AIOISM002 Hot Particle
Sample Type	: Hot Count Lab
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 3/26/2015 9:15:00AM
Acquisition Started	: 3/26/2015 12:52:34PM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: P40818B
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1211.1 seconds
Dead Time	: 0.92 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/9/2014
Efficiency Calibration Used Done On	: 1/5/2015
Efficiency Calibration Description	:
Sample Number	: 12117

Handwritten signature and date: 3/26/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/26/2015 1:12:47PM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004

6708AIOISM002 Hot Particle

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	310.43	1237 -	1247	1241.63	1.02E+02	110.40	2.47E+03	.....
2	683.97	2731 -	2746	2735.07	1.11E+02	135.73	3.45E+03	.....
3	984.77	3928 -	3946	3938.44	1.61E+02	169.85	5.44E+03	.....
4	1173.36	4680 -	4706	4693.26	6.09E+04	514.74	3.65E+03	Co-60
5	1332.66	5317 -	5344	5330.99	5.55E+04	477.82	1.09E+03	Co-60
6	1578.92	6312 -	6323	6317.27	1.94E+01	24.46	1.39E+02	Ag-110m

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Co-60	0.99	1173.23 *	99.85	5.19E-02	4.18E-03	0.850
		1332.49 *	99.98	5.24E-02	4.22E-03	0.847

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
Co-60	0.999	5.22E-02	2.97E-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

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/26/2015 1:12:47PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	310.43	8.51186E-02	54.04	D-Esc	
2	683.97	9.21724E-02	61.36		
3	984.77	1.34114E-01	52.77		
6	1578.92	1.61651E-02	63.05		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	1.53E-04	4.05E-04	4.05E-04	miss
+	Cr-51	320.08	9.91	-8.16E-05	3.70E-04	3.70E-04	free
+	Mn-54	834.85	99.98	7.60E-06	1.03E-04	1.03E-04	miss
+	Co-58	810.76	99.45	-1.36E-05	9.78E-05	9.78E-05	0.999
		1674.73	0.52	1.32E-03		8.11E-03	1.075
+	Co-60	1173.23	* 99.85	5.19E-02	1.26E-04	2.04E-04	0.850
		1332.49	* 99.98	5.24E-02		1.26E-04	0.847
+	Nb-94	702.65	99.81	8.22E-06	9.60E-05	9.60E-05	0.839
		871.09	99.89	-3.84E-06		1.33E-04	0.836
+	Sn-113	255.13	2.11	6.21E-04	6.39E-05	1.57E-03	free
		391.70	64.97	-1.95E-05		6.39E-05	free
+	Cs-134	475.36	1.48	1.18E-03	7.83E-05	3.33E-03	miss
		563.25	8.34	6.37E-05		9.77E-04	0.713
		569.33	15.37	-6.81E-05		5.42E-04	0.693

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Cs-134	604.72	97.62	-2.97E-05	7.83E-05	7.83E-05	0.804
	795.86	85.46	1.25E-04		1.41E-04	0.803
	801.95	8.69	-6.40E-04		1.53E-03	0.714
	1038.61	0.99	6.54E-03		1.45E-02	0.829
	1167.97	1.79	-1.63E-02		4.65E-03	1.245
+	1365.19	3.02	1.40E-04	8.75E-05	9.81E-04	1.363
	661.66	85.10	4.73E-08		8.75E-05	miss
+	Eu-152	121.78	28.67	1.01E-04	1.01E-04	0.828
	244.70	7.61	-8.33E-05		4.55E-04	0.808
	295.94	0.45	3.95E-03		8.15E-03	miss
	344.28	26.60	3.46E-05		1.66E-04	0.879
	367.79	0.86	-8.89E-04		7.11E-03	0.668
	411.12	2.24	-6.12E-04		2.70E-03	0.729
	443.96	2.83	3.04E-04		2.06E-03	0.808
	488.68	0.42	1.71E-03		1.23E-02	miss
	563.99	0.49	-5.64E-03		1.43E-02	0.808
	586.26	0.46	3.26E-03		1.61E-02	0.816
	678.62	0.47	1.66E-03		2.42E-02	0.669
	688.67	0.86	5.45E-03		9.97E-03	0.924
	719.35	0.28	1.13E-02		2.96E-02	miss
	778.90	12.96	4.34E-04		8.69E-04	0.824
	810.45	0.32	-1.94E-03		2.53E-02	1.198
	867.37	4.26	6.41E-05		3.45E-03	0.757
	919.33	0.43	-3.41E-03		3.13E-02	0.924
	964.08	14.65	8.51E-05		8.04E-04	1.089
	1085.87	10.24	8.47E-04		1.11E-03	1.075
	1089.74	1.73	6.30E-03		8.60E-03	0.841
	1112.07	13.69	4.50E-04		9.44E-04	0.961
	1212.95	1.43	-1.42E-03		6.53E-03	0.757
	1249.94	0.19	1.45E-02		2.45E-02	1.316
	1299.14	1.63	9.06E-04		4.27E-03	0.817
	1408.01	21.07	-7.72E-06		1.98E-04	0.931
	1457.64	0.50	-2.58E-04		6.59E-03	1.246
	1528.10	0.28	4.15E-03		1.55E-02	1.002
+	Eu-154	123.07	40.40	7.41E-05	7.41E-05	0.827
	247.93	6.89	2.06E-04		5.21E-04	0.791
	591.76	4.95	-2.75E-04		1.58E-03	0.750
	692.42	1.78	-1.64E-03		5.40E-03	0.804
	723.30	20.06	7.77E-05		5.09E-04	0.810
	756.80	4.52	-1.79E-03		2.54E-03	0.729
	873.18	12.08	1.51E-04		1.16E-03	0.791
	996.29	10.48	-2.70E-04		1.21E-03	0.927
	1004.76	18.01	3.62E-04		7.22E-04	0.919
	1274.43	34.80	-1.41E-05		1.81E-04	0.926
	1596.48	1.80	-7.19E-04		1.36E-03	1.533
+	Eu-155	45.30	1.31	1.32E-04	1.21E-02	0.998
	60.01	1.22	8.88E-03		1.43E-02	1.000
	86.55	30.70	5.98E-05		1.32E-04	free
+	Tl-208	105.31	21.10	8.26E-05	1.37E-04	1.000
	583.19	85.00	-1.26E-05		8.26E-05	0.819
+	Bi-211	351.07	13.02	3.13E-04	3.13E-04	miss

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	Pb-211	404.85	3.78	-4.27E-06	1.17E-03	1.17E-03	miss
		427.09	1.76	-9.82E-05		2.59E-03	miss
		832.01	3.52	-5.73E-04		2.91E-03	miss
+	Bi-212	39.86	1.06	1.24E-03	1.34E-03	1.58E-02	0.995
		727.33	6.67	4.77E-04		1.34E-03	0.948
		785.37	1.10	3.52E-03		1.02E-02	0.836
		1620.50	1.47	-4.41E-04		2.61E-03	1.019
+	Pb-212	115.18	0.60	1.48E-04	6.34E-05	4.30E-03	miss
		238.63	43.60	-1.02E-05		6.34E-05	free
		300.09	3.30	-2.52E-04		1.07E-03	free
+	Pb212-XR	74.82	10.28	2.59E-04	3.46E-04	6.81E-04	miss
		77.11	17.10	-1.71E-04		3.46E-04	miss
		87.35	3.97	3.07E-04		9.91E-04	miss
		89.78	1.46	-7.10E-04		2.46E-03	miss
+	Bi-214	609.32	45.49	-3.46E-05	1.75E-04	1.75E-04	0.853
		768.36	4.89	-1.35E-04		2.21E-03	0.828
		806.18	1.26	-4.70E-03		9.59E-03	0.778
		934.06	3.11	-2.33E-04		5.06E-03	0.832
		1120.29	14.92	1.95E-04		9.78E-04	0.832
		1155.21	1.63	-1.83E-03		7.58E-03	0.829
		1238.12	5.83	1.26E-04		1.29E-03	0.832
		1280.98	1.43	6.11E-04		4.80E-03	0.832
		1377.67	3.99	2.25E-04		9.54E-04	1.098
		1385.31	0.79	2.19E-03		6.23E-03	0.832
		1401.52	1.33	-1.77E-03		3.36E-03	0.832
		1407.99	2.39	-7.60E-05		1.95E-03	0.832
		1509.21	2.13	2.14E-04		2.31E-03	0.846
		1661.27	1.05	1.46E-03		4.26E-03	1.003
		1729.59	2.88	-7.28E-05		1.07E-03	1.396
		1764.49	15.30	2.73E-05		2.91E-04	1.005
		1847.43	2.03	-6.81E-04		1.84E-03	1.207
>		2118.51	1.16	0.00E+00		0.00E+00	1.134
+	Pb-214	241.99	7.25	4.33E-05	1.12E-04	3.87E-04	0.999
		295.22	18.42	9.87E-05		1.97E-04	1.000
		351.93	35.60	-2.65E-05		1.12E-04	free
		785.96	1.06	9.15E-04		8.76E-03	0.999
+	Pb214-XR	74.82	5.80	4.59E-04	6.11E-04	1.21E-03	miss
		77.11	9.70	-3.01E-04		6.11E-04	miss
		87.35	2.24	5.45E-04		1.76E-03	miss
		89.78	0.82	-1.26E-03		4.38E-03	miss
+	Ra-226	186.21	3.64	-2.39E-04	6.45E-04	6.45E-04	free
+	Ac-228	129.07	2.42	2.03E-04	3.44E-04	1.17E-03	0.840
		209.25	3.89	-1.98E-04		7.72E-04	0.933
		270.24	3.46	2.57E-04		1.11E-03	0.874
		328.00	2.95	-3.05E-04		1.46E-03	0.872
		338.32	11.27	-2.18E-04		3.44E-04	0.980
		409.46	1.92	7.24E-04		2.86E-03	0.817
		463.00	4.40	7.39E-05		1.40E-03	0.802
		794.95	4.25	1.31E-04		2.73E-03	0.811
		911.20	25.80	-1.14E-04		4.86E-04	0.970
		964.77	4.99	1.78E-04		2.73E-03	0.940

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10004
6708AIOISM002 Hot Particle

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Ac-228	968.97	15.80	-1.92E-04	3.44E-04	7.95E-04	0.969
	1588.20	3.22	-5.38E-04		1.23E-03	1.008
+ Pa-231	27.36	10.30	6.04E-05	1.43E-03	1.77E-03	0.990
	283.69	1.70	1.03E-03		2.05E-03	1.000
	300.07	2.47	-3.37E-04		1.43E-03	1.000
	302.65	2.20	-1.33E-04		1.65E-03	1.000
	330.06	1.40	5.72E-04		2.76E-03	1.000
+ Th-234	92.38	2.13	1.40E-04	1.67E-03	1.68E-03	free
	92.80	2.10	-9.07E-04		1.67E-03	free
	112.81	0.21	4.71E-03		1.28E-02	free
+ U-235	143.76	10.96	7.88E-06	4.07E-05	2.12E-04	free
	163.33	5.08	-4.99E-05		4.46E-04	free
	185.71	57.20	-1.10E-05		4.07E-05	free
	202.11	1.08	-4.34E-05		2.39E-03	miss
	205.31	5.01	1.27E-04		5.32E-04	free
+ Am-241	59.54	35.90	7.07E-05	5.04E-04	5.04E-04	free

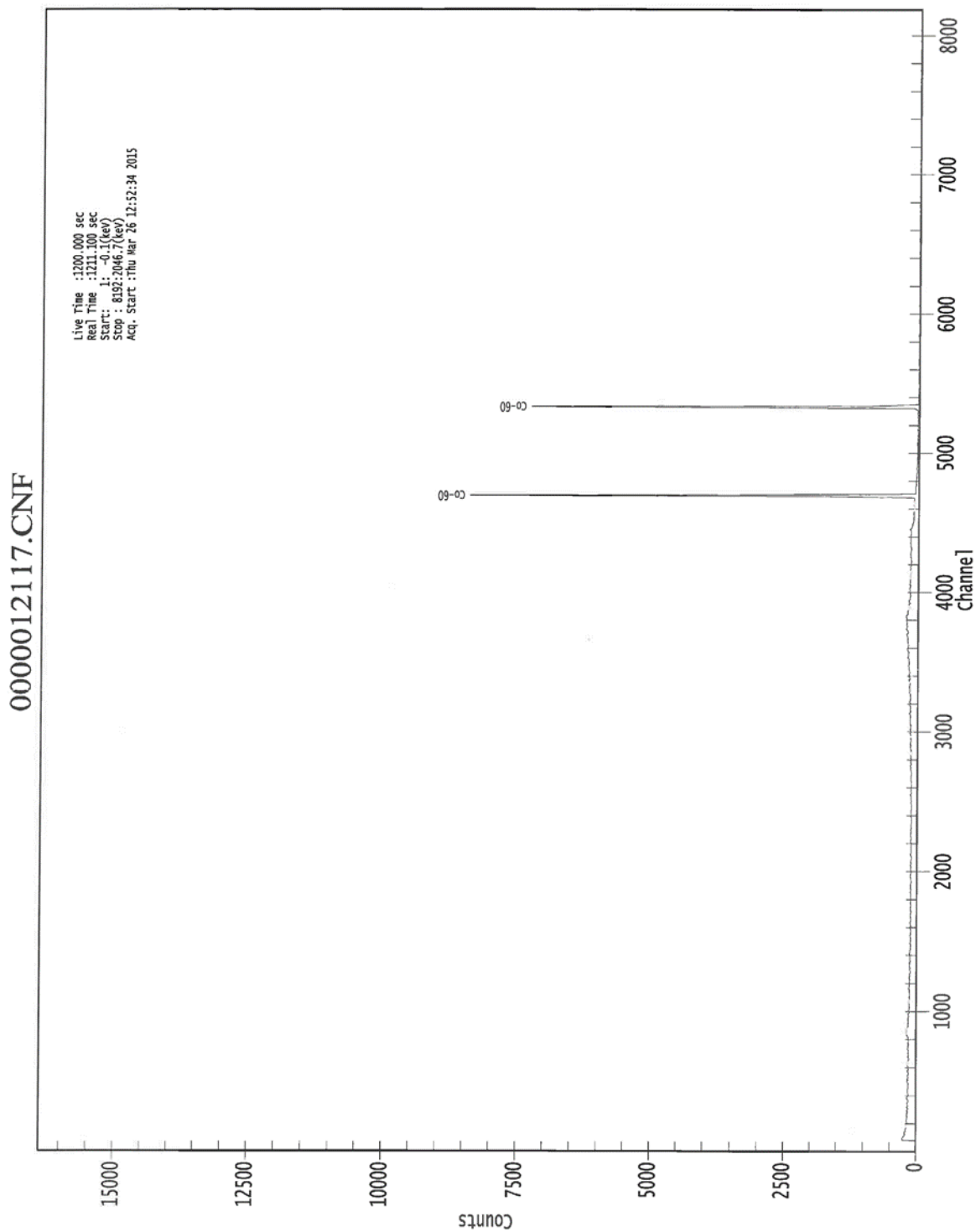
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports



Attachment Figure 2-27 06708A Gamma Spectroscopy Reports



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Analysis Report for 26-Mar-15-10001
6708AIOISM001 U1 TB1 642' Particle from grid 1

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 26-Mar-15-10001
Sample Description	: 6708AIOISM001 U1 TB1 642' Particle from grid 1
Sample Type	: Hot Count Lab
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 3/24/2015 2:30:00PM
Acquisition Started	: 3/26/2015 7:18:58AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: DET02
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1202.2 seconds
Dead Time	: 0.18 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 10/28/2014
Efficiency Calibration Description	:
Sample Number	: 12114

Handwritten signature and date: 3/26/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/26/2015 7:39:02AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOISM001 U1 TB1 642' Particle from grid 1

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	315.41	1252 -	1268	1262.19	3.92E+01	48.25	4.48E+02	....
2	1172.98	4675 -	4710	4692.71	1.03E+04	214.14	7.97E+02	Co-60
3	1332.18	5311 -	5348	5330.07	9.59E+03	201.21	3.41E+02	Co-60
4	1460.18	5835 -	5850	5842.56	1.21E+01	12.99	3.17E+01	Ag-110m K-40

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
K-40	0.98	1460.82 *	10.66	4.96E-05	5.33E-05	miss
Co-60	0.99	1173.23 *	99.85	4.90E-03	4.05E-04	0.794
		1332.49 *	99.98	4.99E-03	4.13E-04	0.790

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOISM001 U1 TB1 642' Particle from grid 1

INTERFERENCE CORRECTED REPORT

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
K-40	0.985	4.96E-05	5.33E-05	
Co-60	0.997	4.95E-03	2.89E-04	

? = 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

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOISM001 U1 TB1 642' Particle from grid 1

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/26/2015 7:39:02AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
1	315.41	3.27060E-02	61.47		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+ K-40	1460.82	* 10.66	4.96E-05	8.48E-05	8.48E-05	miss
+ Cr-51	320.08	9.91	-3.61E-05	9.54E-05	9.54E-05	free
+ Mn-54	834.85	99.98	-9.99E-06	2.35E-05	2.35E-05	miss
+ Co-58	810.76	99.45	3.48E-06	2.18E-05	2.18E-05	0.999
	1674.73	0.52	8.19E-04		1.90E-03	1.126
+ Co-60	1173.23	* 99.85	4.90E-03	4.01E-05	5.47E-05	0.794
	1332.49	* 99.98	4.99E-03		4.01E-05	0.790
+ Nb-94	702.65	99.81	4.38E-06	2.35E-05	2.35E-05	0.778
	871.09	99.89	-1.29E-05		3.17E-05	0.774
+ Sn-113	255.13	2.11	-4.18E-06	1.62E-05	3.74E-04	free
	391.70	64.97	3.98E-06		1.62E-05	free
+ Cs-134	475.36	1.48	-6.63E-05	2.10E-05	7.79E-04	miss
	563.25	8.34	7.04E-05		2.79E-04	0.618
	569.33	15.37	-5.02E-05		1.57E-04	0.592
	604.72	97.62	-1.98E-07		2.10E-05	0.733
	795.86	85.46	3.60E-06		3.30E-05	0.732
	801.95	8.69	-1.52E-04		3.64E-04	0.620
	1038.61	0.99	-2.61E-04		3.49E-03	0.765

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOSM001 U1 TB1 642' Particle from grid 1

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Cs-134	1167.97	1.79	-2.16E-03	2.10E-05	1.30E-03	1.385
	1365.19	3.02	1.58E-05		1.96E-04	1.567
+ Cs-137	661.66	85.10	8.84E-06	2.05E-05	2.05E-05	miss
+ Eu-152	121.78	28.67	-8.06E-06	2.91E-05	2.91E-05	0.767
	244.70	7.61	3.70E-05		1.43E-04	0.733
	295.94	0.45	8.06E-04		2.16E-03	miss
	344.28	26.60	2.17E-05		4.63E-05	0.835
	367.79	0.86	4.39E-04		1.97E-03	0.569
	411.12	2.24	1.94E-04		7.71E-04	0.645
	443.96	2.83	1.40E-04		5.58E-04	0.734
	488.68	0.42	-1.19E-04		2.90E-03	miss
	563.99	0.49	2.21E-04		3.94E-03	0.734
	586.26	0.46	-2.38E-03		3.84E-03	0.753
	678.62	0.47	-2.75E-04		6.18E-03	0.569
	688.67	0.86	-1.04E-03		2.22E-03	0.885
	719.35	0.28	-1.62E-03		6.11E-03	miss
	778.90	12.96	-6.82E-05		1.90E-04	0.763
	810.45	0.32	1.37E-03		5.24E-03	1.280
	867.37	4.26	3.30E-04		9.06E-04	0.671
	919.33	0.43	3.78E-03		7.52E-03	0.885
	964.08	14.65	1.48E-05		1.77E-04	1.127
	1085.87	10.24	1.81E-05		2.44E-04	1.105
	1089.74	1.73	6.80E-06		1.97E-03	0.788
	1112.07	13.69	-8.57E-05		2.00E-04	0.936
	1212.95	1.43	-1.20E-04		1.61E-03	0.672
	1249.94	0.19	-6.86E-04		4.61E-03	1.433
	1299.14	1.63	-3.65E-04		9.95E-04	0.753
	1408.01	21.07	4.51E-06		4.78E-05	0.895
	1457.64	0.50	-3.12E-04		1.38E-03	1.335
	1528.10	0.28	-1.24E-03		2.65E-03	1.007
+ Eu-154	123.07	40.40	1.06E-06	2.14E-05	2.14E-05	0.767
	247.93	6.89	-6.84E-05		1.45E-04	0.713
	591.76	4.95	2.39E-06		4.61E-04	0.661
	692.42	1.78	-7.88E-05		1.33E-03	0.729
	723.30	20.06	3.71E-05		1.27E-04	0.738
	756.80	4.52	1.30E-04		6.68E-04	0.639
	873.18	12.08	6.93E-05		2.93E-04	0.711
	996.29	10.48	6.61E-06		2.88E-04	0.895
	1004.76	18.01	-4.31E-05		1.67E-04	0.882
	1274.43	34.80	2.26E-06		4.48E-05	0.890
	1596.48	1.80	5.59E-06		2.81E-04	1.864
+ Eu-155	45.30	1.31	-6.29E-04	2.76E-05	2.21E-03	0.995
	60.01	1.22	3.44E-04		2.28E-03	0.999
	86.55	30.70	5.78E-07		2.76E-05	free
	105.31	21.10	6.42E-06		3.27E-05	1.000
+ Tl-208	583.19	85.00	-1.82E-06	2.20E-05	2.20E-05	0.758
+ Bi-211	351.07	13.02	1.05E-05	7.95E-05	7.95E-05	miss
+ Pb-211	404.85	3.78	-1.59E-05	2.79E-04	2.79E-04	miss
	427.09	1.76	-1.93E-04		5.88E-04	miss
	832.01	3.52	-2.26E-04		6.31E-04	miss
+ Bi-212	39.86	1.06	-8.15E-04	3.05E-04	2.79E-03	0.993

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOISM001 U1 TB1 642' Particle from grid 1

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Bi-212	727.33	6.67	5.41E-07	3.05E-04	3.05E-04	0.928
	785.37	1.10	-1.04E-04		2.45E-03	0.774
	1620.50	1.47	-6.89E-05		6.28E-04	1.032
+ Pb-212	115.18	0.60	3.11E-04	1.68E-05	1.12E-03	miss
	238.63	43.60	-7.05E-06		1.68E-05	free
	300.09	3.30	-5.98E-05		2.71E-04	free
+ Pb212-XR	74.82	10.28	-2.70E-05	6.68E-05	1.28E-04	miss
	77.11	17.10	-1.92E-05		6.68E-05	miss
	87.35	3.97	-3.93E-05		2.06E-04	miss
+ Bi-214	89.78	1.46	1.10E-04	4.17E-05	5.73E-04	miss
	609.32	45.49	-1.34E-05		4.17E-05	0.798
	768.36	4.89	-3.24E-04		4.94E-04	0.764
	806.18	1.26	9.99E-05		2.37E-03	0.701
	934.06	3.11	-2.74E-04		1.21E-03	0.769
	1120.29	14.92	3.34E-05		2.25E-04	0.769
	1155.21	1.63	-3.48E-04		1.72E-03	0.765
	1238.12	5.83	-1.68E-05		3.15E-04	0.769
	1280.98	1.43	-5.28E-05		1.17E-03	0.769
	1377.67	3.99	1.68E-06		1.91E-04	1.160
	1385.31	0.79	2.48E-04		1.46E-03	0.769
	1401.52	1.33	-1.88E-04		8.29E-04	0.769
	1407.99	2.39	4.63E-05		4.90E-04	0.769
	1509.21	2.13	-3.45E-05		5.00E-04	0.791
	1661.27	1.05	2.19E-04		8.90E-04	1.010
	1729.59	2.88	2.59E-05		1.97E-04	1.654
	1764.49	15.30	1.11E-05		6.81E-05	1.009
	1847.43	2.03	4.12E-05		3.74E-04	1.344
> Pb-214	2118.51	1.16	0.00E+00	2.99E-05	0.00E+00	1.227
	241.99	7.25	-1.64E-05		1.07E-04	0.998
	295.22	18.42	2.83E-05		5.32E-05	1.001
	351.93	35.60	6.99E-06	1.18E-04	2.99E-05	free
	785.96	1.06	-3.65E-04		1.94E-03	0.998
	74.82	5.80	-4.79E-05		2.28E-04	miss
+ Pb214-XR	77.11	9.70	-3.39E-05		1.18E-04	miss
	87.35	2.24	-6.97E-05		3.64E-04	miss
	89.78	0.82	1.95E-04		1.02E-03	miss
+ Ra-226	186.21	3.64	3.34E-05	1.77E-04	1.77E-04	free
+ Ac-228	129.07	2.42	-1.98E-04	8.86E-05	3.19E-04	0.786
	209.25	3.89	8.79E-05		2.25E-04	0.905
	270.24	3.46	-7.46E-06		2.77E-04	0.827
	328.00	2.95	-4.15E-05		3.81E-04	0.824
	338.32	11.27	1.94E-05		8.86E-05	0.971
	409.46	1.92	3.24E-07		7.76E-04	0.747
	463.00	4.40	1.53E-04		3.96E-04	0.720
	794.95	4.25	-6.73E-05		6.41E-04	0.748
	911.20	25.80	-7.97E-05		1.10E-04	0.958
	964.77	4.99	-1.44E-05		6.33E-04	0.917
	968.97	15.80	7.90E-05		1.90E-04	0.957
	1588.20	3.22	8.62E-05		3.13E-04	1.012
+ Pa-231	27.36	10.30	1.18E-04	3.34E-04	3.34E-04	0.987
	283.69	1.70	-5.48E-05		5.30E-04	0.999

