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31 January 2017
File No. 128924-002

Mr. Joseph Jacobsen
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Subject: Groundwater Monitoring Report, December 2016
La Crosse Boiling Water Reactor
Genoa, Wisconsin

Mr. Jacobsen:

Haley & Aldrich Inc. has been contracted by LaCrosseSolutions to evaluate groundwater conditions at the La Crosse Boiling Water Reactor (LACBWR) located in Genoa, Wisconsin. This report summarizes the findings of groundwater monitoring performed in December 2016 to support License Termination and Site Closure.

The purpose of the groundwater monitoring program is to characterize groundwater quality and to evaluate if site-related radiological impacts are present. Based on our findings, the current data do not suggest site-related radiological impacts to groundwater quality.

We appreciate the opportunity to provide environmental consulting services on this project. Please do not hesitate to call Nadia Glucksberg at 207.482.4623 if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.

A handwritten signature in black ink, appearing to read "Miles van Noordennen".

Miles van Noordennen
Technical Specialist

A handwritten signature in black ink, appearing to read "Nadia Glucksberg".

Nadia Glucksberg, PG (WI No. PG-1300)
Lead Hydrogeologist

Enclosures

GROUNDWATER MONITORING REPORT, DECEMBER 2016
LA CROSSE BOILING WATER REACTOR
GENOA, WISCONSIN

by Haley & Aldrich, Inc.
Portland, Maine

for *LaCrosseSolutions*
Genoa, Wisconsin

File No. 128924-002
January 2017



Table of Contents

	Page
List of Tables	iii
List of Figures	iii
List of Acronyms	iv
1. Introduction	1
1.1 BACKGROUND	1
2. Field Activities	1
3. Groundwater Flow Interpretations	2
4. Groundwater Analytical Results	2
4.1 RADIONUCLIDES	2
5. Conclusions and Recommendations	3
5.1 CONCLUSIONS	3
5.2 RECOMMENDATIONS	3
References	4

Tables

Figures

Appendix A – Field Data Records

Appendix B

Appendix B.1 – Data Validation Report

Appendix B.2 – Laboratory Data Report

List of Tables

Table No.	Title
1	Summary of Field Parameters, December 2016
2	Summary of Groundwater Elevations and Vertical Gradients
3	Summary of Radiological Groundwater Quality Data, December 2016
4	Notes for Analytical Data

List of Figures

Figure No.	Title
1	Project Locus
2	Site Topographic Map
3	Groundwater Contours, Shallow Aquifer, December 2016
4	Groundwater Contours, Deep Aquifer, December 2016
5	Cesium-137, Cobalt-60, Strontium-90, Nickel-63, and Tritium Data Observed in Groundwater

List of Acronyms

AEC	Atomic Energy Commission
bgs	Below ground surface
Cs-137	Cesium-137
Co-60	Cobalt-60
CSM	Conceptual Site Model
EPA	Environmental Protection Agency
ft	feet or foot
ft/ft	feet per foot
Haley & Aldrich	Haley & Aldrich, Inc.
H-3	Tritium
LACBWR	La Crosse Boiling Water Reactor
LTP	License Termination Plan
MCLs	Maximum Contaminant Levels
MSL	Mean Sea Level
Ni-63	Nickel-63
Sr-90	Strontium-90
WDNR	Wisconsin Department of Natural Resources

1. Introduction

Haley & Aldrich Inc. (Haley & Aldrich) has been contracted by LaCrosse*Solutions* to evaluate groundwater conditions at the La Crosse Boiling Water Reactor (LACBWR) located in Genoa, Wisconsin (Figure 1).

This report summarizes the findings of groundwater monitoring performed in December 2016. The purpose of this program is to continue the groundwater monitoring and establish baseline conditions to identify if there are any spatial and temporal trends. This sampling program will also support ongoing decommissioning of the Site and the License Termination Plan (LTP). Groundwater was submitted for laboratory analyses of radiological constituents.

This report also addresses one of the recommendations made in the Hydrogeological Investigation Report dated 15 January 2015 and revised 24 February 2016 and the Groundwater Monitoring Report dated 25 March 2016 which included monitoring groundwater elevations and quality including cesium-137 (Cs-137), strontium-90 (Sr-90), cobalt-60 (Co-60), and tritium (H-3).

1.1 BACKGROUND

LACBWR was a 50 megawatt electrical nuclear power plant. The plant is located on the east bank of the Mississippi River in Vernon County, Wisconsin, approximately one mile south of the village of Genoa, Wisconsin, and approximately 19 miles south of the city of La Crosse, Wisconsin. The plant was one of a series of demonstration plants funded in part by the United States Atomic Energy Commission (AEC). The plant achieved initial criticality on 11 July 1967 and began commercial power generation on 1 November 1969. The plant operated for 19 years until it was shut down permanently on 30 April 1987 and de-fueled. The plant was put into SAFSTOR in 1987 and is now undergoing final decommissioning with the goal of license termination.

2. Field Activities

Groundwater samples were collected from groundwater monitoring wells on-site in December 2016. Samples were collected from monitoring wells MW-200A/B, MW-201A/B, MW-202A/B, MW-203A/B, MW-204A/B, MWB11R, MWB11AR, and domestic Well Number 5. Monitoring well locations are shown on Figure 2.

Groundwater samples were collected using the Environmental Protection Agency's (EPA's) Low Stress/Low Flow Sampling Methods (EPA 2010) and LaCrosse*Solutions* Procedure No. WI-2016-030, WI-2016-031, WI-2016-032, WI-2016-033, and WI-2016-034 (LaCrosse*Solutions* 2016a, 2106b, 2016c, 2016d, 2016e) with field parameter measurements for the following:

- pH;
- Oxidation reduction potential (ORP);
- Temperature;
- Conductivity;
- Dissolved oxygen; and
- Turbidity.

As part of this collection method, groundwater is purged at a rate not to depress the water table. Samples are then collected for laboratory analysis once the field parameters have stabilized to within applicable criteria. Field parameter data for 2014-2016 are presented in Table 1. The field data records for the December 2016 sampling are presented in Appendix A.

Groundwater samples were submitted to General Engineering Laboratories (Charleston, South Carolina) for the following analyses:

- Radionuclides Co-60 and Cs-137 by gamma spectroscopy;
- Radionuclides Nickel-63 (Ni-63) and H-3 by liquid scintillation; and
- Radionuclide Sr-90 by gas flow proportional counting.

3. Groundwater Flow Interpretations

The groundwater elevations collected in December 2016 are consistent with the findings of the Hydrogeological Investigation Report (Haley & Aldrich 2016a) and Groundwater Monitoring Report, 2014-2015 (Haley & Aldrich 2016b). Groundwater beneath the site in December 2016 is first encountered at depths ranging from approximately 13.48 to 16.13 feet below ground surface (ft bgs) and the water table aquifer is in strong hydraulic communication with the adjacent Mississippi River. Results from synoptic groundwater elevation rounds are presented in Table 2. Shallow and deep groundwater contours observed in December 2016 are presented on Figures 3 and 4.

Groundwater data are consistent with previous rounds. Groundwater in the shallow aquifer flows towards the west and discharges into the Mississippi River. The deeper groundwater generally flows to the west, but is likely influenced by the river and may turn to flow parallel to the river. The horizontal gradient of the water table was consistent with the Hydrogeological Investigation Report (Haley & Aldrich 2016a) and Groundwater Monitoring Report, 2014-2015 (Haley & Aldrich 2016b). Vertical groundwater gradient continues to be dependent on the river stage. Generally, there was an upward gradient, as expected, during low waters in during the December 2016 sampling event. Vertical gradients in December 2016 ranged from 0.018 foot per foot (ft/ft) in the upward direction to 0.030 ft/ft in the downward direction. These groundwater elevation data were consistent with the groundwater flow conceptual site model (CSM).

4. Groundwater Analytical Results

Laboratory results from groundwater sampling rounds performed in December 2016 are presented in Table 3. The laboratory validation and data report are provided in Appendix B.

4.1 RADIONUCLIDES

Concentrations observed in groundwater samples collected from the monitoring and domestic wells show low levels of radionuclides that are consistent with expected background values (Table 3, Notes associated with this table are in Table 4). Reported values were well below the EPA maximum contaminant levels (MCLs) for groundwater and do not suggest site-related impacts.

As required to support the LTP, radionuclide monitoring included the analysis of constituents: Cs-137, Sr-90, Co-60, Ni-63, and H-3. Results and the uncertainty values of these constituents from groundwater samples collected in December 2016 are shown graphically on Figure 5. Several of the reported values are negative, and in many of the measurements, the laboratory reported accuracy includes zero. Based on these data there are no observed trends or interpreted site-related impacts.

All radionuclide reported values were below EPA MCLs, and no indication of an increasing trend can be observed. Additionally, any spatial trend in radionuclides is also not discernable in the current data set.

5. Conclusions and Recommendations

5.1 CONCLUSIONS

The following conclusions are based on the data presented in this report:

- **Groundwater Flow.** Groundwater flow is consistent with the CSM and is generally to the west towards the Mississippi River. Vertical gradients are generally in the upward direction, but may reverse during higher river stages.
- **Field Data.** Field data do not indicate site-related impacts and parameters are within expected ranges for the geology and geography.
- **Radiological Data.** Data do not indicate site-related impacts to groundwater quality.

5.2 RECOMMENDATIONS

The following recommendation is based on the current data set and LACBWR's end goal of License Termination.

- Continue the currently planned radiological groundwater monitoring program to develop long-term spatial and temporal trends in groundwater data to support the LTP.

References

1. LaCrosseSolutions. 2016a. Radiation Protection, Instruction No. WI-2016-030, Revision 0, Low-Flow Purge, LaCrosseSolutions Site Restoration Project. 26 September 2016.
2. LaCrosseSolutions. 2016a. Radiation Protection, Instruction No. WI-2016-031, Revision 0, Equipment Calibration, LaCrosseSolutions Site Restoration Project. 26 September 2016.
3. LaCrosseSolutions. 2016a. Radiation Protection, Instruction No. WI-2016-032, Revision 0, Manual Water-Level Measurement, LaCrosseSolutions Site Restoration Project. 26 September 2016.
4. LaCrosseSolutions. 2016a. Radiation Protection, Instruction No. WI-2016-033, Revision 0, Sample Management, LaCrosseSolutions Site Restoration Project. 26 September 2016.
5. LaCrosseSolutions. 2016a. Radiation Protection, Instruction No. WI-2016-034, Revision 0, Equipment Decontamination, LaCrosseSolutions Site Restoration Project. 26 September 2016.
6. Haley & Aldrich, Inc. 2016a. Hydrogeological Investigation Report, La Crosse Boiling Water Reactor, Dairyland Power Cooperative. Revised 24 February 2016.
7. Haley & Aldrich, Inc. 2016b. Draft Groundwater Monitoring Report, 2014-2015; La Crosse Boiling Water Reactor. March 2016.
8. U.S. Environmental Protection Agency. 2010. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. USEPA – Region 1.
9. U.S. Environmental Protection Agency. <https://www.epa.gov/your-drinking-water/table-regulated-drinking-water-contaminants>. Accessed 24 March 2016.
10. Wisconsin Department of Natural Resources, NR 140. Published under s. 35.93, stats. Register July 2015, No 715.

TABLES

TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	5 DW-5-03252015 03/25/2015	5 DW-5-06242015 06/24/2015	5 DW-5-09022015 09/02/2015	5 DW-5-11122015 11/12/2015	5 Well 5-120716 12/07/2016	B11AR MW-B11AR-03252015 03/25/2015	B11AR MW-B11RA-06242015 06/24/2015	B11AR MW-B11AR-09022015 09/02/2015	B11AR MW-B11AR-11122015 11/12/2015
Field Parameters									
Temperature (Deg C)	5.48	12.4	12.4	12	9.88	10.3	14.5	14.3	14.3
Dissolved Oxygen, Field (mg/L)	7.13	8.7	8.1	7.7	6.45	3.5	3.5	2.7	2.7
Conductivity, Field (mS/cm)	549.9	622	666	671	0.568	1014	986	950	950
ORP, Field (mv)	304	292	286	230	202	290	350	289	289
Turbidity, Field (NTU)	134.6	0	0	0	43.6	0	1.5	0	0
pH, Field (pH units)	7.23	7.17	7.12	7.28	8.02	7.37	7.15	7.37	7.37

ABBREVIATIONS AND NOTES:

- Only collected field parameters are shown in this table.

C: Celsius

mg/L: milligrams per liter

mS/cm: milliSiemens per centimeter

mV: milliVolts

NTU: Nephelometric Turbidity Unit

TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	B11AR B11AR-120616 12/06/2016	B11R MW-B11R-03252015 03/25/2015	B11R MW-B11R-06242015 06/24/2015	B11R MW-B11R-09022015 09/02/2015	B11R MW-B11R-11122015 11/12/2015	B11R B11R-120616 12/06/2016	MW-200A MW-200A-03242015 03/24/2015	MW-200A MW-200A-06242015 06/24/2015	MW-200A MW-200A-09022015 09/02/2015
Field Parameters									
Temperature (Deg C)	7.01	9.7	13.5	16.1	12.9	10.7	8.93	13.8	16.4
Dissolved Oxygen, Field (mg/L)	1.65	0.64	0.2	0.15	0	0	0.26	0	0.4
Conductivity, Field (mS/cm)	1.12	1095	1085	1132	1120	0.985	1742	1018	614
ORP, Field (mv)	178	131	153	75	90	-65	83	279	251
Turbidity, Field (NTU)	1.9	10	16.4	8	3.3	16.1	10.1	13.6	2.9
pH, Field (pH units)	7.26	6.33	6.3	6.42	6.62	7.5	6.54	6.85	7.09

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mV: milliVolts

NTU: Nephelometric Turbidity Unit

TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-200A MW-200A-11112015 11/11/2015	MW-200A MW-200A-120816 12/08/2016	MW-200B MW-200B-03242015 03/24/2015	MW-200B MW-200B-06242015 06/24/2015	MW-200B MW-200B-09022015 09/02/2015	MW-200B MW-200B-11112015 11/11/2015	MW-200B MW-200B-120816 12/08/2016	MW-201A MW-201A-03252015 03/25/2015
Field Parameters								
Temperature (Deg C)	14.4	10.8	10.4	13.1	14.5	12.4	9.99	8.5
Dissolved Oxygen, Field (mg/L)	0.5	0	0	0.45	0.5	0	0	0.51
Conductivity, Field (mS/cm)	1175	1.27	830	845	846	92	0.915	1356
ORP, Field (mv)	153	-124	119	94	93	92	-101	170
Turbidity, Field (NTU)	8.3	8.7	0.3	5.6	1.1	92	8.7	5.7
pH, Field (pH units)	6.85	7.94	7.37	6.98	7.01	7.23	7.3	6.5

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TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-201A MW-201A-06232015 06/23/2015	MW-201A MW-201A-09012015 09/01/2015	MW-201A MW-201A-11112015 11/11/2015	MW-201A MW-201A-120816 12/08/2016	MW-201B MW-201B-03252015 03/25/2015	MW-201B MW-201B-06232015 06/23/2015	MW-201B MW-201B-09012015 09/01/2015	MW-201B MW-201B-11112015 11/11/2015
Field Parameters								
Temperature (Deg C)	13.4	15.65	13.8	2.96	10.6	14	15.6	12.7
Dissolved Oxygen, Field (mg/L)	0.46	2.3	0.11	0	0	0	0.3	0
Conductivity, Field (mS/cm)	1270	1228	1297	0.688	907	896	866	868
ORP, Field (mv)	276	237	35	-66	126	115	111	132
Turbidity, Field (NTU)	3.5	0	3.5	20	2.5	0	2.8	0
pH, Field (pH units)	6.69	6.99	6.95	7.2	7.15	6.76	6.77	7.04

ABBREVIATIONS AND NOTES:

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mS/cm: milliSiemens per centimeter

mV: milliVolts

NTU: Nephelometric Turbidity Unit

TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-201B MW-201B-120816 12/08/2016	MW-202A MW-202A-03242015 03/24/2015	MW-202A MW-202A-06232015 06/23/2015	MW-202A MW-202A-09012015 09/01/2015	MW-202A MW-202A-11112015 11/11/2015	MW-202A MW-202A-120716 12/07/2016	MW-202B MW-202B-03242015 03/24/2015	MW-202B MW-202B-06232015 06/23/2015
Field Parameters								
Temperature (Deg C)	2.96	10.1	14.7	17.3	15.6	11.73	11.15	15.8
Dissolved Oxygen, Field (mg/L)	0	0	1.3	4	1	0	0.51	0.26
Conductivity, Field (mS/cm)	1.07	615	681	333	439	0.287	975	936
ORP, Field (mv)	-58	370	262	299	266	9	103	91
Turbidity, Field (NTU)	18.7	0	2.1	1.1	0	4.1	4.9	19
pH, Field (pH units)	6.84	7.26	7.05	7.17	7.14	8.24	6.81	6.96

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mV: milliVolts

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TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-202B MW-202B-09012015 09/01/2015	MW-202B MW-202B-11112015 11/11/2015	MW-202B MW-202B-120716 12/07/2016	MW-203A MW-203A-03242015 03/24/2015	MW-203A MW-203A-06232015 06/23/2015	MW-203A MW-203A-09012015 09/01/2015	MW-203A MW-203A-11112015 11/11/2015	MW-203A MW-203A-120716 12/07/2016
Field Parameters								
Temperature (Deg C)	16.7	13.5	10.23	10.6	15	16.6	14.7	9.03
Dissolved Oxygen, Field (mg/L)	0	0.2	0	0.36	2	0	0.6	0
Conductivity, Field (mS/cm)	906	907	1	567	567	589	556	0.914
ORP, Field (mv)	79	88	-116	128	160	96	146	-121
Turbidity, Field (NTU)	1.4	2.4	7.3	9.8	1.1	1.2	2.5	6.9
pH, Field (pH units)	7.26	7.02	7.34	6.55	6.65	7.07	6.78	7.92

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mV: milliVolts

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TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-203B MW-203B-03242015 03/24/2015	MW-203B MW-203B-06232015 06/23/2015	MW-203B MW-203B-09012015 09/01/2015	MW-203B MW-203B-11112015 11/11/2015	MW-203B MW-203B-120716 12/07/2016	MW-204A MW-204A-03242015 03/24/2015	MW-204A MW-204A-06232015 06/23/2015	MW-204A MW-204A-08312015 08/31/2015
Field Parameters								
Temperature (Deg C)	12.5	14.8	15	13.1	8.87	7.11	13.3	18.5
Dissolved Oxygen, Field (mg/L)	0	0	0.2	0	0	0.21	2.4	1.8
Conductivity, Field (mS/cm)	681	609	840	861	0.765	730	6.3	709
ORP, Field (mv)	80	47	58	68	-112	322	360	363
Turbidity, Field (NTU)	0.4	0	0.3	2.1	8	4.7	0	0.4
pH, Field (pH units)	7.5	7.5	7.28	7.39	7.37	7.1	7.26	7.15

ABBREVIATIONS AND NOTES:

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mS/cm: milliSiemens per centimeter

mV: milliVolts

NTU: Nephelometric Turbidity Unit

TABLE 1
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-204A MW-204A-11112015 11/11/2015	MW-204A MW-204A-120716 12/07/2016	MW-204B MW-204B-03242015 03/24/2015	MW-204B MW-204B-06232015 06/23/2015	MW-204B MW-204B-08312015 08/31/2015	MW-204B MW-204B-11112015 11/11/2015	MW-204B MW-204B-120716 12/07/2016
Field Parameters							
Temperature (Deg C)	15.7	8.85	9.39	13.3	15.9	12.7	8.35
Dissolved Oxygen, Field (mg/L)	0	0	0	0.35	0.3	0.2	0
Conductivity, Field (mS/cm)	731	0.727	1205	1159	1402	1267	1.31
ORP, Field (mv)	397	56	350	298	323	304	63
Turbidity, Field (NTU)	0	4.2	1.2	0	0.5	1.1	0.8
pH, Field (pH units)	7.07	7.34	7.25	6.96	6.86	6.87	8.15

ABBREVIATIONS AND NOTES:

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mV: milliVolts

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TABLE 2
SUMMARY OF GROUNDWATER ELEVATIONS AND VERTICAL GRADIENTS
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Well ID	Date	Groundwater Elevation, Feet MSL	Head Difference (feet)	Vertical Gradient ^{1, 2} (feet/feet)	Direction
MW-200A	11/13/2012	620.70	0.05	0.002	Downward
MW-200B		620.65			
MW-200A	12/11/2012	620.73	-0.85	-0.028	Upward
MW-200B		621.58			
MW-200A	6/26/2013	629.39	0.07	0.002	Downward
MW-200B		629.32			
MW-200A	6/27/2013	629.45	0.13	0.004	Downward
MW-200B		629.32			
MW-200A	11/5/2013	621.50	-0.24	-0.008	Upward
MW-200B		621.74			
MW-200A	6/23/2015	624.97	0.53	0.018	Downward
MW-200B		624.44			
MW-200A	11/11/2015	622.59	0.16	0.005	Downward
MW-200B		622.43			
MW-200A	12/8/2016	625.57	-0.53	-0.018	Upward
MW-200B		626.10			
MW-201A	11/13/2012	620.71	0.07	0.002	Downward
MW-201B		620.64			
MW-201A	12/11/2012	620.72	0.13	0.004	Downward
MW-201B		620.59			
MW-201A	6/26/2013	629.41	0.08	0.003	Downward
MW-201B		629.33			
MW-201A	6/27/2013	627.39	-0.03	-0.001	Upward
MW-201B		627.42			
MW-201A	11/5/2013	621.52	0.46	0.015	Downward
MW-201B		621.06			
MW-201A	6/23/2015	624.89	0.43	0.014	Downward
MW-201B		624.46			
MW-201A	11/11/2015	622.65	0.20	0.007	Downward
MW-201B		622.45			
MW-201A	12/8/2016	625.77	-0.33	-0.011	Upward
MW-201B		626.10			
MW-202A	11/13/2012	620.51	0.00	0.000	--
MW-202B		620.51			
MW-202A	12/11/2012	620.57	0.03	0.001	Downward
MW-202B		620.54			
MW-202A	6/26/2013	629.26	0.00	0.000	--
MW-202B		629.26			
MW-202A	6/27/2013	626.98	0.13	0.004	Downward
MW-202B		626.85			
MW-202A	11/5/2013	621.06	0.09	0.003	Downward
MW-202B		620.97			
MW-202A	6/23/2015	624.38	-0.02	-0.001	Upward
MW-202B		624.40			
MW-202A	11/11/2015	622.41	0.00	0.000	--
MW-202B		622.41			
MW-202A	12/7/2016	625.99	0.00	0.000	--
MW-202B		625.99			

ABBREVIATIONS AND NOTES:

¹Shallow wells (denoted with an "A") were installed from 15 to 25 feet bgs.

²Deeper wells (denoted with a "B") were installed from 45 to 55 feet bgs.

Distance between the shallow and deeper screens is 30 feet.

Survey conducted by Lampman & Associates of De Soto, Wisconsin on 20 November 2012.

bgs = below ground surface

TOC = Top of Casing, referencing PVC casing above ground surface

MSL = Mean Sea Level

-- = no directional gradient observed

TABLE 2
SUMMARY OF GROUNDWATER ELEVATIONS AND VERTICAL GRADIENTS
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Well ID	Date	Groundwater Elevation, Feet MSL	Head Difference (feet)	Vertical Gradient ^{1, 2} (feet/feet)	Direction
MW-203A	11/13/2012	620.47	-0.18	-0.006	Upward
MW-203B		620.65			
MW-203A	12/11/2012	620.53	-0.15	-0.005	Upward
MW-203B		620.68			
MW-203A	6/26/2013	629.62	0.18	0.006	Downward
MW-203B		629.44			
MW-203A	6/27/2013	627.27	0.16	0.005	Downward
MW-203B		627.11			
MW-203A	11/5/2013	621.47	0.31	0.010	Downward
MW-203B		621.16			
MW-203A	6/23/2015	624.78	0.22	0.007	Downward
MW-203B		624.56			
MW-203A	11/11/2015	622.75	0.22	0.007	Downward
MW-203B		622.53			
MW-203A	12/7/2016	625.90	-0.19	-0.006	Upward
MW-203B		626.09			
MW-204A	11/13/2012	620.83	0.07	0.002	Downward
MW-204B		620.76			
MW-204A	12/11/2012	620.89	0.05	0.002	Downward
MW-204B		620.84			
MW-204A	6/26/2013	629.83	0.17	0.006	Downward
MW-204B		629.66			
MW-204A	6/27/2013	629.73	0.12	0.004	Downward
MW-204B		629.61			
MW-204A	11/5/2013	621.48	0.17	0.006	Downward
MW-204B		621.31			
MW-204A	6/23/2015	624.86	0.13	0.004	Downward
MW-204B		624.73			
MW-204A	11/11/2015	622.74	0.08	0.003	Downward
MW-204B		622.66			
MW-204A	12/7/2016	626.19	-0.04	-0.001	Upward
MW-204B		626.23			
MW-B11R	6/23/2015	627.35	2.40	0.080	Downward
MW-B11AR		624.95			
MW-B11R	11/11/2015	623.76	0.85	0.028	Downward
MW-B11AR		622.91			
MW-B11R	12/6/2016	627.28	0.90	0.030	Downward
MW-B11AR		626.38			

Notes:

¹Shallow wells (denoted with an "A") were installed from 15 to 25 feet bgs.

²Deeper wells (denoted with a "B") were installed from 45 to 55 feet bgs.

Distance between the shallow and deeper screens is 30 feet.

Survey conducted by Lampman & Associates of De Soto, Wisconsin on 20 November 2012.

bgs = below ground surface

TOC = Top of Casing, referencing PVC casing above ground surface

MSL = Mean Sea Level

-- = no directional gradient observed

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2014-2016
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	3 MW-DW3-06182014 06/18/2014	4 MW-DW4-06182014 06/18/2014	5 MW-DW5-06182014 06/18/2014	5 MW-DW5-09242014 09/24/2014	5 DW-5-03252015 03/25/2015	5 DW-5-11122015 11/12/2015	5 Well 5-120716 12/07/2016	7 MW-DW7-06182014 06/18/2014	B2 MW-B2-06182014 06/18/2014	B3 MW-B3-06182014 06/18/2014
Radiological (pCi/L)										
Americium-241	0.0538 ± 0.0898	0.0341 ± 0.09	0.00464 ± 0.0846	0.128 ± 0.156	-	-	-	-0.0109 ± 0.0766	0.00398 ± 0.0725	0.0228 ± 0.066
Carbon-14	2.79 ± 8.74	0 ± 8.89	-3.97 ± 8.76	-0.944 ± 7.34	-	-	-	-5.08 ± 9.8	1.93 ± 10	-2.04 ± 10.5
Cesium-137	-0.597 ± 2.03	-0.346 ± 1.49	-0.745 ± 2.06	3.96 ± 2.45	2.17 ± 2.8	-0.568 ± 3.01	0.249 U ± 2.32	-1.83 ± 2.24	1.36 ± 2.02	2.13 ± 2.22
Cobalt-60	1.02 ± 1.98	0.394 ± 2.17	2.49 ± 2.11	2.17 ± 3.17	2.37 ± 3.52	0.377 ± 2.15	0.0409 U ± 1.50	-2.41 ± 3.24	-1.38 ± 1.86	-1.13 ± 1.77
Europium-152	9.48 ± 12.9	2.34 ± 7.76	-7.42 ± 11.2	2.48 ± 20.5	4.59 ± 12.6	1.51 ± 17.9	-	-5.5 ± 21.1	0.106 ± 12	14.2 ± 13.1
Europium-154	-5.23 ± 4.13	3.15 ± 5.06	1.34 ± 6.02	-3.3 ± 7.97	-3.36 ± 10.1	-0.26 ± 7.18	-	-4.73 ± 5.45	2.35 ± 4.86	1.69 ± 5.46
Europium-155	-2.67 ± 4.38	1.46 ± 4.67	-0.154 ± 4.42	2.68 ± 4.49	0.902 ± 7.84	0.438 ± 6.76	-	-0.174 ± 4.33	-1.6 ± 4.72	-3.16 ± 4.36
Gross Alpha Analytes	0.126 ± 1.01	-0.132 ± 0.862	4.43 ± 1.71	0.847 ± 0.725	-1.06 ± 1.15	0.947 ± 1.82	-	-0.378 ± 0.909	-2.12 ± 3.23	0.645 ± 1.83
Gross Beta Analytes	1.48 ± 1.57	3.13 ± 1.65	1.92 ± 2.15	2.95 ± 1.74	2.09 ± 1.64	-1.05 ± 2.42	-	0 ± 1.38	11.2 ± 4.99	4.14 ± 3.33
Iron-55	-20 ± 70	-31.1 ± 78.2	-26.6 ± 80.2	9.39 ± 77.7	-	-	-	-38.5 ± 82.3	-9.2 ± 72.9	-43.9 ± 85.6
Nickel-59	18.3 ± 62.2	39.6 ± 76.9	-47.4 ± 87.9	3.12 ± 59.9	-	-	-	26 ± 65.9	-7.12 ± 57.7	31.4 ± 76.5
Nickel-63	-1.77 ± 3.82	-6.13 ± 3.62	-7.4 ± 3.62	2.79 ± 2.89	-	-	16.4 U ± 25.4	-4.38 ± 3.83	-7.94 ± 3.63	1.49 ± 3.83
Niobium-94	0.44 ± 2.13	0.143 ± 1.98	-1.25 ± 1.68	-0.945 ± 2.04	1.86 ± 2.14	-0.374 ± 2.1	-	0.748 ± 2.35	1.76 ± 1.62	0.664 ± 1.87
Plutonium-238	0.0282 ± 0.279	-0.0476 ± 0.172	-0.0221 ± 0.154	0.0171 ± 0.0713	-	-	-	0.0822 ± 0.168	0.0539 ± 0.142	0.0829 ± 0.138
Plutonium-239/240	-0.096 ± 0.201	0.0336 ± 0.172	0.0313 ± 0.16	0.0928 ± 0.12	-	-	-	0.406 ± 0.331	0.034 ± 0.0985	0.145 ± 0.192
Plutonium-241	3.51 ± 17.4	2.7 ± 20.1	-8.39 ± 17.6	3.17 ± 9.31	-	-	-	2.62 ± 13	0 ± 11.8	-0.739 ± 10.9
Strontium-90	0.609 ± 0.686	0.0898 ± 0.658	0.0898 ± 0.595	-0.0174 ± 0.657	-0.0369 ± 0.658	-0.579 ± 0.906	0.870 U ± 0.829	0.0177 ± 0.725	0.652 ± 0.69	0.612 ± 0.671
Technetium-99	-8.27 ± 3.48	-7.37 ± 3.52	-8.26 ± 3.48	-1.54 ± 3.14	-	-	-	-9.35 ± 3.53	-7.41 ± 3.44	-8.09 ± 3.41
Tritium	104 ± 137	159 ± 140	194 ± 141	34.2 ± 139	-52.6 ± 143	-104 ± 146	-96.7 U ± 133	123 ± 139	159 ± 141	193 ± 140

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	B11AR MW-B11AR-06182014 06/18/2014	B11AR MW-B11AR-09242014 09/24/2014	B11AR MW-B11AR-03252015 03/25/2015	B11AR MW-B11AR-11122015 11/12/2015	B11AR B11AR-120616 12/06/2016	B11R MW-B11R-06182014 06/18/2014	B11R MW-B11R-09242014 09/24/2014	B11R MW-B11R-03252015 03/25/2015	B11R MW-B11R-11122015 11/12/2015	B11R B11R-120616 12/06/2016
Radiological (pCi/L)										
Americium-241	0.0837 ± 0.107	-0.0168 ± 0.0514	-	-	-	0.0122 ± 0.0626	0.0368 ± 0.108	-	-	-
Carbon-14	6.83 ± 9.84	0 ± 7.01	-	-	-	9.06 ± 9.66	-2.7 ± 6.97	-	-	-
Cesium-137	1.83 ± 3.8	0.972 ± 2.18	-0.186 ± 2.71	2.38 ± 2.93	-0.727 U ± 1.95	1.24 ± 2.12	-0.724 ± 2.06	-2.2 ± 2.54	-0.562 ± 2.79	R
Cobalt-60	-1.93 ± 3.73	1.22 ± 1.98	2.58 ± 2.21	6.3 ± 3.29	-1.72 U ± 2.18	0.876 ± 1.87	1.32 ± 2.08	1.04 ± 2.7	1.34 ± 2.06	0.436 U ± 2.00
Europium-152	1.47 ± 21.7	6.41 ± 13.9	-4.68 ± 15.7	-29.8 ± 36.3	-	-0.993 ± 13.4	3 ± 10.3	10.5 ± 16.9	-6.36 ± 14.7	-
Europium-154	-2.61 ± 9.62	1.1 ± 5.62	4.5 ± 7.25	-0.762 ± 4.12	-	1.63 ± 5.5	-3.92 ± 5.31	-0.782 ± 5.42	1.97 ± 6.45	-
Europium-155	-4.46 ± 5.54	1.69 ± 4.49	-5.89 ± 7.09	1.69 ± 7.93	-	1.59 ± 4.53	1.94 ± 4.61	2.39 ± 6.91	-6.62 ± 7.29	-
Gross Alpha Analytes	0.733 ± 1.6	0.207 ± 1.86	0.221 ± 1.56	-0.239 ± 2.61	-	0 ± 1.66	3.08 ± 1.94	-1.11 ± 2.1	-0.267 ± 3.1	-
Gross Beta Analytes	-0.269 ± 2.36	0.303 ± 1.97	-1.43 ± 3.06	-0.0949 ± 3.01	-	3.59 ± 3.02	14.4 ± 4.05	4.68 ± 2.8	2.26 ± 3.61	-
Iron-55	-37.5 ± 74.2	-34.8 ± 77.2	-	-	-	-31.8 ± 81.3	-30.9 ± 71	-	-	-
Nickel-59	2.52 ± 54.9	-8.49 ± 60.6	-	-	-	-4.16 ± 55.6	16.3 ± 66.8	-	-	-
Nickel-63	0 ± 3.62	-0.413 ± 2.92	-	-	-12.5 U ± 23.2	-3.56 ± 4.1	2.47 ± 2.98	-	-	3.05 U ± 24.3
Niobium-94	1.52 ± 3.07	-0.129 ± 1.82	0.985 ± 2.13	-1.22 ± 3.25	-	-0.699 ± 1.83	-1.39 ± 1.64	-0.556 ± 2.32	-0.284 ± 2.3	-
Plutonium-238	0.0409 ± 0.118	-0.0055 ± 0.0643	-	-	-	0 ± 0.12	0.0368 ± 0.102	-	-	-
Plutonium-239/240	-0.0339 ± 0.122	-0.0109 ± 0.0652	-	-	-	-0.0254 ± 0.092	0 ± 0.102	-	-	-
Plutonium-241	0.837 ± 12.4	-2.29 ± 8.27	-	-	-	-5.72 ± 9.32	-3.68 ± 8.84	-	-	-
Strontium-90	0.611 ± 0.633	1.32 ± 0.735	3.52 ± 0.924	1.4 ± 0.678	0.248 U ± 0.609	0.733 ± 0.673	1.63 ± 0.642	0.974 ± 0.682	2.46 ± 0.777	-0.702 U ± 0.482
Technetium-99	-8.46 ± 3.48	-1.56 ± 3.18	-	-	-	-5.52 ± 3.48	-0.399 ± 3.27	-	-	-
Tritium	161 ± 142	34.3 ± 139	-69.4 ± 141	-86.3 ± 146	-367 U ± 316	245 ± 141	0 ± 140	-191 ± 139	-105 ± 147	-322 U ± 318

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-200A MW-200A-06172014 06/17/2014	MW-200A MW-200A-09242014 09/24/2014	MW-200A MW-200A-03242015 03/24/2015	MW-200A MW-200A-11112015 11/11/2015	MW-200A MW-200A-120816 12/08/2016	MW-200B MW-200B-06172014 06/17/2014	MW-200B MW-200B-09242014 09/24/2014	MW-200B MW-200B-03242015 03/24/2015	MW-200B MW-200B-D-03242015 03/24/2015	MW-200B MW-200B-11112015 11/11/2015	MW-200B MW-200B-120816 12/08/2016
Radiological (pCi/L)											
Americium-241	0.172 ± 0.179	0.11 ± 0.133	-	-	-	0.37 ± 0.232	0.229 ± 0.249	-	-	-	-
Carbon-14	9.25 ± 7.33	-0.455 ± 7.09	-	-	-	4.84 ± 7.48	-4.98 ± 6.99	-	-	-	-
Cesium-137	0.176 ± 2.05	1.71 ± 2.73	1.13 ± 3.08	3.93 ± 4.18	1.29 U ± 1.98	-0.364 ± 2.2	1.94 ± 2.8	2.34 ± 2.44	0.725 ± 2.43	1.49 ± 2.35	0.608 U ± 1.55
Cobalt-60	1 ± 2.02	3.55 ± 2.86	4.15 ± 3.8	-0.653 ± 4.12	1.11 U ± 1.89	-1.26 ± 3.1	0.619 ± 2.47	0.676 ± 2.4	0.388 ± 1.84	-0.506 ± 2.35	0.114 U ± 1.80
Europium-152	9.7 ± 14.8	-2.38 ± 21.9	-3.51 ± 18.4	4.84 ± 28.7	-	-11.5 ± 17.1	-13.4 ± 19.1	3.81 ± 13.9	-2.24 ± 17.4	15.1 ± 14	-
Europium-154	0.576 ± 5	-0.657 ± 7.96	11 ± 8.14	-0.816 ± 7.7	-	0.559 ± 7.46	-1.53 ± 7.96	2.98 ± 6.58	0.376 ± 7.28	0.619 ± 6.92	-
Europium-155	-3.62 ± 4.33	-0.816 ± 3.91	2.13 ± 7.82	-8.19 ± 7.63	-	-3.44 ± 4.39	-1.64 ± 4.2	-2.74 ± 6.91	1.33 ± 6.85	2.79 ± 6.37	-
Gross Alpha Analytes	4.04 ± 1.91	0.241 ± 1.7	1.05 ± 1.82	0.322 ± 2.89	-	-0.226 ± 2.12	2.01 ± 1.87	0.958 ± 0.995	1.51 ± 1.19	1.06 ± 3.46	-
Gross Beta Analytes	8.65 ± 3.88	2.4 ± 3.16	5.27 ± 5.09	0.964 ± 4.44	-	-1.79 ± 3.42	9.1 ± 3.35	2.17 ± 1.6	1.66 ± 2.51	5.1 ± 4.36	-
Iron-55	19.3 ± 74.6	-33.4 ± 73.4	-	-	-	-41.6 ± 78.4	-45.5 ± 75.9	-	-	-	-
Nickel-59	-21.8 ± 68	7.84 ± 66.7	-	-	-	33.1 ± 75.2	23.7 ± 70.8	-	-	-	-
Nickel-63	-1.97 ± 2.86	3.61 ± 2.93	-	-	0.294 U ± 23.1	-4.68 ± 3.36	-0.787 ± 2.77	-	-	-	11.2 U ± 24.6
Niobium-94	1.08 ± 1.75	-1.42 ± 2.63	1.94 ± 3.18	0.59 ± 4.27	-	0.847 ± 2.48	-0.268 ± 2.69	1.22 ± 2.58	0.332 ± 1.97	1.1 ± 2.34	-
Plutonium-238	-0.0138 ± 0.0818	0.0264 ± 0.0635	-	-	-	0.015 ± 0.0628	-0.00649 ± 0.076	-	-	-	-
Plutonium-239/240	0.0267 ± 0.0819	0.0583 ± 0.0894	-	-	-	-0.0156 ± 0.0628	0 ± 0.105	-	-	-	-
Plutonium-241	0 ± 7.96	-2.22 ± 8.04	-	-	-	4.49 ± 6.55	8.49 ± 10.4	-	-	-	-
Strontium-90	0.986 ± 0.723	2.17 ± 0.748	0.522 ± 0.644	2.4 ± 0.919	-1.8 U ± 0.916	0.998 ± 0.758	1.54 ± 0.731	2.14 ± 0.813	3.68 ± 1	0.829 ± 0.896	0.531 U ± 0.485
Technetium-99	3.54 ± 3.15	-1.57 ± 3.2	-	-	-	5.08 ± 3.18	-1.53 ± 3.13	-	-	-	-
Tritium	52.3 ± 140	68.6 ± 140	-155 ± 139	-17.2 ± 147	-469 U ± 326	123 ± 144	51.7 ± 140	-121 ± 141	-104 ± 142	-52 ± 147	-107 U ± 357

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-201A MW-201A-06172014 06/17/2014	MW-201A MW-201A-D-06172014 06/17/2014	MW-201A MW-201A-09242014 09/24/2014	MW-201A MW-201A-03252015 03/25/2015	MW-201A MW-201A-11112015 11/11/2015	MW-201A MW-201A-120816 12/08/2016	MW-2018 MW-2018-06172014 06/17/2014	MW-2018 MW-2018-09242014 09/24/2014	MW-2018 MW-2018-03252015 03/25/2015	MW-2018 MW-2018-11112015 11/11/2015	MW-2018 MW-2018-120816 12/08/2016	MW-202A MW-202A-06172014 06/17/2014
Radiological (pCi/L)												
Americium-241	0.0945 ± 0.123	0.03 ± 0.0792	0.14 ± 0.14	-	-	-	0.00398 ± 0.0726	0.028 ± 0.0777	-	-	-	0.116 ± 0.118
Carbon-14	4.83 ± 7.47	0 ± 7.06	2.69 ± 7.06	-	-	-	4.51 ± 6.97	0.927 ± 7.25	-	-	-	0 ± 7.09
Cesium-137	0.309 ± 1.84	-1.13 ± 2.25	-1.09 ± 2.07	0.346 ± 3.79	0.388 ± 2.38	-0.629 U ± 2.60	-0.62 ± 2.07	1.84 ± 2.12	2.18 ± 2.63	0.067 ± 2.77	2.40 U ± 2.65	-0.463 ± 2.12
Cobalt-60	-0.0604 ± 1.68	1.42 ± 1.99	-0.0723 ± 1.85	3.58 ± 3.2	0.258 ± 2.38	3.57 U ± 3.10	1.72 ± 1.83	0.95 ± 1.94	1.46 ± 2.11	0.977 ± 2.3	1.08 U ± 2.13	-0.891 ± 1.66
Europium-152	4.15 ± 11.1	1.41 ± 18.4	4.79 ± 13.2	10 ± 20.5	-10.4 ± 11.3	-	11.2 ± 12.4	2.52 ± 10.4	-8.2 ± 15.1	12.7 ± 15.4	-	4.1 ± 11
Europium-154	-2.39 ± 4.89	1.15 ± 7.85	-3.08 ± 6.44	4.57 ± 7.38	-2.9 ± 7.7	-	-2.43 ± 5.38	1.93 ± 5.49	-0.9 ± 7.37	-4.44 ± 6.84	-	-1.11 ± 5.46
Europium-155	-2.92 ± 4.61	1.75 ± 4.34	-1.47 ± 4.43	0.338 ± 7.79	0.845 ± 6.8	-	-2.6 ± 4.38	4.12 ± 4.66	0.169 ± 6.35	0.269 ± 6.65	-	-1.58 ± 4.39
Gross Alpha Analytes	0.383 ± 1.59	0.636 ± 2.16	1.18 ± 2.31	0.873 ± 2.48	3.26 ± 2.55	-	-1.03 ± 2.67	1.42 ± 1.33	2.25 ± 1.76	0 ± 2.93	-	1.05 ± 1.29
Gross Beta Analytes	7.25 ± 3.54	6.75 ± 3.17	7.36 ± 3.27	2.37 ± 3.78	3.4 ± 4.95	-	-1.03 ± 3.17	3.67 ± 2.74	2.77 ± 2.63	-0.121 ± 4.14	-	4.33 ± 2.12
Iron-55	-32 ± 73.4	0.717 ± 67.6	-21.8 ± 77	-	-	-	15.7 ± 72.3	27.6 ± 78.9	-	-	-	-3.26 ± 74.7
Nickel-59	-16.7 ± 60.4	16.4 ± 61.7	-19.8 ± 63.9	-	-	-	-71.1 ± 123	30.8 ± 74.3	-	-	-	24.8 ± 68.3
Nickel-63	1.81 ± 2.72	-1.8 ± 2.62	4.99 ± 2.96	-	-	9.55 U ± 24.4	-1.91 ± 2.78	2.15 ± 2.82	-	-	10.3 U ± 24.5	-1.93 ± 2.81
Niobium-94	0.373 ± 2.03	0.348 ± 2.4	0.655 ± 1.92	0.0628 ± 3.24	1.15 ± 2.17	-	1.79 ± 1.87	0.643 ± 1.48	0.208 ± 2.23	1.32 ± 2.17	-	-0.355 ± 1.63
Plutonium-238	0.0532 ± 0.115	-0.0739 ± 0.0898	-0.0358 ± 0.0887	-	-	-	-0.0501 ± 0.11	0.0854 ± 0.128	-	-	-	-0.00846 ± 0.0956
Plutonium-239/240	-0.00685 ± 0.0802	-0.00671 ± 0.0785	0 ± 0.117	-	-	-	0.0236 ± 0.0986	0.141 ± 0.146	-	-	-	-0.0226 ± 0.091
Plutonium-241	-0.485 ± 6.95	0 ± 8.85	-0.691 ± 10	-	-	-	-1.41 ± 10.1	-0.584 ± 8.48	-	-	-	2.19 ± 10.5
Strontium-90	0.0686 ± 0.708	1.53 ± 0.748	0.92 ± 0.716	0.866 ± 0.662	1.24 ± 0.705	0.301 U ± 0.615	1.01 ± 0.716	0.541 ± 0.708	1.27 ± 0.735	0.875 ± 0.732	-0.208 U ± 0.474	1.12 ± 0.755
Technetium-99	3.91 ± 3.15	6.95 ± 3.3	-0.794 ± 3.24	-	-	-	1.17 ± 3.06	-1.94 ± 3.16	-	-	-	0.388 ± 3.02
Tritium	70.2 ± 142	87 ± 141	86.6 ± 141	52 ± 144	-17.3 ± 147	-375 U ± 331	105 ± 142	-34.1 ± 137	17.2 ± 142	34 ± 146	-123 U ± 307	335 ± 149

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-202A MW-202A-09232014 09/23/2014	MW-202A MW-202A-03242015 03/24/2015	MW-202A MW-202A-11112015 11/11/2015	MW-202A MW-202A-120716 12/07/2016	MW-202A MW-202A-D-120716 12/07/2016	MW-202B MW-202B-06172014 06/17/2014	MW-202B MW-202B-09232014 09/23/2014	MW-202B MW-202B-03242015 03/24/2015	MW-202B MW-202B-11112015 11/11/2015	MW-202B MW-202B-120716 12/07/2016
Radiological (pCi/L)										
Americium-241	0.0662 ± 0.126	-	-	-	-	0.0391 ± 0.0652	0.0947 ± 0.121	-	-	-
Carbon-14	4.94 ± 7.14	-	-	-	-	4.7 ± 7.27	-2.71 ± 7.02	-	-	-
Cesium-137	-0.433 ± 2.18	1.68 ± 3	2.1 ± 3.24	-1.33 U ± 2.62	-0.0139 U ± 1.97	2.86 ± 2.36	2.3 ± 2.61	-0.704 ± 2.64	4.26 ± 4.28	-1.88 U ± 2.71
Cobalt-60	0.972 ± 1.6	3.46 ± 3.23	0.236 ± 3.4	2.01 U ± 2.65	-2.49 U ± 2.64	1.02 ± 2.89	1.17 ± 2.98	0.862 ± 2.46	1.33 ± 4.06	-2.07 U ± 3.19
Europium-152	9.4 ± 12.6	3.66 ± 22.4	0 ± 7.83	-	-	10.8 ± 17.9	6.51 ± 17.3	-7.32 ± 14.4	4.37 ± 21.8	-
Europium-154	-0.367 ± 5.23	-8.38 ± 12.1	-0.635 ± 4.36	-	-	-1.18 ± 2.55	4.18 ± 8.87	1.09 ± 5.78	-10.5 ± 14.2	-
Europium-155	-2.08 ± 4.54	-1.96 ± 8.13	-1.31 ± 7.86	-	-	-3.48 ± 4.19	-0.841 ± 4.47	4.96 ± 6.54	-2.16 ± 7.53	-
Gross Alpha Analytes	1.03 ± 0.574	0.106 ± 0.86	0.475 ± 1.72	-	-	0.406 ± 1.49	-0.209 ± 1.59	0.553 ± 1.4	1.46 ± 2.04	-
Gross Beta Analytes	0.486 ± 1.56	1.47 ± 1.77	2.51 ± 2.74	-	-	1.48 ± 2.84	2.3 ± 2.77	1.4 ± 2.57	4.79 ± 4.47	-
Iron-55	-54.3 ± 81	-	-	-	-	-45.4 ± 77.9	33.6 ± 76.7	-	-	-
Nickel-59	-11.7 ± 65.4	-	-	-	-	-10.4 ± 65.4	-44.6 ± 87.3	-	-	-
Nickel-63	0.824 ± 2.94	-	-	-4.11 U ± 21.5	0.983 U ± 22.2	-3.73 ± 2.68	-0.829 ± 2.92	-	-	2.79 U ± 23.1
Niobium-94	-0.0647 ± 1.96	-0.125 ± 2.64	0.926 ± 2.8	-	-	0.104 ± 1.99	-1.02 ± 2.07	-0.556 ± 2.45	-0.253 ± 3.95	-
Plutonium-238	0.0113 ± 0.0731	-	-	-	-	0.148 ± 0.179	0.0363 ± 0.0909	-	-	-
Plutonium-239/240	0.0586 ± 0.0998	-	-	-	-	-0.0453 ± 0.0729	0.0524 ± 0.0892	-	-	-
Plutonium-241	0 ± 9.65	-	-	-	-	2.72 ± 7.87	-1.75 ± 8.48	-	-	-
Strontium-90	1.71 ± 0.741	0.0945 ± 0.741	1.21 ± 0.81	0.236 U ± 0.626	0.430 U ± 0.825	0.604 ± 0.701	1.57 ± 0.748	1.04 ± 0.732	1.54 ± 0.792	0.145 U ± 0.687
Technetium-99	0.797 ± 3.29	-	-	-	-	2.72 ± 2.89	-0.194 ± 3.19	-	-	-
Tritium	-51.7 ± 138	498 ± 153	174 ± 152	-182 U ± 350	-192 U ± 317	105 ± 143	103 ± 141	-52 ± 141	0 ± 147	-197 U ± 349

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-203A MW-203A-06172014 06/17/2014	MW-203A MW-203A-09232014 09/23/2014	MW-203A MW-203A-03242015 03/24/2015	MW-203A MW-203A-11112015 11/11/2015	MW-203A MW-203A-12072016 12/07/2016	MW-203B MW-203B-06172014 06/17/2014	MW-203B MW-203B-09232014 09/23/2014	MW-203B MW-203B-D-09232014 09/23/2014	MW-203B MW-203B-03242015 03/24/2015	MW-203B MW-203B-11112015 11/11/2015	MW-203B MW-203B-D-11112015 11/11/2015	MW-203B MW-203B-12072016 12/07/2016
Radiological (pCi/L)												
Americium-241	0.0293 ± 0.085	0.25 ± 0.304	-	-	-	0.0763 ± 0.0979	0.102 ± 0.124	-0.00498 ± 0.0564	-	-	-	-
Carbon-14	4.54 ± 7.02	-3.95 ± 7.64	-	-	-	4.54 ± 7.03	0.489 ± 7.64	-2.74 ± 7.09	-	-	-	-
Cesium-137	1.48 ± 1.67	1.55 ± 2.53	3.68 ± 3.45	-2.32 ± 2.54	-0.403 U ± 2.93	1.38 ± 2.57	0.683 ± 1.92	0.335 ± 2.92	-1.65 ± 2.64	-0.0708 ± 2.71	2.83 ± 2.59	-2.13 U ± 3.72
Cobalt-60	0.0348 ± 1.98	3.66 ± 2.85	2.59 ± 3.43	0.467 ± 2.42	1.34 U ± 2.20	-0.955 ± 2.82	1.99 ± 1.84	1.21 ± 2.65	-0.949 ± 2.48	0.613 ± 2.56	2.15 ± 2.31	2.40 U ± 2.63
Europium-152	-0.958 ± 9.46	4.06 ± 21.1	23.6 ± 24.9	-0.672 ± 14.2	-	4.98 ± 21.5	-1.15 ± 12.3	-4.86 ± 18.4	9.69 ± 12	-3.14 ± 16.9	-10.8 ± 18.3	-
Europium-154	1.93 ± 6.1	-3.32 ± 9.28	-0.997 ± 10.5	2.94 ± 5.41	-	-3.69 ± 7.71	-0.231 ± 5.18	-1.53 ± 7.34	0 ± 7.55	-2.96 ± 4.19	-1.28 ± 6.61	-
Europium-155	-4.9 ± 4.39	-0.0953 ± 4.4	5.47 ± 6.26	3.09 ± 5.19	-	4.04 ± 4.44	-0.365 ± 3.81	-4 ± 4.13	6.5 ± 6.46	2.79 ± 6.32	1.5 ± 6.23	-
Gross Alpha Analytes	1.74 ± 1.05	1.36 ± 1.04	1.39 ± 0.803	0.819 ± 1.6	-	-0.228 ± 2.14	-0.668 ± 2	0.785 ± 1.54	1.09 ± 1.02	3.32 ± 2.68	-1.41 ± 2.42	-
Gross Beta Analytes	2.26 ± 1.74	1.51 ± 1.56	3.87 ± 1.89	1.26 ± 3.21	-	5.53 ± 2.99	1 ± 3.02	2.4 ± 2.63	1 ± 2.22	3.04 ± 4.83	-0.386 ± 4.16	-
Iron-55	-49.5 ± 75.1	-49.4 ± 79.5	-	-	-	-49.5 ± 73.2	43.2 ± 74.5	28.4 ± 80.2	-	-	-	-
Nickel-59	-27.1 ± 69.2	53 ± 90.8	-	-	-	-4.66 ± 56.1	-43.4 ± 90.8	2.7 ± 61	-	-	-	-
Nickel-63	-3.69 ± 2.65	1.61 ± 2.9	-	-	1.09 U ± 25.2	-3.8 ± 2.73	-1.77 ± 3.1	-3.1 ± 2.86	-	-	-	11.7 U ± 25.7
Niobium-94	1.58 ± 1.66	0.0853 ± 2.05	0.0209 ± 3.33	1.67 ± 2.05	-	1.5 ± 2.33	2.16 ± 1.92	0.565 ± 2.32	0.806 ± 1.57	1.51 ± 2.28	-0.947 ± 2.32	-
Plutonium-238	-0.0567 ± 0.0747	0.0708 ± 0.106	-	-	-	-0.0586 ± 0.128	0.0812 ± 0.113	-0.0264 ± 0.106	-	-	-	-
Plutonium-239/240	-0.0226 ± 0.0691	0.0915 ± 0.12	-	-	-	-0.0394 ± 0.125	0.0596 ± 0.0915	-0.00882 ± 0.103	-	-	-	-
Plutonium-241	4.06 ± 8.43	0.504 ± 7.33	-	-	-	10.2 ± 13.6	-3.71 ± 8.92	-6.33 ± 13	-	-	-	-
Strontium-90	1.17 ± 0.708	1.52 ± 0.782	0.177 ± 0.665	1.37 ± 1.3	1.01 U ± 0.834	0.822 ± 0.671	1.91 ± 0.765	1.93 ± 0.734	1.12 ± 0.682	0.737 ± 0.781	1.21 ± 0.823	0.210 U ± 0.593
Technetium-99	4.36 ± 3.2	-1.23 ± 3.37	-	-	-	4.16 ± 3.19	-3.32 ± 3.16	-1.37 ± 3.21	-	-	-	-
Tritium	279 ± 146	-34.3 ± 138	-34.7 ± 142	104 ± 150	-303 U ± 340	278 ± 145	121 ± 142	68.7 ± 140	-139 ± 140	-153 ± 143	-120 ± 145	-297 U ± 335

Please see Notes on Table 4

TABLE 3
SUMMARY OF GROUNDWATER QUALITY DATA, 2C
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Location Sample ID Sample Date	MW-204A MW-204A-06172014 06/17/2014	MW-204A MW-204A-09232014 09/23/2014	MW-204A MW-204A-03242015 03/24/2015	MW-204A MW-204A-11112015 11/11/2015	MW-204A MW-204A-120716 12/07/2016	MW-204B MW-204B-06172014 06/17/2014	MW-204B MW-204B-09232014 09/23/2014	MW-204B MW-204B-03242015 03/24/2015	MW-204B MW-204B-11112015 11/11/2015	MW-204B MW-204B-120716 12/07/2016
Radiological (pCi/L)										
Americium-241	0.155 ± 0.149, 0.0362 ± 0.0955	0.105 ± 0.115	-	-	-	0.0824 ± 0.146	0.268 ± 0.351	-	-	-
Carbon-14	4.65 ± 7.19	0.473 ± 7.39	-	-	-	12.9 ± 10.2, 4.61 ± 7.13	0.946 ± 7.39	-	-	-
Cesium-137	-0.303 ± 2.02	-1.14 ± 2.49	-0.633 ± 4.54	4.4 ± 5.41	-3.09 U ± 3.17	1.92 ± 2.24, 2.46 ± 2.15	1.24 ± 2.09	1.87 ± 3.73	-4.15 ± 3.09	-0.257 U ± 2.60
Cobalt-60	0.19 ± 3.23	-0.377 ± 2.42	0.23 ± 4.16	2.52 ± 3.46	0.909 U ± 2.68	-0.231 ± 1.83, 0.665 ± 1.8	2.05 ± 2.11	2.63 ± 3.78	-0.162 ± 2.53	-0.0975 U ± 2.11
Europium-152	2.11 ± 18.3	-19.2 ± 18.2	19.1 ± 23.6	0 ± 12.2	-	7.67 ± 11.1, 4.91 ± 10.4	2.23 ± 12.8	7.43 ± 28.1	8.74 ± 10.9	-
Europium-154	2.36 ± 8.67	-4.94 ± 8.1	-8.09 ± 12.2	-1.27 ± 12.8	-	0.605 ± 6.39, -3.23 ± 5.89	2.36 ± 5.6	-0.428 ± 11.8	-1.76 ± 6.92	-
Europium-155	-0.433 ± 4.28	-2.02 ± 4.49	-2 ± 5.32	1.39 ± 8.05	-	1.66 ± 4.52, -0.45 ± 4.2	0.945 ± 4.76	-1.87 ± 7.28	3.68 ± 6.73	-
Gross Alpha Analytes	0.758 ± 1.96	0.599 ± 1.66	0.978 ± 1.5	1.97 ± 2.62	-	1.26 ± 2.15, 1.92 ± 3.21	3.52 ± 2.03	-0.537 ± 2.88	3.65 ± 3.4	-
Gross Beta Analytes	2.68 ± 2.98	5.28 ± 2.21	10.9 ± 3.06	11.1 ± 4.57	-	0.256 ± 4.48, 1.25 ± 4.09	0 ± 3.39	1.8 ± 3.64	15 ± 6.28	-
Iron-55	-40.3 ± 79.2	34.5 ± 75.3	-	-	-	8.68 ± 68.2, -3.98 ± 78.7	-92.5 ± 89.8	-	-	-
Nickel-59	-6.22 ± 59.1	-31.2 ± 74.8	-	-	-	-24.7 ± 71.8, -22 ± 65.7	-18.6 ± 67	-	-	-
Nickel-63	0 ± 2.75	-0.183 ± 2.6	-	-	11.3 U ± 23.6	-1.97 ± 2.86, -1.95 ± 2.84	0.393 ± 2.79	-	-	-2.04 U ± 24.6
Niobium-94	0.225 ± 1	0.118 ± 2.46	-0.241 ± 3.76	1.52 ± 2.09	-	1.28 ± 1.65, -0.511 ± 0.624	-1.88 ± 1.76	0.0185 ± 1.66	2.3 ± 2.03	-
Plutonium-238	-0.0512 ± 0.115	-0.00645 ± 0.0685	-	-	-	-0.00928 ± 0.108, 0.0143 ± 0.0929	-0.0326 ± 0.0806	-	-	-
Plutonium-239/240	-0.0248 ± 0.0757	-0.00548 ± 0.0641	-	-	-	0.0627 ± 0.157, -0.0381 ± 0.0942	0.0701 ± 0.107	-	-	-
Plutonium-241	4.07 ± 8.44	-3.97 ± 8.17	-	-	-	-1.89 ± 9.01, 6.16 ± 9.99	-6.46 ± 10.3	-	-	-
Strontium-90	2 ± 0.675	1.94 ± 0.734	4.52 ± 1.07	0.76 ± 0.703	0.428 U ± 0.958	0.61 ± 0.637, 0.355 ± 0.681	1.26 ± 0.741	0.654 ± 0.728	1.25 ± 0.745	0.719 U ± 0.652
Technetium-99	6.95 ± 3.3	-1.95 ± 3.18	-	-	-	6.3 ± 3.25, 4.96 ± 3.22	0.389 ± 3.2	-	-	-
Tritium	105 ± 143	68.7 ± 140	-52 ± 141	17.2 ± 147	-206 U ± 340	34.9 ± 140, 139 ± 142	-120 ± 136	-120 ± 140	-17.3 ± 147	-453 U ± 327

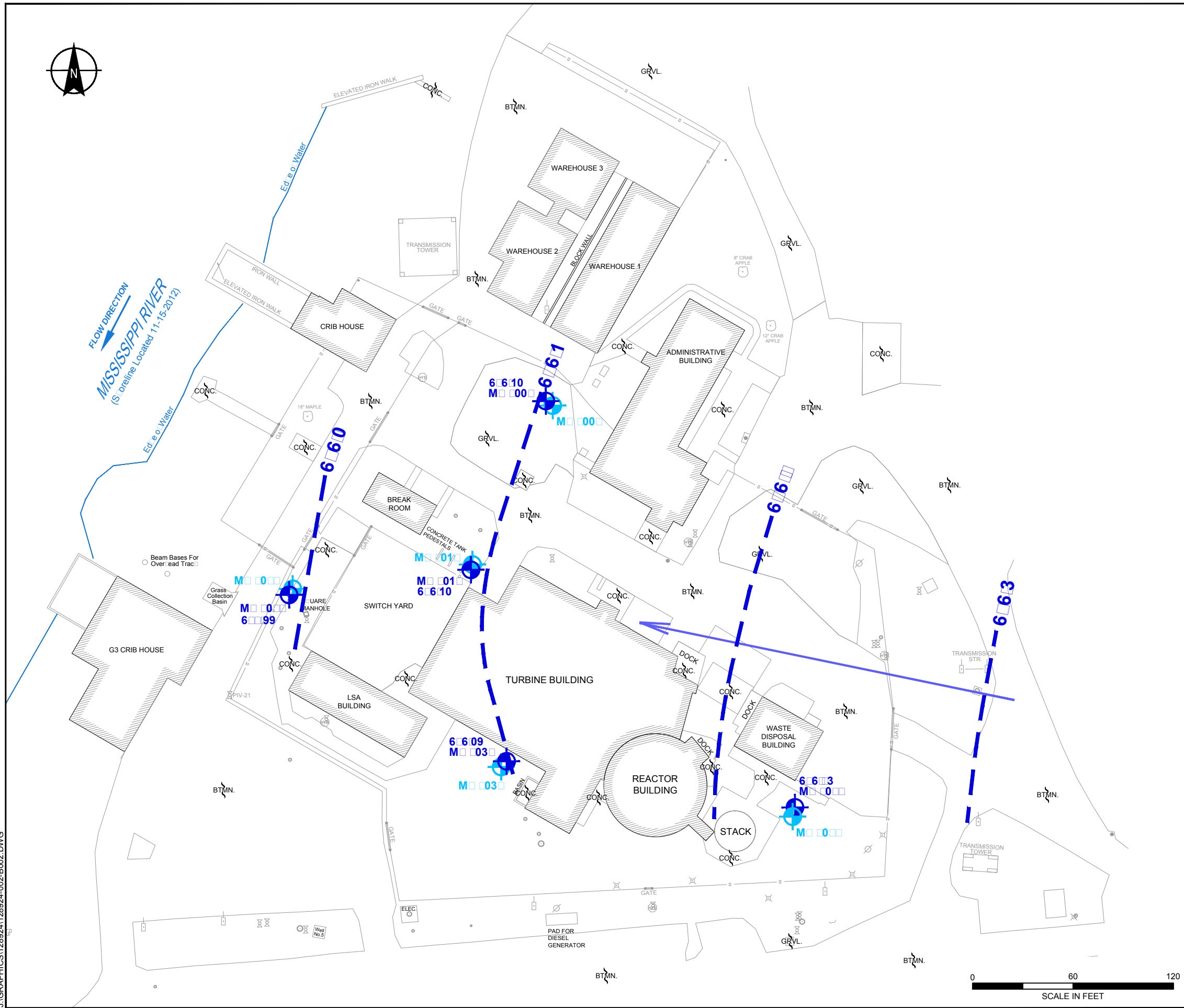
Please see Notes on Table 4

TABLE 4
NOTES FOR ANALYTICAL DATA
LA CROSSE BOILING WATER REACTOR (LACBWR)
GENOA, WISCONSIN

Notes:

- 1 Regulatory criteria from NR 140.10, Subchapter II
 - R Result is rejected
 - pCi/L picoCuries per liter
 - U Not detected, number is the laboratory reporting limit
- Shaded cells indicate duplicate analyses performed.

FIGURES



LEGEND

M 00 DESIGNATION AND APPROXIMATE LOCATION OF MONITORING WELL IN SHALLOW AQUIFER

M 00 DESIGNATION AND APPROXIMATE LOCATION OF MONITORING WELL IN DEEP AQUIFER

6610 INDICATES GROUNDWATER ELEVATION (IN FEET) OBSERVED ON 7 DECEMBER 2016

INFERRED GROUNDWATER CONTOUR

INFERRED GROUNDWATER FLOW DIRECTION

CONC. CONCRETE SURFACE OR CONCRETE PAD

GRVL. GRAVEL SURFACE

BTMN. BITUMINOUS SURFACE

NOTES

- ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- BASE PLAN CREATED FROM PLAN TITLED "TOPOGRAPHIC/SITE SURVEY, DAIRYLAND POWER COOPERATIVE, LACBWR, GENOA, WISCONSIN", DATE 26 NOVEMBER 2012, BY LAMPMAN ASSOCIATES, OF DE SOTO, WISCONSIN.

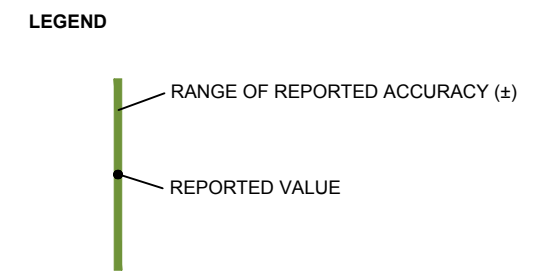
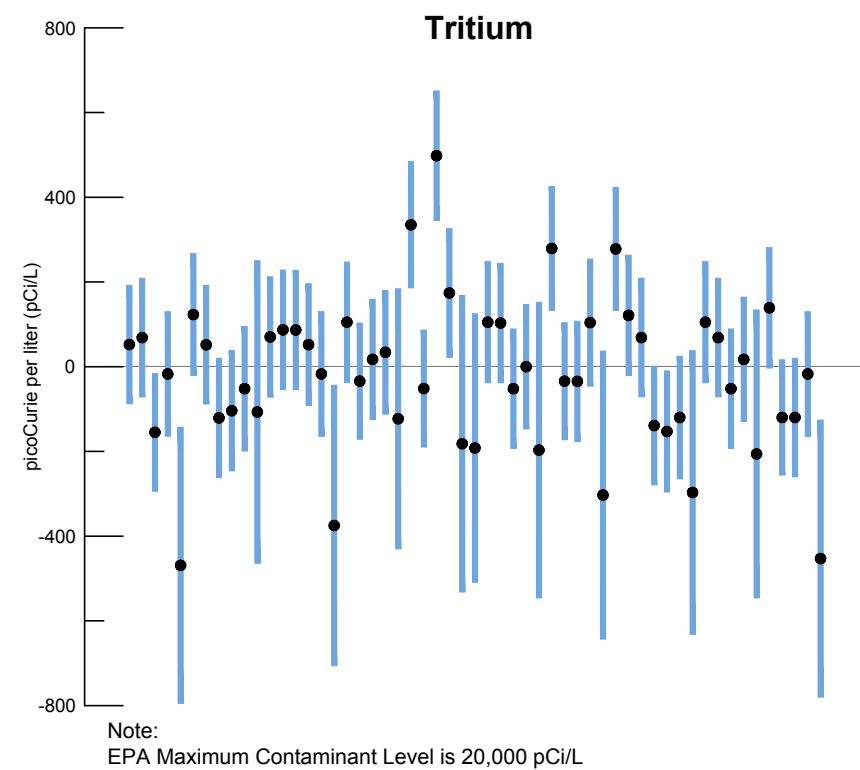
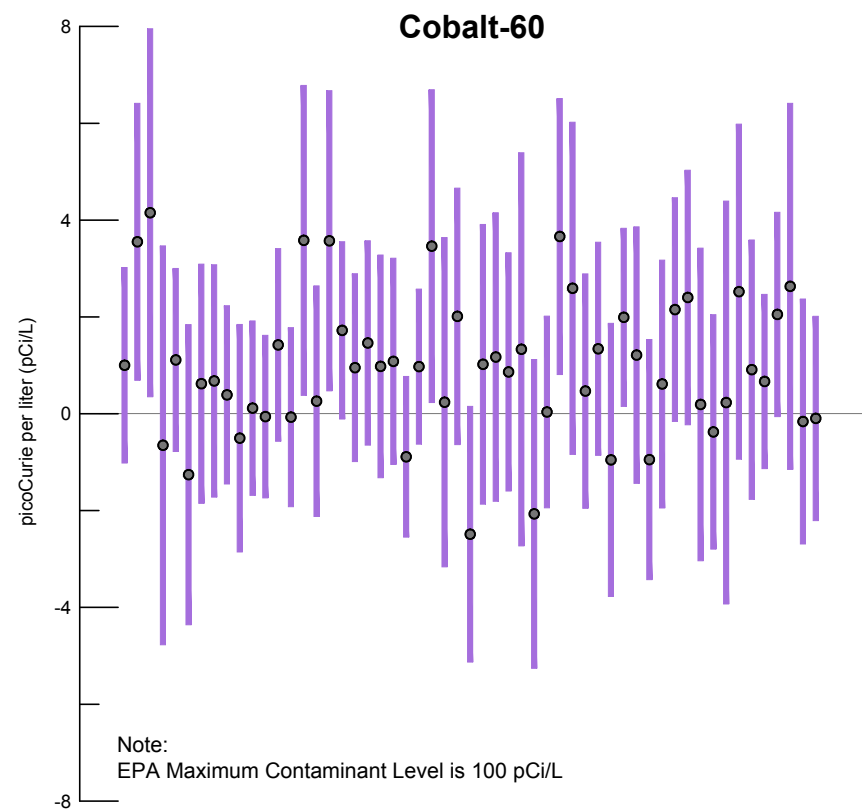
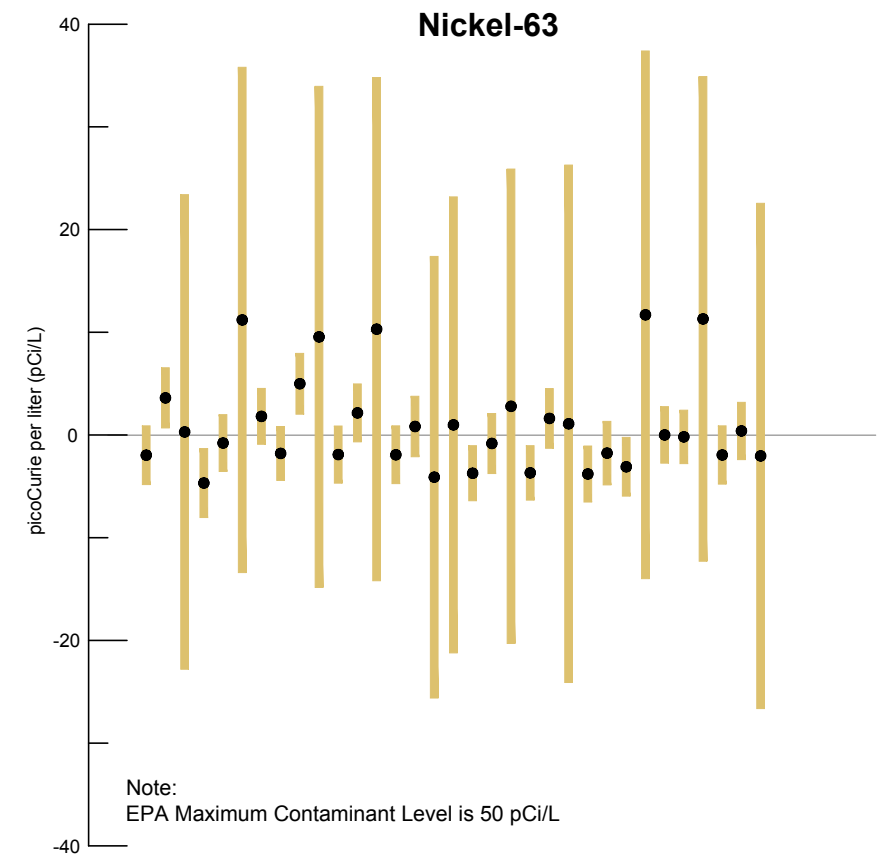
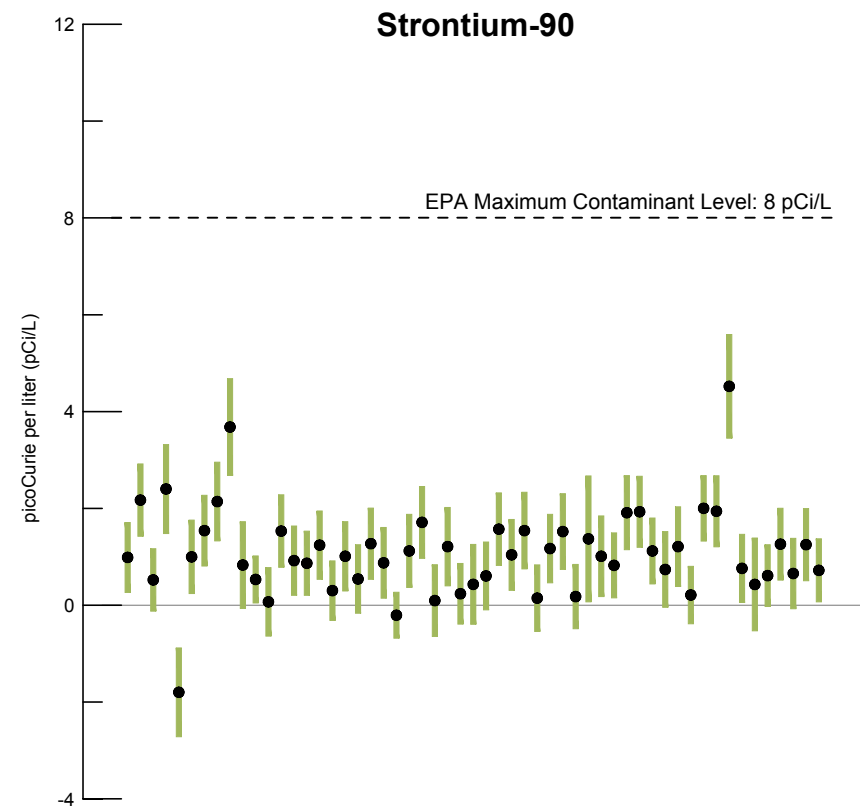
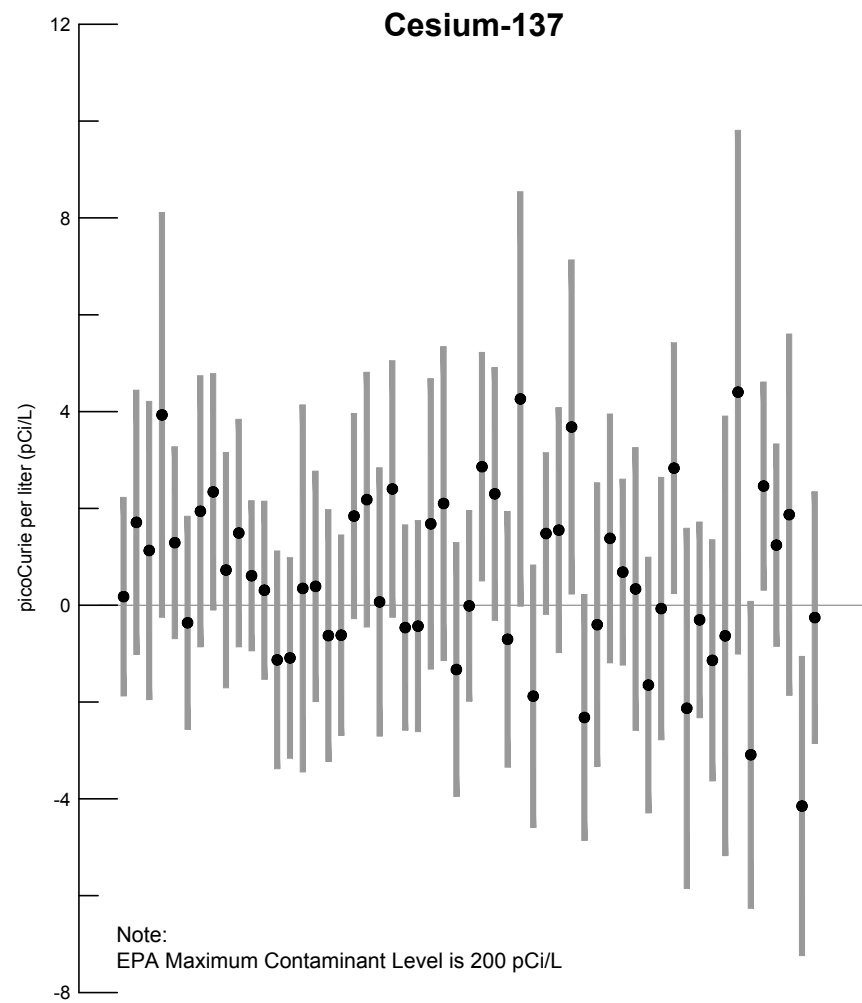
HALEY ALDRICH

LACBWR
LACROSSESOLUTIONS
GENOA, WISCONSIN

**GROUNDWATER CONTOURS
DEEP AQUIFER
DECEMBER 2016**

SCALE: AS SHOWN
JANUARY 2017

FIGURE 4



**HALEY
ALDRICH**

LACBWR
LACROSSE SOLUTIONS
GENOA, WISCONSIN

**CESIUM- 137, COBALT- 60,
STRONTIUM- 90, NICKEL-63
AND TRITIUM OBSERVED
IN GROUNDWATER**

SCALE: AS SHOWN
JANUARY 2017

FIGURE 5

APPENDIX A

Field Data Records

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR	FILE NO. 178924-002
LOCATION	Genna, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/8/16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-200A	
Depth Of Well (ft.) per Log	25'	
Reference Mark	top of PVC	
Depth to Water from Reference Mark (ft.)	16.13'	
Time	720	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	27.68'	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	11.55 ft	
Volume Of Water In Well (gallons/liters)	1.85 gallons	
Purging Device	peristaltic pump	
Volume of Bailer/Pump Capacity	N/A	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~ 4.16 gallons	
Time Purging Started	725 (445 min)	
Time Purging Stopped	828 (508 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500	
Sampling Device	peristaltic pump	
Cleaning Procedure	dedicated	
Color	clear, colorless	
Odor	no odor present	

Sample Management

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page 2 of 2	
PROJECT		LAC BWR2						FILE NO.		128984-002			
LOCATION		Genna, WI						FIELD REP		S-Taylor			
SAMPLER		S-Taylor						DATE		12/8/16			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	✓	0816										
	Gamma	✓	0816										
	Cobalt-60	✓	0816										
	Strontium-90	✓	0816										
	Cesium-137	✓	0816										
	HTDs	✓	0816										
PARAMETERS	Time	730	735	740	745	750	755	800	805	870	915		
	Temp. C	9.30	10.69	10.79	10.86	10.85	10.90	10.85	10.91	11.02	10.80		
	Conductivity (umhos/cm)	1240	1300	1300	1300	1290	1280	1270	1270	1270	1270		
	Dissolved Oxygen (mg/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	pH	6.69	7.50	7.71	7.80	7.85	7.88	7.91	7.92	7.94	7.94		
	ORP (mV)	177	-64	-96	-108	-115	-118	-120	-122	-123	-124		
	Drawdown Ft												
	Volume purged/Gals	250 ml											
	Turbidity (NTU)	126	78.6	43.9	33.0	28.9	22.0	18.0	13.8	8.8	8.7		
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

depth to water 16.13' 16.13' 16.13' 16.13' 16.13' 16.13' 16.13' 16.13' 16.13' 16.13' 16.13'

Sample time 0816

Sample ID: MW-200A-120816

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR GW	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP M. van Noorden
SAMPLER	M. van Noorden	DATE 12-8-16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-200B	
Depth Of Well (ft.) per Log	55	
Reference Mark	TOC	
Depth to Water from Reference Mark (ft.)	15.84	
Time	0720	
Depth to Product (ft.)	NM	
Field Measured Depth Of Well (ft.)	57.46	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	41.62	
Volume Of Water In Well (gallons/liters)	6.66	
Purging Device	Peristaltic Pump	
Volume of Bailer/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	1.78 gal	
Time Purging Started	0727	
Time Purging Stopped	0809	
Instrument Used to Monitor Field Parameters	Horiba U-52, Lamotte 2020	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	Clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD										Page <u>2</u> of <u>2</u>			
PROJECT		<u>LACBWR GW</u>						FILE NO.		<u>128924-002</u>			
LOCATION		<u>Genoa, WI</u>						FIELD REP		<u>M. van Noorden</u>			
SAMPLER		<u>M. van Noorden</u>						DATE		<u>12-8-16</u>			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	<u>0809</u>											
	Gamma	<u>0809</u>											
	Cobalt-60	<u>0809</u>											
	Strontium-90	<u>0809</u>											
	Cesium-137	<u>0809</u>											
	HTDs	<u>0809</u>											
PARAMETERS	Time	<u>0732</u>	<u>0737</u>	<u>0742</u>	<u>0747</u>	<u>0752</u>	<u>0757</u>	<u>0802</u>	<u>0807</u>				
	Temp. C	<u>11.2</u>	<u>11.09</u>	<u>10.65</u>	<u>10.38</u>	<u>10.26</u>	<u>10.13</u>	<u>10.05</u>	<u>9.99</u>				
	Conductivity (umhos/cm)	<u>833</u>	<u>849</u>	<u>871</u>	<u>888</u>	<u>899</u>	<u>904</u>	<u>915</u>	<u>915</u>				
	Dissolved Oxygen (mg/L)	<u>3.56</u>	<u>1.90</u>	<u>1.26</u>	<u>0.81</u>	<u>0.52</u>	<u>0.31</u>	<u>0.01</u>	<u>0.00</u>				
	pH	<u>7.33</u>	<u>7.16</u>	<u>7.12</u>	<u>7.15</u>	<u>7.19</u>	<u>7.23</u>	<u>7.26</u>	<u>7.30</u>				
	ORP (mV)	<u>-23</u>	<u>-62</u>	<u>-72</u>	<u>-79</u>	<u>-86</u>	<u>-92</u>	<u>-96</u>	<u>-101</u>				
	Drawdown Ft	<u>0.00</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.02</u>				
	Volume purged/Gals	<u>0.21</u>	<u>0.42</u>	<u>0.63</u>	<u>0.85</u>	<u>1.06</u>	<u>1.27</u>	<u>1.48</u>	<u>1.69</u>				
	Turbidity (NTU)	<u>11.8</u>	<u>23.9</u>	<u>44.5</u>	<u>14.4</u>	<u>9.8</u>	<u>9.7</u>	<u>9.9</u>	<u>8.7</u>				
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR	FILE NO. 128984-002
LOCATION	Genoa, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/8/10
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-201A	
Depth Of Well (ft.) per Log	25'	
Reference Mark	Top of PVC	
Depth to Water from Reference Mark (ft.)	14.92	
Time	9:15	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	27.69	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	12.77	
Volume Of Water In Well (gallons/liters)	2.04 gallons	
Purging Device	peristaltic pump	
Volume of Bailer/Pump Capacity	N/A	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~4.75 gallons	
Time Purging Started	917 (557 min)	
Time Purging Stopped	1032 (632 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500*	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	dedicated	
Color	clear, colorless	
Odor	no odor present	

Sample Management

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD											Page 2 of 2	
PROJECT		LACBUR					FILE NO.		128924-002			
LOCATION		Genea, WI					FIELD REP		S. Taylor			
SAMPLER		S. Taylor					DATE		12/8/16			
GROUNDWATER SAMPLING INFORMATION												
TIME SAMPLES TAKEN	Tritium	J	1016									
	Gamma	J	1016									
	Cobalt-60	J	1016									
	Strontium-90	J	1016									
	Cesium-137	J	1016									
	HTDs	J	1016									
PARAMETERS	Time	9:30	9:35	10:15								
	Temp. C	-0.08	2.13	2.96								
	Conductivity (umhos/cm)	0.000	0.000	688								
	Dissolved Oxygen (mg/L)	2.90	2.73	0.00								
	pH	7.16	7.74	7.20								
	ORP (mV)	-50	-62	-66								
	Drawdown Ft											
	Volume purged/Gals	240	240									
	Turbidity (NTU)	132	133	20.0								
Remarks: (ie: field filtrations, persons communicated with at site, etc.)												

Depth to water

14.92' 14.92' 14.92'

Sample time: 1016

Sample ID: MW-201A-120816

* Due to below freezing temperatures, flow cell for collecting field parameters not creating successful seal. Unable to collect continuous field parameter measurements.

A single point field parameter measurement was collected with Horiba U-500.