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10001

6708AIOISM001 U1 TB1 642' Particle from grid 1

Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
Pa-231	300.07	2.47	-7.99E-05	3.34E-04	3.62E-04	1.000
	302.65	2.20	9.79E-05		4.44E-04	1.000
	330.06	1.40	-2.86E-04		6.68E-04	1.001
+ Th-234	92.38	2.13	8.95E-06	3.98E-04	3.98E-04	free
	92.80	2.10	5.17E-06		4.03E-04	free
	112.81	0.21	6.31E-04		3.05E-03	free
+ U-235	143.76	10.96	-1.80E-05	1.17E-05	5.53E-05	free
	163.33	5.08	6.49E-05		1.35E-04	free
	185.71	57.20	6.46E-06		1.17E-05	free
	202.11	1.08	-1.72E-04		6.41E-04	miss
	205.31	5.01	-2.06E-05		1.48E-04	free
+ Am-241	59.54	35.90	3.47E-05	8.26E-05	8.26E-05	free

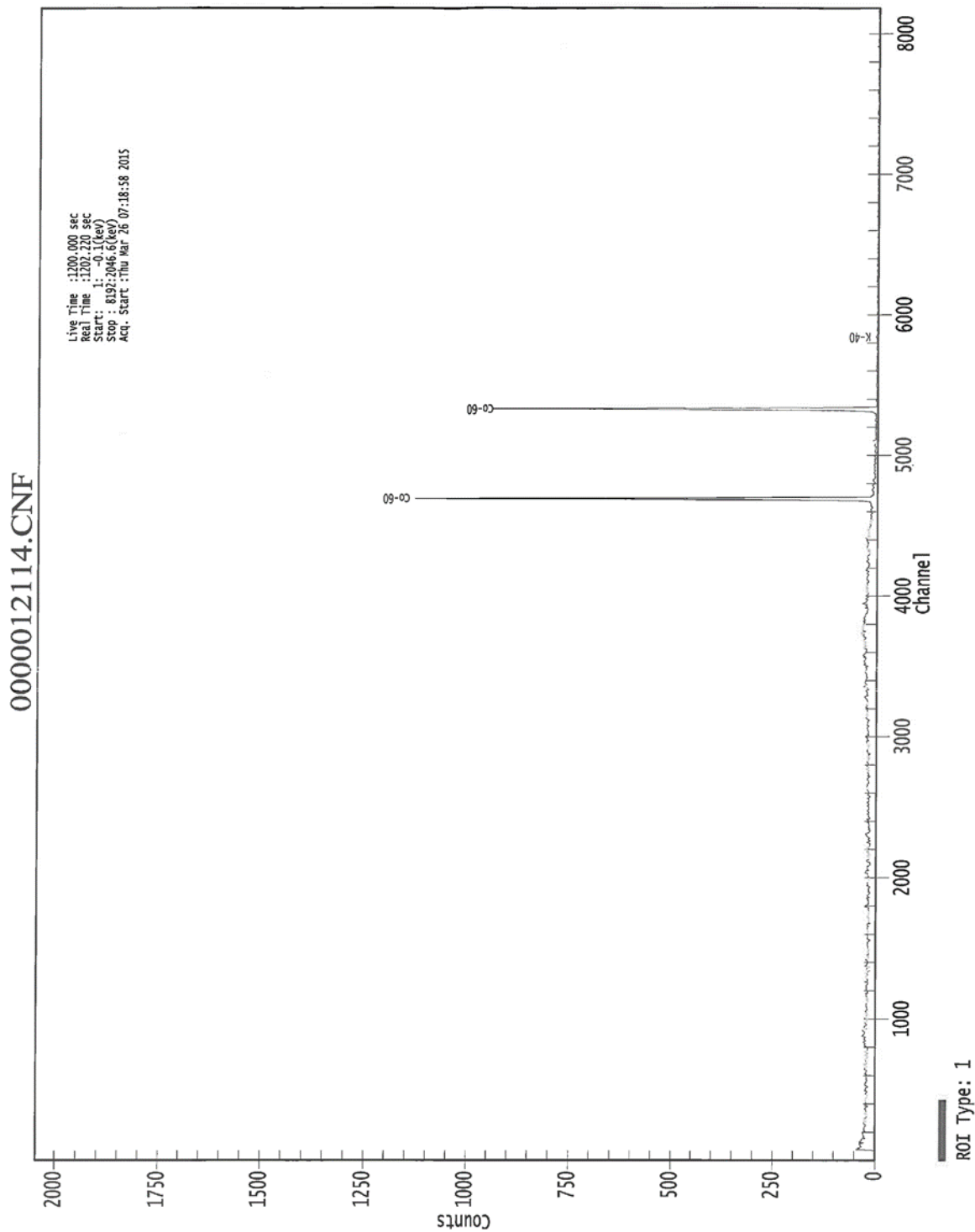
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

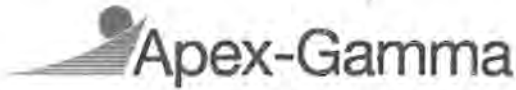
free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-27 06708A Gamma Spectroscopy Reports



Attachment Figure 2-28 06708B Gamma Spectroscopy Reports



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Analysis Report for 26-Mar-15-10002
6708BBIOSM001 TB1 642' particle expansion joint

GAMMA SPECTRUM ANALYSIS

Sample Identification	: 26-Mar-15-10002
Sample Description	: 6708BBIOSM001 TB1 642' particle expansion joint
Sample Type	: Hot Count Lab
Unit	:
Sample Point	:
Sample Size	: 1.000E+00 units
Facility	: Default
Sample Taken On	: 3/24/2015 3:00:00PM
Acquisition Started	: 3/26/2015 7:42:47AM
Procedure	: Non Quantitative Smear
Operator	: Administrator
Detector Name	: DET02
Geometry	: smear nqf
Live Time	: 1200.0 seconds
Real Time	: 1208.6 seconds
Dead Time	: 0.71 %
Peak Locate Threshold	: 2.80
Peak Locate Range (in channels)	: 120 - 8192
Peak Area Range (in channels)	: 120 - 8192
Identification Energy Tolerance	: 1.000FWHM
Energy Calibration Used Done On	: 12/3/2014
Efficiency Calibration Used Done On	: 10/28/2014
Efficiency Calibration Description	:
Sample Number	: 12115

Handwritten signature and date: 3/26/15

PEAK WITH NID REPORT

Peak Analysis Performed on	: 3/26/2015 8:02:57AM
Peak Analysis From Channel	: 120
Peak Analysis To Channel	: 8192
Tentative NID Library	: C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB
Peak Match Tolerance	: 1.000FWHM

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002

6708BIOISM001 TB1 642' particle expansion joint

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1173.11	4675 -	4710	4693.23	6.23E+04	523.64	4.15E+03	Co-60
2	1332.36	5312 -	5349	5330.78	5.62E+04	486.87	1.98E+03	Co-60
3	2026.53	8103 -	8120	8111.55	2.95E+01	30.52	2.23E+02	Ag-110m

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/units)	Activity Uncertainty	Coinc Corr
Co-60	0.99	1173.23 *	99.85	2.97E-02	2.39E-03	0.794
		1332.49 *	99.98	2.92E-02	2.35E-03	0.790

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002
6708BIOSM001 TB1 642' particle expansion joint

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (uCi/units)	Wt mean Activity Uncertainty	Comments
Co-60	0.999	2.95E-02	1.68E-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

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002

0708BIOSM001 TB1 642' particle expansion joint

UNIDENTIFIED PEAKS

Peak Locate Performed on : 3/26/2015 8:02:57AM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
3	2026.53	2.45551E-02	51.78		

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 : C:\Canberra\Apex\Root\Default\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
+	K-40	1460.82	10.66	9.57E-05	2.49E-04	2.49E-04	miss
+	Cr-51	320.08	9.91	-7.23E-05	2.25E-04	2.25E-04	free
+	Mn-54	834.85	99.98	-2.45E-05	5.17E-05	5.17E-05	miss
+	Co-58	810.76	99.45	-1.65E-06	4.77E-05	4.77E-05	0.999
		1674.73	0.52	3.18E-04		4.35E-03	1.126
+	Co-60	1173.23	* 99.85	2.97E-02	9.45E-05	1.23E-04	0.794
		1332.49	* 99.98	2.92E-02		9.45E-05	0.790
+	Nb-94	702.65	99.81	-5.26E-08	5.04E-05	5.04E-05	0.778
		871.09	99.89	2.54E-05		7.47E-05	0.774
+	Sn-113	255.13	2.11	7.33E-05	3.65E-05	8.56E-04	free
		391.70	64.97	-7.31E-07		3.65E-05	free
+	Cs-134	475.36	1.48	-3.69E-04	4.75E-05	1.79E-03	miss
		563.25	8.34	1.91E-04		6.25E-04	0.618
		569.33	15.37	8.02E-05		3.55E-04	0.592
		604.72	97.62	1.61E-06		4.75E-05	0.733
		795.86	85.46	-8.62E-06		7.08E-05	0.732
		801.95	8.69	-1.79E-04		8.44E-04	0.620
		1038.61	0.99	-2.71E-04		8.16E-03	0.765

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002

6708BIOSM001 TB1 642' particle expansion joint

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Cs-134	1167.97	1.79	-8.32E-03	4.75E-05	2.72E-03	1.385
		1365.19	3.02	-2.89E-05		5.20E-04	1.567
+	Cs-137	661.66	85.10	1.70E-05	4.46E-05	4.46E-05	miss
+	Eu-152	121.78	28.67	-1.47E-05	6.43E-05	6.43E-05	0.767
		244.70	7.61	-6.40E-05		3.10E-04	0.733
		295.94	0.45	2.54E-04		4.71E-03	miss
		344.28	26.60	-3.02E-05		9.72E-05	0.835
		367.79	0.86	-2.90E-04		4.59E-03	0.569
		411.12	2.24	-4.22E-05		1.69E-03	0.645
		443.96	2.83	8.10E-04		1.24E-03	0.734
		488.68	0.42	2.00E-03		6.54E-03	miss
		563.99	0.49	-3.22E-03		8.65E-03	0.734
		586.26	0.46	-3.97E-04		9.59E-03	0.753
		678.62	0.47	-3.77E-03		1.39E-02	0.569
		688.67	0.86	-8.81E-04		5.09E-03	0.885
		719.35	0.28	-1.09E-03		1.43E-02	miss
		778.90	12.96	1.85E-05		4.47E-04	0.763
		810.45	0.32	-3.06E-05		1.13E-02	1.280
		867.37	4.26	-1.19E-03		1.93E-03	0.671
		919.33	0.43	1.15E-03		1.70E-02	0.885
		964.08	14.65	1.93E-04		4.11E-04	1.127
		1085.87	10.24	1.02E-04		5.45E-04	1.105
		1089.74	1.73	2.95E-04		4.69E-03	0.788
		1112.07	13.69	2.35E-04		5.16E-04	0.936
		1212.95	1.43	9.62E-04		4.11E-03	0.672
		1249.94	0.19	1.32E-05		1.18E-02	1.433
		1299.14	1.63	2.62E-04		2.46E-03	0.753
		1408.01	21.07	2.11E-05		1.35E-04	0.895
		1457.64	0.50	3.36E-04		3.83E-03	1.335
		1528.10	0.28	2.08E-03		8.74E-03	1.007
+	Eu-154	123.07	40.40	-8.81E-06	4.55E-05	4.55E-05	0.767
		247.93	6.89	4.86E-05		3.65E-04	0.713
		591.76	4.95	-1.66E-04		1.02E-03	0.661
		692.42	1.78	-8.65E-04		2.98E-03	0.729
		723.30	20.06	6.08E-05		2.71E-04	0.738
		756.80	4.52	-2.06E-04		1.47E-03	0.639
		873.18	12.08	1.40E-04		6.77E-04	0.711
		996.29	10.48	5.22E-06		6.56E-04	0.895
		1004.76	18.01	5.49E-06		3.84E-04	0.882
		1274.43	34.80	-5.34E-06		1.01E-04	0.890
		1596.48	1.80	-3.33E-04		6.62E-04	1.864
+	Eu-155	45.30	1.31	1.24E-03	6.19E-05	4.80E-03	0.995
		60.01	1.22	-2.50E-03		4.65E-03	0.999
		86.55	30.70	1.55E-05		6.19E-05	free
		105.31	21.10	-2.98E-05		6.83E-05	1.000
+	Tl-208	583.19	85.00	2.36E-06	5.22E-05	5.22E-05	0.758
+	Bi-211	351.07	13.02	1.73E-05	1.71E-04	1.71E-04	miss
+	Pb-211	404.85	3.78	5.64E-05	6.42E-04	6.42E-04	miss
		427.09	1.76	4.74E-04		1.39E-03	miss
		832.01	3.52	2.96E-04		1.48E-03	miss
+	Bi-212	39.86	1.06	1.92E-03	6.41E-04	6.10E-03	0.993

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002

6708BIOISM001 TB1 642' particle expansion joint

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Bi-212	727.33	6.67	-1.37E-05	6.41E-04	6.41E-04	0.928
		785.37	1.10	3.98E-04		5.31E-03	0.774
		1620.50	1.47	1.18E-05		1.60E-03	1.032
+	Pb-212	115.18	0.60	-5.04E-04	3.99E-05	2.47E-03	miss
		238.63	43.60	-1.11E-05		3.99E-05	free
		300.09	3.30	-3.15E-04		6.12E-04	free
+	Pb212-XR	74.82	10.28	1.42E-04	1.53E-04	2.84E-04	miss
		77.11	17.10	4.69E-05		1.53E-04	miss
		87.35	3.97	1.27E-04		4.72E-04	miss
		89.78	1.46	4.60E-04		1.23E-03	miss
+	Bi-214	609.32	45.49	6.70E-06	9.45E-05	9.45E-05	0.798
		768.36	4.89	-2.70E-04		1.15E-03	0.764
		806.18	1.26	4.34E-04		5.24E-03	0.701
		934.06	3.11	-8.41E-04		2.76E-03	0.769
		1120.29	14.92	-1.49E-04		5.10E-04	0.769
		1155.21	1.63	2.26E-03		4.11E-03	0.765
		1238.12	5.83	-1.02E-04		7.44E-04	0.769
		1280.98	1.43	2.63E-05		2.78E-03	0.769
		1377.67	3.99	9.80E-05		5.37E-04	1.160
		1385.31	0.79	1.32E-03		4.08E-03	0.769
		1401.52	1.33	-5.56E-04		2.36E-03	0.769
		1407.99	2.39	2.16E-04		1.38E-03	0.769
		1509.21	2.13	-5.21E-04		1.34E-03	0.791
		1661.27	1.05	8.97E-05		2.46E-03	1.010
		1729.59	2.88	5.48E-05		5.69E-04	1.654
		1764.49	15.30	5.35E-07		1.75E-04	1.009
		1847.43	2.03	-1.30E-04		1.01E-03	1.344
>		2118.51	1.16	0.00E+00		0.00E+00	1.227
+	Pb-214	241.99	7.25	3.83E-05	6.34E-05	2.46E-04	0.998
		295.22	18.42	5.90E-05		1.16E-04	1.001
		351.93	35.60	2.44E-05		6.34E-05	free
		785.96	1.06	-1.36E-04		4.26E-03	0.998
+	Pb214-XR	74.82	5.80	2.51E-04	2.70E-04	5.03E-04	miss
		77.11	9.70	8.27E-05		2.70E-04	miss
		87.35	2.24	2.26E-04		8.37E-04	miss
		89.78	0.82	8.19E-04		2.18E-03	miss
+	Ra-226	186.21	3.64	-4.83E-05	3.91E-04	3.91E-04	free
+	Ac-228	129.07	2.42	1.83E-05	2.07E-04	7.31E-04	0.786
		209.25	3.89	-5.08E-05		4.66E-04	0.905
		270.24	3.46	1.72E-04		6.55E-04	0.827
		328.00	2.95	7.88E-05		9.02E-04	0.824
		338.32	11.27	1.01E-04		2.07E-04	0.971
		409.46	1.92	2.54E-04		1.70E-03	0.747
		463.00	4.40	2.63E-04		8.30E-04	0.720
		794.95	4.25	-1.92E-04		1.39E-03	0.748
		911.20	25.80	-5.05E-06		2.57E-04	0.958
		964.77	4.99	5.47E-04		1.47E-03	0.917
		968.97	15.80	-1.49E-04		4.19E-04	0.957
		1588.20	3.22	-4.95E-05		7.74E-04	1.012
+	Pa-231	27.36	10.30	-2.70E-04	6.69E-04	6.69E-04	0.987
		283.69	1.70	1.32E-03		1.27E-03	0.999

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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Analysis Report for 26-Mar-15-10002

6708BIOSM001 TB1 642' particle expansion joint

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/units)	Nuclide MDA (uCi/units)	Line MDA (uCi/units)	Coinc Corr
	Pa-231	300.07	2.47	-4.20E-04	6.69E-04	8.18E-04	1.000
		302.65	2.20	-1.90E-04		9.48E-04	1.000
		330.06	1.40	-4.61E-04		1.54E-03	1.001
+	Th-234	92.38	2.13	-1.79E-04	8.14E-04	8.14E-04	free
		92.80	2.10	-9.03E-05		8.24E-04	free
		112.81	0.21	4.63E-04		6.73E-03	free
+	U-235	143.76	10.96	5.40E-05	2.51E-05	1.30E-04	free
		163.33	5.08	4.23E-05		2.78E-04	free
		185.71	57.20	-9.89E-07		2.51E-05	free
		202.11	1.08	5.06E-04		1.41E-03	miss
		205.31	5.01	-1.45E-04		2.99E-04	free
+	Am-241	59.54	35.90	-9.64E-05	1.63E-04	1.63E-04	free

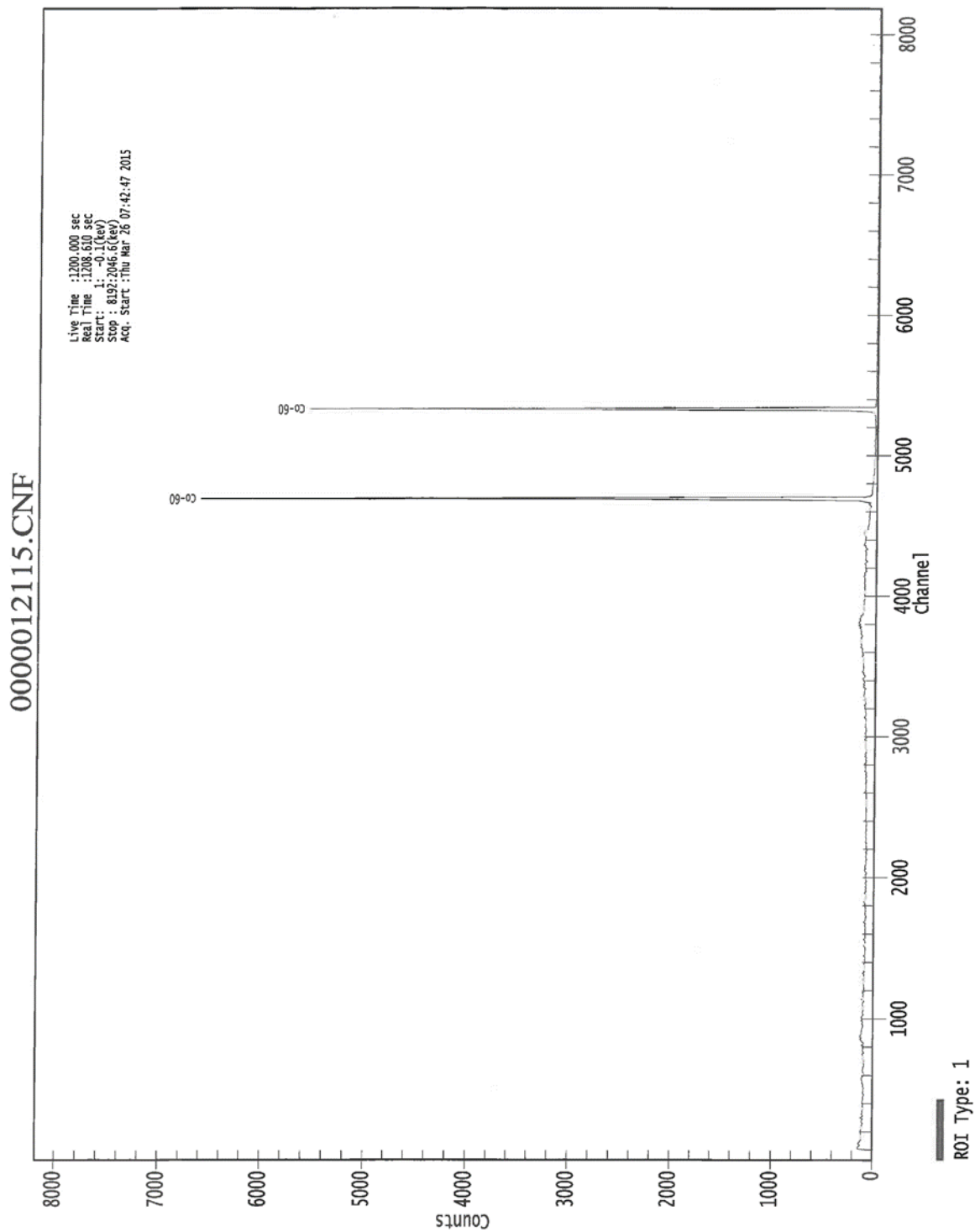
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports



Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\3-24-15\20150324125756.cnf

Report Generated On : 3/24/2015 12:54:54 PM

Sample Title : #6 @ 6708B
Sample Description : Floor
Sample Identification :
Sample Type :
Sample Geometry :

Spot was covered & sealed.

*vb
3/24/2015*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

*Spot was
removed*

Sample Size : 1.000E+000 Floor

*vb
3/25/2015*

Sample Taken On : 3/24/2015 12:41:33 PM
Acquisition Started : 3/24/2015 12:41:33 PM

Live Time : 897.2 seconds
Real Time : 900.0 seconds

Dead Time : 0.31 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst RJ Rolsen

Date 3/24/15

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2015 12:54:54 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: #6 @ 6708B

Peak Analysis Performed on: 3/24/2015 12:54:54 PM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	64	53.63	39.09	1.67	2.96E+003	279.83	2.82E+003
2	434-	488	461.64	345.10	0.95	3.68E+002	371.83	4.35E+003
3	1510-	1607	1558.87	1164.58	2.18	3.55E+002	173.68	1.01E+003
4	1719-	1823	1771.52	1322.82	1.47	2.29E+002	104.33	3.31E+002
5	1891-	1999	1945.69	1452.28	3.46	2.22E+003	164.57	6.61E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 12:54:54 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: #6 @ 6708B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Floo)	Activity Uncertainty
LaBr3	0.658	34.70*	66.40	4.11609E+001	9.10540E+000
		788.70	33.60		
		1436.80*	66.40	8.82285E+001	9.62612E+000
K-40	0.980	1460.82*	10.66	5.49566E+002	6.27667E+001
Co-60	0.977	1173.23*	99.85	7.78128E+000	3.85832E+000
		1332.49*	99.98	5.61868E+000	2.59528E+000
Ba-133	0.984	79.61	2.65		
		81.00	32.90		
		276.40	7.16		
		302.85	18.34		
		356.01*	62.05	4.56794E+000	4.67302E+000
		383.85	8.94		
Bi-211	0.990	351.07*	13.02	2.17697E+001	2.22741E+001
Pb-214	0.993	241.99	7.25		
		295.22	18.42		
		351.93*	35.60	7.96182E+000	8.14504E+000
		785.96	1.06		
Ac-228	0.343	129.07	2.42		
		209.25	3.89		
		270.24	3.46		
		328.00	2.95		
		338.32*	11.27	2.51500E+001	2.57426E+001
		409.46	1.92		
		463.00	4.40		
		794.95	4.25		
		911.20	25.80		
		964.77	4.99		
		968.97	15.80		
		1588.20	3.22		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 12:54:54 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Floo)	Wt mean Activity Uncertainty
	LaBr3	0.658	4.116089E+001	9.105405E+000
	K-40	0.980	2.931793E+002	8.253472E+001
	Co-60	0.977	6.292352E+000	2.153444E+000
X	Cu-64	0.862		
?	Ba-133	0.984	4.567944E+000	4.673025E+000
X	Eu-152	0.998		
?	Bi-211	0.990	2.176966E+001	2.227406E+001
?	Pb-214	0.993	7.961824E+000	8.145038E+000
?	Ac-228	0.343	2.515004E+001	2.574256E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 12:54:54 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

iclude MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: #6 @ 6708B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Floo)	Nuclide MDA (pCi/Floo)	Activity (pCi/Floo)	Dec. Level (pCi/Floo)
+	LaBr3	34.70*	66.40	5.935E+000	5.93E+000	4.116E+001	2.948E+000
		788.70	33.60	7.721E+000		2.392E+000	3.797E+000
		1436.80*	66.40	8.937E+000		8.823E+001	4.415E+000
+	K-40	1460.82*	10.66	5.567E+001	5.57E+001	5.496E+002	2.750E+001
	Cr-51	320.08	9.91	2.108E+001	2.11E+001	-1.815E+000	1.044E+001
	Mn-54	834.85	99.98	2.922E+000	2.92E+000	7.659E-001	1.439E+000
	Co-58	810.76	99.45	2.922E+000	2.92E+000	2.042E+000	1.439E+000
+	Co-60	1173.23*	99.85	6.174E+000	4.09E+000	7.781E+000	3.057E+000
		1332.49*	99.98	4.090E+000		5.619E+000	2.012E+000
	Nb-94	702.65	99.81	2.059E+000	2.06E+000	9.639E-001	1.010E+000
		871.09	99.89	2.929E+000		2.982E-001	1.441E+000
	Sn-113	255.13	2.11	1.107E+002	2.98E+000	-4.803E+001	5.496E+001
		391.70	64.97	2.976E+000		-8.420E-001	1.470E+000
	Cs-137	661.66	85.10	2.324E+000	2.32E+000	-1.486E+000	1.141E+000
	Eu-152	121.78	28.67	1.162E+001	1.16E+001	-3.410E-001	5.787E+000
		244.70	7.61	3.176E+001		-5.487E+000	1.577E+001
		295.94	0.45	4.865E+002		2.203E+002	2.412E+002
		344.28*	26.60	1.769E+001		1.066E+001	8.808E+000
		367.79	0.86	2.256E+002		7.899E+001	1.115E+002
		411.12	2.24	8.612E+001		5.619E+000	4.252E+001
		443.96	2.83	6.744E+001		-4.712E+001	3.326E+001
		488.68	0.42	4.556E+002		-7.215E+001	2.244E+002
		563.99	0.49	4.059E+002		-1.009E+002	1.997E+002
		586.26	0.46	4.629E+002		-2.277E+002	2.279E+002
		678.62	0.47	4.239E+002		-2.591E+001	2.080E+002
		688.67	0.86	2.376E+002		1.417E+001	1.166E+002
		719.35	0.28	7.163E+002		-2.495E+002	3.512E+002
		778.90	12.96	1.867E+001		-2.347E+000	9.171E+000
		810.45	0.32	9.051E+002		6.324E+002	4.458E+002
		867.37	4.26	6.855E+001		-2.996E+001	3.374E+001
		919.33	0.43	6.874E+002		3.008E+002	3.381E+002
		964.08	14.65	1.958E+001		7.523E+000	9.620E+000
		1085.87	10.24	2.532E+001		-8.748E-001	1.239E+001
		1089.74	1.73	1.506E+002		6.169E+001	7.369E+001
		1112.07	13.69	1.930E+001		-3.399E+000	9.441E+000
		1212.95	1.43	1.928E+002		1.032E+002	9.422E+001
		1249.94	0.19	1.172E+003		1.680E+002	5.693E+002
		1299.14*	1.63	2.516E+002		3.457E+002	1.238E+002
		1408.01	21.07	1.780E+001		-7.433E+000	8.737E+000
		1457.64*	0.50	1.180E+003		1.165E+004	5.828E+002
		1528.10	0.28	2.670E+002		-1.151E+002	1.203E+002
	Eu-154	123.07	40.40	8.209E+000	5.53E+000	1.326E+000	4.086E+000

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Floo)	Nuclide MDA (pCi/Floo)	Activity (pCi/Floo)	Dec. Level (pCi/Floo)
	Eu-154	247.93	6.89	3.490E+001	5.53E+000	6.804E+000	1.733E+001
		591.76	4.95	4.330E+001		-5.602E+000	2.132E+001
		692.42	1.78	1.146E+002		-4.398E+001	5.623E+001
		723.30	20.06	9.901E+000		-5.214E+000	4.853E+000
		756.80	4.52	4.596E+001		-4.615E+001	2.253E+001
		873.18	12.08	2.412E+001		-1.010E+001	1.187E+001
		996.29	10.48	2.561E+001		6.483E-001	1.256E+001
		1004.76	18.01	1.454E+001		-1.063E+001	7.124E+000
		1274.43	34.80	5.534E+000		-8.872E-002	2.75E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.549E+002	1.20E+001	-9.007E+000	1.265E+002
		60.01	1.22	3.259E+002		-2.624E+001	1.620E+002
		86.55	30.70	1.205E+001		8.897E-001	5.996E+000
		105.31	21.10	1.668E+001		2.118E+000	8.302E+000
	Tl-208	583.19	85.00	2.510E+000	2.51E+000	1.621E+000	1.236E+000
+	Bi-211	351.07*	13.02	3.615E+001	3.62E+001	2.177E+001	1.800E+001
	Pb-211	404.85	3.78	5.135E+001	5.14E+001	3.712E+001	2.536E+001
		427.09	1.76	1.071E+002		-5.851E+000	5.285E+001
		832.01	3.52	8.298E+001		-3.100E+001	4.086E+001
	Bi-212	39.86	1.06	2.941E+002	2.99E+001	2.561E+003	1.459E+002
		727.33	6.67	2.987E+001		5.173E+000	1.464E+001
		785.37	1.10	2.275E+002		-1.431E+002	1.119E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	5.569E+002	5.64E+000	2.011E+002	2.772E+002
		238.63	43.60	5.644E+000		2.891E+000	2.803E+000
		300.09	3.30	6.505E+001		1.508E+001	3.224E+001
	Pb212-XR	74.82	10.28	3.787E+001	2.24E+001	2.339E+001	1.884E+001
		77.11	17.10	2.235E+001		1.043E+001	1.112E+001
		87.35	3.97	9.258E+001		7.867E+001	4.608E+001
		89.78	1.46	2.487E+002		-9.733E+001	1.238E+002
	Bi-214	609.32	45.49	4.784E+000	4.78E+000	4.932E+000	2.355E+000
		768.36	4.89	4.547E+001		-3.761E+001	2.231E+001
		806.18	1.26	2.279E+002		2.071E+002	1.122E+002
		934.06	3.11	9.479E+001		-9.901E+001	4.661E+001
		1120.29	14.92	1.786E+001		-9.355E+000	8.737E+000
		1155.21	1.63	2.015E+002		3.275E+002	9.897E+001
		1238.12	5.83	4.106E+001		1.125E+001	1.999E+001
		1280.98	1.43	1.367E+002		-5.753E+001	6.612E+001
		1377.67	3.99	4.200E+001		-8.160E+001	2.014E+001
		1385.31	0.79	2.632E+002		-7.244E+002	1.272E+002
		1401.52	1.33	2.417E+002		-2.075E+002	1.182E+002
		1407.99	2.39	1.567E+002		-6.542E+001	7.689E+001
		1509.21	2.13	8.136E+001		-6.329E+001	3.895E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99	7.25	3.366E+001	1.19E+001	4.900E+000	1.672E+001
		295.22	18.42	1.189E+001		8.840E+000	5.893E+000
		351.93*	35.60	1.322E+001		7.962E+000	6.581E+000

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Floo)	Nuclide MDA (pCi/Floo)	Activity (pCi/Floo)	Dec. Level (pCi/Floo)
+	Pb-214	785.96	1.06	2.369E+002	1.19E+001	-2.517E+002	1.165E+002
	Pb214-XR	74.82	5.80	6.712E+001	3.94E+001	4.146E+001	3.339E+001
		77.11	9.70	3.941E+001		1.839E+001	1.961E+001
		87.35	2.24	1.641E+002		1.394E+002	8.167E+001
		89.78	0.82	4.428E+002		-1.733E+002	2.204E+002
	Ra-226	186.21	3.64	7.341E+001	7.34E+001	1.127E+001	3.651E+001
+	Ac-228	129.07	2.42	1.340E+002	1.14E+001	8.740E+001	6.669E+001
		209.25	3.89	6.668E+001		-1.406E+001	3.314E+001
		270.24	3.46	6.662E+001		-3.737E+001	3.305E+001
		328.00	2.95	6.987E+001		-1.683E+001	3.460E+001
		338.32*	11.27	4.176E+001		2.515E+001	2.079E+001
		409.46	1.92	1.004E+002		2.134E+000	4.957E+001
		463.00	4.40	4.287E+001		5.853E+000	2.113E+001
		794.95	4.25	6.411E+001		1.012E+002	3.155E+001
		911.20	25.80	1.143E+001		-2.961E+000	5.621E+000
		964.77	4.99	5.745E+001		2.170E+001	2.822E+001
		968.97	15.80	1.810E+001		4.331E+000	8.890E+000
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	2.426E-001	2.43E-001	0.000E+000	0.000E+000
		283.69	1.70	1.315E+002		1.405E+001	6.520E+001
		300.07	2.47	8.691E+001		2.015E+001	4.307E+001
		302.65	2.20	9.656E+001		-1.721E+001	4.785E+001
		330.06	1.40	1.477E+002		-1.045E+000	7.311E+001
	Th-234	92.38	2.13	1.692E+002	1.69E+002	4.522E+001	8.422E+001
		92.80	2.10	1.713E+002		4.578E+001	8.527E+001
		112.81	0.21	1.604E+003		1.485E+003	7.986E+002
	U-235	143.76	10.96	2.742E+001	4.69E+000	1.797E+001	1.365E+001
		163.33	5.08	5.608E+001		-2.056E+001	2.790E+001
		185.71	57.20	4.692E+000		2.616E+000	2.333E+000
		202.11	1.08	2.362E+002		-3.173E+001	1.174E+002
		205.31	5.01	5.230E+001		5.584E+000	2.600E+001
	Am-241	59.54	35.90	1.121E+001	1.12E+001	-9.023E-001	5.569E+000

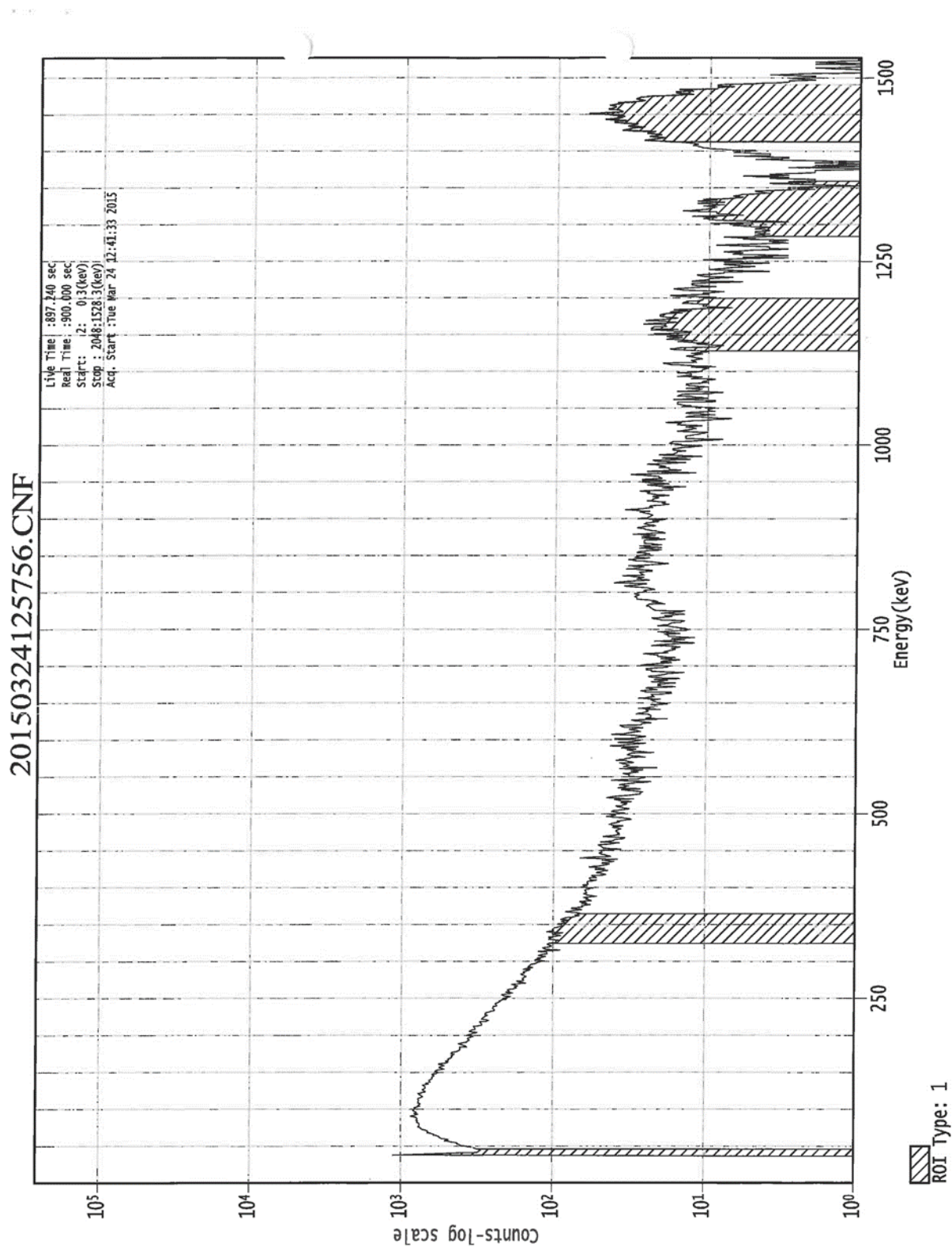
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-28 06708B Gamma Spectroscopy Reports



Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

*** G A M M A S I C T R U M A N A L Y S I S ***

Filename: C:\Canberra\3-24-15\20150324124100.cnf

Report Generated On : 3/24/2015 12:48:08 PM

Sample Title : #65 @ 6708D

Sample Description : monitor

Sample Identification :

Sample Type :

Sample Geometry :

Peak Locate Threshold : 3.00

Peak Locate Range (in channels) : 1 - 2048

Peak Area Range (in channels) : 1 - 2048

Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 units

Sample Taken On : 3/24/2015 12:25:36 PM

Acquisition Started : 3/24/2015 12:25:36 PM

Live Time : 897.8 seconds

Real Time : 900.0 seconds

Dead Time : 0.25 %

Energy Calibration Used Done On : 6/18/2004

Efficiency Calibration Used Done On : 7/15/2014

Efficiency ID : 1M_PAVEN

*The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.*

Analyst RJ Rios

Date 3/24/15

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

Peak Analysis Report

3/24/2015 12:48:08 PM

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*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5

Sample Title: #65 @ 6708D

Peak Analysis Performed on: 3/24/2015 12:48:07 PM

Peak Analysis From Channel: 1

Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.43	38.94	1.75	3.17E+003	205.12	1.25E+003
2	88-	116	102.57	75.84	7.28	8.20E+002	487.19	7.09E+003
3	1036-	1118	1077.36	805.57	0.81	3.60E+002	215.38	1.62E+003
4	1900-	2008	1954.76	1459.03	32.61	3.17E+003	175.52	6.44E+002

= First peak in a multiplet region

= Other peak in a multiplet region

= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 12:48:08 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: #65 @ 6708D
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.929	34.70*	66.40	4.40034E+001	9.25081E+000
		788.70*	33.60	1.70943E+001	1.04191E+001
		1436.80*	66.40	1.26339E+002	1.22967E+001
K-40	0.999	1460.82*	10.66	7.86950E+002	8.10747E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 12:48:08 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.929	3.214150E+001	6.917642E+000
K-40	0.999	5.867439E+002	8.788340E+001
X Co-58	0.992		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 12:48:07 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
2	75.84	9.1308E-001	59.43		

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

iclude MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: #65 @ 6708D
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	3.958E+000	3.96E+000	4.400E+001	1.960E+000
		788.70*	33.60	1.669E+001		1.709E+001	8.279E+000
		1436.80*	66.40	8.950E+000		1.263E+002	4.421E+000
+	K-40	1460.82*	10.66	5.575E+001	5.57E+001	7.869E+002	2.754E+001
	Cr-51	320.08	9.91	1.714E+001	1.71E+001	1.151E+000	8.469E+000
	Mn-54	834.85	99.98	2.952E+000	2.95E+000	-1.132E+000	1.454E+000
	Co-58	810.76*	99.45	5.638E+000	5.64E+000	5.775E+000	2.797E+000
	Co-60	1173.23	99.85	3.151E+000	1.74E+000	-9.532E-001	1.546E+000
		1332.49	99.98	1.744E+000		-2.665E-001	8.387E-001
	Nb-94	702.65	99.81	2.071E+000	2.07E+000	1.148E+000	1.016E+000
		871.09	99.89	3.037E+000		-1.317E+000	1.495E+000
	Sn-113	255.13	2.11	8.474E+001	2.59E+000	-8.544E+001	4.197E+001
		391.70	64.97	2.586E+000		-1.986E+000	1.275E+000
	Cs-137	661.66	85.10	2.299E+000	2.30E+000	1.420E+000	1.128E+000
	Eu-152	121.78	28.67	7.287E+000	6.72E+000	5.555E-001	3.618E+000
		244.70	7.61	2.466E+001		1.265E+001	1.222E+001
		295.94	0.45	3.924E+002		2.318E+002	1.941E+002
		344.28	26.60	6.720E+000		6.442E+000	3.321E+000
		367.79	0.86	1.959E+002		-3.340E+001	9.668E+001
		411.12	2.24	7.513E+001		5.397E+000	3.702E+001
		443.96	2.83	6.156E+001		4.901E+000	3.033E+001
		488.68	0.42	4.293E+002		1.957E+002	2.113E+002
		563.99	0.49	3.975E+002		-3.089E+001	1.955E+002
		586.26	0.46	4.613E+002		4.213E+000	2.271E+002
		678.62	0.47	4.182E+002		1.099E+002	2.052E+002
		688.67	0.86	2.349E+002		-2.121E+002	1.153E+002
		719.35	0.28	7.351E+002		-3.271E+002	3.605E+002
		778.90	12.96	1.810E+001		-2.223E+000	8.887E+000
		810.45	0.32	9.022E+002		8.099E+002	4.443E+002
		867.37	4.26	7.149E+001		2.998E+001	3.520E+001
		919.33	0.43	7.161E+002		2.314E+002	3.524E+002
		964.08	14.65	2.070E+001		3.529E+000	1.018E+001
		1085.87	10.24	2.706E+001		-2.515E+001	1.326E+001
		1089.74	1.73	1.617E+002		-6.665E+001	7.921E+001
		1112.07	13.69	2.129E+001		-8.106E+000	1.044E+001
		1212.95	1.43	2.209E+002		1.033E+002	1.083E+002
		1249.94	0.19	1.416E+003		-4.029E+002	6.915E+002
		1299.14	1.63	1.295E+002		2.380E+001	6.276E+001
		1408.01	21.07	1.493E+001		-6.484E+000	7.301E+000
		1457.64	0.50	1.424E+003		1.036E+004	7.049E+002
		1528.10	0.28	4.119E+002		-5.187E+002	1.928E+002
	Eu-154	123.07	40.40	5.155E+000	5.16E+000	-1.619E+000	2.560E+000

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.705E+001	5.16E+000	6.911E+000	1.341E+001
		591.76	4.95	4.328E+001		-7.615E+000	2.131E+001
		692.42	1.78	1.151E+002		1.100E+001	5.649E+001
		723.30	20.06	1.027E+001		-1.207E+000	5.039E+000
		756.80	4.52	4.689E+001		-1.472E+000	2.299E+001
		873.18	12.08	2.527E+001		3.348E+000	1.244E+001
		996.29	10.48	2.647E+001		-8.673E+000	1.299E+001
		1004.76	18.01	1.509E+001		-6.201E+000	7.398E+000
		1274.43	34.80	6.843E+000		1.394E+000	3.329E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	1.925E+002	7.28E+000	-2.089E+001	9.530E+001
		60.01	1.22	1.950E+002		-5.062E+001	9.651E+001
		86.55	30.70	7.279E+000		-1.327E+001	3.612E+000
		105.31	21.10	1.012E+001		2.380E+000	5.022E+000
	Tl-208	583.19	85.00	2.481E+000	2.48E+000	8.425E+001	1.221E+000
	Bi-211	351.07	13.02	1.343E+001	1.34E+001	8.458E+000	6.634E+000
	Pb-211	404.85	3.78	4.454E+001	4.45E+001	-4.236E+000	2.195E+001
		427.09	1.76	9.408E+001		-8.461E+001	4.633E+001
		832.01	3.52	8.385E+001		-6.388E+000	4.129E+001
	Bi-212	39.86	1.06	2.675E+002	3.12E+001	2.715E+003	1.326E+002
		727.33	6.67	3.117E+001		1.417E+001	1.529E+001
		785.37	1.10	2.225E+002		-1.643E+001	1.093E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.449E+002	4.38E+000	9.779E+001	1.712E+002
		238.63	43.60	4.377E+000		6.583E+000	2.170E+000
		300.09	3.30	5.283E+001		3.619E+001	2.613E+001
	Pb212-XR	74.82	10.28	2.373E+001	1.40E+001	4.184E+001	1.177E+001
		77.11	17.10	1.396E+001		1.837E+000	6.925E+000
		87.35	3.97	5.566E+001		-1.067E+000	2.762E+001
		89.78	1.46	1.486E+002		-8.377E+001	7.374E+001
	Bi-214	609.32	45.49	4.704E+000	4.70E+000	2.573E+000	2.315E+000
		768.36	4.89	4.472E+001		-1.459E+001	2.194E+001
		806.18	1.26	2.248E+002		2.095E+002	1.107E+002
		934.06	3.11	1.005E+002		-3.701E+001	4.944E+001
		1120.29	14.92	2.004E+001		1.864E+001	9.829E+000
		1155.21	1.63	1.915E+002		-1.672E+002	9.394E+001
		1238.12	5.83	4.937E+001		3.957E+001	2.415E+001
		1280.98	1.43	1.620E+002		-2.600E+001	7.874E+001
		1377.67	3.99	4.208E+001		-1.094E+002	2.018E+001
		1385.31	0.79	2.420E+002		-3.647E+002	1.167E+002
		1401.52	1.33	1.972E+002		-1.619E+002	9.600E+001
		1407.99	2.39	1.314E+002		-5.707E+001	6.426E+001
		1509.21	2.13	1.302E+002		-7.183E+001	6.335E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.624E+001	4.91E+000	4.590E+001	1.301E+001
		295.22	18.42	9.572E+000		9.931E+000	4.735E+000
		351.93	35.60	4.908E+000		2.986E+000	2.425E+000