Approximately 4.75 gallons purged prior to sampling (2.5 well volumes)

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR GW	FILE NO. 12P924-002
LOCATION	Genoa, WI	FIELD REP M. van Noorden
SAMPLER	M. van Noorden	DATE 12.8.16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-201B	
Depth Of Well (ft.) per Log	55	
Reference Mark	TOR	
Depth to Water from Reference Mark (ft.)	14.26	
Time	0910	
Depth to Product (ft.)	NM	
Field Measured Depth Of Well (ft.)	52.02	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	42.76	
Volume Of Water In Well (gallons/liters)	6.84	
Purging Device	Peristaltic Pump	
Volume of Bailor/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	3.02 gal	
Time Purging Started	0919	
Time Purging Stopped	1011	
Instrument Used to Monitor Field Parameters	Horiba U52, LaMotte 2020	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	Clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page <u>2</u> of <u>2</u>	
PROJECT		<u>LACBWR GW</u>						FILE NO.		<u>128924.002</u>			
LOCATION		<u>Genoa, WI</u>						FIELD REP		<u>M. van Noodenn</u>			
SAMPLER		<u>M. van Noodenn</u>						DATE		<u>12.8.16</u>			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	1011											
	Gamma	1011											
	Cobalt-60	1011											
	Strontium-90	1011											
	Cesium-137	1011											
	HTDs	1011											
PARAMETERS	Time	0924	0929	0934	0939	0944	0949	0954	0959	1004	1009		
	Temp. C	2.17	2.38	2.45	2.74	2.84	2.89	2.90	2.92	2.95	2.96		
	Conductivity (umhos/cm)	1020	1040	1070	1090	1030	1060	1080	1070	1070	1070		
	Dissolved Oxygen (mg/L)	1.21	0.14	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	pH	7.15	7.02	6.94	6.87	6.84	6.80	6.79	6.81	6.83	6.84		
	ORP (mV)	-27	-46	-48	-50	-54	-54	-56	-57	-57	-58		
	Drawdown Ft	0.00	0.01	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04		
	Volume purged/Gals	0.29	0.58	0.87	1.16	1.45	1.74	2.03	2.32	2.38	2.91		
	Turbidity (NTU)	112	72.1	54.1	42.7	50.3	41.0	26.5	19.5	18.3	18.7		
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LAC BUR	FILE NO. 128924-002
LOCATION	Gorda, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/7/16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW202A	
Depth Of Well (ft.) per Log	25'	
Reference Mark	top of PVC	
Depth to Water from Reference Mark (ft.)	15.80'	
Time	1041	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	27.70'	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	12.50'	
Volume Of Water In Well (gallons/liters)	~ 2.00 gallons	
Purging Device	pump	
Volume of Bailer/Pump Capacity	N/A ~ 2.00 gallons sr	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~ 2.85 gallons	
Time Purging Started	1100 (660 min)	
Time Purging Stopped	1149 (709 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500	
Sampling Device	peristaltic pump	
Cleaning Procedure	dedicated	
Color	clear	
Odor	odorless	

Sample Management

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD										Page 2 of 2		
PROJECT		LACBWR				FILE NO.		128924-002				
LOCATION		Genoa, WI				FIELD REP		S. Taylor				
SAMPLER		S. Taylor				DATE		12/7/16				
GROUNDWATER SAMPLING INFORMATION												
TIME SAMPLES TAKEN	Tritium	J 1130										
	Gamma	J 1130										
	Cobalt-60	J 1130										
	Strontium-90	J 1130										
	Cesium-137	J 1130										
	HTDs	J 1130										
PARAMETERS	Time	1105	1110	1115	1120	1125	1130					
	Temp. C	9.16	10.91	11.21	11.36	11.37	11.73					
	Conductivity (umhos/cm)	292	282	281	283	285	287					
	Dissolved Oxygen (mg/L)	0.00	0.00	0.00	0.00	0.00	0.00					
	pH	8.34	8.28	8.25	8.24	8.24	8.24					
	ORP (mV)	16	4	4	6	8	9					
	Drawdown Ft											
	Volume purged/Gals	200 ml/min										
	Turbidity (NTU)	61.2	48.2	23.9	8.3	5.9	4.1					
Remarks: (ie: field filtrations, persons communicated with at site, etc.)												

water level 15.20' 15.20' 15.20' 15.20' 15.20' 15.20'

Depth to water

Sample Time: 1130 Sample ID: MW-202A-120716

Duplicate Sample Time: 1145 ~~55~~ Sample ID: MW-202A-D-120716

1130

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWA GW	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP M. van Noodennen
SAMPLER	M. van Noodennen	DATE 12-7-16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-202B	
Depth Of Well (ft.) per Log	55	
Reference Mark	TOR	
Depth to Water from Reference Mark (ft.)	15.15	
Time	1035	
Depth to Product (ft.)	NM	
Field Measured Depth Of Well (ft.)	55.69	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	40.54	
Volume Of Water In Well (gallons/liters)	6.49	
Purging Device	Peristaltic Pump	
Volume of Bailer/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	2.48 gal	
Time Purging Started	1046	
Time Purging Stopped	1133	
Instrument Used to Monitor Field Parameters	Horiba U-52, Lamotte 2030	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	Clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD											Page <u>2</u> of <u>2</u>		
PROJECT		<u>LACBWR Gw</u>					FILE NO.		<u>128924-002</u>				
LOCATION		<u>Genoa, WI</u>					FIELD REP		<u>M. Van Noordhagen</u>				
SAMPLER		<u>M. Van Noordhagen</u>					DATE		<u>12-7-16</u>				
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	<u>1133</u>											
	Gamma	<u>1133</u>											
	Cobalt-60	<u>1133</u>											
	Strontium-90	<u>1133</u>											
	Cesium-137	<u>1133</u>											
	HTDs	<u>1133</u>											
PARAMETERS	Time	<u>1051</u>	<u>1056</u>	<u>1101</u>	<u>1106</u>	<u>1111</u>	<u>1116</u>	<u>1121</u>	<u>1126</u>	<u>1131</u>			
	Temp. C	<u>10.56</u>	<u>10.95</u>	<u>11.23</u>	<u>11.29</u>	<u>11.36</u>	<u>11.32</u>	<u>10.51</u>	<u>10.40</u>	<u>10.23</u>			
	Conductivity (umhos/cm)	<u>1030</u>	<u>1020</u>	<u>1010</u>	<u>1000</u>	<u>996</u>	<u>992</u>	<u>995</u>	<u>998</u>	<u>1000</u>			
	Dissolved Oxygen (mg/L)	<u>2.66</u>	<u>1.96</u>	<u>1.17</u>	<u>0.80</u>	<u>0.45</u>	<u>0.22</u>	<u>0.07</u>	<u>0.00</u>	<u>0.00</u>			
	pH	<u>7.47</u>	<u>7.39</u>	<u>7.35</u>	<u>7.34</u>	<u>7.33</u>	<u>7.33</u>	<u>7.33</u>	<u>7.33</u>	<u>7.34</u>			
	ORP (mV)	<u>-96</u>	<u>-103</u>	<u>-105</u>	<u>-107</u>	<u>-101</u>	<u>-111</u>	<u>-112</u>	<u>-114</u>	<u>-116</u>			
	Drawdown Ft	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>			
	Volume purged/Gals	<u>0.26</u>	<u>0.53</u>	<u>0.79</u>	<u>1.06</u>	<u>1.32</u>	<u>1.59</u>	<u>1.85</u>	<u>2.11</u>	<u>2.38</u>			
	Turbidity (NTU)	<u>52.0</u>	<u>52.9</u>	<u>22.5</u>	<u>52.3</u>	<u>30.1</u>	<u>18.3</u>	<u>11.4</u>	<u>9.1</u>	<u>2.3</u>			
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/7/16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW303A	
Depth Of Well (ft.) per Log	25'	
Reference Mark	top of PVC	
Depth to Water from Reference Mark (ft.)	15.25'	
Time	0700	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	27.77' Below Reference	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	12.52	
Volume Of Water In Well (gallons/liters)	~ 2.00 gallons	
Purging Device	peristaltic pump	
Volume of Bailer/Pump Capacity	2 N/A	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~ 3.38 gallons	
Time Purging Started	0915 (555 min)	
Time Purging Stopped	1026 (1026 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500	
Sampling Device	pump	
Cleaning Procedure	dedicated	
Color	clear to slightly yellow	
Odor	none observed	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD											Page 2 of 2		
PROJECT		LACBWR					FILE NO.		128924-002				
LOCATION		Genoa, WI					FIELD REP		S. Taylor				
SAMPLER		S. Taylor					DATE		12/7/16				
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	✓	1000										
	Gamma	✓	1000										
	Cobalt-60	✓	1000										
	Strontium-90	✓	1000										
	Cesium-137	✓	1000										
	HTDs	✓	1000										
PARAMETERS	Time	920	935	930	935	940	945	950	955	1000			
	Temp. C	7.43	7.43	7.30	7.35	7.55	7.76	7.52	7.33	7.63			
	Conductivity (umhos/cm)	954	957	947	937	927	901	914	913	914			
	Dissolved Oxygen (mg/L)	7.54	6.20	4.85	3.46	3.54	1.78	0.96	0.19	0.00			
	pH	7.55	7.90	7.95	7.95	7.94	7.93	7.93	7.93	7.92			
	ORP (mV)	-112	-131	-134	-125	-104	-123	-122	-131	-121			
	Drawdown Ft												
	Volume purged/Gals	180 ⁱⁿ⁴ in. w.											
	Turbidity (NTU)	50.0	34.7	36.8	25.6	8.1	5.9	4.7	6.4	4.9			
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

Depth to
water

15.25'

sample Time 1000

Sample ID: MW-203A-1207⁷_{ST}16

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR GW	FILE NO. 128924-002
LOCATION	Gendg, WI	FIELD REP M. van Noodennen
SAMPLER	M. van Noodennen	DATE 12-7-16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-203B	
Depth Of Well (ft.) per Log	55'	
Reference Mark	TOR	
Depth to Water from Reference Mark (ft.)	15.19	
Time	0900	
Depth to Product (ft.)	NA	
Field Measured Depth Of Well (ft.)	57.75	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	42.56	
Volume Of Water In Well (gallons/liters)	6.81	
Purging Device	Peristaltic Pump	
Volume of Bailer/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	2.89 gal	
Time Purging Started	0909	
Time Purging Stopped	1001	
Instrument Used to Monitor Field Parameters	Horiba U-52, Lamotte 2020	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	Clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page 2 of 2	
PROJECT		LACBOR GW						FILE NO.		128924-002			
LOCATION		Genoa, WI						FIELD REP		M. van Noordennen			
SAMPLER		M. van Noordennen						DATE		12-7-16			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	1001											
	Gamma	1001											
	Cobalt-60	1001											
	Strontium-90	1001											
	Cesium-137	1001											
	HTDs	1001											
PARAMETERS	Time	0914	0919	0924	0929	0934	0939	0944	0949	0954	0959		
	Temp. C	11.93	11.64	11.20	10.69	10.25	9.95	9.69	9.40	9.07	8.87		
	Conductivity (umhos/cm)	222	250	240	241	246	251	255	258	261	265		
	Dissolved Oxygen (mg/L)	3.22	2.58	1.94	1.35	0.98	0.67	0.44	0.22	0.03	0.00		
	pH	7.47	7.44	7.31	7.24	7.22	7.23	7.26	7.30	7.34	7.37		
	ORP (mV)	-8	-62	-73	-79	-85	-91	-97	-102	-108	-112		
	Drawdown Ft	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	Volume purged/Gals	0.28	0.55	0.83	1.11	1.39	1.66	1.94	2.22	2.50	2.77		
	Turbidity (NTU)	65.0	33.3	24.2	13.3	12.0	11.0	10.0	8.1	8.9	8.0		
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR GW	FILE NO. 128924-002
LOCATION	Gends, WI	FIELD REP M-van Noorden
SAMPLER	M-van Noorden	DATE 12-2-16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-204A	
Depth Of Well (ft.) per Log	25	
Reference Mark	TOR	
Depth to Water from Reference Mark (ft.)	14.6)	
Time	1415	
Depth to Product (ft.)	NM	
Field Measured Depth Of Well (ft.)	26.84	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	12.17	
Volume Of Water In Well (gallons/liters)	1.95	
Purging Device	Peristaltic Pump	
Volume of Bailer/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	~~1427~~ ^{AM} 12-2-16 2.00 gal	
Time Purging Started	~~1509~~ ^{AM} 12-2-16 1427	
Time Purging Stopped	1509	
Instrument Used to Monitor Field Parameters	Horiba U-52, Lamotte 2020	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD										Page <u>2</u> of <u>2</u>	
PROJECT		<u>LACBWR GW</u>						FILE NO.		<u>128924-002</u>	
LOCATION		<u>Genoa, WI</u>						FIELD REP		<u>M. van Noordennen</u>	
SAMPLER		<u>M. van Noordennen</u>						DATE		<u>12-7-16</u>	
GROUNDWATER SAMPLING INFORMATION											
TIME SAMPLES TAKEN	Tritium	<u>1509</u>									
	Gamma	<u>1509</u>									
	Cobalt-60	<u>1509</u>									
	Strontium-90	<u>1509</u>									
	Cesium-137	<u>1509</u>									
	HTDs	<u>1509</u>									
PARAMETERS	Time	<u>1432</u>	<u>1437</u>	<u>1442</u>	<u>1447</u>	<u>1452</u>	<u>1457</u>	<u>1502</u>	<u>1507</u>		
	Temp. C	<u>8.41</u>	<u>6.77</u>	<u>7.89</u>	<u>7.51</u>	<u>7.96</u>	<u>10.41</u>	<u>8.07</u>	<u>8.85</u>		
	Conductivity (umhos/cm)	<u>725</u>	<u>776</u>	<u>747</u>	<u>758</u>	<u>745</u>	<u>713</u>	<u>734</u>	<u>727</u>		
	Dissolved Oxygen (mg/L)	<u>2.54</u>	<u>1.69</u>	<u>1.03</u>	<u>0.59</u>	<u>0.17</u>	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>		
	pH	<u>7.50</u>	<u>7.43</u>	<u>7.39</u>	<u>7.38</u>	<u>7.36</u>	<u>7.35</u>	<u>7.35</u>	<u>7.34</u>		
	ORP (mV)	<u>66</u>	<u>61</u>	<u>58</u>	<u>56</u>	<u>56</u>	<u>56</u>	<u>56</u>	<u>56</u>		
	Drawdown Ft	<u>0.01</u>	<u>0.02</u>	<u>0.01</u>	<u>0.02</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>		
	Volume purged/Gals	<u>0.24</u>	<u>0.48</u>	<u>0.71</u>	<u>0.95</u>	<u>1.19</u>	<u>1.43</u>	<u>1.66</u>	<u>1.90</u>		
	Turbidity (NTU)	<u>49.7</u>	<u>16.3</u>	<u>14.9</u>	<u>12.7</u>	<u>11.2</u>	<u>9.1</u>	<u>7.0</u>	<u>4.2</u>		
Remarks: (ie: field filtrations, persons communicated with at site, etc.)											

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBWR	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/7/16
GROUNDWATER SAMPLING INFORMATION		
Well ID	MW-204B	
Depth Of Well (ft.) per Log	55'	
Reference Mark	top of PVC	
Depth to Water from Reference Mark (ft.)	14.50'	
Time	1410	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	56.50'	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	42.00'	
Volume Of Water In Well (gallons/liters)	~ 6.72 gallons	
Purging Device	no pump	
Volume of Bailer/Pump Capacity	N/A	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~ 4.01 gallons	
Time Purging Started	1421 (861 min)	
Time Purging Stopped	1530 (930 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500	
Sampling Device	peristaltic pump	
Cleaning Procedure	dedicated	
Color	clear, colorless	
Odor	no odor present	



ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page 2 of 2	
PROJECT		LACBWR						FILE NO.		128924-002			
LOCATION		Genoa, WI						FIELD REP		S. Taylor			
SAMPLER		S. Taylor						DATE		12/7/16			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	✓	1517										
	Gamma	✓	1517										
	Cobalt-60	✓	1517										
	Strontium-90	✓	1517										
	Cesium-137	✓	1517										
	HTDs	✓	1517										
PARAMETERS	Time	1430	1435	1440	1445	1450	1455	1500	1505	1510	1515		
	Temp. C	7.24	8.18	8.18	8.48	8.43	8.54	8.76	8.17	8.56	8.35		
	Conductivity (umhos/cm)	1340	1320	1320	1320	1310	1320	1320	1320	1310	1320		
	Dissolved Oxygen (mg/L)	0.00	0.00	4.98	0.96	0.00	0.00	0.00	0.00	0.00	0.00		
	pH	8.04	8.12	8.14	8.14	8.14	8.14	8.11	8.14	8.14	8.15		
	ORP (mV)	204	163	130	110	97	85	79	71	65	63		
	Drawdown Ft												
	Volume purged/Gals	220 min											
	Turbidity (NTU)	10.7	5.9	3.5	3.4	1.8	1.8	1.5	0.9	0.4	0.8		
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

depth to
water

14.56' 14.50' 14.50' 14.50' 14.50' 14.50' 14.50' 14.50' 14.50' 14.50' 14.50'

Sample Time: 1517

Sample ID: MW-204B-120716

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LALBWR	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP S. Taylor
SAMPLER	S. Taylor	DATE 12/18/14
GROUNDWATER SAMPLING INFORMATION		
Well ID	M40 ST B11R	
Depth Of Well (ft.) per Log	25'	
Reference Mark	top of PVC	
Depth to Water from Reference Mark (ft.)	13.48'	
Time	1510	
Depth to Product (ft.)	N/A	
Field Measured Depth Of Well (ft.)	22.38'	
Inside Diameter (in.)	2"	
Standing Water Depth (ft.)	8.9'	
Volume Of Water In Well (gallons/liters)	~ 1.42 gallons	
Purging Device	peristaltic pump	
Volume of Bailer/Pump Capacity	N/A 1.42 ST	
Cleaning Procedure	dedicated	
Bails Removed/ Volume Removed	~ 3.23 gallons	
Time Purging Started	1525 (925 min)	
Time Purging Stopped	1706 (1026 min)	
Instrument Used to Monitor Field Parameters	Horiba U-500	
Sampling Device	peristaltic pump	
Cleaning Procedure	dedicated	
Color	light brown / slightly opaque	
Odor	no odor present	

4th B11R

Sample Management

LC-RP-WI-033

Revision 0

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page 2 of 2		
PROJECT		LALBWR						FILE NO.		128924-002				
LOCATION		Genoa, WI						FIELD REP		S. Taylor				
SAMPLER		S. Taylor						DATE		12/6/16				
GROUNDWATER SAMPLING INFORMATION														
TIME SAMPLES TAKEN	Tritium	✓	1646											
	Gamma	✓	1646											
	Cobalt-60	✓	1646											
	Strontium-90	✓	1646											
	Cesium-137	✓	1646											
	HTDs	✓	1646											
PARAMETERS	Time	1545	1550	1555	1600	1605	1610	1615	1620	1625	1630	1635	1640	164
	Temp. C	10.98	10.99	10.56	10.75	10.85	10.53	10.87	10.94	10.66	10.84	10.75	10.70	10.7
	Conductivity (umhos/cm)	986	986	988	986	983	982	980	981	980	980	982	984	982
	Dissolved Oxygen (mg/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	pH	7.48	7.50	7.51	7.52	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.54	7.5
	ORP (mV)	-45	-48	-51	-55	-58	-61	-62	-64	-65	-66	-66	-68	-61
	Drawdown Ft													
	Volume purged/Gals	~120 ml/min												
	Turbidity (NTU)	103	101	87.7	65.4	50.2	37.2	31.5	25.0	21.5	17.9	15.6	14.2	16.1
Remarks: (ie: field filtrations, persons communicated with at site, etc.)														

water level : 14.80 14.80 14.88 14.84 14.80 14.80 14.80 14.80 14.80 14.80 14.80 14.80 14.80 14.80

Sample time: BTTST 1646
 Sample ID: B11R-120616

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page <u>1</u> of <u>2</u>
PROJECT	<u>LACBWR</u>	FILE NO. <u>128924-002</u>
LOCATION	<u>Genoa, WI</u>	FIELD REP <u>S. Taylor</u>
SAMPLER	<u>S. Taylor</u>	DATE <u>12/17/16</u>
GROUNDWATER SAMPLING INFORMATION		
Well ID	<u>Drinking Water well 5</u>	
Depth Of Well (ft.) per Log	—	
Reference Mark	—	
Depth to Water from Reference Mark (ft.)	—	
Time	<u>0730</u>	
Depth to Product (ft.)	—	
Field Measured Depth Of Well (ft.)	—	
Inside Diameter (in.)	—	
Standing Water Depth (ft.)	—	
Volume Of Water In Well (gallons/liters)	—	
Purging Device	<u>production well</u>	
Volume of Bailer/Pump Capacity	<u>N/A</u>	
Cleaning Procedure	<u>dedicated</u>	
Bails Removed/ Volume Removed	<u>~70 gallons/min</u>	
Time Purging Started	<u>749</u>	
Time Purging Stopped	<u>754</u>	
Instrument Used to Monitor Field Parameters	<u>Hanna U-500</u>	
Sampling Device	<u>spigot</u>	
Cleaning Procedure	<u>dedicated</u>	
Color	<u>clear, colorless</u>	
Odor	<u>no odor present</u>	

Drinking well 5

LC-RP-WI-033

Revision 0

Sample Management

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD											Page 2 of 2	
PROJECT		LACBWR					FILE NO. 128924-002					
LOCATION		Genoa, WI					FIELD REP S Taylor / M. VanNoordennen					
SAMPLER		S. Taylor / M. VanNoordennen					DATE 12/7/16					
GROUNDWATER SAMPLING INFORMATION												
TIME SAMPLES TAKEN	Tritium	✓	0759									
	Gamma	✓	0759									
	Cobalt-60	✓	0759									
	Strontium-90	✓	0759									
	Cesium-137	✓	0759									
	HTDs	✓	0759									
PARAMETERS	Time	759										
	Temp. C	4.88										
	Conductivity (umhos/cm)	568										
	Dissolved Oxygen (mg/L)	6.45										
	pH	8.02										
	ORP (mV)	202										
	Drawdown Ft	✓										
	Volume purged/Gals	~70 gallons per min										
	Turbidity (NTU)	43.6										
Remarks: (ie: field filtrations, persons communicated with at site, etc.)												

Sample time: 0759

Sample ID: Well 5-120716

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD		Page 1 of 2
PROJECT	LACBOR GW	FILE NO. 128924-002
LOCATION	Genoa, WI	FIELD REP M. van Nooden
SAMPLER	M. van Nooden	DATE 12-6-16
GROUNDWATER SAMPLING INFORMATION		
Well ID	B11AR	
Depth Of Well (ft.) per Log	—	
Reference Mark	TOR	
Depth to Water from Reference Mark (ft.)	14.89	
Time	1510	
Depth to Product (ft.)	NA	
Field Measured Depth Of Well (ft.)	46.56	
Inside Diameter (in.)	2.0	
Standing Water Depth (ft.)	31.67	
Volume Of Water In Well (gallons/liters)	5.07	
Purging Device	Peristaltic Pump	
Volume of Bailer/Pump Capacity	NA	
Cleaning Procedure	NA	
Bails Removed/ Volume Removed	3.76 gal	
Time Purging Started	1524	
Time Purging Stopped	1621	
Instrument Used to Monitor Field Parameters	Horiba U-52, Lamotte 2020	
Sampling Device	Peristaltic Pump	
Cleaning Procedure	NA	
Color	Clear	
Odor	None	

ATTACHMENT 1

LOW-FLOW GROUNDWATER SAMPLING RECORD												Page 2 of 2	
PROJECT		LACBWR GW						FILE NO.		128924-002			
LOCATION		Genda, WI						FIELD REP		M. van Noorden			
SAMPLER		M. van Noorden						DATE		12-6-16			
GROUNDWATER SAMPLING INFORMATION													
TIME SAMPLES TAKEN	Tritium	1621											
	Gamma	1621											
	Cobalt-60	1621											
	Strontium-90	1621											
	Cesium-137	1621											
	HTDs	1621											
PARAMETERS	Time	1529	1534	1539	1544	1549	1554	1559	1604	1609	1614	1619	
	Temp. C	11.27	11.09	10.62	10.05	9.47	8.91	8.48	8.04	7.65	7.30	7.01	
	Conductivity (umhos/cm)	1000	997	1010	1020	1040	1050	1070	1080	1100	1110	1120	
	Dissolved Oxygen (mg/L)	4.58	3.80	3.38	3.06	2.78	2.52	2.35	2.08	1.89	1.74	1.65	
	pH	7.21	7.15	7.07	7.04	7.05	7.09	7.13	7.17	7.20	7.23	7.26	
	ORP (mV)	190	187	188	189	187	186	184	182	180	179	178	
	Drawdown Ft	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	
	Volume purged/Gals	0.33	0.66	0.99	1.32	1.65	1.98	2.31	2.64	2.97	3.30	3.63	
	Turbidity (NTU)	6.1	5.3	5.3	3.2	2.1	1.7	1.9	1.8	1.6	1.8	1.9	
Remarks: (ie: field filtrations, persons communicated with at site, etc.)													

APPENDIX B

APPENDIX B.1

Data Validation Report

Data Usability Summary Report (DUSR)

Data Validation Notes

Groundwater Monitoring, LACBWR, La Crosse, WI

Laboratories: GEL Laboratories, Inc. – Charleston, SC

Analytical results for environmental samples collected from 05 December through 08 December 2016 from Gel Laboratories, Inc. were reviewed to determine the data usability. Each laboratory data package was reviewed with guidance provided by the United States Environmental Protection Agency (USEPA). The following quality control/quality assurance (QA/QC) criteria from the analysis of the project samples were reviewed as applicable:

- Sample Preservation and Holding Time Compliance
- Method Sample Analysis
- Blank Sample Analysis
- Laboratory Control Samples
- Field and Laboratory Duplicates
- Target Analyte Identification
- Use of Laboratory Data Qualifiers

Maximum allowable holding times, for each parameter, were measured from the time of sample collection to the time of sample preparation or analysis for each project sample.

Analytical precision and accuracy were evaluated based on laboratory duplicate and laboratory control analyses performed concurrently with the project samples. Field precision was evaluated based on field duplicates.

Sample data was qualified by the laboratory in accordance with laboratory standard operating procedures (SOP). Based on a check of the data qualifiers assigned to be project sample results, these flags were applied to the reported results in accordance with the laboratory specific SOP. The results presented in each laboratory report were found to be compliant with the data quality objectives (DQOs) for the project and usable, any exceptions noted below.

1. Sample Delivery Group Number 412372

1.1 SUMMARY

This Data Validation Summary Report summarizes the review of Sample Delivery Group number 412372. This data validation and usability assessment was performed per 1997 Evaluation of Radiochemical Data Usability (Paar, April 1997).

1.2 ANALYTICAL DATA PACKAGE DOCUMENTATION

All samples were collected, preserved, and shipped following standard chain of custody protocol. Samples were also received appropriately, identified correctly, and analyzed according to the monitoring schedule. All chains of custody were appropriately signed and dated by the field and/or laboratory personnel. Custody seals were intact upon arrival at the laboratory.

Analyses were performed on the following samples:

B11AR
B11R
MW-200A
MW-200B
MW-201A
MW-201B
MW-202A (primary and duplicate)
MW-202B
MW-203A
MW-203B
MW-204A
MW-204B
5

For the following methods:

Method	Radionuclide
DOE RESL NI-1 MOD	Nickel-63
E901.1	Cesium-137
E901.1	Cobalt-60
E905.0	Strontium-90
E906.0M	Tritium

1.3 HOLDING TIMES/PRESERVATION

The samples were properly preserved and analyzed within the six month holding time for radionuclides.

1.4 LABORATORY AND FIELD DUPLICATE SAMPLE ANALYSIS

The laboratory duplicate sample analysis is used to demonstrate acceptable method precision by the laboratory at the time of analysis. The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The RPDs for laboratory and field duplicates were within limits.

1.5 BLANK CONTAMINATION

Method blank samples did not have detections, indicating that contamination from laboratory activities did not occur.

1.6 LABORATORY CONTROL SAMPLES

The laboratory control sample (LCS) analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. All compounds associated with the LCS analyses exhibited recoveries within the control limits.

1.7 SYSTEM PERFORMANCE AND OVERALL ASSESSMENT

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all other results are considered valid and usable for all purposes with the exception of the following:

- Cesium-137 for sample B11R was rejected for high peak width.

APPENDIX B.2

Laboratory Data Report

January 06, 2017

Mr. Miles van Noordennen
Haley & Aldrich, Inc.
100 Corporate Place, Suite 105
Rocky Hill, Connecticut 06067

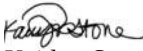
Re: Groundwater Monitoring, LACBWR, La Crosse, WI
Work Order: 412372

Dear Mr. Noordennen:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 09, 2016. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4453.

Sincerely,


Kaitlyn Stone for
Edith Kent
Project Manager

Purchase Order: 128924-002
Enclosures

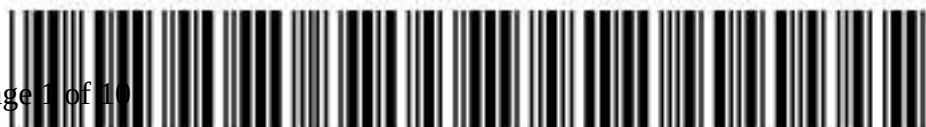


Table of Contents

Case Narrative.....	1
Chain of Custody and Supporting Documentation.....	4
Laboratory Certifications.....	8
Radiological Analysis.....	10
Case Narrative.....	11
Sample Data Summary.....	18
Quality Control Summary.....	47
Gamma Spectroscopy Raw Data.....	52
Continuing Calibration Data.....	381
Background and Efficiency Data.....	386
RAD Standards Traceability.....	435
Runlogs.....	450
Gas Flow Raw Data.....	452
Continuing Calibration Data.....	467
Background and Efficiency Data.....	480
RAD Standards Traceability.....	515
Runlogs.....	521
Liquid Scintillation Raw Data.....	524
Continuing Calibration Data.....	590
Background and Efficiency Data.....	609

RAD Standards Traceability.....	613
Runlogs.....	627

Case Narrative

**Receipt Narrative
for
Haley & Aldrich, Inc.
SDG: 412372**

January 06, 2017

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 09, 2016 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
412372001	B11AR-120616
412372002	B11R-120616
412372003	Well 5-120716
412372004	MW-204B-120716
412372005	MW-203B-120716
412372006	MW-203A-120716
412372007	MW-202B-120716
412372008	MW-202A-120716
412372009	MW-202A-D-120716
412372010	MW-200A-120816
412372011	MW-200B-120816
412372012	MW-201A-120816
412372013	MW-201B-120816
412372014	MW-204A-120716

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Kaitlyn Stone for
Edith Kent
Project Manager

Chain of Custody and Supporting Documentation

Page: 2 of 2
Project #: 128924-002
GEL Quote #: 128924-002
POC Number: 128924-002
PO Number: 128924-002
Client Name: Haley, Albin
Project/Site Name: LACBWR
Address: Geneva, NY
Collected by: M. Van Nieuwen
Send Results To: M. Van Nieuwen
Phone #: 860 810 3152
Fax #:
GEL Work Order Number:
GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

Client Name: Haley - Aldrich				Phone #: 860 810 3152																																																																																																																																																																																																																																																																																
Project/Site Name: LACBWR				Fax #:																																																																																																																																																																																																																																																																																
Address: Geneva, NY																																																																																																																																																																																																																																																																																				
Collected by: M. Van Norderman				Send Results To: M. Van Norderman																																																																																																																																																																																																																																																																																
Sample ID	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (^a)	Field Filtered (^b)	Sample Matrix (^c)																																																																																																																																																																																																																																																																															
* For composites - indicate start and stop date/time																																																																																																																																																																																																																																																																																				
MW-203B-120716	12-7-16	1001	N	N	GW	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative	TSCA Regulated	Total number of containers	Should this sample be considered:	Radiative



SAMPLE RECEIPT & REVIEW FORM

Client: <u>Haley & Aldrich</u>			SDG/AR/COC/Work Order: <u>412372</u>		
Received By: <u>Cery</u>			Date Received: <u>12/10/16</u>		
Suspected Hazard Information		Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
COC/Samples marked as radioactive?				Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>00cpm</u>	
Classified Radioactive II or III by RSO?				If yes, Were swipes taken of sample containers < action levels?	
COC/Samples marked containing PCBs?					
Package, COC, and/or Samples marked as beryllium or asbestos containing?				If yes, samples are to be segregated as Safety Controlled Samples, and opened by the GEL Safety Group.	
Shipped as a DOT Hazardous?				Hazard Class Shipped: UN#:	
Samples identified as Foreign Soil?					

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	☒			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Samples requiring cold preservation within (0 ≤ deg. C)?*	☒			Preservation Method: Ice bags Blue ice Dry ice <u>None</u> Other (describe) *all temperatures are recorded in Celsius
2a Daily check performed and passed on IR temperature gun?	☒			Temperature Device Serial #: <u>E9102009184</u> Secondary Temperature Device Serial # (If Applicable):
3 Chain of custody documents included with shipment?	☒			
4 Sample containers intact and sealed?	☒			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
5 Samples requiring chemical preservation at proper pH?	☒			Sample ID's, containers affected and observed pH: If Preservation added, Lot#:
6 Do Low Level Perchlorate samples have headspace as required?	☒			Sample ID's and containers affected:
7 VOA vials contain acid preservation?	☒			(If unknown, select No)
8 VOA vials free of headspace (defined as < 6mm bubble)?	☒			Sample ID's and containers affected:
9 Arc Encore containers present?	☒			(If yes, immediately deliver to Volatiles laboratory)
10 Samples received within holding time?	☒			ID's and tests affected:
11 Sample ID's on COC match ID's on bottles?	☒			Sample ID's and containers affected:
12 Date & time on COC match date & time on bottles?	☒			Sample ID's affected:
13 Number of containers received match number indicated on COC?	☒			Sample ID's affected:
14 Are sample containers identifiable as GEL provided?	☒			
15 COC form is properly signed in relinquished/received sections?	☒			
16 Carrier and tracking number.				Circle Applicable: FedEx Air FedEx Ground UPS Field Services Courier Other <u>new 12/10/16 SDIS 8105 9859 9A91 - 13°C</u> <u>9A72 - 11°C</u> <u>9A83 - 14°C</u>

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials EM Date 12/13/16 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 06 January 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122016-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-16-11
Utah NELAP	SC000122016-21
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Haley & Aldrich, Inc. (HAAL)
SDG #: 412372

Product: Gammaspec, Gamma, Liquid, Cs-137, Co-60

Analytical Method: EPA 901.1

Analytical Procedure: GL-RAD-A-013 REV# 25

Analytical Batch: 1624165

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372001	B11AR-120616
412372002	B11R-120616
412372003	Well 5-120716
412372004	MW-204B-120716
412372005	MW-203B-120716
412372006	MW-203A-120716
412372007	MW-202B-120716
412372008	MW-202A-120716
412372009	MW-202A-D-120716
412372010	MW-200A-120816
412372011	MW-200B-120816
412372012	MW-201A-120816
412372013	MW-201B-120816
412372014	MW-204A-120716
1203690078	Method Blank (MB)
1203690079	412372001(B11AR-120616) Sample Duplicate (DUP)
1203690080	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Data rejected due to high peak-width.	Cesium-137	412372002	B11R-120616

Product: GFPC, Sr90, liquid

Analytical Method: EPA 905.0

Analytical Procedure: GL-RAD-A-029 REV# 13

Analytical Batch: 1625914

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372003	Well 5-120716
1203694692	Method Blank (MB)
1203694693	412372003(Well 5-120716) Sample Duplicate (DUP)
1203694694	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC, Sr90, liquid

Analytical Method: EPA 905.0 Modified/DOE RP501 Rev. 1 Modified

Analytical Procedure: GL-RAD-A-004 REV# 17

Analytical Batch: 1625919

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372001	B11AR-120616
412372002	B11R-120616
412372004	MW-204B-120716
412372005	MW-203B-120716
412372006	MW-203A-120716
412372007	MW-202B-120716
412372008	MW-202A-120716
412372009	MW-202A-D-120716
412372010	MW-200A-120816
412372011	MW-200B-120816
412372012	MW-201A-120816
412372013	MW-201B-120816
412372014	MW-204A-120716
1203694706	Method Blank (MB)
1203694707	412372002(B11R-120616) Sample Duplicate (DUP)
1203694708	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

QC Information

All of the QC samples meet the required acceptance limits with the following exceptions: The sample and duplicate, 1203694707 (B11R-120616DUP) and 412372002 (B11R-120616), do not meet the client relative error ratio requirement; however, both sample and duplicate results are less than the minimum detectable activity.

Technical Information

Recounts

Samples 412372002 (B11R-120616), 412372005 (MW-203B-120716), 412372007 (MW-202B-120716), 412372008 (MW-202A-120716), 412372009 (MW-202A-D-120716) and 412372013 (MW-201B-120816) were recounted due to a suspected false positive. The recounts are reported. Samples 1203694707 (B11R-120616DUP) and 412372010 (MW-200A-120816) were taken through additional clean-up steps and recounted due to a suspected false positive. The recounts are reported.

Miscellaneous Information

Additional Comments

Sample 412372010 (MW-200A-120816) has a negative result that is greater than the 3 sigma TPU. The background control chart was examined and the detector was determined to be fully functional

Product: LSC, Tritium Dist, Liquid

Analytical Method: EPA 906.0

Analytical Procedure: GL-RAD-A-050 REV# 10

Analytical Batch: 1625595

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372003	Well 5-120716
1203693748	Method Blank (MB)
1203693749	412854004(NonSDG) Sample Duplicate (DUP)
1203693750	412854004(NonSDG) Matrix Spike (MS)
1203693751	412854004(NonSDG) Matrix Spike Duplicate (MSD)
1203693752	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts

Samples 1203693751 (Non SDG 412854004MSD) and 1203693752 (LCS) were recounted due to low recovery. The recounts are reported. Sample 1203693750 (Non SDG 412854004MS) was recounted due to high recovery.

The recount is reported.

Product: Liquid Scint Ni63, Liquid

Analytical Method: DOE RESL Ni-1, Modified

Analytical Procedure: GL-RAD-A-022 REV# 18

Analytical Batch: 1625619

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372001	B11AR-120616
412372002	B11R-120616
412372003	Well 5-120716
412372004	MW-204B-120716
412372005	MW-203B-120716
412372006	MW-203A-120716
412372007	MW-202B-120716
412372008	MW-202A-120716
412372009	MW-202A-D-120716
412372010	MW-200A-120816
412372011	MW-200B-120816
412372012	MW-201A-120816
412372013	MW-201B-120816
412372014	MW-204A-120716
1203693829	Method Blank (MB)
1203693830	412372002(B11R-120616) Sample Duplicate (DUP)
1203693831	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: LSC, Tritium Dist, Liquid

Analytical Method: EPA 906.0 Modified

Analytical Procedure: GL-RAD-A-002 REV# 21

Analytical Batch: 1625629

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
412372001	B11AR-120616
412372002	B11R-120616

412372004	MW-204B-120716
412372005	MW-203B-120716
412372006	MW-203A-120716
412372007	MW-202B-120716
412372008	MW-202A-120716
412372009	MW-202A-D-120716
412372010	MW-200A-120816
412372011	MW-200B-120816
412372012	MW-201A-120816
412372013	MW-201B-120816
412372014	MW-204A-120716
1203693863	Method Blank (MB)
1203693864	412372002(B11R-120616) Sample Duplicate (DUP)
1203693865	412372002(B11R-120616) Matrix Spike (MS)
1203693866	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Recounts

Samples 1203693865 (B11R-120616MS) and 1203693866 (LCS) were recounted due to low recovery. The recounts are reported. Sample 1203693865 (B11R-120616MS) was recounted due to high recovery. The recount is reported. Sample 1203693864 (B11R-120616DUP) was recounted due to results more negative than the three sigma TPU. The second count is reported.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

HAAL003 Haley & Aldrich, Inc.

Client SDG: 412372 GEL Work Order: 412372

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Heather McCarty

Date: 10 JAN 2017

Title: Analyst II

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Report Date: January 10, 2017

Client Sample ID: B11AR-120616
Sample ID: 412372001
Matrix: Ground Water
Collect Date: 06-DEC-16
Receive Date: 09-DEC-16
Collector: Client

Project: HAAL00301
Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.

Rad Gamma Spec Analysis

Gammasec, Gamma, Liquid, Cs-137, Co-60 "As Received"

Cesium-137	U	-0.727	+/-1.92	3.42	+/-1.95	10.0	pCi/L			MXR1	12/20/16	1557	1624165	1
Cobalt-60	U	-1.72	+/-2.03	3.37	+/-2.18		pCi/L							

Rad Gas Flow Proportional Counting

GFPC, Sr90, liquid "As Received"

Strontium-90	U	0.248	+/-0.607	1.11	+/-0.609	2.00	pCi/L			BXF1	01/06/17	0842	1625919	2

Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Liquid "As Received"

Tritium	U	-367	+/-316	625	+/-316	700	pCi/L			TXP3	01/02/17	1317	1625629	3

Liquid Scint Ni63, Liquid "As Received"

Nickel-63	U	-12.5	+/-23.2	41.9	+/-23.2	50.0	pCi/L			MYM	12/23/16	0331	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	91.6	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	85.4	(25%-125%)

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: B11AR-120616

Sample ID: 412372001

Project: HAAL00301

Client ID: HAAL003

Report Date: January 10, 2017

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

DL: Detection Limit

Lc/LC: Critical Level

MDA: Minimum Detectable Activity

MDC: Minimum Detectable Concentration

Mtd.: Method

PF: Prep Factor

RL: Reporting Limit

TPU: Total Propagated Uncertainty

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: B11R-120616
Sample ID: 412372002
Matrix: Ground Water
Collect Date: 06-DEC-16
Receive Date: 09-DEC-16
Collector: Client

Project: HAAL00301
Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	UI	0.00	+/-7.61	2.95	+/-7.62	10.0	pCi/L			MXR1	12/20/16	1557	1624165	1
Cobalt-60	U	0.436	+/-1.99	4.35	+/-2.00		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	-0.702	+/-0.482	1.12	+/-0.482	2.00	pCi/L			BXF1	01/07/17	1406	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-322	+/-318	622	+/-318	700	pCi/L			TXP3	01/02/17	1333	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	3.05	+/-24.3	42.5	+/-24.3	50.0	pCi/L			MYM	12/23/16	0347	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	91.6	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	85	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: B11R-120616

Project: HAAL00301

Sample ID: 412372002

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: Well 5-120716
Sample ID: 412372003
Matrix: Drinking Water (Potable)
Collect Date: 07-DEC-16
Receive Date: 09-DEC-16
Collector: Client

Project: HAAL00301
Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	0.249	+/-2.32	4.38	+/-2.32	10.0	pCi/L			MXR1	12/21/16	0838	1624165	1
Cobalt-60	U	0.0409	+/-1.50	3.23	+/-1.50		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.870	+/-0.797	1.30	+/-0.829	2.00	pCi/L			BXF1	01/05/17	1626	1625914	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-96.7	+/-133	301	+/-133	700	pCi/L			KXA1	12/28/16	1909	1625595	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	16.4	+/-25.3	43.0	+/-25.4	50.0	pCi/L			MYM	12/23/16	0403	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0
3	EPA 906.0
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625914	71.3	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	83.8	(25%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: Well 5-120716

Project: HAAL00301

Sample ID: 412372003

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-204B-120716

Project: HAAL00301

Sample ID: 412372004

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-0.257	+/-2.60	4.77	+/-2.60	10.0	pCi/L			MXR1	12/21/16	0839	1624165	1
Cobalt-60	U	-0.0975	+/-2.11	4.29	+/-2.11		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.719	+/-0.641	1.03	+/-0.652	2.00	pCi/L			BXF1	01/06/17	0846	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-453	+/-327	658	+/-327	700	pCi/L			TXP3	01/02/17	1350	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	-2.04	+/-24.6	43.5	+/-24.6	50.0	pCi/L			MYM	12/23/16	0419	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	92.9	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	82.6	(25%-125%)

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-204B-120716

Project: HAAL00301

Sample ID: 412372004

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-203B-120716

Project: HAAL00301

Sample ID: 412372005

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-2.13	+/-3.59	6.83	+/-3.72	10.0	pCi/L			MXR1	12/21/16	0839	1624165	1
Cobalt-60	U	2.40	+/-2.40	3.63	+/-2.63		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.210	+/-0.592	1.07	+/-0.593	2.00	pCi/L			BXF1	01/07/17	1406	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-297	+/-335	648	+/-335	700	pCi/L			TXP3	01/02/17	1406	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	11.7	+/-25.6	44.0	+/-25.7	50.0	pCi/L			MYM	12/23/16	0435	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	91.6	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	81.8	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-203B-120716

Project: HAAL00301

Sample ID: 412372005

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-203A-120716

Project: HAAL00301

Sample ID: 412372006

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.

Rad Gamma Spec Analysis

Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"

Cesium-137	U	-0.403	+/-2.92	5.34	+/-2.93	10.0	pCi/L			MXR1	12/21/16	0839	1624165	1
Cobalt-60	U	1.34	+/-2.11	5.16	+/-2.20		pCi/L							

Rad Gas Flow Proportional Counting

GFPC, Sr90, liquid "As Received"

Strontium-90	U	1.01	+/-0.819	1.32	+/-0.834	2.00	pCi/L			BXF1	01/06/17	0914	1625919	2

Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Liquid "As Received"

Tritium	U	-303	+/-340	657	+/-340	700	pCi/L			TXP3	01/02/17	1422	1625629	3

Liquid Scint Ni63, Liquid "As Received"

Nickel-63	U	1.09	+/-25.2	44.1	+/-25.2	50.0	pCi/L			MYM 1	12/23/16	0451	1625619	4

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	94.2	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	81.8	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-203A-120716

Project: HAAL00301

Sample ID: 412372006

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-202B-120716

Project: HAAL00301

Sample ID: 412372007

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-1.88	+/-2.57	4.55	+/-2.71	10.0	pCi/L			MXR1	12/21/16	0840	1624165	1
Cobalt-60	U	-2.07	+/-3.05	5.11	+/-3.19		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.145	+/-0.687	1.25	+/-0.687	2.00	pCi/L			BXF1	01/07/17	1406	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-197	+/-349	658	+/-349	700	pCi/L			TXP3	01/02/17	1439	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	2.79	+/-23.1	40.3	+/-23.1	50.0	pCi/L			MYM	12/23/16	0507	1625619	4
											1			

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	90.3	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	89.5	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-202B-120716

Project: HAAL00301

Sample ID: 412372007

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-202A-120716

Project: HAAL00301

Sample ID: 412372008

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.

Rad Gamma Spec Analysis

Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"

Cesium-137	U	-1.33	+/-2.55	4.45	+/-2.62	10.0	pCi/L			MXR1	12/21/16	0914	1624165	1
Cobalt-60	U	2.01	+/-2.49	6.04	+/-2.65		pCi/L							

Rad Gas Flow Proportional Counting

GFPC, Sr90, liquid "As Received"

Strontium-90	U	0.236	+/-0.625	1.12	+/-0.626	2.00	pCi/L			BXF1	01/07/17	1409	1625919	2

Rad Liquid Scintillation Analysis

LSC, Tritium Dist, Liquid "As Received"

Tritium	U	-182	+/-350	658	+/-350	700	pCi/L			TXP3	01/02/17	1455	1625629	3

Liquid Scint Ni63, Liquid "As Received"

Nickel-63	U	-4.11	+/-21.5	38.1	+/-21.5	50.0	pCi/L			MYM	12/23/16	0524	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	94.2	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	89.1	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-202A-120716

Project: HAAL00301

Sample ID: 412372008

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Report Date: January 10, 2017

Client Sample ID: MW-202A-D-120716
Sample ID: 412372009
Matrix: Ground Water
Collect Date: 07-DEC-16
Receive Date: 09-DEC-16
Collector: Client

Project: HAAL00301
Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-0.0139	+/-1.97	3.46	+/-1.97	10.0	pCi/L			MXR1	12/21/16	0915	1624165	1
Cobalt-60	U	-2.49	+/-2.39	3.69	+/-2.64		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.430	+/-0.822	1.44	+/-0.825	2.00	pCi/L			BXF1	01/07/17	1409	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-192	+/-317	600	+/-317	700	pCi/L			TXP3	01/02/17	1511	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	0.983	+/-22.2	38.9	+/-22.2	50.0	pCi/L			MYM	12/23/16	0540	1625619	4
											1			

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	90.3	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	89.1	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-202A-D-120716

Project: HAAL00301

Sample ID: 412372009

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test										Batch ID	Recovery%	Acceptable Limits	

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-200A-120816

Project: HAAL00301

Sample ID: 412372010

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 08-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	1.29	+/-1.89	4.03	+/-1.98	10.0	pCi/L			MXR1	12/21/16	0916	1624165	1
Cobalt-60	U	1.11	+/-1.82	4.09	+/-1.89		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	-1.8	+/-0.916	1.90	+/-0.916	2.00	pCi/L			BXF1	01/10/17	1204	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-469	+/-326	658	+/-326	700	pCi/L			TXP3	01/02/17	1528	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	0.294	+/-23.1	40.5	+/-23.1	50.0	pCi/L			MYM	12/23/16	0556	1625619	4
											1			

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	76.1	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	84.2	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-200A-120816

Project: HAAL00301

Sample ID: 412372010

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-200B-120816

Project: HAAL00301

Sample ID: 412372011

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 08-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	0.608	+/-1.53	3.09	+/-1.55	10.0	pCi/L			MXR1	12/21/16	0916	1624165	1
Cobalt-60	U	0.114	+/-1.80	3.85	+/-1.80		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.531	+/-0.477	0.763	+/-0.485	2.00	pCi/L			BXF1	01/09/17	1230	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-107	+/-357	658	+/-357	700	pCi/L			TXP3	01/02/17	1544	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	11.2	+/-24.6	42.2	+/-24.6	50.0	pCi/L			MYM	12/23/16	0612	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	87.7	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	85	(25%-125%)

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Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-200B-120816

Project: HAAL00301

Sample ID: 412372011

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
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Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-201A-120816

Project: HAAL00301

Sample ID: 412372012

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 08-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-0.629	+/-2.58	4.91	+/-2.60	10.0	pCi/L			MXR1	12/21/16	1153	1624165	1
Cobalt-60	U	3.57	+/-2.64	6.47	+/-3.10		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.301	+/-0.613	1.10	+/-0.615	2.00	pCi/L			BXF1	01/06/17	1104	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-375	+/-331	654	+/-331	700	pCi/L			TXP3	01/02/17	1600	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	9.55	+/-24.3	41.9	+/-24.4	50.0	pCi/L			MYM	12/23/16	0628	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	90.3	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	86.2	(25%-125%)

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-201A-120816

Project: HAAL00301

Sample ID: 412372012

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-201B-120816

Project: HAAL00301

Sample ID: 412372013

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 08-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	2.40	+/-2.41	5.36	+/-2.65	10.0	pCi/L			MXR1	12/21/16	1154	1624165	1
Cobalt-60	U	1.08	+/-2.08	5.00	+/-2.13		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	-0.208	+/-0.474	1.01	+/-0.474	2.00	pCi/L			BXF1	01/06/17	1107	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-123	+/-307	572	+/-307	700	pCi/L			TXP3	01/02/17	1617	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	10.3	+/-24.5	42.1	+/-24.5	50.0	pCi/L			MYM	12/23/16	0644	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	92.9	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	85.4	(25%-125%)

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Certificate of Analysis

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Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-201B-120816

Project: HAAL00301

Sample ID: 412372013

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-204A-120716

Project: HAAL00301

Sample ID: 412372014

Client ID: HAAL003

Matrix: Ground Water

Collect Date: 07-DEC-16

Receive Date: 09-DEC-16

Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Liquid, Cs-137, Co-60 "As Received"</i>														
Cesium-137	U	-3.09	+/-2.84	4.69	+/-3.17	10.0	pCi/L			MXR1	12/21/16	1154	1624165	1
Cobalt-60	U	0.909	+/-2.64	5.93	+/-2.68		pCi/L							
Rad Gas Flow Proportional Counting														
<i>GFPC, Sr90, liquid "As Received"</i>														
Strontium-90	U	0.428	+/-0.955	1.68	+/-0.958	2.00	pCi/L			BXF1	01/06/17	1111	1625919	2
Rad Liquid Scintillation Analysis														
<i>LSC, Tritium Dist, Liquid "As Received"</i>														
Tritium	U	-206	+/-340	644	+/-340	700	pCi/L			TXP3	01/02/17	1633	1625629	3
<i>Liquid Scint Ni63, Liquid "As Received"</i>														
Nickel-63	U	11.3	+/-23.5	40.4	+/-23.6	50.0	pCi/L			MYM	12/23/16	0700	1625619	4

1

The following Analytical Methods were performed

Method	Description
1	EPA 901.1
2	EPA 905.0 Modified/DOE RP501 Rev. 1 Modified
3	EPA 906.0 Modified
4	DOE RESL Ni-1, Modified

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Strontium Carrier	GFPC, Sr90, liquid "As Received"	1625919	89	(25%-125%)
Nickel Carrier	Liquid Scint Ni63, Liquid "As Received"	1625619	88.3	(25%-125%)

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Certificate of Analysis

Company : Haley & Aldrich, Inc.
Address : 100 Corporate Place, Suite 105

Rocky Hill, Connecticut 06067

Report Date: January 10, 2017

Contact: Mr. Miles van Noordennen

Project: Groundwater Monitoring, LACBWR, La Crosse, WI

Client Sample ID: MW-204A-120716

Project: HAAL00301

Sample ID: 412372014

Client ID: HAAL003

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Surrogate/Tracer Recovery	Test							Batch ID	Recovery%	Acceptable Limits				

Notes:

The MDC is a sample specific MDC.

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor

Mtd.: Method

DL: Detection Limit

PF: Prep Factor

Lc/LC: Critical Level

RL: Reporting Limit

MDA: Minimum Detectable Activity

TPU: Total Propagated Uncertainty

MDC: Minimum Detectable Concentration

Quality Control Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Client : Haley & Aldrich, Inc.
100 Corporate Place, Suite 105

Report Date: January 10, 2017
Page 1 of 4

Contact: Rocky Hill, Connecticut
Mr. Miles van Noordennen
Workorder: 412372

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	1624165										
QC1203690079	412372001	DUP									
Cesium-137	U	-0.727	U	0.186	pCi/L	0		N/A	MXR1	12/21/16	11:55
	Uncert:	+/-1.92		+/-1.92							
	TPU:	+/-1.95		+/-1.92							
Cobalt-60	U	-1.72	U	-0.106	pCi/L	0		N/A			
	Uncert:	+/-2.03		+/-1.62							
	TPU:	+/-2.18		+/-1.62							
QC1203690080	LCS										
Americium-241	34400			40600	pCi/L		118	(75%-125%)	MXR1	12/21/16	10:51
	Uncert:			+/-2060							
	TPU:			+/-3900							
Cesium-137	13300			13500	pCi/L		102	(75%-125%)			
	Uncert:			+/-341							
	TPU:			+/-1150							
Cobalt-60	12700			13200	pCi/L		104	(75%-125%)			
	Uncert:			+/-392							
	TPU:			+/-1150							
QC1203690078	MB										
Cesium-137			U	-2.25	pCi/L				MXR1	12/21/16	11:54
	Uncert:			+/-2.44							
	TPU:			+/-2.64							
Cobalt-60			U	0.910	pCi/L						
	Uncert:			+/-2.20							
	TPU:			+/-2.24							
Rad Gas Flow											
Batch	1625914										
QC1203694693	412372003	DUP									
Strontium-90	U	0.870	U	-0.147	pCi/L	0		N/A	BXF1	01/05/17	16:26
	Uncert:	+/-0.797		+/-0.764							
	TPU:	+/-0.829		+/-0.764							
QC1203694694	LCS										
Strontium-90	73.7			79.1	pCi/L		107	(90%-110%)	BXF1	01/05/17	16:26
	Uncert:			+/-4.62							
	TPU:			+/-21.7							
QC1203694692	MB										
Strontium-90			U	-0.342	pCi/L				BXF1	01/05/17	16:26
	Uncert:			+/-0.670							
	TPU:			+/-0.671							
Batch	1625919										
QC1203694707	412372002	DUP									
Strontium-90	U	-0.702	U	1.69	pCi/L	0		N/A	BXF1	01/09/17	18:06

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QC Summary

Workorder: 412372

Page 2 of 4

Parmname		NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time	
Rad Gas Flow													
Batch	1625919												
		Uncert:	+/-0.482		+/-1.22								
		TPU:	+/-0.482		+/-1.25								
QC1203694708	LCS												
Strontium-90		73.7			69.8	pCi/L		94.8	(75%-125%)	BXF1	01/06/17	11:27	
		Uncert:			+/-3.45								
		TPU:			+/-12.4								
QC1203694706	MB												
Strontium-90				U	1.02	pCi/L				BXF1	01/06/17	11:11	
		Uncert:			+/-0.806								
		TPU:			+/-0.822								
Rad Liquid Scintillation													
Batch	1625595												
QC1203693749	412854004	DUP											
Tritium		U	-54.3	U	-12.2	pCi/L	0			N/A	KXA1	12/28/16	22:35
		Uncert:	+/-85.5		+/-90.6								
		TPU:	+/-85.5		+/-90.6								
QC1203693752	LCS												
Tritium		2260			2270	pCi/L		100	(90%-110%)	KXA1	12/29/16	11:28	
		Uncert:			+/-396								
		TPU:			+/-565								
QC1203693748	MB												
Tritium				U	-58.6	pCi/L				KXA1	12/28/16	21:32	
		Uncert:			+/-87.5								
		TPU:			+/-87.5								
QC1203693750	412854004	MS											
Tritium		2270	U	-54.3	1850	pCi/L		81.4	(80%-120%)	KXA1	12/29/16	07:39	
		Uncert:		+/-85.5	+/-372								
		TPU:		+/-85.5	+/-496								
QC1203693751	412854004	MSD											
Tritium		2270	U	-54.3	2080	pCi/L	12.1	91.8	(0%-20%)	KXA1	12/29/16	07:57	
		Uncert:		+/-85.5	+/-402								
		TPU:		+/-85.5	+/-547								
Batch	1625619												
QC1203693830	412372002	DUP											
Nickel-63		U	3.05	U	-11.5	pCi/L	0			N/AMYM1	12/23/16	07:33	
		Uncert:	+/-24.3		+/-23.9								
		TPU:	+/-24.3		+/-23.9								
QC1203693831	LCS												
Nickel-63		1080			1010	pCi/L		93.7	(75%-125%)	MYM1	12/23/16	07:49	
		Uncert:			+/-55.3								
		TPU:			+/-164								
QC1203693829	MB												
Nickel-63				U	-13.2	pCi/L				MYM1	12/23/16	07:17	
		Uncert:			+/-22.7								
		TPU:			+/-22.7								

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QC Summary

Workorder: 412372

Page 3 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD %	REC %	Range	Anlst	Date	Time
Rad Liquid Scintillation											
Batch	1625629										
QC1203693864	412372002	DUP									
Tritium		U	-322	U	-156	pCi/L	0		N/A	TXP3	01/03/1714:30
		Uncert:	+/-318		+/-304						
		TPU:	+/-318		+/-304						
QC1203693866	LCS										
Tritium	2260				1790	pCi/L	79	(75%-125%)	TXP3		01/03/1713:40
		Uncert:			+/-433						
		TPU:			+/-554						
QC1203693863	MB										
Tritium			U	-359	pCi/L				TXP3		01/02/1716:49
		Uncert:		+/-321							
		TPU:		+/-321							
QC1203693865	412372002	MS									
Tritium	2270	U	-322		2310	pCi/L	102	(75%-125%)	TXP3		01/04/1707:08
		Uncert:	+/-318		+/-461						
		TPU:	+/-318		+/-642						

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- ** Analyte is a Tracer compound
- < Result is less than value reported
- > Result is greater than value reported
- BD Results are either below the MDC or tracer recovery is low
- FA Failed analysis.
- H Analytical holding time was exceeded
- J Value is estimated
- K Analyte present. Reported value may be biased high. Actual value is expected to be lower.
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher.
- M M if above MDC and less than LLD
- M REMP Result > MDC/CL and < RDL
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative
- ND Analyte concentration is not detected above the detection limit
- NJ Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Q One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
- R Sample results are rejected
- U Analyte was analyzed for but not detected above the Lc
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification
- UJ Gamma Spectroscopy--Uncertain identification
- UL Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Other specific qualifiers were required to properly define the results. Consult case narrative.

GEL LABORATORIES LLC

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QC Summary

Workorder: 412372

Page 4 of 4

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

^ RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.

h Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

** Indicates analyte is a surrogate/tracer compound.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gamma Spectroscopy

Raw Data

04-Jan-2017

Batch# 1624165 Product: GAMMA/HAAL Date: 1/4/17

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.	NA		
Samples have been blank corrected (if required). Blank correction reported included (if required).	NA		
If activity less than 10x MDA/MDC, error is less than or equal to 150% of sample activity. If greater than 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5* MDA/ MDC, then RPD is 100% or less, If greater 5* MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).	NA		
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.	NA		
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.	NA		
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stasured.	✓		
MS, LC5, and Duplicate RPD/RER values uploaded to LIMS and values verified	✓		
Hit notification complete (if necessary)	NA		
Batch entered into Case Narrative.	✓		
Batch Data Exception Reports (DER) completed, if applicable.	NA		
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.	NA		
Aliquot Correction completed if required.	NA		
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	NA		

Primary Review Performed By: [Signature] 1/4/17

Secondary Review Performed By: [Signature] 1/5/17

1/10

Gamma Spec Queue Sheet

12/13/2016

Batch #: 1624165 Analyst: ~~MMH~~ ^{WJL} First Client Due Date: 01/06/2017 Internal Due Date: 01/06/2017
 Gamma LCS Isotope: Mixed Gamma LCS Code: ~~1604~~ ^{WJL} Expiration Date: 4/1/38 Vol: 1.0 mL
 Initials: MS Prep Date: 12/14/16 Library: LIQUID Balance ID: N39164

Sample ID	Client Description / Container ID	Type	Hazard Code	Client	Matrix	Collect Date	Geometry	Wet/Dry Aliquot (1 g / F)	Detector	Sealing Date/Time (if Applicable)
412372001-1	B11AR-120616	SAMPLE	HAAL003	GROUND WATER	06-DEC-16 16:21:00	W5	24MB	2.0	24	12/22/16
412372002-1	B11R-120616	SAMPLE	HAAL003	GROUND WATER	06-DEC-16 16:46:00	W5		2.0	33	
412372003-1	Well 5-120716	SAMPLE	HAAL003	DRINKING WATER	07-DEC-16 07:59:00	W5		2.0	24	
412372004-1	MW-204B-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 15:17:00	W5		2.0	25	
412372005-1	MW-203B-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 10:01:00	W5		2.0	28	
412372006-1	MW-203A-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 10:00:00	W5		2.0	40	
412372007-1	MW-202B-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 11:33:00	W5		2.0	41	
412372008-1	MW-202A-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 11:30:00	W5		2.0	1	
412372009-1	MW-202A-D-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 11:30:00	W5		2.0	7	
412372010-1	MW-200A-120816	SAMPLE	HAAL003	GROUND WATER	08-DEC-16 08:16:00	W5		2.0	29	
412372011-1	MW-200B-120816	SAMPLE	HAAL003	GROUND WATER	08-DEC-16 08:09:00	W5		2.0	30	
412372012-1	MW-201A-120816	SAMPLE	HAAL003	GROUND WATER	08-DEC-16 10:16:00	W5		2.0	2	
412372013-1	MW-201B-120816	SAMPLE	HAAL003	GROUND WATER	08-DEC-16 10:11:00	W5		2.0	6	
412372014-1	MW-204A-120716	SAMPLE	HAAL003	GROUND WATER	07-DEC-16 15:09:00	W5		2.0	41	
1203690078-1	MB	MB	QC ACCOUNT	GROUND WATER	12/14/16	W5		2.0	40	
1203690079-1	DUP B11AR-120616(412372001)	DUP	QC ACCOUNT	GROUND WATER	06-DEC-16 16:21:00	W5		2.0	30	
1203690080-1	LCS	LCS	QC ACCOUNT	GROUND WATER	12/14/16	W5		2.0	40	12/14/16

GEL Laboratories LLC, Radiochemistry Division

Data Reviewed By: WJL 12/14/17 Page 1 of 1

VAX/VMS Nuclide Identification Report Generated 20-DEC-2016 17:57:32.89

```
*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372001.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM24.CNF;342
Background date    : 18-DEC-2016 13:12:26
Sample date       : 6-DEC-2016 16:21:00. Acquisition date : 20-DEC-2016 15:57:00
Sample ID        : G412372001. Sample quantity : 2.00000E+00 LITER
Detector name     : GAM24. Detector geometry: 2LMB
Elapsed live time : 0 02:00:00.00. Elapsed real time: 0 02:00:05.15 0.1%
Energy tolerance  : 1.50000 keV. Analyst Initials : MXR1
Abundance limit   : 75.00000. Sensitivity : 3.00000
Batch ID          : 1624165. Detector SN# :
Matrix Spike ID   : LCS ID : 1604
*****
```

BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	43.77*	17	67	1.18	87.59	84	13	2.33E-03	89.2	1.07E+00
2	2	46.27*	17	69	1.19	92.59	84	13	2.31E-03	97.1	
3	0	53.88*	6	116	1.17	107.82	106	7	8.17E-04	325.3	
4	0	62.88*	37	141	1.02	125.82	122	8	5.17E-03	62.3	
5	0	65.83*	31	114	0.99	131.72	130	6	4.30E-03	60.0	
6	0	74.84*	82	243	1.32	149.74	143	14	1.14E-02	42.7	
7	3	137.45	27	51	1.14	275.00	274	12	3.72E-03	36.3	5.66E+00
8	3	140.08*	19	150	1.52	280.24	274	12	2.63E-03	124.8	
9	0	143.61*	14	111	1.10	287.31	285	8	1.91E-03	145.0	
10	0	198.15*	47	129	1.89	396.42	390	12	6.52E-03	52.2	
11	0	246.73	11	73	2.95	493.61	488	9	1.58E-03	137.7	
12	0	295.45*	39	77	1.43	591.07	588	12	5.38E-03	49.7	
13	0	351.88*	38	35	0.79	703.96	700	9	5.34E-03	37.6	
14	0	609.01*	51	48	1.27	1218.41	1211	14	7.02E-03	34.9	
15	0	616.37	17	11	2.97	1233.12	1229	11	2.36E-03	44.9	
16	0	673.96	7	12	1.44	1348.35	1344	7	9.80E-04	90.2	
17	0	727.63	33	7	1.57	1455.74	1449	13	4.51E-03	23.9	
18	0	747.11	7	12	0.77	1494.71	1490	7	9.83E-04	89.8	
19	0	758.79	11	11	0.79	1518.07	1511	9	1.51E-03	63.3	
20	0	836.78	16	7	1.34	1674.12	1669	11	2.29E-03	41.0	
21	0	905.68	12	5	1.37	1812.00	1808	7	1.69E-03	42.1	
22	0	911.48*	7	6	2.14	1823.59	1818	11	9.60E-04	105.7	
23	0	993.26	7	7	0.75	1987.24	1980	10	9.28E-04	85.7	
24	0	1116.12	8	11	0.53	2233.09	2225	11	1.17E-03	83.1	
25	0	1120.60*	9	7	2.11	2242.05	2237	9	1.31E-03	72.0	
26	0	1182.35	11	2	0.94	2365.61	2361	8	1.56E-03	36.7	
27	0	1188.29	8	0	1.19	2377.50	2373	8	1.11E-03	35.4	
28	0	1238.78	13	8	1.60	2478.54	2474	8	1.85E-03	45.6	
29	0	1384.81	10	8	0.89	2770.78	2765	10	1.32E-03	62.9	
30	0	1396.87	8	2	3.45	2794.92	2789	10	1.07E-03	52.4	
31	0	1464.05	10	2	1.07	2929.35	2926	7	1.45E-03	37.1	
32	0	1523.47	8	8	0.60	3048.28	3041	11	1.07E-03	80.6	
33	0	1730.32	9	3	1.93	3462.27	3454	11	1.22E-03	50.5	
34	0	1754.99	8	4	1.61	3511.65	3506	9	1.08E-03	60.7	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 20-DEC-2016 17:57:34

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372001.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 6-DEC-2016 16:21:00	Acquisition date	: 20-DEC-2016 15:57:00
Sample ID	: G412372001	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA24	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:05.15 0.1%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Linear	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
ZN-65	1115.54	8	50.60*	8.722E-01	3.592E+00	3.738E+00	166.15
PB-210	46.54	17	4.25*	8.106E-01	9.042E+01	9.053E+01	194.27
PO-210	46.54	17	4.25*	8.106E-01	9.042E+01	9.053E+01	194.27
BI-211	72.87	-----	1.23	2.273E+00	-----	Line Not Found	-----
	351.06	38	12.92*	1.938E+00	2.881E+01	2.884E+01	75.24
BI-214	609.32	51	45.49*	1.323E+00	1.576E+01	1.576E+01	69.76
	1120.29	9	14.92	8.697E-01	1.361E+01	1.361E+01	144.05
	1764.49	-----	15.30	6.129E-01	-----	Line Not Found	-----
TH-232	63.81	37	0.26*	1.838E+00	1.462E+03	1.462E+03	124.68
	140.88	19	0.02	3.127E+00	5.691E+03	5.691E+03	249.51
U-234	53.20	6	0.12*	1.338E+00	6.876E+02	6.876E+02	650.56
	120.90	-----	0.04	3.131E+00	-----	Line Not Found	-----
AM-243	43.53	17	5.90	6.188E-01	8.635E+01	8.635E+01	178.44
	74.66	82	67.20*	2.346E+00	9.745E+00	9.745E+00	85.44

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372001.CNF;1
Acquisition date : 20-DEC-2016 15:57:00 Sensitivity : 3.000
Detector ID : GAM24 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:05.15 Half life ratio : *****
Sample date : 6-DEC-2016 16:21:00 Analyst initials: MXR1
Sample ID : G412372001 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 13-JUN-2016 09:24:52 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
ZN-65	3.738E+00	6.087E+00	6.770E+00
PB-210	9.053E+01	1.724E+02	1.876E+02
PO-210	9.053E+01	1.724E+02	1.876E+02
BI-211	2.884E+01	2.127E+01	1.761E+01
BI-214	1.576E+01	1.077E+01	7.772E+00
TH-232	1.462E+03	1.786E+03	1.732E+03
U-234	6.876E+02	4.384E+03	5.126E+03
AM-243	9.745E+00	8.160E+00	5.414E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	2.883E+00	2.111E+01	3.616E+01	NOT IDENT.
NA-22	2.579E+00	1.899E+00	4.760E+00	NOT IDENT.
NA-24	0.000E+00	9.787E+06	0.000E+00	SHORT HLIF
AL-26	-9.314E-01	1.962E+00	3.542E+00	NOT IDENT.
K-40	-9.524E+00	2.876E+01	5.154E+01	NOT IDENT.
SC-46	-1.224E+00	2.338E+00	3.938E+00	FAIL ABUN
V-48	-4.604E-01	2.463E+00	5.035E+00	NOT IDENT.
CR-51	6.582E-01	2.225E+01	4.203E+01	NOT IDENT.
MN-52	-1.302E-01	9.017E+00	1.910E+01	NOT IDENT.
MN-54	9.576E-01	2.029E+00	3.805E+00	NOT IDENT.
CO-56	1.677E-01	1.874E+00	3.656E+00	FAIL ABUN
CO-57	-1.763E+00	1.912E+00	3.072E+00	FAIL ABUN
CO-58	-8.308E-01	2.181E+00	3.819E+00	NOT IDENT.
FE-59	1.058E+00	3.701E+00	8.010E+00	NOT IDENT.
CO-60	-1.718E+00	2.032E+00	3.373E+00	NOT IDENT.
CU-67	-3.060E+02	1.799E+02	2.680E+02	NOT IDENT.
GE-68	-1.176E+01	6.518E+01	1.266E+02	NOT IDENT.
AS-74	5.526E+00	6.190E+00	1.256E+01	NOT IDENT.
SE-75	-8.851E-01	2.330E+00	4.294E+00	FAIL ABUN
BR-77	-1.985E+02	4.753E+02	8.244E+02	NOT IDENT.
SR-82	5.905E+00	1.857E+01	3.654E+01	NOT IDENT.
RB-83	-1.385E+00	4.179E+00	7.530E+00	NOT IDENT.

RB-84	-5.397E-01	3.688E+00	6.755E+00	NOT IDENT.
KR-85	-1.851E+03	6.895E+02	9.491E+02	NOT IDENT.
SR-85	-9.608E+00	3.579E+00	4.927E+00	NOT IDENT.
RB-86	-2.639E+01	4.123E+01	7.358E+01	NOT IDENT.
Y-88	-1.592E+00	2.486E+00	4.203E+00	NOT IDENT.
Y-91	3.482E+02	1.086E+03	2.230E+03	NOT IDENT.
NB-94	1.608E-01	1.619E+00	3.144E+00	NOT IDENT.
NB-95	8.708E-01	2.573E+00	4.958E+00	NOT IDENT.
NB-95M	-3.689E+00	6.824E+00	1.235E+01	NOT IDENT.
ZR-95	2.782E+00	3.215E+00	7.185E+00	NOT IDENT.
MO-99	-1.646E+02	5.337E+02	9.503E+02	FAIL ABUN
TC-99M	0.000E+00	2.117E+17	0.000E+00	SHORT HLIF
RH-101	6.654E-01	2.163E+00	3.857E+00	FAIL ABUN
RH-102M	-1.234E+00	1.685E+00	2.878E+00	NOT IDENT.
RU-103	1.878E-02	2.381E+00	4.485E+00	FAIL ABUN
RH-106	-6.893E+00	1.735E+01	2.697E+01	NOT IDENT.
RU-106	-6.893E+00	1.735E+01	2.697E+01	NOT IDENT.
AG-108M	9.704E-01	1.697E+00	3.430E+00	NOT IDENT.
CD-109	-1.123E+01	5.143E+01	8.528E+01	NOT IDENT.
AG-110M	-1.302E+00	3.311E+00	5.693E+00	FAIL ABUN
SN-113	-6.432E-01	2.473E+00	4.555E+00	NOT IDENT.
IN-114M	-2.688E+00	1.131E+01	1.902E+01	NOT IDENT.
CD-115	1.471E+02	4.073E+02	8.244E+02	NOT IDENT.
SN-117M	2.129E+00	3.388E+00	6.178E+00	NOT IDENT.
I-123	0.000E+00	8.093E+07	0.000E+00	SHORT HLIF
TE-123M	5.439E-01	1.884E+00	3.334E+00	NOT IDENT.
SB-124	-1.639E+00	4.636E+00	8.766E+00	NOT IDENT.
SB-125	-1.807E+00	5.062E+00	9.193E+00	NOT IDENT.
TE-125M	1.966E+02	6.873E+02	1.225E+03	NOT IDENT.
I-126	3.355E+00	1.181E+01	2.307E+01	NOT IDENT.
SB-126	1.761E-01	6.658E+00	1.277E+01	NOT IDENT.
SN-126	-2.204E+00	5.090E+00	8.302E+00	FAIL ABUN
SB-127	-8.357E+00	5.946E+01	1.097E+02	NOT IDENT.
TE-129	-9.780E+00	2.351E+01	4.253E+01	NOT IDENT.
I-131	-4.459E+00	5.985E+00	1.040E+01	NOT IDENT.
I-132	0.000E+00	8.499E+40	0.000E+00	SHORT HLIF
TE-132	-1.752E+01	3.550E+01	5.755E+01	NOT IDENT.
BA-133	-2.572E+00	2.723E+00	3.972E+00	NOT IDENT.
I-133	0.000E+00	1.306E+05	0.000E+00	SHORT HLIF
CS-134	5.323E-01	2.021E+00	4.027E+00	NOT IDENT.
CS-135	1.674E-01	8.736E+00	1.660E+01	NOT IDENT.
I-135	0.000E+00	1.675E+16	0.000E+00	SHORT HLIF
CS-136	-2.054E+00	3.849E+00	7.165E+00	NOT IDENT.
BA-137M	-6.882E-01	1.816E+00	3.236E+00	NOT IDENT.
CS-137	-7.270E-01	1.919E+00	3.418E+00	NOT IDENT.
CE-139	1.231E+00	1.906E+00	3.484E+00	NOT IDENT.
BA-140	-1.455E+01	1.446E+01	2.327E+01	NOT IDENT.
LA-140	-4.742E-01	3.403E+00	7.096E+00	NOT IDENT.
CE-141	1.120E+00	3.940E+00	6.539E+00	NOT IDENT.
CE-143	0.000E+00	4.297E+03	0.000E+00	SHORT HLIF
CE-144	6.015E+00	1.374E+01	2.468E+01	NOT IDENT.
PM-144	1.252E-01	1.580E+00	3.082E+00	NOT IDENT.
PR-144	9.845E+00	1.183E+02	2.309E+02	NOT IDENT.
PM-146	1.025E+00	2.508E+00	4.955E+00	FAIL ABUN
ND-147	8.554E+00	2.795E+01	5.565E+01	NOT IDENT.
PM-147	-5.731E+04	5.628E+04	8.968E+04	NOT IDENT.
PM-149	6.563E+01	3.523E+03	6.720E+03	NOT IDENT.
EU-152	7.223E-01	5.325E+00	1.027E+01	NOT IDENT.
GD-153	-2.127E+00	6.016E+00	9.888E+00	NOT IDENT.
EU-154	7.311E+00	5.382E+00	1.350E+01	NOT IDENT.
EU-155	1.240E+00	7.092E+00	1.261E+01	NOT IDENT.
HO-166M	-1.773E+00	3.455E+00	5.940E+00	NOT IDENT.
TM-171	1.780E+02	1.135E+03	1.393E+03	FAIL ABUN
LU-176	7.261E-01	1.534E+00	3.036E+00	NOT IDENT.
LU-177	3.978E+01	5.970E+01	1.097E+02	NOT IDENT.
HF-181	-9.642E-01	2.485E+00	4.465E+00	NOT IDENT.
W-181	2.540E+00	9.823E+00	1.676E+01	FAIL ABUN
TA-182	-2.464E+00	8.338E+00	1.584E+01	FAIL ABUN
RE-183	-9.441E-01	9.889E+00	1.626E+01	FAIL ABUN
RE-184	-5.740E-01	6.573E+00	1.091E+01	NOT IDENT.
RE-188	-2.246E+00	1.056E+01	1.792E+01	FAIL ABUN
W-188	2.910E+02	4.005E+02	8.097E+02	FAIL ABUN
OS-191	-2.967E+00	1.052E+01	1.784E+01	FAIL ABUN
IR-192	-1.049E-01	2.125E+00	3.988E+00	FAIL ABUN
HG-203	-1.487E+00	2.006E+00	3.545E+00	NOT IDENT.
BI-207	-1.036E+00	2.134E+00	3.996E+00	FAIL ABUN
TL-208	-2.712E+00	2.440E+00	3.741E+00	NOT IDENT.
PB-211	-1.486E+01	4.173E+01	7.561E+01	NOT IDENT.

BI-212	0.000E+00	3.701E+01	6.653E+01	FAIL ABUN
PB-212	-9.533E-01	4.270E+00	7.509E+00	FAIL ABUN
BI-213	-3.312E+00	6.520E+00	1.153E+01	NOT IDENT.
PB-214	1.045E+01	7.709E+00	1.219E+01	FAIL ABUN
RN-219	1.262E+01	2.493E+01	4.931E+01	NOT IDENT.
FR-221	-2.769E+00	1.171E+01	1.970E+01	NOT IDENT.
RA-223	-1.680E+01	3.994E+01	7.217E+01	FAIL ABUN
RA-224	-9.865E+00	4.129E+01	7.273E+01	NOT IDENT.
RA-226	-2.855E+01	5.602E+01	9.207E+01	NOT IDENT.
AC-227	2.281E+00	1.552E+01	2.965E+01	NOT IDENT.
TH-227	2.281E+00	1.552E+01	2.965E+01	NOT IDENT.
AC-228	5.029E+00	1.042E+01	1.814E+01	FAIL ABUN
RA-228	5.029E+00	1.042E+01	1.814E+01	FAIL ABUN
TH-228	-9.533E-01	4.270E+00	7.509E+00	FAIL ABUN
TH-229	-2.128E+01	3.673E+01	5.390E+01	NOT IDENT.
TH-230	-2.775E+02	6.793E+02	1.036E+03	NOT IDENT.
PA-231	5.890E+00	3.063E+01	5.335E+01	NOT IDENT.
TH-231	-1.252E+01	2.977E+01	4.937E+01	NOT IDENT.
PA-233	-1.362E+00	3.729E+00	6.817E+00	NOT IDENT.
PA-234	1.331E+01	1.344E+01	3.110E+01	NOT IDENT.
PA-234M	3.046E+02	2.384E+02	5.571E+02	NOT IDENT.
TH-234	1.027E+02	1.255E+02	1.508E+02	FAIL ABUN
U-235	7.566E+00	2.151E+01	2.661E+01	FAIL ABUN
NP-237	-1.362E+00	3.729E+00	6.817E+00	NOT IDENT.
NP-238	-7.670E+01	5.279E+02	1.087E+03	NOT IDENT.
U-238	1.027E+02	1.255E+02	1.508E+02	FAIL ABUN
NP-239	1.444E+01	1.834E+01	3.404E+01	NOT IDENT.
AM-241	-1.614E+00	7.754E+00	1.260E+01	NOT IDENT.
AM-242	-1.058E+01	4.358E+01	7.210E+01	NOT IDENT.
CM-243	1.551E+00	6.912E+00	1.239E+01	NOT IDENT.
BK-247	-4.079E-02	4.156E+00	7.951E+00	NOT IDENT.
CM-247	1.409E+00	2.216E+00	4.456E+00	NOT IDENT.
CF-249	6.900E-01	2.421E+00	4.697E+00	NOT IDENT.
CF-251	3.988E-02	8.766E+00	1.507E+01	NOT IDENT.
CF-252	-2.403E+03	1.138E+04	1.968E+04	NOT IDENT.
ANH-511	-1.112E+01	3.938E+00	7.290E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	2	43.77	23	67	1.18	87.59	84	13	3.26E-03	62.3	1.07E+00
2	2	46.27	45	69	1.19	92.59	84	13	6.26E-03	34.1	
3	0	53.88	16	116	1.17	107.82	106	7	2.19E-03	116.3	5.66E+00
4	0	62.88	72	141	1.02	125.82	122	8	9.95E-03	31.0	
5	0	65.83	36	114	0.99	131.72	130	6	5.05E-03	49.5	
6	0	74.84	96	243	1.32	149.74	143	14	1.33E-02	36.1	
7	0	92.64	84	186	1.02	185.35	182	9	1.17E-02	31.1	
8	3	137.45	27	51	1.14	275.00	274	12	3.72E-03	36.3	
9	3	140.08	34	150	1.52	280.24	274	12	4.69E-03	67.3	
10	0	143.61	28	111	1.10	287.31	285	8	3.86E-03	68.6	
11	0	186.17	47	130	1.05	372.45	367	10	6.48E-03	48.3	
12	0	198.15	58	129	1.89	396.42	390	12	8.04E-03	41.4	
13	0	239.25	10	94	0.72	478.64	473	8	1.37E-03	173.2	
14	0	246.73	11	73	2.95	493.61	488	9	1.58E-03	137.7	
15	0	295.45	51	77	1.43	591.07	588	12	7.11E-03	36.2	
16	0	351.88	64	35	0.79	703.96	700	9	8.95E-03	20.5	
17	0	511.40	132	76	2.24	1023.11	1015	16	1.84E-02	17.1	
18	0	609.01	66	48	1.27	1218.41	1211	14	9.11E-03	25.8	
19	0	616.37	17	11	2.97	1233.12	1229	11	2.36E-03	44.9	
20	0	673.96	7	12	1.44	1348.35	1344	7	9.80E-04	90.2	
21	0	727.63	33	7	1.57	1455.74	1449	13	4.51E-03	23.9	
22	0	747.11	7	12	0.77	1494.71	1490	7	9.83E-04	89.8	
23	0	758.79	11	11	0.79	1518.07	1511	9	1.51E-03	63.3	
24	0	836.78	16	7	1.34	1674.12	1669	11	2.29E-03	41.0	
25	0	905.68	12	5	1.37	1812.00	1808	7	1.69E-03	42.1	
26	0	911.48	20	6	2.14	1823.59	1818	11	2.71E-03	32.5	
27	0	993.26	7	7	0.75	1987.24	1980	10	9.28E-04	85.7	
28	0	1116.12	8	11	0.53	2233.09	2225	11	1.17E-03	83.1	
29	0	1120.60	17	7	2.11	2242.05	2237	9	2.40E-03	36.2	
30	0	1182.35	11	2	0.94	2365.61	2361	8	1.56E-03	36.7	
31	0	1188.29	8	0	1.19	2377.50	2373	8	1.11E-03	35.4	
32	0	1238.78	13	8	1.60	2478.54	2474	8	1.85E-03	45.6	
33	0	1384.81	10	8	0.89	2770.78	2765	10	1.32E-03	62.9	
34	0	1396.87	8	2	3.45	2794.92	2789	10	1.07E-03	52.4	
35	0	1460.89	9	6	1.52	2923.03	2919	8	1.22E-03	59.3	
36	0	1464.05	10	2	1.07	2929.35	2926	7	1.45E-03	37.1	
37	0	1523.47	8	8	0.60	3048.28	3041	11	1.07E-03	80.6	
38	0	1730.32	9	3	1.93	3462.27	3454	11	1.22E-03	50.5	
39	0	1754.99	8	4	1.61	3511.65	3506	9	1.08E-03	60.7	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
ZN-65	1115.54	8	50.60*	8.722E-01	3.592E+00	3.738E+00	166.15
PB-210	46.54	17	4.25*	8.106E-01	9.042E+01	9.053E+01	194.27
PO-210	46.54	17	4.25*	8.106E-01	9.042E+01	9.053E+01	194.27
BI-211	72.87	-----	1.23	2.273E+00	-----	Line Not Found	-----
	351.06	38	12.92*	1.938E+00	2.881E+01	2.884E+01	75.24
BI-214	609.32	51	45.49*	1.323E+00	1.576E+01	1.576E+01	69.76
	1120.29	9	14.92	8.697E-01	1.361E+01	1.361E+01	144.05
	1764.49	-----	15.30	6.129E-01	-----	Line Not Found	-----
TH-232	63.81	37	0.26*	1.838E+00	1.462E+03	1.462E+03	124.68
	140.88	19	0.02	3.127E+00	5.691E+03	5.691E+03	249.51
U-234	53.20	6	0.12*	1.338E+00	6.876E+02	6.876E+02	650.56
	120.90	-----	0.04	3.131E+00	-----	Line Not Found	-----
AM-243	43.53	17	5.90	6.188E-01	8.635E+01	8.635E+01	178.44
	74.66	82	67.20*	2.346E+00	9.745E+00	9.745E+00	85.44

Flag: "*" = Keyline

Total number of lines in spectrum 34
Number of unidentified lines 12
Number of lines tentatively identified by NID 22 64.71%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
ZN-65	244.06D	1.04	3.592E+00	3.738E+00	6.212E+00	166.15	
PB-210	22.20Y	1.00	9.042E+01	9.053E+01	17.59E+01	194.27	
PO-210	22.20Y	1.00	9.042E+01	9.053E+01	17.59E+01	194.27	
BI-211	21.77Y	1.00	2.881E+01	2.884E+01	2.170E+01	75.24	
BI-214	1600.00Y	1.00	1.576E+01	1.576E+01	1.099E+01	69.76	
TH-232	1.41E+10Y	1.00	1.462E+03	1.462E+03	1.823E+03	124.68	
U-234	2.45E+05Y	1.00	6.876E+02	6.876E+02	44.73E+02	650.56	
AM-243	7370.00Y	1.00	9.745E+00	9.745E+00	8.326E+00	85.44	
Total Activity :			2.388E+03	2.389E+03			

Grand Total Activity : 2.388E+03 2.389E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	65.83	31	114	0.99	131.72	130	6	4.30E-03	****	1.98E+00	T
3	137.45	27	51	1.14	275.00	274	12	3.72E-03	72.7	3.13E+00	T
0	143.61	14	111	1.10	287.31	285	8	1.91E-03	****	3.12E+00	T
0	198.15	47	129	1.89	396.42	390	12	6.52E-03	****	2.79E+00	T
0	246.73	11	73	2.95	493.61	488	9	1.58E-03	****	2.46E+00	
0	295.45	39	77	1.43	591.07	588	12	5.38E-03	99.3	2.19E+00	T
0	616.37	17	11	2.97	1233.12	1229	11	2.36E-03	89.8	1.31E+00	
0	673.96	7	12	1.44	1348.35	1344	7	9.80E-04	****	1.23E+00	
0	727.63	33	7	1.57	1455.74	1449	13	4.51E-03	47.7	1.17E+00	T
0	747.11	7	12	0.77	1494.71	1490	7	9.83E-04	****	1.15E+00	T
0	758.79	11	11	0.79	1518.07	1511	9	1.51E-03	****	1.14E+00	
0	836.78	16	7	1.34	1674.12	1669	11	2.29E-03	82.0	1.07E+00	T
0	905.68	12	5	1.37	1812.00	1808	7	1.69E-03	84.3	1.01E+00	
0	911.48	7	6	2.14	1823.59	1818	11	9.60E-04	****	1.00E+00	T
0	993.26	7	7	0.75	1987.24	1980	10	9.28E-04	****	9.47E-01	
0	1182.35	11	2	0.94	2365.61	2361	8	1.56E-03	73.4	8.37E-01	
0	1188.29	8	0	1.19	2377.50	2373	8	1.11E-03	70.7	8.34E-01	T
0	1238.78	13	8	1.60	2478.54	2474	8	1.85E-03	91.2	8.09E-01	T
0	1384.81	10	8	0.89	2770.78	2765	10	1.32E-03	****	7.45E-01	T
0	1396.87	8	2	3.45	2794.92	2789	10	1.07E-03	****	7.40E-01	
0	1464.05	10	2	1.07	2929.35	2926	7	1.45E-03	74.2	7.13E-01	
0	1523.47	8	8	0.60	3048.28	3041	11	1.07E-03	****	6.91E-01	
0	1730.32	9	3	1.93	3462.27	3454	11	1.22E-03	****	6.23E-01	
0	1754.99	8	4	1.61	3511.65	3506	9	1.08E-03	****	6.16E-01	

Flags: "T" = Tentatively associated

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372001.CNF;1
Acquisition date : 20-DEC-2016 15:57:00 Sensitivity : 3.000
Detector ID : GAM24 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:05.15 Half life ratio : *****
Sample date : 6-DEC-2016 16:21:00 Nuclide Library : LIQUID
Sample ID : G412372001 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 13-JUN-2016 09:24:52 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7

Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
ZN-65	2.787E+00
PB-210	8.664E+01
PO-210	8.664E+01
BI-211	7.795E+00
BI-214	3.465E+00
TH-232	8.146E+02
U-234	2.401E+03
AM-243	2.547E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.622E+01	NOT IDENT.
NA-22	2.057E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.347E+00	NOT IDENT.
K-40	2.244E+01	NOT IDENT.
SC-46	1.690E+00	FAIL ABUN
V-48	2.028E+00	NOT IDENT.
CR-51	1.927E+01	NOT IDENT.
MN-52	7.555E+00	NOT IDENT.
MN-54	1.658E+00	NOT IDENT.
CO-56	1.556E+00	FAIL ABUN
CO-57	1.439E+00	FAIL ABUN
CO-58	1.641E+00	NOT IDENT.
FE-59	3.372E+00	NOT IDENT.
CO-60	1.354E+00	NOT IDENT.
CU-67	1.262E+02	NOT IDENT.
GE-68	5.415E+01	NOT IDENT.
AS-74	5.727E+00	NOT IDENT.
SE-75	1.949E+00	FAIL ABUN
BR-77	3.862E+02	NOT IDENT.
SR-82	1.607E+01	NOT IDENT.
RB-83	3.338E+00	NOT IDENT.
RB-84	2.896E+00	NOT IDENT.