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports

include MDA Report

3/24/2015 12:48:08 PM

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.339E+002	4.91E+000	-2.328E+000	1.150E+002
Pb214-XR	74.82	5.80	4.205E+001	2.46E+001	7.416E+001	2.086E+001
	77.11	9.70	2.461E+001		3.238E+000	1.221E+001
	87.35	2.24	9.866E+001		-1.891E+000	4.896E+001
	89.78	0.82	2.646E+002		-1.492E+002	1.313E+002
Ra-226	186.21	3.64	5.224E+001	5.22E+001	2.265E+001	2.592E+001
Ac-228	129.07	2.42	8.460E+001	1.19E+001	-9.883E-001	4.200E+001
	209.25	3.89	4.808E+001		-7.405E+001	2.384E+001
	270.24	3.46	5.106E+001		-3.507E+000	2.527E+001
	328.00	2.95	5.719E+001		-3.056E+001	2.826E+001
	338.32	11.27	1.534E+001		5.039E+000	7.580E+000
	409.46	1.92	8.736E+001		3.150E+001	4.306E+001
	463.00	4.40	3.962E+001		-8.519E+000	1.951E+001
	794.95	4.25	6.227E+001		6.806E+001	3.063E+001
	911.20	25.80	1.190E+001		-2.922E+000	5.859E+000
	964.77	4.99	6.085E+001		2.085E+001	2.992E+001
	968.97	15.80	1.913E+001		1.282E+001	9.407E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	1.034E+002		-4.847E+001	5.118E+001
	300.07	2.47	7.058E+001		4.835E+001	3.491E+001
	302.65	2.20	7.852E+001		4.632E+001	3.883E+001
	330.06	1.40	1.211E+002		1.675E+001	5.981E+001
Th-234	92.38	2.13	1.005E+002	1.00E+002	-1.029E+002	4.985E+001
	92.80	2.10	1.017E+002		-1.042E+002	5.047E+001
	112.81	0.21	9.840E+002		-2.626E+002	4.885E+002
U-235	143.76	10.96	1.775E+001	3.33E+000	-1.137E+001	8.813E+000
	163.33	5.08	3.781E+001		-4.353E+000	1.876E+001
	185.71	57.20	3.330E+000		2.635E+000	1.652E+000
	202.11	1.08	1.701E+002		-8.855E+001	8.434E+001
	205.31	5.01	3.772E+001		3.140E-002	1.871E+001
Am-241	59.54	35.90	6.707E+000	6.71E+000	-1.741E+000	3.319E+000

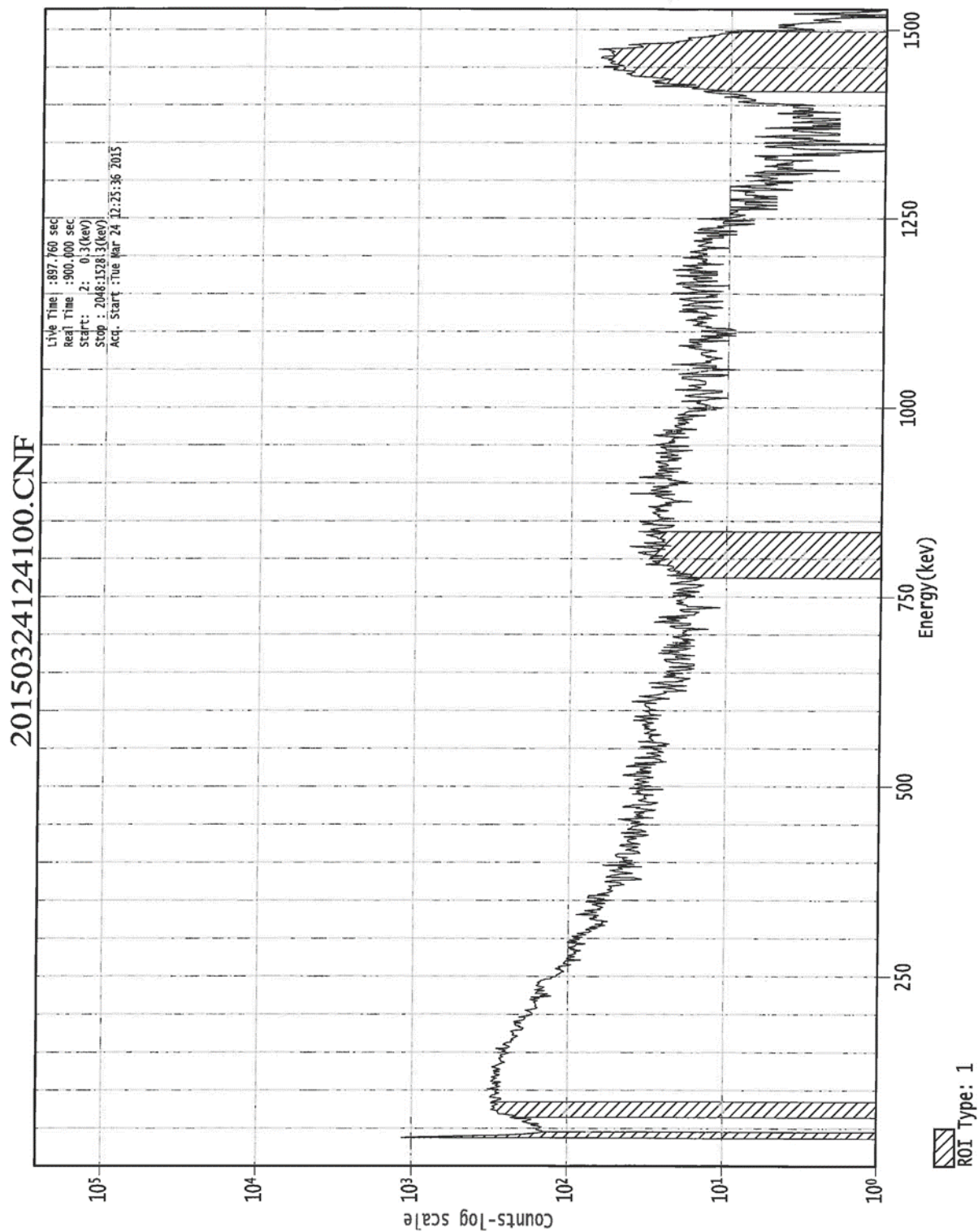
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

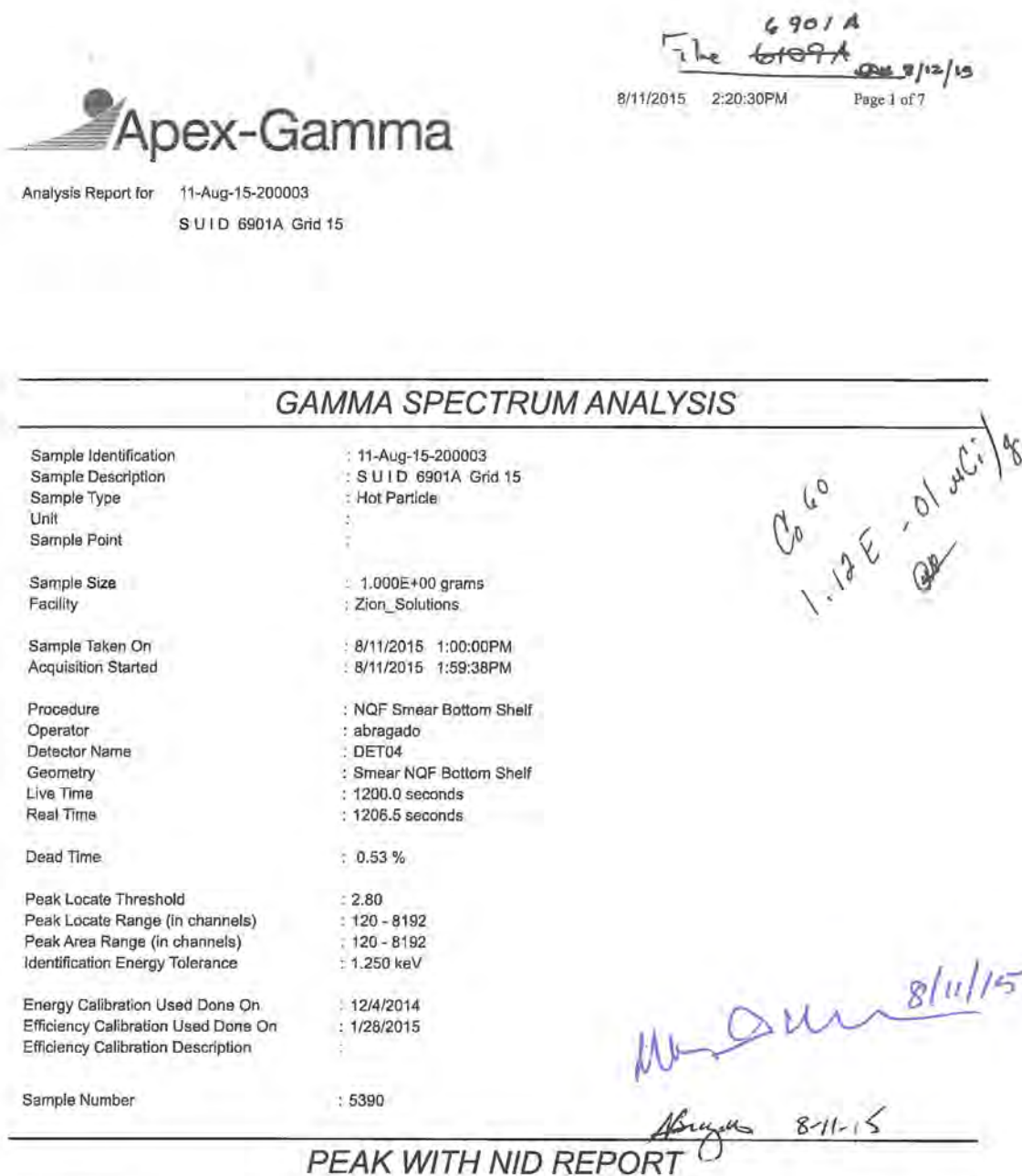
> = MDA value not calculated

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

Attachment Figure 2-29 06708D Gamma Spectroscopy Reports



Attachment Figure 2-30 06901A Gamma Spectroscopy Reports



Peak Analysis Performed on : 8/11/2015 2:19:47PM
Peak Analysis From Channel : 120
Peak Analysis To Channel : 8192
Tentative NID Library : C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB
Peak Match Tolerance : 1.250 keV

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-200003
S U I D 6901A Grid 15

Peak No.	Energy (keV)	ROI start	ROI end	Peak Centroid	Net Peak Area	Net Area Uncertainty	Continuum Counts	Tentative Nuclide
1	1173.14	4679 -	4707	4693.68	3.95E+04	411.07	1.79E+03	Co-60
2	1332.40	5316 -	5345	5331.43	3.57E+04	380.94	3.37E+02	Co-60

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 : C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield(%)	Activity (uCi/grams)	Activity Uncertainty	Coinc Corr
Co-60	0.99	1173.23	*	99.85	1.13E-01	9.09E-03
		1332.49	*	99.98	1.11E-01	8.96E-03

* = Energy line found in the spectrum.
- = Manually added nuclide.
? = Manually edited nuclide.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.250 keV
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000sigma
Coincidence correction performed.
free = No coincidence correction required.
miss = Nuclide energy was not found in the coincidence library.

INTERFERENCE CORRECTED REPORT

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

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Analysis Report for 11-Aug-15-200003

S U I D 6901A Grid 15

<i>Nuclide Name</i>	<i>Nuclide Id Confidence</i>	<i>Wt mean Activity (uCi/grams)</i>	<i>Wt mean Activity Uncertainty</i>	<i>Comments</i>
Co-60	0.999	1.12E-01	6.38E-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

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-200003
S U I D 6901A Grid 15

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UNIDENTIFIED PEAKS

Peak Locate Performed on : 8/11/2015 2:19:47PM
Peak Locate From Channel : 120
Peak Locate To Channel : 8192

Peak No.	Energy (keV)	Peak Size (CPS)	Peak CPS (%) Uncertainty	Peak Type	Tolerance Nuclide
All peaks were identified.					
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 : C:\Canberra\Apex\Root\Zion_Solutions\Library\Zion Lib-BNL.NLB

	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
+	K-40	1460.82	10.66	2.84E-04	8.19E-04	8.19E-04	miss
+	Cr-51	320.08	9.91	-4.62E-05	1.28E-03	1.28E-03	free
+	Mn-54	834.85	99.98	1.18E-04	3.07E-04	3.07E-04	miss
+	Co-58	810.76	99.45	-6.19E-05	2.86E-04	2.86E-04	1.000
		1674.73	0.52	3.89E-03		1.62E-02	1.017
+	Co-60	1173.23	* 99.85	1.13E-01	2.44E-04	4.99E-04	0.961
		1332.49	* 99.98	1.11E-01		2.44E-04	0.961
+	Nb-94	702.65	99.81	-2.37E-04	2.25E-04	2.25E-04	0.960
		871.09	99.89	-1.36E-04		3.25E-04	0.960
+	Ru-106	621.93	9.93	1.12E-03	2.17E-03	2.17E-03	miss
		1050.41	1.56	-4.98E-03		2.25E-02	miss
+	Sn-113	255.13	2.11	3.87E-03	2.12E-04	5.81E-03	free
		391.70	64.97	5.12E-05		2.12E-04	free
+	Sb-125	176.31	6.84	4.42E-04	4.71E-04	1.32E-03	free
		380.45	1.52	-1.86E-04		8.86E-03	free
		427.87	29.60	-2.24E-04		4.71E-04	1.000
		463.36	10.49	9.86E-05		1.43E-03	1.000
		600.60	17.65	2.32E-04		1.13E-03	1.000
		606.71	4.98	-1.17E-03		4.01E-03	1.000

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-200003
S U I D 6901A Grid 15

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	Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
	Sb-125	635.95	11.22	5.24E-05	4.71E-04	1.86E-03	1.000
		671.44	1.79	3.00E-03		1.27E-02	1.000
+	Cs-134	475.36	1.48	6.97E-03	2.24E-04	1.10E-02	miss
		563.25	8.34	-9.21E-04		2.38E-03	0.926
		569.33	15.37	-5.50E-04		1.34E-03	0.920
		604.72	97.62	1.46E-04		2.24E-04	0.951
		795.86	85.46	8.57E-05		3.36E-04	0.951
		801.95	8.69	7.26E-04		3.41E-03	0.926
		1038.61	0.99	-2.14E-03		3.75E-02	0.959
		1167.97	1.79	-2.45E-02		1.49E-02	1.065
		1365.19	3.02	4.98E-04		2.45E-03	1.101
+	Cs-137	661.66	85.10	-4.55E-05	2.59E-04	2.59E-04	miss
+	Eu-152	121.78	28.67	-1.06E-04	2.97E-04	2.97E-04	0.955
		244.70	7.61	8.41E-04		1.68E-03	0.949
		295.94	0.45	-3.80E-03		2.62E-02	miss
		344.28	26.60	1.49E-04		5.04E-04	0.970
		367.79	0.86	5.11E-03		1.68E-02	0.918
		411.12	2.24	-1.09E-03		6.75E-03	0.934
		443.96	2.83	4.72E-04		5.60E-03	0.949
		488.68	0.42	4.99E-03		3.80E-02	miss
		563.99	0.49	7.52E-03		4.05E-02	0.949
		586.26	0.46	3.92E-03		4.65E-02	0.958
		678.62	0.47	2.20E-02		5.28E-02	0.918
		688.67	0.86	-1.16E-02		2.63E-02	0.980
		719.35	0.28	2.72E-03		8.52E-02	miss
		778.90	12.96	4.66E-04		2.17E-03	0.960
		810.45	0.32	-3.40E-02		8.33E-02	1.048
		867.37	4.26	6.85E-04		7.82E-03	0.940
		919.33	0.43	4.32E-02		8.68E-02	0.980
		964.08	14.65	6.75E-04		2.68E-03	1.022
		1085.87	10.24	-9.63E-04		3.48E-03	1.017
		1089.74	1.73	4.11E-03		2.24E-02	0.964
		1112.07	13.69	-4.86E-04		2.80E-03	0.989
		1212.95	1.43	2.43E-04		1.38E-02	0.940
		1249.94	0.19	9.04E-03		7.02E-02	1.072
		1299.14	1.63	-2.01E-03		7.72E-03	0.958
		1408.01	21.07	7.85E-05		3.61E-04	0.982
		1457.64	0.50	-1.08E-03		1.35E-02	1.055
		1528.10	0.28	-1.57E-03		2.36E-02	0.999
+	Eu-154	123.07	40.40	-3.11E-05	2.14E-04	2.14E-04	0.956
		247.93	6.89	-3.62E-04		1.78E-03	0.946
		591.76	4.95	1.21E-03		4.32E-03	0.935
		692.42	1.78	1.69E-03		1.38E-02	0.950
		723.30	20.06	-4.80E-06		1.24E-03	0.952
		756.80	4.52	-1.73E-03		5.95E-03	0.933
		873.18	12.08	1.72E-04		2.80E-03	0.947
		996.29	10.48	2.50E-03		3.66E-03	0.984
		1004.76	18.01	-1.75E-04		2.09E-03	0.980
		1274.43	34.80	-1.25E-04		4.12E-04	0.982
		1596.48	1.80	1.12E-03		3.69E-03	1.130
+	Eu-155	45.30	1.31	-4.44E-03	3.13E-04	1.46E-02	0.998

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-200003
S U I D 6901A Grid 15
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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Eu-155	60.01	1.22	4.45E-04	3.13E-04	1.50E-02	1.000
	86.55	30.70	1.04E-05		3.13E-04	free
	105.31	21.10	2.18E-04		4.06E-04	1.000
+ Tl-208	583.19	85.00	-8.67E-06	2.46E-04	2.46E-04	0.950
+ Bi-211	351.07	13.02	-6.82E-05	9.94E-04	9.94E-04	miss
+ Pb-211	404.85	3.78	6.41E-04	3.71E-03	3.71E-03	miss
	427.09	1.76	-6.71E-04		7.99E-03	miss
	832.01	3.52	-3.90E-03		8.55E-03	miss
+ Bi-212	39.86	1.06	-3.40E-03	3.74E-03	1.83E-02	0.999
	727.33	6.67	4.64E-04		3.74E-03	0.987
	785.37	1.10	-2.11E-02		2.48E-02	0.960
	1620.50	1.47	-2.03E-03		3.91E-03	1.004
+ Pb-212	115.18	0.60	2.70E-03	2.74E-04	1.47E-02	miss
	238.63	43.60	-1.62E-05		2.74E-04	free
	300.09	3.30	-1.13E-03		3.63E-03	free
+ Pb212-XR	74.82	10.28	-2.04E-04	6.54E-04	1.12E-03	miss
	77.11	17.10	-9.42E-05		6.54E-04	miss
	87.35	3.97	1.38E-03		2.43E-03	miss
	89.78	1.46	-4.57E-04		6.06E-03	miss
+ Bi-214	609.32	45.49	3.41E-06	4.55E-04	4.56E-04	0.962
	768.36	4.89	5.79E-04		5.54E-03	0.958
	806.18	1.26	-5.83E-03		2.27E-02	0.944
	934.06	3.11	2.00E-03		1.26E-02	0.959
	1120.29	14.92	-3.76E-04		2.34E-03	0.959
	1155.21	1.63	-2.86E-03		1.80E-02	0.958
	1238.12	5.83	6.72E-04		2.72E-03	0.959
	1280.98	1.43	-1.18E-03		8.95E-03	0.959
	1377.67	3.99	2.02E-04		1.91E-03	1.023
	1385.31	0.79	1.72E-03		9.27E-03	0.959
	1401.52	1.33	9.09E-04		5.44E-03	0.959
	1407.99	2.39	7.07E-04		3.25E-03	0.959
	1509.21	2.13	-6.59E-04		3.41E-03	0.963
	1661.27	1.05	-1.69E-03		6.12E-03	1.001
	1729.59	2.88	-2.90E-05		2.11E-03	1.092
	1764.49	15.30	-4.39E-05		4.55E-04	1.001
	1847.43	2.03	1.10E-03		3.94E-03	1.048
>	2118.51	1.16	0.00E+00		0.00E+00	1.031
+ Pb-214	241.99	7.25	-1.60E-04	3.71E-04	1.65E-03	0.999
	295.22	18.42	-2.24E-04		6.33E-04	1.000
	351.93	35.60	1.24E-04		3.71E-04	free
	785.96	1.06	-1.05E-02		2.53E-02	0.999
+ Pb214-XR	74.82	5.80	-3.61E-04	1.15E-03	1.98E-03	miss
	77.11	9.70	-1.66E-04		1.15E-03	miss
	87.35	2.24	2.44E-03		4.30E-03	miss
	89.78	0.82	-8.14E-04		1.08E-02	miss
+ Ra-226	186.21	3.64	5.38E-04	2.58E-03	2.58E-03	free
+ Ac-228	129.07	2.42	1.25E-03	1.17E-03	3.71E-03	0.961
	209.25	3.89	-3.67E-04		3.29E-03	0.983
	270.24	3.46	-1.21E-03		3.56E-03	0.969
	328.00	2.95	9.50E-04		4.43E-03	0.969

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports

Analysis Report for 11-Aug-15-200003
S U I D 6901A Grid 15

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Nuclide Name	Energy (keV)	Yield(%)	Activity (uCi/grams)	Nuclide MDA (uCi/grams)	Line MDA (uCi/grams)	Coinc Corr
Ac-228	338.32	11.27	8.23E-05	1.17E-03	1.17E-03	0.995
	409.46	1.92	2.65E-03		7.87E-03	0.953
	463.00	4.40	-5.21E-04		3.54E-03	0.949
	794.95	4.25	1.18E-03		6.64E-03	0.957
	911.20	25.80	-8.12E-04		1.35E-03	0.993
	964.77	4.99	2.33E-03		8.07E-03	0.986
	968.97	15.80	9.64E-04		2.44E-03	0.992
	1588.20	3.22	-8.65E-04		2.19E-03	1.002
+ Pa-231	27.36	10.30	3.10E-04	1.70E-03	1.70E-03	0.998
	283.69	1.70	-9.81E-04		7.03E-03	0.999
	300.07	2.47	1.46E-04		4.92E-03	1.000
	302.65	2.20	-2.35E-03		5.49E-03	1.000
	330.06	1.40	-4.96E-03		8.80E-03	1.001
+ Th-234	92.38	2.13	2.86E-04	4.16E-03	4.16E-03	free
	92.80	2.10	-5.64E-05		4.24E-03	free
	112.81	0.21	-1.05E-02		4.02E-02	free
+ U-235	143.76	10.96	-9.69E-05	1.66E-04	7.57E-04	free
	163.33	5.08	4.79E-04		1.72E-03	free
	185.71	57.20	8.68E-05		1.66E-04	free
	202.11	1.08	1.37E-03		1.05E-02	miss
	205.31	5.01	5.67E-04		2.35E-03	free
+ Am-241	59.54	35.90	2.04E-04	5.25E-04	5.25E-04	free