KR-85	4.349E+02	NOT IDENT.
SR-85	2.258E+00	NOT IDENT.
RB-86	3.127E+01	NOT IDENT.
Y-88	1.628E+00	NOT IDENT.
Y-91	9.757E+02	NOT IDENT.
NB-94	1.361E+00	NOT IDENT.
NB-95	2.218E+00	NOT IDENT.
NB-95M	5.707E+00	NOT IDENT.
ZR-95	3.117E+00	NOT IDENT.
MO-99	4.131E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.809E+00	FAIL ABUN
RH-102M	1.268E+00	NOT IDENT.
RU-103	2.008E+00	FAIL ABUN
RH-106	1.147E+01	NOT IDENT.
RU-106	1.147E+01	NOT IDENT.
AG-108M	1.548E+00	NOT IDENT.
CD-109	4.010E+01	NOT IDENT.
AG-110M	2.494E+00	FAIL ABUN
SN-113	2.042E+00	NOT IDENT.
IN-114M	8.815E+00	NOT IDENT.
CD-115	3.626E+02	NOT IDENT.
SN-117M	2.893E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.560E+00	NOT IDENT.
SB-124	3.396E+00	NOT IDENT.
SB-125	4.089E+00	NOT IDENT.
TE-125M	5.765E+02	NOT IDENT.
I-126	1.022E+01	NOT IDENT.
SB-126	5.506E+00	NOT IDENT.
SN-126	3.901E+00	FAIL ABUN
SB-127	4.781E+01	NOT IDENT.
TE-129	1.853E+01	NOT IDENT.
I-131	4.650E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.645E+01	NOT IDENT.
BA-133	1.773E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.741E+00	NOT IDENT.
CS-135	7.621E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	2.855E+00	NOT IDENT.
BA-137M	1.392E+00	NOT IDENT.
CS-137	1.471E+00	NOT IDENT.
CE-139	1.630E+00	NOT IDENT.
BA-140	1.009E+01	NOT IDENT.
LA-140	2.692E+00	NOT IDENT.
CE-141	3.043E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.159E+01	NOT IDENT.
PM-144	1.324E+00	NOT IDENT.
PR-144	9.922E+01	NOT IDENT.
PM-146	2.236E+00	FAIL ABUN
ND-147	2.460E+01	NOT IDENT.
PM-147	4.199E+04	NOT IDENT.
PM-149	3.064E+03	NOT IDENT.
EU-152	4.652E+00	NOT IDENT.
GD-153	4.634E+00	NOT IDENT.
EU-154	5.831E+00	NOT IDENT.
EU-155	5.910E+00	NOT IDENT.
HO-166M	2.576E+00	NOT IDENT.
TM-171	6.528E+02	FAIL ABUN
LU-176	1.391E+00	NOT IDENT.
LU-177	5.098E+01	NOT IDENT.
HF-181	1.978E+00	NOT IDENT.
W-181	7.831E+00	FAIL ABUN
TA-182	6.667E+00	FAIL ABUN
RE-183	7.596E+00	FAIL ABUN
RE-184	4.590E+00	NOT IDENT.
RE-188	8.356E+00	FAIL ABUN
W-188	3.722E+02	FAIL ABUN
OS-191	8.353E+00	FAIL ABUN
IR-192	1.827E+00	FAIL ABUN
HG-203	1.604E+00	NOT IDENT.
BI-207	1.621E+00	FAIL ABUN
TL-208	1.649E+00	NOT IDENT.
PB-211	3.399E+01	NOT IDENT.
BI-212	2.998E+01	FAIL ABUN

PB-212	3.521E+00	FAIL ABUN
BI-213	5.175E+00	NOT IDENT.
PB-214	5.729E+00	FAIL ABUN
RN-219	2.249E+01	NOT IDENT.
FR-221	9.013E+00	NOT IDENT.
RA-223	3.300E+01	FAIL ABUN
RA-224	3.386E+01	NOT IDENT.
RA-226	4.359E+01	NOT IDENT.
AC-227	1.372E+01	NOT IDENT.
TH-227	1.372E+01	NOT IDENT.
AC-228	8.088E+00	FAIL ABUN
RA-228	8.088E+00	FAIL ABUN
TH-228	3.521E+00	FAIL ABUN
TH-229	2.492E+01	NOT IDENT.
TH-230	4.857E+02	NOT IDENT.
PA-231	2.449E+01	NOT IDENT.
TH-231	2.324E+01	NOT IDENT.
PA-233	3.097E+00	NOT IDENT.
PA-234	1.340E+01	NOT IDENT.
PA-234M	2.465E+02	NOT IDENT.
TH-234	7.175E+01	FAIL ABUN
U-235	1.257E+01	FAIL ABUN
NP-237	3.097E+00	NOT IDENT.
NP-238	4.398E+02	NOT IDENT.
U-238	7.175E+01	FAIL ABUN
NP-239	1.600E+01	NOT IDENT.
AM-241	5.878E+00	NOT IDENT.
AM-242	3.368E+01	NOT IDENT.
CM-243	5.792E+00	NOT IDENT.
BK-247	3.617E+00	NOT IDENT.
CM-247	2.029E+00	NOT IDENT.
CF-249	2.137E+00	NOT IDENT.
CF-251	7.036E+00	NOT IDENT.
CF-252	9.181E+03	NOT IDENT.
ANH-511	3.477E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372001.CNF;1
Acquisition date : 20-DEC-2016 15:57:00 Sensitivity : 3.000
Detector ID : GAM24 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:05.15 Half life ratio : *****
Sample date : 6-DEC-2016 16:21:00 Nuclide Library : LIQUID
Sample ID : G412372001 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 13-JUN-2016 09:24:52 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
ZN-65	3.738E+00	6.089E+00	6.089E+00
PB-210	9.053E+01	1.726E+02	1.726E+02
PO-210	9.053E+01	1.726E+02	1.726E+02
BI-211	2.884E+01	2.130E+01	2.130E+01
BI-214	1.576E+01	1.080E+01	1.080E+01
TH-232	1.462E+03	1.795E+03	1.795E+03
U-234	6.876E+02	4.384E+03	4.384E+03
AM-243	9.745E+00	8.182E+00	8.182E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	2.883E+00	2.111E+01	2.115E+01	NOT IDENT.
NA-22	2.579E+00	1.901E+00	2.228E+00	NOT IDENT.
NA-24	3.864E+06	9.788E+06	9.942E+06	SHORT HLIF
AL-26	-9.314E-01	1.963E+00	2.008E+00	NOT IDENT.
K-40	-9.524E+00	2.876E+01	2.908E+01	NOT IDENT.
SC-46	-1.224E+00	2.338E+00	2.402E+00	FAIL ABUN
V-48	-4.604E-01	2.464E+00	2.472E+00	NOT IDENT.
CR-51	6.582E-01	2.225E+01	2.225E+01	NOT IDENT.
MN-52	-1.302E-01	9.017E+00	9.017E+00	NOT IDENT.
MN-54	9.576E-01	2.030E+00	2.075E+00	NOT IDENT.
CO-56	1.677E-01	1.874E+00	1.876E+00	FAIL ABUN
CO-57	-1.763E+00	1.914E+00	2.072E+00	FAIL ABUN
CO-58	-8.308E-01	2.181E+00	2.213E+00	NOT IDENT.
FE-59	1.058E+00	3.702E+00	3.733E+00	NOT IDENT.
CO-60	-1.718E+00	2.033E+00	2.176E+00	NOT IDENT.
CU-67	-3.060E+02	1.805E+02	2.272E+02	NOT IDENT.
GE-68	-1.176E+01	6.518E+01	6.540E+01	NOT IDENT.
AS-74	5.526E+00	6.205E+00	6.686E+00	NOT IDENT.
SE-75	-8.851E-01	2.331E+00	2.365E+00	FAIL ABUN
BR-77	-1.985E+02	4.754E+02	4.837E+02	NOT IDENT.
SR-82	5.905E+00	1.857E+01	1.876E+01	NOT IDENT.
RB-83	-1.385E+00	4.183E+00	4.229E+00	NOT IDENT.

RB-84	-5.397E-01	3.689E+00	3.697E+00	NOT IDENT.
KR-85	-1.851E+03	6.936E+02	1.085E+03	NOT IDENT.
SR-85	-9.608E+00	3.600E+00	5.632E+00	NOT IDENT.
RB-86	-2.639E+01	4.124E+01	4.292E+01	NOT IDENT.
Y-88	-1.592E+00	2.488E+00	2.590E+00	NOT IDENT.
Y-91	3.482E+02	1.086E+03	1.098E+03	NOT IDENT.
NB-94	1.608E-01	1.619E+00	1.621E+00	NOT IDENT.
NB-95	8.708E-01	2.574E+00	2.604E+00	NOT IDENT.
NB-95M	-3.689E+00	6.831E+00	7.030E+00	NOT IDENT.
ZR-95	2.782E+00	3.217E+00	3.453E+00	NOT IDENT.
MO-99	-1.646E+02	5.338E+02	5.389E+02	FAIL ABUN
TC-99M	8.656E+16	2.118E+17	0.000E+00	SHORT HLIF
RH-101	6.654E-01	2.167E+00	2.187E+00	FAIL ABUN
RH-102M	-1.234E+00	1.689E+00	1.778E+00	NOT IDENT.
RU-103	1.878E-02	2.381E+00	2.381E+00	FAIL ABUN
RH-106	-6.893E+00	1.735E+01	1.763E+01	NOT IDENT.
RU-106	-6.893E+00	1.735E+01	1.763E+01	NOT IDENT.
AG-108M	9.704E-01	1.698E+00	1.753E+00	NOT IDENT.
CD-109	-1.123E+01	5.143E+01	5.168E+01	NOT IDENT.
AG-110M	-1.302E+00	3.311E+00	3.363E+00	FAIL ABUN
SN-113	-6.432E-01	2.473E+00	2.490E+00	NOT IDENT.
IN-114M	-2.688E+00	1.131E+01	1.138E+01	NOT IDENT.
CD-115	1.471E+02	4.074E+02	4.127E+02	NOT IDENT.
SN-117M	2.129E+00	3.389E+00	3.523E+00	NOT IDENT.
I-123	2.437E+07	8.093E+07	8.168E+07	SHORT HLIF
TE-123M	5.439E-01	1.884E+00	1.900E+00	NOT IDENT.
SB-124	-1.639E+00	4.637E+00	4.695E+00	NOT IDENT.
SB-125	-1.807E+00	5.063E+00	5.128E+00	NOT IDENT.
TE-125M	1.966E+02	6.874E+02	6.931E+02	NOT IDENT.
I-126	3.355E+00	1.181E+01	1.191E+01	NOT IDENT.
SB-126	1.761E-01	6.658E+00	6.658E+00	NOT IDENT.
SN-126	-2.204E+00	5.092E+00	5.188E+00	FAIL ABUN
SB-127	-8.357E+00	5.946E+01	5.958E+01	NOT IDENT.
TE-129	-9.780E+00	2.356E+01	2.397E+01	NOT IDENT.
I-131	-4.459E+00	5.988E+00	6.317E+00	NOT IDENT.
I-132	1.000E+41	1.213E+41	0.000E+00	SHORT HLIF
TE-132	-1.752E+01	3.553E+01	3.640E+01	NOT IDENT.
BA-133	-2.572E+00	2.725E+00	2.962E+00	NOT IDENT.
I-133	-8.201E+04	1.309E+05	1.361E+05	SHORT HLIF
CS-134	5.323E-01	2.021E+00	2.035E+00	NOT IDENT.
CS-135	1.674E-01	8.736E+00	8.737E+00	NOT IDENT.
I-135	1.438E+15	1.676E+16	0.000E+00	SHORT HLIF
CS-136	-2.054E+00	3.853E+00	3.963E+00	NOT IDENT.
BA-137M	-6.882E-01	1.817E+00	1.843E+00	NOT IDENT.
CS-137	-7.270E-01	1.919E+00	1.947E+00	NOT IDENT.
CE-139	1.231E+00	1.922E+00	2.001E+00	NOT IDENT.
BA-140	-1.455E+01	1.447E+01	1.589E+01	NOT IDENT.
LA-140	-4.742E-01	3.403E+00	3.410E+00	NOT IDENT.
CE-141	1.120E+00	3.941E+00	3.973E+00	NOT IDENT.
CE-143	1.896E+02	4.297E+03	4.298E+03	SHORT HLIF
CE-144	6.015E+00	1.374E+01	1.401E+01	NOT IDENT.
PM-144	1.252E-01	1.580E+00	1.581E+00	NOT IDENT.
PR-144	9.845E+00	1.183E+02	1.184E+02	NOT IDENT.
PM-146	1.025E+00	2.509E+00	2.552E+00	FAIL ABUN
ND-147	8.554E+00	2.795E+01	2.821E+01	NOT IDENT.
PM-147	-5.731E+04	5.634E+04	6.198E+04	NOT IDENT.
PM-149	6.563E+01	3.523E+03	3.523E+03	NOT IDENT.
EU-152	7.223E-01	5.325E+00	5.335E+00	NOT IDENT.
GD-153	-2.127E+00	6.018E+00	6.093E+00	NOT IDENT.
EU-154	7.311E+00	5.390E+00	6.318E+00	NOT IDENT.
EU-155	1.240E+00	7.093E+00	7.115E+00	NOT IDENT.
HO-166M	-1.773E+00	3.456E+00	3.547E+00	NOT IDENT.
TM-171	1.780E+02	1.135E+03	1.138E+03	FAIL ABUN
LU-176	7.261E-01	1.535E+00	1.569E+00	NOT IDENT.
LU-177	3.978E+01	5.973E+01	6.237E+01	NOT IDENT.
HF-181	-9.642E-01	2.485E+00	2.523E+00	NOT IDENT.
W-181	2.540E+00	9.845E+00	9.911E+00	FAIL ABUN
TA-182	-2.464E+00	8.338E+00	8.412E+00	FAIL ABUN
RE-183	-9.441E-01	9.890E+00	9.899E+00	FAIL ABUN
RE-184	-5.740E-01	6.573E+00	6.578E+00	NOT IDENT.
RE-188	-2.246E+00	1.057E+01	1.061E+01	FAIL ABUN
W-188	2.910E+02	4.018E+02	4.227E+02	FAIL ABUN
OS-191	-2.967E+00	1.052E+01	1.061E+01	FAIL ABUN
IR-192	-1.049E-01	2.125E+00	2.126E+00	FAIL ABUN
HG-203	-1.487E+00	2.007E+00	2.116E+00	NOT IDENT.
BI-207	-1.036E+00	2.134E+00	2.185E+00	FAIL ABUN
TL-208	-2.712E+00	2.443E+00	2.732E+00	NOT IDENT.
PB-211	-1.486E+01	4.173E+01	4.227E+01	NOT IDENT.

BI-212	7.915E+01	3.723E+01	5.157E+01	FAIL ABUN
PB-212	-9.533E-01	4.271E+00	4.292E+00	FAIL ABUN
BI-213	-3.312E+00	6.522E+00	6.690E+00	NOT IDENT.
PB-214	1.045E+01	7.721E+00	9.045E+00	FAIL ABUN
RN-219	1.262E+01	2.498E+01	2.562E+01	NOT IDENT.
FR-221	-2.769E+00	1.171E+01	1.178E+01	NOT IDENT.
RA-223	-1.680E+01	3.995E+01	4.066E+01	FAIL ABUN
RA-224	-9.865E+00	4.130E+01	4.153E+01	NOT IDENT.
RA-226	-2.855E+01	5.604E+01	5.749E+01	NOT IDENT.
AC-227	2.281E+00	1.553E+01	1.556E+01	NOT IDENT.
TH-227	2.281E+00	1.553E+01	1.556E+01	NOT IDENT.
AC-228	5.029E+00	1.042E+01	1.067E+01	FAIL ABUN
RA-228	5.029E+00	1.042E+01	1.067E+01	FAIL ABUN
TH-228	-9.533E-01	4.271E+00	4.292E+00	FAIL ABUN
TH-229	-2.128E+01	3.675E+01	3.798E+01	NOT IDENT.
TH-230	-2.775E+02	6.809E+02	6.923E+02	NOT IDENT.
PA-231	5.890E+00	3.066E+01	3.077E+01	NOT IDENT.
TH-231	-1.252E+01	2.981E+01	3.034E+01	NOT IDENT.
PA-233	-1.362E+00	3.730E+00	3.780E+00	NOT IDENT.
PA-234	1.331E+01	2.031E+01	2.118E+01	NOT IDENT.
PA-234M	3.046E+02	2.387E+02	2.754E+02	NOT IDENT.
TH-234	1.027E+02	1.276E+02	1.357E+02	FAIL ABUN
U-235	7.566E+00	2.151E+01	2.178E+01	FAIL ABUN
NP-237	-1.362E+00	3.730E+00	3.780E+00	NOT IDENT.
NP-238	-7.670E+01	5.279E+02	5.290E+02	NOT IDENT.
U-238	1.027E+02	1.276E+02	1.357E+02	FAIL ABUN
NP-239	1.444E+01	1.836E+01	1.948E+01	NOT IDENT.
AM-241	-1.614E+00	7.755E+00	7.789E+00	NOT IDENT.
AM-242	-1.058E+01	4.361E+01	4.387E+01	NOT IDENT.
CM-243	1.551E+00	6.913E+00	6.948E+00	NOT IDENT.
BK-247	-4.079E-02	4.156E+00	4.156E+00	NOT IDENT.
CM-247	1.409E+00	2.229E+00	2.317E+00	NOT IDENT.
CF-249	6.900E-01	2.422E+00	2.442E+00	NOT IDENT.
CF-251	3.988E-02	8.766E+00	8.766E+00	NOT IDENT.
CF-252	-2.403E+03	1.159E+04	1.164E+04	NOT IDENT.
ANH-511	-1.112E+01	3.964E+00	6.390E+00	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	48.6389	88.03	81.7919	140.88	86.8011
46.54	48.9992	88.34	78.6448	143.76	62.6478
49.72	55.2914	88.47	78.6611	144.24	62.6828
51.35	55.4976	91.11	172.9284	145.44	53.5845
52.39	72.8455	91.27	149.4827	152.32	61.3371
53.20	72.9769	92.59	77.0361	152.43	64.8167
56.28	69.4600	93.31	95.3318	153.25	57.9254
57.36	0.0000	94.56	172.7871	154.21	68.4258
57.53	61.6087	94.65	166.3715	155.04	68.4888
57.53	61.6089	94.67	166.3762	156.02	69.7256
57.98	69.7105	97.43	76.5322	158.56	58.2672
59.32	69.9054	98.43	66.9317	158.97	0.0000
59.54	69.9372	98.44	66.9327	159.00	64.1250
61.49	67.5156	99.53	65.9606	162.33	67.8670
63.00	75.8471	100.11	66.0174	162.66	70.2319
63.29	75.8907	100.20	69.2734	163.33	65.5977
63.58	75.9346	102.03	60.7779	165.86	55.2036
63.81	83.4305	103.18	64.1414	176.31	68.8679
64.28	83.5077	103.37	64.1590	176.60	72.4515
64.99	83.6241	105.31	69.7915	177.52	66.5752
65.08	83.6385	106.12	80.7901	181.07	68.0067
66.73	65.4878	106.47	78.6456	184.41	100.5536
66.98	65.5195	109.28	77.8621	184.58	74.2314
67.24	81.9397	111.00	75.8504	185.72	63.5271
67.67	82.0074	111.76	84.7340	186.21	56.3626
67.75	90.2216	112.95	63.9300	190.27	58.9935
69.67	86.4334	116.24	76.3953	193.51	64.4108
70.83	79.7453	116.30	76.4016	198.01	59.4309
72.81	83.8304	116.74	63.1517	201.83	58.4260
72.87	83.8396	117.23	64.3017	205.31	56.1720
74.66	84.1109	119.76	81.2038	208.37	44.0837
74.82	84.1350	120.54	79.0603	210.85	54.0010
74.97	84.1573	120.90	88.0101	218.12	43.2346
77.11	84.4768	121.12	99.1791	222.11	40.9066
79.69	71.2368	121.22	99.1920	227.09	51.0423
80.12	71.2897	121.78	97.0340	227.38	51.0548
80.19	79.6860	122.06	97.0699	228.16	53.5807
80.57	82.8851	123.07	77.0875	228.18	53.5820
81.00	95.5454	123.68	81.6204	235.69	60.1926
81.07	95.5565	127.23	69.6369	235.96	67.7315
83.79	84.3909	129.43	78.8408	238.63	52.7974
84.00	84.4202	131.20	74.4998	238.98	55.3276
84.21	80.2276	133.02	69.0113	240.99	66.5027
85.43	84.6198	133.52	69.0541	242.00	50.4230
86.55	83.7157	136.00	68.1281	244.70	69.4843
86.94	85.8895	136.28	68.1509	250.62	57.8844
87.09	85.9105	136.47	62.1073	252.40	44.0681
87.57	85.9772	140.51	86.7629	252.80	44.9296

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	48.4521	383.85	27.8046	631.29	19.8612
260.90	37.5386	388.16	29.7331	632.98	26.1505
264.66	38.5034	388.63	24.1650	633.25	26.1536
265.00	34.2342	391.70	28.8632	634.78	23.0295
268.22	42.0406	400.66	37.4357	635.95	23.0402
269.46	36.9269	401.81	28.0957	636.99	22.0023
271.23	45.5760	402.40	25.2944	645.85	23.1324
273.65	43.0745	404.85	31.8964	657.76	13.7342
276.40	33.6680	410.95	31.0651	661.66	16.9297
277.37	38.8751	414.70	34.9035	664.57	0.0000
277.60	33.6981	423.72	22.7534	666.33	16.9609
278.00	34.5719	427.09	24.6950	666.50	15.9015
278.43	38.0417	427.87	26.6060	667.71	0.0000
279.20	42.3885	433.94	20.9737	677.62	14.3734
279.54	46.7260	440.45	33.4840	685.70	17.0885
280.46	39.8307	453.88	23.1235	695.00	13.9336
283.69	33.8497	459.60	20.2933	696.49	11.7967
284.31	41.6797	463.37	21.3009	696.51	11.7967
285.41	44.3210	468.07	23.2935	697.00	11.7990
285.90	35.6431	473.00	21.4060	697.49	11.8012
287.50	38.2955	475.06	28.2460	702.65	12.8989
290.67	31.4048	476.78	21.4468	706.68	20.4542
293.27	0.0000	477.60	21.4557	711.68	20.4921
295.22	34.1329	477.99	20.4843	720.70	12.9858
295.96	34.1504	482.18	25.4150	721.93	0.0000
299.98	38.1997	487.02	22.5363	722.78	4.8735
300.09	38.2023	492.35	23.5781	722.91	4.8737
300.13	38.2032	497.08	24.6175	723.31	4.8745
301.36	38.2368	511.00	43.6187	724.19	13.0024
302.85	34.3170	514.00	103.2467	727.33	7.5936
304.50	36.1186	520.40	24.8942	733.00	9.7833
304.85	42.2949	520.69	21.9105	735.93	17.4115
306.78	32.6460	522.65	0.0000	739.50	18.5232
308.46	36.2178	527.90	13.9897	744.23	13.0977
311.90	38.9592	529.59	25.0020	747.24	18.0287
316.51	40.8583	529.87	0.0000	752.31	13.1357
319.41	42.7188	531.02	16.0117	753.82	9.8569
320.08	40.0671	537.26	27.0978	756.73	6.5781
321.04	42.7656	546.56	0.0000	763.94	15.3883
323.87	45.5246	552.55	26.2761	765.80	19.7981
325.23	42.8857	563.25	23.3566	766.42	16.5015
328.76	44.7764	569.33	23.4193	766.84	19.8047
333.37	35.0319	569.50	23.4211	772.60	0.0000
334.37	32.3577	569.70	17.3127	776.52	14.3521
338.28	37.8472	583.19	18.4395	777.92	11.0453
338.32	33.3423	595.83	22.6597	778.90	12.1543
340.48	48.7299	600.60	23.7375	783.70	13.2813
340.55	46.0247	602.73	20.1435	785.37	18.8255
344.28	28.9473	604.72	20.1602	792.07	11.0994
345.93	35.3160	609.32	22.7896	795.86	11.1141
351.06	19.9867	610.33	22.7985	801.95	17.8190
351.93	19.9975	614.28	21.7981	802.10	17.8203
356.01	39.6422	618.01	10.9161	810.29	8.9349
364.49	34.8117	621.93	15.6195	810.45	14.5197
366.42	28.4324	630.19	0.0000	810.76	16.7554

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	15.6645	1129.67	10.1232		
818.51	11.1991	1131.51	0.0000		
832.01	13.4995	1173.23	6.5142		
834.85	10.1342	1189.05	8.9689		
836.80	0.0000	1204.77	13.1310		
846.77	10.1737	1221.41	12.2430		
856.80	17.0117	1231.02	10.3837		
860.56	12.4900	1235.36	13.6072		
871.09	19.3685	1238.28	10.4018		
873.19	11.4006	1260.41	0.0000		
875.33	0.0000	1274.44	2.8614		
880.51	9.1416	1274.54	2.8616		
881.60	13.7173	1291.59	6.7035		
883.24	13.7246	1298.22	0.0000		
884.68	21.7399	1312.11	7.6978		
889.28	18.3340	1332.49	12.5676		
894.76	17.2174	1365.19	7.7910		
898.04	10.3411	1368.63	0.0000		
903.28	10.3579	1384.29	10.7583		
911.20	5.7684	1408.01	4.9158		
923.98	19.6895	1434.09	4.9435		
926.36	8.1134	1457.56	0.0000		
935.54	10.4604	1460.82	7.9546		
937.49	13.9556	1489.16	6.0015		
944.13	11.6528	1596.21	4.0886		
946.00	4.6637	1620.50	4.1082		
949.00	13.1282	1678.03	0.0000		
954.55	0.0000	1690.97	6.2454		
964.08	14.0664	1764.49	8.4409		
968.97	8.8040	1770.23	8.4497		
983.53	7.0732	1771.35	5.2823		
984.45	7.0750	1791.20	0.0000		
996.26	14.1982	1808.65	6.3812		
1001.03	7.1089	1836.06	8.5493		
1004.73	13.3434				
1025.87	9.8439				
1028.54	12.5380				
1037.84	11.6725				
1038.76	0.0000				
1046.59	10.8003				
1048.07	9.0039				
1050.41	7.2080				
1063.66	9.9466				
1077.00	17.2431				
1077.34	13.6148				
1083.85	10.0016				
1085.87	9.0973				
1099.25	7.3037				
1111.64	14.6553				
1112.07	16.1229				
1112.84	11.7281				
1115.54	7.3350				
1120.29	8.8131				
1120.55	11.7516				
1121.30	8.8154				

VAX/VMS Nuclide Identification Report Generated 20-DEC-2016 17:58:15.53

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372002.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM33.CNF;246
Background date    : 18-DEC-2016 13:12:58
Sample date       : 6-DEC-2016 16:46:00. Acquisition date : 20-DEC-2016 15:57:21
Sample ID        : G412372002. Sample quantity : 2.00000E+00 LITER
Detector name    : GAM33. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.86 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID  : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	47.55*	34	105	1.37	95.25	88	13	4.76E-03	66.8	1.23E+00
2	5	63.54*	5	87	1.58	127.19	123	15	6.73E-04	388.2	
3	5	66.33*	36	121	1.59	132.77	123	15	4.98E-03	64.0	
4	0	77.02*	17	115	1.47	154.12	151	7	2.35E-03	114.4	
5	0	92.73*	9	182	1.10	185.49	180	11	1.20E-03	346.8	
6	0	113.06	19	112	1.34	226.09	224	7	2.69E-03	92.9	
7	0	140.04	28	122	0.90	279.98	276	8	3.83E-03	72.3	
8	0	185.83*	41	109	1.08	371.46	367	10	5.66E-03	59.5	
9	0	198.40*	32	94	2.60	396.56	390	11	4.45E-03	64.0	
10	0	250.38	20	31	1.06	500.41	498	6	2.75E-03	50.1	
11	0	295.55*	39	70	0.97	590.65	585	12	5.37E-03	47.7	
12	0	343.65	29	54	3.61	686.76	676	13	3.97E-03	56.7	
13	0	351.96*	46	52	1.13	703.36	698	10	6.34E-03	36.0	
14	0	523.96	12	29	0.73	1047.11	1039	11	1.65E-03	88.2	
15	0	535.62	7	12	0.63	1070.42	1067	6	9.06E-04	93.2	
16	0	558.45*	42	21	1.54	1116.05	1109	15	5.89E-03	31.6	
17	0	566.55	41	14	1.86	1132.24	1124	18	5.76E-03	26.0	
18	0	598.76	23	45	1.47	1196.61	1190	15	3.19E-03	66.9	
19	0	610.10*	36	32	1.49	1219.28	1213	9	4.94E-03	35.9	
20	0	644.08	8	18	1.17	1287.20	1281	10	1.11E-03	104.6	
21	0	660.78	19	46	8.43	1320.60	1299	24	2.61E-03	99.9	
22	0	665.96	5	8	1.37	1330.96	1327	7	7.53E-04	92.7	
23	0	722.22	12	11	0.85	1443.44	1439	9	1.62E-03	59.7	
24	0	728.68	11	20	4.29	1456.34	1447	14	1.49E-03	95.2	
25	0	731.94	8	3	0.62	1462.88	1460	6	1.11E-03	49.2	
26	0	807.27	25	9	3.52	1613.48	1608	12	3.53E-03	30.7	
27	0	838.82	13	6	1.29	1676.59	1673	7	1.74E-03	44.5	
28	0	855.88	8	7	0.89	1710.69	1706	7	1.14E-03	63.4	
29	0	919.79	9	5	0.67	1838.50	1832	10	1.25E-03	57.2	
30	0	1068.71	10	3	1.85	2136.39	2133	7	1.40E-03	43.4	
31	0	1121.96*	15	7	3.48	2242.91	2234	15	2.03E-03	52.9	
32	0	1239.00*	9	0	0.62	2477.09	2473	7	1.27E-03	41.0	
33	0	1269.66	8	2	0.97	2538.45	2535	6	1.17E-03	41.4	
34	0	1310.81	10	0	1.49	2620.80	2616	9	1.39E-03	31.6	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	1408.37	17	0	0.60	2816.06	2810	13	2.36E-03	24.3	
36	0	1765.46*	18	0	3.89	3531.00	3525	12	2.53E-03	28.2	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 20-DEC-2016 17:58:17

```

Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372002.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : MXR1
Sample date       : 6-DEC-2016 16:46:00 Acquisition date : 20-DEC-2016 15:57:21
Sample ID        : G412372002 Sample quantity  : 2.0000 LITER
Sample type      : LIQUID Sample geometry   : 
Detector name    : GAMMA33 Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.86 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type  : Linear Efficiencies at : Peak Energy
Abundance limit  : 75.00
    
```

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
PB-214	351.93	BI-211	351.06

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
CU-67	91.27	7.00	1.941E+00	1.198E+01	5.191E+02	693.62	OK
	93.31	16.10	1.941E+00	5.209E+00	2.257E+02	693.62	OK
	184.58	48.70*	2.411E+00	6.515E+00	2.823E+02	118.93	OK
BA-137M	661.66	89.90*	1.068E+00	3.676E+00	3.679E+00	199.88	OK
CS-137	661.66	85.10*	1.068E+00	3.884E+00	3.887E+00	199.88	OK
PB-210	46.54	4.25*	1.545E-01	9.795E+02	9.807E+02	133.62	OK
PO-210	46.54	4.25*	1.545E-01	9.795E+02	9.807E+02	133.62	OK
BI-214	609.32	45.49*	1.127E+00	1.302E+01	1.302E+01	71.84	OK
	1120.29	14.92	7.450E-01	----- Line	Not Found	-----	Absent
	1764.49	15.30	5.285E-01	4.225E+01	4.225E+01	56.38	OK
PB-214	74.82	5.80	1.293E+00	----- Line	Not Found	-----	Absent
	77.11	9.70	1.386E+00	2.360E+01	2.360E+01	228.88	OK
	87.09	3.41	1.766E+00	----- Line	Not Found	-----	Absent
	242.00	7.25	2.114E+00	----- Line	Not Found	-----	Absent
	295.22	18.42	1.862E+00	2.115E+01	2.115E+01	95.40	OK
	351.93	35.60*	1.652E+00	1.457E+01	1.457E+01	72.07	OK
	186.21	3.59*	2.411E+00	8.838E+01	8.838E+01	118.93	OK
RA-226	67.67	0.38*	9.105E-01	1.944E+03	1.944E+03	127.92	OK
TH-230	63.81	0.26*	7.816E-01	4.477E+02	4.477E+02	776.45	OK
TH-232	140.88	0.02	2.532E+00	1.022E+04	1.022E+04	144.67	OK
TH-234	63.29	3.70*	7.816E-01	3.146E+01	3.146E+01	776.45	OK
	92.59	4.23	1.941E+00	1.982E+01	1.982E+01	693.62	OK
U-238	63.29	3.70*	7.816E-01	3.146E+01	3.146E+01	776.45	OK
	92.59	4.23	1.941E+00	1.982E+01	1.982E+01	693.62	OK