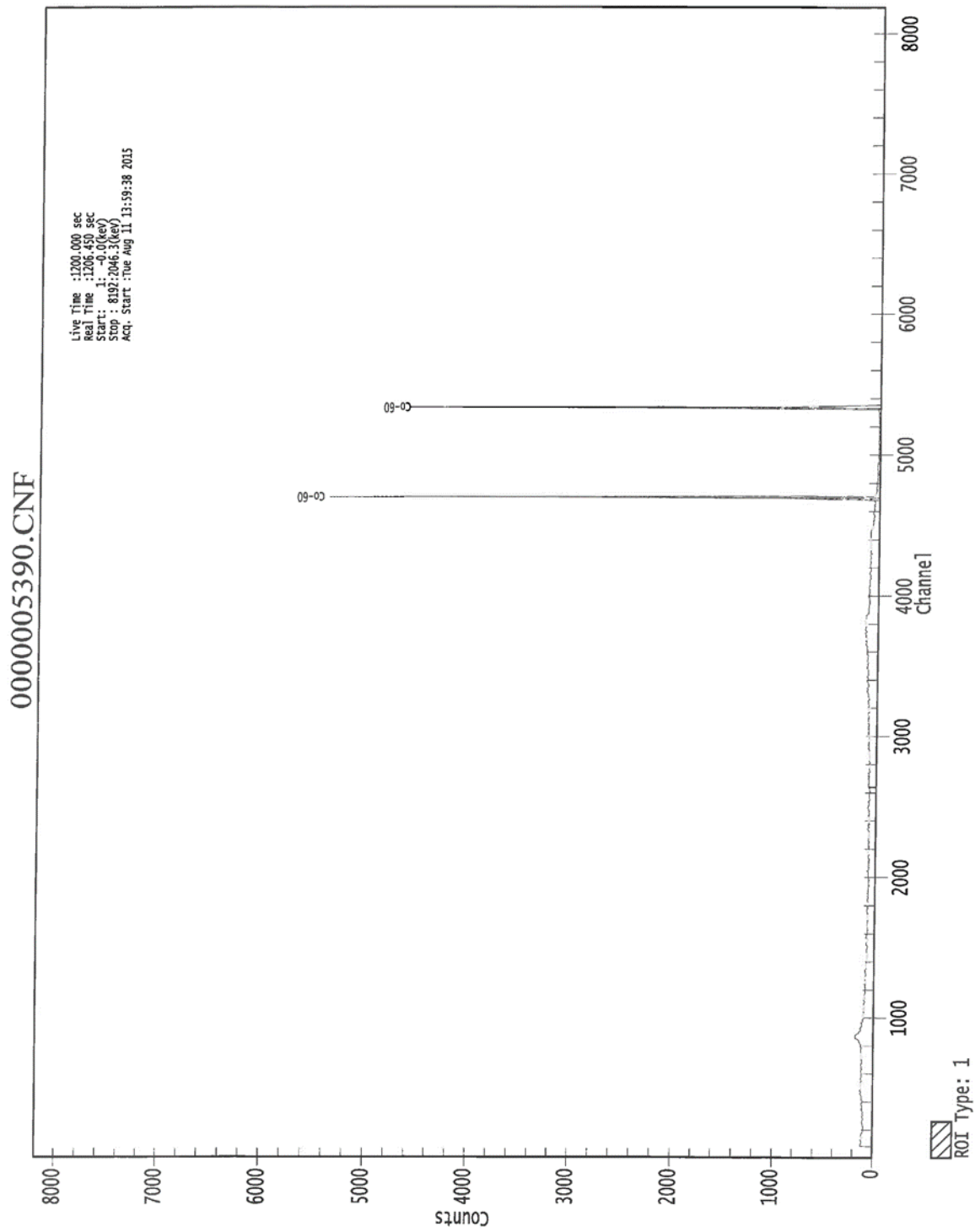
- + = Nuclide identified during the nuclide identification
- * = Energy line found in the spectrum
- > = MDA value not calculated
- @ = Half-life too short to be able to perform the decay correction
- ? = CAUTION: MDA value is inconsistent with Currie MDA at 95% confidence level

Coincidence correction performed.

free = No coincidence correction required.

miss = Nuclide energy was not found in the coincidence library.

Attachment Figure 2-30 06901A Gamma Spectroscopy Reports



Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S *****

.lename: C:\Canberra\9-22-15\20150922124958.cnf

Report Generated On : 9/22/2015 1:21:58 PM
Sample Title : 06901BISVS-01
Sample Description : Roof top on 642 concrete tile
Sample Identification : SU06901B ←
Sample Type :
Sample Geometry : LaBr Paver
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 Units
Sample Taken On : 9/22/2015 12:39:07 PM
Acquisition Started : 9/22/2015 12:39:07 PM
Live Time : 598.7 seconds
Real Time : 600.0 seconds
Dead Time : 0.22 %

Energy Calibration Used Done On :
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVES

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst Rafael H. Jr.
Date 9/22/15

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Peak Analysis Report 9/22/2015 1:21:58 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 06901BISVS-01
Peak Analysis Performed on: 9/22/2015 1:21:58 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	74-	85	79.94	238.46	11.88	5.69E+002	258.49	2.30E+003
2	109-	123	116.23	347.09	14.99	3.79E+002	213.44	1.29E+003
3	472-	499	486.08	1449.34	34.33	1.74E+003	137.16	3.78E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/22/2015 1 1:58 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 06901BISVS-01
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/Unit)	Activity Uncertainty
K-40	0.964	1460.82*	10.66	6.44857E+002	7.56297E+001
Pb-212	1.000	115.18	0.60		
		238.63*	43.60	1.16652E+001	5.62821E+000
		300.09	3.30		
Pb-214	0.508	241.99*	7.25	7.01425E+001	3.38054E+001
		295.22	18.42		
		351.93*	35.60	1.23222E+001	7.22249E+000
		785.96	1.06		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 9/22/2015 1 1:58 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/Unit)	Wt mean Activity Uncertainty
	K-40	0.964	6.448573E+002	7.562969E+001
X	Ba-133	0.990		
X	Bi-211	0.996		
	Pb-212	1.000	9.615951E+000	5.748729E+000
	Pb-214	0.508	1.232218E+001	7.222331E+000
X	Th-227	0.426		
X	Ac-228	0.342		

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 9/22/2015 1:21:58 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: LaBr Paver
Sample Title: 06901BISTVS-01
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
	LaBr3	34.70	66.40	4.525E+000	4.52E+000	3.090E+001	2.234E+000
		788.70	33.60	9.152E+000		-7.661E+000	4.481E+000
		1436.80	66.40	1.157E+001		5.025E+001	5.707E+000
+	K-40	1460.82*	10.66	6.738E+001	6.74E+001	6.449E+002	3.319E+001
	Cr-51	320.08	9.91	1.622E+001	1.62E+001	-1.809E+000	7.962E+000
	Mn-54	834.85	99.98	3.527E+000	3.53E+000	-2.003E+000	1.730E+000
	Co-58	810.76	99.45	3.534E+000	3.53E+000	3.818E+000	1.734E+000
	Co-60	1173.23	99.85	3.324E+000	1.87E+000	1.448E+000	1.617E+000
		1332.49	99.98	1.870E+000		-1.152E+000	8.851E-001
	Nb-94	702.65	99.81	2.207E+000	2.21E+000	7.079E-001	1.075E+000
		871.09	99.89	3.481E+000		-1.950E+000	1.706E+000
	Sn-113	255.13	2.11	8.255E+001	2.66E+000	-4.501E+000	4.067E+001
		391.70	64.97	2.662E+000		-3.403E-001	1.304E+000
	Cs-137	661.66	85.10	2.584E+000	2.58E+000	1.820E-001	1.260E+000
	Eu-152	121.78	28.67	7.780E+000	7.34E+000	-6.289E+000	3.852E+000
		244.70	7.61	2.534E+001		3.352E+001	1.251E+001
		295.94	0.45	3.788E+002		2.682E+002	1.863E+002
		344.28	26.60	7.343E+000		8.245E+000	3.613E+000
		367.79	0.86	2.126E+002		3.971E+000	1.044E+002
		411.12	2.24	7.954E+001		4.073E+001	3.896E+001
		443.96	2.83	6.341E+001		3.262E-001	3.102E+001
		488.68	0.42	4.655E+002		7.272E+001	2.277E+002
		563.99	0.49	4.563E+002		-4.457E+002	2.233E+002
		586.26	0.46	5.515E+002		5.066E+002	2.704E+002
		678.62	0.47	4.603E+002		-8.360E+001	2.243E+002
		688.67	0.86	2.493E+002		-1.062E+002	1.214E+002
		719.35	0.28	8.498E+002		-5.334E+001	4.144E+002
		778.90	12.96	2.265E+001		1.034E+001	1.108E+001
		810.45	0.32	1.094E+003		1.182E+003	5.371E+002
		867.37	4.26	8.177E+001		-5.692E+000	4.008E+001
		919.33	0.43	8.146E+002		1.375E+001	3.988E+002
		964.08	14.65	2.441E+001		7.603E+000	1.195E+001
		1085.87	10.24	3.196E+001		-5.486E+000	1.557E+001
		1089.74	1.73	1.909E+002		4.653E+001	9.302E+001
		1112.07	13.69	2.459E+001		-9.146E+000	1.198E+001
		1212.95	1.43	2.327E+002		1.743E+002	1.131E+002
		1249.94	0.19	1.609E+003		-7.466E+002	7.796E+002
		1299.14	1.63	1.352E+002		-9.385E+000	6.460E+001
		1408.01	21.07	2.385E+001		-7.642E+000	1.168E+001
		1457.64	0.50	1.498E+003		7.092E+003	7.383E+002
>		1528.10	0.28	0.000E+000		0.000E+000	0.000E+000
	Eu-154	123.07	40.40	5.509E+000	5.51E+000	-4.453E+000	2.728E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
	Eu-154	247.93	6.89	2.747E+001	5.51E+000	-7.938E-001	1.355E+001
		591.76	4.95	5.293E+001		6.185E+001	2.596E+001
		692.42	1.78	1.210E+002		-2.768E+001	5.889E+001
		723.30	20.06	1.182E+001		8.131E-001	5.764E+000
		756.80	4.52	5.467E+001		-4.437E+001	2.666E+001
		873.18	12.08	2.885E+001		-1.616E+001	1.414E+001
		996.29	10.48	3.191E+001		1.011E+001	1.558E+001
		1004.76	18.01	1.808E+001		9.907E+000	8.823E+000
		1274.43	34.80	7.400E+000		-3.724E+000	3.562E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.910E+002	7.97E+000	1.969E+003	1.441E+002
		60.01	1.22	2.723E+002		8.804E+001	1.346E+002
		86.55	30.70	7.969E+000		2.930E+000	3.944E+000
		105.31	21.10	1.160E+001		1.569E+000	5.745E+000
	Tl-208	583.19	85.00	2.912E+000	2.91E+000	-4.234E-001	1.427E+000
	Bi-211	351.07*	13.02	3.097E+001	3.10E+001	3.369E+001	1.536E+001
	Pb-211	404.85	3.78	4.599E+001	4.60E+001	-3.906E+001	2.252E+001
		427.09	1.76	1.032E+002		3.830E+001	5.054E+001
		832.01	3.52	1.013E+002		4.311E+001	4.969E+001
	Bi-212	39.86	1.06	3.378E+002	3.52E+001	2.460E+003	1.672E+002
		727.33	6.67	3.519E+001		-1.346E+001	1.715E+001
		785.37	1.10	2.751E+002		-1.564E+002	1.347E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.861E+002	8.63E+000	-4.494E+001	1.912E+002
		238.63*	43.60	8.629E+000		1.167E+001	4.287E+000
		300.09	3.30	5.062E+001		1.049E+000	2.488E+001
	Pb212-XR	74.82	10.28	2.783E+001	1.64E+001	1.798E+000	1.378E+001
		77.11	17.10	1.638E+001		1.461E+001	8.107E+000
		87.35	3.97	6.057E+001		4.291E+001	2.997E+001
		89.78	1.46	1.903E+002		3.003E+001	9.432E+001
	Bi-214	609.32	45.49	5.573E+000	5.57E+000	6.378E+000	2.731E+000
		768.36	4.89	5.472E+001		-2.808E+001	2.673E+001
		806.18	1.26	2.764E+002		3.399E+002	1.356E+002
		934.06	3.11	1.108E+002		-4.599E+001	5.421E+001
		1120.29	14.92	2.266E+001		-1.719E+000	1.104E+001
		1155.21	1.63	2.056E+002		7.178E+001	1.001E+002
		1238.12	5.83	5.593E+001		4.628E+001	2.716E+001
		1280.98	1.43	1.773E+002		1.392E+002	8.527E+001
		1377.67	3.99	5.908E+001		-1.357E+002	2.825E+001
		1385.31	0.79	3.797E+002		-7.270E+002	1.833E+002
		1401.52	1.33	3.368E+002		-1.792E+002	1.645E+002
		1407.99	2.39	2.099E+002		-6.725E+001	1.028E+002
		1509.21	2.13	1.046E+002		-8.660E+001	4.970E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
+	Pb-214	241.99*	7.25	5.189E+001	9.20E+000	7.014E+001	2.578E+001
		295.22	18.42	9.198E+000		6.513E+000	4.523E+000
		351.93*	35.60	1.133E+001		1.232E+001	5.619E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

iclude MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/Unit)	Nuclide MDA (pCi/Unit)	Activity (pCi/Unit)	Dec. Level (pCi/Unit)
+	Pb-214	785.96	1.06	2.862E+002	9.20E+000	-1.627E+002	1.401E+002
	Pb214-XR	74.82	5.80	4.933E+001	2.89E+001	3.186E+000	2.442E+001
		77.11	9.70	2.887E+001		2.576E+001	1.429E+001
		87.35	2.24	1.073E+002		7.605E+001	5.312E+001
		89.78	0.82	3.389E+002		5.346E+001	1.679E+002
	Ra-226	186.21	3.64	4.841E+001	4.84E+001	3.629E+001	2.391E+001
	Ac-228	129.07	2.42	9.048E+001	1.37E+001	1.296E+001	4.479E+001
		209.25	3.89	5.044E+001		-3.520E+001	2.493E+001
		270.24	3.46	4.870E+001		-6.306E+000	2.397E+001
		328.00	2.95	6.224E+001		-4.053E+000	3.061E+001
		338.32*	11.27	3.578E+001		3.892E+001	1.775E+001
		409.46	1.92	9.275E+001		5.727E+001	4.544E+001
		463.00	4.40	4.096E+001		-1.007E+000	2.002E+001
		794.95	4.25	7.713E+001		8.154E+001	3.781E+001
		911.20	25.80	1.371E+001		-1.846E+000	6.714E+000
		964.77	4.99	7.172E+001		2.233E+001	3.510E+001
		968.97	15.80	2.227E+001		-1.660E+001	1.089E+001
>		1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
	Pa-231	27.36	10.30	3.635E-001	3.64E-001	0.000E+000	0.000E+000
		283.69	1.70	9.983E+001		3.162E+001	4.911E+001
		300.07	2.47	6.763E+001		1.401E+000	3.324E+001
		302.65	2.20	7.638E+001		1.583E+000	3.754E+001
		330.06	1.40	1.329E+002		-1.178E+001	6.539E+001
	Th-234	92.38	2.13	1.280E+002	1.28E+002	1.193E+002	6.342E+001
		92.80	2.10	1.296E+002		1.208E+002	6.421E+001
		112.81	0.21	1.113E+003		3.630E+002	5.510E+002
	U-235	143.76	10.96	1.890E+001	3.11E+000	-4.536E+000	9.355E+000
		163.33	5.08	3.785E+001		3.140E+001	1.872E+001
		185.71	57.20	3.107E+000		1.404E+000	1.534E+000
		202.11	1.08	1.812E+002		-1.637E+001	8.955E+001
		205.31	5.01	3.892E+001		-2.442E+001	1.923E+001
	Am-241	59.54	35.90	9.362E+000	9.36E+000	3.028E+000	4.629E+000

+ = 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

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S *****

.lename: C:\Canberra\3-24-15\20150324135012.cnf

Report Generated On : 3/24/2015 1:13:35 PM

Sample Title : Tb 642' SW @ 6708B
Sample Description : Tb 642 @ fire cage
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 units

Sample Taken On : 3/24/2015 1:34:37 PM
Acquisition Started : 3/24/2015 1:34:37 PM

Live Time : 894.6 seconds
Dead Time : 900.0 seconds

Dead Time : 0.60 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst RJ Beland

Date 3/24/15

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2015 1:13:35 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Tb 642' SW @ 6708B
Peak Analysis Performed on: 3/24/2015 1:13:35 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	64	54.12	39.46	2.24	6.15E+003	454.04	8.35E+003
2	1522-	1619	1570.99	1173.60	28.30	3.97E+003	284.84	2.30E+003
3	1732-	1836	1784.78	1332.68	24.53	4.03E+003	178.26	5.24E+002
4	1902-	2010	1956.29	1460.17	21.60	2.18E+003	156.79	5.64E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:13:35 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Tb 642' SW @ 6708B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.625	34.70*	66.40	8.57164E+001	1.82754E+001
		788.70	33.60		
		1436.80*	66.40	8.74427E+001	9.40295E+000
Co-60	1.000	1173.23*	99.85	8.78012E+001	9.43915E+000
		1332.49*	99.98	9.97013E+001	9.11374E+000
Cu-64	0.953	1345.77*	0.47	2.09861E+004	2.15054E+003

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:13:35 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

	Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
	LaBr3	0.625	8.708133E+001	8.361149E+000
X	K-40	1.000		
	Co-60	1.000	8.780118E+001	9.438997E+000
	Cu-64	0.953	2.504853E+003	2.761790E+003

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 1:13:35 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

include MDA Report

3/24/2015

1:13:35 PM

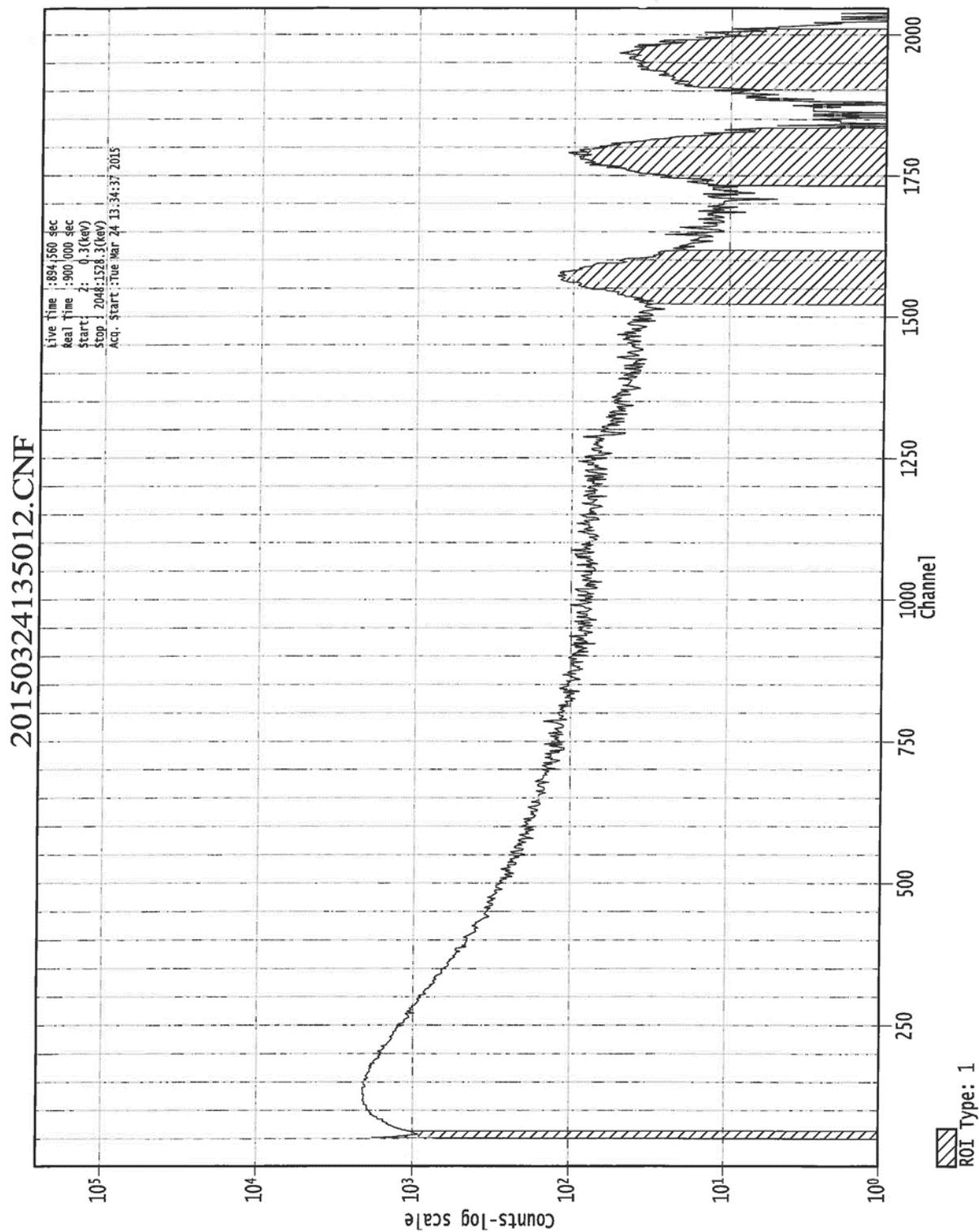
Page 5

*** N U C L I D E M D A R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Tb 642' SW @ 6708B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	9.813E+000	8.41E+000	8.572E+001	4.888E+000
		788.70	33.60	1.398E+001		2.316E+000	6.927E+000
		1436.80*	66.40	8.409E+000		8.744E+001	4.150E+000
	K-40	1460.82*	10.66	5.238E+001	5.24E+001	5.447E+002	2.585E+001
	Cr-51	320.08	9.91	4.087E+001	4.09E+001	-9.441E+000	2.033E+001
	Mn-54	834.85	99.98	5.031E+000	5.03E+000	-1.522E+000	2.493E+000
	Co-58	810.76	99.45	4.980E+000	4.98E+000	3.040E+000	2.468E+000
+	Co-60	1173.23*	99.85	9.363E+000	5.16E+000	8.780E+001	4.651E+000
		1332.49*	99.98	5.158E+000		9.970E+001	2.545E+000
	Nb-94	702.65	99.81	4.340E+000	4.34E+000	3.752E+000	2.151E+000
		871.09	99.89	5.176E+000		-5.246E+000	2.565E+000
	Sn-113	255.13	2.11	2.054E+002	6.12E+000	6.251E+001	1.023E+002
		391.70	64.97	6.122E+000		2.266E+000	3.043E+000
	Cs-137	661.66	85.10	4.986E+000	4.99E+000	-3.969E-001	2.471E+000
	Eu-152	121.78	28.67	1.918E+001	1.31E+001	-6.671E+000	9.566E+000
		244.70	7.61	5.798E+001		-2.773E+001	2.888E+001
		295.94	0.45	9.214E+002		4.317E+002	4.586E+002
		344.28	26.60	1.511E+001		4.962E+000	7.514E+000
		367.79	0.86	4.611E+002		2.440E+002	2.293E+002
		411.12	2.24	1.760E+002		-5.557E+001	8.748E+001
		443.96	2.83	1.407E+002		7.391E+001	6.988E+001
		488.68	0.42	9.571E+002		2.249E+002	4.752E+002
		563.99	0.49	8.214E+002		-5.290E+002	4.075E+002
		586.26	0.46	9.114E+002		-1.193E+002	4.521E+002
		678.62	0.47	8.982E+002		1.457E+000	4.452E+002
		688.67	0.86	5.008E+002		-3.144E+002	2.482E+002
		719.35	0.28	1.552E+003		-1.551E+003	7.688E+002
		778.90	12.96	3.548E+001		-9.019E+000	1.758E+001
		810.45	0.32	1.542E+003		9.414E+002	7.645E+002
		867.37	4.26	1.217E+002		-2.191E+001	6.030E+001
		919.33	0.43	1.236E+003		-2.636E+002	6.124E+002
		964.08	14.65	3.579E+001		6.675E+000	1.772E+001
		1085.87	10.24	4.727E+001		-4.399E+000	2.336E+001
		1089.74	1.73	2.819E+002		2.622E+002	1.393E+002
		1112.07	13.69	3.493E+001		1.381E+001	1.725E+001
		1212.95	1.43	3.115E+002		-8.578E+001	1.536E+002
		1249.94	0.19	1.631E+003		-7.526E+002	7.987E+002
		1299.14	1.63	3.033E+002		-1.146E+002	1.497E+002
		1408.01	21.07	1.314E+001		-9.217E+000	6.403E+000
		1457.64	0.50	1.206E+003		6.803E+003	5.960E+002
		1528.10	0.28	3.738E+002		-2.689E+002	1.736E+002
	Eu-154	123.07	40.40	1.355E+001	8.62E+000	7.526E+000	6.756E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports



Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S *****

.lename: C:\Canberra\3-24-15\20150324140954.cnf

port Generated On : 3/24/2015 1:17:10 PM

ample Title : WSB roof
ample Description : WSB roof @west
ample Identification :
ample Type :
ample Geometry :

ak Locate Threshold : 3.00
ak Locate Range (in channels) : 1 - 2048
ak Area Range (in channels) : 1 - 2048
entification Energy Tolerance : 1.000 FWHM

ample Size : 1.000E+000 units

ample Taken On : 3/24/2015 1:52:51 PM
quisition Started : 3/24/2015 1:52:51 PM

ve Time : 896.7 seconds
al Time : 900.0 seconds

ad Time : 0.36 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst *[Signature]*
Date 3/24/15

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2015 1:17:10 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: WSB roof
Peak Analysis Performed on: 3/24/2015 1:17:10 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	64	53.91	39.30	2.07	5.10E+003	435.01	7.63E+003
2	1905-	2013	1959.79	1462.77	24.28	2.17E+003	159.22	5.89E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:17:10 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: WSB roof
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.611	34.70*	66.40	7.09702E+001	1.54305E+001
		788.70	33.60		
		1436.80*	66.40	8.68237E+001	9.42747E+000
K-40	0.999	1460.82*	10.66	5.40816E+002	6.14974E+001

* = Energy line found in the spectrum.

@ = Energy line not used for Weighted Mean Activity

Energy Tolerance : 1.000 FWHM

Nuclide confidence index threshold = 0.30

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:17:10 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.611	7.097016E+001	1.543047E+001
K-40	0.999	9.875023E+001	1.126339E+002

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 1:17:10 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

iclude MDA Report 3/24/2015 1:17:10 PM Page 5

*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: WSB roof
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	9.441E+000	7.12E+000	7.097E+001	4.702E+000
		788.70	33.60	7.124E+000		1.239E+000	3.499E+000
		1436.80*	66.40	8.613E+000		8.682E+001	4.252E+000
+	K-40	1460.82*	10.66	5.365E+001	5.36E+001	5.408E+002	2.649E+001
	Cr-51	320.08	9.91	2.254E+001	2.25E+001	-9.788E+000	1.117E+001
	Mn-54	834.85	99.98	2.739E+000	2.74E+000	-8.850E+001	1.347E+000
	Co-58	810.76	99.45	2.741E+000	2.74E+000	2.905E+000	1.349E+000
	Co-60	1173.23	99.85	2.650E+000	1.46E+000	-1.490E+000	1.295E+000
		1332.49	99.98	1.459E+000		-4.047E-001	6.959E-001
	Nb-94	702.65	99.81	1.996E+000	2.00E+000	6.710E-001	9.787E-001
		871.09	99.89	2.868E+000		2.877E+000	1.411E+000
	Sn-113	255.13	2.11	1.212E+002	3.14E+000	-1.012E+002	6.018E+001
		391.70	64.97	3.139E+000		8.320E-001	1.552E+000
	Cs-137	661.66	85.10	2.377E+000	2.38E+000	1.561E+000	1.167E+000
	Eu-152	121.78	28.67	1.416E+001	8.23E+000	1.462E+000	7.053E+000
		244.70	7.61	3.507E+001		2.580E+001	1.743E+001
		295.94	0.45	5.211E+002		-3.987E+002	2.585E+002
		344.28	26.60	8.231E+000		-4.212E+000	4.076E+000
		367.79	0.86	2.383E+002		-9.084E+001	1.179E+002
		411.12	2.24	8.907E+001		-2.838E+001	4.400E+001
		443.96	2.83	7.067E+001		2.613E+000	3.488E+001
		488.68	0.42	4.609E+002		-4.108E+002	2.271E+002
		563.99	0.49	4.119E+002		1.093E+002	2.027E+002
		586.26	0.46	4.497E+002		-2.117E+002	2.213E+002
		678.62	0.47	4.235E+002		4.954E+001	2.078E+002
		688.67	0.86	2.344E+002		6.681E+001	1.150E+002
		719.35	0.28	7.080E+002		3.587E+002	3.470E+002
		778.90	12.96	1.717E+001		-1.303E+001	8.423E+000
		810.45	0.32	8.489E+002		8.997E+002	4.177E+002
		867.37	4.26	6.681E+001		2.014E+001	3.286E+001
		919.33	0.43	6.650E+002		3.518E+002	3.268E+002
		964.08	14.65	1.868E+001		-1.597E+001	9.169E+000
		1085.87	10.24	2.322E+001		-9.967E+000	1.134E+001
		1089.74	1.73	1.381E+002		-1.341E+002	6.742E+001
		1112.07	13.69	1.813E+001		-5.116E+000	8.859E+000
		1212.95	1.43	1.851E+002		-1.183E+001	9.041E+001
		1249.94	0.19	1.236E+003		-3.826E+002	6.012E+002
		1299.14	1.63	1.097E+002		-8.236E+000	5.283E+001
		1408.01	21.07	1.223E+001		-9.855E+000	5.948E+000
		1457.64	0.50	1.197E+003		6.015E+003	5.915E+002
		1528.10	0.28	3.875E+002		-3.835E+002	1.805E+002
	Eu-154	123.07	40.40	9.951E+000	5.86E+000	6.219E-001	4.958E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

iclude MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Eu-154	247.93	6.89	3.829E+001	5.86E+000	5.421E+000	1.902E+001
	591.76	4.95	4.172E+001		-3.090E+000	2.053E+001
	692.42	1.78	1.119E+002		-6.493E+001	5.490E+001
	723.30	20.06	9.789E+000		1.893E+000	4.797E+000
	756.80	4.52	4.440E+001		-2.087E+001	2.175E+001
	873.18	12.08	2.365E+001		7.502E+000	1.163E+001
	996.29	10.48	2.531E+001		2.347E+001	1.241E+001
	1004.76	18.01	1.421E+001		-2.572E+000	6.961E+000
	1274.43	34.80	5.857E+000		2.331E+000	2.836E+000
	1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	>					
Eu-155	45.30	1.31	4.148E+002	1.63E+001	1.576E+002	2.065E+002
	60.01	1.22	5.182E+002		4.474E+002	2.581E+002
	86.55	30.70	1.632E+001		-9.888E-001	8.132E+000
	105.31	21.10	2.114E+001		-2.153E+000	1.053E+001
Tl-208	583.19	85.00	2.443E+000	2.44E+000	5.937E-001	1.202E+000
Bi-211	351.07	13.02	1.663E+001	1.66E+001	6.731E+000	8.235E+000
Pb-211	404.85	3.78	5.336E+001	5.34E+001	-1.048E+001	2.637E+001
	427.09	1.76	1.121E+002		-8.773E+001	5.534E+001
	832.01	3.52	7.717E+001		-7.868E+001	3.796E+001
Bi-212	39.86	1.06	4.273E+002	2.96E+001	4.455E+003	2.124E+002
	727.33	6.67	2.959E+001		1.431E+001	1.450E+001
	785.37	1.10	2.116E+002		-3.329E+001	1.039E+002
Pb-212	1620.50	1.47	0.000E+000	6.25E+000	0.000E+000	0.000E+000
	115.18	0.60	6.915E+002		1.190E+002	3.445E+002
	238.63	43.60	6.254E+000		5.546E+000	3.108E+000
Pb212-XR	300.09	3.30	6.958E+001	3.16E+001	-9.251E+000	3.450E+001
	74.82	10.28	5.406E+001		2.456E+001	2.694E+001
	77.11	17.10	3.159E+001		5.685E+000	1.574E+001
Bi-214	87.35	3.97	1.248E+002	4.54E+000	-2.418E+001	6.217E+001
	89.78	1.46	3.325E+002		1.234E+002	1.657E+002
	609.32	45.49	4.536E+000		1.516E+000	2.231E+000
	768.36	4.89	4.201E+001		-5.938E+001	2.058E+001
	806.18	1.26	2.112E+002		3.106E+002	1.039E+002
	934.06	3.11	9.117E+001		4.867E+000	4.479E+001
	1120.29	14.92	1.704E+001		-6.613E+000	8.326E+000
	1155.21	1.63	1.644E+002		1.189E+002	8.039E+001
	1238.12	5.83	4.222E+001		7.332E+000	2.057E+001
	1280.98	1.43	1.393E+002		1.460E+001	6.739E+001
	1377.67	3.99	3.200E+001		-4.509E+001	1.514E+001
	1385.31	0.79	1.762E+002		-5.279E+002	8.377E+001
	1401.52	1.33	1.600E+002		-2.170E+002	7.740E+001
	1407.99	2.39	1.076E+002		-8.674E+001	5.235E+001
	1509.21	2.13	1.354E+002		-5.025E+001	6.597E+001
Pb-214	1661.27	1.05	0.000E+000	6.06E+000	0.000E+000	0.000E+000
	1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
	1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
	1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
	2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	241.99	7.25	3.711E+001		-1.750E+001	1.844E+001
	295.22	18.42	1.274E+001		-4.379E+000	6.319E+000
	351.93	35.60	6.065E+000		2.021E+000	3.003E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

iclude MDA Report

3/24/2015

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.207E+002	6.06E+000	-2.621E+001	1.084E+002
Pb214-XR	74.82	5.80	9.582E+001	5.57E+001	4.353E+001	4.775E+001
	77.11	9.70	5.570E+001		1.002E+001	2.775E+001
	87.35	2.24	2.211E+002		-4.286E+001	1.102E+002
	89.78	0.82	5.920E+002		2.197E+002	2.950E+002
Ra-226	186.21	3.64	8.397E+001	8.40E+001	3.637E+000	4.179E+001
Ac-228	129.07	2.42	1.610E+002	1.11E+001	1.425E+001	8.021E+001
	209.25	3.89	7.624E+001		4.819E+001	3.793E+001
	270.24	3.46	7.337E+001		-2.178E+001	3.643E+001
	328.00	2.95	7.476E+001		-8.856E+000	3.704E+001
	338.32	11.27	1.938E+001		2.023E+001	9.596E+000
	409.46	1.92	1.040E+002		-8.942E+000	5.139E+001
	463.00	4.40	4.483E+001		-1.984E+001	2.211E+001
	794.95	4.25	5.818E+001		3.551E+001	2.859E+001
	911.20	25.80	1.108E+001		-2.107E+000	5.448E+000
	964.77	4.99	5.488E+001		-3.711E+001	2.693E+001
	968.97	15.80	1.752E+001		1.176E+001	8.600E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.427E-001	2.43E-001	0.000E+000	0.000E+000
	283.69	1.70	1.433E+002		3.311E+001	7.110E+001
	300.07	2.47	9.295E+001		-1.236E+001	4.609E+001
	302.65	2.20	1.038E+002		2.706E+001	5.148E+001
	330.06	1.40	1.573E+002		-4.970E+001	7.795E+001
Th-234	92.38	2.13	2.228E+002	2.23E+002	-4.416E+001	1.110E+002
	92.80	2.10	2.256E+002		-4.471E+001	1.124E+002
	112.81	0.21	1.999E+003		1.839E+003	9.960E+002
U-235	143.76	10.96	3.229E+001	5.36E+000	-2.383E+000	1.608E+001
	163.33	5.08	6.496E+001		1.675E+001	3.234E+001
	185.71	57.20	5.363E+000		-1.932E+000	2.669E+000
	202.11	1.08	2.687E+002		-2.589E+002	1.336E+002
	205.31	5.01	5.967E+001		3.733E+001	2.969E+001
Am-241	59.54	35.90	1.782E+001	1.78E+001	1.539E+001	8.875E+000

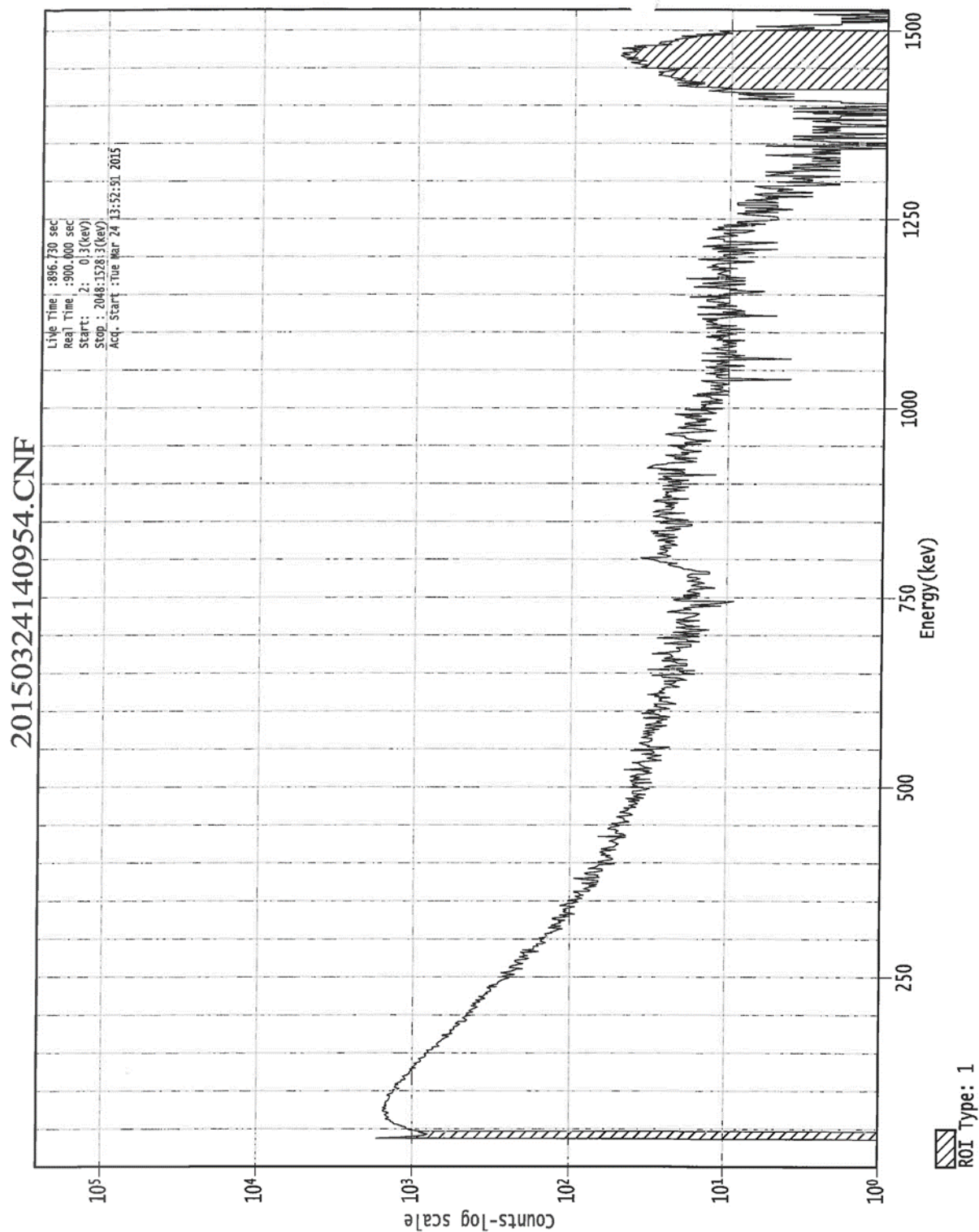
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports



Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S *****

.lename: C:\Canberra\3-24-15\20150324131712.cnf

Report Generated On : 3/24/2015 1:04:07 PM

Sample Title : TB Roof N 6901B
Sample Description : Smoking area N
Sample Identification :
Sample Type :
Sample Geometry :

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 units

Sample Taken On : 3/24/2015 1:01:22 PM
Acquisition Started : 3/24/2015 1:01:22 PM

Live Time : 897.9 seconds
Dead Time : 900.0 seconds

Dead Time : 0.23 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst B. R. Deau
Date 3/24/15

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2015 1:04:07 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: TB Roof N 6901B
Peak Analysis Performed on: 3/24/2015 1:04:07 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.49	38.99	1.75	3.26E+003	231.68	1.75E+003
2	297-	344	321.04	239.72	2.41	2.56E+002	307.83	3.35E+003
3	1904-	2012	1958.77	1462.00	19.21	2.35E+003	153.45	4.98E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:04:07 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: TB Roof N 6901B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.616	34.70*	66.40	4.53461E+001	9.62353E+000
		788.70	33.60		
		1436.80*	66.40		
K-40	1.000	1460.82*	10.66	5.85383E+002	6.35858E+001
Pb-212	1.000	115.18	0.60	3.50723E+000	4.26325E+000
		238.63*	43.60		
		300.09	3.30		
Th-227	0.999	50.13	8.40	1.18539E+001	1.45477E+001
		79.69	1.95		
		94.97	0.03		
		210.62	1.25		
		235.96*	12.90		
		256.23	7.00		
		286.09	1.74		
		299.98	2.21		
		304.50	1.15		
		329.85	2.90		
		334.37	1.14		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:04:07 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.616	4.534612E+001	9.623534E+000
K-40	1.000	3.029270E+002	8.512115E+001
? Pb-212	1.000	3.507231E+000	4.263246E+000
? Th-227	0.999	1.185390E+001	1.454769E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 1:04:07 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

nuclide MDA Report

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**** N U C L I D E M D A R E P O R T ****

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: TB Roof N 6901B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	4.644E+000	4.64E+000	4.535E+001	2.303E+000
		788.70	33.60	6.586E+000		1.235E+000	3.230E+000
		1436.80*	66.40	7.926E+000		9.398E+001	3.909E+000
+	K-40	1460.82*	10.66	4.937E+001	4.94E+001	5.854E+002	2.435E+001
	Cr-51	320.08	9.91	1.285E+001	1.29E+001	-1.065E+001	6.326E+000
	Mn-54	834.85	99.98	2.751E+000	2.75E+000	2.208E+000	1.353E+000
	Co-58	810.76	99.45	2.648E+000	2.65E+000	1.579E+000	1.302E+000
	Co-60	1173.23	99.85	2.677E+000	1.45E+000	3.763E-001	1.309E+000
		1332.49	99.98	1.447E+000		2.489E-001	6.902E-001
	Nb-94	702.65	99.81	1.747E+000	1.75E+000	8.151E-001	8.541E-001
		871.09	99.89	2.767E+000		1.403E+000	1.360E+000
	Sn-113	255.13	2.11	6.234E+001	1.97E+000	2.624E+000	3.077E+001
		391.70	64.97	1.972E+000		4.560E-001	9.682E-001
	Cs-137	661.66	85.10	1.985E+000	1.99E+000	-5.543E-002	9.713E-001
	Eu-152	121.78	28.67	6.295E+000	5.14E+000	2.627E+000	3.122E+000
		244.70	7.61	1.844E+001		2.093E+001	9.110E+000
		295.94	0.45	2.865E+002		-1.040E+001	1.411E+002
		344.28	26.60	5.141E+000		2.714E+000	2.531E+000
		367.79	0.86	1.493E+002		5.845E+000	7.339E+001
		411.12	2.24	5.770E+001		-4.872E+000	2.831E+001
		443.96	2.83	5.032E+001		1.791E+001	2.471E+001
		488.68	0.42	3.610E+002		7.075E+001	1.772E+002
		563.99	0.49	3.323E+002		-4.366E+002	1.629E+002
		586.26	0.46	3.942E+002		3.792E+002	1.935E+002
		678.62	0.47	3.584E+002		1.685E+002	1.752E+002
		688.67	0.86	2.035E+002		2.084E+002	9.957E+001
		719.35	0.28	6.234E+002		5.824E+002	3.047E+002
		778.90	12.96	1.558E+001		-1.252E+001	7.631E+000
		810.45	0.32	8.201E+002		4.891E+002	4.033E+002
		867.37	4.26	6.467E+001		3.775E+001	3.179E+001
		919.33	0.43	6.716E+002		3.787E+002	3.301E+002
		964.08	14.65	1.917E+001		1.623E+001	9.415E+000
		1085.87	10.24	2.264E+001		-6.393E+000	1.105E+001
		1089.74	1.73	1.359E+002		2.081E+001	6.635E+001
		1112.07	13.69	1.792E+001		-4.066E+000	8.753E+000
		1212.95	1.43	1.913E+002		5.950E+001	9.349E+001
		1249.94	0.19	1.271E+003		1.350E+002	6.186E+002
		1299.14	1.63	1.102E+002		4.550E+001	5.309E+001
		1408.01	21.07	1.155E+001		-1.221E+001	5.611E+000
		1457.64	0.50	1.214E+003		6.244E+003	5.996E+002
		1528.10	0.28	4.172E+002		-2.845E+002	1.954E+002
	Eu-154	123.07	40.40	4.448E+000	4.45E+000	1.915E+000	2.206E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Slide MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.007E+001	4.45E+000	-1.103E-001	9.915E+000
		591.76	4.95	3.702E+001		2.271E+001	1.818E+001
		692.42	1.78	9.648E+001		-6.722E+001	4.718E+001
		723.30	20.06	8.579E+000		-2.824E+000	4.192E+000
		756.80	4.52	3.914E+001		1.239E+001	1.912E+001
		873.18	12.08	2.285E+001		7.843E-001	1.123E+001
		996.29	10.48	2.470E+001		-1.577E+001	1.210E+001
		1004.76	18.01	1.412E+001		5.041E-002	6.916E+000
		1274.43	34.80	5.786E+000		-2.125E+000	2.801E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.155E+002	6.92E+000	-4.372E+001	1.068E+002
		60.01	1.22	2.236E+002		-1.092E+002	1.108E+002
		86.55	30.70	6.917E+000		3.757E+000	3.431E+000
		105.31	21.10	9.149E+000		-6.156E-001	4.538E+000
	Tl-208	583.19	85.00	2.113E+000	2.11E+000	6.039E-001	1.037E+000
	Bi-211	351.07	13.02	1.028E+001	1.03E+001	-1.226E-001	5.058E+000
	Pb-211	404.85	3.78	3.451E+001	3.45E+001	3.653E+000	1.694E+001
		427.09	1.76	7.593E+001		5.841E+000	3.726E+001
		832.01	3.52	7.763E+001		1.714E+001	3.818E+001
	Bi-212	39.86	1.06	2.834E+002	2.57E+001	2.860E+003	1.405E+002
		727.33	6.67	2.573E+001		3.482E+000	1.257E+001
		785.37	1.10	1.941E+002		-1.071E+001	9.514E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.023E+002	6.95E+000	-4.976E+001	1.499E+002
		238.63*	43.60	6.950E+000		3.507E+000	3.457E+000
		300.09	3.30	3.885E+001		3.751E+000	1.914E+001
	Pb212-XR	74.82	10.28	2.286E+001	1.34E+001	2.682E+000	1.133E+001
		77.11	17.10	1.338E+001		3.919E+000	6.636E+000
		87.35	3.97	5.288E+001		3.792E+001	2.623E+001
		89.78	1.46	1.400E+002		-7.153E+001	6.946E+001
	Bi-214	609.32	45.49	4.070E+000	4.07E+000	2.250E+000	1.998E+000
		768.36	4.89	3.760E+001		-5.080E+001	1.838E+001
		806.18	1.26	2.044E+002		2.945E+002	1.005E+002
		934.06	3.11	9.364E+001		2.554E+001	4.603E+001
		1120.29	14.92	1.676E+001		1.645E+001	8.189E+000
		1155.21	1.63	1.604E+002		-5.404E+001	7.842E+001
		1238.12	5.83	4.382E+001		4.719E+001	2.137E+001
		1280.98	1.43	1.362E+002		-4.970E+001	6.584E+001
		1377.67	3.99	3.224E+001		-3.816E+001	1.526E+001
		1385.31	0.79	1.786E+002		-8.773E+001	8.498E+001
		1401.52	1.33	1.515E+002		-2.618E+002	7.315E+001
		1407.99	2.39	1.017E+002		-1.075E+002	4.939E+001
		1509.21	2.13	1.416E+002		-3.728E+001	6.909E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	1.957E+001	3.76E+000	3.352E+001	9.675E+000
		295.22	18.42	6.989E+000		9.918E-001	3.444E+000
		351.93	35.60	3.759E+000		-7.364E-002	1.850E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