Flag: "*" = Keyline


```

*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372002.CNF;1  *
* Acquisition date   : 20-DEC-2016 15:57:21 Sensitivity      : 3.000          *
* Detector ID        : GAM33 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:00.86 Half life ratio : *****          *
* Sample date        : 6-DEC-2016 16:46:00 Analyst initials: MXR1          *
* Sample ID          : G412372002 Sample Quantity : 2.0000E+00 LITER      *
* Batch Number       : 1624165 Wet Weight : 0.00000          *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : LIQUID.NLB;10
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 8-JUN-2016 08:46:57 Eff. Geometry    : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM33_2LMB.CNF;9          *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
CU-67	2.823E+02	3.290E+02	2.531E+02
BA-137M	3.679E+00	7.207E+00	2.793E+00
CS-137	3.887E+00	7.614E+00	2.950E+00
PB-210	9.807E+02	1.284E+03	9.958E+02
PO-210	9.807E+02	1.284E+03	9.958E+02
BI-214	1.302E+01	9.164E+00	8.806E+00
PB-214	1.457E+01	1.029E+01	1.020E+01
RA-226	8.838E+01	1.030E+02	7.956E+01
TH-230	1.944E+03	2.437E+03	1.846E+03
TH-232	4.477E+02	3.407E+03	3.293E+03
TH-234	3.146E+01	2.394E+02	2.384E+02
U-238	3.146E+01	2.394E+02	2.384E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	1.177E+00	1.988E+01	3.849E+01	NOT IDENT.
NA-22	-1.589E-01	2.101E+00	4.157E+00	NOT IDENT.
NA-24	0.000E+00	9.818E+06	0.000E+00	SHORT HLIF
AL-26	1.520E+00	2.309E+00	5.547E+00	NOT IDENT.
K-40	-1.744E+00	2.611E+01	5.536E+01	NOT IDENT.
SC-46	-1.881E+00	2.587E+00	4.210E+00	FAIL ABUN
V-48	-1.820E+00	3.252E+00	5.487E+00	FAIL ABUN
CR-51	-1.267E+01	2.202E+01	3.979E+01	NOT IDENT.
MN-52	-1.516E+00	1.266E+01	2.542E+01	NOT IDENT.
MN-54	-1.683E+00	2.627E+00	3.723E+00	NOT IDENT.
CO-56	-9.342E-02	2.202E+00	4.210E+00	FAIL ABUN
CO-57	2.297E-01	2.034E+00	3.636E+00	NOT IDENT.
CO-58	7.652E-01	2.456E+00	4.543E+00	NOT IDENT.
FE-59	2.150E+00	4.247E+00	9.591E+00	NOT IDENT.
CO-60	4.359E-01	1.986E+00	4.348E+00	NOT IDENT.
ZN-65	2.547E-03	4.988E+00	8.996E+00	NOT IDENT.
GE-68	4.022E+01	4.912E+01	1.235E+02	NOT IDENT.
AS-74	8.268E+00	6.711E+00	1.366E+01	NOT IDENT.

SE-75	-9.480E-02	2.869E+00	4.993E+00	NOT IDENT.
BR-77	2.442E+02	5.480E+02	9.927E+02	NOT IDENT.
SR-82	-5.990E+00	1.978E+01	3.574E+01	NOT IDENT.
RB-83	-7.284E-01	4.431E+00	7.460E+00	NOT IDENT.
RB-84	1.621E+00	4.792E+00	9.431E+00	NOT IDENT.
KR-85	-1.719E+03	7.476E+02	1.080E+03	NOT IDENT.
SR-85	-8.920E+00	3.880E+00	5.606E+00	NOT IDENT.
RB-86	2.531E+01	2.749E+01	7.198E+01	NOT IDENT.
Y-88	-3.369E-01	2.201E+00	4.540E+00	NOT IDENT.
Y-91	-4.475E+02	8.179E+02	1.515E+03	NOT IDENT.
NB-94	2.791E-02	2.041E+00	3.893E+00	NOT IDENT.
NB-95	-1.888E+00	2.710E+00	4.781E+00	NOT IDENT.
NB-95M	-2.794E+00	7.620E+00	1.269E+01	NOT IDENT.
ZR-95	-6.951E-01	3.643E+00	6.860E+00	NOT IDENT.
MO-99	1.967E+02	5.522E+02	1.120E+03	FAIL ABUN
TC-99M	0.000E+00	2.102E+17	0.000E+00	SHORT HLIF
RH-101	3.341E-01	2.360E+00	4.235E+00	FAIL ABUN
RH-102M	1.373E-01	1.603E+00	3.168E+00	NOT IDENT.
RU-103	-3.720E-01	2.780E+00	5.183E+00	FAIL ABUN
RH-106	-3.002E+00	1.959E+01	3.662E+01	NOT IDENT.
RU-106	-3.002E+00	1.959E+01	3.662E+01	NOT IDENT.
AG-108M	-4.634E-02	1.967E+00	3.748E+00	FAIL ABUN
CD-109	4.841E+01	6.975E+01	1.232E+02	NOT IDENT.
AG-110M	-8.195E-01	3.779E+00	6.763E+00	NOT IDENT.
SN-113	-1.270E+00	2.600E+00	4.718E+00	NOT IDENT.
IN-114M	9.859E-01	1.405E+01	2.273E+01	NOT IDENT.
CD-115	2.390E+01	4.658E+02	8.754E+02	NOT IDENT.
SN-117M	9.034E-01	3.744E+00	6.717E+00	NOT IDENT.
I-123	0.000E+00	8.914E+07	0.000E+00	SHORT HLIF
TE-123M	-3.789E-02	2.123E+00	3.709E+00	NOT IDENT.
SB-124	1.831E+00	5.840E+00	1.288E+01	FAIL ABUN
SB-125	1.553E+00	6.087E+00	1.195E+01	NOT IDENT.
TE-125M	-9.170E+01	8.701E+02	1.523E+03	NOT IDENT.
I-126	6.173E+00	1.121E+01	2.381E+01	FAIL ABUN
SB-126	8.119E+00	7.129E+00	1.594E+01	FAIL ABUN
SN-126	2.284E+00	6.613E+00	1.212E+01	FAIL ABUN
SB-127	-1.097E+01	5.538E+01	1.045E+02	NOT IDENT.
TE-129	9.385E+00	3.018E+01	6.009E+01	FAIL ABUN
I-131	4.019E+00	6.426E+00	1.324E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-2.290E+01	4.235E+01	6.897E+01	FAIL ABUN
BA-133	9.852E-02	3.062E+00	5.290E+00	NOT IDENT.
I-133	0.000E+00	1.354E+05	0.000E+00	SHORT HLIF
CS-134	-8.730E-01	2.472E+00	4.138E+00	NOT IDENT.
CS-135	-1.452E+00	1.064E+01	1.813E+01	NOT IDENT.
I-135	0.000E+00	1.495E+16	0.000E+00	SHORT HLIF
CS-136	1.315E+00	5.535E+00	1.172E+01	NOT IDENT.
CE-139	-3.350E-02	2.194E+00	3.830E+00	NOT IDENT.
BA-140	4.203E+00	1.642E+01	2.987E+01	NOT IDENT.
LA-140	1.481E+00	4.547E+00	1.036E+01	NOT IDENT.
CE-141	-3.609E+00	5.275E+00	8.401E+00	NOT IDENT.
CE-143	0.000E+00	4.462E+03	0.000E+00	SHORT HLIF
CE-144	1.021E+01	1.549E+01	2.882E+01	NOT IDENT.
PM-144	-1.016E-01	2.328E+00	4.347E+00	NOT IDENT.
PR-144	-7.601E+00	1.741E+02	3.251E+02	NOT IDENT.
PM-146	-1.466E+00	2.541E+00	4.516E+00	NOT IDENT.
ND-147	-2.186E+01	3.248E+01	5.264E+01	NOT IDENT.
PM-147	3.293E+04	5.931E+04	1.101E+05	NOT IDENT.
PM-149	-6.257E+02	4.532E+03	8.518E+03	NOT IDENT.
EU-152	0.000E+00	1.337E+01	1.051E+01	FAIL ABUN
GD-153	-6.612E+00	7.616E+00	1.174E+01	NOT IDENT.
EU-154	-4.506E-01	5.958E+00	1.179E+01	FAIL ABUN
EU-155	-1.207E+01	9.787E+00	1.483E+01	NOT IDENT.
HO-166M	-1.123E+00	3.174E+00	5.768E+00	FAIL ABUN
TM-171	2.947E+03	2.493E+03	5.045E+03	FAIL ABUN
LU-176	9.208E-01	1.685E+00	3.403E+00	NOT IDENT.
LU-177	7.380E+00	6.934E+01	1.219E+02	FAIL ABUN
HF-181	2.055E+00	2.827E+00	5.878E+00	NOT IDENT.
W-181	-6.133E+00	2.379E+01	4.259E+01	FAIL ABUN
TA-182	2.316E+00	8.970E+00	1.912E+01	FAIL ABUN
RE-183	-1.956E+00	2.286E+01	4.155E+01	FAIL ABUN
RE-184	4.061E+00	9.136E+00	1.805E+01	NOT IDENT.
RE-188	1.072E+01	1.160E+01	2.208E+01	FAIL ABUN
W-188	9.860E+01	4.937E+02	8.768E+02	FAIL ABUN
OS-191	-2.701E+00	1.225E+01	2.115E+01	FAIL ABUN
IR-192	-2.092E+00	2.340E+00	4.071E+00	FAIL ABUN
HG-203	1.521E-01	2.328E+00	4.500E+00	NOT IDENT.
BI-207	8.540E-02	2.520E+00	4.979E+00	NOT IDENT.

TL-208	-1.957E+00	3.244E+00	5.579E+00	NOT IDENT.
BI-211	0.000E+00	2.838E+01	3.848E+01	FAIL ABUN
PB-211	3.202E+01	4.499E+01	9.301E+01	NOT IDENT.
BI-212	3.068E+01	5.722E+01	6.332E+01	FAIL ABUN
PB-212	1.848E+00	4.962E+00	8.933E+00	FAIL ABUN
BI-213	-7.220E+00	7.517E+00	1.223E+01	NOT IDENT.
RN-219	-7.990E+00	2.651E+01	4.892E+01	NOT IDENT.
FR-221	9.434E-01	1.573E+01	2.734E+01	NOT IDENT.
RA-223	-2.736E+01	3.887E+01	6.913E+01	NOT IDENT.
RA-224	-3.362E+01	4.957E+01	7.915E+01	NOT IDENT.
AC-227	-1.560E+01	1.921E+01	3.001E+01	NOT IDENT.
TH-227	-1.560E+01	1.921E+01	3.001E+01	NOT IDENT.
AC-228	-6.371E+00	8.593E+00	1.538E+01	NOT IDENT.
RA-228	-6.371E+00	8.593E+00	1.538E+01	NOT IDENT.
TH-228	1.848E+00	4.962E+00	8.933E+00	FAIL ABUN
TH-229	-9.733E+00	4.007E+01	6.235E+01	NOT IDENT.
PA-231	2.035E+00	3.068E+01	5.903E+01	NOT IDENT.
TH-231	-2.169E+01	4.406E+01	7.334E+01	NOT IDENT.
PA-233	-2.791E+00	4.688E+00	7.596E+00	NOT IDENT.
PA-234	-1.276E+01	1.725E+01	2.767E+01	FAIL ABUN
PA-234M	-6.390E+01	3.616E+02	6.349E+02	NOT IDENT.
U-234	6.470E+03	9.003E+03	1.753E+04	NOT IDENT.
U-235	-2.259E+00	1.815E+01	2.870E+01	FAIL ABUN
NP-237	-2.791E+00	4.688E+00	7.596E+00	NOT IDENT.
NP-238	1.715E+02	6.595E+02	1.389E+03	NOT IDENT.
NP-239	1.490E+01	2.307E+01	4.038E+01	NOT IDENT.
AM-241	-3.288E+00	1.831E+01	3.043E+01	NOT IDENT.
AM-242	1.232E+01	5.762E+01	9.852E+01	NOT IDENT.
AM-243	-6.885E-01	5.719E+00	9.367E+00	NOT IDENT.
CM-243	7.999E+00	8.562E+00	1.652E+01	NOT IDENT.
BK-247	-1.876E+00	5.498E+00	9.146E+00	NOT IDENT.
CM-247	-8.452E-01	2.415E+00	4.431E+00	NOT IDENT.
CF-249	1.511E+00	2.664E+00	5.386E+00	NOT IDENT.
CF-251	-2.625E+00	9.506E+00	1.614E+01	NOT IDENT.
CF-252	5.360E+03	1.422E+04	2.629E+04	NOT IDENT.
ANH-511	-1.265E+01	4.115E+00	7.927E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	47.55	45	105	1.37	95.25	88	13	6.25E-03	49.6	1.23E+00
2	5	63.54	51	87	1.58	127.19	123	15	7.07E-03	34.3	
3	5	66.33	46	121	1.59	132.77	123	15	6.44E-03	48.6	
4	0	77.02	27	115	1.47	154.12	151	7	3.72E-03	69.5	
5	0	92.73	156	182	1.10	185.49	180	11	2.17E-02	18.5	
6	0	113.06	19	112	1.34	226.09	224	7	2.69E-03	92.9	
7	0	140.04	28	122	0.90	279.98	276	8	3.83E-03	72.3	
8	0	185.83	154	109	1.08	371.46	367	10	2.13E-02	15.1	
9	0	198.40	45	94	2.60	396.56	390	11	6.18E-03	44.7	
10	0	250.38	20	31	1.06	500.41	498	6	2.75E-03	50.1	
11	0	295.55	46	70	0.97	590.65	585	12	6.41E-03	38.9	
12	0	343.65	29	54	3.61	686.76	676	13	3.97E-03	56.7	
13	0	351.96	64	52	1.13	703.36	698	10	8.84E-03	24.7	
14	0	511.27	122	52	2.32	1021.75	1014	14	1.69E-02	15.5	
15	0	523.96	12	29	0.73	1047.11	1039	11	1.65E-03	88.2	
16	0	535.62	7	12	0.63	1070.42	1067	6	9.06E-04	93.2	
17	0	558.45	49	21	1.54	1116.05	1109	15	6.85E-03	26.3	
18	0	566.55	41	14	1.86	1132.24	1124	18	5.76E-03	26.0	
19	0	598.76	23	45	1.47	1196.61	1190	15	3.19E-03	66.9	
20	0	610.10	45	32	1.49	1219.28	1213	9	6.25E-03	27.0	
21	0	644.08	8	18	1.17	1287.20	1281	10	1.11E-03	104.6	
22	0	660.78	19	46	8.43	1320.60	1299	24	2.61E-03	99.9	
23	0	665.96	5	8	1.37	1330.96	1327	7	7.53E-04	92.7	
24	0	722.22	12	11	0.85	1443.44	1439	9	1.62E-03	59.7	
25	0	728.68	11	20	4.29	1456.34	1447	14	1.49E-03	95.2	
26	0	731.94	8	3	0.62	1462.88	1460	6	1.11E-03	49.2	
27	0	807.27	25	9	3.52	1613.48	1608	12	3.53E-03	30.7	
28	0	838.82	13	6	1.29	1676.59	1673	7	1.74E-03	44.5	
29	0	855.88	8	7	0.89	1710.69	1706	7	1.14E-03	63.4	
30	0	919.79	9	5	0.67	1838.50	1832	10	1.25E-03	57.2	
31	0	1068.71	10	3	1.85	2136.39	2133	7	1.40E-03	43.4	
32	0	1121.96	21	7	3.48	2242.91	2234	15	2.86E-03	36.4	
33	0	1239.00	11	0	0.62	2477.09	2473	7	1.53E-03	30.2	
34	0	1269.66	8	2	0.97	2538.45	2535	6	1.17E-03	41.4	
35	0	1310.81	10	0	1.49	2620.80	2616	9	1.39E-03	31.6	
36	0	1408.37	17	0	0.60	2816.06	2810	13	2.36E-03	24.3	
37	0	1765.46	24	0	3.89	3531.00	3525	12	3.33E-03	20.4	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CU-67	91.27	9	7.00	1.941E+00	1.198E+01	5.191E+02	693.62
	93.31	9	16.10	1.941E+00	5.209E+00	2.257E+02	693.62
	184.58	41	48.70*	2.411E+00	6.515E+00	2.823E+02	118.93
BA-137M	661.66	19	89.90*	1.068E+00	3.676E+00	3.679E+00	199.88
CS-137	661.66	19	85.10*	1.068E+00	3.884E+00	3.887E+00	199.88
PB-210	46.54	34	4.25*	1.545E-01	9.795E+02	9.807E+02	133.62
PO-210	46.54	34	4.25*	1.545E-01	9.795E+02	9.807E+02	133.62
BI-211	72.87	-----	1.23	1.207E+00	-----	Line Not Found	-----
	351.06	46	12.92*	1.652E+00	4.014E+01	4.019E+01	72.07
BI-214	609.32	36	45.49*	1.127E+00	1.302E+01	1.302E+01	71.84
	1120.29	-----	14.92	7.450E-01	-----	Line Not Found	-----
	1764.49	18	15.30	5.285E-01	4.225E+01	4.225E+01	56.38
PB-214	74.82	-----	5.80	1.293E+00	-----	Line Not Found	-----
	77.11	17	9.70	1.386E+00	2.360E+01	2.360E+01	228.88
	87.09	-----	3.41	1.766E+00	-----	Line Not Found	-----
	242.00	-----	7.25	2.114E+00	-----	Line Not Found	-----
	295.22	39	18.42	1.862E+00	2.115E+01	2.115E+01	95.40
	351.93	46	35.60*	1.652E+00	1.457E+01	1.457E+01	72.07
RA-226	186.21	41	3.59*	2.411E+00	8.838E+01	8.838E+01	118.93
TH-230	67.67	36	0.38*	9.105E-01	1.944E+03	1.944E+03	127.92
TH-232	63.81	5	0.26*	7.816E-01	4.477E+02	4.477E+02	776.45
	140.88	28	0.02	2.532E+00	1.022E+04	1.022E+04	144.67
TH-234	63.29	5	3.70*	7.816E-01	3.146E+01	3.146E+01	776.45
	92.59	9	4.23	1.941E+00	1.982E+01	1.982E+01	693.62
U-238	63.29	5	3.70*	7.816E-01	3.146E+01	3.146E+01	776.45
	92.59	9	4.23	1.941E+00	1.982E+01	1.982E+01	693.62

Flag: "*" = Keyline

Total number of lines in spectrum 36
Number of unidentified lines 10
Number of lines tentatively identified by NID 26 72.22%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CU-67	61.83H	43.3	6.515E+00	2.823E+02	3.357E+02	118.93	
BA-137M	30.08Y	1.00	3.676E+00	3.679E+00	7.354E+00	199.88	
CS-137	30.08Y	1.00	3.884E+00	3.887E+00	7.769E+00	199.88	
PB-210	22.20Y	1.00	9.795E+02	9.807E+02	13.10E+02	133.62	
PO-210	22.20Y	1.00	9.795E+02	9.807E+02	13.10E+02	133.62	
BI-211	21.77Y	1.00	4.014E+01	4.019E+01	2.896E+01	72.07	
BI-214	1600.00Y	1.00	1.302E+01	1.302E+01	0.935E+01	71.84	
PB-214	1600.00Y	1.00	1.457E+01	1.457E+01	1.050E+01	72.07	
RA-226	1600.00Y	1.00	8.838E+01	8.838E+01	10.51E+01	118.93	
TH-230	7.54E+04Y	1.00	1.944E+03	1.944E+03	2.487E+03	127.92	
TH-232	1.41E+10Y	1.00	4.477E+02	4.477E+02	34.76E+02	776.45	
TH-234	4.47E+09Y	1.00	3.146E+01	3.146E+01	24.43E+01	776.45	
U-238	4.47E+09Y	1.00	3.146E+01	3.146E+01	24.43E+01	776.45	
Total Activity :			4.584E+03	4.862E+03			

Grand Total Activity : 4.584E+03 4.862E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	113.06	19	112	1.34	226.09	224	7	2.69E-03	****	2.36E+00	T
0	198.40	32	94	2.60	396.56	390	11	4.45E-03	****	2.35E+00	T
0	250.38	20	31	1.06	500.41	498	6	2.75E-03	****	2.07E+00	T
0	343.65	29	54	3.61	686.76	676	13	3.97E-03	****	1.68E+00	T
0	523.96	12	29	0.73	1047.11	1039	11	1.65E-03	****	1.25E+00	T
0	535.62	7	12	0.63	1070.42	1067	6	9.06E-04	****	1.23E+00	
0	558.45	42	21	1.54	1116.05	1109	15	5.89E-03	63.3	1.20E+00	
0	566.55	41	14	1.86	1132.24	1124	18	5.76E-03	51.9	1.19E+00	
0	598.76	23	45	1.47	1196.61	1190	15	3.19E-03	****	1.14E+00	
0	644.08	8	18	1.17	1287.20	1281	10	1.11E-03	****	1.09E+00	
0	665.96	5	8	1.37	1330.96	1327	7	7.53E-04	****	1.06E+00	T
0	722.22	12	11	0.85	1443.44	1439	9	1.62E-03	****	1.01E+00	T
0	728.68	11	20	4.29	1456.34	1447	14	1.49E-03	****	9.99E-01	T
0	731.94	8	3	0.62	1462.88	1460	6	1.11E-03	98.4	9.96E-01	T
0	807.27	25	9	3.52	1613.48	1608	12	3.53E-03	61.4	9.32E-01	
0	838.82	13	6	1.29	1676.59	1673	7	1.74E-03	89.1	9.08E-01	
0	855.88	8	7	0.89	1710.69	1706	7	1.14E-03	****	8.96E-01	T
0	919.79	9	5	0.67	1838.50	1832	10	1.25E-03	****	8.53E-01	
0	1068.71	10	3	1.85	2136.39	2133	7	1.40E-03	86.8	7.70E-01	
0	1121.96	15	7	3.48	2242.91	2234	15	2.03E-03	****	7.44E-01	T
0	1239.00	9	0	0.62	2477.09	2473	7	1.27E-03	81.9	6.94E-01	T
0	1269.66	8	2	0.97	2538.45	2535	6	1.17E-03	82.8	6.81E-01	
0	1310.81	10	0	1.49	2620.80	2616	9	1.39E-03	63.2	6.66E-01	T
0	1408.37	17	0	0.60	2816.06	2810	13	2.36E-03	48.5	6.31E-01	T

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372002.CNF;1  *
* Acquisition date   : 20-DEC-2016 15:57:21 Sensitivity      : 3.000          *
* Detector ID        : GAM33 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:00.86 Half life ratio : *****      *
* Sample date        : 6-DEC-2016 16:46:00 Nuclide Library : LIQUID      *
* Sample ID          : G412372002 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER      *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 8-JUN-2016 08:46:57 Eff. Geometry    : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM33_2LMB.CNF;9          *
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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
CU-67	1.173E+02
BA-137M	1.132E+00
CS-137	1.195E+00
PB-210	4.517E+02
PO-210	4.517E+02
BI-214	3.910E+00
PB-214	4.673E+00
RA-226	3.686E+01
TH-230	8.549E+02
TH-232	1.524E+03
TH-234	1.104E+02
U-238	1.104E+02

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.707E+01	NOT IDENT.
NA-22	1.701E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.282E+00	NOT IDENT.
K-40	2.381E+01	NOT IDENT.
SC-46	1.779E+00	FAIL ABUN
V-48	2.171E+00	FAIL ABUN
CR-51	1.784E+01	NOT IDENT.
MN-52	1.040E+01	NOT IDENT.
MN-54	1.574E+00	NOT IDENT.
CO-56	1.786E+00	FAIL ABUN
CO-57	1.693E+00	NOT IDENT.
CO-58	1.957E+00	NOT IDENT.
FE-59	4.056E+00	NOT IDENT.
CO-60	1.786E+00	NOT IDENT.
ZN-65	3.800E+00	NOT IDENT.
GE-68	5.110E+01	NOT IDENT.
AS-74	6.185E+00	NOT IDENT.
SE-75	2.264E+00	NOT IDENT.

BR-77	4.659E+02	NOT IDENT.
SR-82	1.529E+01	NOT IDENT.
RB-83	3.229E+00	NOT IDENT.
RB-84	4.153E+00	NOT IDENT.
KR-85	4.937E+02	NOT IDENT.
SR-85	2.562E+00	NOT IDENT.
RB-86	2.953E+01	NOT IDENT.
Y-88	1.722E+00	NOT IDENT.
Y-91	5.944E+02	NOT IDENT.
NB-94	1.699E+00	NOT IDENT.
NB-95	2.085E+00	NOT IDENT.
NB-95M	5.794E+00	NOT IDENT.
ZR-95	2.873E+00	NOT IDENT.
MO-99	4.878E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.967E+00	FAIL ABUN
RH-102M	1.384E+00	NOT IDENT.
RU-103	2.317E+00	FAIL ABUN
RH-106	1.595E+01	NOT IDENT.
RU-106	1.595E+01	NOT IDENT.
AG-108M	1.678E+00	FAIL ABUN
CD-109	5.774E+01	NOT IDENT.
AG-110M	2.968E+00	NOT IDENT.
SN-113	2.083E+00	NOT IDENT.
IN-114M	1.054E+01	NOT IDENT.
CD-115	3.799E+02	NOT IDENT.
SN-117M	3.122E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.725E+00	NOT IDENT.
SB-124	5.298E+00	FAIL ABUN
SB-125	5.380E+00	NOT IDENT.
TE-125M	7.136E+02	NOT IDENT.
I-126	1.037E+01	FAIL ABUN
SB-126	6.946E+00	FAIL ABUN
SN-126	5.678E+00	FAIL ABUN
SB-127	4.400E+01	NOT IDENT.
TE-129	2.685E+01	FAIL ABUN
I-131	5.976E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.176E+01	FAIL ABUN
BA-133	2.396E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.750E+00	NOT IDENT.
CS-135	8.271E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	5.010E+00	NOT IDENT.
CE-139	1.780E+00	NOT IDENT.
BA-140	1.313E+01	NOT IDENT.
LA-140	4.187E+00	NOT IDENT.
CE-141	3.923E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.347E+01	NOT IDENT.
PM-144	1.920E+00	NOT IDENT.
PR-144	1.436E+02	NOT IDENT.
PM-146	1.975E+00	NOT IDENT.
ND-147	2.254E+01	NOT IDENT.
PM-147	5.137E+04	NOT IDENT.
PM-149	3.914E+03	NOT IDENT.
EU-152	4.686E+00	FAIL ABUN
GD-153	5.433E+00	NOT IDENT.
EU-154	4.823E+00	FAIL ABUN
EU-155	6.876E+00	NOT IDENT.
HO-166M	2.423E+00	FAIL ABUN
TM-171	2.346E+03	FAIL ABUN
LU-176	1.553E+00	NOT IDENT.
LU-177	5.635E+01	FAIL ABUN
HF-181	2.641E+00	NOT IDENT.
W-181	1.963E+01	FAIL ABUN
TA-182	8.100E+00	FAIL ABUN
RE-183	1.918E+01	FAIL ABUN
RE-184	8.012E+00	NOT IDENT.
RE-188	1.030E+01	FAIL ABUN
W-188	4.000E+02	FAIL ABUN
OS-191	9.858E+00	FAIL ABUN
IR-192	1.840E+00	FAIL ABUN
HG-203	2.052E+00	NOT IDENT.
BI-207	2.049E+00	NOT IDENT.
TL-208	2.530E+00	NOT IDENT.

BI-211	1.806E+01	FAIL ABUN
PB-211	4.204E+01	NOT IDENT.
BI-212	2.781E+01	FAIL ABUN
PB-212	4.191E+00	FAIL ABUN
BI-213	5.426E+00	NOT IDENT.
RN-219	2.191E+01	NOT IDENT.
FR-221	1.268E+01	NOT IDENT.
RA-223	3.093E+01	NOT IDENT.
RA-224	3.663E+01	NOT IDENT.
AC-227	1.370E+01	NOT IDENT.
TH-227	1.370E+01	NOT IDENT.
AC-228	6.543E+00	NOT IDENT.
RA-228	6.543E+00	NOT IDENT.
TH-228	4.191E+00	FAIL ABUN
TH-229	2.876E+01	NOT IDENT.
PA-231	2.694E+01	NOT IDENT.
TH-231	3.438E+01	NOT IDENT.
PA-233	3.432E+00	NOT IDENT.
PA-234	1.131E+01	FAIL ABUN
PA-234M	2.800E+02	NOT IDENT.
U-234	8.141E+03	NOT IDENT.
U-235	1.345E+01	FAIL ABUN
NP-237	3.432E+00	NOT IDENT.
NP-238	5.741E+02	NOT IDENT.
NP-239	1.887E+01	NOT IDENT.
AM-241	1.404E+01	NOT IDENT.
AM-242	4.595E+01	NOT IDENT.
AM-243	4.392E+00	NOT IDENT.
CM-243	7.712E+00	NOT IDENT.
BK-247	4.151E+00	NOT IDENT.
CM-247	1.982E+00	NOT IDENT.
CF-249	2.445E+00	NOT IDENT.
CF-251	7.476E+00	NOT IDENT.
CF-252	1.223E+04	NOT IDENT.
ANH-511	3.766E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372002.CNF;1
Acquisition date : 20-DEC-2016 15:57:21 Sensitivity : 3.000
Detector ID : GAM33 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.86 Half life ratio : *****
Sample date : 6-DEC-2016 16:46:00 Nuclide Library : LIQUID
Sample ID : G412372002 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 8-JUN-2016 08:46:57 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM33_2LMB.CNF;9

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CU-67	2.823E+02	3.293E+02	3.293E+02
BA-137M	3.679E+00	7.209E+00	7.209E+00
CS-137	3.887E+00	7.616E+00	7.616E+00
PB-210	9.807E+02	1.287E+03	1.287E+03
PO-210	9.807E+02	1.287E+03	1.287E+03
BI-214	1.302E+01	9.181E+00	9.181E+00
PB-214	1.457E+01	1.031E+01	1.031E+01
RA-226	8.838E+01	1.031E+02	1.031E+02
TH-230	1.944E+03	2.459E+03	2.459E+03
TH-232	4.477E+02	3.407E+03	3.407E+03
TH-234	3.146E+01	2.395E+02	2.395E+02
U-238	3.146E+01	2.395E+02	2.395E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	1.177E+00	1.988E+01	1.989E+01	NOT IDENT.
NA-22	-1.589E-01	2.101E+00	2.103E+00	NOT IDENT.
NA-24	6.433E+06	9.822E+06	1.024E+07	SHORT HLIF
AL-26	1.520E+00	2.311E+00	2.411E+00	NOT IDENT.
K-40	-1.744E+00	2.611E+01	2.613E+01	NOT IDENT.
SC-46	-1.881E+00	2.588E+00	2.724E+00	FAIL ABUN
V-48	-1.820E+00	3.253E+00	3.355E+00	FAIL ABUN
CR-51	-1.267E+01	2.202E+01	2.275E+01	NOT IDENT.
MN-52	-1.516E+00	1.266E+01	1.268E+01	NOT IDENT.
MN-54	-1.683E+00	2.628E+00	2.736E+00	NOT IDENT.
CO-56	-9.342E-02	2.202E+00	2.202E+00	FAIL ABUN
CO-57	2.297E-01	2.034E+00	2.037E+00	NOT IDENT.
CO-58	7.652E-01	2.457E+00	2.481E+00	NOT IDENT.
FE-59	2.150E+00	4.250E+00	4.359E+00	NOT IDENT.
CO-60	4.359E-01	1.986E+00	1.996E+00	NOT IDENT.
ZN-65	2.547E-03	4.988E+00	4.988E+00	NOT IDENT.
GE-68	4.022E+01	4.915E+01	5.239E+01	NOT IDENT.
AS-74	8.268E+00	6.743E+00	7.704E+00	NOT IDENT.

SE-75	-9.480E-02	2.869E+00	2.869E+00	NOT IDENT.
BR-77	2.442E+02	5.482E+02	5.591E+02	NOT IDENT.
SR-82	-5.990E+00	1.978E+01	1.996E+01	NOT IDENT.
RB-83	-7.284E-01	4.432E+00	4.444E+00	NOT IDENT.
RB-84	1.621E+00	4.793E+00	4.848E+00	NOT IDENT.
KR-85	-1.719E+03	7.509E+02	1.079E+03	NOT IDENT.
SR-85	-8.920E+00	3.897E+00	5.600E+00	NOT IDENT.
RB-86	2.531E+01	2.751E+01	2.978E+01	NOT IDENT.
Y-88	-3.369E-01	2.201E+00	2.206E+00	NOT IDENT.
Y-91	-4.475E+02	8.180E+02	8.425E+02	NOT IDENT.
NB-94	2.791E-02	2.041E+00	2.041E+00	NOT IDENT.
NB-95	-1.888E+00	2.711E+00	2.841E+00	NOT IDENT.
NB-95M	-2.794E+00	7.624E+00	7.727E+00	NOT IDENT.
ZR-95	-6.951E-01	3.643E+00	3.657E+00	NOT IDENT.
MO-99	1.967E+02	5.523E+02	5.594E+02	FAIL ABUN
TC-99M	1.483E+17	2.107E+17	0.000E+00	SHORT HLIF
RH-101	3.341E-01	2.360E+00	2.365E+00	FAIL ABUN
RH-102M	1.373E-01	1.603E+00	1.604E+00	NOT IDENT.
RU-103	-3.720E-01	2.780E+00	2.785E+00	FAIL ABUN
RH-106	-3.002E+00	1.959E+01	1.964E+01	NOT IDENT.
RU-106	-3.002E+00	1.959E+01	1.964E+01	NOT IDENT.
AG-108M	-4.634E-02	1.967E+00	1.968E+00	FAIL ABUN
CD-109	4.841E+01	6.986E+01	7.319E+01	NOT IDENT.
AG-110M	-8.195E-01	3.780E+00	3.798E+00	NOT IDENT.
SN-113	-1.270E+00	2.600E+00	2.663E+00	NOT IDENT.
IN-114M	9.859E-01	1.405E+01	1.406E+01	NOT IDENT.
CD-115	2.390E+01	4.659E+02	4.660E+02	NOT IDENT.
SN-117M	9.034E-01	3.744E+00	3.766E+00	NOT IDENT.
I-123	-2.078E+06	8.914E+07	8.914E+07	SHORT HLIF
TE-123M	-3.789E-02	2.123E+00	2.123E+00	NOT IDENT.
SB-124	1.831E+00	5.841E+00	5.899E+00	FAIL ABUN
SB-125	1.553E+00	6.087E+00	6.127E+00	NOT IDENT.
TE-125M	-9.170E+01	8.701E+02	8.710E+02	NOT IDENT.
I-126	6.173E+00	1.122E+01	1.156E+01	FAIL ABUN
SB-126	8.119E+00	7.173E+00	8.053E+00	FAIL ABUN
SN-126	2.284E+00	6.615E+00	6.694E+00	FAIL ABUN
SB-127	-1.097E+01	5.538E+01	5.560E+01	NOT IDENT.
TE-129	9.385E+00	3.022E+01	3.051E+01	FAIL ABUN
I-131	4.019E+00	6.428E+00	6.679E+00	NOT IDENT.
I-132	-1.000E+41	2.394E+41	0.000E+00	SHORT HLIF
TE-132	-2.290E+01	4.239E+01	4.363E+01	FAIL ABUN
BA-133	9.852E-02	3.062E+00	3.063E+00	NOT IDENT.
I-133	-1.566E+04	1.354E+05	1.356E+05	SHORT HLIF
CS-134	-8.730E-01	2.472E+00	2.503E+00	NOT IDENT.
CS-135	-1.452E+00	1.064E+01	1.066E+01	NOT IDENT.
I-135	-1.127E+16	1.539E+16	0.000E+00	SHORT HLIF
CS-136	1.315E+00	5.536E+00	5.568E+00	NOT IDENT.
CE-139	-3.350E-02	2.194E+00	2.194E+00	NOT IDENT.
BA-140	4.203E+00	1.642E+01	1.653E+01	NOT IDENT.
LA-140	1.481E+00	4.547E+00	4.596E+00	NOT IDENT.
CE-141	-3.609E+00	5.277E+00	5.523E+00	NOT IDENT.
CE-143	1.192E+03	4.463E+03	4.495E+03	SHORT HLIF
CE-144	1.021E+01	1.550E+01	1.617E+01	NOT IDENT.
PM-144	-1.016E-01	2.328E+00	2.328E+00	NOT IDENT.
PR-144	-7.601E+00	1.741E+02	1.741E+02	NOT IDENT.
PM-146	-1.466E+00	2.544E+00	2.628E+00	NOT IDENT.
ND-147	-2.186E+01	3.249E+01	3.395E+01	NOT IDENT.
PM-147	3.293E+04	5.933E+04	6.115E+04	NOT IDENT.
PM-149	-6.257E+02	4.533E+03	4.541E+03	NOT IDENT.
EU-152	1.203E+01	1.338E+01	1.444E+01	FAIL ABUN
GD-153	-6.612E+00	7.626E+00	8.188E+00	NOT IDENT.
EU-154	-4.506E-01	5.958E+00	5.961E+00	FAIL ABUN
EU-155	-1.207E+01	9.825E+00	1.123E+01	NOT IDENT.
HO-166M	-1.123E+00	3.175E+00	3.215E+00	FAIL ABUN
TM-171	2.947E+03	2.506E+03	2.837E+03	FAIL ABUN
LU-176	9.208E-01	1.686E+00	1.736E+00	NOT IDENT.
LU-177	7.380E+00	6.934E+01	6.942E+01	FAIL ABUN
HF-181	2.055E+00	2.828E+00	2.976E+00	NOT IDENT.
W-181	-6.133E+00	2.384E+01	2.400E+01	FAIL ABUN
TA-182	2.316E+00	8.971E+00	9.031E+00	FAIL ABUN
RE-183	-1.956E+00	2.286E+01	2.288E+01	FAIL ABUN
RE-184	4.061E+00	9.141E+00	9.323E+00	NOT IDENT.
RE-188	1.072E+01	1.161E+01	1.258E+01	FAIL ABUN
W-188	9.860E+01	4.938E+02	4.958E+02	FAIL ABUN
OS-191	-2.701E+00	1.225E+01	1.231E+01	FAIL ABUN
IR-192	-2.092E+00	2.341E+00	2.524E+00	FAIL ABUN
HG-203	1.521E-01	2.328E+00	2.329E+00	NOT IDENT.
BI-207	8.540E-02	2.520E+00	2.521E+00	NOT IDENT.

TL-208	-1.957E+00	3.245E+00	3.363E+00	NOT IDENT.
BI-211	4.019E+01	2.844E+01	3.372E+01	FAIL ABUN
PB-211	3.202E+01	4.501E+01	4.727E+01	NOT IDENT.
BI-212	3.068E+01	5.724E+01	5.888E+01	FAIL ABUN
PB-212	1.848E+00	4.963E+00	5.033E+00	FAIL ABUN
BI-213	-7.220E+00	7.523E+00	8.197E+00	NOT IDENT.
RN-219	-7.990E+00	2.653E+01	2.677E+01	NOT IDENT.
FR-221	9.434E-01	1.573E+01	1.573E+01	NOT IDENT.
RA-223	-2.736E+01	3.891E+01	4.082E+01	NOT IDENT.
RA-224	-3.362E+01	4.960E+01	5.187E+01	NOT IDENT.
AC-227	-1.560E+01	1.932E+01	2.056E+01	NOT IDENT.
TH-227	-1.560E+01	1.932E+01	2.056E+01	NOT IDENT.
AC-228	-6.371E+00	8.599E+00	9.066E+00	NOT IDENT.
RA-228	-6.371E+00	8.599E+00	9.066E+00	NOT IDENT.
TH-228	1.848E+00	4.963E+00	5.033E+00	FAIL ABUN
TH-229	-9.733E+00	4.007E+01	4.031E+01	NOT IDENT.
PA-231	2.035E+00	3.068E+01	3.069E+01	NOT IDENT.
TH-231	-2.169E+01	4.416E+01	4.523E+01	NOT IDENT.
PA-233	-2.791E+00	4.690E+00	4.856E+00	NOT IDENT.
PA-234	-1.276E+01	2.260E+01	2.332E+01	FAIL ABUN
PA-234M	-6.390E+01	3.616E+02	3.627E+02	NOT IDENT.
U-234	6.470E+03	9.020E+03	9.480E+03	NOT IDENT.
U-235	-2.259E+00	1.815E+01	1.818E+01	FAIL ABUN
NP-237	-2.791E+00	4.690E+00	4.856E+00	NOT IDENT.
NP-238	1.715E+02	6.595E+02	6.640E+02	NOT IDENT.
NP-239	1.490E+01	2.309E+01	2.404E+01	NOT IDENT.
AM-241	-3.288E+00	1.832E+01	1.838E+01	NOT IDENT.
AM-242	1.232E+01	5.765E+01	5.792E+01	NOT IDENT.
AM-243	-6.885E-01	5.719E+00	5.728E+00	NOT IDENT.
CM-243	7.999E+00	8.594E+00	9.320E+00	NOT IDENT.
BK-247	-1.876E+00	5.511E+00	5.576E+00	NOT IDENT.
CM-247	-8.452E-01	2.419E+00	2.449E+00	NOT IDENT.
CF-249	1.511E+00	2.667E+00	2.753E+00	NOT IDENT.
CF-251	-2.625E+00	9.510E+00	9.584E+00	NOT IDENT.
CF-252	5.360E+03	1.502E+04	1.522E+04	NOT IDENT.
ANH-511	-1.265E+01	4.147E+00	7.053E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	47.3923	88.03	57.3232	140.88	63.2070
46.54	32.0444	88.34	60.0835	143.76	54.5756
49.72	34.1910	88.47	60.0963	144.24	68.6280
51.35	44.4911	91.11	57.6120	145.44	62.0746
52.39	36.3154	91.27	57.6270	152.32	63.6927
53.20	43.0846	92.59	57.7491	152.43	64.8181
56.28	46.2735	93.31	57.8154	153.25	63.7606
57.36	0.0000	94.56	55.1713	154.21	54.8715
57.53	51.2330	94.65	55.1790	155.04	45.9567
57.53	51.2332	94.67	55.1807	156.02	62.8394
57.98	50.3151	97.43	61.3069	158.56	52.8915
59.32	51.7531	98.43	57.2387	158.97	0.0000
59.54	51.7771	98.44	57.2395	159.00	59.6727
61.49	46.7900	99.53	48.9955	162.33	64.4138
63.00	51.8248	100.11	51.1253	162.66	64.4372
63.29	51.8556	100.20	51.1324	163.33	58.8277
63.58	51.8861	102.03	66.9697	165.86	57.8559
63.81	51.9104	103.18	49.2652	176.31	75.7083
64.28	51.9596	103.37	46.1337	176.60	75.7304
64.99	52.0436	105.31	72.5539	177.52	58.5750
65.08	52.0433	106.12	65.2707	181.07	57.6370
66.73	52.2139	106.47	57.9310	184.41	61.6878
66.98	52.2394	109.28	76.1457	184.58	53.2149
67.24	52.2661	111.00	65.0239	185.72	53.2759
67.67	52.3102	111.76	70.7545	186.21	53.3026
67.75	60.5444	112.95	75.4798	190.27	52.7425
69.67	54.1645	116.24	64.0778	193.51	52.9106
70.83	65.5383	116.30	64.0833	198.01	44.5452
72.81	65.7825	116.74	52.7227	201.83	53.3353
72.87	65.7900	117.23	64.1652	205.31	57.8391
74.66	78.6757	119.76	59.0203	208.37	48.5342
74.82	85.3685	120.54	58.0082	210.85	51.0179
74.97	85.3919	120.90	56.9615	218.12	53.7451
77.11	69.3159	121.12	56.9785	222.11	43.1494
79.69	65.9340	121.22	53.7605	227.09	37.3196
80.12	65.9838	121.78	61.3327	227.38	48.1665
80.19	65.9918	122.06	59.2029	228.16	56.6344
80.57	82.2077	123.07	56.0486	228.18	56.6351
81.00	69.7939	123.68	51.7789	235.69	43.6616
81.07	69.8023	127.23	54.1876	235.96	54.5897
83.79	80.2940	129.43	68.4708	238.63	37.6914
84.00	80.3224	131.20	65.3577	238.98	36.4861
84.21	71.1974	133.02	62.2324	240.99	67.0044
85.43	81.5363	133.52	54.6242	242.00	58.5264
86.55	69.4360	136.00	77.4415	244.70	37.8829
86.94	69.4812	136.28	74.5452	250.62	34.3839
87.09	69.4983	136.47	57.0186	252.40	40.9922
87.57	65.4624	140.51	70.5244	252.80	32.8048

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	53.0440	383.85	22.4533	631.29	18.2710
260.90	44.5748	388.16	24.3122	632.98	21.3307
264.66	32.2881	388.63	21.6167	633.25	14.2222
265.00	38.5078	391.70	25.2656	634.78	15.2478
268.22	38.6043	400.66	20.8634	635.95	16.2721
269.46	46.1213	401.81	29.0462	636.99	15.2612
271.23	33.7022	402.40	29.0566	645.85	18.3801
273.65	45.0198	404.85	20.0046	657.76	13.3385
276.40	38.4307	410.95	14.5999	661.66	6.1660
277.37	35.1145	414.70	21.0323	664.57	0.0000
277.60	35.1205	423.72	22.0581	666.33	12.3550
278.00	33.4587	427.09	23.9412	666.50	12.3555
278.43	34.3060	427.87	23.9518	667.71	0.0000
279.20	35.1632	433.94	24.9565	677.62	22.7520
279.54	38.5224	440.45	28.7554	685.70	11.4118
280.46	46.0907	453.88	23.3576	695.00	22.9059
283.69	37.8021	459.60	19.6798	696.49	19.7940
284.31	43.7026	463.37	27.2306	696.51	19.7940
285.41	46.2619	468.07	23.5321	697.00	17.7139
285.90	45.4373	473.00	21.7048	697.49	16.6751
287.50	37.0668	475.06	15.1149	702.65	15.6635
290.67	32.9316	476.78	17.9648	706.68	8.3669
293.27	0.0000	477.60	19.8644	711.68	12.5737
295.22	26.2635	477.99	19.8682	720.70	4.7313
295.96	26.2773	482.18	17.0662	721.93	0.0000
299.98	40.8057	487.02	17.1083	722.78	12.6265
300.09	40.8096	492.35	16.2010	722.91	12.6270
300.13	40.8105	497.08	25.7915	723.31	12.6289
301.36	35.7408	511.00	36.5481	724.19	12.6333
302.85	39.1859	514.00	87.6490	727.33	12.6479
304.50	37.5260	520.40	15.9414	733.00	9.5057
304.85	37.5359	520.69	17.3936	735.93	11.4192
306.78	28.1902	522.65	0.0000	739.50	11.6463
308.46	29.9343	527.90	13.9629	744.23	11.6665
311.90	35.1501	529.59	13.5859	747.24	7.4321
316.51	43.8634	529.87	0.0000	752.31	15.9552
319.41	36.1954	531.02	19.8098	753.82	17.0286
320.08	33.6251	537.26	14.6088	756.73	10.6539
321.04	28.4708	546.56	0.0000	763.94	16.0223
323.87	34.5768	552.55	22.0688	765.80	12.8262
325.23	26.8216	563.25	0.0000	766.42	17.1055
328.76	31.2217	569.33	10.3774	766.84	17.1081
333.37	35.6681	569.50	10.3782	772.60	0.0000
334.37	34.8210	569.70	10.3791	776.52	15.0214
338.28	44.5119	583.19	22.8718	777.92	8.5879
338.32	44.5129	595.83	13.4989	778.90	11.8124
340.48	32.3396	600.60	17.0339	783.70	15.0590
340.55	32.3411	602.73	19.5563	785.37	7.5341
344.28	22.3436	604.72	33.1235	792.07	11.8670
345.93	31.5776	609.32	21.1205	795.86	9.7222
351.06	39.6021	610.33	25.6567	801.95	9.7427
351.93	39.6240	614.28	15.1178	802.10	9.7430
356.01	30.4577	618.01	21.1982	810.29	13.0273
364.49	20.4137	621.93	17.1888	810.45	13.0278
366.42	25.7703	630.19	0.0000	810.76	9.7720

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	10.8765	1129.67	4.4788		
818.51	10.8866	1131.51	0.0000		
832.01	8.7490	1173.23	3.6235		
834.85	18.0616	1189.05	7.2764		
836.80	0.0000	1204.77	8.2183		
846.77	10.9900	1221.41	8.2524		
856.80	13.2314	1231.02	7.3530		
860.56	9.9359	1235.36	11.7773		
871.09	8.8620	1238.28	6.4454		
873.19	18.8448	1260.41	0.0000		
875.33	0.0000	1274.44	7.4307		
880.51	16.6669	1274.54	7.4307		
881.60	14.4499	1291.59	5.5957		
883.24	20.0178	1298.22	0.0000		
884.68	20.0266	1312.11	8.9965		
889.28	17.8281	1332.49	5.6495		
894.76	5.5809	1365.19	9.4861		
898.04	11.1735	1368.63	0.0000		
903.28	15.6685	1384.29	8.5743		
911.20	7.8536	1408.01	5.7466		
923.98	5.4068	1434.09	7.7056		
926.36	9.0179	1457.56	0.0000		
935.54	14.6954	1460.82	3.8752		
937.49	10.1799	1489.16	6.8223		
944.13	6.8003	1596.21	3.9849		
946.00	13.6084	1620.50	6.0062		
949.00	13.6206	1678.03	0.0000		
954.55	0.0000	1690.97	5.0739		
964.08	13.6826	1764.49	1.0287		
968.97	14.8440	1770.23	0.0000		
983.53	9.1742	1771.35	6.1802		
984.45	5.7355	1791.20	0.0000		
996.26	9.2087	1808.65	3.1111		
1001.03	13.8320	1836.06	4.1685		
1004.73	19.6161				
1025.87	8.1262				
1028.54	9.2943				
1037.84	9.3190				
1038.76	0.0000				
1046.59	7.8821				
1048.07	9.6378				
1050.41	10.5205				
1063.66	7.0396				
1077.00	1.7664				
1077.34	2.6497				
1083.85	7.9634				
1085.87	4.4266				
1099.25	6.2194				
1111.64	10.6978				
1112.07	10.6985				
1112.84	8.0255				
1115.54	9.9948				
1120.29	8.9349				
1120.55	8.9355				
1121.30	8.9374				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 10:39:22.59

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372003.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM24.CNF;342
Background date    : 18-DEC-2016 13:12:26
Sample date       : 7-DEC-2016 07:59:00. Acquisition date : 21-DEC-2016 08:38:51
Sample ID        : G412372003. Sample quantity : 2.00000E+00 LITER
Detector name     : GAM24. Detector geometry: 2LMB
Elapsed live time : 0 02:00:00.00. Elapsed real time: 0 02:00:05.55 0.1%
Energy tolerance  : 1.50000 keV. Analyst Initials : MXR1
Abundance limit   : 75.00000. Sensitivity : 3.00000
Batch ID          : 1624165. Detector SN# :
Matrix Spike ID   : LCS ID : 1604
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.86*	23	78	0.76	93.77	91	8	3.21E-03	76.1	
2	0	63.21*	17	163	0.90	126.48	121	10	2.35E-03	152.2	
3	0	66.41*	25	130	0.96	132.88	131	7	3.43E-03	81.6	
4	2	90.19	23	93	1.29	180.45	178	12	3.23E-03	68.6	6.60E-01
5	2	92.51*	24	124	1.29	185.10	178	12	3.34E-03	99.5	
6	2	139.71*	51	82	1.38	279.52	275	12	7.09E-03	37.8	2.39E+00
7	2	141.71*	16	81	1.38	283.52	275	12	2.21E-03	120.1	
8	7	196.30	14	42	1.37	392.72	391	12	1.89E-03	70.5	1.32E+00
9	7	198.45*	27	82	1.41	397.02	391	12	3.78E-03	64.8	
10	0	212.12	13	55	0.86	424.37	422	6	1.87E-03	90.8	
11	0	271.20	37	162	5.84	542.55	526	24	5.12E-03	92.9	
12	0	298.75	30	37	2.41	597.67	594	9	4.20E-03	40.9	
13	0	310.61	27	78	1.38	621.41	615	13	3.75E-03	70.1	
14	0	367.37	17	43	0.51	734.96	728	10	2.36E-03	81.3	
15	0	379.29	13	53	3.34	758.81	750	11	1.80E-03	113.8	
16	0	557.62	35	50	10.84	1115.58	1100	26	4.88E-03	58.6	
17	0	575.16	13	31	1.00	1150.68	1146	11	1.74E-03	89.8	
18	0	585.17	8	28	1.26	1170.70	1164	12	1.13E-03	132.9	
19	0	598.15	41	38	3.24	1196.68	1191	15	5.63E-03	36.5	
20	0	609.32*	35	31	1.03	1219.01	1214	11	4.83E-03	40.3	
21	0	806.11	7	18	3.47	1612.75	1606	12	9.11E-04	135.5	
22	0	887.75	16	11	1.56	1776.10	1770	14	2.26E-03	49.1	
23	0	919.17	11	11	0.83	1838.99	1833	12	1.56E-03	67.8	
24	0	1046.84	9	3	1.25	2094.45	2091	6	1.27E-03	44.3	
25	0	1120.81*	11	8	3.01	2242.48	2237	11	1.54E-03	67.9	
26	0	1130.07	13	5	4.42	2261.00	2255	11	1.81E-03	44.3	
27	0	1718.60	8	7	4.24	3438.81	3430	14	1.11E-03	78.6	
28	0	1764.81*	4	5	1.81	3531.30	3525	11	5.57E-04	154.1	
29	0	1986.43	6	9	3.97	3974.88	3966	13	8.33E-04	113.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 10:39:24

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372003.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 7-DEC-2016 07:59:00	Acquisition date	: 21-DEC-2016 08:38:51
Sample ID	: G412372003	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA24	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:05.55 0.1%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Linear	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
PB-210	46.54	23	4.25*	8.548E-01	1.194E+02	1.195E+02	152.23
PO-210	46.54	23	4.25*	8.548E-01	1.194E+02	1.195E+02	152.23
BI-214	609.32	35	45.49*	1.322E+00	1.086E+01	1.086E+01	80.62
	1120.29	11	14.92	8.696E-01	1.600E+01	1.600E+01	135.84
	1764.49	4	15.30	6.128E-01	8.031E+00	8.031E+00	308.14
TH-230	67.67	25	0.38*	2.005E+00	6.077E+02	6.077E+02	163.14
TH-232	63.81	17	0.26*	1.854E+00	6.601E+02	6.601E+02	304.37
	140.88	16	0.02	3.122E+00	4.792E+03	4.792E+03	240.18
TH-234	63.29	17	3.70*	1.854E+00	4.639E+01	4.639E+01	304.37
	92.59	24	4.23	2.835E+00	3.758E+01	3.758E+01	199.10
U-238	63.29	17	3.70*	1.854E+00	4.639E+01	4.639E+01	304.37
	92.59	24	4.23	2.835E+00	3.758E+01	3.758E+01	199.10

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372003.CNF;1
Acquisition date : 21-DEC-2016 08:38:51 Sensitivity : 3.000
Detector ID : GAM24 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:05.55 Half life ratio : *****
Sample date : 7-DEC-2016 07:59:00 Analyst initials: MXR1
Sample ID : G412372003 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 13-JUN-2016 09:24:52 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
PB-210	1.195E+02	1.783E+02	1.910E+02
PO-210	1.195E+02	1.783E+02	1.910E+02
BI-214	1.086E+01	8.580E+00	7.282E+00
TH-230	6.077E+02	9.715E+02	1.083E+03
TH-232	6.601E+02	1.969E+03	1.699E+03
TH-234	4.639E+01	1.384E+02	1.209E+02
U-238	4.639E+01	1.384E+02	1.209E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-1.753E+01	2.089E+01	3.066E+01	NOT IDENT.
NA-22	-8.187E-01	1.591E+00	2.935E+00	NOT IDENT.
NA-24	0.000E+00	1.284E+07	0.000E+00	SHORT HLIF
AL-26	-5.976E-02	1.554E+00	3.375E+00	FAIL ABUN
K-40	-2.546E+00	2.713E+01	5.415E+01	NOT IDENT.
SC-46	9.532E-01	1.890E+00	3.971E+00	FAIL ABUN
V-48	5.747E-02	2.915E+00	6.043E+00	NOT IDENT.
CR-51	2.532E+00	2.123E+01	4.062E+01	NOT IDENT.
MN-52	1.613E+00	7.678E+00	1.789E+01	NOT IDENT.
MN-54	-7.489E-01	1.929E+00	3.372E+00	NOT IDENT.
CO-56	-1.293E+00	1.771E+00	2.848E+00	NOT IDENT.
CO-57	5.429E-01	1.665E+00	2.994E+00	NOT IDENT.
CO-58	6.548E-01	2.296E+00	4.125E+00	NOT IDENT.
FE-59	-5.293E-01	4.094E+00	8.109E+00	NOT IDENT.
CO-60	4.094E-02	1.501E+00	3.227E+00	NOT IDENT.
ZN-65	-3.151E-01	3.974E+00	7.051E+00	NOT IDENT.
CU-67	-3.058E+02	1.734E+02	2.559E+02	FAIL ABUN
GE-68	2.891E+01	5.902E+01	1.292E+02	NOT IDENT.
AS-74	5.090E+00	6.206E+00	1.172E+01	NOT IDENT.
SE-75	1.589E-01	2.372E+00	4.558E+00	NOT IDENT.
BR-77	4.432E+01	4.794E+02	8.611E+02	NOT IDENT.
SR-82	4.366E+00	1.474E+01	3.015E+01	NOT IDENT.
RB-83	1.954E+00	3.925E+00	7.939E+00	NOT IDENT.

RB-84	1.070E+00	3.550E+00	6.855E+00	NOT IDENT.
KR-85	-1.696E+03	5.844E+02	7.332E+02	NOT IDENT.
SR-85	-8.806E+00	3.035E+00	3.808E+00	NOT IDENT.
RB-86	9.923E+00	3.408E+01	7.311E+01	NOT IDENT.
Y-88	1.584E-01	2.092E+00	4.487E+00	NOT IDENT.
Y-91	-2.823E+02	6.957E+02	1.329E+03	NOT IDENT.
NB-94	-1.595E+00	1.860E+00	2.991E+00	NOT IDENT.
NB-95	-9.523E-02	1.979E+00	3.732E+00	NOT IDENT.
NB-95M	-7.414E-01	6.423E+00	1.208E+01	NOT IDENT.
ZR-95	2.350E+00	4.041E+00	8.250E+00	NOT IDENT.
MO-99	-1.937E+02	4.592E+02	8.090E+02	FAIL ABUN
TC-99M	0.000E+00	1.949E+17	0.000E+00	SHORT HLIF
RH-101	-3.457E-01	2.280E+00	3.905E+00	FAIL ABUN
RH-102M	4.931E-01	1.579E+00	3.132E+00	FAIL ABUN
RU-103	-1.161E+00	2.590E+00	4.576E+00	FAIL ABUN
RH-106	-8.162E+00	1.499E+01	2.606E+01	NOT IDENT.
RU-106	-8.162E+00	1.499E+01	2.606E+01	NOT IDENT.
AG-108M	-3.348E-01	1.609E+00	2.986E+00	NOT IDENT.
CD-109	-9.280E+00	5.098E+01	7.886E+01	NOT IDENT.
AG-110M	-3.819E-02	2.470E+00	4.245E+00	NOT IDENT.
SN-113	3.418E-01	2.684E+00	5.124E+00	NOT IDENT.
IN-114M	1.505E-01	1.058E+01	1.834E+01	NOT IDENT.
CD-115	-2.975E+02	4.842E+02	8.360E+02	NOT IDENT.
SN-117M	1.687E+00	3.389E+00	6.116E+00	NOT IDENT.
I-123	0.000E+00	8.282E+07	0.000E+00	SHORT HLIF
TE-123M	3.924E-01	1.822E+00	3.214E+00	NOT IDENT.
SB-124	-1.539E+00	6.261E+00	1.176E+01	NOT IDENT.
SB-125	2.092E+00	5.022E+00	1.002E+01	NOT IDENT.
TE-125M	3.078E+02	6.286E+02	1.147E+03	NOT IDENT.
I-126	-1.645E+00	1.027E+01	1.908E+01	NOT IDENT.
SB-126	-1.733E+00	6.306E+00	1.150E+01	NOT IDENT.
SN-126	-1.217E+00	5.122E+00	7.883E+00	FAIL ABUN
SB-127	-3.028E+01	6.017E+01	1.041E+02	NOT IDENT.
TE-129	1.993E+01	2.802E+01	5.724E+01	NOT IDENT.
I-131	2.332E+00	7.512E+00	1.319E+01	NOT IDENT.
I-132	0.000E+00	1.623E+41	0.000E+00	SHORT HLIF
TE-132	-8.304E+00	3.626E+01	6.060E+01	NOT IDENT.
BA-133	1.852E+00	2.573E+00	5.172E+00	NOT IDENT.
I-133	0.000E+00	1.460E+05	0.000E+00	SHORT HLIF
CS-134	1.077E+00	2.035E+00	4.222E+00	NOT IDENT.
CS-135	4.138E+00	8.552E+00	1.693E+01	NOT IDENT.
I-135	0.000E+00	1.483E+16	0.000E+00	SHORT HLIF
CS-136	4.944E+00	4.294E+00	9.630E+00	FAIL ABUN
BA-137M	2.358E-01	2.197E+00	4.146E+00	NOT IDENT.
CS-137	2.491E-01	2.321E+00	4.380E+00	NOT IDENT.
CE-139	-9.548E-01	1.921E+00	3.162E+00	NOT IDENT.
BA-140	4.616E+00	1.389E+01	2.759E+01	NOT IDENT.
LA-140	-1.396E+00	5.038E+00	9.528E+00	NOT IDENT.
CE-141	-2.277E+00	3.764E+00	6.174E+00	NOT IDENT.
CE-143	0.000E+00	4.050E+03	0.000E+00	SHORT HLIF
CE-144	-3.016E+00	1.334E+01	2.274E+01	NOT IDENT.
PM-144	2.052E+00	1.802E+00	3.971E+00	NOT IDENT.
PR-144	1.535E+02	1.348E+02	2.970E+02	NOT IDENT.
PM-146	-8.447E-01	2.339E+00	4.237E+00	NOT IDENT.
ND-147	2.327E+01	3.176E+01	6.515E+01	FAIL ABUN
PM-147	1.822E+04	4.936E+04	8.898E+04	NOT IDENT.
PM-149	7.103E+02	3.774E+03	7.272E+03	NOT IDENT.
EU-152	2.304E+00	5.448E+00	1.078E+01	NOT IDENT.
GD-153	2.943E-02	6.099E+00	1.033E+01	NOT IDENT.
EU-154	-2.185E+00	4.550E+00	8.472E+00	NOT IDENT.
EU-155	3.180E+00	6.867E+00	1.253E+01	NOT IDENT.
HO-166M	-1.288E+00	3.319E+00	5.851E+00	NOT IDENT.
TM-171	4.740E+02	8.081E+02	1.427E+03	FAIL ABUN
LU-176	-8.030E-01	1.808E+00	2.898E+00	NOT IDENT.
LU-177	1.322E+01	6.114E+01	1.074E+02	NOT IDENT.
HF-181	-1.207E+00	2.756E+00	4.892E+00	NOT IDENT.
W-181	-6.370E-01	9.113E+00	1.629E+01	FAIL ABUN
TA-182	3.229E+00	7.726E+00	1.681E+01	FAIL ABUN
RE-183	-4.832E+00	9.068E+00	1.557E+01	FAIL ABUN
RE-184	4.493E+00	5.881E+00	1.287E+01	NOT IDENT.
RE-188	7.086E+00	1.031E+01	1.894E+01	FAIL ABUN
W-188	4.878E+01	3.860E+02	7.440E+02	FAIL ABUN
OS-191	9.688E+00	1.058E+01	1.968E+01	FAIL ABUN
IR-192	6.085E-01	2.113E+00	4.088E+00	NOT IDENT.
HG-203	9.484E-01	1.985E+00	3.955E+00	NOT IDENT.
BI-207	-3.800E-01	2.889E+00	5.612E+00	NOT IDENT.
TL-208	-2.161E+00	2.716E+00	4.421E+00	NOT IDENT.
BI-211	-1.323E+01	1.553E+01	2.534E+01	NOT IDENT.

PB-211	4.015E+01	3.873E+01	8.214E+01	NOT IDENT.
BI-212	-1.377E+01	2.733E+01	4.709E+01	NOT IDENT.
PB-212	2.707E-01	4.283E+00	7.679E+00	FAIL ABUN
BI-213	-2.294E+00	6.650E+00	1.198E+01	NOT IDENT.
PB-214	-1.078E+00	5.721E+00	9.948E+00	NOT IDENT.
RN-219	-2.336E+01	1.997E+01	3.203E+01	FAIL ABUN
FR-221	-9.568E+00	1.335E+01	2.112E+01	NOT IDENT.
RA-223	-2.626E+00	3.803E+01	7.133E+01	NOT IDENT.
RA-224	-6.107E+01	3.866E+01	6.379E+01	NOT IDENT.
RA-226	-4.657E+01	5.488E+01	8.789E+01	NOT IDENT.
AC-227	-1.173E+00	1.448E+01	2.729E+01	FAIL ABUN
TH-227	-1.173E+00	1.448E+01	2.729E+01	FAIL ABUN
AC-228	-2.043E+00	9.066E+00	1.626E+01	NOT IDENT.
RA-228	-2.043E+00	9.066E+00	1.626E+01	NOT IDENT.
TH-228	2.707E-01	4.283E+00	7.679E+00	FAIL ABUN
TH-229	1.500E+01	3.288E+01	5.541E+01	FAIL ABUN
PA-231	-2.056E+01	2.724E+01	4.169E+01	NOT IDENT.
TH-231	5.611E+00	2.840E+01	4.935E+01	NOT IDENT.
PA-233	6.231E+00	8.565E+00	7.260E+00	FAIL ABUN
PA-234	2.657E+00	1.464E+01	2.895E+01	NOT IDENT.
PA-234M	1.887E+02	2.390E+02	5.289E+02	NOT IDENT.
U-234	1.833E+03	3.023E+03	5.346E+03	NOT IDENT.
U-235	3.749E+00	1.382E+01	2.187E+01	NOT IDENT.
NP-237	6.231E+00	8.565E+00	7.260E+00	FAIL ABUN
NP-238	-1.729E+02	6.122E+02	1.202E+03	NOT IDENT.
NP-239	2.171E+00	1.863E+01	3.281E+01	NOT IDENT.
AM-241	5.861E-01	7.538E+00	1.263E+01	NOT IDENT.
AM-242	-1.427E+01	4.800E+01	7.932E+01	NOT IDENT.
AM-243	-1.040E+00	3.404E+00	5.689E+00	NOT IDENT.
CM-243	8.331E-01	6.319E+00	1.132E+01	NOT IDENT.
BK-247	6.144E-01	4.336E+00	8.381E+00	NOT IDENT.
CM-247	-2.600E+00	1.801E+00	2.726E+00	NOT IDENT.
CF-249	-9.055E-01	2.468E+00	4.462E+00	NOT IDENT.
CF-251	-1.600E+00	8.057E+00	1.365E+01	NOT IDENT.
CF-252	2.260E+03	1.245E+04	2.211E+04	NOT IDENT.
ANH-511	-1.217E+01	3.747E+00	6.877E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.86	52	78	0.76	93.77	91	8	7.17E-03	32.8	
2	0	63.21	51	163	0.90	126.48	121	10	7.14E-03	48.5	
3	0	66.41	30	130	0.96	132.88	131	7	4.18E-03	65.1	
4	2	90.19	23	93	1.29	180.45	178	12	3.23E-03	68.6	6.60E-01
5	2	92.51	121	124	1.29	185.10	178	12	1.67E-02	18.5	
6	2	139.71	66	82	1.38	279.52	275	12	9.15E-03	27.5	2.39E+00
7	2	141.71	31	81	1.38	283.52	275	12	4.27E-03	58.4	
8	0	185.50	53	108	1.23	371.11	365	10	7.29E-03	39.4	
9	7	196.30	14	42	1.37	392.72	391	12	1.89E-03	70.5	1.32E+00
10	7	198.45	38	82	1.41	397.02	391	12	5.30E-03	44.1	
11	0	212.12	13	55	0.86	424.37	422	6	1.87E-03	90.8	
12	0	240.08	26	110	1.09	480.31	474	11	3.61E-03	80.5	
13	0	271.20	37	162	5.84	542.55	526	24	5.12E-03	92.9	
14	0	298.75	30	37	2.41	597.67	594	9	4.20E-03	40.9	
15	0	310.61	27	78	1.38	621.41	615	13	3.75E-03	70.1	
16	0	352.45	24	50	1.13	705.10	701	9	3.33E-03	56.8	
17	0	367.37	17	43	0.51	734.96	728	10	2.36E-03	81.3	
18	0	379.29	13	53	3.34	758.81	750	11	1.80E-03	113.8	
19	0	511.23	112	70	1.78	1022.76	1016	17	1.56E-02	20.1	
20	0	557.62	35	50	10.84	1115.58	1100	26	4.88E-03	58.6	
21	0	575.16	13	31	1.00	1150.68	1146	11	1.74E-03	89.8	
22	0	585.17	8	28	1.26	1170.70	1164	12	1.13E-03	132.9	
23	0	598.15	41	38	3.24	1196.68	1191	15	5.63E-03	36.5	
24	0	609.32	50	31	1.03	1219.01	1214	11	6.92E-03	26.3	
25	0	806.11	7	18	3.47	1612.75	1606	12	9.11E-04	135.5	
26	0	887.75	16	11	1.56	1776.10	1770	14	2.26E-03	49.1	
27	0	919.17	11	11	0.83	1838.99	1833	12	1.56E-03	67.8	
28	0	1046.84	9	3	1.25	2094.45	2091	6	1.27E-03	44.3	
29	0	1120.81	19	8	3.01	2242.48	2237	11	2.63E-03	37.2	
30	0	1130.07	13	5	4.42	2261.00	2255	11	1.81E-03	44.3	
31	0	1718.60	8	7	4.24	3438.81	3430	14	1.11E-03	78.6	
32	0	1764.81	14	5	1.81	3531.30	3525	11	1.89E-03	42.9	
33	0	1986.43	6	9	3.97	3974.88	3966	13	8.33E-04	113.9	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
PB-210	46.54	23	4.25*	8.548E-01	1.194E+02	1.195E+02	152.23
PO-210	46.54	23	4.25*	8.548E-01	1.194E+02	1.195E+02	152.23
BI-214	609.32	35	45.49*	1.322E+00	1.086E+01	1.086E+01	80.62
	1120.29	11	14.92	8.696E-01	1.600E+01	1.600E+01	135.84
	1764.49	4	15.30	6.128E-01	8.031E+00	8.031E+00	308.14
TH-230	67.67	25	0.38*	2.005E+00	6.077E+02	6.077E+02	163.14
TH-232	63.81	17	0.26*	1.854E+00	6.601E+02	6.601E+02	304.37
	140.88	16	0.02	3.122E+00	4.792E+03	4.792E+03	240.18
TH-234	63.29	17	3.70*	1.854E+00	4.639E+01	4.639E+01	304.37
	92.59	24	4.23	2.835E+00	3.758E+01	3.758E+01	199.10
U-238	63.29	17	3.70*	1.854E+00	4.639E+01	4.639E+01	304.37
	92.59	24	4.23	2.835E+00	3.758E+01	3.758E+01	199.10

Flag: "*" = Keyline

Total number of lines in spectrum 29
Number of unidentified lines 11
Number of lines tentatively identified by NID 18 62.07%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
PB-210	22.20Y	1.00	1.194E+02	1.195E+02	1.820E+02	152.23	
PO-210	22.20Y	1.00	1.194E+02	1.195E+02	1.820E+02	152.23	
BI-214	1600.00Y	1.00	1.086E+01	1.086E+01	0.875E+01	80.62	
TH-230	7.54E+04Y	1.00	6.077E+02	6.077E+02	9.913E+02	163.14	
TH-232	1.41E+10Y	1.00	6.601E+02	6.601E+02	20.09E+02	304.37	
TH-234	4.47E+09Y	1.00	4.639E+01	4.639E+01	14.12E+01	304.37	
U-238	4.47E+09Y	1.00	4.639E+01	4.639E+01	14.12E+01	304.37	
Total Activity :			1.610E+03	1.611E+03			

Grand Total Activity : 1.610E+03 1.611E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
2	90.19	23	93	1.29	180.45	178	12	3.23E-03	****	2.79E+00	T
2	139.71	51	82	1.38	279.52	275	12	7.09E-03	75.5	3.13E+00	T
7	196.30	14	42	1.37	392.72	391	12	1.89E-03	****	2.80E+00	
7	198.45	27	82	1.41	397.02	391	12	3.78E-03	****	2.78E+00	T
0	212.12	13	55	0.86	424.37	422	6	1.87E-03	****	2.69E+00	T
0	271.20	37	162	5.84	542.55	526	24	5.12E-03	****	2.31E+00	T
0	298.75	30	37	2.41	597.67	594	9	4.20E-03	81.8	2.17E+00	T
0	310.61	27	78	1.38	621.41	615	13	3.75E-03	****	2.11E+00	T
0	367.37	17	43	0.51	734.96	728	10	2.36E-03	****	1.88E+00	T
0	379.29	13	53	3.34	758.81	750	11	1.80E-03	****	1.84E+00	
0	557.62	35	50	10.84	1115.58	1100	26	4.88E-03	****	1.41E+00	
0	575.16	13	31	1.00	1150.68	1146	11	1.74E-03	****	1.38E+00	
0	585.17	8	28	1.26	1170.70	1164	12	1.13E-03	****	1.36E+00	
0	598.15	41	38	3.24	1196.68	1191	15	5.63E-03	73.1	1.34E+00	
0	806.11	7	18	3.47	1612.75	1606	12	9.11E-04	****	1.09E+00	
0	887.75	16	11	1.56	1776.10	1770	14	2.26E-03	98.1	1.02E+00	
0	919.17	11	11	0.83	1838.99	1833	12	1.56E-03	****	9.99E-01	
0	1046.84	9	3	1.25	2094.45	2091	6	1.27E-03	88.6	9.13E-01	T
0	1130.07	13	5	4.42	2261.00	2255	11	1.81E-03	88.5	8.65E-01	T
0	1718.60	8	7	4.24	3438.81	3430	14	1.11E-03	****	6.27E-01	
0	1986.43	6	9	3.97	3974.88	3966	13	8.33E-04	****	5.52E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372003.CNF;1  *
* Acquisition date   : 21-DEC-2016 08:38:51 Sensitivity      : 3.000          *
* Detector ID        : GAM24 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:05.55 Half life ratio  : *****        *
* Sample date        : 7-DEC-2016 07:59:00 Nuclide Library : LIQUID      *
* Sample ID          : G412372003 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER    *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000          *
*                                     Dry Weight    : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 13-JUN-2016 09:24:52 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
PB-210	8.835E+01
PO-210	8.835E+01
BI-214	3.220E+00
TH-230	5.092E+02
TH-232	7.978E+02
TH-234	5.680E+01
U-238	5.680E+01

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.347E+01	NOT IDENT.
NA-22	1.143E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.263E+00	FAIL ABUN
K-40	2.375E+01	NOT IDENT.
SC-46	1.707E+00	FAIL ABUN
V-48	2.531E+00	NOT IDENT.
CR-51	1.856E+01	NOT IDENT.
MN-52	6.942E+00	NOT IDENT.
MN-54	1.441E+00	NOT IDENT.
CO-56	1.151E+00	NOT IDENT.
CO-57	1.400E+00	NOT IDENT.
CO-58	1.794E+00	NOT IDENT.
FE-59	3.421E+00	NOT IDENT.
CO-60	1.281E+00	NOT IDENT.
ZN-65	2.928E+00	NOT IDENT.
CU-67	1.200E+02	FAIL ABUN
GE-68	5.546E+01	NOT IDENT.
AS-74	5.308E+00	NOT IDENT.
SE-75	2.081E+00	NOT IDENT.
BR-77	4.042E+02	NOT IDENT.
SR-82	1.287E+01	NOT IDENT.
RB-83	3.542E+00	NOT IDENT.
RB-84	2.946E+00	NOT IDENT.

KR-85	3.269E+02	NOT IDENT.
SR-85	1.698E+00	NOT IDENT.
RB-86	3.102E+01	NOT IDENT.
Y-88	1.770E+00	NOT IDENT.
Y-91	5.248E+02	NOT IDENT.
NB-94	1.284E+00	NOT IDENT.
NB-95	1.605E+00	NOT IDENT.
NB-95M	5.570E+00	NOT IDENT.
ZR-95	3.650E+00	NOT IDENT.
MO-99	3.417E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.833E+00	FAIL ABUN
RH-102M	1.395E+00	FAIL ABUN
RU-103	2.054E+00	FAIL ABUN
RH-106	1.102E+01	NOT IDENT.
RU-106	1.102E+01	NOT IDENT.
AG-108M	1.326E+00	NOT IDENT.
CD-109	3.689E+01	NOT IDENT.
AG-110M	1.769E+00	NOT IDENT.
SN-113	2.326E+00	NOT IDENT.
IN-114M	8.474E+00	NOT IDENT.
CD-115	3.677E+02	NOT IDENT.
SN-117M	2.862E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.500E+00	NOT IDENT.
SB-124	4.895E+00	NOT IDENT.
SB-125	4.505E+00	NOT IDENT.
TE-125M	5.375E+02	NOT IDENT.
I-126	8.226E+00	NOT IDENT.
SB-126	4.871E+00	NOT IDENT.
SN-126	3.692E+00	FAIL ABUN
SB-127	4.495E+01	NOT IDENT.
TE-129	2.589E+01	NOT IDENT.
I-131	6.040E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.795E+01	NOT IDENT.
BA-133	2.374E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.839E+00	NOT IDENT.
CS-135	7.789E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	4.086E+00	FAIL ABUN
BA-137M	1.848E+00	NOT IDENT.
CS-137	1.952E+00	NOT IDENT.
CE-139	1.469E+00	NOT IDENT.
BA-140	1.225E+01	NOT IDENT.
LA-140	3.906E+00	NOT IDENT.
CE-141	2.860E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.062E+01	NOT IDENT.
PM-144	1.769E+00	NOT IDENT.
PR-144	1.323E+02	NOT IDENT.
PM-146	1.877E+00	NOT IDENT.
ND-147	2.935E+01	FAIL ABUN
PM-147	4.164E+04	NOT IDENT.
PM-149	3.336E+03	NOT IDENT.
EU-152	4.907E+00	NOT IDENT.
GD-153	4.853E+00	NOT IDENT.
EU-154	3.318E+00	NOT IDENT.
EU-155	5.868E+00	NOT IDENT.
HO-166M	2.532E+00	NOT IDENT.
TM-171	6.699E+02	FAIL ABUN
LU-176	1.322E+00	NOT IDENT.
LU-177	4.981E+01	NOT IDENT.
HF-181	2.191E+00	NOT IDENT.
W-181	7.594E+00	FAIL ABUN
TA-182	7.152E+00	FAIL ABUN
RE-183	7.248E+00	FAIL ABUN
RE-184	5.568E+00	NOT IDENT.
RE-188	8.866E+00	FAIL ABUN
W-188	3.393E+02	FAIL ABUN
OS-191	9.271E+00	FAIL ABUN
IR-192	1.877E+00	NOT IDENT.
HG-203	1.809E+00	NOT IDENT.
BI-207	2.430E+00	NOT IDENT.
TL-208	1.989E+00	NOT IDENT.
BI-211	1.166E+01	NOT IDENT.
PB-211	3.726E+01	NOT IDENT.

BI-212	2.026E+01	NOT IDENT.
PB-212	3.606E+00	FAIL ABUN
BI-213	5.403E+00	NOT IDENT.
PB-214	4.608E+00	NOT IDENT.
RN-219	1.384E+01	FAIL ABUN
FR-221	9.725E+00	NOT IDENT.
RA-223	3.258E+01	NOT IDENT.
RA-224	2.939E+01	NOT IDENT.
RA-226	4.150E+01	NOT IDENT.
AC-227	1.254E+01	FAIL ABUN
TH-227	1.254E+01	FAIL ABUN
AC-228	7.150E+00	NOT IDENT.
RA-228	7.150E+00	NOT IDENT.
TH-228	3.606E+00	FAIL ABUN
TH-229	2.567E+01	FAIL ABUN
PA-231	1.865E+01	NOT IDENT.
TH-231	2.323E+01	NOT IDENT.
PA-233	3.318E+00	FAIL ABUN
PA-234	1.232E+01	NOT IDENT.
PA-234M	2.324E+02	NOT IDENT.
U-234	2.511E+03	NOT IDENT.
U-235	1.020E+01	NOT IDENT.
NP-237	3.318E+00	FAIL ABUN
NP-238	4.960E+02	NOT IDENT.
NP-239	1.539E+01	NOT IDENT.
AM-241	5.891E+00	NOT IDENT.
AM-242	3.729E+01	NOT IDENT.
AM-243	2.685E+00	NOT IDENT.
CM-243	5.258E+00	NOT IDENT.
BK-247	3.832E+00	NOT IDENT.
CM-247	1.163E+00	NOT IDENT.
CF-249	2.019E+00	NOT IDENT.
CF-251	6.328E+00	NOT IDENT.
CF-252	1.039E+04	NOT IDENT.
ANH-511	3.270E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372003.CNF;1
Acquisition date : 21-DEC-2016 08:38:51 Sensitivity : 3.000
Detector ID : GAM24 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:05.55 Half life ratio : *****
Sample date : 7-DEC-2016 07:59:00 Nuclide Library : LIQUID
Sample ID : G412372003 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 13-JUN-2016 09:24:52 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM24_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
PB-210	1.195E+02	1.786E+02	1.786E+02
PO-210	1.195E+02	1.786E+02	1.786E+02
BI-214	1.086E+01	8.592E+00	8.592E+00
TH-230	6.077E+02	9.768E+02	9.768E+02
TH-232	6.601E+02	1.971E+03	1.971E+03
TH-234	4.639E+01	1.387E+02	1.387E+02
U-238	4.639E+01	1.387E+02	1.387E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.753E+01	2.090E+01	2.235E+01	NOT IDENT.
NA-22	-8.187E-01	1.591E+00	1.634E+00	NOT IDENT.
NA-24	8.614E+06	1.284E+07	1.342E+07	SHORT HLIF
AL-26	-5.976E-02	1.554E+00	1.554E+00	FAIL ABUN
K-40	-2.546E+00	2.713E+01	2.715E+01	NOT IDENT.
SC-46	9.532E-01	1.891E+00	1.939E+00	FAIL ABUN
V-48	5.747E-02	2.915E+00	2.915E+00	NOT IDENT.
CR-51	2.532E+00	2.123E+01	2.126E+01	NOT IDENT.
MN-52	1.613E+00	7.679E+00	7.713E+00	NOT IDENT.
MN-54	-7.489E-01	1.929E+00	1.959E+00	NOT IDENT.
CO-56	-1.293E+00	1.772E+00	1.865E+00	NOT IDENT.
CO-57	5.429E-01	1.666E+00	1.683E+00	NOT IDENT.
CO-58	6.548E-01	2.297E+00	2.315E+00	NOT IDENT.
FE-59	-5.293E-01	4.094E+00	4.101E+00	NOT IDENT.
CO-60	4.094E-02	1.501E+00	1.501E+00	NOT IDENT.
ZN-65	-3.151E-01	3.974E+00	3.977E+00	NOT IDENT.
CU-67	-3.058E+02	1.741E+02	2.221E+02	FAIL ABUN
GE-68	2.891E+01	5.903E+01	6.045E+01	NOT IDENT.
AS-74	5.090E+00	6.219E+00	6.628E+00	NOT IDENT.
SE-75	1.589E-01	2.372E+00	2.373E+00	NOT IDENT.
BR-77	4.432E+01	4.794E+02	4.798E+02	NOT IDENT.
SR-82	4.366E+00	1.474E+01	1.487E+01	NOT IDENT.
RB-83	1.954E+00	3.934E+00	4.032E+00	NOT IDENT.

RB-84	1.070E+00	3.550E+00	3.582E+00	NOT IDENT.
KR-85	-1.696E+03	5.885E+02	9.647E+02	NOT IDENT.
SR-85	-8.806E+00	3.056E+00	5.010E+00	NOT IDENT.
RB-86	9.923E+00	3.408E+01	3.437E+01	NOT IDENT.
Y-88	1.584E-01	2.092E+00	2.093E+00	NOT IDENT.
Y-91	-2.823E+02	6.958E+02	7.073E+02	NOT IDENT.
NB-94	-1.595E+00	1.861E+00	1.995E+00	NOT IDENT.
NB-95	-9.523E-02	1.979E+00	1.980E+00	NOT IDENT.
NB-95M	-7.414E-01	6.423E+00	6.432E+00	NOT IDENT.
ZR-95	2.350E+00	4.043E+00	4.179E+00	NOT IDENT.
MO-99	-1.937E+02	4.593E+02	4.676E+02	FAIL ABUN
TC-99M	2.633E+17	1.966E+17	0.000E+00	SHORT HLIF
RH-101	-3.457E-01	2.281E+00	2.286E+00	FAIL ABUN
RH-102M	4.931E-01	1.580E+00	1.595E+00	FAIL ABUN
RU-103	-1.161E+00	2.590E+00	2.642E+00	FAIL ABUN
RH-106	-8.162E+00	1.499E+01	1.544E+01	NOT IDENT.
RU-106	-8.162E+00	1.499E+01	1.544E+01	NOT IDENT.
AG-108M	-3.348E-01	1.609E+00	1.616E+00	NOT IDENT.
CD-109	-9.280E+00	5.098E+01	5.115E+01	NOT IDENT.
AG-110M	-3.819E-02	2.470E+00	2.470E+00	NOT IDENT.
SN-113	3.418E-01	2.684E+00	2.689E+00	NOT IDENT.
IN-114M	1.505E-01	1.058E+01	1.058E+01	NOT IDENT.
CD-115	-2.975E+02	4.845E+02	5.028E+02	NOT IDENT.
SN-117M	1.687E+00	3.390E+00	3.474E+00	NOT IDENT.
I-123	1.976E+07	8.282E+07	8.330E+07	SHORT HLIF
TE-123M	3.924E-01	1.822E+00	1.830E+00	NOT IDENT.
SB-124	-1.539E+00	6.262E+00	6.300E+00	NOT IDENT.
SB-125	2.092E+00	5.022E+00	5.110E+00	NOT IDENT.
TE-125M	3.078E+02	6.288E+02	6.440E+02	NOT IDENT.
I-126	-1.645E+00	1.027E+01	1.030E+01	NOT IDENT.
SB-126	-1.733E+00	6.308E+00	6.356E+00	NOT IDENT.
SN-126	-1.217E+00	5.122E+00	5.151E+00	FAIL ABUN
SB-127	-3.028E+01	6.021E+01	6.174E+01	NOT IDENT.
TE-129	1.993E+01	2.820E+01	2.960E+01	NOT IDENT.
I-131	2.332E+00	7.513E+00	7.586E+00	NOT IDENT.
I-132	-1.000E+41	1.841E+41	0.000E+00	SHORT HLIF
TE-132	-8.304E+00	3.627E+01	3.646E+01	NOT IDENT.
BA-133	1.852E+00	2.574E+00	2.706E+00	NOT IDENT.
I-133	9.776E+04	1.464E+05	1.529E+05	SHORT HLIF
CS-134	1.077E+00	2.035E+00	2.092E+00	NOT IDENT.
CS-135	4.138E+00	8.557E+00	8.758E+00	NOT IDENT.
I-135	-5.215E+14	1.483E+16	0.000E+00	SHORT HLIF
CS-136	4.944E+00	4.314E+00	4.856E+00	FAIL ABUN
BA-137M	2.358E-01	2.197E+00	2.200E+00	NOT IDENT.
CS-137	2.491E-01	2.321E+00	2.324E+00	NOT IDENT.
CE-139	-9.548E-01	1.930E+00	1.978E+00	NOT IDENT.
BA-140	4.616E+00	1.390E+01	1.405E+01	NOT IDENT.
LA-140	-1.396E+00	5.039E+00	5.078E+00	NOT IDENT.
CE-141	-2.277E+00	3.765E+00	3.903E+00	NOT IDENT.
CE-143	-7.892E-01	4.050E+03	4.050E+03	SHORT HLIF
CE-144	-3.016E+00	1.335E+01	1.341E+01	NOT IDENT.
PM-144	2.052E+00	1.804E+00	2.027E+00	NOT IDENT.
PR-144	1.535E+02	1.349E+02	1.516E+02	NOT IDENT.
PM-146	-8.447E-01	2.340E+00	2.371E+00	NOT IDENT.
ND-147	2.327E+01	3.178E+01	3.347E+01	FAIL ABUN
PM-147	1.822E+04	4.936E+04	5.004E+04	NOT IDENT.
PM-149	7.103E+02	3.775E+03	3.789E+03	NOT IDENT.
EU-152	2.304E+00	5.450E+00	5.548E+00	NOT IDENT.
GD-153	2.943E-02	6.099E+00	6.099E+00	NOT IDENT.
EU-154	-2.185E+00	4.551E+00	4.656E+00	NOT IDENT.
EU-155	3.180E+00	6.871E+00	7.019E+00	NOT IDENT.
HO-166M	-1.288E+00	3.319E+00	3.370E+00	NOT IDENT.
TM-171	4.740E+02	8.091E+02	8.369E+02	FAIL ABUN
LU-176	-8.030E-01	1.808E+00	1.844E+00	NOT IDENT.
LU-177	1.322E+01	6.114E+01	6.143E+01	NOT IDENT.
HF-181	-1.207E+00	2.757E+00	2.810E+00	NOT IDENT.
W-181	-6.370E-01	9.115E+00	9.119E+00	FAIL ABUN
TA-182	3.229E+00	7.727E+00	7.862E+00	FAIL ABUN
RE-183	-4.832E+00	9.082E+00	9.339E+00	FAIL ABUN
RE-184	4.493E+00	5.891E+00	6.229E+00	NOT IDENT.
RE-188	7.086E+00	1.032E+01	1.080E+01	FAIL ABUN
W-188	4.878E+01	3.861E+02	3.867E+02	FAIL ABUN
OS-191	9.688E+00	1.059E+01	1.145E+01	FAIL ABUN
IR-192	6.085E-01	2.113E+00	2.131E+00	NOT IDENT.
HG-203	9.484E-01	1.986E+00	2.031E+00	NOT IDENT.
BI-207	-3.800E-01	2.889E+00	2.894E+00	NOT IDENT.
TL-208	-2.161E+00	2.718E+00	2.887E+00	NOT IDENT.
BI-211	-1.323E+01	1.554E+01	1.664E+01	NOT IDENT.

PB-211	4.015E+01	3.878E+01	4.280E+01	NOT IDENT.
BI-212	-1.377E+01	2.734E+01	2.803E+01	NOT IDENT.
PB-212	2.707E-01	4.283E+00	4.284E+00	FAIL ABUN
BI-213	-2.294E+00	6.651E+00	6.731E+00	NOT IDENT.
PB-214	-1.078E+00	5.721E+00	5.742E+00	NOT IDENT.
RN-219	-2.336E+01	2.018E+01	2.277E+01	FAIL ABUN
FR-221	-9.568E+00	1.337E+01	1.405E+01	NOT IDENT.
RA-223	-2.626E+00	3.803E+01	3.805E+01	NOT IDENT.
RA-224	-6.107E+01	3.880E+01	4.758E+01	NOT IDENT.
RA-226	-4.657E+01	5.493E+01	5.881E+01	NOT IDENT.
AC-227	-1.173E+00	1.448E+01	1.449E+01	FAIL ABUN
TH-227	-1.173E+00	1.448E+01	1.449E+01	FAIL ABUN
AC-228	-2.043E+00	9.067E+00	9.114E+00	NOT IDENT.
RA-228	-2.043E+00	9.067E+00	9.114E+00	NOT IDENT.
TH-228	2.707E-01	4.283E+00	4.284E+00	FAIL ABUN
TH-229	1.500E+01	3.289E+01	3.358E+01	FAIL ABUN
PA-231	-2.056E+01	2.759E+01	2.910E+01	NOT IDENT.
TH-231	5.611E+00	2.841E+01	2.852E+01	NOT IDENT.
PA-233	6.231E+00	8.570E+00	9.019E+00	FAIL ABUN
PA-234	2.657E+00	1.495E+01	1.500E+01	NOT IDENT.
PA-234M	1.887E+02	2.392E+02	2.539E+02	NOT IDENT.
U-234	1.833E+03	3.027E+03	3.137E+03	NOT IDENT.
U-235	3.749E+00	1.383E+01	1.393E+01	NOT IDENT.
NP-237	6.231E+00	8.570E+00	9.019E+00	FAIL ABUN
NP-238	-1.729E+02	6.122E+02	6.172E+02	NOT IDENT.
NP-239	2.171E+00	1.863E+01	1.866E+01	NOT IDENT.
AM-241	5.861E-01	7.538E+00	7.542E+00	NOT IDENT.
AM-242	-1.427E+01	4.807E+01	4.850E+01	NOT IDENT.
AM-243	-1.040E+00	3.405E+00	3.437E+00	NOT IDENT.
CM-243	8.331E-01	6.319E+00	6.331E+00	NOT IDENT.
BK-247	6.144E-01	4.338E+00	4.347E+00	NOT IDENT.
CM-247	-2.600E+00	1.853E+00	2.193E+00	NOT IDENT.
CF-249	-9.055E-01	2.469E+00	2.503E+00	NOT IDENT.
CF-251	-1.600E+00	8.059E+00	8.091E+00	NOT IDENT.
CF-252	2.260E+03	1.262E+04	1.266E+04	NOT IDENT.
ANH-511	-1.217E+01	3.780E+00	6.661E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	46.6934	88.03	67.9829	140.88	62.8166
46.54	50.9592	88.34	72.2682	143.76	42.7839
49.72	51.3420	88.47	72.2832	144.24	45.8655
51.35	67.3899	91.11	73.6547	145.44	66.5979
52.39	53.6407	91.27	73.6736	152.32	63.6517
53.20	54.7327	92.59	73.8263	152.43	65.9741
56.28	57.1042	93.31	73.9089	153.25	66.0350
57.36	0.0000	94.56	67.2546	154.21	63.7868
57.53	65.2918	94.65	62.9707	155.04	55.7197
57.53	65.2921	94.67	62.9725	156.02	72.0498
57.98	73.3971	97.43	74.3764	158.56	59.4326
59.32	63.1837	98.43	63.6931	158.97	0.0000
59.54	63.2124	98.44	63.6940	159.00	60.6273
61.49	79.6684	99.53	83.2618	162.33	70.2072
63.00	79.9104	100.11	77.9222	162.66	71.4025
63.29	79.9563	100.20	77.9326	163.33	65.5977
63.58	80.0025	102.03	68.3751	165.86	68.1236
63.81	80.0390	103.18	65.2286	176.31	61.7437
64.28	67.2135	103.37	54.3720	176.60	64.1374
64.99	67.3072	105.31	62.1581	177.52	58.2533
65.08	67.3188	106.12	68.7808	181.07	60.8481
66.73	83.2241	106.47	73.1841	184.41	92.1742
66.98	83.2644	109.28	62.5090	184.58	63.4559
67.24	83.3054	111.00	82.4461	185.72	57.5339
67.67	83.3742	111.76	81.4326	186.21	56.3626
67.75	97.0566	112.95	70.5435	190.27	49.3619
69.67	74.0858	116.24	76.3953	193.51	43.4773
70.83	104.1501	116.30	76.4016	198.01	63.0695
72.81	90.0400	116.74	73.1231	201.83	48.6884
72.87	90.0500	117.23	74.2796	205.31	47.6241
74.66	88.2645	119.76	73.4171	208.37	50.2065
74.82	90.3672	120.54	66.8115	210.85	45.8190
74.97	90.3911	120.90	70.1853	218.12	60.5285
77.11	94.9060	121.12	62.4048	222.11	60.7401
79.69	81.7128	121.22	62.4130	227.09	64.7366
80.12	78.6283	121.78	65.8047	227.38	64.7524
80.19	68.1525	122.06	61.3660	228.16	52.3347
80.57	68.1966	123.07	79.3219	228.18	52.3359
81.00	72.4465	123.68	65.9672	235.69	49.3245
81.07	72.4549	127.23	83.1151	235.96	64.3868
83.79	71.7322	129.43	65.3252	238.63	49.4451
84.00	71.7571	131.20	82.4012	238.98	47.7830
84.21	63.3376	133.02	65.6173	240.99	78.9300
85.43	81.4465	133.52	72.4502	242.00	56.3057
86.55	78.4172	136.00	59.0443	244.70	41.2695
86.94	83.4153	136.28	63.6075	250.62	46.5444
87.09	83.4357	136.47	60.5924	252.40	42.3731
87.57	72.1784	140.51	62.7889	252.80	45.7773

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	44.2019	383.85	28.7314	631.29	16.7253
260.90	42.2309	388.16	36.2372	632.98	13.5983
264.66	35.9365	388.63	28.8121	633.25	16.7383
265.00	35.9459	391.70	30.7253	634.78	12.5615
268.22	36.0348	400.66	23.3973	635.95	13.6147
269.46	36.0681	401.81	28.0957	636.99	13.6205
271.23	36.1168	402.40	29.0417	645.85	13.6691
273.65	42.6438	404.85	17.8245	657.76	19.0166
276.40	41.4375	410.95	31.0651	661.66	21.1621
277.37	39.3935	414.70	36.7902	664.57	0.0000
277.60	38.8824	423.72	18.0131	666.33	14.8408
278.00	37.1648	427.09	28.4943	666.50	18.0217
278.43	35.4479	427.87	20.9047	667.71	0.0000
279.20	31.1426	433.94	23.8337	677.62	12.7764
279.54	32.0159	440.45	33.4840	685.70	19.2246
280.46	42.4284	453.88	25.0505	695.00	20.3645
283.69	33.8497	459.60	20.2933	696.49	9.6519
284.31	37.3381	463.37	17.4280	696.51	9.6519
285.41	40.8448	468.07	22.3229	697.00	10.7263
285.90	38.2511	473.00	25.2981	697.49	18.2382
287.50	42.6472	475.06	18.5060	702.65	22.5731
290.67	34.0219	476.78	19.4971	706.68	24.7604
293.27	0.0000	477.60	28.2826	711.68	18.3350
295.22	28.8817	477.99	23.4106	720.70	12.9858
295.96	36.7773	482.18	31.2799	721.93	0.0000
299.98	34.2480	487.02	16.6572	722.78	9.7471
300.09	34.2504	492.35	18.6660	722.91	7.5813
300.13	34.2512	497.08	32.4951	723.31	7.5825
301.36	36.9183	511.00	35.6880	724.19	13.0024
302.85	34.3170	514.00	80.4133	727.33	18.4416
304.50	38.0566	520.40	16.9281	733.00	11.9574
304.85	35.6863	520.69	17.9268	735.93	8.7057
306.78	44.9985	522.65	0.0000	739.50	14.1648
308.46	38.4262	527.90	25.9810	744.23	20.7380
311.90	35.4175	529.59	21.0017	747.24	9.8339
316.51	37.3054	529.87	0.0000	752.31	9.8518
319.41	39.1589	531.02	18.0132	753.82	14.2378
320.08	35.6152	537.26	17.0616	756.73	13.1563
321.04	35.6380	546.56	0.0000	763.94	16.4874
323.87	38.3835	552.55	20.2124	765.80	13.1987
325.23	35.7381	563.25	18.2791	766.42	9.9009
328.76	36.7167	569.33	12.2188	766.84	8.8021
333.37	33.2354	569.50	12.2197	772.60	0.0000
334.37	36.8518	569.70	13.4428	776.52	8.8320
338.28	36.0449	583.19	23.5615	777.92	14.3589
338.32	35.1446	595.83	18.5398	778.90	12.1543
340.48	36.9986	600.60	20.6413	783.70	13.2813
340.55	36.0978	602.73	26.3415	785.37	14.3960
344.28	28.0427	604.72	18.6094	792.07	12.2094
345.93	36.2215	609.32	19.6819	795.86	10.0027
351.06	36.3395	610.33	19.6896	801.95	16.7053
351.93	30.9052	614.28	24.9121	802.10	16.7065
356.01	30.0734	618.01	18.7134	810.29	13.4023
364.49	34.3536	621.93	15.6195	810.45	11.7275
366.42	33.0183	630.19	0.0000	810.76	11.7288

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	12.3079	1129.67	7.3623		
818.51	14.5589	1131.51	0.0000		
832.01	11.2496	1173.23	7.4448		
834.85	15.7642	1189.05	4.6713		
836.80	0.0000	1204.77	7.5034		
846.77	12.4345	1221.41	7.5342		
856.80	15.8776	1231.02	8.4957		
860.56	15.8964	1235.36	7.5596		
871.09	11.3932	1238.28	6.6193		
873.19	6.8403	1260.41	0.0000		
875.33	0.0000	1274.44	7.6304		
880.51	10.2843	1274.54	7.6309		
881.60	9.6021	1291.59	5.7458		
883.24	10.2935	1298.22	0.0000		
884.68	8.5815	1312.11	12.5089		
889.28	8.0211	1332.49	4.8337		
894.76	12.6261	1365.19	11.6865		
898.04	11.4901	1368.63	0.0000		
903.28	6.9053	1384.29	6.8462		
911.20	8.0758	1408.01	7.8652		
923.98	5.2119	1434.09	2.9661		
926.36	8.1134	1457.56	0.0000		
935.54	18.5964	1460.82	6.9603		
937.49	12.7926	1489.16	6.0015		
944.13	17.4792	1596.21	9.1994		
946.00	9.3275	1620.50	7.1893		
949.00	7.0017	1678.03	0.0000		
954.55	0.0000	1690.97	10.4089		
964.08	11.4290	1764.49	4.2205		
968.97	11.4452	1770.23	7.0414		
983.53	8.8416	1771.35	6.3387		
984.45	9.7281	1791.20	0.0000		
996.26	7.0991	1808.65	3.1906		
1001.03	9.7747	1836.06	4.2747		
1004.73	16.9016				
1025.87	7.1592				
1028.54	12.5380				
1037.84	8.9789				
1038.76	0.0000				
1046.59	7.2002				
1048.07	10.0844				
1050.41	7.2080				
1063.66	15.3720				
1077.00	8.1678				
1077.34	8.1689				
1083.85	10.0016				
1085.87	5.4584				
1099.25	10.9556				
1111.64	7.3276				
1112.07	10.9929				
1112.84	8.2463				
1115.54	8.8020				
1120.29	9.1803				
1120.55	9.1809				
1121.30	9.1827				

VAX/VMS Nuclide Identification Report Generated 22-DEC-2016 08:40:41.41

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372004.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM25.CNF;371
Background date    : 18-DEC-2016 13:12:31
Sample date       : 7-DEC-2016 15:17:00. Acquisition date : 21-DEC-2016 08:39:11
Sample ID        : G412372004. Sample quantity : 2.00000E+00 LITER
Detector name    : GAM25. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.54 0.0%
Energy tolerance : 2.00000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID  : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.72*	35	135	0.97	92.93	89	10	4.84E-03	71.1	
2	0	53.40*	84	193	1.42	106.30	100	14	1.17E-02	37.1	
3	0	63.21*	16	97	1.03	125.92	123	6	2.19E-03	126.3	
4	0	67.25*	48	208	3.50	133.99	130	11	6.63E-03	61.7	
5	0	76.61*	27	114	1.26	152.72	151	6	3.75E-03	69.4	
6	0	92.60*	14	169	1.09	184.69	180	10	1.99E-03	199.1	
7	0	139.58	73	118	2.00	278.63	273	11	1.02E-02	30.9	
8	0	153.08	18	117	2.72	305.63	299	10	2.49E-03	117.1	
9	0	174.14	21	100	0.59	347.74	344	9	2.98E-03	87.0	
10	0	198.24*	24	71	0.67	395.93	392	7	3.31E-03	68.4	
11	0	297.35	29	81	0.66	594.16	590	10	4.05E-03	61.6	
12	0	317.36	22	45	1.09	634.18	629	10	3.02E-03	61.7	
13	0	351.99*	49	67	1.08	703.44	698	11	6.77E-03	36.6	
14	0	452.64	17	18	1.26	904.76	901	8	2.34E-03	50.0	
15	0	466.96	19	22	2.80	933.40	927	10	2.59E-03	52.8	
16	0	596.08	16	7	0.53	1191.70	1188	7	2.19E-03	37.7	
17	0	610.38*	51	28	1.22	1220.31	1214	13	7.06E-03	28.3	
18	0	673.49	28	26	2.88	1346.55	1338	20	3.91E-03	47.5	
19	0	747.25	10	21	4.84	1494.12	1483	15	1.44E-03	103.2	
20	0	868.22	12	7	1.40	1736.16	1731	9	1.71E-03	47.4	
21	0	874.44	5	9	1.26	1748.61	1744	7	6.55E-04	114.8	
22	0	884.94	11	4	1.31	1769.61	1765	8	1.56E-03	42.8	
23	0	963.27	7	1	1.33	1926.35	1923	6	9.11E-04	48.8	
24	0	1002.19*	8	8	1.87	2004.23	1998	11	1.14E-03	89.5	
25	0	1032.25	4	3	1.25	2064.38	2060	6	5.56E-04	84.8	
26	0	1120.81	15	3	2.55	2241.62	2236	11	2.13E-03	33.0	
27	0	1241.91	17	4	3.04	2483.97	2477	14	2.42E-03	33.0	
28	0	1388.51	17	0	3.56	2777.41	2771	14	2.36E-03	24.3	
29	0	1490.26	15	3	5.17	2981.09	2973	16	2.02E-03	40.1	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 22-DEC-2016 08:40:43

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372004.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 7-DEC-2016 15:17:00	Acquisition date	: 21-DEC-2016 08:39:11
Sample ID	: G412372004	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA25	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.54 0.0%
Energy tolerance	: 2.00 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Linear	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	16	59.00*	1.078E+00	4.650E+00	7.955E+00	75.34
	634.78	-----	15.40	1.028E+00	-----	Line Not Found	-----
PM-146	453.88	17	65.00*	1.334E+00	3.649E+00	3.666E+00	99.97
	633.25	-----	2.15	1.030E+00	-----	Line Not Found	-----
	735.93	-----	22.50	9.194E-01	-----	Line Not Found	-----
	747.24	10	34.00	9.089E-01	6.318E+00	6.348E+00	206.50
RE-188	61.49	16	1.39	2.934E+00	7.250E+01	8.312E+01	252.55
	63.00	16	2.38	2.934E+00	4.234E+01	4.855E+01	252.55
	155.04	18	15.61*	2.875E+00	7.505E+00	8.605E+00	234.12
	477.99	-----	1.08	1.278E+00	-----	Line Not Found	-----
	632.98	-----	1.37	1.030E+00	-----	Line Not Found	-----
IR-192	295.96	29	28.72	1.859E+00	1.024E+01	1.166E+01	123.23
	308.46	-----	29.68	1.807E+00	-----	Line Not Found	-----
	316.51	22	82.71*	1.767E+00	2.790E+00	3.175E+00	123.39
	468.07	19	47.81	1.302E+00	5.630E+00	6.407E+00	105.64
PB-210	46.54	35	4.25*	2.538E+00	6.068E+01	6.075E+01	142.27
PO-210	46.54	35	4.25*	2.538E+00	6.068E+01	6.075E+01	142.27
BI-211	72.87	-----	1.23	3.014E+00	-----	Line Not Found	-----
	351.06	49	12.92*	1.627E+00	4.350E+01	4.355E+01	73.20
BI-214	609.32	51	45.49*	1.059E+00	1.981E+01	1.981E+01	56.65
	1120.29	15	14.92	6.682E-01	2.881E+01	2.881E+01	66.07
	1764.49	-----	15.30	4.569E-01	-----	Line Not Found	-----
TH-230	67.67	48	0.38*	2.969E+00	7.937E+02	7.937E+02	123.45
TH-232	63.81	16	0.26*	2.934E+00	3.876E+02	3.876E+02	252.55
	140.88	73	0.02	2.980E+00	2.312E+04	2.312E+04	61.88
TH-234	63.29	16	3.70*	2.934E+00	2.724E+01	2.724E+01	252.55
	92.59	14	4.23	3.127E+00	2.035E+01	2.035E+01	398.20
U-234	53.20	84	0.12*	2.811E+00	4.687E+03	4.687E+03	74.24
	120.90	-----	0.04	3.094E+00	-----	Line Not Found	-----
U-238	63.29	16	3.70*	2.934E+00	2.724E+01	2.724E+01	252.55
	92.59	14	4.23	3.127E+00	2.035E+01	2.035E+01	398.20
AM-243	43.53	-----	5.90	2.230E+00	-----	Line Not Found	-----
	74.66	27	67.20*	3.042E+00	2.480E+00	2.480E+00	138.77

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372004.CNF;1
Acquisition date : 21-DEC-2016 08:39:11 Sensitivity : 3.000
Detector ID : GAM25 Energy tolerance: 2.000
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.54 Half life ratio : *****
Sample date : 7-DEC-2016 15:17:00 Analyst initials: MXR1
Sample ID : G412372004 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 1-AUG-2016 11:35:29 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM25_2LMB.CNF;11

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
AS-74	7.955E+00	5.873E+00	8.599E+00
PM-146	3.666E+00	3.592E+00	6.016E+00
RE-188	8.605E+00	1.974E+01	1.772E+01
IR-192	3.175E+00	3.839E+00	4.181E+00
PB-210	6.075E+01	8.470E+01	5.495E+01
PO-210	6.075E+01	8.470E+01	5.495E+01
BI-211	4.355E+01	3.124E+01	2.660E+01
BI-214	1.981E+01	1.100E+01	9.192E+00
TH-230	7.937E+02	9.603E+02	6.147E+02
TH-232	3.876E+02	9.593E+02	1.006E+03
TH-234	2.724E+01	6.741E+01	6.626E+01
U-234	4.687E+03	3.410E+03	1.855E+03
U-238	2.724E+01	6.741E+01	6.626E+01
AM-243	2.480E+00	3.372E+00	3.837E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-6.461E+00	2.237E+01	4.077E+01	NOT IDENT.
NA-22	8.238E-01	2.273E+00	4.971E+00	NOT IDENT.
NA-24	0.000E+00	9.510E+06	0.000E+00	SHORT HLIF
AL-26	2.953E+00	2.963E+00	7.326E+00	NOT IDENT.
K-40	-2.878E+01	3.117E+01	5.437E+01	NOT IDENT.
SC-46	1.954E+00	2.802E+00	5.810E+00	FAIL ABUN
V-48	4.490E-01	2.639E+00	5.962E+00	NOT IDENT.
CR-51	6.366E+00	2.451E+01	4.424E+01	NOT IDENT.
MN-52	-2.886E+00	1.721E+01	3.423E+01	NOT IDENT.
MN-54	-1.059E+00	2.323E+00	4.298E+00	NOT IDENT.
CO-56	4.463E-01	2.384E+00	4.935E+00	NOT IDENT.
CO-57	-6.310E-01	1.481E+00	2.626E+00	NOT IDENT.
CO-58	-1.212E-01	2.463E+00	4.899E+00	NOT IDENT.
FE-59	-2.412E+00	6.086E+00	1.104E+01	NOT IDENT.
CO-60	-9.753E-02	2.107E+00	4.288E+00	NOT IDENT.
ZN-65	-4.556E+00	5.733E+00	7.538E+00	NOT IDENT.

CU-67	-2.406E+02	1.554E+02	2.505E+02	FAIL ABUN
GE-68	-5.996E+01	7.483E+01	1.244E+02	NOT IDENT.
SE-75	2.017E+00	2.966E+00	5.621E+00	NOT IDENT.
BR-77	4.563E+02	4.646E+02	8.859E+02	NOT IDENT.
SR-82	1.561E+01	2.285E+01	4.905E+01	NOT IDENT.
RB-83	5.311E+00	4.691E+00	1.023E+01	NOT IDENT.
RB-84	-5.896E-01	4.690E+00	8.060E+00	NOT IDENT.
KR-85	-1.410E+03	7.676E+02	1.150E+03	NOT IDENT.
SR-85	-7.300E+00	3.973E+00	5.953E+00	NOT IDENT.
RB-86	-3.669E+01	4.474E+01	7.396E+01	NOT IDENT.
Y-88	1.428E+00	2.062E+00	5.661E+00	NOT IDENT.
Y-91	2.275E+02	1.140E+03	2.346E+03	NOT IDENT.
NB-94	-2.424E-01	2.196E+00	4.033E+00	NOT IDENT.
NB-95	-1.460E+00	2.973E+00	4.826E+00	NOT IDENT.
NB-95M	1.900E+00	7.192E+00	1.309E+01	NOT IDENT.
ZR-95	5.725E-01	4.672E+00	8.947E+00	NOT IDENT.
MO-99	3.428E+02	5.332E+02	1.066E+03	FAIL ABUN
TC-99M	0.000E+00	1.041E+17	0.000E+00	SHORT HLIF
RH-101	7.659E-01	2.032E+00	3.806E+00	FAIL ABUN
RH-102M	5.082E-02	2.065E+00	3.921E+00	NOT IDENT.
RU-103	-2.837E-01	2.423E+00	4.573E+00	FAIL ABUN
RH-106	-3.255E+00	2.186E+01	4.010E+01	NOT IDENT.
RU-106	-3.255E+00	2.186E+01	4.010E+01	NOT IDENT.
AG-108M	7.200E-01	2.167E+00	4.249E+00	NOT IDENT.
CD-109	-2.629E+01	3.366E+01	5.930E+01	NOT IDENT.
AG-110M	3.753E+00	3.150E+00	6.756E+00	FAIL ABUN
SN-113	-7.044E-01	3.062E+00	5.684E+00	NOT IDENT.
IN-114M	9.990E+00	1.115E+01	2.160E+01	NOT IDENT.
CD-115	1.423E+02	4.765E+02	9.503E+02	NOT IDENT.
SN-117M	-1.391E+00	3.671E+00	6.052E+00	NOT IDENT.
I-123	0.000E+00	6.228E+07	0.000E+00	SHORT HLIF
TE-123M	-1.070E+00	2.007E+00	3.259E+00	NOT IDENT.
SB-124	1.134E-01	5.263E+00	1.163E+01	NOT IDENT.
SB-125	-1.398E+00	6.509E+00	1.203E+01	NOT IDENT.
TE-125M	-2.562E+02	5.744E+02	1.022E+03	NOT IDENT.
I-126	3.745E+00	1.371E+01	2.471E+01	NOT IDENT.
SB-126	-1.106E-01	8.874E+00	1.657E+01	NOT IDENT.
SN-126	-1.640E+00	3.311E+00	5.976E+00	FAIL ABUN
SB-127	3.189E+01	6.573E+01	1.344E+02	NOT IDENT.
TE-129	-1.031E+01	3.009E+01	5.495E+01	NOT IDENT.
I-131	7.463E+00	6.202E+00	1.358E+01	NOT IDENT.
I-132	0.000E+00	1.509E+41	0.000E+00	SHORT HLIF
TE-132	2.427E+00	3.639E+01	6.457E+01	NOT IDENT.
BA-133	1.147E+00	2.875E+00	5.279E+00	NOT IDENT.
I-133	0.000E+00	1.319E+05	0.000E+00	SHORT HLIF
CS-134	-3.501E-01	2.443E+00	4.810E+00	NOT IDENT.
CS-135	-2.224E+00	9.157E+00	1.572E+01	NOT IDENT.
I-135	0.000E+00	1.026E+16	0.000E+00	SHORT HLIF
CS-136	2.438E+00	4.547E+00	1.062E+01	FAIL ABUN
BA-137M	-2.435E-01	2.457E+00	4.520E+00	NOT IDENT.
CS-137	-2.573E-01	2.595E+00	4.774E+00	NOT IDENT.
CE-139	-3.750E-01	2.085E+00	3.389E+00	NOT IDENT.
BA-140	1.399E+01	1.606E+01	3.432E+01	NOT IDENT.
LA-140	-3.363E+00	5.701E+00	1.034E+01	NOT IDENT.
CE-141	-1.119E+00	3.906E+00	6.584E+00	NOT IDENT.
CE-143	-1.357E+03	4.741E+03	7.247E+03	NOT IDENT.
CE-144	1.024E+01	1.297E+01	2.494E+01	NOT IDENT.
PM-144	-1.149E+00	2.410E+00	4.122E+00	NOT IDENT.
PR-144	-8.898E+01	1.798E+02	3.064E+02	FAIL ABUN
ND-147	-5.810E+00	3.441E+01	6.380E+01	FAIL ABUN
PM-147	4.684E+03	4.323E+04	8.027E+04	NOT IDENT.
PM-149	-1.389E+03	4.228E+03	7.076E+03	NOT IDENT.
EU-152	3.144E+00	6.344E+00	1.277E+01	FAIL ABUN
GD-153	-3.644E+00	4.651E+00	7.485E+00	NOT IDENT.
EU-154	2.693E+00	6.539E+00	1.439E+01	FAIL ABUN
EU-155	-4.301E+00	5.558E+00	9.664E+00	NOT IDENT.
HO-166M	-3.235E+00	4.379E+00	7.085E+00	NOT IDENT.
TM-171	0.000E+00	8.825E+02	6.179E+02	FAIL ABUN
LU-176	-1.375E-01	1.800E+00	3.114E+00	NOT IDENT.
LU-177	3.774E+00	5.589E+01	1.008E+02	NOT IDENT.
HF-181	-3.450E+00	3.018E+00	4.802E+00	NOT IDENT.
W-181	-2.162E+00	4.414E+00	7.594E+00	FAIL ABUN
TA-182	-1.850E+00	7.982E+00	1.554E+01	FAIL ABUN
RE-183	-7.777E-01	4.403E+00	7.801E+00	FAIL ABUN
RE-184	2.523E-01	7.791E+00	1.561E+01	NOT IDENT.
W-188	-2.643E+02	5.230E+02	8.528E+02	FAIL ABUN
OS-191	-1.141E+00	9.552E+00	1.723E+01	FAIL ABUN
HG-203	2.348E-01	2.565E+00	4.535E+00	NOT IDENT.

BI-207	1.357E+00	2.616E+00	5.944E+00	FAIL ABUN
TL-208	3.963E-01	2.908E+00	5.345E+00	NOT IDENT.
PB-211	2.552E+00	4.892E+01	9.361E+01	NOT IDENT.
BI-212	-1.492E+01	3.520E+01	6.061E+01	NOT IDENT.
PB-212	2.198E+00	4.681E+00	8.534E+00	FAIL ABUN
BI-213	1.147E+00	6.492E+00	1.277E+01	NOT IDENT.
PB-214	0.000E+00	1.132E+01	1.438E+01	FAIL ABUN
RN-219	8.456E+00	2.690E+01	5.319E+01	NOT IDENT.
FR-221	-2.439E+00	1.348E+01	2.344E+01	NOT IDENT.
RA-223	1.568E+01	4.028E+01	8.057E+01	FAIL ABUN
RA-224	-9.790E+01	5.022E+01	7.044E+01	NOT IDENT.
RA-226	-4.283E+00	5.494E+01	9.874E+01	NOT IDENT.
AC-227	-1.532E+01	1.898E+01	3.018E+01	NOT IDENT.
TH-227	-1.532E+01	1.898E+01	3.018E+01	NOT IDENT.
AC-228	4.472E+00	1.031E+01	2.133E+01	NOT IDENT.
RA-228	4.472E+00	1.031E+01	2.133E+01	NOT IDENT.
TH-228	2.198E+00	4.681E+00	8.534E+00	FAIL ABUN
TH-229	1.149E+01	3.299E+01	6.084E+01	NOT IDENT.
PA-231	-3.936E+01	3.701E+01	4.866E+01	NOT IDENT.
TH-231	4.697E+00	2.224E+01	3.926E+01	NOT IDENT.
PA-233	-1.038E+00	4.424E+00	7.940E+00	NOT IDENT.
PA-234	2.279E+00	1.779E+01	3.663E+01	FAIL ABUN
PA-234M	2.515E+02	4.411E+02	7.404E+02	FAIL ABUN
U-235	-1.249E+01	1.444E+01	2.154E+01	NOT IDENT.
NP-237	-1.038E+00	4.424E+00	7.940E+00	NOT IDENT.
NP-238	-6.274E+01	5.803E+02	1.198E+03	NOT IDENT.
NP-239	8.256E+00	1.602E+01	3.062E+01	NOT IDENT.
AM-241	3.541E-01	3.453E+00	6.686E+00	NOT IDENT.
AM-242	-1.683E+01	3.735E+01	6.225E+01	NOT IDENT.
CM-243	-1.201E+00	5.627E+00	1.030E+01	NOT IDENT.
BK-247	1.699E+00	5.604E+00	1.016E+01	NOT IDENT.
CM-247	-1.202E+00	2.495E+00	4.493E+00	NOT IDENT.
CF-249	-4.697E-02	2.608E+00	4.985E+00	NOT IDENT.
CF-251	-3.729E+00	9.009E+00	1.420E+01	NOT IDENT.
CF-252	-2.719E+03	1.023E+04	1.727E+04	NOT IDENT.
ANH-511	-1.142E+01	4.487E+00	7.918E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.72	104	135	0.97	92.93	89	10	1.44E-02	23.1	
2	0	53.40	92	193	1.42	106.30	100	14	1.27E-02	33.7	
3	0	63.21	118	97	1.03	125.92	123	6	1.64E-02	16.0	
4	0	67.25	56	208	3.50	133.99	130	11	7.81E-03	51.7	
5	0	76.61	41	114	1.26	152.72	151	6	5.64E-03	44.6	
6	0	92.60	158	169	1.09	184.69	180	10	2.20E-02	17.3	
7	0	139.58	73	118	2.00	278.63	273	11	1.02E-02	30.9	
8	0	153.08	18	117	2.72	305.63	299	10	2.49E-03	117.1	
9	0	174.14	21	100	0.59	347.74	344	9	2.98E-03	87.0	
10	0	185.72	47	106	0.64	370.90	367	8	6.46E-03	41.1	
11	0	198.24	33	71	0.67	395.93	392	7	4.56E-03	46.4	
12	0	297.35	29	81	0.66	594.16	590	10	4.05E-03	61.6	
13	0	317.36	22	45	1.09	634.18	629	10	3.02E-03	61.7	
14	0	351.99	54	67	1.08	703.44	698	11	7.52E-03	32.1	
15	0	452.64	17	18	1.26	904.76	901	8	2.34E-03	50.0	
16	0	466.96	19	22	2.80	933.40	927	10	2.59E-03	52.8	
17	0	512.07	126	54	2.21	1023.63	1016	19	1.74E-02	17.7	
18	0	596.08	16	7	0.53	1191.70	1188	7	2.19E-03	37.7	
19	0	610.38	65	28	1.22	1220.31	1214	13	9.01E-03	21.1	
20	0	673.49	28	26	2.88	1346.55	1338	20	3.91E-03	47.5	
21	0	747.25	10	21	4.84	1494.12	1483	15	1.44E-03	103.2	
22	0	868.22	12	7	1.40	1736.16	1731	9	1.71E-03	47.4	
23	0	874.44	5	9	1.26	1748.61	1744	7	6.55E-04	114.8	
24	0	884.94	11	4	1.31	1769.61	1765	8	1.56E-03	42.8	
25	0	963.27	7	1	1.33	1926.35	1923	6	9.11E-04	48.8	
26	0	1002.19	16	8	1.87	2004.23	1998	11	2.20E-03	43.2	
27	0	1032.25	4	3	1.25	2064.38	2060	6	5.56E-04	84.8	
28	0	1120.81	15	3	2.55	2241.62	2236	11	2.13E-03	33.0	
29	0	1241.91	17	4	3.04	2483.97	2477	14	2.42E-03	33.0	
30	0	1388.51	17	0	3.56	2777.41	2771	14	2.36E-03	24.3	
31	0	1490.26	15	3	5.17	2981.09	2973	16	2.02E-03	40.1	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	16	59.00*	1.078E+00	4.650E+00	7.955E+00	75.34
	634.78	-----	15.40	1.028E+00	-----	Line Not Found	-----
PM-146	453.88	17	65.00*	1.334E+00	3.649E+00	3.666E+00	99.97
	633.25	-----	2.15	1.030E+00	-----	Line Not Found	-----
	735.93	-----	22.50	9.194E-01	-----	Line Not Found	-----
	747.24	10	34.00	9.089E-01	6.318E+00	6.348E+00	206.50
RE-188	61.49	16	1.39	2.934E+00	7.250E+01	8.312E+01	252.55
	63.00	16	2.38	2.934E+00	4.234E+01	4.855E+01	252.55
	155.04	18	15.61*	2.875E+00	7.505E+00	8.605E+00	234.12
	477.99	-----	1.08	1.278E+00	-----	Line Not Found	-----
	632.98	-----	1.37	1.030E+00	-----	Line Not Found	-----
IR-192	295.96	29	28.72	1.859E+00	1.024E+01	1.166E+01	123.23
	308.46	-----	29.68	1.807E+00	-----	Line Not Found	-----
	316.51	22	82.71*	1.767E+00	2.790E+00	3.175E+00	123.39
	468.07	19	47.81	1.302E+00	5.630E+00	6.407E+00	105.64
PB-210	46.54	35	4.25*	2.538E+00	6.068E+01	6.075E+01	142.27
PO-210	46.54	35	4.25*	2.538E+00	6.068E+01	6.075E+01	142.27
BI-211	72.87	-----	1.23	3.014E+00	-----	Line Not Found	-----
	351.06	49	12.92*	1.627E+00	4.350E+01	4.355E+01	73.20
BI-214	609.32	51	45.49*	1.059E+00	1.981E+01	1.981E+01	56.65
	1120.29	15	14.92	6.682E-01	2.881E+01	2.881E+01	66.07
	1764.49	-----	15.30	4.569E-01	-----	Line Not Found	-----
TH-230	67.67	48	0.38*	2.969E+00	7.937E+02	7.937E+02	123.45
TH-232	63.81	16	0.26*	2.934E+00	3.876E+02	3.876E+02	252.55
	140.88	73	0.02	2.980E+00	2.312E+04	2.312E+04	61.88
TH-234	63.29	16	3.70*	2.934E+00	2.724E+01	2.724E+01	252.55
	92.59	14	4.23	3.127E+00	2.035E+01	2.035E+01	398.20
U-234	53.20	84	0.12*	2.811E+00	4.687E+03	4.687E+03	74.24
	120.90	-----	0.04	3.094E+00	-----	Line Not Found	-----
U-238	63.29	16	3.70*	2.934E+00	2.724E+01	2.724E+01	252.55
	92.59	14	4.23	3.127E+00	2.035E+01	2.035E+01	398.20
AM-243	43.53	-----	5.90	2.230E+00	-----	Line Not Found	-----
	74.66	27	67.20*	3.042E+00	2.480E+00	2.480E+00	138.77

Flag: "*" = Keyline

Total number of lines in spectrum 29
Number of unidentified lines 6
Number of lines tentatively identified by NID 23 79.31%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AS-74	17.77D	1.71	4.650E+00	7.955E+00	5.993E+00	75.34	
PM-146	5.53Y	1.00	3.649E+00	3.666E+00	3.665E+00	99.97	
RE-188	69.78D	1.15	7.505E+00	8.605E+00	20.15E+00	234.12	
IR-192	73.83D	1.14	2.790E+00	3.175E+00	3.917E+00	123.39	
PB-210	22.20Y	1.00	6.068E+01	6.075E+01	8.643E+01	142.27	
PO-210	22.20Y	1.00	6.068E+01	6.075E+01	8.643E+01	142.27	
BI-211	21.77Y	1.00	4.350E+01	4.355E+01	3.188E+01	73.20	
BI-214	1600.00Y	1.00	1.981E+01	1.981E+01	1.122E+01	56.65	
TH-230	7.54E+04Y	1.00	7.937E+02	7.937E+02	9.799E+02	123.45	
TH-232	1.41E+10Y	1.00	3.876E+02	3.876E+02	9.789E+02	252.55	
TH-234	4.47E+09Y	1.00	2.724E+01	2.724E+01	6.878E+01	252.55	
U-234	2.45E+05Y	1.00	4.687E+03	4.687E+03	3.479E+03	74.24	
U-238	4.47E+09Y	1.00	2.724E+01	2.724E+01	6.878E+01	252.55	
AM-243	7370.00Y	1.00	2.480E+00	2.480E+00	3.441E+00	138.77	
Total Activity :			6.128E+03	6.133E+03			

Grand Total Activity : 6.128E+03 6.133E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	174.14	21	100	0.59	347.74	344	9	2.98E-03	****	2.70E+00	
0	198.24	24	71	0.67	395.93	392	7	3.31E-03	****	2.50E+00	T
0	673.49	28	26	2.88	1346.55	1338	20	3.91E-03	94.9	9.83E-01	
0	868.22	12	7	1.40	1736.16	1731	9	1.71E-03	94.7	8.12E-01	
0	874.44	5	9	1.26	1748.61	1744	7	6.55E-04	****	8.08E-01	T
0	884.94	11	4	1.31	1769.61	1765	8	1.56E-03	85.6	8.00E-01	T
0	963.27	7	1	1.33	1926.35	1923	6	9.11E-04	97.6	7.51E-01	T
0	1002.19	8	8	1.87	2004.23	1998	11	1.14E-03	****	7.28E-01	T
0	1032.25	4	3	1.25	2064.38	2060	6	5.56E-04	****	7.12E-01	
0	1241.91	17	4	3.04	2483.97	2477	14	2.42E-03	66.1	6.16E-01	
0	1388.51	17	0	3.56	2777.41	2771	14	2.36E-03	48.5	5.63E-01	
0	1490.26	15	3	5.17	2981.09	2973	16	2.02E-03	80.3	5.30E-01	T

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                               *
*                                     2040 Savage Road                               *
*                                     Charleston, SC 29407                           *
*****
*
*                                     DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372004.CNF;1        *
* Acquisition date   : 21-DEC-2016 08:39:11 Sensitivity      : 3.000                *
* Detector ID        : GAM25 Energy tolerance: 2.000          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000    *
* Elapsed real time  : 0 02:00:00.54 Half life ratio  : *****          *
* Sample date        : 7-DEC-2016 15:17:00 Nuclide Library : LIQUID          *
* Sample ID          : G412372004 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER          *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                       *
*
* Eff. Cal. date     : 1-AUG-2016 11:35:29 Eff. Geometry    : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM25_2LMB.CNF;11          *
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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
AS-74	3.618E+00
PM-146	2.714E+00
RE-188	8.209E+00
IR-192	1.894E+00
PB-210	2.512E+01
PO-210	2.512E+01
BI-211	1.210E+01
BI-214	4.071E+00
TH-230	2.850E+02
TH-232	4.702E+02
TH-234	3.081E+01
U-234	8.523E+02
U-238	3.081E+01
AM-243	1.795E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.812E+01	NOT IDENT.
NA-22	2.061E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	3.094E+00	NOT IDENT.
K-40	2.278E+01	NOT IDENT.
SC-46	2.549E+00	FAIL ABUN
V-48	2.357E+00	NOT IDENT.
CR-51	2.007E+01	NOT IDENT.
MN-52	1.457E+01	NOT IDENT.
MN-54	1.836E+00	NOT IDENT.
CO-56	2.121E+00	NOT IDENT.
CO-57	1.214E+00	NOT IDENT.
CO-58	2.108E+00	NOT IDENT.
FE-59	4.698E+00	NOT IDENT.
CO-60	1.706E+00	NOT IDENT.
ZN-65	2.992E+00	NOT IDENT.
CU-67	1.172E+02	FAIL ABUN

GE-68	5.034E+01	NOT IDENT.
SE-75	2.582E+00	NOT IDENT.
BR-77	4.154E+02	NOT IDENT.
SR-82	2.175E+01	NOT IDENT.
RB-83	4.591E+00	NOT IDENT.
RB-84	3.417E+00	NOT IDENT.
KR-85	5.263E+02	NOT IDENT.
SR-85	2.724E+00	NOT IDENT.
RB-86	2.987E+01	NOT IDENT.
Y-88	2.195E+00	NOT IDENT.
Y-91	9.910E+02	NOT IDENT.
NB-94	1.750E+00	NOT IDENT.
NB-95	2.083E+00	NOT IDENT.
NB-95M	6.013E+00	NOT IDENT.
ZR-95	3.873E+00	NOT IDENT.
MO-99	4.596E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.781E+00	FAIL ABUN
RH-102M	1.752E+00	NOT IDENT.
RU-103	2.000E+00	FAIL ABUN
RH-106	1.754E+01	NOT IDENT.
RU-106	1.754E+01	NOT IDENT.
AG-108M	1.922E+00	NOT IDENT.
CD-109	2.741E+01	NOT IDENT.
AG-110M	2.926E+00	FAIL ABUN
SN-113	2.559E+00	NOT IDENT.
IN-114M	1.003E+01	NOT IDENT.
CD-115	4.188E+02	NOT IDENT.
SN-117M	2.818E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.514E+00	NOT IDENT.
SB-124	4.498E+00	NOT IDENT.
SB-125	5.402E+00	NOT IDENT.
TE-125M	4.758E+02	NOT IDENT.
I-126	1.073E+01	NOT IDENT.
SB-126	7.192E+00	NOT IDENT.
SN-126	2.768E+00	FAIL ABUN
SB-127	5.874E+01	NOT IDENT.
TE-129	2.416E+01	NOT IDENT.
I-131	6.149E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.979E+01	NOT IDENT.
BA-133	2.386E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.058E+00	NOT IDENT.
CS-135	7.073E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	4.379E+00	FAIL ABUN
BA-137M	1.977E+00	NOT IDENT.
CS-137	2.088E+00	NOT IDENT.
CE-139	1.573E+00	NOT IDENT.
BA-140	1.528E+01	NOT IDENT.
LA-140	4.044E+00	NOT IDENT.
CE-141	3.053E+00	NOT IDENT.
CE-143	3.302E+03	NOT IDENT.
CE-144	1.169E+01	NOT IDENT.
PM-144	1.788E+00	NOT IDENT.
PR-144	1.328E+02	FAIL ABUN
ND-147	2.799E+01	FAIL ABUN
PM-147	3.725E+04	NOT IDENT.
PM-149	3.220E+03	NOT IDENT.
EU-152	5.809E+00	FAIL ABUN
GD-153	3.454E+00	NOT IDENT.
EU-154	5.989E+00	FAIL ABUN
EU-155	4.449E+00	NOT IDENT.
HO-166M	3.045E+00	NOT IDENT.
TM-171	2.895E+02	FAIL ABUN
LU-176	1.408E+00	NOT IDENT.
LU-177	4.614E+01	NOT IDENT.
HF-181	2.091E+00	NOT IDENT.
W-181	3.500E+00	FAIL ABUN
TA-182	6.136E+00	FAIL ABUN
RE-183	3.608E+00	FAIL ABUN
RE-184	6.699E+00	NOT IDENT.
W-188	3.883E+02	FAIL ABUN
OS-191	8.035E+00	FAIL ABUN
HG-203	2.073E+00	NOT IDENT.
BI-207	2.483E+00	FAIL ABUN

TL-208	2.397E+00	NOT IDENT.
PB-211	4.221E+01	NOT IDENT.
BI-212	2.615E+01	NOT IDENT.
PB-212	4.000E+00	FAIL ABUN
BI-213	5.668E+00	NOT IDENT.
PB-214	6.753E+00	FAIL ABUN
RN-219	2.398E+01	NOT IDENT.
FR-221	1.077E+01	NOT IDENT.
RA-223	3.663E+01	FAIL ABUN
RA-224	3.236E+01	NOT IDENT.
RA-226	4.667E+01	NOT IDENT.
AC-227	1.381E+01	NOT IDENT.
TH-227	1.381E+01	NOT IDENT.
AC-228	9.407E+00	NOT IDENT.
RA-228	9.407E+00	NOT IDENT.
TH-228	4.000E+00	FAIL ABUN
TH-229	2.816E+01	NOT IDENT.
PA-231	2.176E+01	NOT IDENT.
TH-231	1.840E+01	NOT IDENT.
PA-233	3.603E+00	NOT IDENT.
PA-234	1.554E+01	FAIL ABUN
PA-234M	3.289E+02	FAIL ABUN
U-235	9.988E+00	NOT IDENT.
NP-237	3.603E+00	NOT IDENT.
NP-238	4.763E+02	NOT IDENT.
NP-239	1.429E+01	NOT IDENT.
AM-241	3.101E+00	NOT IDENT.
AM-242	2.889E+01	NOT IDENT.
CM-243	4.763E+00	NOT IDENT.
BK-247	4.663E+00	NOT IDENT.
CM-247	2.006E+00	NOT IDENT.
CF-249	2.238E+00	NOT IDENT.
CF-251	6.554E+00	NOT IDENT.
CF-252	8.010E+03	NOT IDENT.
ANH-511	3.752E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372004.CNF;1
Acquisition date : 21-DEC-2016 08:39:11 Sensitivity : 3.000
Detector ID : GAM25 Energy tolerance: 2.000
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.54 Half life ratio : *****
Sample date : 7-DEC-2016 15:17:00 Nuclide Library : LIQUID
Sample ID : G412372004 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 1-AUG-2016 11:35:29 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM25_2LMB.CNF;11

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
AS-74	7.955E+00	5.907E+00	5.907E+00
PM-146	3.666E+00	3.601E+00	3.601E+00
RE-188	8.605E+00	1.975E+01	1.975E+01
IR-192	3.175E+00	3.841E+00	3.841E+00
PB-210	6.075E+01	8.484E+01	8.484E+01
PO-210	6.075E+01	8.484E+01	8.484E+01
BI-211	4.355E+01	3.130E+01	3.130E+01
BI-214	1.981E+01	1.103E+01	1.103E+01
TH-230	7.937E+02	9.693E+02	9.693E+02
TH-232	3.876E+02	9.604E+02	9.604E+02
TH-234	2.724E+01	6.768E+01	6.768E+01
U-234	4.687E+03	3.432E+03	3.432E+03
U-238	2.724E+01	6.768E+01	6.768E+01
AM-243	2.480E+00	3.376E+00	3.376E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-6.461E+00	2.237E+01	2.256E+01	NOT IDENT.
NA-22	8.238E-01	2.273E+00	2.304E+00	NOT IDENT.
NA-24	-5.865E+06	9.514E+06	9.874E+06	SHORT HLIF
AL-26	2.953E+00	2.968E+00	3.253E+00	NOT IDENT.
K-40	-2.878E+01	3.121E+01	3.380E+01	NOT IDENT.
SC-46	1.954E+00	2.803E+00	2.938E+00	FAIL ABUN
V-48	4.490E-01	2.639E+00	2.647E+00	NOT IDENT.
CR-51	6.366E+00	2.451E+01	2.468E+01	NOT IDENT.
MN-52	-2.886E+00	1.721E+01	1.726E+01	NOT IDENT.
MN-54	-1.059E+00	2.323E+00	2.372E+00	NOT IDENT.
CO-56	4.463E-01	2.384E+00	2.393E+00	NOT IDENT.
CO-57	-6.310E-01	1.481E+00	1.508E+00	NOT IDENT.
CO-58	-1.212E-01	2.463E+00	2.464E+00	NOT IDENT.
FE-59	-2.412E+00	6.088E+00	6.185E+00	NOT IDENT.
CO-60	-9.753E-02	2.107E+00	2.107E+00	NOT IDENT.
ZN-65	-4.556E+00	5.736E+00	6.092E+00	NOT IDENT.

CU-67	-2.406E+02	1.559E+02	1.899E+02	FAIL ABUN
GE-68	-5.996E+01	7.486E+01	7.959E+01	NOT IDENT.
SE-75	2.017E+00	2.967E+00	3.103E+00	NOT IDENT.
BR-77	4.563E+02	4.652E+02	5.086E+02	NOT IDENT.
SR-82	1.561E+01	2.286E+01	2.392E+01	NOT IDENT.
RB-83	5.311E+00	4.747E+00	5.316E+00	NOT IDENT.
RB-84	-5.896E-01	4.690E+00	4.698E+00	NOT IDENT.
KR-85	-1.410E+03	7.697E+02	9.983E+02	NOT IDENT.
SR-85	-7.300E+00	3.985E+00	5.168E+00	NOT IDENT.
RB-86	-3.669E+01	4.476E+01	4.772E+01	NOT IDENT.
Y-88	1.428E+00	2.064E+00	2.162E+00	NOT IDENT.
Y-91	2.275E+02	1.140E+03	1.145E+03	NOT IDENT.
NB-94	-2.424E-01	2.196E+00	2.199E+00	NOT IDENT.
NB-95	-1.460E+00	2.974E+00	3.046E+00	NOT IDENT.
NB-95M	1.900E+00	7.194E+00	7.245E+00	NOT IDENT.
ZR-95	5.725E-01	4.672E+00	4.679E+00	NOT IDENT.
MO-99	3.428E+02	5.336E+02	5.555E+02	FAIL ABUN
TC-99M	1.716E+17	1.054E+17	0.000E+00	SHORT HLIF
RH-101	7.659E-01	2.037E+00	2.066E+00	FAIL ABUN
RH-102M	5.082E-02	2.065E+00	2.065E+00	NOT IDENT.
RU-103	-2.837E-01	2.423E+00	2.427E+00	FAIL ABUN
RH-106	-3.255E+00	2.186E+01	2.191E+01	NOT IDENT.
RU-106	-3.255E+00	2.186E+01	2.191E+01	NOT IDENT.
AG-108M	7.200E-01	2.167E+00	2.191E+00	NOT IDENT.
CD-109	-2.629E+01	3.373E+01	3.576E+01	NOT IDENT.
AG-110M	3.753E+00	3.156E+00	3.581E+00	FAIL ABUN
SN-113	-7.044E-01	3.062E+00	3.079E+00	NOT IDENT.
IN-114M	9.990E+00	1.117E+01	1.204E+01	NOT IDENT.
CD-115	1.423E+02	4.766E+02	4.809E+02	NOT IDENT.
SN-117M	-1.391E+00	3.671E+00	3.724E+00	NOT IDENT.
I-123	-3.254E+07	6.230E+07	6.400E+07	SHORT HLIF
TE-123M	-1.070E+00	2.008E+00	2.065E+00	NOT IDENT.
SB-124	1.134E-01	5.263E+00	5.264E+00	NOT IDENT.
SB-125	-1.398E+00	6.510E+00	6.540E+00	NOT IDENT.
TE-125M	-2.562E+02	5.745E+02	5.860E+02	NOT IDENT.
I-126	3.745E+00	1.372E+01	1.382E+01	NOT IDENT.
SB-126	-1.106E-01	8.874E+00	8.874E+00	NOT IDENT.
SN-126	-1.640E+00	3.313E+00	3.394E+00	FAIL ABUN
SB-127	3.189E+01	6.577E+01	6.733E+01	NOT IDENT.
TE-129	-1.031E+01	3.013E+01	3.049E+01	NOT IDENT.
I-131	7.463E+00	6.211E+00	7.064E+00	NOT IDENT.
I-132	1.000E+41	1.732E+41	0.000E+00	SHORT HLIF
TE-132	2.427E+00	3.639E+01	3.640E+01	NOT IDENT.
BA-133	1.147E+00	2.876E+00	2.922E+00	NOT IDENT.
I-133	-6.164E+04	1.320E+05	1.349E+05	SHORT HLIF
CS-134	-3.501E-01	2.443E+00	2.449E+00	NOT IDENT.
CS-135	-2.224E+00	9.159E+00	9.213E+00	NOT IDENT.
I-135	-1.677E+15	1.027E+16	0.000E+00	SHORT HLIF
CS-136	2.438E+00	4.551E+00	4.682E+00	FAIL ABUN
BA-137M	-2.435E-01	2.457E+00	2.459E+00	NOT IDENT.
CS-137	-2.573E-01	2.595E+00	2.598E+00	NOT IDENT.
CE-139	-3.750E-01	2.086E+00	2.093E+00	NOT IDENT.
BA-140	1.399E+01	1.607E+01	1.727E+01	NOT IDENT.
LA-140	-3.363E+00	5.703E+00	5.901E+00	NOT IDENT.
CE-141	-1.119E+00	3.906E+00	3.939E+00	NOT IDENT.
CE-143	-1.357E+03	4.741E+03	4.781E+03	NOT IDENT.
CE-144	1.024E+01	1.299E+01	1.378E+01	NOT IDENT.
PM-144	-1.149E+00	2.411E+00	2.466E+00	NOT IDENT.
PR-144	-8.898E+01	1.798E+02	1.842E+02	FAIL ABUN
ND-147	-5.810E+00	3.441E+01	3.451E+01	FAIL ABUN
PM-147	4.684E+03	4.323E+04	4.328E+04	NOT IDENT.
PM-149	-1.389E+03	4.232E+03	4.278E+03	NOT IDENT.
EU-152	3.144E+00	6.346E+00	6.503E+00	FAIL ABUN
GD-153	-3.644E+00	4.656E+00	4.937E+00	NOT IDENT.
EU-154	2.693E+00	6.540E+00	6.652E+00	FAIL ABUN
EU-155	-4.301E+00	5.566E+00	5.894E+00	NOT IDENT.
HO-166M	-3.235E+00	4.383E+00	4.619E+00	NOT IDENT.
TM-171	1.213E+03	8.889E+02	1.044E+03	FAIL ABUN
LU-176	-1.375E-01	1.800E+00	1.801E+00	NOT IDENT.
LU-177	3.774E+00	5.589E+01	5.592E+01	NOT IDENT.
HF-181	-3.450E+00	3.021E+00	3.398E+00	NOT IDENT.
W-181	-2.162E+00	4.448E+00	4.554E+00	FAIL ABUN
TA-182	-1.850E+00	7.982E+00	8.025E+00	FAIL ABUN
RE-183	-7.777E-01	4.404E+00	4.418E+00	FAIL ABUN
RE-184	2.523E-01	7.791E+00	7.791E+00	NOT IDENT.
W-188	-2.643E+02	5.239E+02	5.372E+02	FAIL ABUN
OS-191	-1.141E+00	9.552E+00	9.566E+00	FAIL ABUN
HG-203	2.348E-01	2.565E+00	2.568E+00	NOT IDENT.

BI-207	1.357E+00	2.617E+00	2.687E+00	FAIL ABUN
TL-208	3.963E-01	2.908E+00	2.913E+00	NOT IDENT.
PB-211	2.552E+00	4.892E+01	4.894E+01	NOT IDENT.
BI-212	-1.492E+01	3.520E+01	3.584E+01	NOT IDENT.
PB-212	2.198E+00	4.682E+00	4.786E+00	FAIL ABUN
BI-213	1.147E+00	6.492E+00	6.512E+00	NOT IDENT.
PB-214	1.579E+01	1.134E+01	1.339E+01	FAIL ABUN
RN-219	8.456E+00	2.692E+01	2.719E+01	NOT IDENT.
FR-221	-2.439E+00	1.348E+01	1.353E+01	NOT IDENT.
RA-223	1.568E+01	4.029E+01	4.091E+01	FAIL ABUN
RA-224	-9.790E+01	5.049E+01	6.706E+01	NOT IDENT.
RA-226	-4.283E+00	5.494E+01	5.497E+01	NOT IDENT.
AC-227	-1.532E+01	1.909E+01	2.030E+01	NOT IDENT.
TH-227	-1.532E+01	1.909E+01	2.030E+01	NOT IDENT.
AC-228	4.472E+00	1.032E+01	1.051E+01	NOT IDENT.
RA-228	4.472E+00	1.032E+01	1.051E+01	NOT IDENT.
TH-228	2.198E+00	4.682E+00	4.786E+00	FAIL ABUN
TH-229	1.149E+01	3.299E+01	3.340E+01	NOT IDENT.
PA-231	-3.936E+01	3.796E+01	4.190E+01	NOT IDENT.
TH-231	4.697E+00	2.225E+01	2.235E+01	NOT IDENT.
PA-233	-1.038E+00	4.424E+00	4.449E+00	NOT IDENT.
PA-234	2.279E+00	1.798E+01	1.801E+01	FAIL ABUN
PA-234M	2.515E+02	4.412E+02	4.555E+02	FAIL ABUN
U-235	-1.249E+01	1.445E+01	1.551E+01	NOT IDENT.
NP-237	-1.038E+00	4.424E+00	4.449E+00	NOT IDENT.
NP-238	-6.274E+01	5.803E+02	5.810E+02	NOT IDENT.
NP-239	8.256E+00	1.603E+01	1.645E+01	NOT IDENT.
AM-241	3.541E-01	3.453E+00	3.456E+00	NOT IDENT.
AM-242	-1.683E+01	3.747E+01	3.823E+01	NOT IDENT.
CM-243	-1.201E+00	5.629E+00	5.655E+00	NOT IDENT.
BK-247	1.699E+00	5.615E+00	5.667E+00	NOT IDENT.
CM-247	-1.202E+00	2.503E+00	2.561E+00	NOT IDENT.
CF-249	-4.697E-02	2.608E+00	2.608E+00	NOT IDENT.
CF-251	-3.729E+00	9.018E+00	9.174E+00	NOT IDENT.
CF-252	-2.719E+03	1.052E+04	1.059E+04	NOT IDENT.
ANH-511	-1.142E+01	4.511E+00	6.846E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	38.9003	88.03	65.8588	140.88	45.8633
46.54	38.0246	88.34	67.3473	143.76	61.5173
49.72	41.5717	88.47	68.5156	144.24	56.0102
51.35	37.3953	91.11	57.8342	145.44	46.2972
52.39	43.0805	91.27	57.8613	152.32	56.9261
53.20	43.2353	92.59	58.0847	152.43	56.9382
56.28	44.8326	93.31	58.2058	153.25	57.0304
57.36	56.2952	94.56	55.7998	154.21	49.4523
57.53	56.3352	94.65	60.4651	155.04	53.5482
57.53	56.3358	94.67	60.4688	156.02	49.6254
57.98	54.3880	97.43	58.8908	158.56	61.6609
59.32	52.6238	98.43	48.4779	158.97	0.0000
59.54	52.6711	98.44	48.4792	159.00	61.7121
61.49	44.7571	99.53	60.1184	162.33	58.0289
63.00	58.6344	100.11	60.2139	162.66	53.9899
63.29	58.7005	100.20	54.9146	163.33	57.1168
63.58	58.7663	102.03	55.1880	165.86	50.2112
63.81	67.7464	103.18	55.3583	176.31	38.9791
64.28	66.2902	103.37	55.3867	176.60	37.6057
64.99	66.4701	105.31	60.1616	177.52	57.1966
65.08	66.4927	106.12	66.5883	181.07	51.5825
66.73	54.1621	106.47	59.4439	184.41	91.0476
66.98	54.2129	109.28	70.7631	184.58	59.3035
67.24	54.2648	111.00	58.3159	185.72	58.3561
67.67	54.3514	111.76	49.2984	186.21	49.9088
67.75	54.3670	112.95	48.5298	190.27	39.5553
69.67	54.7494	116.24	47.0783	193.51	45.1390
70.83	63.6010	116.30	47.0849	198.01	41.1357
72.81	75.7158	116.74	54.5293	201.83	57.7205
72.87	82.2459	117.23	56.4447	205.31	55.8443
74.66	69.9193	119.76	54.9263	208.37	38.5045
74.82	69.9570	120.54	47.5666	210.85	37.5455
74.97	69.9928	120.90	47.6071	218.12	46.8853
77.11	76.8347	121.12	53.2353	222.11	44.9133
79.69	61.1040	121.22	53.2479	227.09	47.4967
80.12	68.9774	121.78	62.6719	227.38	50.9106
80.19	52.3013	122.06	58.9693	228.16	46.4366
80.57	55.1507	123.07	54.4175	228.18	46.4378
81.00	50.2066	123.68	51.6758	235.69	37.7710
81.07	50.2180	127.23	62.5170	235.96	50.3802
83.79	58.2514	129.43	66.6365	238.63	39.0728
84.00	54.9107	131.20	70.7221	238.98	28.7437
84.21	51.5656	133.02	57.5720	240.99	88.7728
85.43	73.8238	133.52	57.6352	242.00	48.4875
86.55	55.3456	136.00	55.3702	244.70	59.0917
86.94	63.9364	136.28	55.4034	250.62	49.0464
87.09	63.9656	136.47	55.4262	252.40	52.6726
87.57	63.2048	140.51	45.8274	252.80	48.0156

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	55.2868	383.85	30.6008	631.29	16.1816
260.90	39.0505	388.16	26.2034	632.98	18.3572
264.66	30.9131	388.63	31.6383	633.25	14.0405
265.00	36.8740	391.70	30.8194	634.78	10.8101
268.22	31.0504	400.66	21.9292	635.95	11.8992
269.46	37.0783	401.81	23.7810	636.99	14.0717
271.23	29.9675	402.40	30.1990	645.85	17.4089
273.65	34.8650	404.85	27.5128	657.76	18.6256
276.40	43.4257	410.95	27.6593	661.66	17.5690
277.37	26.5688	414.70	25.8985	664.57	17.5983
277.60	26.5762	423.72	27.0300	666.33	11.5604
278.00	43.5092	427.09	24.3025	666.50	11.5613
278.43	45.9507	427.87	28.9950	667.71	0.0000
279.20	36.3098	433.94	25.3812	677.62	14.9584
279.54	32.6920	440.45	18.9014	685.70	11.1304
280.46	41.2134	453.88	28.6597	695.00	15.6623
283.69	36.5048	459.60	22.0721	696.49	20.1533
284.31	40.1845	463.37	15.8810	696.51	20.1541
285.41	24.3860	468.07	17.3881	697.00	20.1592
285.90	40.2600	473.00	21.3331	697.49	19.0441
287.50	35.4464	475.06	23.3091	702.65	15.7278
290.67	44.1650	476.78	25.2843	706.68	22.5171
293.27	41.0166	477.60	25.3002	711.68	21.4492
295.22	37.8195	477.99	23.3608	720.70	14.7461
295.96	34.5599	482.18	30.2703	721.93	17.0264
299.98	26.4518	487.02	28.4206	722.78	6.8135
300.09	26.4551	492.35	18.6942	722.91	6.8140
300.13	26.4564	497.08	17.7722	723.31	13.6309
301.36	44.7067	511.00	43.8836	724.19	19.3194
302.85	26.1225	514.00	77.9619	727.33	18.2129
304.50	27.4167	520.40	12.0483	733.00	12.5590
304.85	32.4143	520.69	17.0719	735.93	13.7212
306.78	31.2347	522.65	0.0000	739.50	6.8735
308.46	30.8755	527.90	15.1398	744.23	12.6324
311.90	36.1854	529.59	21.2205	747.24	10.3513
316.51	31.1472	529.87	0.0000	752.31	10.3784
319.41	29.1332	531.02	19.2188	753.82	12.6946
320.08	27.8867	537.26	12.1904	756.73	12.7134
321.04	30.4534	546.56	0.0000	763.94	15.0799
323.87	27.9995	552.55	16.4232	765.80	16.2547
325.23	28.8895	563.25	17.5741	766.42	18.5827
328.76	22.1740	569.33	19.7205	766.84	16.2633
333.37	28.2788	569.50	15.5701	772.60	0.0000
334.37	29.1655	569.70	11.4198	776.52	13.1319
338.28	27.5605	583.19	16.7559	777.92	14.8932
338.32	24.9773	595.83	9.5006	778.90	14.9004
340.48	30.2113	600.60	17.9996	783.70	14.0571
340.55	30.2134	602.73	15.9027	785.37	12.3102
344.28	26.8620	604.72	27.0678	792.07	10.5864
345.93	35.5856	609.32	20.2262	795.86	13.2573
351.06	34.0226	610.33	20.2385	801.95	8.8644
351.93	34.0520	614.28	20.8211	802.10	8.8651
356.01	23.6689	618.01	16.0529	810.29	11.5698
364.49	15.0255	621.93	18.2361	810.45	11.5710
366.42	24.7934	630.19	0.0000	810.76	13.3530

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	6.2463	1129.67	10.1465		
818.51	18.7634	1131.51	0.0000		
832.01	11.6892	1173.23	9.2719		
834.85	16.2065	1189.05	12.4292		
836.80	0.0000	1204.77	8.3301		
846.77	10.8640	1221.41	6.2823		
856.80	10.0047	1231.02	6.3025		
860.56	17.3104	1235.36	8.4150		
871.09	3.6616	1238.28	5.0540		
873.19	10.9951	1260.41	0.0000		
875.33	0.0000	1274.44	5.3262		
880.51	5.8832	1274.54	5.3265		
881.60	11.7723	1291.59	11.7815		
883.24	8.8356	1298.22	0.0000		
884.68	12.8934	1312.11	11.8574		
889.28	9.8434	1332.49	5.4236		
894.76	15.7258	1365.19	4.3821		
898.04	12.9695	1368.63	0.0000		
903.28	12.0705	1384.29	8.8140		
911.20	13.9751	1408.01	5.5472		
923.98	10.3048	1434.09	7.8246		
926.36	12.1907	1457.56	0.0000		
935.54	12.2379	1460.82	9.9118		
937.49	12.2482	1489.16	11.8066		
944.13	8.5029	1596.21	8.4116		
946.00	9.4553	1620.50	7.5242		
949.00	5.6801	1678.03	0.0000		
954.55	0.0000	1690.97	3.8291		
964.08	13.7175	1764.49	7.7953		
968.97	6.6815	1770.23	11.7094		
983.53	3.8406	1771.35	11.7123		
984.45	5.7631	1791.20	0.0000		
996.26	10.8086	1808.65	2.9537		
1001.03	7.7351	1836.06	0.9908		
1004.73	15.4927				
1025.87	12.2739				
1028.54	7.8188				
1037.84	9.8083				
1038.76	0.0000				
1046.59	3.9365				
1048.07	3.9387				
1050.41	11.8264				
1063.66	4.9524				
1077.00	12.9405				
1077.34	12.9421				
1083.85	13.9718				
1085.87	6.9910				
1099.25	15.0540				
1111.64	6.0487				
1112.07	7.0581				
1112.84	6.0513				
1115.54	12.9219				
1120.29	14.1572				
1120.55	14.1589				
1121.30	19.4227				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 10:40:49.16

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372005.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM28.CNF;278
Background date    : 18-DEC-2016 13:12:41
Sample date       : 7-DEC-2016 10:01:00. Acquisition date : 21-DEC-2016 08:39:29
Sample ID        : G412372005. Sample quantity : 2.00000E+00 LITER
Detector name    : GAM28. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.46 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.59*	29	96	1.32	93.22	89	10	4.04E-03	70.8	
2	0	58.32	18	78	0.98	116.71	114	7	2.57E-03	82.2	
3	0	63.84*	64	196	3.96	127.76	121	15	8.93E-03	50.9	
4	0	142.67	122	228	8.21	285.52	276	21	1.69E-02	32.4	
5	0	155.00	42	101	2.55	310.20	306	9	5.77E-03	46.4	
6	0	186.07*	3	106	1.16	372.39	367	10	4.07E-04	798.7	
7	0	198.10*	20	112	1.07	396.47	392	8	2.73E-03	103.0	
8	0	240.53	71	204	4.00	481.40	469	22	9.87E-03	52.6	
9	0	270.75	19	40	0.88	541.87	540	6	2.64E-03	58.7	
10	0	351.62*	25	56	1.15	703.75	699	10	3.52E-03	62.6	
11	0	367.73	16	32	0.49	735.98	733	7	2.22E-03	64.5	
12	0	481.39	30	81	12.12	963.47	945	25	4.15E-03	83.2	
13	0	525.14	19	37	0.60	1051.04	1043	14	2.60E-03	76.1	
14	0	583.60*	22	61	11.99	1168.05	1153	27	3.02E-03	106.6	
15	0	595.97	25	30	0.83	1192.80	1187	10	3.45E-03	45.9	
16	0	609.40*	40	23	1.64	1219.68	1215	9	5.52E-03	32.0	
17	0	762.14	21	9	0.55	1525.40	1518	13	2.87E-03	38.0	
18	0	799.90	13	6	0.98	1600.97	1597	8	1.84E-03	42.0	
19	0	803.80*	12	7	1.39	1608.77	1605	9	1.60E-03	61.4	
20	0	854.62	24	5	4.04	1710.49	1705	11	3.33E-03	27.7	
21	0	917.54	7	8	1.11	1836.43	1834	8	9.72E-04	79.5	
22	0	930.71	13	2	1.41	1862.79	1857	10	1.77E-03	36.1	
23	0	954.32	14	2	1.39	1910.04	1905	9	1.90E-03	33.5	
24	0	972.79	19	34	8.39	1947.00	1935	21	2.57E-03	84.6	
25	0	996.55	15	2	1.37	1994.56	1990	11	2.07E-03	33.3	
26	0	1073.74	4	5	1.27	2149.06	2145	6	6.17E-04	89.3	
27	0	1331.26	9	3	4.66	2664.48	2658	13	1.30E-03	50.9	
28	0	1447.76	11	4	1.39	2897.66	2890	15	1.56E-03	48.1	
29	0	1912.45	9	4	4.80	3827.73	3820	14	1.31E-03	53.3	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 10:40:50

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Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372005.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : MXR1
Sample date       : 7-DEC-2016 10:01:00   Acquisition date : 21-DEC-2016 08:39:29
Sample ID        : G412372005             Sample quantity  : 2.0000 LITER
Sample type      : LIQUID                 Sample geometry   : 
Detector name    : GAMMA28                Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00          Elapsed real time: 0 02:00:00.46    0.0%
Energy tolerance : 1.50 keV               Half life ratio  : 10.00
Errors propagated: No                     Systematic Error : 0.00 %
Efficiency type  : Linear                  Efficiencies at  : Peak Energy
Abundance limit  : 75.00
    
```