nuclide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.035E+002	3.76E+000	6.223E+001	9.974E+001
Pb214-XR	74.82	5.80	4.051E+001	2.36E+001	4.753E+000	2.009E+001
	77.11	9.70	2.359E+001		6.909E+000	1.170E+001
	87.35	2.24	9.372E+001		6.720E+001	4.649E+001
	89.78	0.82	2.493E+002		-1.274E+002	1.237E+002
Ra-226	186.21	3.64	4.107E+001	4.11E+001	2.045E+001	2.034E+001
Ac-228	129.07	2.42	7.278E+001	1.12E+001	6.480E+001	3.609E+001
	209.25	3.89	3.783E+001		1.822E+001	1.872E+001
	270.24	3.46	3.770E+001		1.048E+001	1.860E+001
	328.00	2.95	4.344E+001		-1.690E+001	2.138E+001
	338.32	11.27	1.171E+001		1.207E+001	5.762E+000
	409.46	1.92	6.759E+001		-8.407E+000	3.317E+001
	463.00	4.40	3.294E+001		-2.839E+000	1.616E+001
	794.95	4.25	5.505E+001		1.789E+001	2.702E+001
	911.20	25.80	1.118E+001		1.067E+001	5.497E+000
	964.77	4.99	5.589E+001		1.259E+001	2.744E+001
	968.97	15.80	1.756E+001		1.115E+000	8.619E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.572E+001		-2.202E+001	3.732E+001
	300.07	2.47	5.190E+001		5.011E+000	2.557E+001
	302.65	2.20	5.804E+001		1.841E+001	2.859E+001
	330.06	1.40	9.186E+001		-2.647E+001	4.521E+001
Th-234	92.38	2.13	9.421E+001	9.42E+001	-7.141E+001	4.673E+001
	92.80	2.10	9.538E+001		-7.230E+001	4.731E+001
	112.81	0.21	8.744E+002		7.604E+002	4.337E+002
U-235	143.76	10.96	1.480E+001	2.62E+000	1.266E+001	7.337E+000
	163.33	5.08	3.043E+001		2.146E+001	1.507E+001
	185.71	57.20	2.623E+000		1.854E+000	1.299E+000
	202.11	1.08	1.338E+002		4.531E+001	6.622E+001
	205.31	5.01	2.966E+001		-1.301E+000	1.468E+001
Am-241	59.54	35.90	7.690E+000	7.69E+000	-3.755E+000	3.810E+000

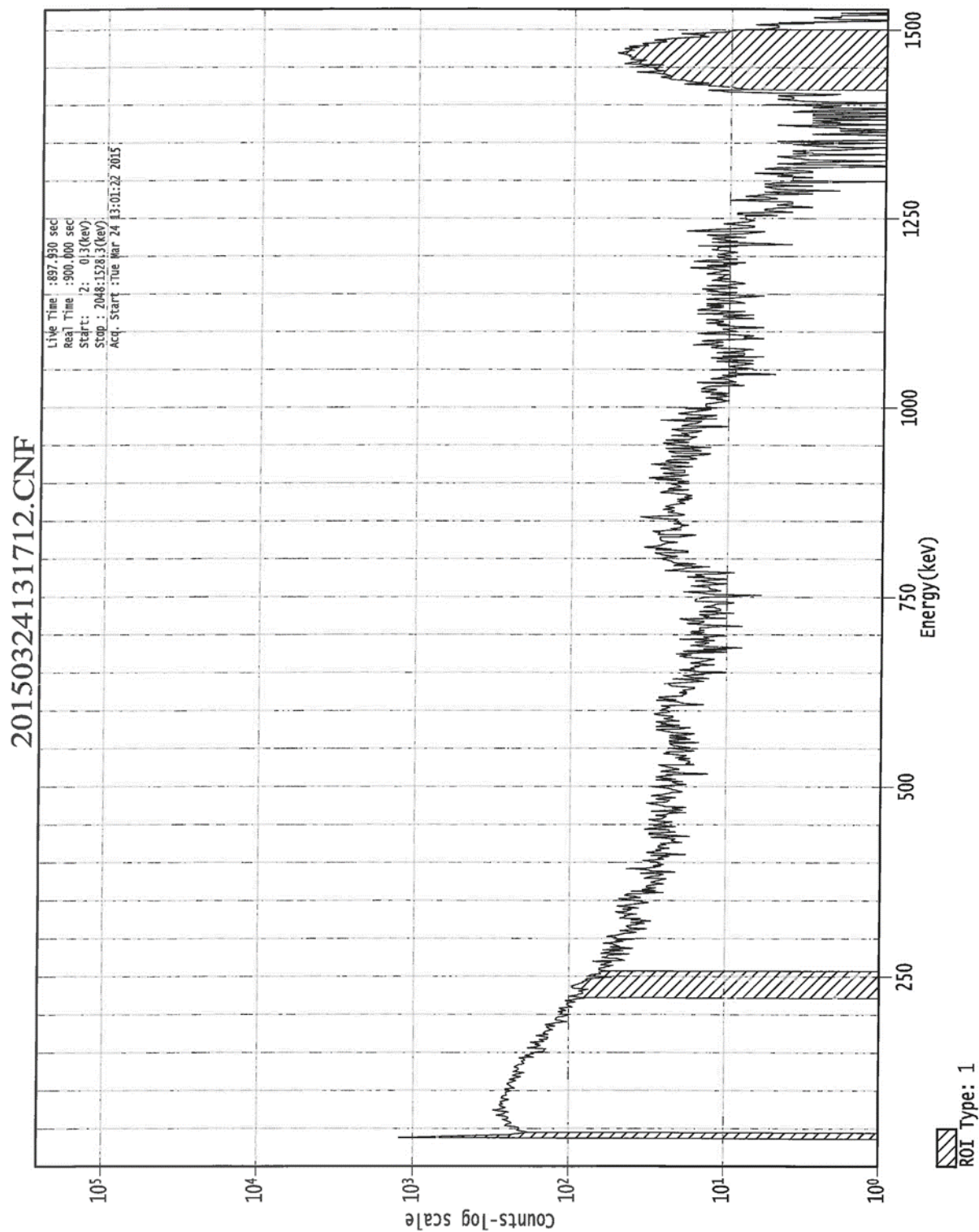
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports



Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

*** G A M M A S E C T R U M A N A L Y I S ***

Filename: C:\Canberra\3-24-15\20150324133248.cnf

Report Generated On : 3/24/2015 1:08:02 PM
Sample Title : Tb roof S @ 6901B
Sample Description : Smoking area S
Sample Identification :
Sample Type :
Sample Geometry :
Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 2048
Peak Area Range (in channels) : 1 - 2048
Identification Energy Tolerance : 1.000 FWHM
Sample Size : 1.000E+000 units
Sample Taken On : 3/24/2015 1:17:21 PM
Acquisition Started : 3/24/2015 1:17:21 PM
Live Time : 897.9 seconds
Dead Time : 900.0 seconds
Load Time : 0.24 %

Energy Calibration Used Done On : 6/18/2004
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst *[Signature]*
Date 3/24/15

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Peak Analysis Report 3/24/2015 1:08:02 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: Tb roof S @ 6901B
Peak Analysis Performed on: 3/24/2015 1:08:01 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 2048

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	43-	63	53.55	39.03	1.79	3.36E+003	245.61	2.04E+003
2	297-	343	320.51	239.33	3.04	3.45E+002	314.19	3.55E+003
3	1904-	2013	1959.09	1462.24	14.86	2.32E+003	161.70	5.93E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:08:02 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: Tb roof S @ 6901B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
LaBr3	0.614	34.70*	66.40	4.66748E+001	9.93921E+000
		788.70	33.60		
		1436.80*	66.40		
K-40	0.999	1460.82*	10.66	5.76736E+002	6.42581E+001
Pb-212	1.000	115.18	0.60	4.73688E+000	4.37559E+000
		238.63*	43.60		
		300.09	3.30		
Th-227	0.999	50.13	8.40	1.60099E+001	1.50343E+001
		79.69	1.95		
		94.97	0.03		
		210.62	1.25		
		235.96*	12.90		
		256.23	7.00		
		286.09	1.74		
		299.98	2.21		
		304.50	1.15		
		329.85	2.90		
		334.37	1.14		

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Interference Corrected Activity Report 3/24/2015 1:08:02 PM Page 4

 *** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
LaBr3	0.614	4.667477E+001	9.939212E+000
K-40	0.999	2.860043E+002	8.707831E+001
? Pb-212	1.000	4.736880E+000	4.375594E+000
? Th-227	0.999	1.600992E+001	1.503428E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 3/24/2015 1:08:01 PM
 Peak Locate From Channel: 1
 Peak Locate To Channel: 2048

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
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All peaks were identified.

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

Slide MDA Report

3/24/2015

1:08:02 PM

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry:
Sample Title: Tb roof S @ 6901B
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
+	LaBr3	34.70*	66.40	4.987E+000	4.99E+000	4.667E+001	2.475E+000
		788.70	33.60	6.506E+000		2.310E+000	3.190E+000
		1436.80*	66.40	8.652E+000		9.259E+001	4.272E+000
+	K-40	1460.82*	10.66	5.389E+001	5.39E+001	5.767E+002	2.661E+001
	Cr-51	320.08	9.91	1.280E+001	1.28E+001	-1.249E+001	6.298E+000
	Mn-54	834.85	99.98	2.660E+000	2.66E+000	-5.901E-001	1.308E+000
	Co-58	810.76	99.45	2.617E+000	2.62E+000	2.071E+000	1.287E+000
	Co-60	1173.23	99.85	2.641E+000	1.59E+000	1.128E+000	1.290E+000
		1332.49	99.98	1.588E+000		8.612E-001	7.605E-001
	Nb-94	702.65	99.81	1.777E+000	1.78E+000	-7.074E-001	8.693E-001
		871.09	99.89	2.731E+000		9.737E-001	1.342E+000
	Sn-113	255.13	2.11	6.440E+001	2.06E+000	-9.265E+000	3.180E+001
		391.70	64.97	2.059E+000		5.128E-001	1.012E+000
	Cs-137	661.66	85.10	2.043E+000	2.04E+000	-9.284E-002	1.000E+000
	Eu-152	121.78	28.67	6.658E+000	5.23E+000	-3.453E+000	3.304E+000
		244.70	7.61	1.916E+001		1.929E+001	9.474E+000
		295.94	0.45	2.942E+002		-4.212E+001	1.450E+002
		344.28	26.60	5.226E+000		3.907E+000	2.574E+000
		367.79	0.86	1.555E+002		-2.771E+001	7.648E+001
		411.12	2.24	5.935E+001		-3.674E+001	2.913E+001
		443.96	2.83	4.993E+001		-3.067E+001	2.451E+001
		488.68	0.42	3.683E+002		2.347E+002	1.808E+002
		563.99	0.49	3.316E+002		-3.902E+002	1.626E+002
		586.26	0.46	3.934E+002		1.898E+002	1.932E+002
		678.62	0.47	3.651E+002		-3.999E+002	1.786E+002
		688.67	0.86	2.054E+002		-1.715E+001	1.005E+002
		719.35	0.28	6.477E+002		1.199E+002	3.169E+002
		778.90	12.96	1.557E+001		-4.759E+000	7.621E+000
		810.45	0.32	8.104E+002		6.415E+002	3.984E+002
		867.37	4.26	6.361E+001		1.116E+001	3.126E+001
		919.33	0.43	6.318E+002		1.016E+002	3.102E+002
		964.08	14.65	1.855E+001		8.518E+000	9.104E+000
		1085.87	10.24	2.288E+001		-1.494E+000	1.117E+001
		1089.74	1.73	1.354E+002		-9.596E+001	6.606E+001
		1112.07	13.69	1.814E+001		4.685E-001	8.862E+000
		1212.95	1.43	1.869E+002		1.118E+002	9.128E+001
		1249.94	0.19	1.240E+003		9.486E+001	6.032E+002
		1299.14	1.63	1.139E+002		3.405E+001	5.497E+001
		1408.01	21.07	1.224E+001		-9.310E+000	5.954E+000
		1457.64	0.50	1.220E+003		6.432E+003	6.029E+002
		1528.10	0.28	4.669E+002		-2.204E+002	2.202E+002
	Eu-154	123.07	40.40	4.705E+000	4.71E+000	2.816E+000	2.335E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.084E+001	4.71E+000	-1.669E+000	1.030E+001
		591.76	4.95	3.720E+001		5.326E+000	1.827E+001
		692.42	1.78	1.004E+002		5.449E+001	4.915E+001
		723.30	20.06	8.982E+000		-1.253E+000	4.393E+000
		756.80	4.52	4.001E+001		-2.985E+001	1.955E+001
		873.18	12.08	2.258E+001		6.596E+000	1.110E+001
		996.29	10.48	2.453E+001		-1.686E+000	1.202E+001
		1004.76	18.01	1.371E+001		-1.642E+001	6.711E+000
		1274.43	34.80	6.015E+000		2.203E+000	2.915E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.312E+002	7.46E+000	1.247E+001	1.147E+002
		60.01	1.22	2.435E+002		2.090E+002	1.207E+002
		86.55	30.70	7.463E+000		4.636E+000	3.704E+000
		105.31	21.10	9.695E+000		-3.531E+000	4.811E+000
	Tl-208	583.19	85.00	2.089E+000	2.09E+000	-5.398E-001	1.025E+000
	Bi-211	351.07	13.02	1.060E+001	1.06E+001	1.006E+001	5.220E+000
	Pb-211	404.85	3.78	3.478E+001	3.48E+001	-1.608E+001	1.708E+001
		427.09	1.76	7.723E+001		3.310E+001	3.791E+001
		832.01	3.52	7.542E+001		-1.089E+001	3.708E+001
	Bi-212	39.86	1.06	2.935E+002	2.70E+001	2.904E+003	1.456E+002
		727.33	6.67	2.695E+001		4.558E+000	1.318E+001
		785.37	1.10	1.911E+002		-1.997E+002	9.365E+001
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
+	Pb-212	115.18	0.60	3.231E+002	7.07E+000	2.320E+002	1.603E+002
		238.63*	43.60	7.074E+000		4.737E+000	3.519E+000
		300.09	3.30	3.985E+001		3.721E+001	1.964E+001
	Pb212-XR	74.82	10.28	2.508E+001	1.46E+001	2.530E+001	1.244E+001
		77.11	17.10	1.461E+001		-4.331E+000	7.248E+000
		87.35	3.97	5.699E+001		-8.933E+000	2.829E+001
		89.78	1.46	1.515E+002		1.106E+002	7.520E+001
	Bi-214	609.32	45.49	4.146E+000	4.15E+000	2.526E+000	2.036E+000
		768.36	4.89	3.820E+001		-5.514E+001	1.868E+001
		806.18	1.26	2.022E+002		3.340E+002	9.940E+001
		934.06	3.11	8.752E+001		-2.886E+001	4.297E+001
		1120.29	14.92	1.713E+001		1.589E+001	8.374E+000
		1155.21	1.63	1.593E+002		7.371E+001	7.787E+001
		1238.12	5.83	4.245E+001		8.722E+000	2.069E+001
		1280.98	1.43	1.402E+002		-9.485E+001	6.785E+001
		1377.67	3.99	3.138E+001		-7.059E+001	1.483E+001
		1385.31	0.79	1.838E+002		-3.689E+002	8.756E+001
		1401.52	1.33	1.614E+002		-2.288E+002	7.807E+001
		1407.99	2.39	1.077E+002		-8.194E+001	5.240E+001
		1509.21	2.13	1.442E+002		-2.887E+001	7.037E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.028E+001	3.87E+000	1.427E+001	1.003E+001
		295.22	18.42	7.194E+000		1.602E+000	3.546E+000
		351.93	35.60	3.868E+000		2.073E+000	1.904E+000

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.002E+002	3.87E+000	-1.756E+002	9.809E+001
Pb214-XR	74.82	5.80	4.444E+001	2.57E+001	4.484E+001	2.206E+001
	77.11	9.70	2.575E+001		-7.636E+000	1.278E+001
	87.35	2.24	1.010E+002		-1.583E+001	5.014E+001
	89.78	0.82	2.698E+002		1.969E+002	1.339E+002
Ra-226	186.21	3.64	4.322E+001	4.32E+001	-1.250E+001	2.141E+001
Ac-228	129.07	2.42	7.648E+001	1.05E+001	2.371E+001	3.794E+001
	209.25	3.89	3.923E+001		-1.200E+001	1.942E+001
	270.24	3.46	3.937E+001		2.771E-001	1.943E+001
	328.00	2.95	4.286E+001		-4.910E+001	2.109E+001
	338.32	11.27	1.169E+001		-4.377E+000	5.752E+000
	409.46	1.92	6.877E+001		-6.014E+001	3.376E+001
	463.00	4.40	3.268E+001		1.673E+001	1.604E+001
	794.95	4.25	5.422E+001		3.504E+001	2.661E+001
	911.20	25.80	1.052E+001		-1.927E+000	5.165E+000
	964.77	4.99	5.447E+001		3.383E+001	2.673E+001
	968.97	15.80	1.702E+001		-1.309E+000	8.352E+000
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	2.424E-001	2.42E-001	0.000E+000	0.000E+000
	283.69	1.70	7.853E+001		-5.604E+001	3.873E+001
	300.07	2.47	5.324E+001		4.971E+001	2.624E+001
	302.65	2.20	5.964E+001		6.038E+001	2.939E+001
	330.06	1.40	9.122E+001		-4.661E+001	4.489E+001
Th-234	92.38	2.13	1.014E+002	1.01E+002	-4.010E+001	5.031E+001
	92.80	2.10	1.026E+002		-4.060E+001	5.093E+001
	112.81	0.21	9.288E+002		6.672E+001	4.609E+002
U-235	143.76	10.96	1.547E+001	2.76E+000	5.888E+000	7.672E+000
	163.33	5.08	3.170E+001		-1.764E+001	1.571E+001
	185.71	57.20	2.759E+000		-2.932E-001	1.367E+000
	202.11	1.08	1.405E+002		1.340E+002	6.954E+001
	205.31	5.01	3.095E+001		2.816E+000	1.532E+001
Am-241	59.54	35.90	8.373E+000	8.37E+000	7.188E+000	4.152E+000

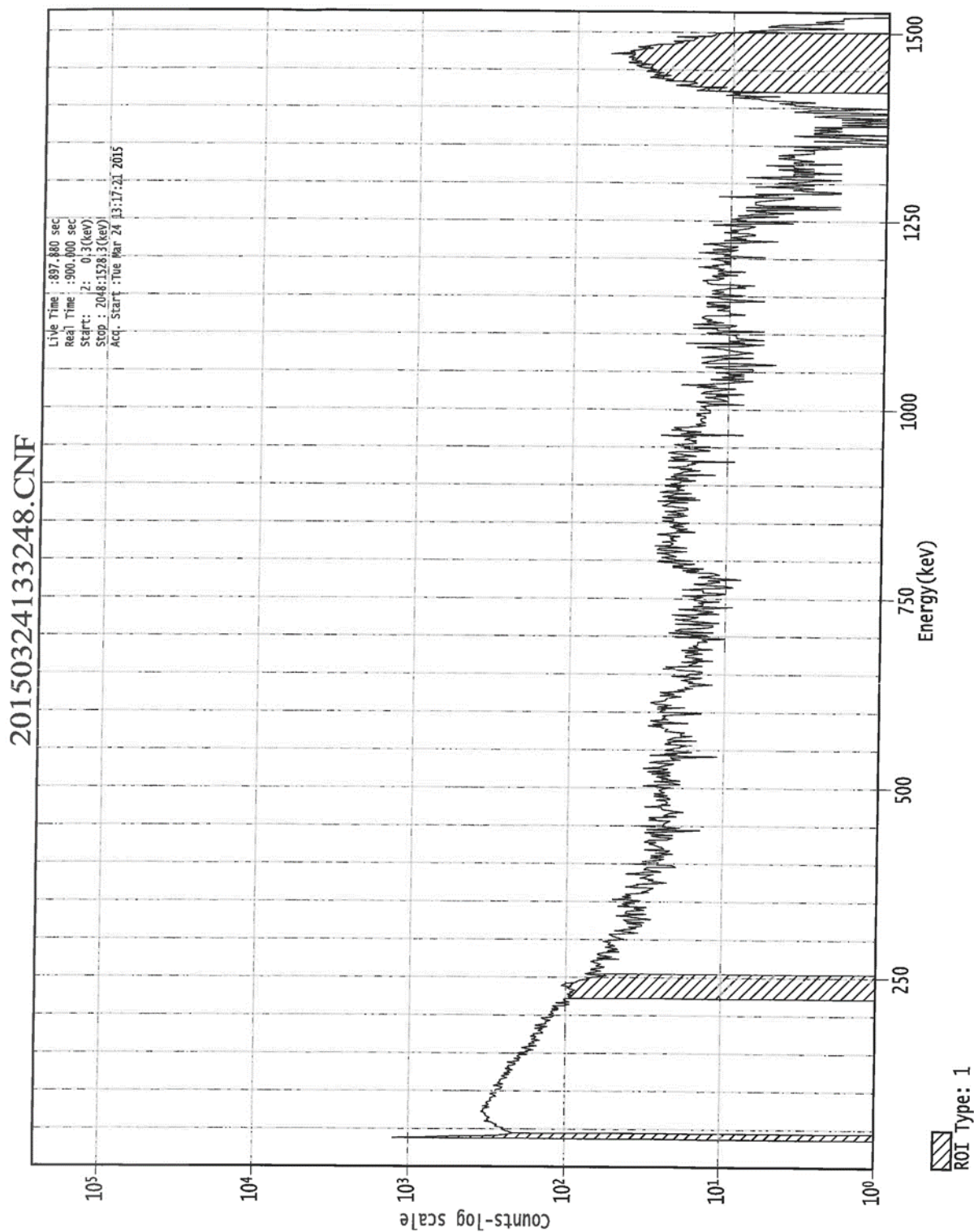
+ = Nuclide identified during the nuclide identification

* = Energy line found in the spectrum

> = MDA value not calculated

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

Attachment Figure 2-31 06901B Gamma Spectroscopy Reports



Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S ***

Filename: C:\Canberra\10-14-15\20151014143333.cnf

Report Generated On : 10/14/2015 2:59:48 PM

Sample Title : 6902A #18
Sample Description : Tb 663
Sample Identification : 6902A#18
Sample Type :
Sample Geometry : LaBr Paver
Sample Location : TB 663

*Response to alarm
CF 10/14/2015*

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 10/14/2015 2:21:56 PM
Acquisition Started : 10/14/2015 2:21:56 PM

Live Time : 598.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On : 9/30/2015
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVER

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst *RJ Rekasel*

Date *10-14-15*

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Peak Analysis Report 10/14/2015 2:59:48 PM Page 2

*** P E A K A N A L Y S I S R E P O R T *****

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 6902A #18
Peak Analysis Performed on: 10/14/2015 2:59:47 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	471-	498	485.35	1455.00	42.19	1.51E+003	133.11	3.76E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/14/2015 2 9:48 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6902A #18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
K-40	0.991	1460.82*	10.66	5.61039E+002	6.94498E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/14/2015 2 9:48 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
K-40	0.991	5.610387E+002	6.944983E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 10/14/2015 2:59:47 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

include MDA Report

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: LaBr Paver
Sample Title: 6902A #18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	LaBr3	34.70	66.40	4.426E+000	4.43E+000	2.861E+001	2.185E+000
		788.70	33.60	8.666E+000		-6.125E-001	4.238E+000
		1436.80	66.40	1.055E+001		2.880E+001	5.194E+000
+	K-40	1460.82*	10.66	6.712E+001	6.71E+001	5.610E+002	3.306E+001
	Cr-51	320.08	9.91	1.528E+001	1.53E+001	-6.517E+000	7.491E+000
	Mn-54	834.85	99.98	3.351E+000	3.35E+000	-2.858E-002	1.642E+000
	Co-58	810.76	99.45	3.289E+000	3.29E+000	1.817E+000	1.612E+000
	Co-60	1173.23	99.85	3.392E+000	1.66E+000	2.314E+000	1.652E+000
		1332.49	99.98	1.657E+000		-1.198E+000	7.784E-001
	Nb-94	702.65	99.81	2.075E+000	2.08E+000	3.414E-001	1.009E+000
		871.09	99.89	3.429E+000		2.075E+000	1.680E+000
	Sn-113	255.13	2.11	8.098E+001	2.57E+000	-1.996E+001	3.989E+001
		391.70	64.97	2.568E+000		-5.256E-001	1.257E+000
	Cs-137	661.66	85.10	2.369E+000	2.37E+000	-4.483E-001	1.152E+000
	Eu-152	121.78	28.67	8.030E+000	6.58E+000	-6.602E-002	3.977E+000
		244.70	7.61	2.323E+001		1.906E+001	1.145E+001
		295.94	0.45	3.576E+002		2.607E+002	1.757E+002
		344.28	26.60	6.580E+000		4.422E+000	3.231E+000
		367.79	0.86	1.978E+002		2.530E+001	9.699E+001
		411.12	2.24	7.484E+001		4.009E+000	3.661E+001
		443.96	2.83	5.957E+001		-5.401E+001	2.910E+001
		488.68	0.42	4.267E+002		1.210E+002	2.084E+002
		563.99	0.49	4.277E+002		-8.125E+001	2.090E+002
		586.26	0.46	4.827E+002		1.529E+001	2.360E+002
		678.62	0.47	4.358E+002		-1.197E+002	2.120E+002
		688.67	0.86	2.407E+002		-1.311E+001	1.171E+002
		719.35	0.28	7.774E+002		2.782E+002	3.782E+002
		778.90	12.96	2.112E+001		-1.258E+000	1.032E+001
		810.45	0.32	1.019E+003		5.628E+002	4.993E+002
		867.37	4.26	8.050E+001		5.900E+001	3.944E+001
		919.33	0.43	7.780E+002		7.374E+002	3.805E+002
		964.08	14.65	2.198E+001		-1.921E+001	1.073E+001
		1085.87	10.24	2.886E+001		-9.144E+000	1.402E+001
		1089.74	1.73	1.736E+002		-9.210E+001	8.439E+001
		1112.07	13.69	2.336E+001		6.611E+000	1.137E+001
		1212.95	1.43	2.131E+002		5.354E+001	1.033E+002
		1249.94	0.19	1.433E+003		-1.123E+001	6.916E+002
		1299.14	1.63	1.275E+002		-3.399E+001	6.076E+001
		1408.01	21.07	2.139E+001		-4.502E+000	1.045E+001
		1457.64	0.50	1.460E+003		6.187E+003	7.193E+002
		1528.10	0.28	3.366E+002		-1.657E+001	1.485E+002
	Eu-154	123.07	40.40	5.686E+000	5.69E+000	-4.675E-002	2.816E+000

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.547E+001	5.69E+000	8.455E+000	1.255E+001
		591.76	4.95	4.579E+001		-2.084E+001	2.239E+001
		692.42	1.78	1.172E+002		6.310E+001	5.700E+001
		723.30	20.06	1.083E+001		-1.497E-001	5.268E+000
		756.80	4.52	5.102E+001		-6.796E+001	2.483E+001
		873.18	12.08	2.841E+001		1.719E+001	1.392E+001
		996.29	10.48	2.941E+001		2.208E+000	1.434E+001
		1004.76	18.01	1.632E+001		1.801E+000	7.941E+000
		1274.43	34.80	6.856E+000		-8.686E-001	3.290E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.891E+002	7.73E+000	1.935E+003	1.431E+002
		60.01	1.22	2.636E+002		-1.521E+002	1.303E+002
		86.55	30.70	7.732E+000		5.431E-001	3.825E+000
		105.31	21.10	1.198E+001		6.443E+000	5.937E+000
	Tl-208	583.19	85.00	2.608E+000	2.61E+000	1.361E+000	1.275E+000
	Bi-211	351.07	13.02	1.340E+001	1.34E+001	9.411E+000	6.579E+000
	Pb-211	404.85	3.78	4.390E+001	4.39E+001	-8.363E+000	2.148E+001
		427.09	1.76	9.339E+001		-1.709E+001	4.564E+001
		832.01	3.52	9.478E+001		-2.205E+000	4.644E+001
	Bi-212	39.86	1.06	3.324E+002	3.20E+001	2.152E+003	1.645E+002
		727.33	6.67	3.199E+001		-2.050E+001	1.555E+001
		785.37	1.10	2.608E+002		7.783E+001	1.275E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.982E+002	4.08E+000	6.678E+001	1.972E+002
		238.63	43.60	4.085E+000		-1.323E+000	2.015E+000
		300.09	3.30	4.833E+001		1.116E+001	2.374E+001
	Pb212-XR	74.82	10.28	2.636E+001	1.54E+001	5.664E+000	1.304E+001
		77.11	17.10	1.540E+001		2.473E-001	7.617E+000
		87.35	3.97	5.902E+001		-1.807E+001	2.920E+001
		89.78	1.46	1.874E+002		-1.674E+001	9.287E+001
	Bi-214	609.32	45.49	5.096E+000	5.10E+000	2.227E+000	2.492E+000
		768.36	4.89	5.065E+001		-2.345E+001	2.469E+001
		806.18	1.26	2.549E+002		1.619E+002	1.249E+002
		934.06	3.11	1.028E+002		-3.308E+001	5.024E+001
		1120.29	14.92	2.155E+001		1.339E+000	1.049E+001
		1155.21	1.63	2.045E+002		3.101E+000	9.955E+001
		1238.12	5.83	4.975E+001		4.778E+001	2.407E+001
		1280.98	1.43	1.621E+002		3.359E+001	7.766E+001
		1377.67	3.99	4.814E+001		-9.614E+001	2.278E+001
		1385.31	0.79	2.886E+002		-3.780E+002	1.378E+002
		1401.52	1.33	2.929E+002		-2.020E+002	1.425E+002
		1407.99	2.39	1.882E+002		-3.962E+001	9.194E+001
		1509.21	2.13	1.127E+002		-6.974E+001	5.374E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.457E+001	4.83E+000	2.098E+001	1.211E+001
		295.22	18.42	8.683E+000		6.331E+000	4.265E+000
		351.93	35.60	4.834E+000		1.566E+000	2.373E+000

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Slide MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.713E+002	4.83E+000	8.097E+001	1.326E+002
Pb214-XR	74.82	5.80	4.673E+001	2.71E+001	1.004E+001	2.311E+001
	77.11	9.70	2.715E+001		4.360E-001	1.343E+001
	87.35	2.24	1.046E+002		-3.203E+001	5.174E+001
	89.78	0.82	3.337E+002		-2.981E+001	1.654E+002
Ra-226	186.21	3.64	4.941E+001	4.94E+001	3.025E+001	2.441E+001
Ac-228	129.07	2.42	9.352E+001	1.29E+001	5.240E+001	4.631E+001
	209.25	3.89	5.000E+001		1.990E+001	2.471E+001
	270.24	3.46	4.591E+001		-3.038E+001	2.258E+001
	328.00	2.95	5.738E+001		1.490E+001	2.818E+001
	338.32	11.27	1.537E+001		4.654E-002	7.546E+000
	409.46	1.92	8.690E+001		4.655E+000	4.251E+001
	463.00	4.40	4.056E+001		2.988E+001	1.982E+001
	794.95	4.25	7.189E+001		9.443E+001	3.519E+001
	911.20	25.80	1.291E+001		-3.123E-001	6.315E+000
	964.77	4.99	6.458E+001		-5.642E+001	3.153E+001
	968.97	15.80	2.064E+001		1.195E+001	1.008E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.279E+001		3.516E+000	4.559E+001
	300.07	2.47	6.457E+001		1.491E+001	3.171E+001
	302.65	2.20	7.254E+001		5.084E+001	3.562E+001
	330.06	1.40	1.214E+002		3.153E+001	5.963E+001
Th-234	92.38	2.13	1.268E+002	1.27E+002	2.571E+001	6.284E+001
	92.80	2.10	1.284E+002		2.603E+001	6.363E+001
	112.81	0.21	1.141E+003		-6.508E+002	5.654E+002
U-235	143.76	10.96	1.932E+001	3.14E+000	-1.672E-002	9.564E+000
	163.33	5.08	3.756E+001		3.529E+000	1.857E+001
	185.71	57.20	3.141E+000		1.923E+000	1.551E+000
	202.11	1.08	1.813E+002		1.694E+001	8.960E+001
	205.31	5.01	3.896E+001		2.429E+001	1.925E+001
Am-241	59.54	35.90	9.064E+000	9.06E+000	-5.231E+000	4.480E+000

+ = 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

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

*** G A M M A S P E C T R U M A N A L Y S I S *****

.lename: C:\Canberra\10-14-15\20151014143333.cnf

Report Generated On : 10/14/2015 2:59:48 PM

Sample Title : 6902A #18
Sample Description : Tb 663
Sample Identification : 6902A#18
Sample Type :
Sample Geometry : LaBr Paver
Sample Location : TB 663

*ALAN
Response* (5)

Peak Locate Threshold : 3.00
Peak Locate Range (in channels) : 1 - 512
Peak Area Range (in channels) : 1 - 512
Identification Energy Tolerance : 1.000 FWHM

Sample Size : 1.000E+000 unit

Sample Taken On : 10/14/2015 2:21:56 PM
Acquisition Started : 10/14/2015 2:21:56 PM

Live Time : 598.7 seconds
Real Time : 600.0 seconds

Dead Time : 0.21 %

Energy Calibration Used Done On : 9/30/2015
Efficiency Calibration Used Done On : 7/15/2014
Efficiency ID : 1M_PAVAR

***The accuracy of this count CAN NOT be
assured because the physical and calibration
geometries of the count did not match. This
is a QUALITATIVE identification only.***

Analyst RJ. Reber

Date 10-14-15

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Peak Analysis Report 10/14/2015 2:59:48 PM Page 2

*** P E A K A N A L Y S I S R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Title: 6902A #18
Peak Analysis Performed on: 10/14/2015 2:59:47 PM
Peak Analysis From Channel: 1
Peak Analysis To Channel: 512

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	471-	498	485.35	1455.00	42.19	1.51E+003	133.11	3.76E+002

= First peak in a multiplet region
= Other peak in a multiplet region
= Fitted singlet

Errors quoted at 2.000 sigma

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/14/2015 1:59:48 PM Page 3

*** N U C L I D E I D E N T I F I C A T I O N R E P O R T ***

Sample Title: 6902A #18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

..... IDENTIFIED NUCLIDES

Nuclide Name	Id Confidence	Energy (keV)	Yield (%)	Activity (pCi/unit)	Activity Uncertainty
K-40	0.991	1460.82*	10.66	5.61039E+002	6.94498E+001

* = Energy line found in the spectrum.
@ = Energy line not used for Weighted Mean Activity
Energy Tolerance : 1.000 FWHM
Nuclide confidence index threshold = 0.30
Errors quoted at 2.000 sigma

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

Interference Corrected Activity Report 10/14/2015 2:59:48 PM Page 4

*** I N T E R F E R E N C E C O R R E C T E D R E P O R T ***

Nuclide Name	Nuclide Id Confidence	Wt mean Activity (pCi/unit)	Wt mean Activity Uncertainty
K-40	0.991	5.610387E+002	6.944983E+001

? = 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 2.000 sigma

***** U N I D E N T I F I E D P E A K S *****

Peak Locate Performed on: 10/14/2015 2:59:47 PM
Peak Locate From Channel: 1
Peak Locate To Channel: 512

Peak No.	Energy (keV)	Peak Size in Counts per Second	Peak CPS % Uncertainty	Peak Type	Tol. Nuclide
-------------	-----------------	-----------------------------------	---------------------------	--------------	-----------------

All peaks were identified.

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

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*** N U C L I D E M D A R E P O R T ***

Detector Name: Sgc LaBr 1R5x1R5
Sample Geometry: LaBr Paver
Sample Title: 6902A #18
Nuclide Library Used: C:\GENIE2K\CAMFILES\Zion Lib-BNL_LaBr3.N

	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	LaBr3	34.70	66.40	4.426E+000	4.43E+000	2.861E+001	2.185E+000
		788.70	33.60	8.666E+000		-6.125E-001	4.238E+000
		1436.80	66.40	1.055E+001		2.880E+001	5.194E+000
+	K-40	1460.82*	10.66	6.712E+001	6.71E+001	5.610E+002	3.306E+001
	Cr-51	320.08	9.91	1.528E+001	1.53E+001	-6.517E+000	7.491E+000
	Mn-54	834.85	99.98	3.351E+000	3.35E+000	-2.858E-002	1.642E+000
	Co-58	810.76	99.45	3.289E+000	3.29E+000	1.817E+000	1.612E+000
	Co-60	1173.23	99.85	3.392E+000	1.66E+000	2.314E+000	1.652E+000
		1332.49	99.98	1.657E+000		-1.198E+000	7.784E-001
	Nb-94	702.65	99.81	2.075E+000	2.08E+000	3.414E-001	1.009E+000
		871.09	99.89	3.429E+000		2.075E+000	1.680E+000
	Sn-113	255.13	2.11	8.098E+001	2.57E+000	-1.996E+001	3.989E+001
		391.70	64.97	2.568E+000		-5.256E-001	1.257E+000
	Cs-137	661.66	85.10	2.369E+000	2.37E+000	-4.483E-001	1.152E+000
	Eu-152	121.78	28.67	8.030E+000	6.58E+000	-6.602E-002	3.977E+000
		244.70	7.61	2.323E+001		1.906E+001	1.145E+001
		295.94	0.45	3.576E+002		2.607E+002	1.757E+002
		344.28	26.60	6.580E+000		4.422E+000	3.231E+000
		367.79	0.86	1.978E+002		2.530E+001	9.699E+001
		411.12	2.24	7.484E+001		4.009E+000	3.661E+001
		443.96	2.83	5.957E+001		-5.401E+001	2.910E+001
		488.68	0.42	4.267E+002		1.210E+002	2.084E+002
		563.99	0.49	4.277E+002		-8.125E+001	2.090E+002
		586.26	0.46	4.827E+002		1.529E+001	2.360E+002
		678.62	0.47	4.358E+002		-1.197E+002	2.120E+002
		688.67	0.86	2.407E+002		-1.311E+001	1.171E+002
		719.35	0.28	7.774E+002		2.782E+002	3.782E+002
		778.90	12.96	2.112E+001		-1.258E+000	1.032E+001
		810.45	0.32	1.019E+003		5.628E+002	4.993E+002
		867.37	4.26	8.050E+001		5.900E+001	3.944E+001
		919.33	0.43	7.780E+002		7.374E+002	3.805E+002
		964.08	14.65	2.198E+001		-1.921E+001	1.073E+001
		1085.87	10.24	2.886E+001		-9.144E+000	1.402E+001
		1089.74	1.73	1.736E+002		-9.210E+001	8.439E+001
		1112.07	13.69	2.336E+001		6.611E+000	1.137E+001
		1212.95	1.43	2.131E+002		5.354E+001	1.033E+002
		1249.94	0.19	1.433E+003		-1.123E+001	6.916E+002
		1299.14	1.63	1.275E+002		-3.399E+001	6.076E+001
		1408.01	21.07	2.139E+001		-4.502E+000	1.045E+001
		1457.64	0.50	1.460E+003		6.187E+003	7.193E+002
		1528.10	0.28	3.366E+002		-1.657E+001	1.485E+002
	Eu-154	123.07	40.40	5.686E+000	5.69E+000	-4.675E-002	2.816E+000

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

include MDA Report

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	Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
	Eu-154	247.93	6.89	2.547E+001	5.69E+000	8.455E+000	1.255E+001
		591.76	4.95	4.579E+001		-2.084E+001	2.239E+001
		692.42	1.78	1.172E+002		6.310E+001	5.700E+001
		723.30	20.06	1.083E+001		-1.497E-001	5.268E+000
		756.80	4.52	5.102E+001		-6.796E+001	2.483E+001
		873.18	12.08	2.841E+001		1.719E+001	1.392E+001
		996.29	10.48	2.941E+001		2.208E+000	1.434E+001
		1004.76	18.01	1.632E+001		1.801E+000	7.941E+000
		1274.43	34.80	6.856E+000		-8.686E-001	3.290E+000
>		1596.48	1.80	0.000E+000		0.000E+000	0.000E+000
	Eu-155	45.30	1.31	2.891E+002	7.73E+000	1.935E+003	1.431E+002
		60.01	1.22	2.636E+002		-1.521E+002	1.303E+002
		86.55	30.70	7.732E+000		5.431E-001	3.825E+000
		105.31	21.10	1.198E+001		6.443E+000	5.937E+000
	Tl-208	583.19	85.00	2.608E+000	2.61E+000	1.361E+000	1.275E+000
	Bi-211	351.07	13.02	1.340E+001	1.34E+001	9.411E+000	6.579E+000
	Pb-211	404.85	3.78	4.390E+001	4.39E+001	-8.363E+000	2.148E+001
		427.09	1.76	9.339E+001		-1.709E+001	4.564E+001
		832.01	3.52	9.478E+001		-2.205E+000	4.644E+001
	Bi-212	39.86	1.06	3.324E+002	3.20E+001	2.152E+003	1.645E+002
		727.33	6.67	3.199E+001		-2.050E+001	1.555E+001
		785.37	1.10	2.608E+002		7.783E+001	1.275E+002
>		1620.50	1.47	0.000E+000		0.000E+000	0.000E+000
	Pb-212	115.18	0.60	3.982E+002	4.08E+000	6.678E+001	1.972E+002
		238.63	43.60	4.085E+000		-1.323E+000	2.015E+000
		300.09	3.30	4.833E+001		1.116E+001	2.374E+001
	Pb212-XR	74.82	10.28	2.636E+001	1.54E+001	5.664E+000	1.304E+001
		77.11	17.10	1.540E+001		2.473E-001	7.617E+000
		87.35	3.97	5.902E+001		-1.807E+001	2.920E+001
		89.78	1.46	1.874E+002		-1.674E+001	9.287E+001
	Bi-214	609.32	45.49	5.096E+000	5.10E+000	2.227E+000	2.492E+000
		768.36	4.89	5.065E+001		-2.345E+001	2.469E+001
		806.18	1.26	2.549E+002		1.619E+002	1.249E+002
		934.06	3.11	1.028E+002		-3.308E+001	5.024E+001
		1120.29	14.92	2.155E+001		1.339E+000	1.049E+001
		1155.21	1.63	2.045E+002		3.101E+000	9.955E+001
		1238.12	5.83	4.975E+001		4.778E+001	2.407E+001
		1280.98	1.43	1.621E+002		3.359E+001	7.766E+001
		1377.67	3.99	4.814E+001		-9.614E+001	2.278E+001
		1385.31	0.79	2.886E+002		-3.780E+002	1.378E+002
		1401.52	1.33	2.929E+002		-2.020E+002	1.425E+002
		1407.99	2.39	1.882E+002		-3.962E+001	9.194E+001
		1509.21	2.13	1.127E+002		-6.974E+001	5.374E+001
>		1661.27	1.05	0.000E+000		0.000E+000	0.000E+000
>		1729.59	2.88	0.000E+000		0.000E+000	0.000E+000
>		1764.49	15.30	0.000E+000		0.000E+000	0.000E+000
>		1847.43	2.03	0.000E+000		0.000E+000	0.000E+000
>		2118.51	1.16	0.000E+000		0.000E+000	0.000E+000
	Pb-214	241.99	7.25	2.457E+001	4.83E+000	2.098E+001	1.211E+001
		295.22	18.42	8.683E+000		6.331E+000	4.265E+000
		351.93	35.60	4.834E+000		1.566E+000	2.373E+000

Attachment Figure 2-32 06902A Gamma Spectroscopy Reports

include MDA Report

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Nuclide Name	Energy (keV)	Yield (%)	Line MDA (pCi/unit)	Nuclide MDA (pCi/unit)	Activity (pCi/unit)	Dec. Level (pCi/unit)
Pb-214	785.96	1.06	2.713E+002	4.83E+000	8.097E+001	1.326E+002
Pb214-XR	74.82	5.80	4.673E+001	2.71E+001	1.004E+001	2.311E+001
	77.11	9.70	2.715E+001		4.360E-001	1.343E+001
	87.35	2.24	1.046E+002		-3.203E+001	5.174E+001
	89.78	0.82	3.337E+002		-2.981E+001	1.654E+002
Ra-226	186.21	3.64	4.941E+001	4.94E+001	3.025E+001	2.441E+001
Ac-228	129.07	2.42	9.352E+001	1.29E+001	5.240E+001	4.631E+001
	209.25	3.89	5.000E+001		1.990E+001	2.471E+001
	270.24	3.46	4.591E+001		-3.038E+001	2.258E+001
	328.00	2.95	5.738E+001		1.490E+001	2.818E+001
	338.32	11.27	1.537E+001		4.654E-002	7.546E+000
	409.46	1.92	8.690E+001		4.655E+000	4.251E+001
	463.00	4.40	4.056E+001		2.988E+001	1.982E+001
	794.95	4.25	7.189E+001		9.443E+001	3.519E+001
	911.20	25.80	1.291E+001		-3.123E-001	6.315E+000
	964.77	4.99	6.458E+001		-5.642E+001	3.153E+001
	968.97	15.80	2.064E+001		1.195E+001	1.008E+001
>	1588.20	3.22	0.000E+000		0.000E+000	0.000E+000
Pa-231	27.36	10.30	3.635E-001	3.63E-001	0.000E+000	0.000E+000
	283.69	1.70	9.279E+001		3.516E+000	4.559E+001
	300.07	2.47	6.457E+001		1.491E+001	3.171E+001
	302.65	2.20	7.254E+001		5.084E+001	3.562E+001
	330.06	1.40	1.214E+002		3.153E+001	5.963E+001
Th-234	92.38	2.13	1.268E+002	1.27E+002	2.571E+001	6.284E+001
	92.80	2.10	1.284E+002		2.603E+001	6.363E+001
	112.81	0.21	1.141E+003		-6.508E+002	5.654E+002
U-235	143.76	10.96	1.932E+001	3.14E+000	-1.672E-002	9.564E+000
	163.33	5.08	3.756E+001		3.529E+000	1.857E+001
	185.71	57.20	3.141E+000		1.923E+000	1.551E+000
	202.11	1.08	1.813E+002		1.694E+001	8.960E+001
	205.31	5.01	3.896E+001		2.429E+001	1.925E+001
Am-241	59.54	35.90	9.064E+000	9.06E+000	-5.231E+000	4.480E+000

+ = 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