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
U-235	185.72	RA-226	186.21

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
AS-74	595.83	59.00*	1.275E+00	6.202E+00	1.070E+01	91.75	OK
	634.78	15.40	1.221E+00	----- Line	Not Found	-----	Absent
RE-188	61.49	1.39	9.107E-01	----- Line	Not Found	-----	Absent
	63.00	2.38	1.028E+00	4.936E+02	5.672E+02	101.80	OK
	155.04	15.61*	2.763E+00	1.808E+01	2.077E+01	92.71	OK
	477.99	1.08	1.486E+00	----- Line	Not Found	-----	Absent
	632.98	1.37	1.223E+00	----- Line	Not Found	-----	Absent
TL-208	277.37	6.60	2.157E+00	----- Line	Not Found	-----	Absent
	583.19	85.00*	1.293E+00	3.707E+00	3.759E+00	213.28	OK
	860.56	12.50	9.925E-01	----- Line	Not Found	-----	Absent
PB-210	46.54	4.25*	2.087E-01	6.153E+02	6.160E+02	141.66	OK
PO-210	46.54	4.25*	2.087E-01	6.153E+02	6.160E+02	141.66	OK
BI-211	72.87	1.23	1.451E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	1.841E+00	2.000E+01	2.002E+01	125.11	OK
RA-224	240.99	4.10*	2.351E+00	1.383E+02	1.403E+02	105.14	OK
TH-232	63.81	0.26*	1.028E+00	4.519E+03	4.519E+03	101.80	OK
	140.88	0.02	2.766E+00	----- Line	Not Found	-----	Absent
U-235	143.76	10.96*	2.768E+00	7.546E+01	7.546E+01	64.82	OK
	163.33	5.08	2.744E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	2.651E+00	3.624E-01	3.624E-01	1597.43	OK
	205.31	5.01	2.549E+00	----- Line	Not Found	-----	Absent
AM-241	59.54	35.90*	7.515E-01	1.286E+01	1.286E+01	164.31	OK

Flag: "*" = Keyline

```

*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372005.CNF;1  *
* Acquisition date   : 21-DEC-2016 08:39:29 Sensitivity      : 3.000          *
* Detector ID        : GAM28 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:00.46 Half life ratio : *****      *
* Sample date        : 7-DEC-2016 10:01:00 Analyst initials: MXR1      *
* Sample ID          : G412372005 Sample Quantity : 2.0000E+00 LITER  *
* Batch Number       : 1624165 Wet Weight : 0.00000        *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000         *
* Nuclide Library    : LIQUID.NLB;10
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 1-AUG-2016 12:45:28 Eff. Geometry    : 2LMB      *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM28_2LMB.CNF;8
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
AS-74	1.070E+01	9.621E+00	1.208E+01
RE-188	2.077E+01	1.887E+01	2.209E+01
TL-208	3.759E+00	7.858E+00	4.595E+00
PB-210	6.160E+02	8.552E+02	7.632E+02
PO-210	6.160E+02	8.552E+02	7.632E+02
BI-211	2.002E+01	2.455E+01	2.667E+01
RA-224	1.403E+02	1.445E+02	7.775E+01
TH-232	4.519E+03	4.508E+03	2.557E+03
U-235	7.546E+01	4.794E+01	2.487E+01
AM-241	1.286E+01	2.071E+01	2.283E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-3.988E+00	2.064E+01	3.724E+01	NOT IDENT.
NA-22	5.171E-01	1.730E+00	3.803E+00	NOT IDENT.
NA-24	0.000E+00	1.342E+07	0.000E+00	SHORT HLIF
AL-26	8.226E-01	2.135E+00	4.905E+00	NOT IDENT.
K-40	-2.434E+01	2.997E+01	5.640E+01	NOT IDENT.
SC-46	-1.314E-01	2.307E+00	4.502E+00	NOT IDENT.
V-48	-1.183E+00	2.913E+00	5.483E+00	NOT IDENT.
CR-51	4.928E+00	2.398E+01	4.528E+01	NOT IDENT.
MN-52	-8.470E+00	1.488E+01	2.431E+01	NOT IDENT.
MN-54	5.820E-01	2.128E+00	4.331E+00	NOT IDENT.
CO-56	-1.070E+00	2.638E+00	4.685E+00	NOT IDENT.
CO-57	-1.667E+00	2.113E+00	3.358E+00	NOT IDENT.
CO-58	6.938E-01	2.329E+00	4.761E+00	NOT IDENT.
FE-59	-3.314E+00	4.546E+00	7.771E+00	NOT IDENT.
CO-60	2.404E+00	2.398E+00	3.634E+00	FAIL ABUN
ZN-65	-2.599E+00	4.579E+00	8.323E+00	NOT IDENT.
CU-67	1.833E+01	2.870E+02	3.210E+02	FAIL ABUN
GE-68	-6.449E+01	8.176E+01	1.126E+02	NOT IDENT.
SE-75	1.592E-01	3.169E+00	5.877E+00	NOT IDENT.
BR-77	-7.372E+01	5.236E+02	9.118E+02	NOT IDENT.

SR-82	-4.886E+00	1.583E+01	3.040E+01	NOT IDENT.
RB-83	2.146E+00	5.077E+00	8.988E+00	NOT IDENT.
RB-84	-2.780E+00	3.746E+00	6.531E+00	NOT IDENT.
KR-85	-1.802E+03	7.214E+02	9.776E+02	NOT IDENT.
SR-85	-9.349E+00	3.743E+00	5.073E+00	NOT IDENT.
RB-86	-1.899E+01	4.396E+01	6.809E+01	NOT IDENT.
Y-88	-5.788E-01	2.503E+00	5.015E+00	NOT IDENT.
Y-91	-6.908E+02	1.158E+03	2.013E+03	NOT IDENT.
NB-94	4.664E-01	2.044E+00	3.887E+00	NOT IDENT.
NB-95	-8.094E-01	2.310E+00	3.771E+00	NOT IDENT.
NB-95M	-2.321E+00	7.638E+00	1.383E+01	NOT IDENT.
ZR-95	-7.213E-01	4.522E+00	7.670E+00	NOT IDENT.
MO-99	9.917E+01	6.642E+02	1.226E+03	FAIL ABUN
TC-99M	0.000E+00	1.268E+17	0.000E+00	SHORT HLIF
RH-101	-1.629E-01	2.562E+00	4.349E+00	FAIL ABUN
RH-102M	3.731E-01	1.993E+00	3.751E+00	NOT IDENT.
RU-103	9.320E-01	2.995E+00	5.640E+00	FAIL ABUN
RH-106	6.739E+00	1.875E+01	3.675E+01	NOT IDENT.
RU-106	6.739E+00	1.875E+01	3.675E+01	NOT IDENT.
AG-108M	2.704E-01	2.233E+00	4.131E+00	NOT IDENT.
CD-109	3.050E+00	6.782E+01	1.174E+02	NOT IDENT.
AG-110M	1.960E+00	2.588E+00	5.771E+00	NOT IDENT.
SN-113	3.700E-01	2.966E+00	5.552E+00	NOT IDENT.
IN-114M	6.677E+00	1.368E+01	2.400E+01	NOT IDENT.
CD-115	2.322E+01	4.874E+02	8.284E+02	NOT IDENT.
SN-117M	4.120E+00	4.487E+00	7.612E+00	FAIL ABUN
I-123	0.000E+00	1.046E+08	0.000E+00	SHORT HLIF
TE-123M	1.493E+00	2.563E+00	4.194E+00	NOT IDENT.
SB-124	3.219E+00	5.949E+00	1.310E+01	NOT IDENT.
SB-125	-1.998E+00	6.142E+00	1.091E+01	NOT IDENT.
TE-125M	2.365E+02	8.096E+02	1.425E+03	NOT IDENT.
I-126	1.908E+00	1.386E+01	2.577E+01	NOT IDENT.
SB-126	3.271E-01	7.389E+00	1.389E+01	NOT IDENT.
SN-126	3.619E+00	6.571E+00	1.183E+01	FAIL ABUN
SB-127	5.609E-01	6.708E+01	1.237E+02	NOT IDENT.
TE-129	2.297E+01	3.431E+01	6.738E+01	NOT IDENT.
I-131	2.648E+00	8.729E+00	1.488E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-5.982E+00	3.848E+01	7.052E+01	NOT IDENT.
BA-133	-2.081E+00	3.835E+00	5.852E+00	NOT IDENT.
I-133	0.000E+00	1.521E+05	0.000E+00	SHORT HLIF
CS-134	6.560E-01	2.311E+00	4.340E+00	NOT IDENT.
CS-135	-5.421E+00	1.163E+01	1.829E+01	NOT IDENT.
I-135	0.000E+00	1.762E+16	0.000E+00	SHORT HLIF
CS-136	3.416E-01	4.119E+00	8.652E+00	NOT IDENT.
BA-137M	-2.017E+00	3.398E+00	6.468E+00	NOT IDENT.
CS-137	-2.131E+00	3.589E+00	6.833E+00	NOT IDENT.
CE-139	5.172E-01	2.166E+00	4.101E+00	NOT IDENT.
BA-140	2.719E+00	1.686E+01	3.169E+01	NOT IDENT.
LA-140	3.575E-01	5.250E+00	1.055E+01	NOT IDENT.
CE-141	-1.592E+00	5.320E+00	7.984E+00	NOT IDENT.
CE-143	0.000E+00	4.631E+03	0.000E+00	SHORT HLIF
CE-144	-6.907E+00	1.760E+01	2.885E+01	NOT IDENT.
PM-144	3.043E+00	2.511E+00	5.199E+00	NOT IDENT.
PR-144	2.281E+02	1.879E+02	3.890E+02	NOT IDENT.
PM-146	7.849E-01	2.775E+00	5.302E+00	NOT IDENT.
ND-147	-7.356E-01	3.263E+01	6.041E+01	NOT IDENT.
PM-147	-2.364E+04	6.341E+04	1.049E+05	NOT IDENT.
PM-149	3.056E+02	4.814E+03	8.280E+03	NOT IDENT.
EU-152	3.330E+00	6.605E+00	1.278E+01	NOT IDENT.
GD-153	1.856E+00	7.904E+00	1.324E+01	NOT IDENT.
EU-154	1.466E+00	4.903E+00	1.078E+01	FAIL ABUN
EU-155	8.416E+00	9.907E+00	1.803E+01	NOT IDENT.
HO-166M	-2.444E-01	4.103E+00	7.400E+00	NOT IDENT.
TM-171	-9.541E+01	2.308E+03	3.849E+03	NOT IDENT.
LU-176	-5.656E-01	1.881E+00	3.375E+00	NOT IDENT.
LU-177	-6.360E+01	6.738E+01	1.163E+02	NOT IDENT.
HF-181	0.000E+00	9.664E+00	5.711E+00	FAIL ABUN
W-181	1.563E+01	2.517E+01	3.479E+01	FAIL ABUN
TA-182	6.395E+00	9.078E+00	1.991E+01	NOT IDENT.
RE-183	1.546E+01	2.490E+01	3.451E+01	FAIL ABUN
RE-184	-1.506E+00	7.209E+00	1.373E+01	NOT IDENT.
W-188	-1.584E+02	4.847E+02	8.705E+02	FAIL ABUN
OS-191	-5.157E-01	1.242E+01	2.109E+01	FAIL ABUN
IR-192	1.341E-01	2.382E+00	4.423E+00	NOT IDENT.
HG-203	2.399E-01	2.826E+00	5.223E+00	NOT IDENT.
BI-207	1.143E+00	2.972E+00	6.164E+00	NOT IDENT.
PB-211	-1.859E+01	4.527E+01	7.988E+01	NOT IDENT.

BI-212	1.487E+00	2.895E+01	5.415E+01	NOT IDENT.
PB-212	-6.016E-01	4.763E+00	8.303E+00	NOT IDENT.
BI-213	1.560E+00	6.942E+00	1.316E+01	NOT IDENT.
BI-214	1.305E+01	8.184E+00	1.390E+01	FAIL ABUN
PB-214	7.259E+00	8.900E+00	1.182E+01	FAIL ABUN
RN-219	-8.627E+00	2.513E+01	4.481E+01	FAIL ABUN
FR-221	3.042E+00	1.517E+01	2.843E+01	NOT IDENT.
RA-223	2.759E+01	4.676E+01	9.020E+01	FAIL ABUN
RA-226	5.774E+00	9.039E+01	1.131E+02	FAIL ABUN
AC-227	-5.434E+00	1.797E+01	3.240E+01	NOT IDENT.
TH-227	-5.434E+00	1.797E+01	3.240E+01	NOT IDENT.
AC-228	1.636E+00	8.545E+00	1.712E+01	NOT IDENT.
RA-228	1.636E+00	8.545E+00	1.712E+01	NOT IDENT.
TH-228	-6.016E-01	4.763E+00	8.303E+00	NOT IDENT.
TH-229	-1.115E+01	4.247E+01	6.927E+01	NOT IDENT.
TH-230	-1.169E+03	1.093E+03	1.566E+03	NOT IDENT.
PA-231	-2.846E+01	3.399E+01	5.793E+01	NOT IDENT.
TH-231	-6.544E+00	3.919E+01	6.687E+01	NOT IDENT.
PA-233	1.012E+00	4.273E+00	8.102E+00	NOT IDENT.
PA-234	-8.997E+00	1.719E+01	3.104E+01	NOT IDENT.
PA-234M	-1.131E+02	3.198E+02	5.120E+02	NOT IDENT.
TH-234	0.000E+00	3.168E+02	2.637E+02	FAIL ABUN
U-234	1.406E+03	8.305E+03	1.409E+04	NOT IDENT.
NP-237	1.012E+00	4.273E+00	8.102E+00	NOT IDENT.
NP-238	-1.046E+03	6.649E+02	8.506E+02	NOT IDENT.
U-238	0.000E+00	3.168E+02	2.637E+02	FAIL ABUN
NP-239	6.461E+00	2.375E+01	4.144E+01	NOT IDENT.
AM-242	-6.608E+01	6.063E+01	8.992E+01	NOT IDENT.
AM-243	-2.635E+00	4.486E+00	7.434E+00	NOT IDENT.
CM-243	-8.386E+00	1.015E+01	1.622E+01	NOT IDENT.
BK-247	8.785E-01	5.753E+00	1.075E+01	NOT IDENT.
CM-247	-2.284E+00	2.353E+00	3.844E+00	NOT IDENT.
CF-249	-2.542E-01	2.671E+00	4.885E+00	NOT IDENT.
CF-251	-3.567E+00	9.459E+00	1.716E+01	NOT IDENT.
CF-252	-7.066E+03	1.530E+04	2.533E+04	NOT IDENT.
ANH-511	-6.292E+00	4.220E+00	8.112E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.59	50	96	1.32	93.22	89	10	6.91E-03	39.7	
2	0	58.32	18	78	0.98	116.71	114	7	2.57E-03	82.2	
3	0	63.84	99	196	3.96	127.76	121	15	1.37E-02	32.4	
4	0	92.63	96	96	1.50	185.37	182	7	1.33E-02	19.9	
5	0	142.67	122	228	8.21	285.52	276	21	1.69E-02	32.4	
6	0	155.00	42	101	2.55	310.20	306	9	5.77E-03	46.4	
7	0	186.07	95	106	1.16	372.39	367	10	1.32E-02	23.0	
8	0	198.10	36	112	1.07	396.47	392	8	5.00E-03	53.6	
9	0	240.53	71	204	4.00	481.40	469	22	9.87E-03	52.6	
10	0	270.75	19	40	0.88	541.87	540	6	2.64E-03	58.7	
11	0	351.62	40	56	1.15	703.75	699	10	5.62E-03	37.8	
12	0	367.73	16	32	0.49	735.98	733	7	2.22E-03	64.5	
13	0	481.39	30	81	12.12	963.47	945	25	4.15E-03	83.2	
14	0	510.94	150	49	2.80	1022.61	1017	13	2.08E-02	12.6	
15	0	525.14	19	37	0.60	1051.04	1043	14	2.60E-03	76.1	
16	0	583.60	39	61	11.99	1168.05	1153	27	5.41E-03	58.0	
17	0	595.97	25	30	0.83	1192.80	1187	10	3.45E-03	45.9	
18	0	609.40	56	23	1.64	1219.68	1215	9	7.73E-03	20.9	
19	0	661.84	39	20	1.23	1324.65	1320	10	5.48E-03	25.7	
20	0	762.14	21	9	0.55	1525.40	1518	13	2.87E-03	38.0	
21	0	799.90	13	6	0.98	1600.97	1597	8	1.84E-03	42.0	
22	0	803.80	19	7	1.39	1608.77	1605	9	2.62E-03	34.0	
23	0	854.62	24	5	4.04	1710.49	1705	11	3.33E-03	27.7	
24	0	917.54	7	8	1.11	1836.43	1834	8	9.72E-04	79.5	
25	0	930.71	13	2	1.41	1862.79	1857	10	1.77E-03	36.1	
26	0	954.32	14	2	1.39	1910.04	1905	9	1.90E-03	33.5	
27	0	972.79	19	34	8.39	1947.00	1935	21	2.57E-03	84.6	
28	0	996.55	15	2	1.37	1994.56	1990	11	2.07E-03	33.3	
29	0	1073.74	4	5	1.27	2149.06	2145	6	6.17E-04	89.3	
30	0	1331.26	9	3	4.66	2664.48	2658	13	1.30E-03	50.9	
31	0	1447.76	11	4	1.39	2897.66	2890	15	1.56E-03	48.1	
32	0	1461.60	15	2	1.72	2925.36	2921	9	2.08E-03	31.4	
33	0	1764.05	14	4	1.88	3530.70	3522	13	1.98E-03	37.5	
34	0	1912.45	9	4	4.80	3827.73	3820	14	1.31E-03	53.3	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	25	59.00*	1.275E+00	6.202E+00	1.070E+01	91.75
	634.78	-----	15.40	1.221E+00	-----	Line Not Found	-----
RE-188	61.49	-----	1.39	9.107E-01	-----	Line Not Found	-----
	63.00	64	2.38	1.028E+00	4.936E+02	5.672E+02	101.80
	155.04	42	15.61*	2.763E+00	1.808E+01	2.077E+01	92.71
	477.99	-----	1.08	1.486E+00	-----	Line Not Found	-----
	632.98	-----	1.37	1.223E+00	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	2.157E+00	-----	Line Not Found	-----
	583.19	22	85.00*	1.293E+00	3.707E+00	3.759E+00	213.28
	860.56	-----	12.50	9.925E-01	-----	Line Not Found	-----
PB-210	46.54	29	4.25*	2.087E-01	6.153E+02	6.160E+02	141.66
PO-210	46.54	29	4.25*	2.087E-01	6.153E+02	6.160E+02	141.66
BI-211	72.87	-----	1.23	1.451E+00	-----	Line Not Found	-----
	351.06	25	12.92*	1.841E+00	2.000E+01	2.002E+01	125.11
RA-224	240.99	71	4.10*	2.351E+00	1.383E+02	1.403E+02	105.14
RA-226	186.21	3	3.59*	2.651E+00	5.774E+00	5.774E+00	1597.43
TH-232	63.81	64	0.26*	1.028E+00	4.519E+03	4.519E+03	101.80
	140.88	-----	0.02	2.766E+00	-----	Line Not Found	-----
U-235	143.76	122	10.96*	2.768E+00	7.546E+01	7.546E+01	64.82
	163.33	-----	5.08	2.744E+00	-----	Line Not Found	-----
	185.72	3	57.20	2.651E+00	3.624E-01	3.624E-01	1597.43
	205.31	-----	5.01	2.549E+00	-----	Line Not Found	-----
AM-241	59.54	18	35.90*	7.515E-01	1.286E+01	1.286E+01	164.31

Flag: "*" = Keyline

Total number of lines in spectrum 29
Number of unidentified lines 11
Number of lines tentatively identified by NID 18 62.07%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AS-74	17.77D	1.73	6.202E+00	1.070E+01	0.982E+01	91.75	
RE-188	69.78D	1.15	1.808E+01	2.077E+01	1.926E+01	92.71	
TL-208	1.91Y	1.01	3.707E+00	3.759E+00	8.018E+00	213.28	
PB-210	22.20Y	1.00	6.153E+02	6.160E+02	8.727E+02	141.66	
PO-210	22.20Y	1.00	6.153E+02	6.160E+02	8.727E+02	141.66	
BI-211	21.77Y	1.00	2.000E+01	2.002E+01	2.505E+01	125.11	
RA-224	1.91Y	1.01	1.383E+02	1.403E+02	1.475E+02	105.14	
RA-226	1600.00Y	1.00	5.774E+00	5.774E+00	92.24E+00	1597.43	
TH-232	1.41E+10Y	1.00	4.519E+03	4.519E+03	4.600E+03	101.80	
U-235	7.04E+08Y	1.00	7.546E+01	7.546E+01	4.891E+01	64.82	
AM-241	432.60Y	1.00	1.286E+01	1.286E+01	2.114E+01	164.31	
Total Activity :			6.030E+03	6.040E+03			

Grand Total Activity : 6.030E+03 6.040E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	198.10	20	112	1.07	396.47	392	8	2.73E-03	****	2.59E+00	T
0	270.75	19	40	0.88	541.87	540	6	2.64E-03	****	2.19E+00	T
0	367.73	16	32	0.49	735.98	733	7	2.22E-03	****	1.79E+00	T
0	481.39	30	81	12.12	963.47	945	25	4.15E-03	****	1.48E+00	T
0	525.14	19	37	0.60	1051.04	1043	14	2.60E-03	****	1.39E+00	
0	609.40	40	23	1.64	1219.68	1215	9	5.52E-03	64.0	1.26E+00	T
0	762.14	21	9	0.55	1525.40	1518	13	2.87E-03	76.1	1.08E+00	
0	799.90	13	6	0.98	1600.97	1597	8	1.84E-03	84.0	1.04E+00	
0	803.80	12	7	1.39	1608.77	1605	9	1.60E-03	****	1.04E+00	
0	854.62	24	5	4.04	1710.49	1705	11	3.33E-03	55.4	9.97E-01	
0	917.54	7	8	1.11	1836.43	1834	8	9.72E-04	****	9.50E-01	
0	930.71	13	2	1.41	1862.79	1857	10	1.77E-03	72.2	9.41E-01	
0	954.32	14	2	1.39	1910.04	1905	9	1.90E-03	67.1	9.25E-01	T
0	972.79	19	34	8.39	1947.00	1935	21	2.57E-03	****	9.13E-01	
0	996.55	15	2	1.37	1994.56	1990	11	2.07E-03	66.6	8.98E-01	T
0	1073.74	4	5	1.27	2149.06	2145	6	6.17E-04	****	8.53E-01	
0	1331.26	9	3	4.66	2664.48	2658	13	1.30E-03	****	7.33E-01	T
0	1447.76	11	4	1.39	2897.66	2890	15	1.56E-03	96.3	6.89E-01	
0	1912.45	9	4	4.80	3827.73	3820	14	1.31E-03	****	5.52E-01	

Flags: "T" = Tentatively associated


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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372005.CNF;1  *
* Acquisition date   : 21-DEC-2016 08:39:29 Sensitivity      : 3.000          *
* Detector ID        : GAM28 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000    *
* Elapsed real time  : 0 02:00:00.46 Half life ratio : *****      *
* Sample date        : 7-DEC-2016 10:01:00 Nuclide Library : LIQUID      *
* Sample ID          : G412372005 Analyst initials: MXR1         *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER  *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000        *
*                                     Dry Weight    : 0.00000        *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 1-AUG-2016 12:45:28 Eff. Geometry    : 2LMB        *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM28_2LMB.CNF;8          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
AS-74	5.462E+00
RE-188	1.037E+01
TL-208	2.064E+00
PB-210	3.529E+02
PO-210	3.529E+02
BI-211	1.228E+01
RA-224	3.622E+01
TH-232	1.184E+03
U-235	1.160E+01
AM-241	1.055E+01

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.667E+01	NOT IDENT.
NA-22	1.562E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.013E+00	NOT IDENT.
K-40	2.473E+01	NOT IDENT.
SC-46	1.958E+00	NOT IDENT.
V-48	2.228E+00	NOT IDENT.
CR-51	2.080E+01	NOT IDENT.
MN-52	1.009E+01	NOT IDENT.
MN-54	1.907E+00	NOT IDENT.
CO-56	2.056E+00	NOT IDENT.
CO-57	1.565E+00	NOT IDENT.
CO-58	2.098E+00	NOT IDENT.
FE-59	3.221E+00	NOT IDENT.
CO-60	1.469E+00	FAIL ABUN
ZN-65	3.534E+00	NOT IDENT.
CU-67	1.521E+02	FAIL ABUN
GE-68	4.671E+01	NOT IDENT.
SE-75	2.729E+00	NOT IDENT.
BR-77	4.286E+02	NOT IDENT.
SR-82	1.288E+01	NOT IDENT.

RB-83	4.045E+00	NOT IDENT.
RB-84	2.759E+00	NOT IDENT.
KR-85	4.471E+02	NOT IDENT.
SR-85	2.320E+00	NOT IDENT.
RB-86	2.825E+01	NOT IDENT.
Y-88	2.017E+00	NOT IDENT.
Y-91	8.605E+02	NOT IDENT.
NB-94	1.721E+00	NOT IDENT.
NB-95	1.611E+00	NOT IDENT.
NB-95M	6.417E+00	NOT IDENT.
ZR-95	3.334E+00	NOT IDENT.
MO-99	5.485E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.037E+00	FAIL ABUN
RH-102M	1.696E+00	NOT IDENT.
RU-103	2.574E+00	FAIL ABUN
RH-106	1.626E+01	NOT IDENT.
RU-106	1.626E+01	NOT IDENT.
AG-108M	1.890E+00	NOT IDENT.
CD-109	5.526E+01	NOT IDENT.
AG-110M	2.514E+00	NOT IDENT.
SN-113	2.528E+00	NOT IDENT.
IN-114M	1.125E+01	NOT IDENT.
CD-115	3.626E+02	NOT IDENT.
SN-117M	3.590E+00	FAIL ABUN
I-123	0.000E+00	SHORT HLIF
TE-123M	1.979E+00	NOT IDENT.
SB-124	5.528E+00	NOT IDENT.
SB-125	4.919E+00	NOT IDENT.
TE-125M	6.687E+02	NOT IDENT.
I-126	1.151E+01	NOT IDENT.
SB-126	6.025E+00	NOT IDENT.
SN-126	5.576E+00	FAIL ABUN
SB-127	5.448E+01	NOT IDENT.
TE-129	3.082E+01	NOT IDENT.
I-131	6.864E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.281E+01	NOT IDENT.
BA-133	2.703E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.883E+00	NOT IDENT.
CS-135	8.428E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.562E+00	NOT IDENT.
BA-137M	2.997E+00	NOT IDENT.
CS-137	3.166E+00	NOT IDENT.
CE-139	1.927E+00	NOT IDENT.
BA-140	1.422E+01	NOT IDENT.
LA-140	4.383E+00	NOT IDENT.
CE-141	3.738E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.357E+01	NOT IDENT.
PM-144	2.372E+00	NOT IDENT.
PR-144	1.775E+02	NOT IDENT.
PM-146	2.397E+00	NOT IDENT.
ND-147	2.682E+01	NOT IDENT.
PM-147	4.909E+04	NOT IDENT.
PM-149	3.832E+03	NOT IDENT.
EU-152	5.880E+00	NOT IDENT.
GD-153	6.225E+00	NOT IDENT.
EU-154	4.429E+00	FAIL ABUN
EU-155	8.528E+00	NOT IDENT.
HO-166M	3.285E+00	NOT IDENT.
TM-171	1.806E+03	NOT IDENT.
LU-176	1.554E+00	NOT IDENT.
LU-177	5.404E+01	NOT IDENT.
HF-181	2.588E+00	FAIL ABUN
W-181	1.619E+01	FAIL ABUN
TA-182	8.643E+00	NOT IDENT.
RE-183	1.611E+01	FAIL ABUN
RE-184	5.952E+00	NOT IDENT.
W-188	4.007E+02	FAIL ABUN
OS-191	9.891E+00	FAIL ABUN
IR-192	2.036E+00	NOT IDENT.
HG-203	2.434E+00	NOT IDENT.
BI-207	2.686E+00	NOT IDENT.
PB-211	3.592E+01	NOT IDENT.
BI-212	2.361E+01	NOT IDENT.

PB-212	3.903E+00	NOT IDENT.
BI-213	5.959E+00	NOT IDENT.
BI-214	6.511E+00	FAIL ABUN
PB-214	5.526E+00	FAIL ABUN
RN-219	2.012E+01	FAIL ABUN
FR-221	1.332E+01	NOT IDENT.
RA-223	4.185E+01	FAIL ABUN
RA-226	5.391E+01	FAIL ABUN
AC-227	1.503E+01	NOT IDENT.
TH-227	1.503E+01	NOT IDENT.
AC-228	7.529E+00	NOT IDENT.
RA-228	7.529E+00	NOT IDENT.
TH-228	3.903E+00	NOT IDENT.
TH-229	3.245E+01	NOT IDENT.
TH-230	7.282E+02	NOT IDENT.
PA-231	2.665E+01	NOT IDENT.
TH-231	3.143E+01	NOT IDENT.
PA-233	3.722E+00	NOT IDENT.
PA-234	1.325E+01	NOT IDENT.
PA-234M	2.223E+02	NOT IDENT.
TH-234	1.250E+02	FAIL ABUN
U-234	6.620E+03	NOT IDENT.
NP-237	3.722E+00	NOT IDENT.
NP-238	3.176E+02	NOT IDENT.
U-238	1.250E+02	FAIL ABUN
NP-239	1.951E+01	NOT IDENT.
AM-242	4.197E+01	NOT IDENT.
AM-243	3.472E+00	NOT IDENT.
CM-243	7.611E+00	NOT IDENT.
BK-247	4.998E+00	NOT IDENT.
CM-247	1.712E+00	NOT IDENT.
CF-249	2.220E+00	NOT IDENT.
CF-251	8.039E+00	NOT IDENT.
CF-252	1.183E+04	NOT IDENT.
ANH-511	3.879E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372005.CNF;1
Acquisition date : 21-DEC-2016 08:39:29 Sensitivity : 3.000
Detector ID : GAM28 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.46 Half life ratio : *****
Sample date : 7-DEC-2016 10:01:00 Nuclide Library : LIQUID
Sample ID : G412372005 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 1-AUG-2016 12:45:28 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM28_2LMB.CNF;8

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
AS-74	1.070E+01	9.658E+00	9.658E+00
RE-188	2.077E+01	1.890E+01	1.890E+01
TL-208	3.759E+00	7.859E+00	7.859E+00
PB-210	6.160E+02	8.575E+02	8.575E+02
PO-210	6.160E+02	8.575E+02	8.575E+02
BI-211	2.002E+01	2.457E+01	2.457E+01
RA-224	1.403E+02	1.447E+02	1.447E+02
TH-232	4.519E+03	4.540E+03	4.540E+03
U-235	7.546E+01	4.809E+01	4.809E+01
AM-241	1.286E+01	2.074E+01	2.074E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-3.988E+00	2.064E+01	2.072E+01	NOT IDENT.
NA-22	5.171E-01	1.730E+00	1.745E+00	NOT IDENT.
NA-24	-9.456E+06	1.342E+07	1.409E+07	SHORT HLIF
AL-26	8.226E-01	2.135E+00	2.167E+00	NOT IDENT.
K-40	-2.434E+01	2.999E+01	3.194E+01	NOT IDENT.
SC-46	-1.314E-01	2.307E+00	2.308E+00	NOT IDENT.
V-48	-1.183E+00	2.914E+00	2.962E+00	NOT IDENT.
CR-51	4.928E+00	2.398E+01	2.408E+01	NOT IDENT.
MN-52	-8.470E+00	1.488E+01	1.537E+01	NOT IDENT.
MN-54	5.820E-01	2.128E+00	2.145E+00	NOT IDENT.
CO-56	-1.070E+00	2.639E+00	2.682E+00	NOT IDENT.
CO-57	-1.667E+00	2.115E+00	2.244E+00	NOT IDENT.
CO-58	6.938E-01	2.329E+00	2.350E+00	NOT IDENT.
FE-59	-3.314E+00	4.553E+00	4.792E+00	NOT IDENT.
CO-60	2.404E+00	2.399E+00	2.633E+00	FAIL ABUN
ZN-65	-2.599E+00	4.580E+00	4.727E+00	NOT IDENT.
CU-67	1.833E+01	2.870E+02	2.871E+02	FAIL ABUN
GE-68	-6.449E+01	8.180E+01	8.681E+01	NOT IDENT.
SE-75	1.592E-01	3.169E+00	3.170E+00	NOT IDENT.
BR-77	-7.372E+01	5.236E+02	5.247E+02	NOT IDENT.

SR-82	-4.886E+00	1.583E+01	1.599E+01	NOT IDENT.
RB-83	2.146E+00	5.086E+00	5.177E+00	NOT IDENT.
RB-84	-2.780E+00	3.747E+00	3.951E+00	NOT IDENT.
KR-85	-1.802E+03	7.251E+02	1.089E+03	NOT IDENT.
SR-85	-9.349E+00	3.763E+00	5.650E+00	NOT IDENT.
RB-86	-1.899E+01	4.396E+01	4.479E+01	NOT IDENT.
Y-88	-5.788E-01	2.504E+00	2.517E+00	NOT IDENT.
Y-91	-6.908E+02	1.158E+03	1.199E+03	NOT IDENT.
NB-94	4.664E-01	2.044E+00	2.055E+00	NOT IDENT.
NB-95	-8.094E-01	2.310E+00	2.339E+00	NOT IDENT.
NB-95M	-2.321E+00	7.641E+00	7.712E+00	NOT IDENT.
ZR-95	-7.213E-01	4.522E+00	4.533E+00	NOT IDENT.
MO-99	9.917E+01	6.642E+02	6.657E+02	FAIL ABUN
TC-99M	1.058E+17	1.272E+17	0.000E+00	SHORT HLIF
RH-101	-1.629E-01	2.562E+00	2.563E+00	FAIL ABUN
RH-102M	3.731E-01	1.993E+00	2.000E+00	NOT IDENT.
RU-103	9.320E-01	2.995E+00	3.024E+00	FAIL ABUN
RH-106	6.739E+00	1.875E+01	1.900E+01	NOT IDENT.
RU-106	6.739E+00	1.875E+01	1.900E+01	NOT IDENT.
AG-108M	2.704E-01	2.233E+00	2.236E+00	NOT IDENT.
CD-109	3.050E+00	6.782E+01	6.783E+01	NOT IDENT.
AG-110M	1.960E+00	2.590E+00	2.736E+00	NOT IDENT.
SN-113	3.700E-01	2.966E+00	2.971E+00	NOT IDENT.
IN-114M	6.677E+00	1.368E+01	1.401E+01	NOT IDENT.
CD-115	2.322E+01	4.874E+02	4.875E+02	NOT IDENT.
SN-117M	4.120E+00	4.491E+00	4.860E+00	FAIL ABUN
I-123	6.029E+07	1.046E+08	1.081E+08	SHORT HLIF
TE-123M	1.493E+00	2.564E+00	2.650E+00	NOT IDENT.
SB-124	3.219E+00	5.951E+00	6.126E+00	NOT IDENT.
SB-125	-1.998E+00	6.143E+00	6.209E+00	NOT IDENT.
TE-125M	2.365E+02	8.097E+02	8.167E+02	NOT IDENT.
I-126	1.908E+00	1.386E+01	1.389E+01	NOT IDENT.
SB-126	3.271E-01	7.389E+00	7.390E+00	NOT IDENT.
SN-126	3.619E+00	6.575E+00	6.774E+00	FAIL ABUN
SB-127	5.609E-01	6.708E+01	6.708E+01	NOT IDENT.
TE-129	2.297E+01	3.450E+01	3.602E+01	NOT IDENT.
I-131	2.648E+00	8.730E+00	8.812E+00	NOT IDENT.
I-132	-1.000E+41	3.809E+42	0.000E+00	SHORT HLIF
TE-132	-5.982E+00	3.848E+01	3.858E+01	NOT IDENT.
BA-133	-2.081E+00	3.836E+00	3.949E+00	NOT IDENT.
I-133	6.588E+04	1.522E+05	1.551E+05	SHORT HLIF
CS-134	6.560E-01	2.312E+00	2.330E+00	NOT IDENT.
CS-135	-5.421E+00	1.163E+01	1.189E+01	NOT IDENT.
I-135	2.171E+16	1.897E+16	0.000E+00	SHORT HLIF
CS-136	3.416E-01	4.119E+00	4.122E+00	NOT IDENT.
BA-137M	-2.017E+00	3.399E+00	3.518E+00	NOT IDENT.
CS-137	-2.131E+00	3.590E+00	3.717E+00	NOT IDENT.
CE-139	5.172E-01	2.169E+00	2.181E+00	NOT IDENT.
BA-140	2.719E+00	1.686E+01	1.691E+01	NOT IDENT.
LA-140	3.575E-01	5.250E+00	5.252E+00	NOT IDENT.
CE-141	-1.592E+00	5.320E+00	5.368E+00	NOT IDENT.
CE-143	1.815E+03	4.632E+03	4.704E+03	SHORT HLIF
CE-144	-6.907E+00	1.760E+01	1.788E+01	NOT IDENT.
PM-144	3.043E+00	2.515E+00	2.865E+00	NOT IDENT.
PR-144	2.281E+02	1.881E+02	2.144E+02	NOT IDENT.
PM-146	7.849E-01	2.775E+00	2.798E+00	NOT IDENT.
ND-147	-7.356E-01	3.263E+01	3.263E+01	NOT IDENT.
PM-147	-2.364E+04	6.342E+04	6.431E+04	NOT IDENT.
PM-149	3.056E+02	4.814E+03	4.816E+03	NOT IDENT.
EU-152	3.330E+00	6.607E+00	6.776E+00	NOT IDENT.
GD-153	1.856E+00	7.904E+00	7.948E+00	NOT IDENT.
EU-154	1.466E+00	4.904E+00	4.948E+00	FAIL ABUN
EU-155	8.416E+00	9.925E+00	1.063E+01	NOT IDENT.
HO-166M	-2.444E-01	4.103E+00	4.105E+00	NOT IDENT.
TM-171	-9.541E+01	2.308E+03	2.308E+03	NOT IDENT.
LU-176	-5.656E-01	1.881E+00	1.898E+00	NOT IDENT.
LU-177	-6.360E+01	6.745E+01	7.329E+01	NOT IDENT.
HF-181	5.928E+00	9.667E+00	1.003E+01	FAIL ABUN
W-181	1.563E+01	2.549E+01	2.645E+01	FAIL ABUN
TA-182	6.395E+00	9.081E+00	9.528E+00	NOT IDENT.
RE-183	1.546E+01	2.495E+01	2.591E+01	FAIL ABUN
RE-184	-1.506E+00	7.210E+00	7.242E+00	NOT IDENT.
W-188	-1.584E+02	4.851E+02	4.903E+02	FAIL ABUN
OS-191	-5.157E-01	1.242E+01	1.243E+01	FAIL ABUN
IR-192	1.341E-01	2.382E+00	2.383E+00	NOT IDENT.
HG-203	2.399E-01	2.826E+00	2.828E+00	NOT IDENT.
BI-207	1.143E+00	2.972E+00	3.016E+00	NOT IDENT.
PB-211	-1.859E+01	4.528E+01	4.605E+01	NOT IDENT.

BI-212	1.487E+00	2.895E+01	2.896E+01	NOT IDENT.
PB-212	-6.016E-01	4.763E+00	4.771E+00	NOT IDENT.
BI-213	1.560E+00	6.942E+00	6.978E+00	NOT IDENT.
BI-214	1.305E+01	8.203E+00	1.010E+01	FAIL ABUN
PB-214	7.259E+00	8.905E+00	9.487E+00	FAIL ABUN
RN-219	-8.627E+00	2.516E+01	2.546E+01	FAIL ABUN
FR-221	3.042E+00	1.517E+01	1.524E+01	NOT IDENT.
RA-223	2.759E+01	4.679E+01	4.841E+01	FAIL ABUN
RA-226	5.774E+00	9.039E+01	9.043E+01	FAIL ABUN
AC-227	-5.434E+00	1.798E+01	1.815E+01	NOT IDENT.
TH-227	-5.434E+00	1.798E+01	1.815E+01	NOT IDENT.
AC-228	1.636E+00	8.546E+00	8.578E+00	NOT IDENT.
RA-228	1.636E+00	8.546E+00	8.578E+00	NOT IDENT.
TH-228	-6.016E-01	4.763E+00	4.771E+00	NOT IDENT.
TH-229	-1.115E+01	4.247E+01	4.277E+01	NOT IDENT.
TH-230	-1.169E+03	1.111E+03	1.229E+03	NOT IDENT.
PA-231	-2.846E+01	3.453E+01	3.683E+01	NOT IDENT.
TH-231	-6.544E+00	3.920E+01	3.931E+01	NOT IDENT.
PA-233	1.012E+00	4.273E+00	4.297E+00	NOT IDENT.
PA-234	-8.997E+00	2.004E+01	2.044E+01	NOT IDENT.
PA-234M	-1.131E+02	3.199E+02	3.239E+02	NOT IDENT.
TH-234	3.175E+02	3.246E+02	3.547E+02	FAIL ABUN
U-234	1.406E+03	8.306E+03	8.330E+03	NOT IDENT.
NP-237	1.012E+00	4.273E+00	4.297E+00	NOT IDENT.
NP-238	-1.046E+03	6.663E+02	8.164E+02	NOT IDENT.
U-238	3.175E+02	3.246E+02	3.547E+02	FAIL ABUN
NP-239	6.461E+00	2.375E+01	2.393E+01	NOT IDENT.
AM-242	-6.608E+01	6.170E+01	6.851E+01	NOT IDENT.
AM-243	-2.635E+00	4.489E+00	4.644E+00	NOT IDENT.
CM-243	-8.386E+00	1.018E+01	1.085E+01	NOT IDENT.
BK-247	8.785E-01	5.756E+00	5.769E+00	NOT IDENT.
CM-247	-2.284E+00	2.384E+00	2.597E+00	NOT IDENT.
CF-249	-2.542E-01	2.671E+00	2.674E+00	NOT IDENT.
CF-251	-3.567E+00	9.468E+00	9.603E+00	NOT IDENT.
CF-252	-7.066E+03	1.659E+04	1.689E+04	NOT IDENT.
ANH-511	-6.292E+00	4.228E+00	5.091E+00	NOT IDENT.

* GEL Laboratories LLC *
* 2040 Savage Road *
* Charleston, SC 29407 *
* GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	44.4600	88.03	85.3146	140.88	64.8097
46.54	50.3866	88.34	87.6337	143.76	65.0288
49.72	56.4044	88.47	87.6519	144.24	65.0652
51.35	80.6752	91.11	124.5992	145.44	65.1558
52.39	67.0315	91.27	124.6300	152.32	75.9938
53.20	66.0860	92.59	65.3083	152.43	79.3076
56.28	58.6595	93.31	64.2343	153.25	76.0724
57.36	0.0000	94.56	154.0000	154.21	79.4648
57.53	53.0768	94.65	154.0205	155.04	79.5381
57.53	53.0770	94.67	154.0256	156.02	81.2829
57.98	45.9476	97.43	63.4851	158.56	66.5389
59.32	49.6753	98.43	85.5444	158.97	0.0000
59.54	49.6978	98.44	85.5456	159.00	76.5562
61.49	52.0649	99.53	82.2113	162.33	81.8431
63.00	52.2225	100.11	78.8050	162.66	76.0250
63.29	52.2525	100.20	78.8154	163.33	68.5552
63.58	52.2825	102.03	75.5411	165.86	75.4459
63.81	52.3063	103.18	91.9652	176.31	64.4041
64.28	52.3546	103.37	100.1422	176.60	73.7479
64.99	52.4271	105.31	78.2355	177.52	82.3006
65.08	52.4363	106.12	75.9879	181.07	77.9115
66.73	64.2933	106.47	81.8742	184.41	60.6567
66.98	64.3242	109.28	70.4562	184.58	60.6668
67.24	81.9076	111.00	83.5726	185.72	60.7347
67.67	87.8302	111.76	81.3037	186.21	60.7636
67.75	87.8430	112.95	70.8142	190.27	63.1521
69.67	80.8148	116.24	71.1305	193.51	80.1555
70.83	81.7245	116.30	71.1365	198.01	81.3626
72.81	67.6123	116.74	79.4822	201.83	71.6638
72.87	78.7044	117.23	86.6569	205.31	67.9723
74.66	81.1826	119.76	61.9353	208.37	77.7745
74.82	83.4303	120.54	77.4984	210.85	64.8117
74.97	83.4526	120.90	79.9208	218.12	69.6393
77.11	77.0670	121.12	81.1370	222.11	76.9587
79.69	74.0461	121.22	81.1474	227.09	81.7307
80.12	75.2232	121.78	80.0128	227.38	82.6399
80.19	75.2321	122.06	82.4313	228.16	63.1325
80.57	89.8877	123.07	66.9883	228.18	63.1333
81.00	93.3262	123.68	70.6324	235.69	61.7444
81.07	93.3376	127.23	74.5604	235.96	61.7578
83.79	73.4295	129.43	77.1787	238.63	61.8946
84.00	76.8455	131.20	88.2269	238.98	61.9129
84.21	85.9157	133.02	84.7913	240.99	62.0146
85.43	89.4868	133.52	94.5388	242.00	62.0659
86.55	78.3020	136.00	61.5954	244.70	63.5550
86.94	78.3515	136.28	61.6163	250.62	65.2170
87.09	77.2351	136.47	71.3621	252.40	56.2386
87.57	76.1581	140.51	64.7806	252.80	48.9974

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	60.9576	383.85	36.6959	631.29	11.1829
260.90	57.5283	388.16	34.7999	632.98	22.3812
264.66	55.8633	388.63	38.7881	633.25	22.3836
265.00	54.9622	391.70	32.8792	634.78	20.1577
268.22	56.4738	400.66	25.0371	635.95	24.6488
269.46	49.6340	401.81	31.0662	636.99	11.2089
271.23	42.3370	402.40	37.0918	645.85	19.1229
273.65	58.0897	404.85	33.1276	657.76	21.4740
276.40	59.1328	410.95	31.2270	661.66	15.8474
277.37	49.9296	414.70	30.2832	664.57	0.0000
277.60	49.0125	423.72	36.5208	666.33	21.5466
278.00	57.3530	427.09	32.5228	666.50	21.5474
278.43	58.2960	427.87	33.5532	667.71	0.0000
279.20	61.1069	433.94	36.7236	677.62	17.0850
279.54	57.4186	440.45	27.6389	685.70	18.2806
280.46	56.5310	453.88	25.7731	695.00	32.1038
283.69	52.9493	459.60	27.9179	696.49	18.3555
284.31	60.4072	463.37	26.9358	696.51	18.3555
285.41	47.4348	468.07	24.9238	697.00	21.8018
285.90	44.6602	473.00	21.8626	697.49	25.2486
287.50	45.6434	475.06	27.0966	702.65	17.2485
290.67	51.3499	476.78	27.1198	706.68	23.0322
293.27	0.0000	477.60	27.1309	711.68	21.9216
295.22	54.3278	477.99	27.1362	720.70	13.8916
295.96	60.9163	482.18	27.1928	721.93	0.0000
299.98	46.9920	487.02	30.1939	722.78	9.2682
300.09	46.9950	492.35	28.3810	722.91	9.2686
300.13	46.9961	497.08	31.6077	723.31	12.7461
301.36	61.1478	511.00	32.8811	724.19	19.7047
302.85	53.6776	514.00	96.6579	727.33	15.0857
304.50	41.4836	520.40	20.7751	733.00	10.4656
304.85	39.6074	520.69	25.5732	735.93	16.2969
306.78	50.9919	522.65	0.0000	739.50	22.1458
308.46	46.3243	527.90	16.0370	744.23	23.6431
311.90	38.8521	529.59	19.2598	747.24	23.6687
316.51	43.7277	529.87	0.0000	752.31	22.8333
319.41	44.7653	531.02	21.4136	753.82	18.4519
320.08	39.0681	537.26	23.6230	756.73	16.8879
321.04	51.4885	546.56	0.0000	763.94	14.1094
323.87	43.9439	552.55	11.8938	765.80	15.5305
325.23	61.1940	563.25	24.9887	766.42	14.1216
328.76	46.9613	569.33	27.2339	766.84	14.1235
333.37	38.4513	569.50	27.2359	772.60	0.0000
334.37	53.8672	569.70	27.2390	776.52	13.2857
338.28	40.5029	583.19	26.3037	777.92	12.4059
338.32	40.5038	595.83	29.7521	778.90	12.4102
340.48	44.4231	600.60	38.4250	783.70	12.4307
340.55	44.4249	602.73	25.4183	785.37	14.2148
344.28	35.8182	604.72	29.8641	792.07	16.9190
345.93	43.6084	609.32	24.3803	795.86	11.4129
351.06	44.7225	610.33	21.6193	801.95	3.5739
351.93	44.7469	614.28	29.3176	802.10	3.5741
356.01	61.4388	618.01	25.5811	810.29	14.3359
364.49	41.1746	621.93	15.5962	810.45	15.2325
366.42	44.1669	630.19	0.0000	810.76	15.2345

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	16.1576	1129.67	13.7787		
818.51	23.3602	1131.51	0.0000		
832.01	19.8549	1173.23	4.9762		
834.85	15.3564	1189.05	13.9880		
836.80	0.0000	1204.77	18.0549		
846.77	19.9509	1221.41	8.0571		
856.80	13.1014	1231.02	6.0571		
860.56	6.2463	1235.36	9.0950		
871.09	20.1074	1238.28	17.1920		
873.19	9.1458	1260.41	0.0000		
875.33	0.0000	1274.44	5.1001		
880.51	18.3344	1274.54	5.1004		
881.60	17.4234	1291.59	5.1205		
883.24	10.0923	1298.22	0.0000		
884.68	8.2612	1312.11	10.2899		
889.28	15.6267	1332.49	4.9623		
894.76	17.4953	1365.19	7.2901		
898.04	19.3568	1368.63	0.0000		
903.28	16.6185	1384.29	8.3672		
911.20	15.7336	1408.01	9.4620		
923.98	6.3710	1434.09	10.5725		
926.36	7.4382	1457.56	0.0000		
935.54	7.4590	1460.82	9.5696		
937.49	9.3292	1489.16	5.3479		
944.13	12.1518	1596.21	7.6507		
946.00	16.8349	1620.50	8.7852		
949.00	11.9824	1678.03	0.0000		
954.55	0.0000	1690.97	5.5652		
964.08	16.5494	1764.49	10.8305		
968.97	13.1831	1770.23	4.5173		
983.53	9.4565	1771.35	9.0366		
984.45	16.0802	1791.20	0.0000		
996.26	10.4404	1808.65	4.5486		
1001.03	10.6446	1836.06	7.3129		
1004.73	14.2712				
1025.87	10.5280				
1028.54	12.4517				
1037.84	10.5629				
1038.76	0.0000				
1046.59	6.7385				
1048.07	6.7411				
1050.41	8.6726				
1063.66	11.6052				
1077.00	12.4242				
1077.34	17.0844				
1083.85	19.4482				
1085.87	6.8107				
1099.25	14.6457				
1111.64	10.7758				
1112.07	13.7163				
1112.84	10.7791				
1115.54	10.7865				
1120.29	12.7635				
1120.55	12.7643				
1121.30	13.7488				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 10:41:33.11

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372006.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM40.CNF;163
Background date    : 18-DEC-2016 13:13:15
Sample date       : 7-DEC-2016 10:00:00. Acquisition date : 21-DEC-2016 08:39:51
Sample ID        : G412372006. Sample quantity : 2.00000E+00 LITER
Detector name    : GAM40. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.75 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID  : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	62.92*	18	64	1.20	125.93	121	16	2.55E-03	82.2	1.52E+00
2	1	66.34*	31	66	1.21	132.78	121	16	4.30E-03	50.5	
3	0	92.74*	16	89	1.39	185.58	181	9	2.24E-03	124.6	
4	0	185.88*	22	86	1.14	371.89	368	9	3.09E-03	86.1	
5	0	228.22	25	48	1.01	456.57	452	9	3.52E-03	52.8	
6	0	240.66	37	105	4.41	481.46	473	14	5.09E-03	61.6	
7	0	297.65	43	72	3.27	595.43	588	17	6.02E-03	47.4	
8	0	337.85	73	35	6.27	675.85	667	20	1.01E-02	23.2	
9	0	352.83*	40	56	0.70	705.81	701	15	5.52E-03	45.1	
10	0	359.66	8	27	1.53	719.47	715	6	1.05E-03	106.1	
11	0	372.08	19	17	1.76	744.30	741	8	2.67E-03	42.9	
12	0	510.90*	8	17	2.80	1021.96	1015	17	1.09E-03	210.6	
13	0	597.08*	15	36	1.31	1194.32	1188	14	2.12E-03	89.3	
14	0	609.49	33	18	1.19	1219.15	1214	10	4.61E-03	29.3	
15	0	651.96	8	10	1.19	1304.08	1300	8	1.17E-03	73.2	
16	0	663.67	29	15	3.88	1327.49	1320	17	3.97E-03	37.7	
17	0	813.34	10	7	1.00	1626.83	1623	8	1.38E-03	57.8	
18	0	831.78	18	9	3.16	1663.71	1654	17	2.43E-03	45.0	
19	0	844.39*	3	9	0.96	1688.92	1680	11	4.25E-04	238.8	
20	0	860.31	8	7	0.99	1720.77	1716	9	1.04E-03	72.0	
21	0	878.97	19	7	4.27	1758.08	1752	13	2.67E-03	35.7	
22	0	911.16	13	8	0.79	1822.46	1817	11	1.82E-03	50.4	
23	0	962.12	17	6	0.64	1924.37	1917	14	2.34E-03	41.0	
24	0	979.93	10	3	0.95	1959.98	1956	7	1.35E-03	45.1	
25	0	1075.13	8	3	3.38	2150.37	2143	11	1.12E-03	53.3	
26	0	1084.23	14	0	1.83	2168.57	2162	11	1.94E-03	26.7	
27	0	1174.14	7	2	1.47	2348.36	2344	8	9.95E-04	50.3	
28	0	1234.98	14	2	3.25	2470.03	2466	9	1.96E-03	32.5	
29	0	1443.27	8	3	4.22	2886.52	2878	12	1.08E-03	57.5	
30	0	1484.18	6	0	0.96	2968.33	2964	7	8.33E-04	40.8	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 10:41:34

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372006.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 7-DEC-2016 10:00:00	Acquisition date	: 21-DEC-2016 08:39:51
Sample ID	: G412372006	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA40	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.75 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Empirical	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CU-67	91.27	16	7.00	1.705E+00	2.532E+01	1.091E+03	249.22
	93.31	16	16.10	1.705E+00	1.101E+01	4.743E+02	249.22
	184.58	22	48.70*	2.114E+00	4.057E+00	1.748E+02	172.19
AS-74	595.83	15	59.00*	1.016E+00	4.782E+00	8.251E+00	178.54
	634.78	-----	15.40	9.714E-01	-----	Line Not Found	-----
TE-132	49.72	-----	15.00	1.524E-01	-----	Line Not Found	-----
	111.76	-----	1.74	2.083E+00	-----	Line Not Found	-----
	116.30	-----	1.96	2.135E+00	-----	Line Not Found	-----
RA-224	228.16	25	88.00*	1.911E+00	2.832E+00	5.858E+01	105.56
	240.99	37	4.10*	1.854E+00	9.044E+01	9.170E+01	123.28
RA-226	186.21	22	3.59*	2.114E+00	5.504E+01	5.504E+01	172.19
TH-230	67.67	31	0.38*	7.185E-01	2.129E+03	2.129E+03	100.91
TH-232	63.81	18	0.26*	5.778E-01	2.290E+03	2.290E+03	164.46
	140.88	-----	0.02	2.246E+00	-----	Line Not Found	-----
TH-234	63.29	18	3.70*	5.778E-01	1.609E+02	1.609E+02	164.46
	92.59	16	4.23	1.705E+00	4.191E+01	4.191E+01	249.22
U-238	63.29	18	3.70*	5.778E-01	1.609E+02	1.609E+02	164.46
	92.59	16	4.23	1.705E+00	4.191E+01	4.191E+01	249.22
ANH-511	511.00	8	100.00*	1.134E+00	1.303E+00	1.303E+00	421.30

Flag: "*" = Keyline

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*                                     DETECTOR AND SAMPLE DATA                 *
*                                     *                                         *
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372006.CNF;1  *
* Acquisition date   : 21-DEC-2016 08:39:51 Sensitivity      : 3.000          *
* Detector ID        : GAM40 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:00.75 Half life ratio : *****          *
* Sample date        : 7-DEC-2016 10:00:00 Analyst initials: MXR1          *
* Sample ID          : G412372006 Sample Quantity : 2.0000E+00 LITER      *
* Batch Number       : 1624165 Wet Weight : 0.00000          *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : LIQUID.NLB;10                                         *
*****
*                                     CALIBRATION INFORMATION                   *
*                                     *                                         *
* Eff. Cal. date     : 11-NOV-2016 10:53:00 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4          *
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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
CU-67	1.748E+02	2.949E+02	3.038E+02
AS-74	8.251E+00	1.444E+01	1.035E+01
TE-132	5.858E+01	6.061E+01	7.618E+01
RA-224	9.170E+01	1.108E+02	8.832E+01
RA-226	5.504E+01	9.287E+01	9.609E+01
TH-230	2.129E+03	2.106E+03	2.443E+03
TH-232	2.290E+03	3.690E+03	3.932E+03
TH-234	1.609E+02	2.593E+02	2.860E+02
U-238	1.609E+02	2.593E+02	2.860E+02
ANH-511	1.303E+00	5.378E+00	3.640E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-1.245E+01	2.042E+01	3.544E+01	NOT IDENT.
NA-22	-1.036E+00	2.095E+00	3.914E+00	NOT IDENT.
NA-24	0.000E+00	1.573E+07	0.000E+00	SHORT HLIF
AL-26	-3.252E+00	3.219E+00	4.584E+00	NOT IDENT.
K-40	-2.155E+01	3.566E+01	6.454E+01	NOT IDENT.
SC-46	-2.368E+00	2.394E+00	3.461E+00	NOT IDENT.
V-48	1.845E+00	3.658E+00	7.896E+00	NOT IDENT.
CR-51	2.266E+01	2.607E+01	5.367E+01	NOT IDENT.
MN-52	4.284E+00	1.147E+01	2.730E+01	NOT IDENT.
MN-54	9.096E-01	2.014E+00	4.057E+00	NOT IDENT.
CO-56	-3.263E-02	3.470E+00	5.462E+00	NOT IDENT.
CO-57	-1.039E+00	2.385E+00	3.944E+00	NOT IDENT.
CO-58	2.586E-01	2.793E+00	4.884E+00	NOT IDENT.
FE-59	2.269E+00	5.088E+00	1.134E+01	NOT IDENT.
CO-60	1.339E+00	2.110E+00	5.160E+00	FAIL ABUN
ZN-65	-1.860E+00	4.038E+00	7.678E+00	NOT IDENT.
GE-68	1.150E+01	4.651E+01	1.020E+02	NOT IDENT.
SE-75	-7.805E-01	3.271E+00	6.042E+00	NOT IDENT.
BR-77	-3.086E+02	5.630E+02	1.012E+03	NOT IDENT.
SR-82	-1.864E+01	2.119E+01	3.297E+01	NOT IDENT.

RB-83	-2.243E+00	4.111E+00	7.213E+00	NOT IDENT.
RB-84	-3.139E+00	6.393E+00	9.290E+00	NOT IDENT.
KR-85	1.089E+02	4.648E+02	9.112E+02	NOT IDENT.
SR-85	5.649E-01	2.412E+00	4.728E+00	NOT IDENT.
RB-86	1.858E+01	3.234E+01	7.519E+01	NOT IDENT.
Y-88	8.710E-01	2.680E+00	6.209E+00	NOT IDENT.
Y-91	1.181E+03	1.119E+03	2.727E+03	NOT IDENT.
NB-94	-9.509E-01	2.388E+00	4.190E+00	NOT IDENT.
NB-95	-3.922E+00	3.064E+00	3.951E+00	NOT IDENT.
NB-95M	-3.868E-01	8.405E+00	1.432E+01	NOT IDENT.
ZR-95	-3.142E+00	3.776E+00	5.888E+00	NOT IDENT.
MO-99	-2.925E+02	6.263E+02	1.087E+03	NOT IDENT.
TC-99M	0.000E+00	1.385E+17	0.000E+00	SHORT HLIF
RH-101	-1.312E+00	2.778E+00	4.574E+00	NOT IDENT.
RH-102M	1.254E+00	1.582E+00	3.504E+00	NOT IDENT.
RU-103	-4.568E-01	2.621E+00	4.880E+00	FAIL ABUN
RH-106	-8.560E+00	2.274E+01	4.038E+01	NOT IDENT.
RU-106	-8.560E+00	2.274E+01	4.038E+01	NOT IDENT.
AG-108M	-6.059E-02	1.982E+00	3.772E+00	NOT IDENT.
CD-109	6.166E+01	6.964E+01	1.320E+02	NOT IDENT.
AG-110M	1.462E+00	3.975E+00	7.274E+00	NOT IDENT.
SN-113	7.159E-02	2.785E+00	5.369E+00	NOT IDENT.
IN-114M	2.758E+00	1.399E+01	2.449E+01	NOT IDENT.
CD-115	4.569E+02	4.778E+02	1.065E+03	NOT IDENT.
SN-117M	-3.621E-01	4.050E+00	6.914E+00	NOT IDENT.
I-123	0.000E+00	9.532E+07	0.000E+00	SHORT HLIF
TE-123M	-7.324E-01	2.333E+00	3.874E+00	NOT IDENT.
SB-124	-1.130E+00	5.346E+00	1.092E+01	NOT IDENT.
SB-125	-7.458E-01	6.911E+00	1.284E+01	NOT IDENT.
TE-125M	4.094E+01	8.952E+02	1.560E+03	NOT IDENT.
I-126	-1.225E+01	1.446E+01	2.327E+01	NOT IDENT.
SB-126	-1.763E+00	7.753E+00	1.436E+01	NOT IDENT.
SN-126	6.039E+00	6.656E+00	1.271E+01	FAIL ABUN
SB-127	2.874E+01	6.033E+01	1.286E+02	NOT IDENT.
TE-129	3.664E+01	3.276E+01	7.116E+01	FAIL ABUN
I-131	2.746E+00	7.418E+00	1.469E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
BA-133	-1.019E+00	3.747E+00	6.056E+00	NOT IDENT.
I-133	0.000E+00	1.452E+05	0.000E+00	SHORT HLIF
CS-134	5.024E-01	2.569E+00	5.104E+00	NOT IDENT.
CS-135	3.882E+00	1.037E+01	2.045E+01	NOT IDENT.
I-135	0.000E+00	2.103E+16	0.000E+00	SHORT HLIF
CS-136	-2.326E+00	7.477E+00	1.418E+01	FAIL ABUN
BA-137M	-3.812E-01	2.766E+00	5.056E+00	NOT IDENT.
CS-137	-4.027E-01	2.922E+00	5.341E+00	NOT IDENT.
CE-139	1.147E+00	2.286E+00	4.150E+00	NOT IDENT.
BA-140	-4.816E+00	1.554E+01	2.842E+01	NOT IDENT.
LA-140	5.201E+00	6.022E+00	1.473E+01	NOT IDENT.
CE-141	-3.729E+00	4.845E+00	7.668E+00	NOT IDENT.
CE-143	0.000E+00	4.697E+03	0.000E+00	SHORT HLIF
CE-144	-1.766E+00	1.688E+01	2.886E+01	NOT IDENT.
PM-144	1.732E-01	1.928E+00	3.811E+00	NOT IDENT.
PR-144	1.552E+01	1.447E+02	2.869E+02	NOT IDENT.
PM-146	4.096E-01	2.736E+00	5.355E+00	NOT IDENT.
ND-147	-3.627E+01	3.574E+01	5.663E+01	NOT IDENT.
PM-147	1.534E+04	6.716E+04	1.187E+05	NOT IDENT.
PM-149	-3.313E+03	5.074E+03	8.934E+03	NOT IDENT.
EU-152	-5.536E-01	6.787E+00	1.153E+01	NOT IDENT.
GD-153	-2.675E+00	7.866E+00	1.328E+01	NOT IDENT.
EU-154	-2.936E+00	5.938E+00	1.110E+01	NOT IDENT.
EU-155	-2.059E+00	9.270E+00	1.583E+01	NOT IDENT.
HO-166M	9.022E-04	4.747E+00	8.844E+00	FAIL ABUN
TM-171	-3.056E+01	3.395E+03	6.098E+03	FAIL ABUN
LU-176	1.085E+00	1.839E+00	3.712E+00	NOT IDENT.
LU-177	2.698E+01	7.052E+01	1.376E+02	NOT IDENT.
HF-181	-2.712E+00	3.038E+00	4.999E+00	NOT IDENT.
W-181	2.352E+01	3.269E+01	6.237E+01	FAIL ABUN
TA-182	-3.489E-01	9.695E+00	1.992E+01	FAIL ABUN
RE-183	1.562E+01	3.146E+01	5.876E+01	FAIL ABUN
RE-184	-5.138E+00	6.988E+00	1.105E+01	NOT IDENT.
RE-188	-7.658E+00	1.287E+01	2.075E+01	FAIL ABUN
W-188	-5.913E+02	4.899E+02	8.039E+02	FAIL ABUN
OS-191	5.021E+00	1.300E+01	2.329E+01	FAIL ABUN
IR-192	-4.300E-01	2.455E+00	4.565E+00	NOT IDENT.
HG-203	8.617E-01	2.567E+00	5.039E+00	NOT IDENT.
BI-207	1.603E+00	4.052E+00	8.465E+00	NOT IDENT.
TL-208	1.699E+00	2.951E+00	5.609E+00	FAIL ABUN
PB-210	-8.295E+02	1.034E+03	1.563E+03	NOT IDENT.

PO-210	-8.295E+02	1.034E+03	1.563E+03	NOT IDENT.
BI-211	1.669E+01	1.948E+01	3.535E+01	NOT IDENT.
PB-211	-1.392E+01	4.398E+01	8.079E+01	FAIL ABUN
BI-212	-1.709E+01	3.502E+01	5.788E+01	NOT IDENT.
PB-212	-2.835E+00	5.111E+00	9.187E+00	NOT IDENT.
BI-213	6.905E+00	6.707E+00	1.462E+01	NOT IDENT.
BI-214	1.369E+01	7.867E+00	1.424E+01	FAIL ABUN
PB-214	0.000E+00	1.272E+01	1.387E+01	FAIL ABUN
RN-219	7.085E-02	2.367E+01	4.589E+01	NOT IDENT.
FR-221	-1.580E+00	1.440E+01	2.707E+01	NOT IDENT.
RA-223	1.741E+01	4.528E+01	8.925E+01	FAIL ABUN
AC-227	1.771E+00	1.656E+01	3.197E+01	NOT IDENT.
TH-227	1.771E+00	1.656E+01	3.197E+01	NOT IDENT.
AC-228	1.305E+01	1.289E+01	2.175E+01	FAIL ABUN
RA-228	1.305E+01	1.289E+01	2.175E+01	FAIL ABUN
TH-228	-2.835E+00	5.111E+00	9.187E+00	NOT IDENT.
TH-229	9.992E+00	3.944E+01	7.593E+01	NOT IDENT.
PA-231	3.191E+00	3.376E+01	5.880E+01	NOT IDENT.
TH-231	-2.317E+01	4.490E+01	7.345E+01	NOT IDENT.
PA-233	-4.825E+00	4.680E+00	7.834E+00	NOT IDENT.
PA-234	9.050E+00	1.873E+01	4.134E+01	NOT IDENT.
PA-234M	-6.137E+01	2.793E+02	5.691E+02	NOT IDENT.
U-234	3.072E+03	1.132E+04	2.102E+04	NOT IDENT.
U-235	2.235E+01	1.618E+01	3.155E+01	FAIL ABUN
NP-237	-4.825E+00	4.680E+00	7.834E+00	NOT IDENT.
NP-238	1.214E+02	7.686E+02	1.577E+03	NOT IDENT.
NP-239	-6.903E+00	2.360E+01	3.978E+01	FAIL ABUN
AM-241	-1.581E+01	2.442E+01	3.690E+01	NOT IDENT.
AM-242	2.791E+01	5.494E+01	1.014E+02	NOT IDENT.
AM-243	3.725E+00	5.873E+00	1.086E+01	NOT IDENT.
CM-243	7.970E+00	1.017E+01	1.893E+01	FAIL ABUN
BK-247	-1.340E+00	5.868E+00	1.086E+01	NOT IDENT.
CM-247	-4.457E-01	2.090E+00	3.936E+00	NOT IDENT.
CF-249	-5.967E-03	2.894E+00	5.473E+00	NOT IDENT.
CF-251	-8.917E+00	1.130E+01	1.768E+01	FAIL ABUN
CF-252	-2.373E+04	1.710E+04	2.562E+04	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	62.92	36	64	1.20	125.93	121	16	5.03E-03	40.4	1.52E+00
2	1	66.34	38	66	1.21	132.78	121	16	5.30E-03	39.5	
3	0	92.74	80	89	1.39	185.58	181	9	1.11E-02	24.1	
4	0	185.88	54	86	1.14	371.89	368	9	7.50E-03	34.0	
5	0	228.22	25	48	1.01	456.57	452	9	3.52E-03	52.8	
6	0	240.66	37	105	4.41	481.46	473	14	5.09E-03	61.6	
7	0	297.65	43	72	3.27	595.43	588	17	6.02E-03	47.4	
8	0	337.85	73	35	6.27	675.85	667	20	1.01E-02	23.2	
9	0	352.83	50	56	0.70	705.81	701	15	6.99E-03	34.6	
10	0	359.66	8	27	1.53	719.47	715	6	1.05E-03	106.1	
11	0	372.08	19	17	1.76	744.30	741	8	2.67E-03	42.9	
12	0	510.90	136	17	2.80	1021.96	1015	17	1.89E-02	11.0	
13	0	597.08	20	36	1.31	1194.32	1188	14	2.75E-03	67.4	
14	0	609.49	33	18	1.19	1219.15	1214	10	4.61E-03	29.3	
15	0	651.96	8	10	1.19	1304.08	1300	8	1.17E-03	73.2	
16	0	663.67	29	15	3.88	1327.49	1320	17	3.97E-03	37.7	
17	0	813.34	10	7	1.00	1626.83	1623	8	1.38E-03	57.8	
18	0	831.78	18	9	3.16	1663.71	1654	17	2.43E-03	45.0	
19	0	844.39	8	9	0.96	1688.92	1680	11	1.17E-03	74.6	
20	0	860.31	8	7	0.99	1720.77	1716	9	1.04E-03	72.0	
21	0	878.97	19	7	4.27	1758.08	1752	13	2.67E-03	35.7	
22	0	911.16	13	8	0.79	1822.46	1817	11	1.82E-03	50.4	
23	0	962.12	17	6	0.64	1924.37	1917	14	2.34E-03	41.0	
24	0	979.93	10	3	0.95	1959.98	1956	7	1.35E-03	45.1	
25	0	1075.13	8	3	3.38	2150.37	2143	11	1.12E-03	53.3	
26	0	1084.23	14	0	1.83	2168.57	2162	11	1.94E-03	26.7	
27	0	1174.14	7	2	1.47	2348.36	2344	8	9.95E-04	50.3	
28	0	1234.98	14	2	3.25	2470.03	2466	9	1.96E-03	32.5	
29	0	1443.27	8	3	4.22	2886.52	2878	12	1.08E-03	57.5	
30	0	1484.18	6	0	0.96	2968.33	2964	7	8.33E-04	40.8	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CU-67	91.27	16	7.00	1.705E+00	2.532E+01	1.091E+03	249.22
	93.31	16	16.10	1.705E+00	1.101E+01	4.743E+02	249.22
	184.58	22	48.70*	2.114E+00	4.057E+00	1.748E+02	172.19
AS-74	595.83	15	59.00*	1.016E+00	4.782E+00	8.251E+00	178.54
	634.78	-----	15.40	9.714E-01	-----	Line Not Found	-----
TE-132	49.72	-----	15.00	1.524E-01	-----	Line Not Found	-----
	111.76	-----	1.74	2.083E+00	-----	Line Not Found	-----
	116.30	-----	1.96	2.135E+00	-----	Line Not Found	-----
	228.16	25	88.00*	1.911E+00	2.832E+00	5.858E+01	105.56
RA-224	240.99	37	4.10*	1.854E+00	9.044E+01	9.170E+01	123.28
RA-226	186.21	22	3.59*	2.114E+00	5.504E+01	5.504E+01	172.19
TH-230	67.67	31	0.38*	7.185E-01	2.129E+03	2.129E+03	100.91
TH-232	63.81	18	0.26*	5.778E-01	2.290E+03	2.290E+03	164.46
	140.88	-----	0.02	2.246E+00	-----	Line Not Found	-----
TH-234	63.29	18	3.70*	5.778E-01	1.609E+02	1.609E+02	164.46
	92.59	16	4.23	1.705E+00	4.191E+01	4.191E+01	249.22
U-238	63.29	18	3.70*	5.778E-01	1.609E+02	1.609E+02	164.46
	92.59	16	4.23	1.705E+00	4.191E+01	4.191E+01	249.22
ANH-511	511.00	8	100.00*	1.134E+00	1.303E+00	1.303E+00	421.30

Flag: "*" = Keyline

Total number of lines in spectrum 30
Number of unidentified lines 12
Number of lines tentatively identified by NID 18 60.00%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CU-67	61.83H	43.1	4.057E+00	1.748E+02	3.009E+02	172.19	
AS-74	17.77D	1.73	4.782E+00	8.251E+00	14.73E+00	178.54	
TE-132	3.20D	20.7	2.832E+00	5.858E+01	6.184E+01	105.56	
RA-224	1.91Y	1.01	9.044E+01	9.170E+01	11.30E+01	123.28	
RA-226	1600.00Y	1.00	5.504E+01	5.504E+01	9.477E+01	172.19	
TH-230	7.54E+04Y	1.00	2.129E+03	2.129E+03	2.149E+03	100.91	
TH-232	1.41E+10Y	1.00	2.290E+03	2.290E+03	3.766E+03	164.46	
TH-234	4.47E+09Y	1.00	1.609E+02	1.609E+02	2.646E+02	164.46	
U-238	4.47E+09Y	1.00	1.609E+02	1.609E+02	2.646E+02	164.46	
ANH-511	1.00E+09Y	1.00	1.303E+00	1.303E+00	5.488E+00	421.30	
Total Activity :			4.899E+03	5.130E+03			

Grand Total Activity : 4.899E+03 5.130E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	297.65	43	72	3.27	595.43	588	17	6.02E-03	94.8	1.63E+00	
0	337.85	73	35	6.27	675.85	667	20	1.01E-02	46.3	1.50E+00	T
0	352.83	40	56	0.70	705.81	701	15	5.52E-03	90.1	1.46E+00	T
0	359.66	8	27	1.53	719.47	715	6	1.05E-03	****	1.44E+00	
0	372.08	19	17	1.76	744.30	741	8	2.67E-03	85.8	1.41E+00	
0	609.49	33	18	1.19	1219.15	1214	10	4.61E-03	58.6	1.00E+00	T
0	651.96	8	10	1.19	1304.08	1300	8	1.17E-03	****	9.52E-01	
0	663.67	29	15	3.88	1327.49	1320	17	3.97E-03	75.4	9.40E-01	T
0	813.34	10	7	1.00	1626.83	1623	8	1.38E-03	****	8.04E-01	
0	831.78	18	9	3.16	1663.71	1654	17	2.43E-03	90.1	7.90E-01	T
0	844.39	3	9	0.96	1688.92	1680	11	4.25E-04	****	7.81E-01	
0	860.31	8	7	0.99	1720.77	1716	9	1.04E-03	****	7.69E-01	T
0	878.97	19	7	4.27	1758.08	1752	13	2.67E-03	71.4	7.56E-01	
0	911.16	13	8	0.79	1822.46	1817	11	1.82E-03	****	7.35E-01	T
0	962.12	17	6	0.64	1924.37	1917	14	2.34E-03	81.9	7.03E-01	
0	979.93	10	3	0.95	1959.98	1956	7	1.35E-03	90.2	6.92E-01	
0	1075.13	8	3	3.38	2150.37	2143	11	1.12E-03	****	6.42E-01	
0	1084.23	14	0	1.83	2168.57	2162	11	1.94E-03	53.5	6.37E-01	T
0	1174.14	7	2	1.47	2348.36	2344	8	9.95E-04	****	5.97E-01	T
0	1234.98	14	2	3.25	2470.03	2466	9	1.96E-03	65.0	5.73E-01	T
0	1443.27	8	3	4.22	2886.52	2878	12	1.08E-03	****	5.08E-01	
0	1484.18	6	0	0.96	2968.33	2964	7	8.33E-04	81.6	4.98E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                               *
*                                     2040 Savage Road                               *
*                                     Charleston, SC 29407                           *
*****
*
*                                     DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372006.CNF;1      *
* Acquisition date   : 21-DEC-2016 08:39:51 Sensitivity      : 3.000                *
* Detector ID        : GAM40 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000    *
* Elapsed real time  : 0 02:00:00.75 Half life ratio  : *****          *
* Sample date        : 7-DEC-2016 10:00:00 Nuclide Library : LIQUID          *
* Sample ID          : G412372006 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000        *
*                                     Dry Weight   : 0.00000        *
*****
*
*                                     CALIBRATION INFORMATION                       *
*
* Eff. Cal. date     : 11-NOV-2016 10:53:00 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
CU-67	1.414E+02
AS-74	4.449E+00
TE-132	3.498E+01
RA-224	4.079E+01
RA-226	4.472E+01
TH-230	1.136E+03
TH-232	1.808E+03
TH-234	1.315E+02
U-238	1.315E+02
ANH-511	1.597E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.527E+01	NOT IDENT.
NA-22	1.498E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.715E+00	NOT IDENT.
K-40	2.755E+01	NOT IDENT.
SC-46	1.350E+00	NOT IDENT.
V-48	3.274E+00	NOT IDENT.
CR-51	2.450E+01	NOT IDENT.
MN-52	1.084E+01	NOT IDENT.
MN-54	1.696E+00	NOT IDENT.
CO-56	2.362E+00	NOT IDENT.
CO-57	1.832E+00	NOT IDENT.
CO-58	2.080E+00	NOT IDENT.
FE-59	4.786E+00	NOT IDENT.
CO-60	2.107E+00	FAIL ABUN
ZN-65	3.001E+00	NOT IDENT.
GE-68	3.822E+01	NOT IDENT.
SE-75	2.755E+00	NOT IDENT.
BR-77	4.715E+02	NOT IDENT.
SR-82	1.353E+01	NOT IDENT.
RB-83	3.044E+00	NOT IDENT.

RB-84	3.990E+00	NOT IDENT.
KR-85	4.033E+02	NOT IDENT.
SR-85	2.093E+00	NOT IDENT.
RB-86	2.989E+01	NOT IDENT.
Y-88	2.464E+00	NOT IDENT.
Y-91	1.167E+03	NOT IDENT.
NB-94	1.813E+00	NOT IDENT.
NB-95	1.625E+00	NOT IDENT.
NB-95M	6.527E+00	NOT IDENT.
ZR-95	2.306E+00	NOT IDENT.
MO-99	4.611E+02	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.118E+00	NOT IDENT.
RH-102M	1.527E+00	NOT IDENT.
RU-103	2.132E+00	FAIL ABUN
RH-106	1.753E+01	NOT IDENT.
RU-106	1.753E+01	NOT IDENT.
AG-108M	1.665E+00	NOT IDENT.
CD-109	6.157E+01	NOT IDENT.
AG-110M	3.155E+00	NOT IDENT.
SN-113	2.373E+00	NOT IDENT.
IN-114M	1.130E+01	NOT IDENT.
CD-115	4.679E+02	NOT IDENT.
SN-117M	3.188E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.790E+00	NOT IDENT.
SB-124	4.087E+00	NOT IDENT.
SB-125	5.753E+00	NOT IDENT.
TE-125M	7.258E+02	NOT IDENT.
I-126	9.895E+00	NOT IDENT.
SB-126	6.010E+00	NOT IDENT.
SN-126	5.913E+00	FAIL ABUN
SB-127	5.496E+01	NOT IDENT.
TE-129	3.199E+01	FAIL ABUN
I-131	6.618E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
BA-133	2.746E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.185E+00	NOT IDENT.
CS-135	9.314E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	6.080E+00	FAIL ABUN
BA-137M	2.229E+00	NOT IDENT.
CS-137	2.354E+00	NOT IDENT.
CE-139	1.921E+00	NOT IDENT.
BA-140	1.218E+01	NOT IDENT.
LA-140	6.162E+00	NOT IDENT.
CE-141	3.520E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.337E+01	NOT IDENT.
PM-144	1.617E+00	NOT IDENT.
PR-144	1.219E+02	NOT IDENT.
PM-146	2.360E+00	NOT IDENT.
ND-147	2.408E+01	NOT IDENT.
PM-147	5.526E+04	NOT IDENT.
PM-149	4.076E+03	NOT IDENT.
EU-152	5.120E+00	NOT IDENT.
GD-153	6.145E+00	NOT IDENT.
EU-154	4.246E+00	NOT IDENT.
EU-155	7.309E+00	NOT IDENT.
HO-166M	3.897E+00	FAIL ABUN
TM-171	2.798E+03	FAIL ABUN
LU-176	1.687E+00	NOT IDENT.
LU-177	6.358E+01	NOT IDENT.
HF-181	2.164E+00	NOT IDENT.
W-181	2.891E+01	FAIL ABUN
TA-182	8.192E+00	FAIL ABUN
RE-183	2.722E+01	FAIL ABUN
RE-184	4.342E+00	NOT IDENT.
RE-188	9.539E+00	FAIL ABUN
W-188	3.581E+02	FAIL ABUN
OS-191	1.084E+01	FAIL ABUN
IR-192	2.059E+00	NOT IDENT.
HG-203	2.294E+00	NOT IDENT.
BI-207	3.707E+00	NOT IDENT.
TL-208	2.512E+00	FAIL ABUN
PB-210	7.171E+02	NOT IDENT.
PO-210	7.171E+02	NOT IDENT.

BI-211	1.633E+01	NOT IDENT.
PB-211	3.535E+01	FAIL ABUN
BI-212	2.455E+01	NOT IDENT.
PB-212	4.279E+00	NOT IDENT.
BI-213	6.531E+00	NOT IDENT.
BI-214	6.564E+00	FAIL ABUN
PB-214	6.449E+00	FAIL ABUN
RN-219	2.007E+01	NOT IDENT.
FR-221	1.240E+01	NOT IDENT.
RA-223	4.051E+01	FAIL ABUN
AC-227	1.449E+01	NOT IDENT.
TH-227	1.449E+01	NOT IDENT.
AC-228	9.531E+00	FAIL ABUN
RA-228	9.531E+00	FAIL ABUN
TH-228	4.279E+00	NOT IDENT.
TH-229	3.521E+01	NOT IDENT.
PA-231	2.647E+01	NOT IDENT.
TH-231	3.406E+01	NOT IDENT.
PA-233	3.501E+00	NOT IDENT.
PA-234	1.771E+01	NOT IDENT.
PA-234M	2.402E+02	NOT IDENT.
U-234	9.630E+03	NOT IDENT.
U-235	1.475E+01	FAIL ABUN
NP-237	3.501E+00	NOT IDENT.
NP-238	6.470E+02	NOT IDENT.
NP-239	1.840E+01	FAIL ABUN
AM-241	1.687E+01	NOT IDENT.
AM-242	4.694E+01	NOT IDENT.
AM-243	5.079E+00	NOT IDENT.
CM-243	8.844E+00	FAIL ABUN
BK-247	4.946E+00	NOT IDENT.
CM-247	1.705E+00	NOT IDENT.
CF-249	2.456E+00	NOT IDENT.
CF-251	8.162E+00	FAIL ABUN
CF-252	1.177E+04	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372006.CNF;1
Acquisition date : 21-DEC-2016 08:39:51 Sensitivity : 3.000
Detector ID : GAM40 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.75 Half life ratio : *****
Sample date : 7-DEC-2016 10:00:00 Nuclide Library : LIQUID
Sample ID : G412372006 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 11-NOV-2016 10:53:00 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CU-67	1.748E+02	2.952E+02	2.952E+02
AS-74	8.251E+00	1.446E+01	1.446E+01
TE-132	5.858E+01	6.091E+01	6.091E+01
RA-224	9.170E+01	1.110E+02	1.110E+02
RA-226	5.504E+01	9.298E+01	9.298E+01
TH-230	2.129E+03	2.138E+03	2.138E+03
TH-232	2.290E+03	3.702E+03	3.702E+03
TH-234	1.609E+02	2.619E+02	2.619E+02
U-238	1.609E+02	2.619E+02	2.619E+02
ANH-511	1.303E+00	5.379E+00	5.379E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.245E+01	2.045E+01	2.120E+01	NOT IDENT.
NA-22	-1.036E+00	2.096E+00	2.148E+00	NOT IDENT.
NA-24	7.492E+06	1.574E+07	1.610E+07	SHORT HLIF
AL-26	-3.252E+00	3.228E+00	3.546E+00	NOT IDENT.
K-40	-2.155E+01	3.572E+01	3.701E+01	NOT IDENT.
SC-46	-2.368E+00	2.402E+00	2.629E+00	NOT IDENT.
V-48	1.845E+00	3.661E+00	3.754E+00	NOT IDENT.
CR-51	2.266E+01	2.613E+01	2.805E+01	NOT IDENT.
MN-52	4.284E+00	1.147E+01	1.163E+01	NOT IDENT.
MN-54	9.096E-01	2.016E+00	2.057E+00	NOT IDENT.
CO-56	-3.263E-02	3.470E+00	3.470E+00	NOT IDENT.
CO-57	-1.039E+00	2.386E+00	2.432E+00	NOT IDENT.
CO-58	2.586E-01	2.793E+00	2.796E+00	NOT IDENT.
FE-59	2.269E+00	5.093E+00	5.195E+00	NOT IDENT.
CO-60	1.339E+00	2.113E+00	2.198E+00	FAIL ABUN
ZN-65	-1.860E+00	4.041E+00	4.127E+00	NOT IDENT.
GE-68	1.150E+01	4.652E+01	4.680E+01	NOT IDENT.
SE-75	-7.805E-01	3.272E+00	3.291E+00	NOT IDENT.
BR-77	-3.086E+02	5.635E+02	5.804E+02	NOT IDENT.
SR-82	-1.864E+01	2.125E+01	2.285E+01	NOT IDENT.

RB-83	-2.243E+00	4.125E+00	4.248E+00	NOT IDENT.
RB-84	-3.139E+00	6.398E+00	6.553E+00	NOT IDENT.
KR-85	1.089E+02	4.648E+02	4.674E+02	NOT IDENT.
SR-85	5.649E-01	2.412E+00	2.425E+00	NOT IDENT.
RB-86	1.858E+01	3.237E+01	3.344E+01	NOT IDENT.
Y-88	8.710E-01	2.681E+00	2.709E+00	NOT IDENT.
Y-91	1.181E+03	1.123E+03	1.243E+03	NOT IDENT.
NB-94	-9.509E-01	2.389E+00	2.427E+00	NOT IDENT.
NB-95	-3.922E+00	3.081E+00	3.553E+00	NOT IDENT.
NB-95M	-3.868E-01	8.405E+00	8.407E+00	NOT IDENT.
ZR-95	-3.142E+00	3.785E+00	4.041E+00	NOT IDENT.
MO-99	-2.925E+02	6.269E+02	6.406E+02	NOT IDENT.
TC-99M	1.259E+16	1.385E+17	0.000E+00	SHORT HLIF
RH-101	-1.312E+00	2.789E+00	2.851E+00	NOT IDENT.
RH-102M	1.254E+00	1.589E+00	1.686E+00	NOT IDENT.
RU-103	-4.568E-01	2.622E+00	2.630E+00	FAIL ABUN
RH-106	-8.560E+00	2.276E+01	2.308E+01	NOT IDENT.
RU-106	-8.560E+00	2.276E+01	2.308E+01	NOT IDENT.
AG-108M	-6.059E-02	1.982E+00	1.982E+00	NOT IDENT.
CD-109	6.166E+01	6.989E+01	7.522E+01	NOT IDENT.
AG-110M	1.462E+00	3.977E+00	4.032E+00	NOT IDENT.
SN-113	7.159E-02	2.785E+00	2.785E+00	NOT IDENT.
IN-114M	2.758E+00	1.399E+01	1.404E+01	NOT IDENT.
CD-115	4.569E+02	4.797E+02	5.220E+02	NOT IDENT.
SN-117M	-3.621E-01	4.050E+00	4.053E+00	NOT IDENT.
I-123	-3.020E+07	9.535E+07	9.631E+07	SHORT HLIF
TE-123M	-7.324E-01	2.333E+00	2.357E+00	NOT IDENT.
SB-124	-1.130E+00	5.347E+00	5.371E+00	NOT IDENT.
SB-125	-7.458E-01	6.911E+00	6.919E+00	NOT IDENT.
TE-125M	4.094E+01	8.952E+02	8.954E+02	NOT IDENT.
I-126	-1.225E+01	1.451E+01	1.552E+01	NOT IDENT.
SB-126	-1.763E+00	7.755E+00	7.796E+00	NOT IDENT.
SN-126	6.039E+00	6.674E+00	7.208E+00	FAIL ABUN
SB-127	2.874E+01	6.040E+01	6.178E+01	NOT IDENT.
TE-129	3.664E+01	3.337E+01	3.723E+01	FAIL ABUN
I-131	2.746E+00	7.422E+00	7.524E+00	NOT IDENT.
I-132	1.000E+41	2.353E+41	0.000E+00	SHORT HLIF
BA-133	-1.019E+00	3.748E+00	3.776E+00	NOT IDENT.
I-133	-7.292E+04	1.455E+05	1.492E+05	SHORT HLIF
CS-134	5.024E-01	2.569E+00	2.579E+00	NOT IDENT.
CS-135	3.882E+00	1.037E+01	1.052E+01	NOT IDENT.
I-135	1.954E+16	2.201E+16	0.000E+00	SHORT HLIF
CS-136	-2.326E+00	7.482E+00	7.555E+00	FAIL ABUN
BA-137M	-3.812E-01	2.767E+00	2.772E+00	NOT IDENT.
CS-137	-4.027E-01	2.923E+00	2.928E+00	NOT IDENT.
CE-139	1.147E+00	2.299E+00	2.357E+00	NOT IDENT.
BA-140	-4.816E+00	1.555E+01	1.570E+01	NOT IDENT.
LA-140	5.201E+00	6.036E+00	6.476E+00	NOT IDENT.
CE-141	-3.729E+00	4.854E+00	5.136E+00	NOT IDENT.
CE-143	3.164E+03	4.703E+03	4.915E+03	SHORT HLIF
CE-144	-1.766E+00	1.689E+01	1.690E+01	NOT IDENT.
PM-144	1.732E-01	1.928E+00	1.929E+00	NOT IDENT.
PR-144	1.552E+01	1.447E+02	1.449E+02	NOT IDENT.
PM-146	4.096E-01	2.736E+00	2.742E+00	NOT IDENT.
ND-147	-3.627E+01	3.587E+01	3.942E+01	NOT IDENT.
PM-147	1.534E+04	6.717E+04	6.753E+04	NOT IDENT.
PM-149	-3.313E+03	5.098E+03	5.312E+03	NOT IDENT.
EU-152	-5.536E-01	6.787E+00	6.792E+00	NOT IDENT.
GD-153	-2.675E+00	7.868E+00	7.960E+00	NOT IDENT.
EU-154	-2.936E+00	5.943E+00	6.089E+00	NOT IDENT.
EU-155	-2.059E+00	9.272E+00	9.318E+00	NOT IDENT.
HO-166M	9.022E-04	4.747E+00	4.747E+00	FAIL ABUN
TM-171	-3.056E+01	3.395E+03	3.395E+03	FAIL ABUN
LU-176	1.085E+00	1.841E+00	1.905E+00	NOT IDENT.
LU-177	2.698E+01	7.055E+01	7.159E+01	NOT IDENT.
HF-181	-2.712E+00	3.046E+00	3.283E+00	NOT IDENT.
W-181	2.352E+01	3.325E+01	3.490E+01	FAIL ABUN
TA-182	-3.489E-01	9.695E+00	9.697E+00	FAIL ABUN
RE-183	1.562E+01	3.151E+01	3.228E+01	FAIL ABUN
RE-184	-5.138E+00	7.009E+00	7.382E+00	NOT IDENT.
RE-188	-7.658E+00	1.289E+01	1.334E+01	FAIL ABUN
W-188	-5.913E+02	4.957E+02	5.629E+02	FAIL ABUN
OS-191	5.021E+00	1.300E+01	1.320E+01	FAIL ABUN
IR-192	-4.300E-01	2.455E+00	2.462E+00	NOT IDENT.
HG-203	8.617E-01	2.568E+00	2.597E+00	NOT IDENT.
BI-207	1.603E+00	4.054E+00	4.118E+00	NOT IDENT.
TL-208	1.699E+00	2.954E+00	3.052E+00	FAIL ABUN
PB-210	-8.295E+02	1.038E+03	1.103E+03	NOT IDENT.

PO-210	-8.295E+02	1.038E+03	1.103E+03	NOT IDENT.
BI-211	1.669E+01	1.953E+01	2.093E+01	NOT IDENT.
PB-211	-1.392E+01	4.399E+01	4.444E+01	FAIL ABUN
BI-212	-1.709E+01	3.505E+01	3.589E+01	NOT IDENT.
PB-212	-2.835E+00	5.116E+00	5.274E+00	NOT IDENT.
BI-213	6.905E+00	6.730E+00	7.415E+00	NOT IDENT.
BI-214	1.369E+01	7.947E+00	1.006E+01	FAIL ABUN
PB-214	1.440E+01	1.277E+01	1.432E+01	FAIL ABUN
RN-219	7.085E-02	2.367E+01	2.367E+01	NOT IDENT.
FR-221	-1.580E+00	1.440E+01	1.442E+01	NOT IDENT.
RA-223	1.741E+01	4.530E+01	4.598E+01	FAIL ABUN
AC-227	1.771E+00	1.656E+01	1.658E+01	NOT IDENT.
TH-227	1.771E+00	1.656E+01	1.658E+01	NOT IDENT.
AC-228	1.305E+01	1.294E+01	1.422E+01	FAIL ABUN
RA-228	1.305E+01	1.294E+01	1.422E+01	FAIL ABUN
TH-228	-2.835E+00	5.116E+00	5.274E+00	NOT IDENT.
TH-229	9.992E+00	3.944E+01	3.970E+01	NOT IDENT.
PA-231	3.191E+00	3.376E+01	3.379E+01	NOT IDENT.
TH-231	-2.317E+01	4.502E+01	4.622E+01	NOT IDENT.
PA-233	-4.825E+00	4.696E+00	5.176E+00	NOT IDENT.
PA-234	9.050E+00	2.141E+01	2.180E+01	NOT IDENT.
PA-234M	-6.137E+01	2.794E+02	2.807E+02	NOT IDENT.
U-234	3.072E+03	1.132E+04	1.140E+04	NOT IDENT.
U-235	2.235E+01	1.628E+01	1.915E+01	FAIL ABUN
NP-237	-4.825E+00	4.696E+00	5.176E+00	NOT IDENT.
NP-238	1.214E+02	7.686E+02	7.706E+02	NOT IDENT.
NP-239	-6.903E+00	2.360E+01	2.381E+01	FAIL ABUN
AM-241	-1.581E+01	2.446E+01	2.547E+01	NOT IDENT.
AM-242	2.791E+01	5.517E+01	5.659E+01	NOT IDENT.
AM-243	3.725E+00	5.880E+00	6.115E+00	NOT IDENT.
CM-243	7.970E+00	1.020E+01	1.081E+01	FAIL ABUN
BK-247	-1.340E+00	5.874E+00	5.905E+00	NOT IDENT.
CM-247	-4.457E-01	2.092E+00	2.101E+00	NOT IDENT.
CF-249	-5.967E-03	2.894E+00	2.894E+00	NOT IDENT.
CF-251	-8.917E+00	1.136E+01	1.205E+01	FAIL ABUN
CF-252	-2.373E+04	2.750E+04	2.951E+04	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	45.1762	88.03	45.2719	140.88	68.6451
46.54	51.8003	88.34	49.8203	143.76	39.8582
49.72	43.6171	88.47	49.8290	144.24	49.5446
51.35	36.2839	91.11	50.0079	145.44	58.0730
52.39	41.7019	91.27	50.0186	152.32	57.2497
53.20	35.3398	92.59	51.2457	152.43	51.1644
56.28	47.3868	93.31	51.2945	153.25	43.8904
57.36	0.0000	94.56	47.1928	154.21	45.1508
57.53	39.9373	94.65	47.1982	155.04	56.1783
57.53	39.9375	94.67	47.1994	156.02	37.8948
57.98	43.2100	97.43	58.4474	158.56	49.0149
59.32	51.9745	98.43	44.7525	158.97	0.0000
59.54	51.9944	98.44	44.7531	159.00	56.3903
61.49	43.4749	99.53	42.5173	162.33	49.1882
63.00	43.5864	100.11	73.5977	162.66	40.5929
63.29	43.6077	100.20	73.6060	163.33	48.0032
63.58	43.6290	102.03	53.0264	165.86	41.9464
63.81	43.6458	103.18	36.9407	176.31	51.0604
64.28	43.6800	103.37	50.8055	176.60	53.5650
64.99	43.7315	105.31	53.2422	177.52	66.0753
65.08	43.7381	106.12	62.5640	181.07	56.0253
66.73	43.8565	106.47	50.9995	184.41	50.1666
66.98	43.8745	109.28	59.3143	184.58	60.2087
67.24	59.9869	111.00	57.1056	185.72	60.2673
67.67	58.5645	111.76	60.6562	186.21	60.2922
67.75	58.5722	112.95	53.7329	190.27	44.1142
69.67	41.1267	116.24	48.0760	193.51	49.7104
70.83	55.1811	116.30	48.0791	198.01	46.5120
72.81	79.7058	116.74	57.4895	201.83	59.3808
72.87	79.7135	117.23	51.6525	205.31	47.6374
74.66	55.5084	119.76	55.3334	208.37	42.6366
74.82	61.0740	120.54	62.4523	210.85	44.4288
74.97	61.0878	120.90	55.4048	218.12	42.1019
77.11	85.7984	121.12	55.4184	222.11	46.5392
79.69	52.5702	121.22	55.4245	227.09	42.3880
80.12	45.8879	121.78	71.9791	227.38	42.3975
80.19	45.8926	122.06	67.2805	228.16	42.4219
80.57	55.9975	123.07	67.3561	228.18	42.4224
81.00	76.2038	123.68	62.6718	235.69	36.5637
81.07	76.2115	127.23	62.9165	235.96	36.5706
83.79	48.3806	129.43	52.3574	238.63	48.8553
84.00	49.5201	131.20	59.6100	238.98	48.8678
84.21	52.9123	133.02	64.5032	240.99	48.9385
85.43	64.2803	133.52	56.1718	242.00	48.5365
86.55	51.9564	136.00	45.5338	244.70	38.1152
86.94	49.7242	136.28	45.5471	250.62	43.9931
87.09	42.9527	136.47	55.1465	252.40	31.7146
87.57	41.8500	140.51	68.6190	252.80	32.6046

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	30.0321	383.85	20.9652	631.29	7.4235
260.90	42.5332	388.16	25.7877	632.98	13.7950
264.66	39.9765	388.63	21.9729	633.25	12.7354
265.00	39.0971	391.70	19.1370	634.78	14.8659
268.22	29.3859	400.66	16.3408	635.95	10.6230
269.46	32.9750	401.81	16.3501	636.99	14.8778
271.23	34.7986	402.40	16.3550	645.85	7.4628
273.65	23.2361	404.85	20.2280	657.76	16.0596
276.40	33.1263	410.95	24.1547	661.66	20.3707
277.37	26.8762	414.70	19.3595	664.57	0.0000
277.60	23.2959	423.72	29.1675	666.33	20.4040
278.00	25.9910	427.09	28.2413	666.50	20.4047
278.43	25.1016	427.87	26.3035	667.71	0.0000
279.20	29.5988	433.94	19.5410	677.62	11.8594
279.54	36.7826	440.45	11.7610	685.70	7.5680
280.46	42.1902	453.88	16.7662	695.00	10.8455
283.69	39.5796	459.60	12.8551	696.49	9.7661
284.31	29.6968	463.37	22.7829	696.51	9.7661
285.41	40.5240	468.07	16.8755	697.00	8.6823
285.90	47.7433	473.00	17.9077	697.49	13.0259
287.50	40.5780	475.06	7.9665	702.65	18.4851
290.67	40.6595	476.78	19.9312	706.68	17.4219
293.27	0.0000	477.60	19.9386	711.68	18.5419
295.22	33.5267	477.99	21.9364	720.70	10.9395
295.96	33.5418	482.18	24.9741	721.93	0.0000
299.98	33.6261	487.02	20.0220	722.78	12.0420
300.09	33.6284	492.35	18.0619	722.91	10.9477
300.13	33.6291	497.08	18.0992	723.31	10.9489
301.36	25.9232	511.00	17.1961	724.19	7.6665
302.85	25.9470	514.00	17.2179	727.33	13.1563
304.50	30.0741	520.40	15.2332	733.00	13.1807
304.85	28.4394	520.69	15.2350	735.93	10.9945
306.78	24.6401	522.65	0.0000	739.50	15.4099
308.46	26.4925	527.90	8.1501	744.23	9.9218
311.90	39.3633	529.59	16.3112	747.24	7.7243
316.51	31.2102	529.87	0.0000	752.31	6.6316
319.41	23.9079	531.02	22.4413	753.82	3.3174
320.08	23.9174	537.26	15.3400	756.73	11.0685
321.04	33.1355	546.56	0.0000	763.94	8.8750
323.87	26.7367	552.55	7.2034	765.80	17.7604
325.23	32.2941	563.25	21.7024	766.42	14.4335
328.76	28.6620	569.33	20.7186	766.84	12.2143
333.37	18.0773	569.50	20.7202	772.60	0.0000
334.37	25.0444	569.70	14.5053	776.52	15.5928
338.28	21.3819	583.19	8.3324	777.92	11.1426
338.32	21.3823	595.83	12.5591	778.90	8.9170
340.48	21.4085	600.60	6.2910	783.70	12.2792
340.55	21.4095	602.73	22.0365	785.37	6.7012
344.28	22.3872	604.72	15.7520	792.07	11.1918
345.93	19.0470	609.32	16.8314	795.86	10.0844
351.06	22.4722	610.33	14.2064	801.95	10.1034
351.93	36.5347	614.28	24.0283	802.10	11.2264
356.01	36.6172	618.01	17.9408	810.29	10.1290
364.49	22.6377	621.93	19.0239	810.45	10.1294
366.42	28.3264	630.19	0.0000	810.76	10.1305

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	10.1459	1129.67	7.3525		
818.51	2.2565	1131.51	0.0000		
832.01	5.6641	1173.23	1.4854		
834.85	5.1019	1189.05	3.7271		
836.80	0.0000	1204.77	3.7405		
846.77	8.5330	1221.41	7.5088		
856.80	5.1350	1231.02	9.0299		
860.56	6.8540	1235.36	7.5317		
871.09	5.7292	1238.28	4.5220		
873.19	0.0000	1260.41	0.0000		
875.33	0.0000	1274.44	6.6467		
880.51	8.6169	1274.54	6.6467		
881.60	18.9626	1291.59	7.6240		
883.24	10.3484	1298.22	0.0000		
884.68	10.3524	1312.11	6.7001		
889.28	12.6695	1332.49	2.8837		
894.76	9.2285	1365.19	5.8063		
898.04	10.3916	1368.63	0.0000		
903.28	10.4070	1384.29	8.7435		
911.20	8.1123	1408.01	3.9045		
923.98	2.3259	1434.09	2.9434		
926.36	8.1462	1457.56	0.0000		
935.54	9.6250	1460.82	7.8901		
937.49	7.8791	1489.16	3.9666		
944.13	8.7704	1596.21	3.0346		
946.00	7.8972	1620.50	8.1274		
949.00	12.2949	1678.03	0.0000		
954.55	0.0000	1690.97	4.1143		
964.08	5.6432	1764.49	9.3730		
968.97	4.4145	1770.23	2.0850		
983.53	4.2542	1771.35	2.0853		
984.45	5.9100	1791.20	0.0000		
996.26	8.0033	1808.65	9.4417		
1001.03	5.3421	1836.06	3.1613		
1004.73	10.6941				
1025.87	7.1680				
1028.54	11.6559				
1037.84	8.0887				
1038.76	0.0000				
1046.59	7.2056				
1048.07	15.3181				
1050.41	12.6217				
1063.66	12.6636				
1077.00	1.8151				
1077.34	1.8152				
1083.85	3.6362				
1085.87	7.2759				
1099.25	6.3869				
1111.64	3.6606				
1112.07	5.4913				
1112.84	6.4078				
1115.54	7.3281				
1120.29	6.4194				
1120.55	6.4198				
1121.30	9.1724				

VAX/VMS Nuclide Identification Report Generated 23-DEC-2016 11:28:37.32

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*****
*                               GEL Laboratories LLC                      *
*                               2040 Savage Road                        *
*                               Charleston, SC 29407                    *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372007.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM41.CNF;135
Background date : 18-DEC-2016 13:13:22
Sample date     : 7-DEC-2016 11:33:00. Acquisition date : 21-DEC-2016 08:40:20
Sample ID       : G412372007. Sample quantity : 2.00000E+00 LITER
Detector name   : GAM41. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:11.07 0.2%
Energy tolerance: 1.50000 keV Analyst Initials : MXR1
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.71*	29	87	1.09	93.72	90	8	4.06E-03	71.9	
2	0	52.99*	46	115	1.03	106.27	102	10	6.36E-03	48.3	
3	0	65.44	12	99	1.15	131.17	131	6	1.73E-03	127.7	
4	0	74.61*	6	111	0.83	149.50	147	7	8.09E-04	317.5	
5	0	77.42*	12	67	0.69	155.11	153	6	1.68E-03	121.2	
6	0	84.23*	16	140	1.29	168.72	163	11	2.18E-03	156.5	
7	0	139.84	33	83	1.23	279.92	276	10	4.59E-03	54.4	
8	0	143.77*	20	50	1.22	287.78	285	7	2.73E-03	73.4	
9	0	185.68*	9	102	1.31	371.57	365	12	1.19E-03	274.9	
10	0	197.86*	14	102	3.89	395.92	389	12	1.95E-03	153.4	
11	2	238.92*	3	61	1.75	478.03	473	14	4.49E-04	509.2	1.63E+00
12	2	241.87	21	30	1.17	483.92	473	14	2.90E-03	53.0	
13	0	254.82	21	31	1.14	509.82	506	8	2.86E-03	54.0	
14	0	287.96	13	29	0.90	576.09	573	7	1.86E-03	71.2	
15	0	351.76*	29	49	0.88	703.65	695	14	3.98E-03	57.2	
16	0	436.76	11	27	0.85	873.64	866	9	1.53E-03	90.3	
17	0	438.85	11	20	1.21	877.81	875	6	1.56E-03	69.2	
18	0	556.59	17	15	2.91	1113.27	1107	14	2.42E-03	51.6	
19	0	577.31	22	15	1.81	1154.72	1148	13	3.08E-03	42.8	
20	0	583.00*	28	2	2.99	1166.10	1161	10	3.85E-03	26.9	
21	0	596.44	26	19	1.38	1192.97	1189	11	3.54E-03	37.1	
22	0	609.77*	20	28	1.37	1219.63	1214	12	2.71E-03	63.5	
23	0	878.50	10	8	1.16	1757.11	1750	11	1.35E-03	65.6	
24	0	1200.86	11	1	0.60	2401.94	2399	8	1.48E-03	37.6	
25	0	1526.19	6	0	1.37	3052.83	3049	8	8.33E-04	40.8	
26	0	1534.66	9	0	0.96	3069.78	3066	9	1.25E-03	33.3	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372007.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title : MXR1
Sample date : 7-DEC-2016 11:33:00 Acquisition date : 21-DEC-2016 08:40:20
Sample ID : G412372007 Sample quantity : 2.0000 LITER
Sample type : LIQUID Sample geometry :
Detector name : GAMMA41 Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:11.07 0.2%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
U-235	185.72	RA-226	186.21

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
AS-74	595.83	59.00*	9.138E-01	8.877E+00	1.528E+01	74.15	OK
	634.78	15.40	8.662E-01	----- Line	Not Found	-----	Absent
TL-208	277.37	6.60	1.669E+00	----- Line	Not Found	-----	Absent
	583.19	85.00*	9.318E-01	6.565E+00	6.657E+00	53.74	OK
	860.56	12.50	6.660E-01	----- Line	Not Found	-----	Absent
PB-210	46.54	4.25*	2.616E+00	4.938E+01	4.944E+01	143.70	OK
PO-210	46.54	4.25*	2.616E+00	4.938E+01	4.944E+01	143.70	OK
BI-211	72.87	1.23	2.776E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	1.406E+00	2.960E+01	2.964E+01	114.34	OK
PB-212	74.82	10.28	2.775E+00	3.833E+00	3.887E+00	634.91	OK
	77.11	17.10	2.771E+00	4.782E+00	4.849E+00	242.44	OK
	238.63	43.60*	1.842E+00	7.550E-01	7.655E-01	1018.48	OK
	300.09	3.30	1.580E+00	----- Line	Not Found	-----	Absent
RA-224	240.99	4.10*	1.828E+00	5.230E+01	5.302E+01	106.00	OK
TH-228	74.82	10.28	2.775E+00	3.833E+00	3.887E+00	634.91	OK
	77.11	17.10	2.771E+00	4.782E+00	4.849E+00	242.44	OK
	238.63	43.60*	1.842E+00	7.550E-01	7.655E-01	1018.48	OK
	300.09	3.30	1.580E+00	----- Line	Not Found	-----	Absent
TH-231	84.21	6.60*	2.753E+00	1.621E+01	1.621E+01	312.92	OK
U-234	53.20	0.12*	2.696E+00	2.655E+03	2.655E+03	96.66	OK
	120.90	0.04	2.554E+00	----- Line	Not Found	-----	Absent
U-235	143.76	10.96*	2.401E+00	1.401E+01	1.401E+01	146.86	OK
	163.33	5.08	2.272E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	2.132E+00	1.324E+00	1.324E+00	549.72	OK
	205.31	5.01	2.017E+00	----- Line	Not Found	-----	Absent
AM-243	43.53	5.90	2.560E+00	----- Line	Not Found	-----	Absent
	74.66	67.20*	2.775E+00	5.864E-01	5.864E-01	634.91	OK

Flag: "*" = Keyline

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*****
*                                     GEL Laboratories LLC                               *
*                                     2040 Savage Road                               *
*                                     Charleston, SC 29407                          *
*****
*                                     DETECTOR AND SAMPLE DATA                      *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372007.CNF;1      *
* Acquisition date   : 21-DEC-2016 08:40:20 Sensitivity      : 3.000                *
* Detector ID        : GAM41 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000    *
* Elapsed real time  : 0 02:00:11.07 Half life ratio : *****      *
* Sample date        : 7-DEC-2016 11:33:00 Analyst initials: MXR1      *
* Sample ID          : G412372007 Sample Quantity : 2.0000E+00 LITER *
* Batch Number       : 1624165 Wet Weight      : 0.00000      *
* Wet wt corr        : 1.00000 Dry Weight       : 0.00000      *
* Nuclide Library    : LIQUID.NLB;10
*****
*                                     CALIBRATION INFORMATION                      *
*
* Eff. Cal. date     : 27-JAN-2016 05:57:05 Eff. Geometry   : 2LMB      *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3      *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
AS-74	1.528E+01	1.110E+01	1.198E+01
TL-208	6.657E+00	3.506E+00	3.191E+00
PB-210	4.944E+01	6.962E+01	7.003E+01
PO-210	4.944E+01	6.962E+01	7.003E+01
BI-211	2.964E+01	3.321E+01	2.910E+01
PB-212	7.655E-01	7.641E+00	7.218E+00
RA-224	5.302E+01	5.508E+01	7.729E+01
TH-228	7.655E-01	7.641E+00	7.218E+00
TH-231	1.621E+01	4.972E+01	4.293E+01
U-234	2.655E+03	2.515E+03	2.255E+03
U-235	1.401E+01	2.016E+01	2.587E+01
AM-243	5.864E-01	3.649E+00	4.719E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-1.758E+00	2.579E+01	4.706E+01	NOT IDENT.
NA-22	1.076E+00	3.262E+00	6.905E+00	NOT IDENT.
NA-24	0.000E+00	1.032E+07	0.000E+00	SHORT HLIF
AL-26	2.116E+00	2.437E+00	6.737E+00	NOT IDENT.
K-40	-1.434E+01	3.608E+01	7.065E+01	NOT IDENT.
SC-46	2.869E+00	3.101E+00	7.013E+00	NOT IDENT.
V-48	-1.277E+00	4.118E+00	7.927E+00	NOT IDENT.
CR-51	9.711E+00	2.718E+01	5.226E+01	NOT IDENT.
MN-52	-6.158E+00	1.717E+01	3.168E+01	NOT IDENT.
MN-54	-1.928E+00	2.820E+00	4.941E+00	NOT IDENT.
CO-56	-4.400E-02	2.878E+00	5.743E+00	NOT IDENT.
CO-57	1.119E+00	1.877E+00	3.648E+00	NOT IDENT.
CO-58	2.028E+00	2.993E+00	6.550E+00	NOT IDENT.
FE-59	-5.084E+00	6.599E+00	1.103E+01	NOT IDENT.
CO-60	-2.069E+00	3.045E+00	5.105E+00	NOT IDENT.
ZN-65	5.681E-01	6.169E+00	1.250E+01	NOT IDENT.
CU-67	6.582E+01	3.546E+02	4.082E+02	FAIL ABUN
GE-68	-4.063E+01	1.015E+02	1.853E+02	NOT IDENT.

SE-75	-5.627E-01	2.714E+00	4.984E+00	NOT IDENT.
BR-77	8.263E+01	8.248E+02	1.041E+03	FAIL ABUN
SR-82	7.660E+00	2.415E+01	5.047E+01	NOT IDENT.
RB-83	1.381E+00	5.707E+00	1.091E+01	NOT IDENT.
RB-84	4.233E-02	6.081E+00	1.063E+01	NOT IDENT.
KR-85	-1.762E+03	8.843E+02	1.224E+03	NOT IDENT.
SR-85	-9.137E+00	4.585E+00	6.346E+00	NOT IDENT.
RB-86	-1.320E+01	6.083E+01	1.153E+02	NOT IDENT.
Y-88	-2.005E+00	2.988E+00	5.314E+00	NOT IDENT.
Y-91	6.947E+02	1.190E+03	2.605E+03	NOT IDENT.
NB-94	1.191E+00	2.345E+00	5.023E+00	NOT IDENT.
NB-95	-2.094E-01	3.326E+00	6.446E+00	NOT IDENT.
NB-95M	-4.343E+00	9.610E+00	1.494E+01	NOT IDENT.
ZR-95	-1.165E+00	4.795E+00	9.279E+00	NOT IDENT.
MO-99	3.168E+02	7.416E+02	1.543E+03	FAIL ABUN
TC-99M	0.000E+00	1.555E+17	0.000E+00	SHORT HLIF
RH-101	2.508E+00	2.187E+00	4.442E+00	FAIL ABUN
RH-102M	2.033E+00	2.199E+00	4.624E+00	NOT IDENT.
RU-103	-3.333E+00	3.496E+00	5.492E+00	FAIL ABUN
RH-106	1.637E+00	2.589E+01	4.821E+01	NOT IDENT.
RU-106	1.637E+00	2.589E+01	4.821E+01	NOT IDENT.
AG-108M	9.497E-01	2.459E+00	4.372E+00	NOT IDENT.
CD-109	-2.604E+01	5.100E+01	8.273E+01	NOT IDENT.
AG-110M	-2.337E+00	4.253E+00	7.604E+00	NOT IDENT.
SN-113	2.372E+00	3.535E+00	6.600E+00	NOT IDENT.
IN-114M	-2.386E+01	1.552E+01	2.078E+01	NOT IDENT.
CD-115	-4.470E+02	6.269E+02	1.022E+03	NOT IDENT.
SN-117M	1.228E+00	3.713E+00	7.091E+00	NOT IDENT.
I-123	0.000E+00	8.065E+07	0.000E+00	SHORT HLIF
TE-123M	1.265E+00	2.098E+00	4.077E+00	NOT IDENT.
SB-124	-1.940E+00	5.402E+00	1.115E+01	NOT IDENT.
SB-125	7.407E-01	6.663E+00	1.260E+01	NOT IDENT.
TE-125M	-5.655E+01	6.792E+02	1.259E+03	NOT IDENT.
I-126	5.467E+00	1.481E+01	3.103E+01	NOT IDENT.
SB-126	8.891E+00	9.191E+00	2.108E+01	NOT IDENT.
SN-126	-5.225E+00	5.095E+00	7.874E+00	FAIL ABUN
SB-127	4.625E+01	7.500E+01	1.636E+02	NOT IDENT.
TE-129	3.249E+01	3.585E+01	7.487E+01	NOT IDENT.
I-131	4.525E+00	8.126E+00	1.601E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-1.434E+00	4.114E+01	7.575E+01	NOT IDENT.
BA-133	2.368E+00	3.581E+00	6.510E+00	NOT IDENT.
I-133	0.000E+00	1.631E+05	0.000E+00	SHORT HLIF
CS-134	-7.530E-01	3.266E+00	5.959E+00	NOT IDENT.
CS-135	-7.331E+00	1.004E+01	1.710E+01	NOT IDENT.
I-135	0.000E+00	1.849E+16	0.000E+00	SHORT HLIF
CS-136	-8.600E-01	6.965E+00	1.371E+01	NOT IDENT.
BA-137M	-1.776E+00	2.432E+00	4.303E+00	NOT IDENT.
CS-137	-1.877E+00	2.569E+00	4.545E+00	NOT IDENT.
CE-139	-1.637E+00	2.129E+00	3.690E+00	NOT IDENT.
BA-140	-8.403E+00	1.788E+01	3.068E+01	NOT IDENT.
LA-140	1.737E+00	6.028E+00	1.366E+01	NOT IDENT.
CE-141	-5.439E+00	5.204E+00	7.775E+00	NOT IDENT.
CE-143	0.000E+00	5.218E+03	0.000E+00	SHORT HLIF
CE-144	-1.115E+01	1.701E+01	2.718E+01	NOT IDENT.
PM-144	1.293E+00	2.157E+00	4.781E+00	NOT IDENT.
PR-144	3.025E+01	1.731E+02	3.567E+02	NOT IDENT.
PM-146	8.675E-02	3.088E+00	5.780E+00	NOT IDENT.
ND-147	6.927E+00	3.993E+01	7.632E+01	NOT IDENT.
PM-147	-2.393E+04	5.582E+04	1.006E+05	NOT IDENT.
PM-149	5.023E+02	4.593E+03	7.826E+03	NOT IDENT.
EU-152	-9.587E-01	8.108E+00	1.398E+01	NOT IDENT.
GD-153	-1.734E+00	6.235E+00	1.075E+01	NOT IDENT.
EU-154	2.630E+00	9.148E+00	1.926E+01	NOT IDENT.
EU-155	-5.731E+00	7.593E+00	1.339E+01	NOT IDENT.
HO-166M	-1.629E+00	4.219E+00	7.931E+00	FAIL ABUN
TM-171	6.872E+02	6.509E+02	7.563E+02	FAIL ABUN
LU-176	-1.084E+00	1.827E+00	3.151E+00	NOT IDENT.
LU-177	5.905E-01	7.108E+01	1.316E+02	NOT IDENT.
HF-181	-8.125E-01	2.954E+00	5.299E+00	NOT IDENT.
W-181	-3.518E+00	6.444E+00	9.527E+00	FAIL ABUN
TA-182	9.668E-01	1.087E+01	2.266E+01	NOT IDENT.
RE-183	2.684E-01	5.627E+00	9.667E+00	NOT IDENT.
RE-184	4.433E+00	9.133E+00	1.970E+01	NOT IDENT.
RE-188	9.261E-01	1.065E+01	2.008E+01	NOT IDENT.
W-188	-1.981E+02	5.678E+02	8.909E+02	NOT IDENT.
OS-191	-1.435E+01	1.098E+01	1.830E+01	FAIL ABUN
IR-192	-2.069E+00	2.610E+00	4.362E+00	NOT IDENT.

HG-203	2.599E-01	2.471E+00	4.674E+00	NOT IDENT.
BI-207	3.127E+00	3.642E+00	8.486E+00	FAIL ABUN
PB-211	-5.970E+00	5.528E+01	1.006E+02	NOT IDENT.
BI-212	-7.081E-01	2.999E+01	6.132E+01	NOT IDENT.
BI-213	2.022E+00	9.861E+00	1.668E+01	NOT IDENT.
BI-214	8.994E+00	1.120E+01	1.441E+01	FAIL ABUN
PB-214	1.074E+01	1.204E+01	1.348E+01	FAIL ABUN
RN-219	-2.778E+01	3.212E+01	5.217E+01	NOT IDENT.
FR-221	1.562E+00	1.594E+01	2.963E+01	NOT IDENT.
RA-223	-3.922E+01	4.922E+01	8.209E+01	FAIL ABUN
RA-226	2.109E+01	1.136E+02	1.387E+02	FAIL ABUN
AC-227	2.308E+01	2.443E+01	3.066E+01	FAIL ABUN
TH-227	2.308E+01	2.443E+01	3.066E+01	FAIL ABUN
AC-228	-4.475E+00	1.111E+01	2.046E+01	NOT IDENT.
RA-228	-4.475E+00	1.111E+01	2.046E+01	NOT IDENT.
TH-229	5.503E+01	4.080E+01	7.850E+01	FAIL ABUN
TH-230	-5.731E+00	5.621E+02	8.708E+02	NOT IDENT.
PA-231	2.137E+01	3.379E+01	6.705E+01	NOT IDENT.
TH-232	2.954E+01	1.041E+03	1.951E+03	FAIL ABUN
PA-233	2.393E+00	4.750E+00	9.310E+00	NOT IDENT.
PA-234	-7.476E+00	2.000E+01	3.761E+01	NOT IDENT.
PA-234M	2.906E+02	4.173E+02	8.536E+02	NOT IDENT.
TH-234	-1.763E+01	7.626E+01	1.391E+02	NOT IDENT.
NP-237	2.393E+00	4.750E+00	9.310E+00	NOT IDENT.
NP-238	3.581E+02	7.636E+02	1.777E+03	NOT IDENT.
U-238	-1.763E+01	7.626E+01	1.391E+02	NOT IDENT.
NP-239	4.689E+00	1.978E+01	3.746E+01	NOT IDENT.
AM-241	1.564E+00	4.895E+00	8.566E+00	NOT IDENT.
AM-242	-2.166E+01	4.392E+01	7.913E+01	NOT IDENT.
CM-243	1.674E-01	7.495E+00	1.400E+01	NOT IDENT.
BK-247	1.241E+00	4.942E+00	9.599E+00	FAIL ABUN
CM-247	-3.059E+00	2.997E+00	4.743E+00	FAIL ABUN
CF-249	-1.596E-01	3.126E+00	5.730E+00	NOT IDENT.
CF-251	3.219E-01	8.623E+00	1.617E+01	NOT IDENT.
CF-252	-2.846E+03	1.222E+04	2.243E+04	NOT IDENT.
ANH-511	-5.630E+00	4.774E+00	8.973E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.71	127	87	1.09	93.72	90	8	1.77E-02	15.5	
2	0	52.99	58	115	1.03	106.27	102	10	8.06E-03	37.0	
3	0	63.19	157	171	0.97	126.66	122	10	2.18E-02	17.6	
4	0	65.44	12	99	1.15	131.17	131	6	1.73E-03	127.7	
5	0	74.61	19	111	0.83	149.50	147	7	2.63E-03	94.8	
6	0	77.42	30	67	0.69	155.11	153	6	4.17E-03	47.7	
7	0	84.23	42	140	1.29	168.72	163	11	5.89E-03	56.2	
8	0	92.73	224	162	1.14	185.72	181	10	3.11E-02	12.6	
9	0	139.84	33	83	1.23	279.92	276	10	4.59E-03	54.4	
10	0	143.77	43	50	1.22	287.78	285	7	6.03E-03	30.8	
11	0	185.68	102	102	1.31	371.57	365	12	1.41E-02	22.2	
12	0	197.86	32	102	3.89	395.92	389	12	4.39E-03	66.3	
13	2	238.92	34	61	1.75	478.03	473	14	4.70E-03	45.8	1.63E+00
14	2	241.87	21	30	1.17	483.92	473	14	2.90E-03	53.0	
15	0	254.82	21	31	1.14	509.82	506	8	2.86E-03	54.0	
16	0	287.96	13	29	0.90	576.09	573	7	1.86E-03	71.2	
17	0	351.76	35	49	0.88	703.65	695	14	4.91E-03	45.2	
18	0	436.76	11	27	0.85	873.64	866	9	1.53E-03	90.3	
19	0	438.85	11	20	1.21	877.81	875	6	1.56E-03	69.2	
20	0	511.52	99	41	1.56	1023.13	1016	16	1.38E-02	17.9	
21	0	556.59	17	15	2.91	1113.27	1107	14	2.42E-03	51.6	
22	0	577.31	22	15	1.81	1154.72	1148	13	3.08E-03	42.8	
23	0	583.00	34	2	2.99	1166.10	1161	10	4.66E-03	19.4	
24	0	596.44	26	19	1.38	1192.97	1189	11	3.54E-03	37.1	
25	0	609.77	24	28	1.37	1219.63	1214	12	3.38E-03	48.9	
26	0	878.50	10	8	1.16	1757.11	1750	11	1.35E-03	65.6	
27	0	1200.86	11	1	0.60	2401.94	2399	8	1.48E-03	37.6	
28	0	1526.19	6	0	1.37	3052.83	3049	8	8.33E-04	40.8	
29	0	1534.66	9	0	0.96	3069.78	3066	9	1.25E-03	33.3	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	26	59.00*	9.138E-01	8.877E+00	1.528E+01	74.15
	634.78	-----	15.40	8.662E-01	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	1.669E+00	-----	Line Not Found	-----
	583.19	28	85.00*	9.318E-01	6.565E+00	6.657E+00	53.74
	860.56	-----	12.50	6.660E-01	-----	Line Not Found	-----
PB-210	46.54	29	4.25*	2.616E+00	4.938E+01	4.944E+01	143.70
PO-210	46.54	29	4.25*	2.616E+00	4.938E+01	4.944E+01	143.70
BI-211	72.87	-----	1.23	2.776E+00	-----	Line Not Found	-----
	351.06	29	12.92*	1.406E+00	2.960E+01	2.964E+01	114.34
PB-212	74.82	6	10.28	2.775E+00	3.833E+00	3.887E+00	634.91
	77.11	12	17.10	2.771E+00	4.782E+00	4.849E+00	242.44
	238.63	3	43.60*	1.842E+00	7.550E-01	7.655E-01	1018.48
	300.09	-----	3.30	1.580E+00	-----	Line Not Found	-----
RA-224	240.99	21	4.10*	1.828E+00	5.230E+01	5.302E+01	106.00
RA-226	186.21	9	3.59*	2.132E+00	2.109E+01	2.109E+01	549.72
TH-228	74.82	6	10.28	2.775E+00	3.833E+00	3.887E+00	634.91
	77.11	12	17.10	2.771E+00	4.782E+00	4.849E+00	242.44
	238.63	3	43.60*	1.842E+00	7.550E-01	7.655E-01	1018.48
	300.09	-----	3.30	1.580E+00	-----	Line Not Found	-----
TH-231	84.21	16	6.60*	2.753E+00	1.621E+01	1.621E+01	312.92
U-234	53.20	46	0.12*	2.696E+00	2.655E+03	2.655E+03	96.66
	120.90	-----	0.04	2.554E+00	-----	Line Not Found	-----
U-235	143.76	20	10.96*	2.401E+00	1.401E+01	1.401E+01	146.86
	163.33	-----	5.08	2.272E+00	-----	Line Not Found	-----
	185.72	9	57.20	2.132E+00	1.324E+00	1.324E+00	549.72
	205.31	-----	5.01	2.017E+00	-----	Line Not Found	-----
AM-243	43.53	-----	5.90	2.560E+00	-----	Line Not Found	-----
	74.66	6	67.20*	2.775E+00	5.864E-01	5.864E-01	634.91

Flag: "*" = Keyline

Total number of lines in spectrum 26
Number of unidentified lines 8
Number of lines tentatively identified by NID 18 69.23%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AS-74	17.77D	1.72	8.877E+00	1.528E+01	1.133E+01	74.15	
TL-208	1.91Y	1.01	6.565E+00	6.657E+00	3.577E+00	53.74	
PB-210	22.20Y	1.00	4.938E+01	4.944E+01	7.104E+01	143.70	
PO-210	22.20Y	1.00	4.938E+01	4.944E+01	7.104E+01	143.70	
BI-211	21.77Y	1.00	2.960E+01	2.964E+01	3.389E+01	114.34	
PB-212	1.91Y	1.01	7.550E-01	7.655E-01	77.97E-01	1018.48	
RA-224	1.91Y	1.01	5.230E+01	5.302E+01	5.621E+01	106.00	
RA-226	1600.00Y	1.00	2.109E+01	2.109E+01	11.59E+01	549.72	
TH-228	1.91Y	1.01	7.550E-01	7.655E-01	77.97E-01	1018.48	
TH-231	7.04E+08Y	1.00	1.621E+01	1.621E+01	5.074E+01	312.92	
U-234	2.45E+05Y	1.00	2.655E+03	2.655E+03	2.566E+03	96.66	
U-235	7.04E+08Y	1.00	1.401E+01	1.401E+01	2.057E+01	146.86	
AM-243	7370.00Y	1.00	5.864E-01	5.864E-01	37.23E-01	634.91	
Total Activity :			2.904E+03	2.912E+03			

Grand Total Activity : 2.904E+03 2.912E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	65.44	12	99	1.15	131.17	131	6	1.73E-03	****	2.77E+00	T
0	139.84	33	83	1.23	279.92	276	10	4.59E-03	****	2.43E+00	T
0	197.86	14	102	3.89	395.92	389	12	1.95E-03	****	2.06E+00	T
0	254.82	21	31	1.14	509.82	506	8	2.86E-03	****	1.77E+00	T
0	287.96	13	29	0.90	576.09	573	7	1.86E-03	****	1.63E+00	T
0	436.76	11	27	0.85	873.64	866	9	1.53E-03	****	1.19E+00	
0	438.85	11	20	1.21	877.81	875	6	1.56E-03	****	1.18E+00	
0	556.59	17	15	2.91	1113.27	1107	14	2.42E-03	****	9.69E-01	
0	577.31	22	15	1.81	1154.72	1148	13	3.08E-03	85.6	9.40E-01	
0	609.77	20	28	1.37	1219.63	1214	12	2.71E-03	****	8.97E-01	T
0	878.50	10	8	1.16	1757.11	1750	11	1.35E-03	****	6.54E-01	
0	1200.86	11	1	0.60	2401.94	2399	8	1.48E-03	75.3	5.03E-01	
0	1526.19	6	0	1.37	3052.83	3049	8	8.33E-04	81.6	4.16E-01	
0	1534.66	9	0	0.96	3069.78	3066	9	1.25E-03	66.7	4.14E-01	

Flags: "T" = Tentatively associated

```

*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372007.CNF;1  *
* Acquisition date   : 21-DEC-2016 08:40:20 Sensitivity      : 3.000          *
* Detector ID        : GAM41 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000    *
* Elapsed real time  : 0 02:00:11.07 Half life ratio  : *****        *
* Sample date        : 7-DEC-2016 11:33:00 Nuclide Library : LIQUID      *
* Sample ID          : G412372007 Analyst initials: MXR1        *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER  *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000        *
*                                     Dry Weight    : 0.00000        *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 27-JAN-2016 05:57:05 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
AS-74	5.181E+00
TL-208	1.271E+00
PB-210	3.274E+01
PO-210	3.274E+01
BI-211	1.316E+01
PB-212	3.290E+00
RA-224	3.523E+01
TH-228	3.290E+00
TH-231	2.008E+01
U-234	1.050E+03
U-235	1.198E+01
AM-243	2.224E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	2.089E+01	NOT IDENT.
NA-22	2.917E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.677E+00	NOT IDENT.
K-40	2.980E+01	NOT IDENT.
SC-46	3.067E+00	NOT IDENT.
V-48	3.182E+00	NOT IDENT.
CR-51	2.374E+01	NOT IDENT.
MN-52	1.257E+01	NOT IDENT.
MN-54	2.088E+00	NOT IDENT.
CO-56	2.446E+00	NOT IDENT.
CO-57	1.704E+00	NOT IDENT.
CO-58	2.859E+00	NOT IDENT.
FE-59	4.484E+00	NOT IDENT.
CO-60	2.001E+00	NOT IDENT.
ZN-65	5.274E+00	NOT IDENT.
CU-67	1.939E+02	FAIL ABUN
GE-68	7.782E+01	NOT IDENT.
SE-75	2.222E+00	NOT IDENT.

BR-77	4.859E+02	FAIL ABUN
SR-82	2.186E+01	NOT IDENT.
RB-83	4.842E+00	NOT IDENT.
RB-84	4.557E+00	NOT IDENT.
KR-85	5.551E+02	NOT IDENT.
SR-85	2.878E+00	NOT IDENT.
RB-86	4.871E+01	NOT IDENT.
Y-88	1.887E+00	NOT IDENT.
Y-91	1.073E+03	NOT IDENT.
NB-94	2.192E+00	NOT IDENT.
NB-95	2.823E+00	NOT IDENT.
NB-95M	6.833E+00	NOT IDENT.
ZR-95	3.911E+00	NOT IDENT.
MO-99	6.794E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.072E+00	FAIL ABUN
RH-102M	2.069E+00	NOT IDENT.
RU-103	2.412E+00	FAIL ABUN
RH-106	2.113E+01	NOT IDENT.
RU-106	2.113E+01	NOT IDENT.
AG-108M	1.952E+00	NOT IDENT.
CD-109	3.882E+01	NOT IDENT.
AG-110M	3.245E+00	NOT IDENT.
SN-113	2.972E+00	NOT IDENT.
IN-114M	9.453E+00	NOT IDENT.
CD-115	4.419E+02	NOT IDENT.
SN-117M	3.288E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.897E+00	NOT IDENT.
SB-124	3.951E+00	NOT IDENT.
SB-125	5.589E+00	NOT IDENT.
TE-125M	5.876E+02	NOT IDENT.
I-126	1.356E+01	NOT IDENT.
SB-126	9.216E+00	NOT IDENT.
SN-126	3.688E+00	FAIL ABUN
SB-127	7.139E+01	NOT IDENT.
TE-129	3.359E+01	NOT IDENT.
I-131	7.251E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.479E+01	NOT IDENT.
BA-133	2.962E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.558E+00	NOT IDENT.
CS-135	7.625E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	5.684E+00	NOT IDENT.
BA-137M	1.814E+00	NOT IDENT.
CS-137	1.916E+00	NOT IDENT.
CE-139	1.695E+00	NOT IDENT.
BA-140	1.312E+01	NOT IDENT.
LA-140	5.422E+00	NOT IDENT.
CE-141	3.593E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.264E+01	NOT IDENT.
PM-144	2.063E+00	NOT IDENT.
PR-144	1.539E+02	NOT IDENT.
PM-146	2.549E+00	NOT IDENT.
ND-147	3.354E+01	NOT IDENT.
PM-147	4.680E+04	NOT IDENT.
PM-149	3.521E+03	NOT IDENT.
EU-152	6.326E+00	NOT IDENT.
GD-153	5.040E+00	NOT IDENT.
EU-154	8.114E+00	NOT IDENT.
EU-155	6.244E+00	NOT IDENT.
HO-166M	3.369E+00	FAIL ABUN
TM-171	3.580E+02	FAIL ABUN
LU-176	1.401E+00	NOT IDENT.
LU-177	6.058E+01	NOT IDENT.
HF-181	2.288E+00	NOT IDENT.
W-181	4.452E+00	FAIL ABUN
TA-182	9.271E+00	NOT IDENT.
RE-183	4.525E+00	NOT IDENT.
RE-184	8.484E+00	NOT IDENT.
RE-188	9.242E+00	NOT IDENT.
W-188	4.007E+02	NOT IDENT.
OS-191	8.437E+00	FAIL ABUN
IR-192	1.952E+00	NOT IDENT.
HG-203	2.107E+00	NOT IDENT.

BI-207	3.632E+00	FAIL ABUN
PB-211	4.496E+01	NOT IDENT.
BI-212	2.566E+01	NOT IDENT.
BI-213	7.511E+00	NOT IDENT.
BI-214	6.587E+00	FAIL ABUN
PB-214	6.235E+00	FAIL ABUN
RN-219	2.305E+01	NOT IDENT.
FR-221	1.368E+01	NOT IDENT.
RA-223	3.680E+01	FAIL ABUN
RA-226	6.607E+01	FAIL ABUN
AC-227	1.381E+01	FAIL ABUN
TH-227	1.381E+01	FAIL ABUN
AC-228	8.675E+00	NOT IDENT.
RA-228	8.675E+00	NOT IDENT.
TH-229	3.650E+01	FAIL ABUN
TH-230	4.115E+02	NOT IDENT.
PA-231	3.052E+01	NOT IDENT.
TH-232	9.408E+02	FAIL ABUN
PA-233	4.227E+00	NOT IDENT.
PA-234	1.536E+01	NOT IDENT.
PA-234M	3.753E+02	NOT IDENT.
TH-234	6.710E+01	NOT IDENT.
NP-237	4.227E+00	NOT IDENT.
NP-238	7.278E+02	NOT IDENT.
U-238	6.710E+01	NOT IDENT.
NP-239	1.750E+01	NOT IDENT.
AM-241	4.027E+00	NOT IDENT.
AM-242	3.696E+01	NOT IDENT.
CM-243	6.547E+00	NOT IDENT.
BK-247	4.310E+00	FAIL ABUN
CM-247	2.094E+00	FAIL ABUN
CF-249	2.571E+00	NOT IDENT.
CF-251	7.416E+00	NOT IDENT.
CF-252	1.048E+04	NOT IDENT.
ANH-511	4.245E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372007.CNF;1
Acquisition date : 21-DEC-2016 08:40:20 Sensitivity : 3.000
Detector ID : GAM41 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:11.07 Half life ratio : *****
Sample date : 7-DEC-2016 11:33:00 Nuclide Library : LIQUID
Sample ID : G412372007 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 27-JAN-2016 05:57:05 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
AS-74	1.528E+01	1.124E+01	1.124E+01
TL-208	6.657E+00	3.564E+00	3.564E+00
PB-210	4.944E+01	7.002E+01	7.002E+01
PO-210	4.944E+01	7.002E+01	7.002E+01
BI-211	2.964E+01	3.334E+01	3.334E+01
PB-212	7.655E-01	7.641E+00	7.641E+00
RA-224	5.302E+01	5.527E+01	5.527E+01
TH-228	7.655E-01	7.641E+00	7.641E+00
TH-231	1.621E+01	4.978E+01	4.978E+01
U-234	2.655E+03	2.548E+03	2.548E+03
U-235	1.401E+01	2.021E+01	2.021E+01
AM-243	5.864E-01	3.649E+00	3.649E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.758E+00	2.579E+01	2.580E+01	NOT IDENT.
NA-22	1.076E+00	3.263E+00	3.299E+00	NOT IDENT.
NA-24	-6.900E+05	1.032E+07	1.033E+07	SHORT HLIF
AL-26	2.116E+00	2.443E+00	2.623E+00	NOT IDENT.
K-40	-1.434E+01	3.610E+01	3.667E+01	NOT IDENT.
SC-46	2.869E+00	3.111E+00	3.369E+00	NOT IDENT.
V-48	-1.277E+00	4.121E+00	4.161E+00	NOT IDENT.
CR-51	9.711E+00	2.719E+01	2.754E+01	NOT IDENT.
MN-52	-6.158E+00	1.718E+01	1.740E+01	NOT IDENT.
MN-54	-1.928E+00	2.825E+00	2.956E+00	NOT IDENT.
CO-56	-4.400E-02	2.878E+00	2.878E+00	NOT IDENT.
CO-57	1.119E+00	1.880E+00	1.947E+00	NOT IDENT.
CO-58	2.028E+00	2.998E+00	3.134E+00	NOT IDENT.
FE-59	-5.084E+00	6.646E+00	7.030E+00	NOT IDENT.
CO-60	-2.069E+00	3.049E+00	3.188E+00	NOT IDENT.
ZN-65	5.681E-01	6.169E+00	6.175E+00	NOT IDENT.
CU-67	6.582E+01	3.546E+02	3.559E+02	FAIL ABUN
GE-68	-4.063E+01	1.016E+02	1.033E+02	NOT IDENT.

SE-75	-5.627E-01	2.715E+00	2.727E+00	NOT IDENT.
BR-77	8.263E+01	8.248E+02	8.256E+02	FAIL ABUN
SR-82	7.660E+00	2.416E+01	2.441E+01	NOT IDENT.
RB-83	1.381E+00	5.712E+00	5.745E+00	NOT IDENT.
RB-84	4.233E-02	6.081E+00	6.081E+00	NOT IDENT.
KR-85	-1.762E+03	9.026E+02	1.202E+03	NOT IDENT.
SR-85	-9.137E+00	4.680E+00	6.235E+00	NOT IDENT.
RB-86	-1.320E+01	6.086E+01	6.115E+01	NOT IDENT.
Y-88	-2.005E+00	2.992E+00	3.125E+00	NOT IDENT.
Y-91	6.947E+02	1.192E+03	1.232E+03	NOT IDENT.
NB-94	1.191E+00	2.347E+00	2.408E+00	NOT IDENT.
NB-95	-2.094E-01	3.326E+00	3.327E+00	NOT IDENT.
NB-95M	-4.343E+00	9.621E+00	9.818E+00	NOT IDENT.
ZR-95	-1.165E+00	4.796E+00	4.824E+00	NOT IDENT.
MO-99	3.168E+02	7.422E+02	7.558E+02	FAIL ABUN
TC-99M	1.460E+17	1.567E+17	0.000E+00	SHORT HLIF
RH-101	2.508E+00	2.243E+00	2.512E+00	FAIL ABUN
RH-102M	2.033E+00	2.216E+00	2.398E+00	NOT IDENT.
RU-103	-3.333E+00	3.514E+00	3.822E+00	FAIL ABUN
RH-106	1.637E+00	2.589E+01	2.590E+01	NOT IDENT.
RU-106	1.637E+00	2.589E+01	2.590E+01	NOT IDENT.
AG-108M	9.497E-01	2.461E+00	2.498E+00	NOT IDENT.
CD-109	-2.604E+01	5.106E+01	5.239E+01	NOT IDENT.
AG-110M	-2.337E+00	4.258E+00	4.387E+00	NOT IDENT.
SN-113	2.372E+00	3.544E+00	3.702E+00	NOT IDENT.
IN-114M	-2.386E+01	1.564E+01	1.898E+01	NOT IDENT.
CD-115	-4.470E+02	6.289E+02	6.604E+02	NOT IDENT.
SN-117M	1.228E+00	3.715E+00	3.756E+00	NOT IDENT.
I-123	2.959E+07	8.069E+07	8.179E+07	SHORT HLIF
TE-123M	1.265E+00	2.100E+00	2.177E+00	NOT IDENT.
SB-124	-1.940E+00	5.404E+00	5.474E+00	NOT IDENT.
SB-125	7.407E-01	6.663E+00	6.672E+00	NOT IDENT.
TE-125M	-5.655E+01	6.792E+02	6.797E+02	NOT IDENT.
I-126	5.467E+00	1.482E+01	1.502E+01	NOT IDENT.
SB-126	8.891E+00	9.255E+00	1.009E+01	NOT IDENT.
SN-126	-5.225E+00	5.112E+00	5.629E+00	FAIL ABUN
SB-127	4.625E+01	5.516E+01	7.799E+01	NOT IDENT.
TE-129	3.249E+01	3.635E+01	3.919E+01	NOT IDENT.
I-131	4.525E+00	8.139E+00	8.391E+00	NOT IDENT.
I-132	-1.000E+41	2.164E+41	0.000E+00	SHORT HLIF
TE-132	-1.434E+00	4.114E+01	4.115E+01	NOT IDENT.
BA-133	2.368E+00	3.589E+00	3.744E+00	NOT IDENT.
I-133	1.993E+04	1.631E+05	1.634E+05	SHORT HLIF
CS-134	-7.530E-01	3.266E+00	3.284E+00	NOT IDENT.
CS-135	-7.331E+00	1.007E+01	1.060E+01	NOT IDENT.
I-135	8.811E+14	1.849E+16	0.000E+00	SHORT HLIF
CS-136	-8.600E-01	6.966E+00	6.977E+00	NOT IDENT.
BA-137M	-1.776E+00	2.436E+00	2.565E+00	NOT IDENT.
CS-137	-1.877E+00	2.574E+00	2.709E+00	NOT IDENT.
CE-139	-1.637E+00	2.157E+00	2.280E+00	NOT IDENT.
BA-140	-8.403E+00	1.790E+01	1.830E+01	NOT IDENT.
LA-140	1.737E+00	6.029E+00	6.080E+00	NOT IDENT.
CE-141	-5.439E+00	5.226E+00	5.773E+00	NOT IDENT.
CE-143	1.091E+03	5.219E+03	5.242E+03	SHORT HLIF
CE-144	-1.115E+01	1.704E+01	1.777E+01	NOT IDENT.
PM-144	1.293E+00	2.160E+00	2.237E+00	NOT IDENT.
PR-144	3.025E+01	1.732E+02	1.737E+02	NOT IDENT.
PM-146	8.675E-02	3.088E+00	3.089E+00	NOT IDENT.
ND-147	6.927E+00	3.994E+01	4.006E+01	NOT IDENT.
PM-147	-2.393E+04	5.587E+04	5.691E+04	NOT IDENT.
PM-149	5.023E+02	4.593E+03	4.599E+03	NOT IDENT.
EU-152	-9.587E-01	8.109E+00	8.120E+00	NOT IDENT.
GD-153	-1.734E+00	6.236E+00	6.285E+00	NOT IDENT.
EU-154	2.630E+00	9.150E+00	9.227E+00	NOT IDENT.
EU-155	-5.731E+00	7.616E+00	8.042E+00	NOT IDENT.
HO-166M	-1.629E+00	4.222E+00	4.285E+00	FAIL ABUN
TM-171	6.872E+02	6.597E+02	7.288E+02	FAIL ABUN
LU-176	-1.084E+00	1.830E+00	1.894E+00	NOT IDENT.
LU-177	5.905E-01	7.108E+01	7.108E+01	NOT IDENT.
HF-181	-8.125E-01	2.956E+00	2.978E+00	NOT IDENT.
W-181	-3.518E+00	6.523E+00	6.713E+00	FAIL ABUN
TA-182	9.668E-01	1.087E+01	1.088E+01	NOT IDENT.
RE-183	2.684E-01	5.627E+00	5.628E+00	NOT IDENT.
RE-184	4.433E+00	9.145E+00	9.361E+00	NOT IDENT.
RE-188	9.261E-01	1.065E+01	1.065E+01	NOT IDENT.
W-188	-1.981E+02	5.684E+02	5.754E+02	NOT IDENT.
OS-191	-1.435E+01	1.107E+01	1.282E+01	FAIL ABUN
IR-192	-2.069E+00	2.617E+00	2.778E+00	NOT IDENT.

HG-203	2.599E-01	2.471E+00	2.474E+00	NOT IDENT.
BI-207	3.127E+00	3.665E+00	3.927E+00	FAIL ABUN
PB-211	-5.970E+00	5.528E+01	5.534E+01	NOT IDENT.
BI-212	-7.081E-01	2.999E+01	2.999E+01	NOT IDENT.
BI-213	2.022E+00	9.864E+00	9.906E+00	NOT IDENT.
BI-214	8.994E+00	1.123E+01	1.194E+01	FAIL ABUN
PB-214	1.074E+01	1.208E+01	1.302E+01	FAIL ABUN
RN-219	-2.778E+01	3.243E+01	3.476E+01	NOT IDENT.
FR-221	1.562E+00	1.594E+01	1.596E+01	NOT IDENT.
RA-223	-3.922E+01	4.938E+01	5.245E+01	FAIL ABUN
RA-226	2.109E+01	1.136E+02	1.140E+02	FAIL ABUN
AC-227	2.308E+01	2.467E+01	2.678E+01	FAIL ABUN
TH-227	2.308E+01	2.467E+01	2.678E+01	FAIL ABUN
AC-228	-4.475E+00	1.112E+01	1.130E+01	NOT IDENT.
RA-228	-4.475E+00	1.112E+01	1.130E+01	NOT IDENT.
TH-229	5.503E+01	4.104E+01	4.795E+01	FAIL ABUN
TH-230	-5.731E+00	5.621E+02	5.621E+02	NOT IDENT.
PA-231	2.137E+01	3.414E+01	3.547E+01	NOT IDENT.
TH-232	2.954E+01	1.041E+03	1.041E+03	FAIL ABUN
PA-233	2.393E+00	4.755E+00	4.876E+00	NOT IDENT.
PA-234	-7.476E+00	2.176E+01	2.202E+01	NOT IDENT.
PA-234M	2.906E+02	4.187E+02	4.387E+02	NOT IDENT.
TH-234	-1.763E+01	7.639E+01	7.681E+01	NOT IDENT.
NP-237	2.393E+00	4.755E+00	4.876E+00	NOT IDENT.
NP-238	3.581E+02	7.645E+02	7.814E+02	NOT IDENT.
U-238	-1.763E+01	7.639E+01	7.681E+01	NOT IDENT.
NP-239	4.689E+00	1.979E+01	1.990E+01	NOT IDENT.
AM-241	1.564E+00	4.902E+00	4.952E+00	NOT IDENT.
AM-242	-2.166E+01	4.410E+01	4.517E+01	NOT IDENT.
CM-243	1.674E-01	7.495E+00	7.496E+00	NOT IDENT.
BK-247	1.241E+00	4.949E+00	4.981E+00	FAIL ABUN
CM-247	-3.059E+00	3.056E+00	3.352E+00	FAIL ABUN
CF-249	-1.596E-01	3.126E+00	3.127E+00	NOT IDENT.
CF-251	3.219E-01	8.623E+00	8.624E+00	NOT IDENT.
CF-252	-2.846E+03	1.249E+04	1.255E+04	NOT IDENT.
ANH-511	-5.630E+00	4.809E+00	5.438E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	66.8225	88.03	77.7327	140.88	57.3003
46.54	69.1845	88.34	77.7654	143.76	52.1188
49.72	63.7136	88.47	75.2696	144.24	46.7957
51.35	64.6987	91.11	172.8905	145.44	50.8665
52.39	60.4759	91.27	172.9271	152.32	61.0882
53.20	60.5660	92.59	80.7271	152.43	61.0944
56.28	76.4265	93.31	72.3858	153.25	59.3439
57.36	0.0000	94.56	251.2314	154.21	53.0978
57.53	82.9774	94.65	251.2602	155.04	43.2324
57.53	82.9779	94.67	251.2662	156.02	44.1735
57.98	70.6659	97.43	65.9998	158.56	47.8932
59.32	82.8345	98.43	77.0969	158.97	0.0000
59.54	74.4592	98.44	77.0978	159.00	47.9126
61.49	222.9112	99.53	78.0513	162.33	52.5938
63.00	80.5305	100.11	73.8629	162.66	55.3309
63.29	80.5689	100.20	73.8713	163.33	42.6578
63.58	62.8739	102.03	59.5713	165.86	57.3110
63.81	62.8975	103.18	74.9948	176.31	47.7434
64.28	87.1561	103.37	69.0454	176.60	42.2448
64.99	284.3923	105.31	80.3156	177.52	40.4403
65.08	284.4334	106.12	64.1438	181.07	45.6338
66.73	98.4388	106.47	63.3152	184.41	46.2255
66.98	113.4730	109.28	66.9606	184.58	46.2321
67.24	113.5200	111.00	72.2567	185.72	46.2763
67.67	98.9919	111.76	59.4064	186.21	46.2952
67.75	99.0040	112.95	71.5582	190.27	68.2834
69.67	60.2330	116.24	62.3082	193.51	32.1367
70.83	101.5197	116.30	62.3126	198.01	56.0938
72.81	83.4244	116.74	62.3434	201.83	43.6056
72.87	75.2526	117.23	59.7787	205.31	51.7180
74.66	90.2182	119.76	66.0300	208.37	45.2437
74.82	90.2394	120.54	67.8263	210.85	43.4418
74.97	90.2596	120.90	69.5931	218.12	46.5317
77.11	64.2046	121.12	68.7397	222.11	49.5286
79.69	52.0514	121.22	68.7473	227.09	45.8872
80.12	54.5636	121.78	58.3408	227.38	46.8532
80.19	54.5690	122.06	54.8744	228.16	43.0527
80.57	59.5620	123.07	52.3193	228.18	43.0536
81.00	54.6321	123.68	56.7170	235.69	47.6168
81.07	54.6375	127.23	42.0437	235.96	47.6258
83.79	69.8043	129.43	73.7495	238.63	35.6668
84.00	69.8248	131.20	53.6561	238.98	35.6759
84.21	69.8449	133.02	63.4519	240.99	35.7263
85.43	73.2939	133.52	67.0118	242.00	28.9880
86.55	81.3308	136.00	57.0175	244.70	27.5908
86.94	81.3740	136.28	57.0339	250.62	37.9106
87.09	81.3903	136.47	53.0652	252.40	40.8768
87.57	87.7083	140.51	57.2787	252.80	43.8084

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	26.3463	383.85	23.1337	631.29	16.6499
260.90	31.3236	388.16	26.3458	632.98	14.0298
264.66	25.5139	388.63	28.4606	633.25	14.0308
265.00	22.5751	391.70	16.8919	634.78	16.6708
268.22	33.4425	400.66	23.3307	635.95	14.0444
269.46	28.5481	401.81	31.8329	636.99	12.2936
271.23	34.4944	402.40	33.9648	645.85	17.6178
273.65	34.5485	404.85	25.5049	657.76	11.4996
276.40	34.6098	410.95	24.5152	661.66	16.8297
277.37	26.7155	414.70	18.1531	664.57	0.0000
277.60	26.7193	423.72	16.0873	666.33	12.4209
278.00	25.7366	427.09	16.1133	666.50	13.3090
278.43	30.6941	427.87	19.3429	667.71	0.0000
279.20	26.7468	433.94	17.7820	677.62	13.3598
279.54	26.7528	440.45	24.3224	685.70	9.8244
280.46	27.7596	453.88	18.4910	695.00	11.6472
283.69	25.3329	459.60	14.1770	696.49	8.0673
284.31	26.8336	463.37	18.5706	696.51	11.6527
285.41	22.3769	468.07	21.8937	697.00	12.5512
285.90	25.3682	473.00	16.4563	697.49	17.9333
287.50	23.8999	475.06	13.1770	702.65	10.7787
290.67	32.9275	476.78	19.7805	706.68	17.0889
293.27	0.0000	477.60	21.9861	711.68	14.4146
295.22	28.0171	477.99	18.6916	720.70	7.2285
295.96	28.0296	482.18	16.5228	721.93	0.0000
299.98	34.1197	487.02	16.5576	722.78	10.8501
300.09	34.1217	492.35	17.7021	722.91	11.7551
300.13	34.1231	497.08	31.0417	723.31	12.6610
301.36	25.1088	511.00	26.7642	724.19	13.5690
302.85	32.1686	514.00	73.6941	727.33	9.0552
304.50	27.1692	520.40	17.9128	733.00	13.6079
304.85	31.2012	520.69	13.4360	735.93	13.6208
306.78	30.2295	522.65	0.0000	739.50	13.6363
308.46	25.2167	527.90	22.4601	744.23	15.4778
311.90	25.2680	529.59	14.6091	747.24	20.0496
316.51	36.4849	529.87	0.0000	752.31	9.1281
319.41	25.3794	531.02	15.7420	753.82	10.9589
320.08	27.4208	537.26	16.9092	756.73	11.8832
321.04	30.4846	546.56	0.0000	763.94	17.4066
323.87	37.6594	552.55	23.8190	765.80	17.4171
325.23	30.5585	563.25	10.9344	766.42	20.1711
328.76	33.6821	569.33	18.2669	766.84	19.2568
333.37	24.5605	569.50	21.6935	772.60	0.0000
334.37	27.6460	569.70	21.6951	776.52	11.0369
338.28	25.6546	583.19	5.1650	777.92	10.1215
338.32	25.6551	595.83	13.8394	778.90	11.9653
340.48	41.0978	600.60	10.3982	783.70	12.9050
340.55	41.0994	602.73	20.8132	785.37	9.2224
344.28	32.1236	604.72	24.3000	792.07	12.9379
345.93	34.0084	609.32	13.9092	795.86	12.0276
351.06	29.9700	610.33	13.9146	801.95	11.1229
351.93	29.9841	614.28	17.4182	802.10	11.1233
356.01	23.3153	618.01	16.2792	810.29	9.2923
364.49	22.9010	621.93	16.3026	810.45	8.3636
366.42	32.3024	630.19	0.0000	810.76	9.2938

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	12.0998	1129.67	5.0537		
818.51	9.3152	1131.51	0.0000		
832.01	9.3524	1173.23	5.1047		
834.85	16.8486	1189.05	9.2214		
836.80	0.0000	1204.77	3.2902		
846.77	11.2712	1221.41	6.1919		
856.80	9.4202	1231.02	4.1365		
860.56	2.8291	1235.36	3.1053		
871.09	7.5669	1238.28	5.1788		
873.19	16.6568	1260.41	0.0000		
875.33	0.0000	1274.44	7.3068		
880.51	13.6564	1274.54	7.3072		
881.60	12.1430	1291.59	7.3337		
883.24	10.1237	1298.22	0.0000		
884.68	17.0909	1312.11	7.3649		
889.28	7.6057	1332.49	9.5092		
894.76	12.3783	1365.19	1.0637		
898.04	12.3894	1368.63	0.0000		
903.28	8.5897	1384.29	8.5420		
911.20	14.3477	1408.01	5.3638		
923.98	2.8795	1434.09	7.5477		
926.36	8.6440	1457.56	0.0000		
935.54	16.3686	1460.82	6.5028		
937.49	7.7068	1489.16	8.7173		
944.13	10.6156	1596.21	3.3338		
946.00	9.6555	1620.50	3.3481		
949.00	5.7979	1678.03	0.0000		
954.55	0.0000	1690.97	3.6152		
964.08	10.6720	1764.49	5.4902		
968.97	9.7144	1770.23	5.4952		
983.53	7.8010	1771.35	8.2446		
984.45	3.9014	1791.20	0.0000		
996.26	9.7833	1808.65	0.9216		
1001.03	5.8771	1836.06	5.5544		
1004.73	13.7261				
1025.87	9.8572				
1028.54	7.8911				
1037.84	8.8978				
1038.76	0.0000				
1046.59	8.9171				
1048.07	8.9203				
1050.41	4.9588				
1063.66	4.9750				
1077.00	11.9780				
1077.34	12.9778				
1083.85	12.9976				
1085.87	7.0021				
1099.25	13.0460				
1111.64	9.0582				
1112.07	6.0396				
1112.84	6.0406				
1115.54	9.0670				
1120.29	10.0854				
1120.55	10.0861				
1121.30	9.0791				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 11:16:30.83

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*****
*                               GEL Laboratories LLC                      *
*                               2040 Savage Road                        *
*                               Charleston, SC 29407                   *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372008.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM01.CNF;415
Background date  : 19-DEC-2016 09:32:31
Sample date     : 7-DEC-2016 11:30:00. Acquisition date : 21-DEC-2016 09:14:49
Sample ID      : G412372008. Sample quantity : 2.00000E+00 LITER
Detector name   : GAM01. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00. Elapsed real time: 0 02:00:00.41 0.0%
Energy tolerance: 1.50000 keV. Analyst Initials : MXR1
Abundance limit : 75.00000. Sensitivity : 3.00000
Batch ID       : 1624165. Detector SN# :
Matrix Spike ID: : LCS ID : 1604
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	5	35.35*	18	20	1.84	71.39	67	15	2.52E-03	76.9	1.30E+00
2	0	92.64*	21	224	1.31	185.97	179	15	2.88E-03	171.7	
3	3	140.15	46	105	1.69	280.98	275	27	6.34E-03	46.1	1.55E+00
4	3	143.87*	23	105	1.69	288.42	275	27	3.18E-03	93.6	
5	0	174.49	37	92	1.23	349.66	345	9	5.14E-03	49.9	
6	0	185.92*	4	87	0.95	372.51	368	8	6.22E-04	44.1	
7	0	238.75*	16	59	1.56	478.15	473	9	2.22E-03	102.7	
8	0	352.34*	17	49	0.82	705.31	700	11	2.30E-03	95.3	
9	0	476.90	34	23	6.26	954.38	945	19	4.69E-03	38.6	
10	0	491.22	8	15	0.48	983.02	976	9	1.06E-03	100.5	
11	0	565.28*	5	21	0.77	1131.11	1126	10	7.01E-04	213.5	
12	0	583.02*	11	21	1.12	1166.59	1161	13	1.58E-03	102.7	
13	0	609.75*	27	44	2.11	1220.03	1212	17	3.82E-03	63.4	
14	0	699.71	11	18	1.83	1399.91	1396	9	1.53E-03	75.8	
15	0	708.07	14	13	1.63	1416.62	1412	10	1.97E-03	53.9	
16	0	840.12	11	9	1.69	1680.64	1676	9	1.53E-03	57.7	
17	0	901.22	10	15	3.16	1802.80	1795	11	1.37E-03	84.7	
18	0	938.40	8	5	1.46	1877.15	1871	9	1.16E-03	57.4	
19	0	1113.44	6	4	0.58	2227.09	2223	6	8.06E-04	70.6	
20	0	1149.56	15	3	3.10	2299.31	2294	12	2.04E-03	35.4	
21	0	1160.60	6	1	0.76	2321.37	2318	6	7.74E-04	54.6	
22	0	1172.82	12	5	3.73	2345.80	2340	10	1.60E-03	46.4	
23	0	1311.17	8	2	0.64	2622.40	2617	9	1.08E-03	50.1	
24	0	1396.73	9	3	0.59	2793.43	2790	7	1.26E-03	46.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 11:16:32

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Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372008.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : MXR1
Sample date       : 7-DEC-2016 11:30:00 Acquisition date : 21-DEC-2016 09:14:49
Sample ID        : G412372008 Sample quantity : 2.0000 LITER
Sample type      : LIQUID Sample geometry :
Detector name    : GAMMA1 Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.41 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type  : Linear Efficiencies at : Peak Energy
Abundance limit  : 75.00
    
```

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
U-235	185.72	CU-67	184.58
U-235	185.72	RA-226	186.21

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
BE-7	477.60	10.44*	1.122E+00	5.414E+01	6.492E+01	77.15	OK
TL-208	277.37	6.60	1.687E+00	----- Line	Not Found	-----	Absent
	583.19	85.00*	9.644E-01	2.608E+00	2.644E+00	205.50	OK
	860.56	12.50	7.253E-01	----- Line	Not Found	-----	Absent
BI-211	72.87	1.23	1.103E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	1.413E+00	1.700E+01	1.702E+01	190.69	OK
U-235	143.76	10.96*	2.257E+00	1.740E+01	1.740E+01	187.29	OK
	163.33	5.08	2.225E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	2.134E+00	6.891E-01	6.891E-01	883.60	OK
	205.31	5.01	2.038E+00	----- Line	Not Found	-----	Absent

Flag: "*" = Keyline

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372008.CNF;1  *
* Acquisition date   : 21-DEC-2016 09:14:49 Sensitivity      : 3.000          *
* Detector ID        : GAM01 Energy tolerance: 1.500         *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000        *
* Elapsed real time  : 0 02:00:00.41 Half life ratio : *****          *
* Sample date        : 7-DEC-2016 11:30:00 Analyst initials: MXR1         *
* Sample ID          : G412372008 Sample Quantity : 2.0000E+00 LITER      *
* Batch Number       : 1624165 Wet Weight : 0.00000         *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : LIQUID.NLB;10
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 21-JUL-2016 06:08:35 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM01_2LMB.CNF;7          *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
BE-7	6.492E+01	4.909E+01	4.402E+01
TL-208	2.644E+00	5.325E+00	4.859E+00
BI-211	1.702E+01	3.181E+01	2.943E+01
U-235	1.740E+01	3.193E+01	3.165E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
NA-22	1.963E-01	2.408E+00	5.183E+00	NOT IDENT.
NA-24	0.000E+00	1.468E+07	0.000E+00	SHORT HLIF
AL-26	3.027E+00	2.900E+00	7.477E+00	NOT IDENT.
K-40	4.425E+00	3.340E+01	6.927E+01	NOT IDENT.
SC-46	-1.044E+00	2.880E+00	5.125E+00	NOT IDENT.
V-48	2.555E+00	3.559E+00	8.402E+00	FAIL ABUN
CR-51	4.769E+00	2.923E+01	5.554E+01	NOT IDENT.
MN-52	7.182E+00	9.462E+00	2.631E+01	NOT IDENT.
MN-54	1.866E+00	2.724E+00	5.613E+00	NOT IDENT.
CO-56	-1.932E+00	2.734E+00	4.496E+00	NOT IDENT.
CO-57	-7.283E-02	2.277E+00	4.261E+00	NOT IDENT.
CO-58	1.006E+00	2.464E+00	5.203E+00	NOT IDENT.
FE-59	1.046E+00	4.515E+00	9.688E+00	NOT IDENT.
CO-60	2.013E+00	2.485E+00	6.043E+00	FAIL ABUN
ZN-65	-9.339E-02	6.118E+00	1.047E+01	NOT IDENT.
CU-67	3.451E+01	2.988E+02	4.049E+02	FAIL ABUN
GE-68	4.100E+01	6.541E+01	1.525E+02	NOT IDENT.
AS-74	6.476E+00	7.553E+00	1.569E+01	NOT IDENT.
SE-75	-1.323E-01	3.140E+00	5.902E+00	NOT IDENT.
BR-77	4.066E+02	8.182E+02	1.117E+03	FAIL ABUN
SR-82	1.955E+01	2.241E+01	4.959E+01	NOT IDENT.
RB-83	-7.606E-01	5.115E+00	9.561E+00	NOT IDENT.
RB-84	-3.079E+00	4.700E+00	7.809E+00	NOT IDENT.
KR-85	-1.666E+03	8.011E+02	1.142E+03	NOT IDENT.
SR-85	-8.640E+00	4.155E+00	5.921E+00	NOT IDENT.
RB-86	1.670E+01	3.711E+01	8.499E+01	NOT IDENT.

Y-88	1.599E+00	3.292E+00	7.688E+00	NOT IDENT.
Y-91	1.024E+03	1.206E+03	2.837E+03	NOT IDENT.
NB-94	2.229E-01	3.009E+00	4.741E+00	NOT IDENT.
NB-95	-2.544E+00	2.892E+00	4.541E+00	NOT IDENT.
NB-95M	2.306E+00	9.569E+00	1.654E+01	NOT IDENT.
ZR-95	-1.685E+00	5.604E+00	1.007E+01	NOT IDENT.
MO-99	2.480E+02	7.207E+02	1.437E+03	FAIL ABUN
TC-99M	0.000E+00	2.111E+17	0.000E+00	SHORT HLIF
RH-101	1.146E+00	2.862E+00	5.489E+00	NOT IDENT.
RH-102M	2.743E-01	2.163E+00	4.189E+00	FAIL ABUN
RU-103	-9.099E-01	3.226E+00	5.850E+00	FAIL ABUN
RH-106	-7.652E+00	2.102E+01	3.805E+01	NOT IDENT.
RU-106	-7.652E+00	2.102E+01	3.805E+01	NOT IDENT.
AG-108M	-1.027E+00	2.240E+00	3.989E+00	NOT IDENT.
CD-109	7.369E+01	9.034E+01	1.526E+02	NOT IDENT.
AG-110M	-2.742E-01	2.915E+00	5.667E+00	FAIL ABUN
SN-113	-3.654E-01	2.913E+00	5.493E+00	NOT IDENT.
IN-114M	-4.110E+00	1.418E+01	2.586E+01	NOT IDENT.
CD-115	-6.467E+02	6.531E+02	1.055E+03	FAIL ABUN
SN-117M	-1.638E+00	4.390E+00	7.964E+00	NOT IDENT.
I-123	0.000E+00	9.290E+07	0.000E+00	SHORT HLIF
TE-123M	-1.198E-01	2.385E+00	4.430E+00	NOT IDENT.
SB-124	2.263E-01	7.046E+00	1.497E+01	NOT IDENT.
SB-125	-3.348E+00	7.455E+00	1.324E+01	NOT IDENT.
TE-125M	2.691E+01	1.056E+03	1.788E+03	NOT IDENT.
I-126	-4.517E+00	1.505E+01	2.728E+01	NOT IDENT.
SB-126	-1.154E+00	8.239E+00	1.567E+01	NOT IDENT.
SN-126	7.466E+00	8.837E+00	1.498E+01	NOT IDENT.
SB-127	-1.955E+01	6.264E+01	1.156E+02	NOT IDENT.
TE-129	9.183E+00	3.508E+01	6.902E+01	NOT IDENT.
I-131	1.438E+00	7.494E+00	1.457E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	1.302E+01	4.282E+01	8.204E+01	NOT IDENT.
BA-133	1.795E-01	3.357E+00	5.753E+00	NOT IDENT.
I-133	0.000E+00	1.707E+05	0.000E+00	SHORT HLIF
CS-134	1.735E+00	2.508E+00	5.545E+00	NOT IDENT.
CS-135	8.747E-03	1.125E+01	2.115E+01	NOT IDENT.
I-135	0.000E+00	1.842E+16	0.000E+00	SHORT HLIF
CS-136	-6.981E-01	7.403E+00	1.385E+01	NOT IDENT.
BA-137M	-1.263E+00	2.413E+00	4.209E+00	NOT IDENT.
CS-137	-1.334E+00	2.550E+00	4.447E+00	NOT IDENT.
CE-139	-2.524E+00	2.341E+00	4.011E+00	NOT IDENT.
BA-140	5.449E+00	1.592E+01	3.271E+01	NOT IDENT.
LA-140	3.238E+00	4.174E+00	1.155E+01	NOT IDENT.
CE-141	3.557E+00	5.484E+00	1.061E+01	NOT IDENT.
CE-143	0.000E+00	4.954E+03	0.000E+00	SHORT HLIF
CE-144	1.213E+01	1.828E+01	3.551E+01	NOT IDENT.
PM-144	-6.410E-01	2.455E+00	3.966E+00	FAIL ABUN
PR-144	-4.863E+01	1.835E+02	2.961E+02	NOT IDENT.
PM-146	1.111E+00	2.992E+00	6.003E+00	NOT IDENT.
ND-147	1.958E+01	3.940E+01	8.020E+01	NOT IDENT.
PM-147	-8.649E+03	6.625E+04	1.232E+05	NOT IDENT.
PM-149	-5.506E+02	4.464E+03	8.324E+03	NOT IDENT.
EU-152	-1.860E+00	6.765E+00	1.242E+01	FAIL ABUN
GD-153	-8.455E-01	1.023E+01	1.580E+01	NOT IDENT.
EU-154	3.808E+00	6.317E+00	1.522E+01	NOT IDENT.
EU-155	8.778E-01	1.110E+01	1.896E+01	NOT IDENT.
HO-166M	-3.064E-02	4.965E+00	8.438E+00	NOT IDENT.
TM-171	6.366E+02	2.716E+03	4.846E+03	NOT IDENT.
LU-176	-1.131E+00	2.067E+00	3.660E+00	NOT IDENT.
LU-177	3.626E+01	7.856E+01	1.513E+02	NOT IDENT.
HF-181	8.565E-01	2.958E+00	5.479E+00	NOT IDENT.
W-181	-1.181E+01	3.186E+01	4.873E+01	NOT IDENT.
TA-182	3.975E-02	1.024E+01	2.137E+01	NOT IDENT.
RE-183	-2.320E+00	2.863E+01	4.483E+01	NOT IDENT.
RE-184	1.432E+00	7.949E+00	1.481E+01	NOT IDENT.
RE-188	1.081E+01	1.375E+01	2.696E+01	FAIL ABUN
W-188	-7.574E+01	4.975E+02	9.254E+02	NOT IDENT.
OS-191	-1.394E-01	1.272E+01	2.384E+01	NOT IDENT.
IR-192	9.398E-01	2.592E+00	5.065E+00	NOT IDENT.
HG-203	1.500E+00	2.806E+00	5.532E+00	NOT IDENT.
BI-207	1.331E+00	2.591E+00	5.981E+00	NOT IDENT.
PB-210	2.085E+02	7.489E+02	1.333E+03	NOT IDENT.
PO-210	2.085E+02	7.489E+02	1.333E+03	NOT IDENT.
PB-211	-1.509E+01	5.275E+01	9.628E+01	NOT IDENT.
BI-212	1.562E+01	3.509E+01	7.239E+01	NOT IDENT.
PB-212	3.739E+00	7.522E+00	1.042E+01	FAIL ABUN
BI-213	-6.514E+00	6.503E+00	1.048E+01	NOT IDENT.

BI-214	1.215E+01	1.512E+01	1.692E+01	FAIL ABUN
PB-214	6.170E+00	1.153E+01	1.379E+01	FAIL ABUN
RN-219	2.036E+01	3.111E+01	6.309E+01	NOT IDENT.
FR-221	-5.180E+00	1.473E+01	2.681E+01	NOT IDENT.
RA-223	-4.097E+00	5.230E+01	9.693E+01	FAIL ABUN
RA-224	7.128E+00	4.928E+01	8.450E+01	NOT IDENT.
RA-226	1.098E+01	9.507E+01	1.404E+02	FAIL ABUN
AC-227	-1.019E+01	2.093E+01	3.619E+01	NOT IDENT.
TH-227	-1.019E+01	2.093E+01	3.619E+01	NOT IDENT.
AC-228	-2.198E+00	1.149E+01	2.247E+01	NOT IDENT.
RA-228	-2.198E+00	1.149E+01	2.247E+01	NOT IDENT.
TH-228	3.739E+00	7.522E+00	1.042E+01	FAIL ABUN
TH-229	1.720E+01	4.208E+01	8.077E+01	NOT IDENT.
TH-230	-1.754E+03	1.538E+03	2.286E+03	NOT IDENT.
PA-231	1.889E+00	3.630E+01	6.839E+01	NOT IDENT.
TH-231	5.036E+00	5.260E+01	8.566E+01	NOT IDENT.
TH-232	-3.223E+03	2.985E+03	4.937E+03	FAIL ABUN
PA-233	1.855E+00	5.112E+00	9.925E+00	NOT IDENT.
PA-234	7.598E+00	1.894E+01	4.022E+01	NOT IDENT.
PA-234M	-1.328E+02	3.329E+02	5.670E+02	NOT IDENT.
TH-234	-5.982E+01	2.083E+02	3.659E+02	FAIL ABUN
U-234	7.904E+02	9.590E+03	1.686E+04	NOT IDENT.
NP-237	1.855E+00	5.112E+00	9.925E+00	NOT IDENT.
NP-238	1.258E+02	6.960E+02	1.493E+03	NOT IDENT.
U-238	-5.982E+01	2.083E+02	3.659E+02	FAIL ABUN
NP-239	1.079E+01	2.674E+01	4.697E+01	NOT IDENT.
AM-241	-4.457E+00	2.113E+01	3.572E+01	NOT IDENT.
AM-242	2.647E+00	6.838E+01	1.166E+02	NOT IDENT.
AM-243	2.660E-01	6.468E+00	1.103E+01	NOT IDENT.
CM-243	-2.844E+00	1.123E+01	1.863E+01	NOT IDENT.
BK-247	6.672E-01	5.726E+00	1.093E+01	NOT IDENT.
CM-247	5.077E-01	2.770E+00	5.358E+00	NOT IDENT.
CF-249	-1.087E+00	2.750E+00	4.974E+00	NOT IDENT.
CF-251	2.184E+00	1.091E+01	1.880E+01	NOT IDENT.
CF-252	8.925E+02	1.885E+04	3.216E+04	NOT IDENT.
ANH-511	-1.359E+01	4.663E+00	8.826E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	5	35.35	50	20	1.84	71.39	67	15	6.97E-03	26.6	1.30E+00
2	5	37.53	27	46	1.52	75.75	67	15	3.82E-03	51.2	
3	0	92.64	136	224	1.31	185.97	179	15	1.89E-02	25.5	1.55E+00
4	3	140.15	46	105	1.69	280.98	275	27	6.34E-03	46.1	
5	3	143.87	38	105	1.69	288.42	275	27	5.29E-03	54.9	
6	0	174.49	37	92	1.23	349.66	345	9	5.14E-03	49.9	
7	0	185.92	84	87	0.95	372.51	368	8	1.17E-02	22.2	
8	0	238.75	47	59	1.56	478.15	473	9	6.58E-03	32.5	
9	0	352.34	32	49	0.82	705.31	700	11	4.47E-03	45.8	
10	0	476.90	34	23	6.26	954.38	945	19	4.69E-03	38.6	
11	0	491.22	8	15	0.48	983.02	976	9	1.06E-03	100.5	
12	0	511.23	110	47	3.24	1023.03	1016	16	1.53E-02	17.0	
13	0	565.28	19	21	0.77	1131.11	1126	10	2.60E-03	52.5	
14	0	583.02	27	21	1.12	1166.59	1161	13	3.77E-03	40.7	
15	0	609.75	42	44	2.11	1220.03	1212	17	5.77E-03	40.6	
16	0	699.71	11	18	1.83	1399.91	1396	9	1.53E-03	75.8	
17	0	708.07	14	13	1.63	1416.62	1412	10	1.97E-03	53.9	
18	0	840.12	11	9	1.69	1680.64	1676	9	1.53E-03	57.7	
19	0	901.22	10	15	3.16	1802.80	1795	11	1.37E-03	84.7	
20	0	938.40	8	5	1.46	1877.15	1871	9	1.16E-03	57.4	
21	0	1113.44	6	4	0.58	2227.09	2223	6	8.06E-04	70.6	
22	0	1149.56	15	3	3.10	2299.31	2294	12	2.04E-03	35.4	
23	0	1160.60	6	1	0.76	2321.37	2318	6	7.74E-04	54.6	
24	0	1172.82	12	5	3.73	2345.80	2340	10	1.60E-03	46.4	
25	0	1311.17	8	2	0.64	2622.40	2617	9	1.08E-03	50.1	
26	0	1396.73	9	3	0.59	2793.43	2790	7	1.26E-03	46.9	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
BE-7	477.60	34	10.44*	1.122E+00	5.414E+01	6.492E+01	77.15
CU-67	91.27	21	7.00	1.734E+00	3.204E+01	1.366E+03	343.31
	93.31	21	16.10	1.734E+00	1.393E+01	5.939E+02	343.31
	184.58	4	48.70*	2.134E+00	8.093E-01	3.451E+01	883.60
TL-208	277.37	-----	6.60	1.687E+00	-----	Line Not Found	-----
	583.19	11	85.00*	9.644E-01	2.608E+00	2.644E+00	205.50
	860.56	-----	12.50	7.253E-01	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	1.103E+00	-----	Line Not Found	-----
	351.06	17	12.92*	1.413E+00	1.700E+01	1.702E+01	190.69
RA-226	186.21	4	3.59*	2.134E+00	1.098E+01	1.098E+01	883.60
U-235	143.76	23	10.96*	2.257E+00	1.740E+01	1.740E+01	187.29
	163.33	-----	5.08	2.225E+00	-----	Line Not Found	-----
	185.72	4	57.20	2.134E+00	6.891E-01	6.891E-01	883.60
	205.31	-----	5.01	2.038E+00	-----	Line Not Found	-----

Flag: "*" = Keyline

Total number of lines in spectrum 24
Number of unidentified lines 9
Number of lines tentatively identified by NID 15 62.50%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BE-7	53.22D	1.20	5.414E+01	6.492E+01	5.009E+01	77.15	
CU-67	61.83H	42.6	8.093E-01	3.451E+01	30.49E+01	883.60	
TL-208	1.91Y	1.01	2.608E+00	2.644E+00	5.433E+00	205.50	
BI-211	21.77Y	1.00	1.700E+01	1.702E+01	3.246E+01	190.69	
RA-226	1600.00Y	1.00	1.098E+01	1.098E+01	9.701E+01	883.60	
U-235	7.04E+08Y	1.00	1.740E+01	1.740E+01	3.259E+01	187.29	
Total Activity :			1.029E+02	1.475E+02			

Grand Total Activity : 1.029E+02 1.475E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
5	35.35	18	20	1.84	71.39	67	15	2.52E-03	****	1.88E-03	
3	140.15	46	105	1.69	280.98	275	27	6.34E-03	92.2	2.25E+00	T
0	174.49	37	92	1.23	349.66	345	9	5.14E-03	99.8	2.18E+00	
0	238.75	16	59	1.56	478.15	473	9	2.22E-03	****	1.87E+00	T
0	491.22	8	15	0.48	983.02	976	9	1.06E-03	****	1.10E+00	T
0	565.28	5	21	0.77	1131.11	1126	10	7.01E-04	****	9.87E-01	
0	609.75	27	44	2.11	1220.03	1212	17	3.82E-03	****	9.33E-01	T
0	699.71	11	18	1.83	1399.91	1396	9	1.53E-03	****	8.43E-01	
0	708.07	14	13	1.63	1416.62	1412	10	1.97E-03	****	8.36E-01	T
0	840.12	11	9	1.69	1680.64	1676	9	1.53E-03	****	7.38E-01	
0	901.22	10	15	3.16	1802.80	1795	11	1.37E-03	****	7.01E-01	
0	938.40	8	5	1.46	1877.15	1871	9	1.16E-03	****	6.81E-01	T
0	1113.44	6	4	0.58	2227.09	2223	6	8.06E-04	****	6.01E-01	T
0	1149.56	15	3	3.10	2299.31	2294	12	2.04E-03	70.7	5.87E-01	
0	1160.60	6	1	0.76	2321.37	2318	6	7.74E-04	****	5.83E-01	
0	1172.82	12	5	3.73	2345.80	2340	10	1.60E-03	92.8	5.78E-01	T
0	1311.17	8	2	0.64	2622.40	2617	9	1.08E-03	****	5.32E-01	T
0	1396.73	9	3	0.59	2793.43	2790	7	1.26E-03	93.7	5.06E-01	

Flags: "T" = Tentatively associated

```

*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372008.CNF;1  *
* Acquisition date   : 21-DEC-2016 09:14:49 Sensitivity      : 3.000          *
* Detector ID        : GAM01 Energy tolerance: 1.500         *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:00.41 Half life ratio  : *****        *
* Sample date        : 7-DEC-2016 11:30:00 Nuclide Library : LIQUID      *
* Sample ID          : G412372008 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER    *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000         *
*                                     Dry Weight    : 0.00000         *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 21-JUL-2016 06:08:35 Eff. Geometry   : 2LMB        *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM01_2LMB.CNF;7          *
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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
BE-7	1.941E+01
TL-208	2.116E+00
BI-211	1.333E+01
U-235	1.481E+01

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

Nuclide	Lc (pCi/LITER)	
NA-22	2.120E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	3.118E+00	NOT IDENT.
K-40	2.977E+01	NOT IDENT.
SC-46	2.161E+00	NOT IDENT.
V-48	3.495E+00	FAIL ABUN
CR-51	2.539E+01	NOT IDENT.
MN-52	1.027E+01	NOT IDENT.
MN-54	2.454E+00	NOT IDENT.
CO-56	1.856E+00	NOT IDENT.
CO-57	1.991E+00	NOT IDENT.
CO-58	2.216E+00	NOT IDENT.
FE-59	3.924E+00	NOT IDENT.
CO-60	2.536E+00	FAIL ABUN
ZN-65	4.368E+00	NOT IDENT.
CU-67	1.921E+02	FAIL ABUN
GE-68	6.300E+01	NOT IDENT.
AS-74	7.065E+00	NOT IDENT.
SE-75	2.684E+00	NOT IDENT.
BR-77	5.243E+02	FAIL ABUN
SR-82	2.165E+01	NOT IDENT.
RB-83	4.181E+00	NOT IDENT.
RB-84	3.211E+00	NOT IDENT.
KR-85	5.152E+02	NOT IDENT.
SR-85	2.672E+00	NOT IDENT.
RB-86	3.449E+01	NOT IDENT.
Y-88	3.152E+00	NOT IDENT.

Y-91	1.216E+03	NOT IDENT.
NB-94	2.069E+00	NOT IDENT.
NB-95	1.896E+00	NOT IDENT.
NB-95M	7.640E+00	NOT IDENT.
ZR-95	4.357E+00	NOT IDENT.
MO-99	6.314E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.576E+00	NOT IDENT.
RH-102M	1.856E+00	FAIL ABUN
RU-103	2.597E+00	FAIL ABUN
RH-106	1.618E+01	NOT IDENT.
RU-106	1.618E+01	NOT IDENT.
AG-108M	1.763E+00	NOT IDENT.
CD-109	7.197E+01	NOT IDENT.
AG-110M	2.323E+00	FAIL ABUN
SN-113	2.421E+00	NOT IDENT.
IN-114M	1.200E+01	NOT IDENT.
CD-115	4.594E+02	FAIL ABUN
SN-117M	3.717E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	2.069E+00	NOT IDENT.
SB-124	6.041E+00	NOT IDENT.
SB-125	5.917E+00	NOT IDENT.
TE-125M	8.400E+02	NOT IDENT.
I-126	1.178E+01	NOT IDENT.
SB-126	6.588E+00	NOT IDENT.
SN-126	7.065E+00	NOT IDENT.
SB-127	4.790E+01	NOT IDENT.
TE-129	3.071E+01	NOT IDENT.
I-131	6.533E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.796E+01	NOT IDENT.
BA-133	2.585E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.381E+00	NOT IDENT.
CS-135	9.660E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	5.872E+00	NOT IDENT.
BA-137M	1.783E+00	NOT IDENT.
CS-137	1.884E+00	NOT IDENT.
CE-139	1.853E+00	NOT IDENT.
BA-140	1.419E+01	NOT IDENT.
LA-140	4.527E+00	NOT IDENT.
CE-141	4.996E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.671E+01	NOT IDENT.
PM-144	1.674E+00	FAIL ABUN
PR-144	1.249E+02	NOT IDENT.
PM-146	2.665E+00	NOT IDENT.
ND-147	3.560E+01	NOT IDENT.
PM-147	5.750E+04	NOT IDENT.
PM-149	3.771E+03	NOT IDENT.
EU-152	5.549E+00	FAIL ABUN
GD-153	7.412E+00	NOT IDENT.
EU-154	6.272E+00	NOT IDENT.
EU-155	8.877E+00	NOT IDENT.
HO-166M	3.657E+00	NOT IDENT.
TM-171	2.244E+03	NOT IDENT.
LU-176	1.657E+00	NOT IDENT.
LU-177	7.049E+01	NOT IDENT.
HF-181	2.384E+00	NOT IDENT.
W-181	2.264E+01	NOT IDENT.
TA-182	8.864E+00	NOT IDENT.
RE-183	2.076E+01	NOT IDENT.
RE-184	6.157E+00	NOT IDENT.
RE-188	1.265E+01	FAIL ABUN
W-188	4.184E+02	NOT IDENT.
OS-191	1.112E+01	NOT IDENT.
IR-192	2.305E+00	NOT IDENT.
HG-203	2.539E+00	NOT IDENT.
BI-207	2.443E+00	NOT IDENT.
PB-210	6.214E+02	NOT IDENT.
PO-210	6.214E+02	NOT IDENT.
PB-211	4.287E+01	NOT IDENT.
BI-212	3.150E+01	NOT IDENT.
PB-212	4.897E+00	FAIL ABUN
BI-213	4.421E+00	NOT IDENT.
BI-214	7.865E+00	FAIL ABUN

PB-214	6.395E+00	FAIL ABUN
RN-219	2.854E+01	NOT IDENT.
FR-221	1.228E+01	NOT IDENT.
RA-223	4.425E+01	FAIL ABUN
RA-224	3.889E+01	NOT IDENT.
RA-226	6.690E+01	FAIL ABUN
AC-227	1.660E+01	NOT IDENT.
TH-227	1.660E+01	NOT IDENT.
AC-228	9.816E+00	NOT IDENT.
RA-228	9.816E+00	NOT IDENT.
TH-228	4.897E+00	FAIL ABUN
TH-229	3.766E+01	NOT IDENT.
TH-230	1.069E+03	NOT IDENT.
PA-231	3.122E+01	NOT IDENT.
TH-231	4.028E+01	NOT IDENT.
TH-232	2.339E+03	FAIL ABUN
PA-233	4.539E+00	NOT IDENT.
PA-234	1.699E+01	NOT IDENT.
PA-234M	2.371E+02	NOT IDENT.
TH-234	1.735E+02	FAIL ABUN
U-234	7.796E+03	NOT IDENT.
NP-237	4.539E+00	NOT IDENT.
NP-238	5.999E+02	NOT IDENT.
U-238	1.735E+02	FAIL ABUN
NP-239	2.200E+01	NOT IDENT.
AM-241	1.663E+01	NOT IDENT.
AM-242	5.457E+01	NOT IDENT.
AM-243	5.194E+00	NOT IDENT.
CM-243	8.697E+00	NOT IDENT.
BK-247	4.981E+00	NOT IDENT.
CM-247	2.404E+00	NOT IDENT.
CF-249	2.195E+00	NOT IDENT.
CF-251	8.728E+00	NOT IDENT.
CF-252	1.505E+04	NOT IDENT.
ANH-511	4.176E+00	NOT IDENT.

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372008.CNF;1  *
* Acquisition date   : 21-DEC-2016 09:14:49 Sensitivity      : 3.000          *
* Detector ID        : GAM01 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:00.41 Half life ratio : *****          *
* Sample date        : 7-DEC-2016 11:30:00 Nuclide Library : LIQUID          *
* Sample ID          : G412372008 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER          *
*                                     Quantity Err(%) : 5.0000E-03 %          *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 21-JUL-2016 06:08:35 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM01_2LMB.CNF;7          *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
BE-7	6.492E+01	4.916E+01	4.916E+01
TL-208	2.644E+00	5.326E+00	5.326E+00
BI-211	1.702E+01	3.182E+01	3.182E+01
U-235	1.740E+01	3.195E+01	3.195E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
NA-22	1.963E-01	2.408E+00	2.410E+00	NOT IDENT.
NA-24	-3.453E+06	1.468E+07	1.477E+07	SHORT HLIF
AL-26	3.027E+00	2.907E+00	3.211E+00	NOT IDENT.
K-40	4.425E+00	3.341E+01	3.346E+01	NOT IDENT.
SC-46	-1.044E+00	2.880E+00	2.918E+00	NOT IDENT.
V-48	2.555E+00	3.561E+00	3.742E+00	FAIL ABUN
CR-51	4.769E+00	2.923E+01	2.931E+01	NOT IDENT.
MN-52	7.182E+00	9.466E+00	1.000E+01	NOT IDENT.
MN-54	1.866E+00	2.725E+00	2.852E+00	NOT IDENT.
CO-56	-1.932E+00	2.736E+00	2.871E+00	NOT IDENT.
CO-57	-7.283E-02	2.277E+00	2.277E+00	NOT IDENT.
CO-58	1.006E+00	2.464E+00	2.505E+00	NOT IDENT.
FE-59	1.046E+00	4.515E+00	4.540E+00	NOT IDENT.
CO-60	2.013E+00	2.486E+00	2.647E+00	FAIL ABUN
ZN-65	-9.339E-02	6.118E+00	6.118E+00	NOT IDENT.
CU-67	3.451E+01	2.988E+02	2.992E+02	FAIL ABUN
GE-68	4.100E+01	6.543E+01	6.799E+01	NOT IDENT.
AS-74	6.476E+00	7.570E+00	8.114E+00	NOT IDENT.
SE-75	-1.323E-01	3.140E+00	3.140E+00	NOT IDENT.
BR-77	4.066E+02	8.184E+02	8.387E+02	FAIL ABUN
SR-82	1.955E+01	2.243E+01	2.410E+01	NOT IDENT.
RB-83	-7.606E-01	5.116E+00	5.128E+00	NOT IDENT.
RB-84	-3.079E+00	4.701E+00	4.902E+00	NOT IDENT.
KR-85	-1.666E+03	8.040E+02	1.100E+03	NOT IDENT.
SR-85	-8.640E+00	4.170E+00	5.706E+00	NOT IDENT.
RB-86	1.670E+01	3.712E+01	3.787E+01	NOT IDENT.

Y-88	1.599E+00	3.294E+00	3.372E+00	NOT IDENT.
Y-91	1.024E+03	1.206E+03	1.291E+03	NOT IDENT.
NB-94	2.229E-01	3.009E+00	3.011E+00	NOT IDENT.
NB-95	-2.544E+00	2.894E+00	3.113E+00	NOT IDENT.
NB-95M	2.306E+00	9.571E+00	9.627E+00	NOT IDENT.
ZR-95	-1.685E+00	5.605E+00	5.656E+00	NOT IDENT.
MO-99	2.480E+02	7.208E+02	7.294E+02	FAIL ABUN
TC-99M	2.335E+17	2.123E+17	0.000E+00	SHORT HLIF
RH-101	1.146E+00	2.869E+00	2.916E+00	NOT IDENT.
RH-102M	2.743E-01	2.163E+00	2.167E+00	FAIL ABUN
RU-103	-9.099E-01	3.226E+00	3.252E+00	FAIL ABUN
RH-106	-7.652E+00	2.103E+01	2.131E+01	NOT IDENT.
RU-106	-7.652E+00	2.103E+01	2.131E+01	NOT IDENT.
AG-108M	-1.027E+00	2.241E+00	2.288E+00	NOT IDENT.
CD-109	7.369E+01	9.054E+01	9.644E+01	NOT IDENT.
AG-110M	-2.742E-01	2.915E+00	2.918E+00	FAIL ABUN
SN-113	-3.654E-01	2.913E+00	2.917E+00	NOT IDENT.
IN-114M	-4.110E+00	1.418E+01	1.430E+01	NOT IDENT.
CD-115	-6.467E+02	6.542E+02	7.163E+02	FAIL ABUN
SN-117M	-1.638E+00	4.390E+00	4.452E+00	NOT IDENT.
I-123	-4.920E+06	9.290E+07	9.293E+07	SHORT HLIF
TE-123M	-1.198E-01	2.385E+00	2.385E+00	NOT IDENT.
SB-124	2.263E-01	7.046E+00	7.047E+00	NOT IDENT.
SB-125	-3.348E+00	7.456E+00	7.608E+00	NOT IDENT.
TE-125M	2.691E+01	1.056E+03	1.057E+03	NOT IDENT.
I-126	-4.517E+00	1.506E+01	1.519E+01	NOT IDENT.
SB-126	-1.154E+00	8.240E+00	8.256E+00	NOT IDENT.
SN-126	7.466E+00	8.849E+00	9.468E+00	NOT IDENT.
SB-127	-1.955E+01	6.266E+01	6.327E+01	NOT IDENT.
TE-129	9.183E+00	3.511E+01	3.535E+01	NOT IDENT.
I-131	1.438E+00	7.494E+00	7.522E+00	NOT IDENT.
I-132	1.000E+41	7.975E+41	0.000E+00	SHORT HLIF
TE-132	1.302E+01	4.284E+01	4.324E+01	NOT IDENT.
BA-133	1.795E-01	3.357E+00	3.358E+00	NOT IDENT.
I-133	-8.837E+03	1.707E+05	1.707E+05	SHORT HLIF
CS-134	1.735E+00	2.509E+00	2.628E+00	NOT IDENT.
CS-135	8.747E-03	1.125E+01	1.125E+01	NOT IDENT.
I-135	-1.366E+16	1.894E+16	0.000E+00	SHORT HLIF
CS-136	-6.981E-01	7.403E+00	7.410E+00	NOT IDENT.
BA-137M	-1.263E+00	2.414E+00	2.480E+00	NOT IDENT.
CS-137	-1.334E+00	2.550E+00	2.620E+00	NOT IDENT.
CE-139	-2.524E+00	2.396E+00	2.652E+00	NOT IDENT.
BA-140	5.449E+00	1.592E+01	1.611E+01	NOT IDENT.
LA-140	3.238E+00	4.177E+00	4.424E+00	NOT IDENT.
CE-141	3.557E+00	5.486E+00	5.715E+00	NOT IDENT.
CE-143	6.159E+02	4.955E+03	4.962E+03	SHORT HLIF
CE-144	1.213E+01	1.829E+01	1.909E+01	NOT IDENT.
PM-144	-6.410E-01	2.456E+00	2.473E+00	FAIL ABUN
PR-144	-4.863E+01	1.835E+02	1.848E+02	NOT IDENT.
PM-146	1.111E+00	2.993E+00	3.035E+00	NOT IDENT.
ND-147	1.958E+01	3.941E+01	4.038E+01	NOT IDENT.
PM-147	-8.649E+03	6.625E+04	6.636E+04	NOT IDENT.
PM-149	-5.506E+02	4.465E+03	4.472E+03	NOT IDENT.
EU-152	-1.860E+00	6.766E+00	6.818E+00	FAIL ABUN
GD-153	-8.455E-01	1.023E+01	1.024E+01	NOT IDENT.
EU-154	3.808E+00	6.319E+00	6.548E+00	NOT IDENT.
EU-155	8.778E-01	1.110E+01	1.110E+01	NOT IDENT.
HO-166M	-3.064E-02	4.965E+00	4.965E+00	NOT IDENT.
TM-171	6.366E+02	2.716E+03	2.731E+03	NOT IDENT.
LU-176	-1.131E+00	2.068E+00	2.130E+00	NOT IDENT.
LU-177	3.626E+01	7.857E+01	8.026E+01	NOT IDENT.
HF-181	8.565E-01	2.958E+00	2.983E+00	NOT IDENT.
W-181	-1.181E+01	3.200E+01	3.244E+01	NOT IDENT.
TA-182	3.975E-02	1.024E+01	1.024E+01	NOT IDENT.
RE-183	-2.320E+00	2.863E+01	2.865E+01	NOT IDENT.
RE-184	1.432E+00	7.950E+00	7.976E+00	NOT IDENT.
RE-188	1.081E+01	1.376E+01	1.459E+01	FAIL ABUN
W-188	-7.574E+01	4.976E+02	4.987E+02	NOT IDENT.
OS-191	-1.394E-01	1.272E+01	1.272E+01	NOT IDENT.
IR-192	9.398E-01	2.592E+00	2.626E+00	NOT IDENT.
HG-203	1.500E+00	2.807E+00	2.888E+00	NOT IDENT.
BI-207	1.331E+00	2.592E+00	2.661E+00	NOT IDENT.
PB-210	2.085E+02	7.491E+02	7.550E+02	NOT IDENT.
PO-210	2.085E+02	7.491E+02	7.550E+02	NOT IDENT.
PB-211	-1.509E+01	5.275E+01	5.319E+01	NOT IDENT.
BI-212	1.562E+01	3.510E+01	3.580E+01	NOT IDENT.
PB-212	3.739E+00	7.525E+00	7.711E+00	FAIL ABUN
BI-213	-6.514E+00	6.509E+00	7.141E+00	NOT IDENT.

BI-214	1.215E+01	1.512E+01	1.609E+01	FAIL ABUN
PB-214	6.170E+00	1.153E+01	1.186E+01	FAIL ABUN
RN-219	2.036E+01	3.122E+01	3.254E+01	NOT IDENT.
FR-221	-5.180E+00	1.473E+01	1.492E+01	NOT IDENT.
RA-223	-4.097E+00	5.230E+01	5.233E+01	FAIL ABUN
RA-224	7.128E+00	4.928E+01	4.938E+01	NOT IDENT.
RA-226	1.098E+01	9.507E+01	9.520E+01	FAIL ABUN
AC-227	-1.019E+01	2.098E+01	2.147E+01	NOT IDENT.
TH-227	-1.019E+01	2.098E+01	2.147E+01	NOT IDENT.
AC-228	-2.198E+00	1.149E+01	1.153E+01	NOT IDENT.
RA-228	-2.198E+00	1.149E+01	1.153E+01	NOT IDENT.
TH-228	3.739E+00	7.525E+00	7.711E+00	FAIL ABUN
TH-229	1.720E+01	4.209E+01	4.280E+01	NOT IDENT.
TH-230	-1.754E+03	1.566E+03	1.754E+03	NOT IDENT.
PA-231	1.889E+00	3.630E+01	3.631E+01	NOT IDENT.
TH-231	5.036E+00	5.261E+01	5.265E+01	NOT IDENT.
TH-232	-3.223E+03	3.009E+03	3.342E+03	FAIL ABUN
PA-233	1.855E+00	5.113E+00	5.181E+00	NOT IDENT.
PA-234	7.598E+00	2.084E+01	2.112E+01	NOT IDENT.
PA-234M	-1.328E+02	3.330E+02	3.383E+02	NOT IDENT.
TH-234	-5.982E+01	2.088E+02	2.105E+02	FAIL ABUN
U-234	7.904E+02	9.590E+03	9.597E+03	NOT IDENT.
NP-237	1.855E+00	5.113E+00	5.181E+00	NOT IDENT.
NP-238	1.258E+02	6.960E+02	6.983E+02	NOT IDENT.
U-238	-5.982E+01	2.088E+02	2.105E+02	FAIL ABUN
NP-239	1.079E+01	2.674E+01	2.718E+01	NOT IDENT.
AM-241	-4.457E+00	2.113E+01	2.122E+01	NOT IDENT.
AM-242	2.647E+00	6.838E+01	6.839E+01	NOT IDENT.
AM-243	2.660E-01	6.468E+00	6.469E+00	NOT IDENT.
CM-243	-2.844E+00	1.123E+01	1.130E+01	NOT IDENT.
BK-247	6.672E-01	5.728E+00	5.736E+00	NOT IDENT.
CM-247	5.077E-01	2.772E+00	2.781E+00	NOT IDENT.
CF-249	-1.087E+00	2.752E+00	2.795E+00	NOT IDENT.
CF-251	2.184E+00	1.091E+01	1.095E+01	NOT IDENT.
CF-252	8.925E+02	1.886E+04	1.887E+04	NOT IDENT.
ANH-511	-1.359E+01	4.696E+00	7.718E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
74.66	50.8398	86.94	71.2431	133.52	69.0215
46.54	56.8546	87.09	71.2534	136.00	77.1584
228.16	47.7753	87.57	68.0456	136.28	70.8485
52.39	52.5478	88.03	69.6961	136.47	70.8579
53.20	49.1608	306.78	72.9593	739.50	70.2204
57.53	48.1747	88.47	72.9680	140.51	0.0000
293.27	0.0000	531.02	74.3680	140.88	70.2390
57.53	58.8392	184.58	74.3791	143.76	70.3833
482.18	58.8392	92.59	74.4699	144.24	70.4070
57.98	47.0969	93.31	74.5187	145.44	70.4669
59.32	66.0416	94.56	74.6039	152.32	72.9364
59.54	66.0589	311.90	74.6100	152.43	72.9417
155.04	93.4042	946.00	74.6114	1048.07	75.9701
63.00	79.3547	97.43	78.4756	154.21	63.2076
129.43	77.0116	98.43	67.0909	155.04	60.6791
63.29	77.0116	98.44	67.0917	158.56	68.4163
290.67	77.0371	99.53	71.2513	158.97	0.0000
63.81	96.0254	103.37	71.2513	159.00	68.5531
87.57	109.1242	116.74	71.2513	162.33	65.2692
64.99	104.4637	100.11	74.9748	537.26	59.2702
65.08	104.4745	100.20	70.0641	163.33	58.4375
66.73	63.0382	102.03	82.4874	165.86	71.4455
66.98	63.0560	103.18	72.7106	427.87	55.8923
67.24	63.0742	103.37	72.7228	176.60	55.9024
67.67	85.7263	105.31	70.3746	177.52	52.0319
1221.41	98.8316	106.12	77.8358	181.07	57.3613
97.43	69.2086	106.47	82.8023	184.41	61.3978
279.20	65.7111	109.28	80.5210	184.58	61.4042
1063.66	80.2173	111.00	86.8388	185.72	56.6528
72.87	80.2224	111.76	78.2040	186.21	54.9263
351.06	80.2224	208.37	62.1273	190.27	61.1781
74.66	86.3712	116.24	63.5391	193.51	55.1667
238.63	77.9869	116.30	63.5422	198.01	67.6045
351.93	77.9869	116.74	63.5648	201.83	65.9943
238.63	77.9869	117.23	68.5771	205.31	52.9010
74.97	77.9991	119.76	59.9696	208.37	52.9926
77.11	75.7661	120.54	64.1737	210.85	58.3737
256.23	77.1704	120.90	62.5244	218.12	46.1771
133.52	59.1090	264.66	62.5351	222.11	38.2684
364.49	59.1131	121.22	68.3771	227.09	38.3712
711.68	72.4109	344.28	68.4072	227.38	42.8398
356.01	67.6125	122.06	68.4222	228.16	45.5360
323.87	67.6172	1274.44	72.6513	228.18	45.5365
83.79	55.6915	123.68	77.6987	235.69	44.3730
265.00	55.7031	127.23	68.6956	235.96	49.7588
84.21	71.4597	129.43	64.6147	238.63	50.2772
193.51	94.5840	131.20	74.7841	238.98	50.2863
105.31	88.6162	133.02	67.3128	240.99	41.7991

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
242.00	49.9152	351.06	31.1913	610.33	14.4364
244.70	48.6332	351.93	31.2020	614.28	20.1300
459.60	37.0366	356.01	25.5712	618.01	12.4009
685.70	45.2067	364.49	22.8071	621.93	14.4836
388.16	44.3115	366.42	24.7268	630.19	0.0000
256.23	44.3873	383.85	24.8955	631.29	18.6702
527.90	38.1343	388.16	23.9772	632.98	6.2263
264.66	34.5658	666.33	25.9003	633.25	8.3024
265.00	33.6615	391.70	20.1682	634.78	12.4590
268.22	37.3589	400.66	26.9814	635.95	14.5400
269.46	44.6754	401.81	21.2091	636.99	11.4275
401.81	33.7631	402.40	23.1421	645.85	7.2897
273.65	42.0244	404.85	26.0585	884.68	12.5371
276.40	42.9944	410.95	29.0192	661.66	15.6879
583.19	36.6073	720.70	23.2471	664.57	0.0000
277.60	39.3572	423.72	14.5770	666.33	16.7546
402.40	38.4496	427.09	26.2705	666.50	18.8496
278.43	37.5416	427.87	30.1713	667.71	0.0000
279.20	32.9751	433.94	25.3594	677.62	10.5029
279.54	33.8963	440.45	20.5296	685.70	10.5253
280.46	40.3271	453.88	16.6970	695.00	15.8258
301.36	33.0447	459.60	18.6981	696.49	12.6655
284.31	29.3815	463.37	25.6197	696.51	12.6655
285.41	34.9083	468.07	27.6343	697.00	17.4178
285.90	33.0784	473.00	19.2774	697.49	14.2526
287.50	31.2642	475.06	18.7959	702.65	14.7998
290.67	32.2307	696.49	18.8067	706.68	14.2861
293.27	0.0000	477.60	18.8117	711.68	14.3047
295.22	26.7609	477.99	18.8145	720.70	10.6201
316.51	37.8469	482.18	11.8994	721.93	0.0000
299.98	29.5931	487.02	14.8978	722.78	14.8761
300.09	25.8951	492.35	22.3860	722.91	14.8767
300.13	25.8957	497.08	24.9115	723.31	13.8151
301.36	36.0888	511.00	36.0333	756.73	13.8183
302.85	29.6309	514.00	69.1292	727.33	10.6380
304.50	33.3596	520.40	18.0703	733.00	9.5878
304.85	27.8040	520.69	16.0638	735.93	11.7269
306.78	39.8865	667.71	0.0000	739.50	13.8712
308.46	34.3465	527.90	28.1755	1434.09	10.6828
311.90	32.5391	529.59	18.1223	747.24	5.3455
316.51	28.8783	529.87	0.0000	752.31	3.2112
319.41	36.3768	531.02	15.1086	753.82	13.9204
320.08	35.4541	537.26	11.1012	756.73	17.1452
321.04	33.6021	1260.41	0.0000	763.94	11.8079
323.87	38.3157	552.55	14.1948	765.80	11.8133
325.23	35.5322	795.86	15.2576	1001.03	10.7410
1596.21	39.3323	569.33	7.6425	766.84	12.8906
333.37	32.8403	569.50	12.2285	772.60	0.0000
334.37	34.7319	569.70	13.7582	776.52	7.5369
338.28	32.9079	583.19	15.3473	777.92	11.8477
911.20	32.9086	595.83	16.4310	778.90	16.1603
340.48	37.6432	600.60	17.4814	783.70	12.9429
340.55	33.8804	1690.97	19.7563	785.37	9.7112
344.28	27.3344	604.72	15.4431	903.28	8.6458
345.93	29.2397	609.32	14.4324	795.86	6.4902

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
801.95	5.4163	1112.84	10.4026		
802.10	5.4165	1115.54	8.6731		
810.29	8.6829	1120.29	5.7874		
810.45	4.3416	1120.55	6.9453		
810.76	7.5984	1121.30	8.1040		
815.77	5.4338	1808.65	8.1165		
818.51	9.7870	1131.51	0.0000		
832.01	15.2715	1332.49	12.6220		
834.85	9.1687	1189.05	3.5161		
836.80	0.0000	1204.77	5.2888		
846.77	14.2283	1221.41	7.9568		
856.80	12.0666	1231.02	4.4278		
860.56	4.3916	1235.36	5.3174		
871.09	17.6074	1238.28	3.5466		
873.19	5.5050	1260.41	0.0000		
875.33	0.0000	1274.44	3.5686		
880.51	5.5137	1274.54	6.2455		
881.60	13.2363	1291.59	11.6321		
883.24	6.6206	1298.22	0.0000		
884.68	7.7263	1312.11	4.3096		
889.28	13.2588	1332.49	3.6035		
894.76	14.9337	1365.19	4.5285		
1836.06	8.3023	1368.63	0.0000		
903.28	6.6494	1384.29	7.2676		
911.20	9.9913	1408.01	3.6475		
984.45	2.2264	1434.09	0.9156		
926.36	12.2510	1457.56	0.0000		
935.54	6.6956	1460.82	5.5166		
937.49	6.6982	1489.16	5.5404		
983.53	7.8254	1596.21	0.9381		
946.00	6.7102	1620.50	5.6484		
949.00	12.3097	1678.03	0.0000		
954.55	0.0000	1690.97	5.7045		
964.08	10.1034	1764.49	2.8810		
968.97	8.9896	1770.23	6.7274		
983.53	3.3812	1771.35	3.8447		
984.45	4.5091	1791.20	0.0000		
996.26	6.7800	1808.65	1.9319		
1001.03	7.9174	1836.06	3.8777		
1004.73	10.1873				
1025.87	7.9570				
1028.54	6.8237				
1037.84	4.5576				
1038.76	0.0000				
1046.59	6.8481				
1048.07	11.4168				
1050.41	9.1374				
1063.66	3.4353				
1077.00	3.4441				
1077.34	3.4443				
1083.85	6.8975				
1085.87	9.1999				
1099.25	4.6117				
1111.64	8.6670				
1112.07	9.2454				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 11:17:16.01

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372009.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM07.CNF;496
Background date  : 18-DEC-2016 13:11:30
Sample date      : 7-DEC-2016 11:30:00. Acquisition date : 21-DEC-2016 09:15:39
Sample ID        : G412372009. Sample quantity : 2.00000E+00 LITER
Detector name    : GAM07. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.64 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID         : 1624165 Detector SN# :
Matrix Spike ID  : LCS ID : 1604
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	53.56	24	99	1.02	107.63	104	9	3.33E-03	77.5	
2	0	75.10*	9	93	0.95	150.69	147	6	1.25E-03	183.1	
3	0	92.83*	36	132	1.50	186.14	181	12	4.93E-03	73.6	
4	0	137.94	16	212	4.36	276.34	274	14	2.26E-03	190.5	
5	0	145.76	3	70	0.32	291.98	287	6	4.41E-04	428.6	
6	0	159.20	25	69	1.47	318.85	316	7	3.42E-03	59.8	
7	0	175.27	35	76	1.04	350.97	347	8	4.86E-03	46.3	
8	0	185.88*	8	86	0.95	372.18	367	9	1.08E-03	254.4	
9	1	198.20*	44	75	1.35	396.83	392	18	6.14E-03	38.5	4.01E+00
10	1	201.41*	15	69	1.35	403.25	392	18	2.11E-03	102.4	
11	2	234.58	22	55	1.53	469.58	466	26	3.06E-03	54.0	1.86E+00
12	2	238.56*	15	58	1.54	477.53	466	26	2.12E-03	109.4	
13	2	241.53	22	46	1.54	483.46	466	26	3.00E-03	68.9	
14	0	253.46	21	33	1.51	507.32	504	7	2.96E-03	49.0	
15	0	300.25	24	37	2.13	600.87	596	9	3.35E-03	50.3	
16	0	351.86*	73	33	1.59	704.08	698	12	1.01E-02	21.1	
17	0	378.50	51	96	4.96	757.35	738	35	7.09E-03	61.6	
18	0	462.64	37	52	7.63	925.59	912	26	5.14E-03	55.8	
19	0	567.20	14	8	0.76	1134.67	1132	6	1.88E-03	44.0	
20	0	583.89*	6	29	0.76	1168.06	1162	11	8.97E-04	184.9	
21	0	596.11	35	6	3.25	1192.49	1186	12	4.86E-03	21.9	
22	0	609.72*	21	42	0.71	1219.70	1212	12	2.89E-03	70.2	
23	0	668.59	17	15	6.25	1337.41	1328	15	2.36E-03	55.3	
24	0	806.46	15	4	3.40	1613.11	1608	10	2.02E-03	38.6	
25	0	868.65	11	14	0.71	1737.48	1730	11	1.57E-03	74.1	
26	0	904.72	11	3	1.14	1809.60	1806	8	1.52E-03	42.9	
27	0	909.69	18	9	0.95	1819.54	1814	10	2.45E-03	40.8	
28	0	967.57	14	6	3.89	1935.30	1930	11	1.87E-03	43.3	
29	0	1036.29	10	2	1.90	2072.70	2069	8	1.37E-03	40.7	
30	0	1120.35*	11	9	0.83	2240.81	2233	12	1.55E-03	66.0	
31	0	1198.50	4	8	0.51	2397.09	2392	8	5.09E-04	144.3	
32	0	1230.61	13	0	3.81	2461.31	2456	10	1.81E-03	27.7	
33	0	1459.75*	1	6	4.79	2919.56	2913	12	1.99E-04	455.0	
34	4	1471.26	8	0	1.62	2942.57	2941	12	1.13E-03	27.5	1.33E-01

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	4	1474.67	9	0	1.93	2949.40	2941	12	1.26E-03	27.1	
36	0	1516.14	8	8	0.61	3032.33	3026	11	1.06E-03	81.6	
37	0	1763.94	19	3	1.99	3527.90	3522	11	2.68E-03	28.2	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 11:17:17

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372009.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 7-DEC-2016 11:30:00	Acquisition date	: 21-DEC-2016 09:15:39
Sample ID	: G412372009	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA7	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.64 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Linear	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
K-40	1460.82	1	10.66*	5.712E-01	4.419E+00	4.419E+00	909.91
CU-67	91.27	-----	7.00	2.209E+00	-----	Line Not Found	-----
	93.31	36	16.10	2.244E+00	1.846E+01	7.870E+02	147.29
	184.58	8	48.70*	2.447E+00	1.230E+00	5.244E+01	508.78
AS-74	595.83	35	59.00*	1.101E+00	1.012E+01	1.743E+01	43.89
	634.78	-----	15.40	1.052E+00	-----	Line Not Found	-----
NB-95M	235.69	22	24.80*	2.158E+00	7.731E+00	8.992E+00	107.95
SN-117M	156.02	-----	2.11	2.596E+00	-----	Line Not Found	-----
	158.56	25	86.40*	2.584E+00	2.069E+00	4.213E+00	119.54
TE-123M	159.00	25	84.00*	2.584E+00	2.129E+00	2.308E+00	119.54
CE-141	145.44	3	48.29*	2.627E+00	4.703E-01	6.331E-01	857.11
TL-208	277.37	-----	6.60	1.931E+00	-----	Line Not Found	-----
	583.19	6	85.00*	1.117E+00	1.276E+00	1.294E+00	369.85
	860.56	-----	12.50	8.455E-01	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	1.639E+00	-----	Line Not Found	-----
	351.06	73	12.92*	1.626E+00	6.512E+01	6.520E+01	42.13
PB-212	74.82	9	10.28	1.724E+00	9.562E+00	9.696E+00	366.24
	77.11	-----	17.10	1.797E+00	-----	Line Not Found	-----
	238.63	15	43.60*	2.135E+00	3.071E+00	3.114E+00	218.88
	300.09	24	3.30	1.825E+00	7.516E+01	7.621E+01	100.54
BI-214	609.32	21	45.49*	1.083E+00	7.923E+00	7.923E+00	140.39
	1120.29	11	14.92	6.987E-01	2.010E+01	2.010E+01	131.92
	1764.49	19	15.30	4.885E-01	4.839E+01	4.839E+01	56.42
RA-224	240.99	22	4.10*	2.118E+00	4.661E+01	4.726E+01	137.72
RA-226	186.21	8	3.59*	2.447E+00	1.668E+01	1.668E+01	508.78
TH-228	74.82	9	10.28	1.724E+00	9.562E+00	9.696E+00	366.24
	77.11	-----	17.10	1.797E+00	-----	Line Not Found	-----
	238.63	15	43.60*	2.135E+00	3.071E+00	3.114E+00	218.88
	300.09	24	3.30	1.825E+00	7.516E+01	7.621E+01	100.54
PA-231	283.69	-----	1.70	1.900E+00	-----	Line Not Found	-----
	301.36	24	5.35*	1.825E+00	4.636E+01	4.636E+01	100.54
U-234	53.20	24	0.12*	7.257E-01	5.173E+03	5.173E+03	154.95
	120.90	-----	0.04	2.600E+00	-----	Line Not Found	-----
AM-243	43.53	-----	5.90	2.101E-01	-----	Line Not Found	-----
	74.66	9	67.20*	1.724E+00	1.463E+00	1.463E+00	366.24

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372009.CNF;1
Acquisition date : 21-DEC-2016 09:15:39 Sensitivity : 3.000
Detector ID : GAM07 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.64 Half life ratio : *****
Sample date : 7-DEC-2016 11:30:00 Analyst initials: MXR1
Sample ID : G412372009 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 22-AUG-2016 07:28:43 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM07_2LMB.CNF;16

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
K-40	4.419E+00	3.941E+01	6.411E+01
CU-67	5.244E+01	2.615E+02	2.369E+02
AS-74	1.743E+01	7.497E+00	7.670E+00
NB-95M	8.992E+00	9.513E+00	1.258E+01
SN-117M	4.213E+00	4.936E+00	6.501E+00
TE-123M	2.308E+00	2.704E+00	3.345E+00
CE-141	6.331E-01	5.318E+00	6.714E+00
TL-208	1.294E+00	4.690E+00	4.374E+00
BI-211	6.520E+01	2.692E+01	2.359E+01
PB-212	3.114E+00	6.680E+00	6.297E+00
BI-214	7.923E+00	1.090E+01	9.232E+00
RA-224	4.726E+01	6.378E+01	6.745E+01
RA-226	1.668E+01	8.318E+01	7.573E+01
TH-228	3.114E+00	6.680E+00	6.297E+00
PA-231	4.636E+01	4.568E+01	4.674E+01
U-234	5.173E+03	7.855E+03	7.941E+03
AM-243	1.463E+00	5.250E+00	7.115E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	1.670E+00	1.935E+01	3.741E+01	NOT IDENT.
NA-22	-3.335E+00	2.664E+00	4.034E+00	NOT IDENT.
NA-24	0.000E+00	1.201E+07	0.000E+00	SHORT HLIF
AL-26	9.103E-02	3.054E+00	6.354E+00	NOT IDENT.
SC-46	2.502E+00	2.420E+00	5.580E+00	FAIL ABUN
V-48	-1.075E+00	3.019E+00	5.867E+00	NOT IDENT.
CR-51	9.311E+00	2.299E+01	4.549E+01	NOT IDENT.
MN-52	2.913E+00	2.253E+01	2.712E+01	NOT IDENT.
MN-54	-2.670E-01	2.209E+00	4.349E+00	NOT IDENT.
CO-56	8.367E-01	2.356E+00	4.999E+00	NOT IDENT.
CO-57	6.918E-01	1.952E+00	3.438E+00	FAIL ABUN
CO-58	7.872E-01	1.719E+00	3.615E+00	NOT IDENT.
FE-59	-1.815E+00	5.027E+00	9.420E+00	NOT IDENT.

CO-60	-2.494E+00	2.385E+00	3.694E+00	NOT IDENT.
ZN-65	-4.339E-02	6.026E+00	1.045E+01	NOT IDENT.
GE-68	3.588E+01	7.542E+01	1.627E+02	NOT IDENT.
SE-75	-8.595E-01	3.146E+00	5.792E+00	NOT IDENT.
BR-77	3.387E+02	7.266E+02	1.007E+03	FAIL ABUN
SR-82	1.440E+01	2.381E+01	4.808E+01	NOT IDENT.
RB-83	1.025E+00	4.765E+00	9.248E+00	NOT IDENT.
RB-84	-1.074E+00	3.472E+00	6.759E+00	NOT IDENT.
KR-85	-1.450E+03	6.622E+02	9.057E+02	NOT IDENT.
SR-85	-7.522E+00	3.435E+00	4.698E+00	NOT IDENT.
RB-86	1.311E+01	4.958E+01	1.020E+02	NOT IDENT.
Y-88	-2.121E+00	2.320E+00	3.704E+00	NOT IDENT.
Y-91	3.896E+02	1.199E+03	2.496E+03	NOT IDENT.
NB-94	3.804E-01	1.907E+00	3.763E+00	NOT IDENT.
NB-95	7.783E-01	2.565E+00	5.051E+00	NOT IDENT.
ZR-95	-7.241E-01	3.823E+00	7.074E+00	NOT IDENT.
MO-99	2.718E+02	6.322E+02	1.258E+03	NOT IDENT.
TC-99M	0.000E+00	1.319E+17	0.000E+00	SHORT HLIF
RH-101	-1.372E+00	2.300E+00	3.806E+00	FAIL ABUN
RH-102M	-9.444E-01	1.798E+00	3.159E+00	NOT IDENT.
RU-103	-1.230E+00	2.433E+00	4.274E+00	FAIL ABUN
RH-106	-1.371E+01	1.968E+01	3.268E+01	NOT IDENT.
RU-106	-1.371E+01	1.968E+01	3.268E+01	NOT IDENT.
AG-108M	4.378E-01	1.930E+00	3.765E+00	NOT IDENT.
CD-109	2.271E+01	5.757E+01	9.363E+01	NOT IDENT.
AG-110M	-8.698E-01	2.537E+00	4.907E+00	NOT IDENT.
SN-113	-1.972E+00	2.906E+00	5.037E+00	NOT IDENT.
IN-114M	4.869E+00	1.229E+01	2.212E+01	NOT IDENT.
CD-115	-8.547E+01	3.915E+02	7.378E+02	NOT IDENT.
I-123	0.000E+00	1.055E+08	0.000E+00	SHORT HLIF
SB-124	2.442E+00	4.845E+00	1.187E+01	NOT IDENT.
SB-125	-2.165E+00	5.968E+00	1.077E+01	FAIL ABUN
TE-125M	-2.196E+02	7.462E+02	1.279E+03	NOT IDENT.
I-126	-7.051E-01	1.210E+01	2.280E+01	NOT IDENT.
SB-126	-3.877E+00	8.667E+00	1.495E+01	NOT IDENT.
SN-126	1.922E+00	5.643E+00	9.669E+00	NOT IDENT.
SB-127	1.880E+01	5.762E+01	1.182E+02	FAIL ABUN
TE-129	1.665E+01	2.810E+01	5.825E+01	NOT IDENT.
I-131	8.580E-01	6.645E+00	1.283E+01	NOT IDENT.
I-132	0.000E+00	1.083E+41	0.000E+00	SHORT HLIF
TE-132	1.672E+01	3.617E+01	7.121E+01	NOT IDENT.
BA-133	8.180E-01	2.886E+00	5.147E+00	NOT IDENT.
I-133	0.000E+00	1.213E+05	0.000E+00	SHORT HLIF
CS-134	1.439E+00	2.351E+00	4.985E+00	NOT IDENT.
CS-135	-1.995E+00	9.943E+00	1.751E+01	NOT IDENT.
I-135	0.000E+00	1.370E+16	0.000E+00	SHORT HLIF
CS-136	9.459E-01	4.605E+00	1.005E+01	FAIL ABUN
BA-137M	-1.314E-02	1.869E+00	3.274E+00	NOT IDENT.
CS-137	-1.389E-02	1.974E+00	3.459E+00	NOT IDENT.
CE-139	4.524E-01	2.072E+00	3.674E+00	NOT IDENT.
BA-140	8.097E+00	1.706E+01	3.421E+01	NOT IDENT.
LA-140	-4.307E+00	5.957E+00	9.741E+00	NOT IDENT.
CE-143	0.000E+00	4.266E+03	0.000E+00	SHORT HLIF
CE-144	7.514E-01	1.450E+01	2.549E+01	NOT IDENT.
PM-144	1.684E+00	2.186E+00	4.596E+00	NOT IDENT.
PR-144	1.259E+02	1.635E+02	3.438E+02	NOT IDENT.
PM-146	5.030E-01	2.770E+00	4.918E+00	NOT IDENT.
ND-147	1.502E+01	2.652E+01	5.705E+01	NOT IDENT.
PM-147	1.240E+04	5.322E+04	9.588E+04	NOT IDENT.
PM-149	-1.519E+03	3.593E+03	6.575E+03	NOT IDENT.
EU-152	-3.308E-01	5.975E+00	1.131E+01	NOT IDENT.
GD-153	-1.683E+00	7.461E+00	1.127E+01	NOT IDENT.
EU-154	-9.794E+00	7.478E+00	1.109E+01	NOT IDENT.
EU-155	-1.483E+00	8.377E+00	1.453E+01	NOT IDENT.
HO-166M	-1.977E+00	3.696E+00	6.279E+00	FAIL ABUN
TM-171	1.339E+03	2.033E+03	2.166E+03	FAIL ABUN
LU-176	5.800E-02	1.813E+00	3.435E+00	FAIL ABUN
LU-177	-5.181E-01	7.240E+01	1.239E+02	NOT IDENT.
HF-181	-1.120E+00	2.875E+00	5.138E+00	NOT IDENT.
W-181	9.148E-01	1.495E+01	2.531E+01	NOT IDENT.
TA-182	-2.543E+00	7.017E+00	1.351E+01	FAIL ABUN
RE-183	-1.487E+00	1.423E+01	2.368E+01	NOT IDENT.
RE-184	8.672E+00	7.295E+00	1.628E+01	FAIL ABUN
RE-188	8.159E+00	1.146E+01	2.124E+01	NOT IDENT.
W-188	-2.963E+02	4.536E+02	8.040E+02	NOT IDENT.
OS-191	6.835E+00	1.055E+01	1.966E+01	NOT IDENT.
IR-192	-1.767E+00	2.144E+00	3.703E+00	NOT IDENT.
HG-203	2.323E+00	2.421E+00	4.984E+00	NOT IDENT.

BI-207	-2.823E-01	3.142E+00	5.934E+00	FAIL ABUN
PB-210	-8.695E+01	2.550E+02	4.390E+02	NOT IDENT.
PO-210	-8.695E+01	2.550E+02	4.390E+02	NOT IDENT.
PB-211	3.514E+01	4.613E+01	9.505E+01	NOT IDENT.
BI-212	6.376E+00	3.384E+01	6.510E+01	NOT IDENT.
BI-213	3.101E+00	5.578E+00	1.171E+01	NOT IDENT.
PB-214	0.000E+00	9.757E+00	1.514E+01	FAIL ABUN
RN-219	1.394E+01	2.372E+01	4.884E+01	NOT IDENT.
FR-221	1.130E+01	1.429E+01	2.668E+01	NOT IDENT.
RA-223	-2.761E+00	4.641E+01	8.656E+01	NOT IDENT.
AC-227	1.133E+01	1.936E+01	3.510E+01	FAIL ABUN
TH-227	1.133E+01	1.936E+01	3.510E+01	FAIL ABUN
AC-228	-3.505E+00	1.350E+01	2.212E+01	FAIL ABUN
RA-228	-3.505E+00	1.350E+01	2.212E+01	FAIL ABUN
TH-229	2.741E+01	3.696E+01	6.465E+01	NOT IDENT.
TH-230	-3.358E+02	8.059E+02	1.366E+03	NOT IDENT.
TH-231	-1.539E+01	3.345E+01	5.396E+01	NOT IDENT.
TH-232	2.456E+02	1.600E+03	2.771E+03	NOT IDENT.
PA-233	-6.080E-01	4.605E+00	8.557E+00	FAIL ABUN
PA-234	-2.040E+01	1.632E+01	2.450E+01	NOT IDENT.
PA-234M	6.226E+01	2.468E+02	5.233E+02	NOT IDENT.
TH-234	2.041E+01	1.148E+02	1.993E+02	FAIL ABUN
U-235	9.122E+00	1.738E+01	2.669E+01	FAIL ABUN
NP-237	-6.080E-01	4.605E+00	8.557E+00	FAIL ABUN
NP-238	-4.874E+02	6.447E+02	1.115E+03	NOT IDENT.
U-238	2.041E+01	1.148E+02	1.993E+02	FAIL ABUN
NP-239	1.232E+00	1.810E+01	3.231E+01	NOT IDENT.
AM-241	-3.216E+00	1.045E+01	1.842E+01	NOT IDENT.
AM-242	-1.036E+01	5.256E+01	8.509E+01	NOT IDENT.
CM-243	2.468E+00	8.543E+00	1.541E+01	NOT IDENT.
BK-247	-1.344E+00	5.452E+00	1.009E+01	NOT IDENT.
CM-247	2.916E-01	2.278E+00	4.411E+00	NOT IDENT.
CF-249	6.271E-01	2.565E+00	4.604E+00	FAIL ABUN
CF-251	-2.662E+00	1.004E+01	1.543E+01	NOT IDENT.
CF-252	2.997E+03	1.365E+04	2.459E+04	NOT IDENT.
ANH-511	-1.349E+01	4.389E+00	7.792E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.43	19	48	1.32	93.37	90	6	2.64E-03	62.1	
2	0	53.56	24	99	1.02	107.63	104	9	3.33E-03	77.5	
3	0	62.59	24	135	0.69	125.68	125	8	3.33E-03	85.3	
4	0	75.10	15	93	0.95	150.69	147	6	2.13E-03	102.4	
5	0	92.83	115	132	1.50	186.14	181	12	1.60E-02	22.0	
6	0	137.94	16	212	4.36	276.34	274	14	2.26E-03	190.5	
7	0	145.76	3	70	0.32	291.98	287	6	4.41E-04	428.6	
8	0	159.20	25	69	1.47	318.85	316	7	3.42E-03	59.8	
9	0	175.27	35	76	1.04	350.97	347	8	4.86E-03	46.3	
10	0	185.88	63	86	0.95	372.18	367	9	8.72E-03	29.6	
11	1	198.20	61	75	1.35	396.83	392	18	8.50E-03	26.5	4.01E+00
12	1	201.41	25	69	1.35	403.25	392	18	3.41E-03	61.0	
13	2	234.58	22	55	1.53	469.58	466	26	3.06E-03	54.0	1.86E+00
14	2	238.56	49	58	1.54	477.53	466	26	6.82E-03	31.9	
15	2	241.53	22	46	1.54	483.46	466	26	3.00E-03	68.9	
16	0	253.46	21	33	1.51	507.32	504	7	2.96E-03	49.0	
17	0	300.25	24	37	2.13	600.87	596	9	3.35E-03	50.3	
18	0	351.86	86	33	1.59	704.08	698	12	1.20E-02	17.1	
19	0	378.50	51	96	4.96	757.35	738	35	7.09E-03	61.6	
20	0	462.64	37	52	7.63	925.59	912	26	5.14E-03	55.8	
21	0	510.75	136	26	2.30	1021.79	1015	17	1.88E-02	12.1	
22	0	567.20	14	8	0.76	1134.67	1132	6	1.88E-03	44.0	
23	0	583.89	20	29	0.76	1168.06	1162	11	2.76E-03	57.8	
24	0	596.11	35	6	3.25	1192.49	1186	12	4.86E-03	21.9	
25	0	609.72	28	42	0.71	1219.70	1212	12	3.89E-03	50.0	
26	0	668.59	17	15	6.25	1337.41	1328	15	2.36E-03	55.3	
27	0	806.46	15	4	3.40	1613.11	1608	10	2.02E-03	38.6	
28	0	868.65	11	14	0.71	1737.48	1730	11	1.57E-03	74.1	
29	0	904.72	11	3	1.14	1809.60	1806	8	1.52E-03	42.9	
30	0	909.69	18	9	0.95	1819.54	1814	10	2.45E-03	40.8	
31	0	967.57	14	6	3.89	1935.30	1930	11	1.87E-03	43.3	
32	0	1036.29	10	2	1.90	2072.70	2069	8	1.37E-03	40.7	
33	0	1120.35	14	9	0.83	2240.81	2233	12	1.93E-03	50.9	
34	0	1198.50	4	8	0.51	2397.09	2392	8	5.09E-04	144.3	
35	0	1230.61	13	0	3.81	2461.31	2456	10	1.81E-03	27.7	
36	0	1459.75	13	6	4.79	2919.56	2913	12	1.80E-03	47.0	
37	4	1471.26	8	0	1.62	2942.57	2941	12	1.13E-03	27.5	1.33E-01
38	4	1474.67	9	0	1.93	2949.40	2941	12	1.26E-03	27.1	
39	0	1516.14	8	8	0.61	3032.33	3026	11	1.06E-03	81.6	
40	0	1763.94	19	3	1.99	3527.90	3522	11	2.68E-03	28.2	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
K-40	1460.82	1	10.66*	5.712E-01	4.419E+00	4.419E+00	909.91
CU-67	91.27	-----	7.00	2.209E+00	-----	Line Not Found	-----
	93.31	36	16.10	2.244E+00	1.846E+01	7.870E+02	147.29
	184.58	8	48.70*	2.447E+00	1.230E+00	5.244E+01	508.78
AS-74	595.83	35	59.00*	1.101E+00	1.012E+01	1.743E+01	43.89
	634.78	-----	15.40	1.052E+00	-----	Line Not Found	-----
NB-95M	235.69	22	24.80*	2.158E+00	7.731E+00	8.992E+00	107.95
SN-117M	156.02	-----	2.11	2.596E+00	-----	Line Not Found	-----
	158.56	25	86.40*	2.584E+00	2.069E+00	4.213E+00	119.54
TE-123M	159.00	25	84.00*	2.584E+00	2.129E+00	2.308E+00	119.54
CE-141	145.44	3	48.29*	2.627E+00	4.703E-01	6.331E-01	857.11
TL-208	277.37	-----	6.60	1.931E+00	-----	Line Not Found	-----
	583.19	6	85.00*	1.117E+00	1.276E+00	1.294E+00	369.85
	860.56	-----	12.50	8.455E-01	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	1.639E+00	-----	Line Not Found	-----
	351.06	73	12.92*	1.626E+00	6.512E+01	6.520E+01	42.13
PB-212	74.82	9	10.28	1.724E+00	9.562E+00	9.696E+00	366.24
	77.11	-----	17.10	1.797E+00	-----	Line Not Found	-----
	238.63	15	43.60*	2.135E+00	3.071E+00	3.114E+00	218.88
	300.09	24	3.30	1.825E+00	7.516E+01	7.621E+01	100.54
BI-214	609.32	21	45.49*	1.083E+00	7.923E+00	7.923E+00	140.39
	1120.29	11	14.92	6.987E-01	2.010E+01	2.010E+01	131.92
	1764.49	19	15.30	4.885E-01	4.839E+01	4.839E+01	56.42
RA-224	240.99	22	4.10*	2.118E+00	4.661E+01	4.726E+01	137.72
RA-226	186.21	8	3.59*	2.447E+00	1.668E+01	1.668E+01	508.78
TH-228	74.82	9	10.28	1.724E+00	9.562E+00	9.696E+00	366.24
	77.11	-----	17.10	1.797E+00	-----	Line Not Found	-----
	238.63	15	43.60*	2.135E+00	3.071E+00	3.114E+00	218.88
	300.09	24	3.30	1.825E+00	7.516E+01	7.621E+01	100.54
PA-231	283.69	-----	1.70	1.900E+00	-----	Line Not Found	-----
	301.36	24	5.35*	1.825E+00	4.636E+01	4.636E+01	100.54
U-234	53.20	24	0.12*	7.257E-01	5.173E+03	5.173E+03	154.95
	120.90	-----	0.04	2.600E+00	-----	Line Not Found	-----
AM-243	43.53	-----	5.90	2.101E-01	-----	Line Not Found	-----
	74.66	9	67.20*	1.724E+00	1.463E+00	1.463E+00	366.24

Flag: "*" = Keyline

Total number of lines in spectrum 37
Number of unidentified lines 10
Number of lines tentatively identified by NID 27 72.97%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	4.419E+00	4.419E+00	40.21E+00	909.91	
CU-67	61.83H	42.6	1.230E+00	5.244E+01	26.68E+01	508.78	
AS-74	17.77D	1.72	1.012E+01	1.743E+01	0.765E+01	43.89	
NB-95M	64.03D	1.16	7.731E+00	8.992E+00	9.707E+00	107.95	
SN-117M	13.60D	2.04	2.069E+00	4.213E+00	5.036E+00	119.54	
TE-123M	119.20D	1.08	2.129E+00	2.308E+00	2.760E+00	119.54	
CE-141	32.51D	1.35	4.703E-01	6.331E-01	54.27E-01	857.11	
TL-208	1.91Y	1.01	1.276E+00	1.294E+00	4.786E+00	369.85	
BI-211	21.77Y	1.00	6.512E+01	6.520E+01	2.747E+01	42.13	
PB-212	1.91Y	1.01	3.071E+00	3.114E+00	6.816E+00	218.88	
BI-214	1600.00Y	1.00	7.923E+00	7.923E+00	11.12E+00	140.39	
RA-224	1.91Y	1.01	4.661E+01	4.726E+01	6.509E+01	137.72	
RA-226	1600.00Y	1.00	1.668E+01	1.668E+01	8.488E+01	508.78	
TH-228	1.91Y	1.01	3.071E+00	3.114E+00	6.816E+00	218.88	
PA-231	3.28E+04Y	1.00	4.636E+01	4.636E+01	4.661E+01	100.54	
U-234	2.45E+05Y	1.00	5.173E+03	5.173E+03	8.015E+03	154.95	
AM-243	7370.00Y	1.00	1.463E+00	1.463E+00	5.357E+00	366.24	
Total Activity :			5.392E+03	5.456E+03			

Grand Total Activity : 5.392E+03 5.456E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	137.94	16	212	4.36	276.34	274	14	2.26E-03	****	2.64E+00	T
0	175.27	35	76	1.04	350.97	347	8	4.86E-03	92.7	2.51E+00	T
1	198.20	44	75	1.35	396.83	392	18	6.14E-03	77.1	2.37E+00	T
1	201.41	15	69	1.35	403.25	392	18	2.11E-03	****	2.35E+00	T
0	253.46	21	33	1.51	507.32	504	7	2.96E-03	98.0	2.05E+00	T
0	378.50	51	96	4.96	757.35	738	35	7.09E-03	****	1.54E+00	
0	462.64	37	52	7.63	925.59	912	26	5.14E-03	****	1.33E+00	T
0	567.20	14	8	0.76	1134.67	1132	6	1.88E-03	88.0	1.14E+00	
0	668.59	17	15	6.25	1337.41	1328	15	2.36E-03	****	1.01E+00	T
0	806.46	15	4	3.40	1613.11	1608	10	2.02E-03	77.3	8.86E-01	
0	868.65	11	14	0.71	1737.48	1730	11	1.57E-03	****	8.40E-01	
0	904.72	11	3	1.14	1809.60	1806	8	1.52E-03	85.8	8.16E-01	T
0	909.69	18	9	0.95	1819.54	1814	10	2.45E-03	81.6	8.13E-01	
0	967.57	14	6	3.89	1935.30	1930	11	1.87E-03	86.5	7.77E-01	T
0	1036.29	10	2	1.90	2072.70	2069	8	1.37E-03	81.4	7.40E-01	
0	1198.50	4	8	0.51	2397.09	2392	8	5.09E-04	****	6.65E-01	
0	1230.61	13	0	3.81	2461.31	2456	10	1.81E-03	55.5	6.52E-01	T
4	1471.26	8	0	1.62	2942.57	2941	12	1.13E-03	55.0	5.68E-01	
4	1474.67	9	0	1.93	2949.40	2941	12	1.26E-03	54.2	5.67E-01	
0	1516.14	8	8	0.61	3032.33	3026	11	1.06E-03	****	5.54E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372009.CNF;1  *
* Acquisition date   : 21-DEC-2016 09:15:39 Sensitivity      : 3.000          *
* Detector ID        : GAM07 Energy tolerance: 1.500         *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000        *
* Elapsed real time  : 0 02:00:00.64 Half life ratio : *****          *
* Sample date        : 7-DEC-2016 11:30:00 Nuclide Library : LIQUID         *
* Sample ID          : G412372009 Analyst initials: MXR1           *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER      *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 22-AUG-2016 07:28:43 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM07_2LMB.CNF;16         *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
K-40	2.789E+01
CU-67	1.095E+02
AS-74	3.162E+00
NB-95M	5.741E+00
SN-117M	3.020E+00
TE-123M	1.547E+00
CE-141	3.089E+00
TL-208	1.917E+00
BI-211	1.059E+01
PB-212	2.873E+00
BI-214	4.102E+00
RA-224	3.078E+01
RA-226	3.499E+01
TH-228	2.873E+00
PA-231	2.077E+01
U-234	3.673E+03
AM-243	3.338E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.646E+01	NOT IDENT.
NA-22	1.613E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.646E+00	NOT IDENT.
SC-46	2.446E+00	FAIL ABUN
V-48	2.328E+00	NOT IDENT.
CR-51	2.067E+01	NOT IDENT.
MN-52	1.109E+01	NOT IDENT.
MN-54	1.872E+00	NOT IDENT.
CO-56	2.164E+00	NOT IDENT.
CO-57	1.602E+00	FAIL ABUN
CO-58	1.476E+00	NOT IDENT.
FE-59	3.923E+00	NOT IDENT.
CO-60	1.431E+00	NOT IDENT.

ZN-65	4.480E+00	NOT IDENT.
GE-68	7.002E+01	NOT IDENT.
SE-75	2.663E+00	NOT IDENT.
BR-77	4.738E+02	FAIL ABUN
SR-82	2.134E+01	NOT IDENT.
RB-83	4.106E+00	NOT IDENT.
RB-84	2.785E+00	NOT IDENT.
KR-85	4.048E+02	NOT IDENT.
SR-85	2.099E+00	NOT IDENT.
RB-86	4.417E+01	NOT IDENT.
Y-88	1.258E+00	NOT IDENT.
Y-91	1.074E+03	NOT IDENT.
NB-94	1.622E+00	NOT IDENT.
NB-95	2.204E+00	NOT IDENT.
ZR-95	2.952E+00	NOT IDENT.
MO-99	5.544E+02	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.760E+00	FAIL ABUN
RH-102M	1.373E+00	NOT IDENT.
RU-103	1.854E+00	FAIL ABUN
RH-106	1.388E+01	NOT IDENT.
RU-106	1.388E+01	NOT IDENT.
AG-108M	1.681E+00	NOT IDENT.
CD-109	4.355E+01	NOT IDENT.
AG-110M	2.016E+00	NOT IDENT.
SN-113	2.236E+00	NOT IDENT.
IN-114M	1.025E+01	NOT IDENT.
CD-115	3.101E+02	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
SB-124	4.698E+00	NOT IDENT.
SB-125	4.774E+00	FAIL ABUN
TE-125M	5.956E+02	NOT IDENT.
I-126	9.796E+00	NOT IDENT.
SB-126	6.403E+00	NOT IDENT.
SN-126	4.513E+00	NOT IDENT.
SB-127	5.056E+01	FAIL ABUN
TE-129	2.584E+01	NOT IDENT.
I-131	5.763E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.293E+01	NOT IDENT.
BA-133	2.320E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.157E+00	NOT IDENT.
CS-135	7.956E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	4.127E+00	FAIL ABUN
BA-137M	1.361E+00	NOT IDENT.
CS-137	1.437E+00	NOT IDENT.
CE-139	1.704E+00	NOT IDENT.
BA-140	1.524E+01	NOT IDENT.
LA-140	3.802E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.185E+01	NOT IDENT.
PM-144	2.032E+00	NOT IDENT.
PR-144	1.520E+02	NOT IDENT.
PM-146	2.168E+00	NOT IDENT.
ND-147	2.463E+01	NOT IDENT.
PM-147	4.450E+04	NOT IDENT.
PM-149	2.946E+03	NOT IDENT.
EU-152	5.077E+00	NOT IDENT.
GD-153	5.248E+00	NOT IDENT.
EU-154	4.398E+00	NOT IDENT.
EU-155	6.776E+00	NOT IDENT.
HO-166M	2.656E+00	FAIL ABUN
TM-171	1.001E+03	FAIL ABUN
LU-176	1.567E+00	FAIL ABUN
LU-177	5.742E+01	NOT IDENT.
HF-181	2.262E+00	NOT IDENT.
W-181	1.174E+01	NOT IDENT.
TA-182	5.192E+00	FAIL ABUN
RE-183	1.096E+01	NOT IDENT.
RE-184	7.069E+00	FAIL ABUN
RE-188	9.904E+00	NOT IDENT.
W-188	3.633E+02	NOT IDENT.
OS-191	9.150E+00	NOT IDENT.
IR-192	1.653E+00	NOT IDENT.
HG-203	2.294E+00	NOT IDENT.
BI-207	2.498E+00	FAIL ABUN

PB-210	2.026E+02	NOT IDENT.
PO-210	2.026E+02	NOT IDENT.
PB-211	4.295E+01	NOT IDENT.
BI-212	2.851E+01	NOT IDENT.
BI-213	5.146E+00	NOT IDENT.
PB-214	7.133E+00	FAIL ABUN
RN-219	2.181E+01	NOT IDENT.
FR-221	1.236E+01	NOT IDENT.
RA-223	3.961E+01	NOT IDENT.
AC-227	1.624E+01	FAIL ABUN
TH-227	1.624E+01	FAIL ABUN
AC-228	9.847E+00	FAIL ABUN
RA-228	9.847E+00	FAIL ABUN
TH-229	2.994E+01	NOT IDENT.
TH-230	6.366E+02	NOT IDENT.
TH-231	2.509E+01	NOT IDENT.
TH-232	1.308E+03	NOT IDENT.
PA-233	3.909E+00	FAIL ABUN
PA-234	9.571E+00	NOT IDENT.
PA-234M	2.219E+02	NOT IDENT.
TH-234	9.407E+01	FAIL ABUN
U-235	1.247E+01	FAIL ABUN
NP-237	3.909E+00	FAIL ABUN
NP-238	4.318E+02	NOT IDENT.
U-238	9.407E+01	FAIL ABUN
NP-239	1.492E+01	NOT IDENT.
AM-241	8.532E+00	NOT IDENT.
AM-242	3.959E+01	NOT IDENT.
CM-243	7.209E+00	NOT IDENT.
BK-247	4.621E+00	NOT IDENT.
CM-247	1.967E+00	NOT IDENT.
CF-249	2.048E+00	FAIL ABUN
CF-251	7.130E+00	NOT IDENT.
CF-252	1.148E+04	NOT IDENT.
ANH-511	3.692E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372009.CNF;1
Acquisition date : 21-DEC-2016 09:15:39 Sensitivity : 3.000
Detector ID : GAM07 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.64 Half life ratio : *****
Sample date : 7-DEC-2016 11:30:00 Nuclide Library : LIQUID
Sample ID : G412372009 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 22-AUG-2016 07:28:43 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM07_2LMB.CNF;16

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	4.419E+00	3.941E+01	3.941E+01
CU-67	5.244E+01	2.615E+02	2.615E+02
AS-74	1.743E+01	7.621E+00	7.621E+00
NB-95M	8.992E+00	9.540E+00	9.540E+00
SN-117M	4.213E+00	4.939E+00	4.939E+00
TE-123M	2.308E+00	2.706E+00	2.706E+00
CE-141	6.331E-01	5.318E+00	5.318E+00
TL-208	1.294E+00	4.690E+00	4.690E+00
BI-211	6.520E+01	2.707E+01	2.707E+01
PB-212	3.114E+00	6.682E+00	6.682E+00
BI-214	7.923E+00	1.091E+01	1.091E+01
RA-224	4.726E+01	6.383E+01	6.383E+01
RA-226	1.668E+01	8.319E+01	8.319E+01
TH-228	3.114E+00	6.682E+00	6.682E+00
PA-231	4.636E+01	4.674E+01	4.674E+01
U-234	5.173E+03	7.867E+03	7.867E+03
AM-243	1.463E+00	5.251E+00	5.251E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	1.670E+00	1.935E+01	1.936E+01	NOT IDENT.
NA-22	-3.335E+00	2.666E+00	3.061E+00	NOT IDENT.
NA-24	9.391E+06	1.201E+07	1.274E+07	SHORT HLIF
AL-26	9.103E-02	3.054E+00	3.054E+00	NOT IDENT.
SC-46	2.502E+00	2.422E+00	2.672E+00	FAIL ABUN
V-48	-1.075E+00	3.020E+00	3.058E+00	NOT IDENT.
CR-51	9.311E+00	2.299E+01	2.337E+01	NOT IDENT.
MN-52	2.913E+00	1.253E+01	1.260E+01	NOT IDENT.
MN-54	-2.670E-01	2.209E+00	2.212E+00	NOT IDENT.
CO-56	8.367E-01	2.357E+00	2.387E+00	NOT IDENT.
CO-57	6.918E-01	1.953E+00	1.977E+00	FAIL ABUN
CO-58	7.872E-01	1.719E+00	1.755E+00	NOT IDENT.
FE-59	-1.815E+00	5.029E+00	5.095E+00	NOT IDENT.

CO-60	-2.494E+00	2.387E+00	2.638E+00	NOT IDENT.
ZN-65	-4.339E-02	6.026E+00	6.026E+00	NOT IDENT.
GE-68	3.588E+01	7.543E+01	7.715E+01	NOT IDENT.
SE-75	-8.595E-01	3.147E+00	3.170E+00	NOT IDENT.
BR-77	3.387E+02	7.268E+02	7.427E+02	FAIL ABUN
SR-82	1.440E+01	2.382E+01	2.469E+01	NOT IDENT.
RB-83	1.025E+00	4.767E+00	4.789E+00	NOT IDENT.
RB-84	-1.074E+00	3.472E+00	3.506E+00	NOT IDENT.
KR-85	-1.450E+03	6.649E+02	9.325E+02	NOT IDENT.
SR-85	-7.522E+00	3.448E+00	4.836E+00	NOT IDENT.
RB-86	1.311E+01	4.959E+01	4.994E+01	NOT IDENT.
Y-88	-2.121E+00	2.325E+00	2.514E+00	NOT IDENT.
Y-91	3.896E+02	1.199E+03	1.211E+03	NOT IDENT.
NB-94	3.804E-01	1.907E+00	1.915E+00	NOT IDENT.
NB-95	7.783E-01	2.565E+00	2.589E+00	NOT IDENT.
ZR-95	-7.241E-01	3.823E+00	3.837E+00	NOT IDENT.
MO-99	2.718E+02	6.324E+02	6.441E+02	NOT IDENT.
TC-99M	-7.439E+15	1.319E+17	0.000E+00	SHORT HLIF
RH-101	-1.372E+00	2.313E+00	2.395E+00	FAIL ABUN
RH-102M	-9.444E-01	1.800E+00	1.850E+00	NOT IDENT.
RU-103	-1.230E+00	2.433E+00	2.496E+00	FAIL ABUN
RH-106	-1.371E+01	1.970E+01	2.065E+01	NOT IDENT.
RU-106	-1.371E+01	1.970E+01	2.065E+01	NOT IDENT.
AG-108M	4.378E-01	1.930E+00	1.940E+00	NOT IDENT.
CD-109	2.271E+01	5.760E+01	5.851E+01	NOT IDENT.
AG-110M	-8.698E-01	2.537E+00	2.567E+00	NOT IDENT.
SN-113	-1.972E+00	2.907E+00	3.040E+00	NOT IDENT.
IN-114M	4.869E+00	1.230E+01	1.249E+01	NOT IDENT.
CD-115	-8.547E+01	3.916E+02	3.935E+02	NOT IDENT.
I-123	9.001E+07	1.055E+08	1.131E+08	SHORT HLIF
SB-124	2.442E+00	4.847E+00	4.970E+00	NOT IDENT.
SB-125	-2.165E+00	5.969E+00	6.048E+00	FAIL ABUN
TE-125M	-2.196E+02	7.463E+02	7.528E+02	NOT IDENT.
I-126	-7.051E-01	1.210E+01	1.211E+01	NOT IDENT.
SB-126	-3.877E+00	8.676E+00	8.850E+00	NOT IDENT.
SN-126	1.922E+00	5.645E+00	5.711E+00	NOT IDENT.
SB-127	1.880E+01	5.764E+01	5.826E+01	FAIL ABUN
TE-129	1.665E+01	2.822E+01	2.920E+01	NOT IDENT.
I-131	8.580E-01	6.646E+00	6.657E+00	NOT IDENT.
I-132	1.000E+41	1.383E+41	0.000E+00	SHORT HLIF
TE-132	1.672E+01	3.620E+01	3.697E+01	NOT IDENT.
BA-133	8.180E-01	2.887E+00	2.910E+00	NOT IDENT.
I-133	-9.094E+04	1.217E+05	1.284E+05	SHORT HLIF
CS-134	1.439E+00	2.352E+00	2.440E+00	NOT IDENT.
CS-135	-1.995E+00	9.944E+00	9.985E+00	NOT IDENT.
I-135	-2.107E+15	1.370E+16	0.000E+00	SHORT HLIF
CS-136	9.459E-01	4.605E+00	4.625E+00	FAIL ABUN
BA-137M	-1.314E-02	1.869E+00	1.869E+00	NOT IDENT.
CS-137	-1.389E-02	1.974E+00	1.974E+00	NOT IDENT.
CE-139	4.524E-01	2.074E+00	2.084E+00	NOT IDENT.
BA-140	8.097E+00	1.706E+01	1.745E+01	NOT IDENT.
LA-140	-4.307E+00	5.960E+00	6.268E+00	NOT IDENT.
CE-143	-8.192E+02	4.266E+03	4.282E+03	SHORT HLIF
CE-144	7.514E-01	1.450E+01	1.451E+01	NOT IDENT.
PM-144	1.684E+00	2.187E+00	2.315E+00	NOT IDENT.
PR-144	1.259E+02	1.636E+02	1.731E+02	NOT IDENT.
PM-146	5.030E-01	2.770E+00	2.780E+00	NOT IDENT.
ND-147	1.502E+01	2.653E+01	2.738E+01	NOT IDENT.
PM-147	1.240E+04	5.323E+04	5.352E+04	NOT IDENT.
PM-149	-1.519E+03	3.599E+03	3.663E+03	NOT IDENT.
EU-152	-3.308E-01	5.975E+00	5.977E+00	NOT IDENT.
GD-153	-1.683E+00	7.461E+00	7.500E+00	NOT IDENT.
EU-154	-9.794E+00	7.488E+00	8.693E+00	NOT IDENT.
EU-155	-1.483E+00	8.377E+00	8.404E+00	NOT IDENT.
HO-166M	-1.977E+00	3.698E+00	3.803E+00	FAIL ABUN
TM-171	1.339E+03	2.037E+03	2.124E+03	FAIL ABUN
LU-176	5.800E-02	1.813E+00	1.813E+00	FAIL ABUN
LU-177	-5.181E-01	7.240E+01	7.240E+01	NOT IDENT.
HF-181	-1.120E+00	2.876E+00	2.920E+00	NOT IDENT.
W-181	9.148E-01	1.495E+01	1.496E+01	NOT IDENT.
TA-182	-2.543E+00	7.018E+00	7.111E+00	FAIL ABUN
RE-183	-1.487E+00	1.423E+01	1.425E+01	NOT IDENT.
RE-184	8.672E+00	7.324E+00	8.302E+00	FAIL ABUN
RE-188	8.159E+00	1.147E+01	1.204E+01	NOT IDENT.
W-188	-2.963E+02	4.548E+02	4.740E+02	NOT IDENT.
OS-191	6.835E+00	1.056E+01	1.100E+01	NOT IDENT.
IR-192	-1.767E+00	2.146E+00	2.289E+00	NOT IDENT.
HG-203	2.323E+00	2.423E+00	2.640E+00	NOT IDENT.

BI-207	-2.823E-01	3.142E+00	3.145E+00	FAIL ABUN
PB-210	-8.695E+01	2.551E+02	2.581E+02	NOT IDENT.
PO-210	-8.695E+01	2.551E+02	2.581E+02	NOT IDENT.
PB-211	3.514E+01	4.616E+01	4.880E+01	NOT IDENT.
BI-212	6.376E+00	3.384E+01	3.396E+01	NOT IDENT.
BI-213	3.101E+00	5.579E+00	5.752E+00	NOT IDENT.
PB-214	2.363E+01	9.807E+00	1.448E+01	FAIL ABUN
RN-219	1.394E+01	2.378E+01	2.460E+01	NOT IDENT.
FR-221	1.130E+01	1.431E+01	1.519E+01	NOT IDENT.
RA-223	-2.761E+00	4.641E+01	4.642E+01	NOT IDENT.
AC-227	1.133E+01	1.942E+01	2.008E+01	FAIL ABUN
TH-227	1.133E+01	1.942E+01	2.008E+01	FAIL ABUN
AC-228	-3.505E+00	1.350E+01	1.359E+01	FAIL ABUN
RA-228	-3.505E+00	1.350E+01	1.359E+01	FAIL ABUN
TH-229	2.741E+01	3.699E+01	3.900E+01	NOT IDENT.
TH-230	-3.358E+02	8.078E+02	8.219E+02	NOT IDENT.
TH-231	-1.539E+01	3.352E+01	3.423E+01	NOT IDENT.
TH-232	2.456E+02	1.601E+03	1.604E+03	NOT IDENT.
PA-233	-6.080E-01	4.605E+00	4.613E+00	FAIL ABUN
PA-234	-2.040E+01	2.848E+01	2.993E+01	NOT IDENT.
PA-234M	6.226E+01	2.468E+02	2.484E+02	NOT IDENT.
TH-234	2.041E+01	1.149E+02	1.153E+02	FAIL ABUN
U-235	9.122E+00	1.738E+01	1.786E+01	FAIL ABUN
NP-237	-6.080E-01	4.605E+00	4.613E+00	FAIL ABUN
NP-238	-4.874E+02	6.450E+02	6.814E+02	NOT IDENT.
U-238	2.041E+01	1.149E+02	1.153E+02	FAIL ABUN
NP-239	1.232E+00	1.810E+01	1.811E+01	NOT IDENT.
AM-241	-3.216E+00	1.045E+01	1.055E+01	NOT IDENT.
AM-242	-1.036E+01	5.259E+01	5.279E+01	NOT IDENT.
CM-243	2.468E+00	8.546E+00	8.619E+00	NOT IDENT.
BK-247	-1.344E+00	5.459E+00	5.493E+00	NOT IDENT.
CM-247	2.916E-01	2.279E+00	2.283E+00	NOT IDENT.
CF-249	6.271E-01	2.565E+00	2.581E+00	FAIL ABUN
CF-251	-2.662E+00	1.004E+01	1.011E+01	NOT IDENT.
CF-252	2.997E+03	1.392E+04	1.399E+04	NOT IDENT.
ANH-511	-1.349E+01	4.423E+00	7.518E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	33.3000	88.03	44.9046	140.88	83.7958
46.54	31.6656	88.34	61.7788	143.76	45.8820
49.72	41.2962	88.47	61.7935	144.24	71.9267
51.35	58.3223	91.11	55.0346	145.44	44.4505
52.39	50.6823	91.27	55.0500	152.32	63.7893
53.20	50.7874	92.59	55.1802	152.43	66.1185
56.28	60.3663	93.31	55.2504	153.25	44.1248
57.36	0.0000	94.56	55.3722	323.87	65.1046
57.53	53.9691	94.65	55.3809	155.04	48.8791
57.53	53.9693	94.67	55.3829	156.02	69.9133
57.98	54.0277	97.43	61.3558	158.56	57.6657
59.32	57.5062	98.43	47.1679	158.97	0.0000
59.54	59.5203	98.44	47.1686	159.00	50.2896
61.49	81.7172	99.53	59.0699	162.33	51.6686
63.00	64.0015	100.11	60.2028	162.66	53.2557
63.29	59.0403	100.20	60.2122	163.33	63.4881
63.58	59.0793	102.03	57.1617	165.86	50.7095
63.81	59.1103	103.18	63.7539	176.31	47.7515
64.28	73.2140	103.37	63.7741	176.60	44.5828
64.99	96.4351	105.31	68.3146	177.52	55.7869
65.08	92.4359	106.12	61.8902	181.07	52.8106
66.73	66.5559	106.47	54.3201	184.41	49.3938
66.98	66.5927	109.28	67.6616	184.58	49.4026
67.24	70.6686	111.00	57.9971	185.72	49.4651
67.67	64.6724	111.76	67.9270	186.21	49.4920
67.75	64.6836	112.95	55.9793	190.27	44.8623
69.67	54.8038	116.24	46.3345	193.51	37.3132
70.83	70.2003	116.30	46.3387	198.01	33.0092
72.81	55.8491	116.74	47.4738	201.83	33.1415
72.87	55.8562	117.23	40.8800	205.31	52.5605
74.66	76.9152	119.76	55.4543	208.37	54.3729
74.82	76.9403	99.53	55.5187	210.85	45.8379
74.97	76.9644	120.90	51.1046	218.12	37.4359
77.11	56.3416	121.12	54.4551	222.11	43.4280
79.69	69.4071	121.22	51.1288	227.09	47.8328
80.12	63.2446	121.78	54.5085	227.38	48.6856
80.19	63.2534	122.06	47.8537	228.16	42.0019
80.57	66.4136	123.07	60.1848	228.18	42.0024
81.00	69.5845	265.00	55.7762	116.74	42.0024
81.07	71.6716	127.23	63.9126	235.69	36.3788
83.79	64.7374	129.43	47.2417	235.96	36.3878
84.00	53.2731	131.20	64.2737	238.63	36.4781
84.21	57.4741	133.02	45.2191	238.98	36.4895
85.43	61.7958	133.52	57.6948	240.99	36.5573
86.55	69.2720	136.00	59.0276	242.00	36.5909
86.94	76.6747	57.53	65.1063	244.70	37.1076
87.09	71.4427	136.47	65.1238	250.62	25.7278
87.57	52.5780	140.51	83.7544	252.40	30.9221

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.80	30.9331	366.42	18.2848	630.19	0.0000
256.23	40.0764	356.01	21.8171	631.29	14.0712
260.90	42.4035	388.16	18.5486	155.04	19.4978
264.66	48.6172	388.63	19.4105	633.25	19.5000
265.00	44.2899	391.70	30.5078	634.78	14.0929
268.22	33.9615	264.66	19.1764	635.95	16.2695
269.46	41.8428	401.81	16.3117	636.99	18.4471
271.23	34.0480	402.40	21.1174	645.85	13.0723
273.65	26.2439	404.85	19.2269	657.76	13.1401
276.40	39.4565	410.95	25.0902	661.66	8.2263
277.37	35.1001	414.70	21.2789	664.57	0.0000
277.60	31.5967	423.72	23.3413	666.33	13.1885
278.00	32.4849	427.09	19.4906	666.50	13.1895
278.43	29.8614	427.87	25.3499	667.71	0.0000
279.20	29.0019	433.94	20.5493	677.62	18.7729
279.54	28.1309	440.45	11.7876	685.70	8.8643
280.46	36.9491	453.88	16.3345	695.00	17.7969
283.69	29.9907	459.60	13.9049	696.49	11.1300
284.31	36.1828	463.37	13.9345	696.51	11.1300
285.41	34.4487	468.07	17.9634	697.00	8.9059
285.90	30.9276	473.00	19.0135	697.49	13.3613
287.50	26.5442	475.06	21.0389	702.65	11.1580
290.67	39.9170	476.78	17.0477	706.68	16.7645
293.27	0.0000	477.60	17.0553	711.68	15.6788
351.93	40.5958	477.99	17.0591	720.70	16.8597
295.96	29.3960	482.18	23.1334	721.93	0.0000
299.98	29.4886	487.02	13.1098	722.78	22.4984
300.09	29.4913	492.35	16.1820	722.91	20.2500
300.13	29.4927	497.08	20.2787	723.31	21.3781
301.36	21.4697	511.00	34.7284	724.19	13.5068
302.85	30.8985	514.00	64.4509	727.33	14.6504
256.23	33.3591	520.40	18.4761	733.00	12.4247
304.85	31.2154	520.69	20.5322	735.93	14.7006
306.78	35.9334	522.65	0.0000	739.50	13.5889
308.46	42.2753	527.90	11.3344	744.23	17.0178
311.90	39.6816	529.59	18.5632	747.24	11.3582
316.51	35.2946	529.87	0.0000	752.31	6.8284
319.41	25.3949	531.02	8.2562	753.82	10.2488
320.08	27.2223	537.26	16.5651	756.73	10.2601
321.04	39.0466	546.56	0.0000	763.94	16.0046
323.87	40.0388	552.55	16.6914	765.80	12.5840
325.23	37.3456	563.25	3.1461	766.42	11.4429
328.76	38.3564	569.33	20.5101	766.84	13.7334
333.37	22.9075	946.00	20.5117	772.60	0.0000
334.37	28.4261	569.70	25.2471	776.52	13.7842
338.28	22.0688	583.19	16.9401	739.50	16.0901
338.32	22.0698	595.83	7.4554	778.90	14.9461
311.90	25.7874	427.87	14.4102	783.70	8.0624
340.55	25.7891	602.73	17.9505	785.37	6.9150
344.28	26.7804	604.72	17.6461	792.07	13.8647
345.93	19.9701	609.32	21.4347	795.86	8.0992
351.06	25.9805	610.33	25.7334	802.10	6.9580
351.93	25.9959	614.28	19.3345	810.29	3.4895
356.01	23.7418	618.01	13.9876	344.28	3.4897
364.49	24.3480	621.93	18.3240	810.76	3.4901

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	6.9929	1129.67	3.8628		
1048.07	11.3750	1131.51	0.0000		
832.01	7.9132	1173.23	2.9321		
834.85	14.0820	1189.05	7.8521		
836.80	0.0000	1204.77	9.8566		
846.77	10.6066	1221.41	5.9399		
856.80	14.1919	1231.02	4.7637		
860.56	11.5460	1235.36	6.3590		
871.09	8.5573	1238.28	5.9659		
873.19	5.9469	1260.41	0.0000		
875.33	0.0000	1274.44	12.0432		
880.51	8.9429	1274.54	12.0432		
881.60	9.8409	1291.59	7.0555		
883.24	5.3707	1298.22	0.0000		
884.68	9.8513	1312.11	10.1306		
889.28	7.1755	1332.49	5.0909		
894.76	12.5807	1365.19	11.2887		
898.04	17.0929	1368.63	0.0000		
903.28	12.9771	1384.29	5.1547		
911.20	17.3490	1408.01	8.2935		
923.98	8.1667	1434.09	5.2148		
926.36	9.0811	1457.56	0.0000		
935.54	10.0194	1460.82	15.1102		
937.49	11.8487	1489.16	3.1681		
944.13	8.2205	1596.21	9.7267		
946.00	14.6230	1620.50	4.3450		
949.00	1.8297	1678.03	0.0000		
667.71	0.0000	1690.97	2.2039		
964.08	10.2956	1764.49	3.5775		
968.97	7.3655	1063.66	2.2384		
983.53	7.3992	1771.35	4.4778		
984.45	9.2517	1791.20	0.0000		
996.26	8.3570	1808.65	8.1176		
1001.03	8.3694	1836.06	6.3465		
1274.44	13.0340				
1025.87	7.4961				
1028.54	11.2529				
1037.84	7.5229				
1038.76	0.0000				
475.06	4.7144				
1048.07	5.6594				
1050.41	2.8317				
1063.66	8.5287				
1077.00	11.4155				
1077.34	8.5627				
459.60	7.6255				
1085.87	6.6761				
1099.25	11.4895				
1111.64	10.5690				
1112.07	10.5703				
1112.84	8.9705				
1115.54	12.3117				
1120.29	6.1641				
1120.55	6.1648				
1221.41	7.7075				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 11:17:59.34

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*****
*                               GEL Laboratories LLC                      *
*                               2040 Savage Road                        *
*                               Charleston, SC 29407                    *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372010.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM29.CNF;365
Background date    : 18-DEC-2016 13:12:47
Sample date       : 8-DEC-2016 08:16:00. Acquisition date : 21-DEC-2016 09:16:06
Sample ID        : G412372010. Sample quantity : 2.00000E+00 LITER
Detector name     : GAM29. Detector geometry: 2LMB
Elapsed live time : 0 02:00:00.00. Elapsed real time: 0 02:00:02.15 0.0%
Energy tolerance  : 1.50000 keV. Analyst Initials : MXR1
Abundance limit   : 75.00000. Sensitivity : 3.00000
Batch ID          : 1624165. Detector SN# :
Matrix Spike ID   : LCS ID : 1604
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.11*	5	201	0.89	126.19	122	9	6.66E-04	575.8	
2	0	140.14*	60	155	1.98	280.04	275	10	8.34E-03	41.9	
3	1	175.28	32	87	1.24	350.23	347	16	4.48E-03	50.8	1.62E+00
4	1	180.06*	24	85	1.25	359.77	347	16	3.39E-03	70.7	
5	0	198.00	37	102	0.64	395.60	393	8	5.16E-03	49.6	
6	0	239.00*	33	88	1.37	477.49	473	8	4.60E-03	57.8	
7	4	295.29*	40	88	1.81	589.94	584	17	5.51E-03	50.6	1.82E+00
8	4	298.39	35	63	1.81	596.15	584	17	4.87E-03	45.2	
9	0	352.14*	52	49	1.08	703.53	700	9	7.18E-03	30.7	
10	0	477.04	31	61	2.36	953.10	944	20	4.30E-03	63.9	
11	0	484.85	25	19	1.14	968.72	964	9	3.48E-03	37.8	
12	0	558.88*	23	39	1.09	1116.68	1113	11	3.23E-03	59.0	
13	0	583.63*	2	29	0.87	1166.14	1162	9	3.35E-04	476.1	
14	0	596.65	14	23	1.48	1192.17	1188	9	1.90E-03	68.3	
15	0	609.16*	105	34	1.58	1217.17	1209	17	1.46E-02	17.0	
16	0	830.09	18	15	3.67	1658.86	1652	12	2.48E-03	49.4	
17	0	911.55*	9	11	2.79	1821.75	1815	11	1.30E-03	91.0	
18	0	1032.67	9	10	1.66	2064.00	2058	10	1.25E-03	73.7	
19	0	1120.96*	14	7	2.46	2240.63	2236	9	1.99E-03	50.2	
20	0	1132.32	11	5	1.38	2263.36	2257	10	1.51E-03	49.1	
21	0	1218.28	9	0	0.55	2435.33	2433	6	1.25E-03	33.3	
22	0	1279.51	8	14	3.99	2557.88	2547	14	1.11E-03	105.3	
23	0	1463.11	25	7	0.75	2925.34	2919	14	3.47E-03	30.1	
24	0	1510.84	12	5	1.85	3020.88	3014	10	1.62E-03	46.6	
25	0	1527.21	9	2	0.98	3053.65	3048	8	1.19E-03	45.1	
26	0	1619.29	10	0	0.73	3238.00	3233	9	1.39E-03	31.6	
27	0	1734.33	7	3	1.33	3468.38	3462	9	1.03E-03	52.1	
28	0	1764.93*	12	3	0.80	3529.65	3524	11	1.61E-03	54.3	
29	0	1970.89	6	2	0.63	3942.22	3935	10	8.33E-04	62.9	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 11:18:01

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372010.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 8-DEC-2016 08:16:00	Acquisition date	: 21-DEC-2016 09:16:06
Sample ID	: G412372010	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA29	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:02.15 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Linear	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
BE-7	477.60	31	10.44*	1.579E+00	3.526E+01	4.181E+01	127.87
AS-74	595.83	14	59.00*	1.353E+00	3.221E+00	5.366E+00	136.63
	634.78	-----	15.40	1.297E+00	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	2.285E+00	-----	Line Not Found	-----
	583.19	2	85.00*	1.374E+00	3.875E-01	3.926E-01	952.16
	860.56	-----	12.50	1.055E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	1.774E+00	-----	Line Not Found	-----
	351.06	52	12.92*	1.949E+00	3.852E+01	3.856E+01	61.31
BI-214	609.32	105	45.49*	1.334E+00	3.248E+01	3.248E+01	33.95
	1120.29	14	14.92	8.793E-01	2.046E+01	2.046E+01	100.42
	1764.49	12	15.30	6.237E-01	2.280E+01	2.280E+01	108.67
TH-232	63.81	5	0.26*	1.283E+00	2.697E+02	2.697E+02	1151.63
	140.88	60	0.02	2.992E+00	1.883E+04	1.883E+04	83.78

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372010.CNF;1
Acquisition date : 21-DEC-2016 09:16:06 Sensitivity : 3.000
Detector ID : GAM29 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.15 Half life ratio : *****
Sample date : 8-DEC-2016 08:16:00 Analyst initials: MXR1
Sample ID : G412372010 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 30-JUN-2016 11:29:50 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM29_2LMB.CNF;11

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
BE-7	4.181E+01	5.240E+01	3.106E+01
AS-74	5.366E+00	7.185E+00	9.379E+00
TL-208	3.926E-01	3.663E+00	4.047E+00
BI-211	3.856E+01	2.317E+01	2.343E+01
BI-214	3.248E+01	1.080E+01	6.966E+00
TH-232	2.697E+02	3.044E+03	2.490E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
NA-22	1.085E+00	2.242E+00	4.367E+00	NOT IDENT.
NA-24	0.000E+00	3.086E+06	0.000E+00	SHORT HLIF
AL-26	1.010E+00	1.978E+00	4.649E+00	NOT IDENT.
K-40	-3.624E+01	3.012E+01	5.201E+01	NOT IDENT.
SC-46	-2.212E+00	2.169E+00	3.375E+00	FAIL ABUN
V-48	1.502E+00	3.892E+00	7.780E+00	NOT IDENT.
CR-51	-3.943E+00	1.985E+01	3.747E+01	NOT IDENT.
MN-52	-6.106E+00	8.205E+00	1.445E+01	NOT IDENT.
MN-54	-1.225E+00	2.466E+00	3.618E+00	NOT IDENT.
CO-56	2.175E+00	2.402E+00	5.087E+00	NOT IDENT.
CO-57	8.673E-01	1.898E+00	3.458E+00	NOT IDENT.
CO-58	-1.212E+00	1.907E+00	3.273E+00	NOT IDENT.
FE-59	1.018E+00	3.043E+00	6.717E+00	NOT IDENT.
CO-60	1.105E+00	1.822E+00	4.086E+00	NOT IDENT.
ZN-65	-2.912E-01	2.933E+00	5.563E+00	NOT IDENT.
CU-67	-2.815E+02	1.390E+02	2.316E+02	NOT IDENT.
GE-68	4.335E-01	6.596E+01	1.262E+02	NOT IDENT.
SE-75	-9.384E-01	3.087E+00	5.157E+00	NOT IDENT.
BR-77	4.886E+02	5.537E+02	7.730E+02	FAIL ABUN
SR-82	-1.005E+01	1.516E+01	2.596E+01	NOT IDENT.
RB-83	-8.622E-01	4.102E+00	7.663E+00	NOT IDENT.
RB-84	5.325E-01	3.393E+00	6.745E+00	NOT IDENT.
KR-85	-1.637E+03	6.457E+02	9.320E+02	NOT IDENT.
SR-85	-8.416E+00	3.319E+00	4.790E+00	NOT IDENT.

RB-86	2.343E+00	3.729E+01	7.247E+01	NOT IDENT.
Y-88	1.892E-01	1.665E+00	3.866E+00	NOT IDENT.
Y-91	7.076E+01	8.855E+02	1.740E+03	NOT IDENT.
NB-94	-3.478E-01	1.699E+00	3.177E+00	NOT IDENT.
NB-95	7.357E-01	2.302E+00	4.559E+00	NOT IDENT.
NB-95M	-1.259E+00	8.872E+00	1.382E+01	NOT IDENT.
ZR-95	1.942E+00	3.438E+00	7.296E+00	NOT IDENT.
MO-99	-7.369E+02	4.908E+02	5.828E+02	FAIL ABUN
TC-99M	0.000E+00	1.743E+16	0.000E+00	SHORT HLIF
RH-101	-1.160E+00	2.402E+00	4.053E+00	FAIL ABUN
RH-102M	1.745E+00	1.885E+00	3.689E+00	NOT IDENT.
RU-103	-5.713E-01	2.324E+00	4.317E+00	FAIL ABUN
RH-106	4.283E+00	1.794E+01	3.548E+01	NOT IDENT.
RU-106	4.283E+00	1.794E+01	3.548E+01	NOT IDENT.
AG-108M	-6.901E-01	1.579E+00	2.898E+00	NOT IDENT.
CD-109	-8.827E-02	5.964E+01	1.054E+02	NOT IDENT.
AG-110M	-1.421E+00	2.716E+00	4.730E+00	NOT IDENT.
SN-113	3.072E+00	2.655E+00	5.623E+00	NOT IDENT.
IN-114M	-1.295E+00	1.143E+01	1.972E+01	NOT IDENT.
CD-115	-5.852E+01	3.394E+02	6.396E+02	NOT IDENT.
SN-117M	-9.451E-01	3.818E+00	6.498E+00	NOT IDENT.
I-123	0.000E+00	2.828E+07	0.000E+00	SHORT HLIF
TE-123M	-1.038E+00	2.141E+00	3.576E+00	NOT IDENT.
SB-124	4.086E+00	4.655E+00	1.159E+01	NOT IDENT.
SB-125	2.392E+00	5.574E+00	1.110E+01	FAIL ABUN
TE-125M	-2.251E+02	7.682E+02	1.253E+03	NOT IDENT.
I-126	-7.807E-01	9.516E+00	1.831E+01	NOT IDENT.
SB-126	3.207E+00	8.198E+00	1.618E+01	NOT IDENT.
SN-126	-2.584E+00	6.016E+00	1.031E+01	FAIL ABUN
SB-127	-1.103E+01	4.973E+01	8.847E+01	NOT IDENT.
TE-129	2.855E+00	2.754E+01	5.337E+01	NOT IDENT.
I-131	-3.526E+00	5.780E+00	1.040E+01	NOT IDENT.
I-132	0.000E+00	1.158E+41	0.000E+00	SHORT HLIF
TE-132	1.385E+00	3.020E+01	5.262E+01	NOT IDENT.
BA-133	1.487E+00	2.686E+00	4.969E+00	NOT IDENT.
I-133	0.000E+00	6.119E+04	0.000E+00	SHORT HLIF
CS-134	5.561E-01	1.806E+00	3.752E+00	NOT IDENT.
CS-135	4.946E+00	1.078E+01	1.939E+01	NOT IDENT.
I-135	0.000E+00	1.446E+15	0.000E+00	SHORT HLIF
CS-136	2.998E-01	3.759E+00	7.677E+00	FAIL ABUN
BA-137M	1.222E+00	1.792E+00	3.813E+00	NOT IDENT.
CS-137	1.291E+00	1.893E+00	4.028E+00	NOT IDENT.
CE-139	-6.419E-01	2.092E+00	3.550E+00	NOT IDENT.
BA-140	-3.593E+00	1.526E+01	2.820E+01	NOT IDENT.
LA-140	4.130E-01	4.974E+00	1.027E+01	NOT IDENT.
CE-141	-6.879E+00	4.694E+00	7.233E+00	NOT IDENT.
CE-143	-8.209E+02	3.250E+03	4.801E+03	NOT IDENT.
CE-144	-8.112E+00	1.500E+01	2.515E+01	NOT IDENT.
PM-144	1.319E+00	2.100E+00	4.271E+00	FAIL ABUN
PR-144	9.579E+01	1.566E+02	3.180E+02	NOT IDENT.
PM-146	-1.022E+00	2.423E+00	4.429E+00	NOT IDENT.
ND-147	-2.706E-01	2.674E+01	5.168E+01	NOT IDENT.
PM-147	2.778E+04	5.592E+04	1.021E+05	NOT IDENT.
PM-149	4.808E+02	3.214E+03	5.644E+03	NOT IDENT.
EU-152	6.491E+00	6.585E+00	1.342E+01	NOT IDENT.
GD-153	5.158E-01	6.801E+00	1.207E+01	NOT IDENT.
EU-154	2.539E+00	6.250E+00	1.201E+01	NOT IDENT.
EU-155	4.739E+00	8.028E+00	1.482E+01	NOT IDENT.
HO-166M	-1.979E+00	2.927E+00	5.034E+00	NOT IDENT.
TM-171	-3.869E+02	1.483E+03	2.625E+03	NOT IDENT.
LU-176	1.234E-01	1.799E+00	3.129E+00	NOT IDENT.
LU-177	-1.458E+01	6.723E+01	1.136E+02	NOT IDENT.
HF-181	7.422E-02	3.049E+00	4.278E+00	NOT IDENT.
W-181	1.386E+01	1.460E+01	2.831E+01	NOT IDENT.
TA-182	3.262E+00	6.385E+00	1.365E+01	FAIL ABUN
RE-183	5.626E+00	1.408E+01	2.624E+01	NOT IDENT.
RE-184	-2.605E+00	5.967E+00	1.062E+01	NOT IDENT.
RE-188	-1.352E+01	1.306E+01	1.990E+01	FAIL ABUN
W-188	2.730E+00	5.266E+02	8.347E+02	FAIL ABUN
OS-191	1.192E+00	1.078E+01	1.906E+01	FAIL ABUN
IR-192	3.159E-01	2.377E+00	4.153E+00	FAIL ABUN
HG-203	3.079E-01	2.408E+00	4.226E+00	NOT IDENT.
BI-207	3.239E-01	2.393E+00	4.796E+00	NOT IDENT.
PB-210	-2.556E+02	3.721E+02	6.088E+02	NOT IDENT.
PO-210	-2.556E+02	3.721E+02	6.088E+02	NOT IDENT.
PB-211	1.377E+01	3.986E+01	7.946E+01	NOT IDENT.
BI-212	1.218E+01	2.710E+01	5.539E+01	FAIL ABUN
PB-212	5.775E+00	6.545E+00	9.259E+00	FAIL ABUN

BI-213	-8.193E-01	6.022E+00	1.139E+01	NOT IDENT.
PB-214	0.000E+00	8.399E+00	1.263E+01	FAIL ABUN
RN-219	-2.238E+00	1.971E+01	3.797E+01	NOT IDENT.
FR-221	-1.121E+01	1.486E+01	2.387E+01	NOT IDENT.
RA-223	3.381E+01	3.945E+01	8.056E+01	NOT IDENT.
RA-224	6.021E+00	4.420E+01	7.140E+01	NOT IDENT.
RA-226	-4.896E+00	5.460E+01	1.035E+02	NOT IDENT.
AC-227	1.506E+01	1.574E+01	3.015E+01	NOT IDENT.
TH-227	1.506E+01	1.574E+01	3.015E+01	NOT IDENT.
AC-228	6.754E+00	1.204E+01	1.805E+01	FAIL ABUN
RA-228	6.754E+00	1.204E+01	1.805E+01	FAIL ABUN
TH-228	5.775E+00	6.545E+00	9.259E+00	FAIL ABUN
TH-229	-3.264E+01	3.620E+01	5.764E+01	NOT IDENT.
TH-230	-2.621E+02	8.622E+02	1.504E+03	NOT IDENT.
PA-231	1.094E+01	3.290E+01	5.477E+01	NOT IDENT.
TH-231	-1.254E+01	3.487E+01	6.033E+01	NOT IDENT.
PA-233	2.468E+00	4.520E+00	8.242E+00	NOT IDENT.
PA-234	-1.782E+00	1.686E+01	3.156E+01	NOT IDENT.
PA-234M	-3.825E+01	2.738E+02	5.261E+02	NOT IDENT.
TH-234	1.895E+01	2.139E+02	2.315E+02	FAIL ABUN
U-234	7.223E+02	5.382E+03	9.793E+03	NOT IDENT.
U-235	-3.798E+00	1.701E+01	2.606E+01	NOT IDENT.
NP-237	2.468E+00	4.520E+00	8.242E+00	NOT IDENT.
NP-238	2.257E+02	6.285E+02	1.252E+03	NOT IDENT.
U-238	1.895E+01	2.139E+02	2.315E+02	FAIL ABUN
NP-239	2.575E+00	2.255E+01	3.978E+01	NOT IDENT.
AM-241	1.564E+00	1.175E+01	1.992E+01	NOT IDENT.
AM-242	-2.451E+01	5.234E+01	8.915E+01	NOT IDENT.
AM-243	8.405E-02	4.558E+00	7.933E+00	NOT IDENT.
CM-243	-2.267E+00	7.929E+00	1.373E+01	NOT IDENT.
BK-247	-4.659E+00	5.868E+00	9.269E+00	NOT IDENT.
CM-247	-1.272E+00	1.900E+00	3.392E+00	NOT IDENT.
CF-249	2.900E-01	2.137E+00	4.194E+00	NOT IDENT.
CF-251	-2.132E+00	9.787E+00	1.579E+01	NOT IDENT.
CF-252	-8.128E+03	1.395E+04	2.356E+04	NOT IDENT.
ANH-511	-9.275E+00	3.935E+00	7.533E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.11	57	201	0.89	126.19	122	9	7.85E-03	47.1	
2	0	92.79	117	167	1.04	185.46	182	8	1.62E-02	21.4	
3	0	140.14	66	155	1.98	280.04	275	10	9.17E-03	37.4	
4	1	175.28	32	87	1.24	350.23	347	16	4.48E-03	50.8	1.62E+00
5	1	180.06	31	85	1.25	359.77	347	16	4.27E-03	53.6	
6	0	186.26	63	115	0.66	372.15	368	8	8.70E-03	32.8	
7	0	198.00	37	102	0.64	395.60	393	8	5.16E-03	49.6	
8	0	239.00	61	88	1.37	477.49	473	8	8.40E-03	30.0	
9	4	295.29	46	88	1.81	589.94	584	17	6.36E-03	42.8	1.82E+00
10	4	298.39	35	63	1.81	596.15	584	17	4.87E-03	45.2	
11	0	352.14	63	49	1.08	703.53	700	9	8.80E-03	23.6	
12	0	477.04	31	61	2.36	953.10	944	20	4.30E-03	63.9	
13	0	484.85	25	19	1.14	968.72	964	9	3.48E-03	37.8	
14	0	511.36	162	90	2.61	1021.70	1014	20	2.25E-02	16.4	
15	0	558.88	31	39	1.09	1116.68	1113	11	4.25E-03	43.4	
16	0	583.63	19	29	0.87	1166.14	1162	9	2.65E-03	55.9	
17	0	596.65	14	23	1.48	1192.17	1188	9	1.90E-03	68.3	
18	0	609.16	122	34	1.58	1217.17	1209	17	1.69E-02	14.2	
19	0	830.09	18	15	3.67	1658.86	1652	12	2.48E-03	49.4	
20	0	911.55	19	11	2.79	1821.75	1815	11	2.66E-03	40.6	
21	0	1032.67	9	10	1.66	2064.00	2058	10	1.25E-03	73.7	
22	0	1120.96	22	7	2.46	2240.63	2236	9	3.11E-03	29.7	
23	0	1132.32	11	5	1.38	2263.36	2257	10	1.51E-03	49.1	
24	0	1218.28	9	0	0.55	2435.33	2433	6	1.25E-03	33.3	
25	0	1279.51	8	14	3.99	2557.88	2547	14	1.11E-03	105.3	
26	0	1463.11	25	7	0.75	2925.34	2919	14	3.47E-03	30.1	
27	0	1510.84	12	5	1.85	3020.88	3014	10	1.62E-03	46.6	
28	0	1527.21	9	2	0.98	3053.65	3048	8	1.19E-03	45.1	
29	0	1619.29	10	0	0.73	3238.00	3233	9	1.39E-03	31.6	
30	0	1734.33	7	3	1.33	3468.38	3462	9	1.03E-03	52.1	
31	0	1764.93	24	3	0.80	3529.65	3524	11	3.38E-03	24.2	
32	0	1970.89	6	2	0.63	3942.22	3935	10	8.33E-04	62.9	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
BE-7	477.60	31	10.44*	1.579E+00	3.526E+01	4.181E+01	127.87
AS-74	595.83	14	59.00*	1.353E+00	3.221E+00	5.366E+00	136.63
	634.78	-----	15.40	1.297E+00	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	2.285E+00	-----	Line Not Found	-----
	583.19	2	85.00*	1.374E+00	3.875E-01	3.926E-01	952.16
	860.56	-----	12.50	1.055E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	1.774E+00	-----	Line Not Found	-----
	351.06	52	12.92*	1.949E+00	3.852E+01	3.856E+01	61.31
BI-214	609.32	105	45.49*	1.334E+00	3.248E+01	3.248E+01	33.95
	1120.29	14	14.92	8.793E-01	2.046E+01	2.046E+01	100.42
	1764.49	12	15.30	6.237E-01	2.280E+01	2.280E+01	108.67
TH-232	63.81	5	0.26*	1.283E+00	2.697E+02	2.697E+02	1151.63
	140.88	60	0.02	2.992E+00	1.883E+04	1.883E+04	83.78

Flag: "*" = Keyline

Total number of lines in spectrum 29
Number of unidentified lines 12
Number of lines tentatively identified by NID 17 58.62%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
BE-7	53.22D	1.19	3.526E+01	4.181E+01	5.347E+01	127.87	
AS-74	17.77D	1.67	3.221E+00	5.366E+00	7.332E+00	136.63	
TL-208	1.91Y	1.01	3.875E-01	3.926E-01	37.38E-01	952.16	
BI-211	21.77Y	1.00	3.852E+01	3.856E+01	2.364E+01	61.31	
BI-214	1600.00Y	1.00	3.248E+01	3.248E+01	1.103E+01	33.95	
TH-232	1.41E+10Y	1.00	2.697E+02	2.697E+02	31.06E+02	1151.63	
Total Activity :			3.796E+02	3.883E+02			

Grand Total Activity : 3.796E+02 3.883E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	175.28	32	87	1.24	350.23	347	16	4.48E-03	****	2.89E+00	T
1	180.06	24	85	1.25	359.77	347	16	3.39E-03	****	2.86E+00	T
0	198.00	37	102	0.64	395.60	393	8	5.16E-03	99.1	2.75E+00	T
0	239.00	33	88	1.37	477.49	473	8	4.60E-03	****	2.50E+00	T
4	295.29	40	88	1.81	589.94	584	17	5.51E-03	****	2.19E+00	T
4	298.39	35	63	1.81	596.15	584	17	4.87E-03	90.4	2.18E+00	
0	484.85	25	19	1.14	968.72	964	9	3.48E-03	75.5	1.56E+00	
0	558.88	23	39	1.09	1116.68	1113	11	3.23E-03	****	1.42E+00	
0	830.09	18	15	3.67	1658.86	1652	12	2.48E-03	98.8	1.08E+00	
0	911.55	9	11	2.79	1821.75	1815	11	1.30E-03	****	1.01E+00	T
0	1032.67	9	10	1.66	2064.00	2058	10	1.25E-03	****	9.31E-01	
0	1132.32	11	5	1.38	2263.36	2257	10	1.51E-03	98.2	8.73E-01	T
0	1218.28	9	0	0.55	2435.33	2433	6	1.25E-03	66.7	8.29E-01	
0	1279.51	8	14	3.99	2557.88	2547	14	1.11E-03	****	8.00E-01	
0	1463.11	25	7	0.75	2925.34	2919	14	3.47E-03	60.1	7.24E-01	
0	1510.84	12	5	1.85	3020.88	3014	10	1.62E-03	93.3	7.06E-01	
0	1527.21	9	2	0.98	3053.65	3048	8	1.19E-03	90.2	7.00E-01	
0	1619.29	10	0	0.73	3238.00	3233	9	1.39E-03	63.2	6.69E-01	T
0	1734.33	7	3	1.33	3468.38	3462	9	1.03E-03	****	6.33E-01	
0	1970.89	6	2	0.63	3942.22	3935	10	8.33E-04	****	5.67E-01	

Flags: "T" = Tentatively associated


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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372010.CNF;1  *
* Acquisition date   : 21-DEC-2016 09:16:06 Sensitivity      : 3.000          *
* Detector ID       : GAM29 Energy tolerance: 1.500          *
* Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time : 0 02:00:02.15 Half life ratio : *****          *
* Sample date       : 8-DEC-2016 08:16:00 Nuclide Library : LIQUID      *
* Sample ID        : G412372010 Analyst initials: MXR1          *
* Batch Number     : 1624165 Sample Quantity : 2.0000E+00 LITER      *
* Wet wt corr      : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
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*                                     CALIBRATION INFORMATION                  *
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* Eff. Cal. date    : 30-JUN-2016 11:29:50 Eff. Geometry   : 2LMB          *
* Eff. File        : DKA100:[CANBERRA.GAMMA]EFF_GAM29_2LMB.CNF;11          *
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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
BE-7	1.370E+01
AS-74	4.162E+00
TL-208	1.804E+00
BI-211	1.071E+01
BI-214	3.066E+00
TH-232	1.171E+03

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

Nuclide	Lc (pCi/LITER)	
NA-22	1.864E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.908E+00	NOT IDENT.
K-40	2.273E+01	NOT IDENT.
SC-46	1.413E+00	FAIL ABUN
V-48	3.426E+00	NOT IDENT.
CR-51	1.704E+01	NOT IDENT.
MN-52	5.474E+00	NOT IDENT.
MN-54	1.567E+00	NOT IDENT.
CO-56	2.276E+00	NOT IDENT.
CO-57	1.625E+00	NOT IDENT.
CO-58	1.373E+00	NOT IDENT.
FE-59	2.741E+00	NOT IDENT.
CO-60	1.715E+00	NOT IDENT.
ZN-65	2.192E+00	NOT IDENT.
CU-67	1.097E+02	NOT IDENT.
GE-68	5.410E+01	NOT IDENT.
SE-75	2.382E+00	NOT IDENT.
BR-77	3.667E+02	FAIL ABUN
SR-82	1.085E+01	NOT IDENT.
RB-83	3.411E+00	NOT IDENT.
RB-84	2.905E+00	NOT IDENT.
KR-85	4.267E+02	NOT IDENT.
SR-85	2.193E+00	NOT IDENT.
RB-86	3.096E+01	NOT IDENT.

Y-88	1.471E+00	NOT IDENT.
Y-91	7.337E+02	NOT IDENT.
NB-94	1.379E+00	NOT IDENT.
NB-95	2.024E+00	NOT IDENT.
NB-95M	6.447E+00	NOT IDENT.
ZR-95	3.182E+00	NOT IDENT.
MO-99	2.429E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.901E+00	FAIL ABUN
RH-102M	1.675E+00	NOT IDENT.
RU-103	1.930E+00	FAIL ABUN
RH-106	1.575E+01	NOT IDENT.
RU-106	1.575E+01	NOT IDENT.
AG-108M	1.283E+00	NOT IDENT.
CD-109	4.975E+01	NOT IDENT.
AG-110M	2.016E+00	NOT IDENT.
SN-113	2.579E+00	NOT IDENT.
IN-114M	9.165E+00	NOT IDENT.
CD-115	2.832E+02	NOT IDENT.
SN-117M	3.057E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.679E+00	NOT IDENT.
SB-124	4.833E+00	NOT IDENT.
SB-125	5.049E+00	FAIL ABUN
TE-125M	5.874E+02	NOT IDENT.
I-126	7.916E+00	NOT IDENT.
SB-126	7.264E+00	NOT IDENT.
SN-126	4.864E+00	FAIL ABUN
SB-127	3.834E+01	NOT IDENT.
TE-129	2.403E+01	NOT IDENT.
I-131	4.697E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.441E+01	NOT IDENT.
BA-133	2.274E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.606E+00	NOT IDENT.
CS-135	9.019E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.153E+00	FAIL ABUN
BA-137M	1.683E+00	NOT IDENT.
CS-137	1.778E+00	NOT IDENT.
CE-139	1.660E+00	NOT IDENT.
BA-140	1.265E+01	NOT IDENT.
LA-140	4.334E+00	NOT IDENT.
CE-141	3.386E+00	NOT IDENT.
CE-143	2.206E+03	NOT IDENT.
CE-144	1.179E+01	NOT IDENT.
PM-144	1.921E+00	FAIL ABUN
PR-144	1.430E+02	NOT IDENT.
PM-146	1.975E+00	NOT IDENT.
ND-147	2.283E+01	NOT IDENT.
PM-147	4.803E+04	NOT IDENT.
PM-149	2.603E+03	NOT IDENT.
EU-152	6.232E+00	NOT IDENT.
GD-153	5.687E+00	NOT IDENT.
EU-154	5.100E+00	NOT IDENT.
EU-155	6.971E+00	NOT IDENT.
HO-166M	2.127E+00	NOT IDENT.
TM-171	1.230E+03	NOT IDENT.
LU-176	1.438E+00	NOT IDENT.
LU-177	5.327E+01	NOT IDENT.
HF-181	1.890E+00	NOT IDENT.
W-181	1.327E+01	NOT IDENT.
TA-182	5.598E+00	FAIL ABUN
RE-183	1.228E+01	NOT IDENT.
RE-184	4.467E+00	NOT IDENT.
RE-188	9.332E+00	FAIL ABUN
W-188	3.851E+02	FAIL ABUN
OS-191	8.954E+00	FAIL ABUN
IR-192	1.912E+00	FAIL ABUN
HG-203	1.948E+00	NOT IDENT.
BI-207	2.025E+00	NOT IDENT.
PB-210	2.862E+02	NOT IDENT.
PO-210	2.862E+02	NOT IDENT.
PB-211	3.594E+01	NOT IDENT.
BI-212	2.444E+01	FAIL ABUN
PB-212	4.396E+00	FAIL ABUN
BI-213	5.112E+00	NOT IDENT.

PB-214	5.953E+00	FAIL ABUN
RN-219	1.683E+01	NOT IDENT.
FR-221	1.109E+01	NOT IDENT.
RA-223	3.721E+01	NOT IDENT.
RA-224	3.320E+01	NOT IDENT.
RA-226	4.928E+01	NOT IDENT.
AC-227	1.397E+01	NOT IDENT.
TH-227	1.397E+01	NOT IDENT.
AC-228	8.054E+00	FAIL ABUN
RA-228	8.054E+00	FAIL ABUN
TH-228	4.396E+00	FAIL ABUN
TH-229	2.676E+01	NOT IDENT.
TH-230	7.087E+02	NOT IDENT.
PA-231	2.520E+01	NOT IDENT.
TH-231	2.845E+01	NOT IDENT.
PA-233	3.811E+00	NOT IDENT.
PA-234	1.365E+01	NOT IDENT.
PA-234M	2.314E+02	NOT IDENT.
TH-234	1.105E+02	FAIL ABUN
U-234	4.599E+03	NOT IDENT.
U-235	1.226E+01	NOT IDENT.
NP-237	3.811E+00	NOT IDENT.
NP-238	5.509E+02	NOT IDENT.
U-238	1.105E+02	FAIL ABUN
NP-239	1.879E+01	NOT IDENT.
AM-241	9.310E+00	NOT IDENT.
AM-242	4.193E+01	NOT IDENT.
AM-243	3.765E+00	NOT IDENT.
CM-243	6.421E+00	NOT IDENT.
BK-247	4.277E+00	NOT IDENT.
CM-247	1.498E+00	NOT IDENT.
CF-249	1.887E+00	NOT IDENT.
CF-251	7.389E+00	NOT IDENT.
CF-252	1.104E+04	NOT IDENT.
ANH-511	3.600E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372010.CNF;1
Acquisition date : 21-DEC-2016 09:16:06 Sensitivity : 3.000
Detector ID : GAM29 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.15 Half life ratio : *****
Sample date : 8-DEC-2016 08:16:00 Nuclide Library : LIQUID
Sample ID : G412372010 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 30-JUN-2016 11:29:50 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM29_2LMB.CNF;11

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
BE-7	4.181E+01	5.242E+01	5.242E+01
AS-74	5.366E+00	7.197E+00	7.197E+00
TL-208	3.926E-01	3.663E+00	3.663E+00
BI-211	3.856E+01	2.323E+01	2.323E+01
BI-214	3.248E+01	1.089E+01	1.089E+01
TH-232	2.697E+02	3.044E+03	3.044E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
NA-22	1.085E+00	2.243E+00	2.295E+00	NOT IDENT.
NA-24	2.570E+06	3.088E+06	3.298E+06	SHORT HLIF
AL-26	1.010E+00	1.979E+00	2.031E+00	NOT IDENT.
K-40	-3.624E+01	3.018E+01	3.431E+01	NOT IDENT.
SC-46	-2.212E+00	2.171E+00	2.389E+00	FAIL ABUN
V-48	1.502E+00	3.893E+00	3.951E+00	NOT IDENT.
CR-51	-3.943E+00	1.985E+01	1.993E+01	NOT IDENT.
MN-52	-6.106E+00	8.209E+00	8.658E+00	NOT IDENT.
MN-54	-1.225E+00	2.467E+00	2.528E+00	NOT IDENT.
CO-56	2.175E+00	2.404E+00	2.596E+00	NOT IDENT.
CO-57	8.673E-01	1.899E+00	1.939E+00	NOT IDENT.
CO-58	-1.212E+00	1.907E+00	1.984E+00	NOT IDENT.
FE-59	1.018E+00	3.044E+00	3.078E+00	NOT IDENT.
CO-60	1.105E+00	1.822E+00	1.889E+00	NOT IDENT.
ZN-65	-2.912E-01	2.933E+00	2.936E+00	NOT IDENT.
CU-67	-2.815E+02	1.397E+02	1.887E+02	NOT IDENT.
GE-68	4.335E-01	6.596E+01	6.596E+01	NOT IDENT.
SE-75	-9.384E-01	3.087E+00	3.116E+00	NOT IDENT.
BR-77	4.886E+02	5.542E+02	5.964E+02	FAIL ABUN
SR-82	-1.005E+01	1.516E+01	1.582E+01	NOT IDENT.
RB-83	-8.622E-01	4.104E+00	4.122E+00	NOT IDENT.
RB-84	5.325E-01	3.393E+00	3.401E+00	NOT IDENT.
KR-85	-1.637E+03	6.491E+02	9.829E+02	NOT IDENT.
SR-85	-8.416E+00	3.336E+00	5.052E+00	NOT IDENT.

RB-86	2.343E+00	3.729E+01	3.730E+01	NOT IDENT.
Y-88	1.892E-01	1.665E+00	1.667E+00	NOT IDENT.
Y-91	7.076E+01	8.855E+02	8.861E+02	NOT IDENT.
NB-94	-3.478E-01	1.699E+00	1.706E+00	NOT IDENT.
NB-95	7.357E-01	2.302E+00	2.326E+00	NOT IDENT.
NB-95M	-1.259E+00	8.873E+00	8.891E+00	NOT IDENT.
ZR-95	1.942E+00	3.439E+00	3.549E+00	NOT IDENT.
MO-99	-7.369E+02	4.925E+02	5.941E+02	FAIL ABUN
TC-99M	2.123E+16	1.755E+16	0.000E+00	SHORT HLIF
RH-101	-1.160E+00	2.411E+00	2.467E+00	FAIL ABUN
RH-102M	1.745E+00	1.892E+00	2.049E+00	NOT IDENT.
RU-103	-5.713E-01	2.324E+00	2.338E+00	FAIL ABUN
RH-106	4.283E+00	1.794E+01	1.805E+01	NOT IDENT.
RU-106	4.283E+00	1.794E+01	1.805E+01	NOT IDENT.
AG-108M	-6.901E-01	1.579E+00	1.610E+00	NOT IDENT.
CD-109	-8.827E-02	5.964E+01	5.964E+01	NOT IDENT.
AG-110M	-1.421E+00	2.717E+00	2.791E+00	NOT IDENT.
SN-113	3.072E+00	2.658E+00	2.997E+00	NOT IDENT.
IN-114M	-1.295E+00	1.143E+01	1.145E+01	NOT IDENT.
CD-115	-5.852E+01	3.394E+02	3.405E+02	NOT IDENT.
SN-117M	-9.451E-01	3.818E+00	3.842E+00	NOT IDENT.
I-123	-1.325E+07	2.829E+07	2.891E+07	SHORT HLIF
TE-123M	-1.038E+00	2.141E+00	2.192E+00	NOT IDENT.
SB-124	4.086E+00	4.661E+00	5.011E+00	NOT IDENT.
SB-125	2.392E+00	5.575E+00	5.678E+00	FAIL ABUN
TE-125M	-2.251E+02	7.683E+02	7.750E+02	NOT IDENT.
I-126	-7.807E-01	9.516E+00	9.522E+00	NOT IDENT.
SB-126	3.207E+00	8.204E+00	8.330E+00	NOT IDENT.
SN-126	-2.584E+00	6.018E+00	6.130E+00	FAIL ABUN
SB-127	-1.103E+01	4.973E+01	4.998E+01	NOT IDENT.
TE-129	2.855E+00	2.754E+01	2.757E+01	NOT IDENT.
I-131	-3.526E+00	5.782E+00	5.997E+00	NOT IDENT.
I-132	-1.000E+41	1.412E+41	0.000E+00	SHORT HLIF
TE-132	1.385E+00	3.020E+01	3.021E+01	NOT IDENT.
BA-133	1.487E+00	2.687E+00	2.769E+00	NOT IDENT.
I-133	-5.831E+04	6.148E+04	6.687E+04	SHORT HLIF
CS-134	5.561E-01	1.806E+00	1.824E+00	NOT IDENT.
CS-135	4.946E+00	1.078E+01	1.101E+01	NOT IDENT.
I-135	-3.251E+14	1.449E+15	1.456E+15	SHORT HLIF
CS-136	2.998E-01	3.759E+00	3.761E+00	FAIL ABUN
BA-137M	1.222E+00	1.793E+00	1.875E+00	NOT IDENT.
CS-137	1.291E+00	1.894E+00	1.981E+00	NOT IDENT.
CE-139	-6.419E-01	2.096E+00	2.116E+00	NOT IDENT.
BA-140	-3.593E+00	1.526E+01	1.534E+01	NOT IDENT.
LA-140	4.130E-01	4.974E+00	4.978E+00	NOT IDENT.
CE-141	-6.879E+00	4.703E+00	5.634E+00	NOT IDENT.
CE-143	-8.209E+02	3.251E+03	3.272E+03	NOT IDENT.
CE-144	-8.112E+00	1.501E+01	1.545E+01	NOT IDENT.
PM-144	1.319E+00	2.101E+00	2.183E+00	FAIL ABUN
PR-144	9.579E+01	1.566E+02	1.625E+02	NOT IDENT.
PM-146	-1.022E+00	2.424E+00	2.468E+00	NOT IDENT.
ND-147	-2.706E-01	2.674E+01	2.674E+01	NOT IDENT.
PM-147	2.778E+04	5.593E+04	5.732E+04	NOT IDENT.
PM-149	4.808E+02	3.215E+03	3.222E+03	NOT IDENT.
EU-152	6.491E+00	6.595E+00	7.215E+00	NOT IDENT.
GD-153	5.158E-01	6.801E+00	6.805E+00	NOT IDENT.
EU-154	2.539E+00	6.251E+00	6.355E+00	NOT IDENT.
EU-155	4.739E+00	8.035E+00	8.314E+00	NOT IDENT.
HO-166M	-1.979E+00	2.929E+00	3.062E+00	NOT IDENT.
TM-171	-3.869E+02	1.484E+03	1.494E+03	NOT IDENT.
LU-176	1.234E-01	1.799E+00	1.800E+00	NOT IDENT.
LU-177	-1.458E+01	6.724E+01	6.756E+01	NOT IDENT.
HF-181	7.422E-02	3.049E+00	3.049E+00	NOT IDENT.
W-181	1.386E+01	1.502E+01	1.627E+01	NOT IDENT.
TA-182	3.262E+00	6.386E+00	6.553E+00	FAIL ABUN
RE-183	5.626E+00	1.409E+01	1.432E+01	NOT IDENT.
RE-184	-2.605E+00	5.970E+00	6.084E+00	NOT IDENT.
RE-188	-1.352E+01	1.308E+01	1.443E+01	FAIL ABUN
W-188	2.730E+00	5.266E+02	5.266E+02	FAIL ABUN
OS-191	1.192E+00	1.078E+01	1.079E+01	FAIL ABUN
IR-192	3.159E-01	2.377E+00	2.381E+00	FAIL ABUN
HG-203	3.079E-01	2.408E+00	2.412E+00	NOT IDENT.
BI-207	3.239E-01	2.393E+00	2.397E+00	NOT IDENT.
PB-210	-2.556E+02	3.728E+02	3.902E+02	NOT IDENT.
PO-210	-2.556E+02	3.728E+02	3.902E+02	NOT IDENT.
PB-211	1.377E+01	3.987E+01	4.035E+01	NOT IDENT.
BI-212	1.218E+01	2.710E+01	2.765E+01	FAIL ABUN
PB-212	5.775E+00	6.552E+00	7.050E+00	FAIL ABUN

BI-213	-8.193E-01	6.022E+00	6.033E+00	NOT IDENT.
PB-214	1.398E+01	8.419E+00	1.052E+01	FAIL ABUN
RN-219	-2.238E+00	1.971E+01	1.973E+01	NOT IDENT.
FR-221	-1.121E+01	1.489E+01	1.572E+01	NOT IDENT.
RA-223	3.381E+01	3.951E+01	4.235E+01	NOT IDENT.
RA-224	6.021E+00	4.420E+01	4.428E+01	NOT IDENT.
RA-226	-4.896E+00	5.461E+01	5.465E+01	NOT IDENT.
AC-227	1.506E+01	1.586E+01	1.725E+01	NOT IDENT.
TH-227	1.506E+01	1.586E+01	1.725E+01	NOT IDENT.
AC-228	6.754E+00	1.205E+01	1.243E+01	FAIL ABUN
RA-228	6.754E+00	1.205E+01	1.243E+01	FAIL ABUN
TH-228	5.775E+00	6.552E+00	7.050E+00	FAIL ABUN
TH-229	-3.264E+01	3.623E+01	3.911E+01	NOT IDENT.
TH-230	-2.621E+02	8.633E+02	8.713E+02	NOT IDENT.
PA-231	1.094E+01	3.298E+01	3.335E+01	NOT IDENT.
TH-231	-1.254E+01	3.491E+01	3.537E+01	NOT IDENT.
PA-233	2.468E+00	4.522E+00	4.656E+00	NOT IDENT.
PA-234	-1.782E+00	1.698E+01	1.700E+01	NOT IDENT.
PA-234M	-3.825E+01	2.738E+02	2.743E+02	NOT IDENT.
TH-234	1.895E+01	2.139E+02	2.141E+02	FAIL ABUN
U-234	7.223E+02	5.382E+03	5.392E+03	NOT IDENT.
U-235	-3.798E+00	1.701E+01	1.710E+01	NOT IDENT.
NP-237	2.468E+00	4.522E+00	4.656E+00	NOT IDENT.
NP-238	2.257E+02	6.285E+02	6.367E+02	NOT IDENT.
U-238	1.895E+01	2.139E+02	2.141E+02	FAIL ABUN
NP-239	2.575E+00	2.255E+01	2.258E+01	NOT IDENT.
AM-241	1.564E+00	1.175E+01	1.177E+01	NOT IDENT.
AM-242	-2.451E+01	5.251E+01	5.366E+01	NOT IDENT.
AM-243	8.405E-02	4.558E+00	4.558E+00	NOT IDENT.
CM-243	-2.267E+00	7.932E+00	7.998E+00	NOT IDENT.
BK-247	-4.659E+00	5.942E+00	6.302E+00	NOT IDENT.
CM-247	-1.272E+00	1.912E+00	1.996E+00	NOT IDENT.
CF-249	2.900E-01	2.137E+00	2.141E+00	NOT IDENT.
CF-251	-2.132E+00	9.790E+00	9.837E+00	NOT IDENT.
CF-252	-8.128E+03	1.577E+04	1.619E+04	NOT IDENT.
ANH-511	-9.275E+00	3.953E+00	5.754E+00	NOT IDENT.

* GEL Laboratories LLC *
* 2040 Savage Road *
* Charleston, SC 29407 *
* GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
74.66	61.7677	86.94	107.4201	133.52	88.7729
46.54	64.0692	87.09	107.4425	136.00	65.1270
228.16	75.0653	87.57	104.4428	136.28	65.1462
52.39	78.2005	88.03	94.2636	136.47	73.8469
53.20	76.5394	306.78	93.2793	739.50	86.1555
57.53	69.1832	88.47	93.2960	140.51	0.0000
293.27	54.6740	531.02	209.9050	140.88	86.1881
57.53	54.6907	184.58	209.9517	143.76	68.5704
482.18	54.6909	92.59	81.4498	144.24	84.6600
57.98	61.5770	93.31	89.7845	145.44	111.7991
59.32	65.3165	94.56	190.2062	152.32	72.8381
59.54	65.3419	311.90	190.2287	152.43	72.8451
155.04	72.1215	946.00	190.2343	1048.07	76.2173
63.00	84.7983	97.43	87.1614	154.21	81.8171
129.43	84.8405	98.43	69.6121	155.04	96.2674
63.29	84.8405	98.44	69.6131	158.56	80.8529
290.67	84.8821	99.53	95.7222	158.97	0.0000
63.81	84.9153	103.37	95.7222	159.00	91.0814
87.57	92.2291	116.74	95.7222	162.33	83.5693
64.99	94.9775	100.11	89.5464	537.26	83.5945
65.08	94.9915	100.20	89.5569	163.33	78.0707
66.73	88.6375	102.03	75.1525	165.86	77.1375
66.98	88.6736	103.18	81.5337	427.87	69.9733
67.24	88.7118	103.37	76.3250	176.60	69.9912
67.67	96.3932	105.31	70.2219	177.52	70.0480
1221.41	96.4050	106.12	68.1937	181.07	71.0231
97.43	87.7328	106.47	68.2234	184.41	88.6581
279.20	94.8869	109.28	74.7772	184.58	86.3976
1063.66	98.1892	111.00	89.7081	185.72	78.5168
72.87	98.1981	111.76	92.9589	186.21	53.5054
351.06	98.1981	208.37	90.9748	190.27	60.5453
74.66	92.4422	116.24	91.3278	193.51	77.8925
238.63	97.4899	116.30	88.1482	198.01	63.2379
351.93	97.4899	116.74	94.5686	201.83	50.7488
238.63	97.4899	117.23	82.9274	205.31	67.0846
74.97	97.5121	119.76	89.5672	208.37	81.1629
77.11	101.8646	120.54	85.3778	210.85	69.7055
256.23	77.9582	120.90	72.6012	218.12	75.9447
133.52	73.9552	264.66	70.4835	222.11	62.1150
364.49	73.9630	121.22	70.4911	227.09	47.0563
711.68	72.9904	344.28	69.4672	227.38	55.3033
356.01	65.9358	122.06	70.5585	228.16	54.1582
323.87	65.9427	1274.44	79.2009	228.18	56.5144
83.79	81.4801	123.68	91.0362	235.69	67.8804
265.00	81.5045	127.23	88.1698	235.96	67.8935
84.21	81.5289	129.43	77.6041	238.63	66.4445
193.51	90.8585	131.20	69.1143	238.98	66.4615
105.31	93.0467	133.02	73.5771	240.99	55.4651

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
242.00	50.7480	351.06	38.2288	610.33	18.1589
244.70	54.8187	351.93	37.3980	614.28	14.3573
459.60	61.0333	356.01	29.3894	618.01	22.0454
685.70	43.1367	364.49	38.5135	621.93	18.2385
388.16	50.3403	366.42	29.9863	630.19	0.0000
256.23	34.8419	383.85	31.9964	631.29	11.5586
527.90	65.0874	388.16	25.1343	632.98	15.4212
264.66	55.5866	666.33	29.4754	633.25	15.4225
265.00	65.2687	391.70	23.4443	634.78	15.4316
268.22	49.6647	400.66	16.5740	635.95	13.5084
269.46	55.7677	401.81	21.8206	636.99	17.3745
401.81	47.3372	402.40	27.9388	645.85	19.3669
273.65	52.2763	404.85	25.3508	884.68	15.5599
276.40	56.0260	410.95	42.0889	661.66	11.6860
583.19	46.3113	720.70	23.7195	664.57	12.6731
277.60	46.3183	423.72	35.2970	666.33	14.6320
402.40	49.9888	427.09	26.5161	666.50	14.6332
278.43	53.6613	427.87	27.4107	667.71	0.0000
279.20	43.9266	433.94	25.7172	677.62	18.6073
279.54	41.4956	440.45	27.5772	685.70	12.7673
280.46	53.7324	453.88	28.6471	695.00	21.6750
301.36	42.8314	459.60	26.0305	696.49	18.7294
284.31	50.1940	463.37	28.7734	696.51	18.7294
285.41	36.7538	468.07	27.9342	697.00	21.6903
285.90	44.1178	473.00	23.0300	697.49	23.6660
287.50	50.2978	475.06	18.9834	702.65	16.7932
290.67	47.5309	696.49	18.9984	706.68	12.8593
293.27	42.6848	477.60	19.0052	711.68	16.8444
295.22	44.3804	477.99	19.0086	720.70	20.8710
316.51	44.4012	482.18	19.0445	721.93	14.9139
299.98	47.8106	487.02	19.0855	722.78	24.8637
300.09	47.8141	492.35	30.0620	722.91	28.8431
300.13	47.8153	497.08	27.3859	723.31	28.8466
301.36	37.9515	511.00	42.2453	756.73	23.8799
302.85	35.9217	514.00	95.6338	727.33	13.9447
304.50	48.3584	520.40	24.8961	733.00	18.9598
304.85	47.1289	520.69	24.8983	735.93	10.9875
306.78	42.2178	667.71	0.0000	739.50	17.0007
308.46	42.2614	527.90	22.1992	1434.09	14.0222
311.90	39.8584	529.59	19.4380	747.24	16.0410
316.51	42.4678	529.87	0.0000	752.31	14.0587
319.41	37.5366	531.02	19.4500	753.82	18.0842
320.08	36.7168	537.26	28.7863	756.73	10.0566
321.04	44.2529	1260.41	0.0000	763.94	18.1436
323.87	34.2910	552.55	26.1634	765.80	17.1453
325.23	35.1555	795.86	9.8536	1001.03	10.0875
1596.21	44.4546	569.33	19.7550	766.84	10.0891
333.37	41.2102	569.50	19.7567	772.60	0.0000
334.37	37.0265	569.70	19.7576	776.52	15.1801
338.28	32.8928	583.19	22.7002	777.92	14.1743
911.20	32.8936	595.83	20.9106	778.90	10.1278
340.48	54.0456	600.60	14.2834	783.70	17.2428
340.55	54.0482	1690.97	20.0131	785.37	17.2518
344.28	38.0832	604.72	17.1672	903.28	21.3555
345.93	51.6723	609.32	18.1519	795.86	9.1633

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
801.95	15.3009	1112.84	2.2196		
802.10	15.3015	1115.54	5.3301		
810.29	12.2720	1120.29	13.3408		
810.45	15.3406	1120.55	13.3418		
810.76	15.3424	1121.30	11.6758		
815.77	17.4143	1808.65	3.3428		
818.51	12.3027	1131.51	0.0000		
832.01	18.5295	1332.49	10.1309		
834.85	13.9087	1189.05	9.0378		
836.80	0.0000	1204.77	9.0703		
846.77	13.4412	1221.41	3.4141		
856.80	11.4069	1231.02	4.5618		
860.56	12.4575	1235.36	9.1328		
871.09	14.5788	1238.28	9.1387		
873.19	11.4615	1260.41	0.0000		
875.33	0.0000	1274.44	6.9082		
880.51	7.3090	1274.54	6.9087		
881.60	11.4892	1291.59	9.2454		
883.24	15.6744	1298.22	0.0000		
884.68	16.7266	1312.11	8.1251		
889.28	19.8891	1332.49	4.6628		
894.76	9.4358	1365.19	4.4012		
1836.06	12.5928	1368.63	0.0000		
903.28	13.6623	1384.29	4.4183		
911.20	16.8529	1408.01	6.2151		
984.45	5.2852	1434.09	8.0327		
926.36	9.5197	1457.56	0.0000		
935.54	6.3625	1460.82	11.4844		
937.49	13.7929	1489.16	7.2168		
983.53	14.8807	1596.21	9.2029		
946.00	14.8881	1620.50	2.9580		
949.00	11.7076	1678.03	0.0000		
954.55	0.0000	1690.97	2.8077		
964.08	16.0297	1764.49	3.7908		
968.97	12.8408	1770.23	6.0711		
983.53	13.9643	1771.35	3.7952		
984.45	13.9680	1791.20	0.0000		
996.26	7.5446	1808.65	3.8188		
1001.03	8.6331	1836.06	2.8770		
1004.73	12.9624				
1025.87	8.6888				
1028.54	8.1512				
1037.84	9.8049				
1038.76	0.0000				
1046.59	9.8262				
1048.07	6.5532				
1050.41	8.7428				
1063.66	8.7721				
1077.00	11.0010				
1077.34	12.1020				
1083.85	9.9177				
1085.87	9.9229				
1099.25	4.4245				
1111.64	6.6567				
1112.07	3.3286				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 11:18:42.66

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372011.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM30.CNF;312
Background date : 18-DEC-2016 13:20:06
Sample date     : 8-DEC-2016 08:09:00. Acquisition date : 21-DEC-2016 09:16:32
Sample ID      : G412372011. Sample quantity : 2.00000E+00 LITER
Detector name   : GAM30. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00. Elapsed real time: 0 02:00:02.28 0.0%
Energy tolerance: 1.50000 keV. Analyst Initials : MXR1
Abundance limit : 75.00000. Sensitivity : 3.00000
Batch ID       : 1624165. Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	63.46*	26	95	1.29	126.64	123	16	3.61E-03	73.0	2.35E+00
2	3	65.96	37	83	1.29	131.64	123	16	5.19E-03	48.9	
3	0	92.73*	0	133	0.93	185.18	181	10	6.06E-05	*****	
4	0	139.74*	38	110	1.48	279.20	275	10	5.24E-03	56.8	
5	0	199.18*	81	100	4.84	398.10	390	17	1.13E-02	32.1	
6	0	204.58*	11	21	1.30	408.90	407	5	1.46E-03	89.4	
7	0	214.14	24	42	2.32	428.03	424	8	3.29E-03	51.7	
8	0	238.67*	6	69	1.03	477.08	473	9	8.43E-04	272.5	
9	0	295.17*	70	40	1.87	590.09	584	14	9.68E-03	23.2	
10	0	309.02	24	22	1.54	617.79	614	8	3.31E-03	39.8	
11	0	352.31*	46	52	1.71	704.40	697	14	6.43E-03	38.2	
12	0	379.34	10	16	0.82	758.45	755	5	1.32E-03	71.5	
13	5	515.44	14	20	2.05	1030.70	1014	22	1.99E-03	67.3	1.28E+00
14	0	583.37*	17	16	1.66	1166.58	1162	12	2.41E-03	58.4	
15	0	595.84	21	31	1.24	1191.54	1185	13	2.94E-03	59.3	
16	0	609.46*	42	26	1.02	1218.78	1215	10	5.79E-03	30.0	
17	0	648.29	16	4	2.22	1296.45	1293	7	2.15E-03	32.3	
18	0	667.29	22	9	0.70	1334.47	1328	13	3.00E-03	36.7	
19	0	768.00	14	9	0.80	1535.94	1532	9	1.90E-03	48.1	
20	0	844.50	4	14	0.61	1688.99	1684	8	5.02E-04	187.8	
21	0	859.86	14	3	0.58	1719.72	1717	10	1.88E-03	35.6	
22	0	1080.82	9	2	1.40	2161.80	2158	7	1.29E-03	40.2	
23	0	1103.33	9	5	0.75	2206.83	2200	11	1.25E-03	60.0	
24	0	1120.21	16	2	2.61	2240.60	2235	10	2.19E-03	31.3	
25	0	1204.72	5	3	1.24	2409.70	2406	6	6.94E-04	70.7	
26	0	1766.45	6	8	0.43	3533.79	3524	11	7.89E-04	106.7	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 11:18:44

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372011.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 8-DEC-2016 08:09:00	Acquisition date	: 21-DEC-2016 09:16:32
Sample ID	: G412372011	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA30	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:02.28 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Empirical	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	21	59.00*	1.296E+00	5.197E+00	8.659E+00	118.59
	634.78	-----	15.40	1.241E+00	-----	Line Not Found	-----
KR-85	514.00	14	0.43*	1.429E+00	4.368E+02	4.378E+02	134.67
SR-85	514.00	14	96.00*	1.429E+00	1.957E+00	2.250E+00	134.67
Y-91	1204.77	5	0.26*	7.816E-01	4.618E+02	5.392E+02	141.42
TL-208	277.37	-----	6.60	2.134E+00	-----	Line Not Found	-----
	583.19	17	85.00*	1.315E+00	2.913E+00	2.951E+00	116.80
	860.56	14	12.50	1.003E+00	2.025E+01	2.051E+01	71.28
BI-211	72.87	-----	1.23	1.852E+00	-----	Line Not Found	-----
	351.06	46	12.92*	1.836E+00	3.666E+01	3.670E+01	76.45
BI-214	609.32	42	45.49*	1.276E+00	1.348E+01	1.348E+01	60.06
	1120.29	16	14.92	8.258E-01	2.399E+01	2.399E+01	62.53
	1764.49	-----	15.30	5.844E-01	-----	Line Not Found	-----
TH-232	63.81	26	0.26*	1.386E+00	1.355E+03	1.355E+03	146.04
	140.88	38	0.02	2.856E+00	1.239E+04	1.239E+04	113.62
TH-234	63.29	26	3.70*	1.386E+00	9.520E+01	9.520E+01	146.04
	92.59	0	4.23	2.514E+00	7.697E-01	7.697E-01	11089.24
U-238	63.29	26	3.70*	1.386E+00	9.520E+01	9.520E+01	146.04
	92.59	0	4.23	2.514E+00	7.697E-01	7.697E-01	11089.24

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372011.CNF;1
Acquisition date : 21-DEC-2016 09:16:32 Sensitivity : 3.000
Detector ID : GAM30 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.28 Half life ratio : *****
Sample date : 8-DEC-2016 08:09:00 Analyst initials: MXR1
Sample ID : G412372011 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 15-MAR-2016 05:52:58 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
AS-74	8.659E+00	1.006E+01	9.463E+00
KR-85	4.378E+02	5.778E+02	6.481E+02
SR-85	2.250E+00	2.970E+00	3.331E+00
Y-91	5.392E+02	7.473E+02	1.725E+03
TL-208	2.951E+00	3.377E+00	3.361E+00
BI-211	3.670E+01	2.750E+01	2.166E+01
BI-214	1.348E+01	7.932E+00	6.798E+00
TH-232	1.355E+03	1.939E+03	1.867E+03
TH-234	9.520E+01	1.362E+02	1.338E+02
U-238	9.520E+01	1.362E+02	1.338E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	3.340E+00	1.778E+01	3.511E+01	NOT IDENT.
NA-22	-7.596E-01	1.603E+00	3.074E+00	NOT IDENT.
NA-24	0.000E+00	3.582E+06	0.000E+00	SHORT HLIF
AL-26	-2.319E-01	2.323E+00	4.690E+00	NOT IDENT.
K-40	1.019E+00	2.436E+01	5.416E+01	NOT IDENT.
SC-46	-1.373E+00	2.077E+00	3.485E+00	FAIL ABUN
V-48	1.312E+00	2.983E+00	6.396E+00	NOT IDENT.
CR-51	2.312E+00	1.827E+01	3.609E+01	NOT IDENT.
MN-52	-6.135E+00	7.691E+00	1.298E+01	NOT IDENT.
MN-54	-1.688E-01	1.682E+00	3.232E+00	NOT IDENT.
CO-56	-9.490E-01	2.004E+00	3.039E+00	NOT IDENT.
CO-57	4.497E-01	1.618E+00	2.966E+00	NOT IDENT.
CO-58	4.041E-01	1.940E+00	3.914E+00	NOT IDENT.
FE-59	-7.376E-01	4.420E+00	7.300E+00	NOT IDENT.
CO-60	1.138E-01	1.800E+00	3.852E+00	NOT IDENT.
ZN-65	7.337E-01	3.000E+00	6.091E+00	NOT IDENT.
CU-67	-2.002E+02	1.233E+02	1.940E+02	FAIL ABUN
GE-68	1.988E+00	5.980E+01	1.068E+02	NOT IDENT.
SE-75	2.246E-03	2.839E+00	4.956E+00	NOT IDENT.
BR-77	9.628E+01	5.142E+02	6.621E+02	FAIL ABUN

SR-82	1.065E+00	1.176E+01	2.453E+01	NOT IDENT.
RB-83	1.865E+00	3.610E+00	7.330E+00	NOT IDENT.
RB-84	8.089E-01	3.186E+00	6.547E+00	NOT IDENT.
RB-86	3.995E+00	3.569E+01	6.500E+01	NOT IDENT.
Y-88	1.510E+00	2.028E+00	5.169E+00	NOT IDENT.
NB-94	-1.445E-01	2.051E+00	3.839E+00	NOT IDENT.
NB-95	9.226E-01	1.579E+00	3.354E+00	NOT IDENT.
NB-95M	-1.909E+00	6.576E+00	1.057E+01	NOT IDENT.
ZR-95	-1.549E+00	3.057E+00	5.433E+00	NOT IDENT.
MO-99	2.852E+02	3.459E+02	7.734E+02	FAIL ABUN
TC-99M	0.000E+00	1.578E+16	0.000E+00	SHORT HLIF
RH-101	-1.474E+00	2.017E+00	3.345E+00	FAIL ABUN
RH-102M	-1.125E-01	1.585E+00	3.046E+00	FAIL ABUN
RU-103	-1.455E+00	2.042E+00	3.566E+00	FAIL ABUN
RH-106	-7.118E+00	1.486E+01	2.680E+01	NOT IDENT.
RU-106	-7.118E+00	1.486E+01	2.680E+01	NOT IDENT.
AG-108M	-2.037E-01	1.481E+00	2.849E+00	NOT IDENT.
CD-109	-1.001E+01	4.879E+01	8.608E+01	NOT IDENT.
AG-110M	-4.531E-01	2.663E+00	4.970E+00	NOT IDENT.
SN-113	6.231E-01	2.383E+00	4.760E+00	NOT IDENT.
IN-114M	9.077E-01	1.218E+01	2.141E+01	NOT IDENT.
CD-115	-1.425E+02	3.033E+02	5.514E+02	NOT IDENT.
SN-117M	7.932E-01	3.045E+00	5.529E+00	NOT IDENT.
I-123	0.000E+00	2.242E+07	0.000E+00	SHORT HLIF
TE-123M	1.914E+00	1.703E+00	3.340E+00	NOT IDENT.
SB-124	3.114E+00	4.668E+00	1.141E+01	NOT IDENT.
SB-125	-2.158E+00	4.774E+00	8.756E+00	NOT IDENT.
TE-125M	-1.254E+02	6.382E+02	1.120E+03	NOT IDENT.
I-126	2.069E+01	1.489E+01	2.240E+01	FAIL ABUN
SB-126	3.829E-01	7.886E+00	1.380E+01	FAIL ABUN
SN-126	6.335E-01	4.762E+00	8.641E+00	FAIL ABUN
SB-127	1.760E+00	4.425E+01	8.721E+01	NOT IDENT.
TE-129	1.177E+01	2.404E+01	4.983E+01	NOT IDENT.
I-131	4.147E+00	5.072E+00	1.078E+01	NOT IDENT.
I-132	0.000E+00	7.196E+40	0.000E+00	SHORT HLIF
TE-132	1.047E+01	2.807E+01	5.129E+01	NOT IDENT.
BA-133	-2.855E-01	2.461E+00	4.238E+00	NOT IDENT.
I-133	0.000E+00	5.764E+04	0.000E+00	SHORT HLIF
CS-134	1.731E+00	2.229E+00	4.777E+00	NOT IDENT.
CS-135	-4.424E+00	9.465E+00	1.559E+01	NOT IDENT.
I-135	0.000E+00	1.488E+15	0.000E+00	SHORT HLIF
CS-136	5.585E-01	4.725E+00	9.378E+00	NOT IDENT.
BA-137M	5.759E-01	1.444E+00	2.921E+00	NOT IDENT.
CS-137	6.084E-01	1.526E+00	3.086E+00	NOT IDENT.
CE-139	-1.156E+00	1.674E+00	2.752E+00	NOT IDENT.
BA-140	-3.780E+00	1.163E+01	2.171E+01	NOT IDENT.
LA-140	-9.780E-03	3.392E+00	7.479E+00	NOT IDENT.
CE-141	3.881E-01	3.809E+00	6.809E+00	NOT IDENT.
CE-143	2.085E+03	2.410E+03	4.719E+03	NOT IDENT.
CE-144	-8.804E+00	1.253E+01	2.080E+01	NOT IDENT.
PM-144	1.230E-01	1.857E+00	3.394E+00	NOT IDENT.
PR-144	7.210E+00	1.385E+02	2.525E+02	NOT IDENT.
PM-146	1.301E+00	1.981E+00	4.259E+00	NOT IDENT.
ND-147	-4.673E+00	2.539E+01	4.826E+01	NOT IDENT.
PM-147	-2.993E+03	5.062E+04	8.963E+04	NOT IDENT.
PM-149	-1.290E+03	2.735E+03	4.500E+03	NOT IDENT.
EU-152	4.524E-01	5.810E+00	1.124E+01	NOT IDENT.
GD-153	2.627E+00	5.230E+00	9.836E+00	NOT IDENT.
EU-154	-2.154E+00	4.547E+00	8.717E+00	NOT IDENT.
EU-155	3.909E-01	7.126E+00	1.280E+01	NOT IDENT.
HO-166M	1.424E-01	3.071E+00	6.005E+00	NOT IDENT.
TM-171	-1.170E+03	1.061E+03	1.576E+03	FAIL ABUN
LU-176	-5.340E-01	1.531E+00	2.329E+00	NOT IDENT.
LU-177	-1.855E+01	5.943E+01	9.627E+01	NOT IDENT.
HF-181	-1.514E+00	1.916E+00	3.308E+00	NOT IDENT.
W-181	-6.542E+00	1.025E+01	1.778E+01	FAIL ABUN
TA-182	-2.101E+00	5.302E+00	1.061E+01	FAIL ABUN
RE-183	-8.231E+00	1.014E+01	1.723E+01	FAIL ABUN
RE-184	-8.549E-01	5.906E+00	1.118E+01	NOT IDENT.
RE-188	7.704E+00	9.505E+00	1.820E+01	FAIL ABUN
W-188	2.873E+02	3.860E+02	7.147E+02	FAIL ABUN
OS-191	1.114E+01	9.472E+00	1.852E+01	FAIL ABUN
IR-192	5.797E-01	1.925E+00	3.833E+00	FAIL ABUN
HG-203	-9.921E-01	2.258E+00	3.727E+00	NOT IDENT.
BI-207	-5.247E-01	2.553E+00	4.732E+00	NOT IDENT.
PB-210	-3.406E+01	1.851E+02	3.084E+02	NOT IDENT.
PO-210	-3.406E+01	1.851E+02	3.084E+02	NOT IDENT.
PB-211	9.438E+00	3.077E+01	6.386E+01	NOT IDENT.

BI-212	-1.269E+01	2.403E+01	4.239E+01	NOT IDENT.
PB-212	1.136E+00	6.069E+00	7.731E+00	FAIL ABUN
BI-213	-5.125E-01	5.759E+00	1.103E+01	NOT IDENT.
PB-214	0.000E+00	9.968E+00	1.124E+01	FAIL ABUN
RN-219	-1.351E+01	1.815E+01	3.206E+01	NOT IDENT.
FR-221	-3.645E+00	1.255E+01	2.133E+01	NOT IDENT.
RA-223	-1.439E+01	3.253E+01	6.037E+01	NOT IDENT.
RA-224	-1.476E+01	4.571E+01	6.992E+01	NOT IDENT.
RA-226	-4.351E+01	4.993E+01	8.415E+01	NOT IDENT.
AC-227	-7.726E+00	1.587E+01	2.613E+01	NOT IDENT.
TH-227	-7.726E+00	1.587E+01	2.613E+01	NOT IDENT.
AC-228	-4.595E+00	8.004E+00	1.452E+01	NOT IDENT.
RA-228	-4.595E+00	8.004E+00	1.452E+01	NOT IDENT.
TH-228	1.136E+00	6.069E+00	7.731E+00	FAIL ABUN
TH-229	-9.776E+00	3.417E+01	5.341E+01	NOT IDENT.
TH-230	1.639E+02	6.304E+02	1.173E+03	NOT IDENT.
PA-231	3.070E+01	2.735E+01	5.484E+01	NOT IDENT.
TH-231	-2.178E+01	2.898E+01	4.521E+01	NOT IDENT.
PA-233	2.737E-01	3.648E+00	6.505E+00	NOT IDENT.
PA-234	6.050E+00	1.268E+01	2.792E+01	NOT IDENT.
PA-234M	-2.150E+02	2.522E+02	4.133E+02	NOT IDENT.
U-234	-1.944E+03	3.703E+03	5.836E+03	NOT IDENT.
U-235	-3.777E+00	1.458E+01	2.328E+01	FAIL ABUN
NP-237	2.737E-01	3.648E+00	6.505E+00	NOT IDENT.
NP-238	1.670E+02	4.738E+02	1.005E+03	NOT IDENT.
NP-239	-7.539E+00	1.662E+01	2.850E+01	NOT IDENT.
AM-241	5.113E+00	8.828E+00	1.605E+01	NOT IDENT.
AM-242	-1.462E+01	4.143E+01	7.209E+01	NOT IDENT.
AM-243	-1.434E+00	3.370E+00	5.692E+00	NOT IDENT.
CM-243	-1.908E+00	7.257E+00	1.269E+01	NOT IDENT.
BK-247	-5.352E-01	5.196E+00	8.955E+00	NOT IDENT.
CM-247	-1.294E+00	1.607E+00	2.808E+00	NOT IDENT.
CF-249	-8.215E-02	2.291E+00	4.402E+00	NOT IDENT.
CF-251	3.412E+00	7.682E+00	1.421E+01	NOT IDENT.
CF-252	-2.208E+03	1.108E+04	1.958E+04	NOT IDENT.
ANH-511	-1.055E+01	3.508E+00	6.709E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	3	63.46	56	95	1.29	126.64	123	16	7.73E-03	32.7	2.35E+00
2	3	65.96	37	83	1.29	131.64	123	16	5.19E-03	48.9	
3	0	92.73	74	133	0.93	185.18	181	10	1.02E-02	31.5	
4	0	139.74	50	110	1.48	279.20	275	10	6.94E-03	41.7	
5	0	186.03	30	79	1.21	371.80	367	8	4.13E-03	55.1	
6	0	199.18	97	100	4.84	398.10	390	17	1.35E-02	26.1	
7	0	204.58	23	21	1.30	408.90	407	5	3.24E-03	35.6	
8	0	214.14	24	42	2.32	428.03	424	8	3.29E-03	51.7	
9	0	238.67	36	69	1.03	477.08	473	9	5.05E-03	44.1	
10	0	295.17	75	40	1.87	590.09	584	14	1.05E-02	20.9	
11	0	309.02	24	22	1.54	617.79	614	8	3.31E-03	39.8	1.28E+00
12	0	352.31	55	52	1.71	704.40	697	14	7.66E-03	30.9	
13	0	379.34	10	16	0.82	758.45	755	5	1.32E-03	71.5	
14	5	510.73	102	22	2.25	1021.28	1014	22	1.42E-02	15.0	
15	5	515.44	14	20	2.05	1030.70	1014	22	1.99E-03	67.3	
16	0	583.37	29	16	1.66	1166.58	1162	12	4.08E-03	32.3	
17	0	595.84	21	31	1.24	1191.54	1185	13	2.94E-03	59.3	
18	0	609.46	48	26	1.02	1218.78	1215	10	6.68E-03	24.3	
19	0	648.29	16	4	2.22	1296.45	1293	7	2.15E-03	32.3	
20	0	667.29	22	9	0.70	1334.47	1328	13	3.00E-03	36.7	
21	0	768.00	14	9	0.80	1535.94	1532	9	1.90E-03	48.1	1.28E+00
22	0	804.30	9	38	0.65	1608.57	1600	16	1.30E-03	147.5	
23	0	844.50	4	14	0.61	1688.99	1684	8	5.02E-04	187.8	
24	0	859.86	14	3	0.58	1719.72	1717	10	1.88E-03	35.6	
25	0	910.86	9	10	0.65	1821.75	1815	13	1.25E-03	79.1	
26	0	1080.82	9	2	1.40	2161.80	2158	7	1.29E-03	40.2	
27	0	1103.33	9	5	0.75	2206.83	2200	11	1.25E-03	60.0	
28	0	1120.21	16	2	2.61	2240.60	2235	10	2.19E-03	31.3	
29	0	1204.72	5	3	1.24	2409.70	2406	6	6.94E-04	70.7	
30	0	1766.45	6	8	0.43	3533.79	3524	11	7.89E-04	106.7	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
AS-74	595.83	21	59.00*	1.296E+00	5.197E+00	8.659E+00	118.59
	634.78	-----	15.40	1.241E+00	-----	Line Not Found	-----
KR-85	514.00	14	0.43*	1.429E+00	4.368E+02	4.378E+02	134.67
SR-85	514.00	14	96.00*	1.429E+00	1.957E+00	2.250E+00	134.67
Y-91	1204.77	5	0.26*	7.816E-01	4.618E+02	5.392E+02	141.42
TL-208	277.37	-----	6.60	2.134E+00	-----	Line Not Found	-----
	583.19	17	85.00*	1.315E+00	2.913E+00	2.951E+00	116.80
	860.56	14	12.50	1.003E+00	2.025E+01	2.051E+01	71.28
BI-211	72.87	-----	1.23	1.852E+00	-----	Line Not Found	-----
	351.06	46	12.92*	1.836E+00	3.666E+01	3.670E+01	76.45
BI-214	609.32	42	45.49*	1.276E+00	1.348E+01	1.348E+01	60.06
	1120.29	16	14.92	8.258E-01	2.399E+01	2.399E+01	62.53
	1764.49	-----	15.30	5.844E-01	-----	Line Not Found	-----
TH-232	63.81	26	0.26*	1.386E+00	1.355E+03	1.355E+03	146.04
	140.88	38	0.02	2.856E+00	1.239E+04	1.239E+04	113.62
TH-234	63.29	26	3.70*	1.386E+00	9.520E+01	9.520E+01	146.04
	92.59	0	4.23	2.514E+00	7.697E-01	7.697E-01	11089.24
U-238	63.29	26	3.70*	1.386E+00	9.520E+01	9.520E+01	146.04
	92.59	0	4.23	2.514E+00	7.697E-01	7.697E-01	11089.24

Flag: "*" = Keyline

Total number of lines in spectrum 26
Number of unidentified lines 7
Number of lines tentatively identified by NID 19 73.08%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
AS-74	17.77D	1.67	5.197E+00	8.659E+00	10.27E+00	118.59	
KR-85	10.76Y	1.00	4.368E+02	4.378E+02	5.896E+02	134.67	
SR-85	64.84D	1.15	1.957E+00	2.250E+00	3.031E+00	134.67	
Y-91	58.51D	1.17	4.618E+02	5.392E+02	7.626E+02	141.42	
TL-208	1.91Y	1.01	2.913E+00	2.951E+00	3.446E+00	116.80	
BI-211	21.77Y	1.00	3.666E+01	3.670E+01	2.806E+01	76.45	
BI-214	1600.00Y	1.00	1.348E+01	1.348E+01	0.809E+01	60.06	
TH-232	1.41E+10Y	1.00	1.355E+03	1.355E+03	1.978E+03	146.04	
TH-234	4.47E+09Y	1.00	9.520E+01	9.520E+01	13.90E+01	146.04	
U-238	4.47E+09Y	1.00	9.520E+01	9.520E+01	13.90E+01	146.04	
Total Activity :			2.504E+03	2.586E+03			

Grand Total Activity : 2.504E+03 2.586E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
3	65.96	37	83	1.29	131.64	123	16	5.19E-03	97.9	1.52E+00	T
0	199.18	81	100	4.84	398.10	390	17	1.13E-02	64.1	2.56E+00	T
0	204.58	11	21	1.30	408.90	407	5	1.46E-03	****	2.53E+00	T
0	214.14	24	42	2.32	428.03	424	8	3.29E-03	****	2.47E+00	
0	238.67	6	69	1.03	477.08	473	9	8.43E-04	****	2.33E+00	T
0	295.17	70	40	1.87	590.09	584	14	9.68E-03	46.5	2.05E+00	T
0	309.02	24	22	1.54	617.79	614	8	3.31E-03	79.5	2.00E+00	T
0	379.34	10	16	0.82	758.45	755	5	1.32E-03	****	1.75E+00	
0	648.29	16	4	2.22	1296.45	1293	7	2.15E-03	64.7	1.22E+00	
0	667.29	22	9	0.70	1334.47	1328	13	3.00E-03	73.4	1.20E+00	T
0	768.00	14	9	0.80	1535.94	1532	9	1.90E-03	96.2	1.09E+00	T
0	844.50	4	14	0.61	1688.99	1684	8	5.02E-04	****	1.02E+00	
0	1080.82	9	2	1.40	2161.80	2158	7	1.29E-03	80.5	8.48E-01	
0	1103.33	9	5	0.75	2206.83	2200	11	1.25E-03	****	8.35E-01	
0	1766.45	6	8	0.43	3533.79	3524	11	7.89E-04	****	5.84E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                               *
*                                     2040 Savage Road                               *
*                                     Charleston, SC 29407                          *
*****
*
*                                     DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372011.CNF;1      *
* Acquisition date   : 21-DEC-2016 09:16:32 Sensitivity      : 3.000              *
* Detector ID        : GAM30 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:02.28 Half life ratio  : *****          *
* Sample date        : 8-DEC-2016 08:09:00 Nuclide Library : LIQUID          *
* Sample ID          : G412372011 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER      *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000          *
*                                     Dry Weight    : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                       *
*
* Eff. Cal. date     : 15-MAR-2016 05:52:58 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
AS-74	4.180E+00
KR-85	2.828E+02
SR-85	1.454E+00
Y-91	7.168E+02
TL-208	1.451E+00
BI-211	9.764E+00
BI-214	2.963E+00
TH-232	8.642E+02
TH-234	6.192E+01
U-238	6.192E+01

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.564E+01	NOT IDENT.
NA-22	1.194E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.902E+00	NOT IDENT.
K-40	2.356E+01	NOT IDENT.
SC-46	1.454E+00	FAIL ABUN
V-48	2.706E+00	NOT IDENT.
CR-51	1.623E+01	NOT IDENT.
MN-52	4.611E+00	NOT IDENT.
MN-54	1.361E+00	NOT IDENT.
CO-56	1.238E+00	NOT IDENT.
CO-57	1.376E+00	NOT IDENT.
CO-58	1.680E+00	NOT IDENT.
FE-59	2.993E+00	NOT IDENT.
CO-60	1.574E+00	NOT IDENT.
ZN-65	2.417E+00	NOT IDENT.
CU-67	9.038E+01	FAIL ABUN
GE-68	4.380E+01	NOT IDENT.
SE-75	2.267E+00	NOT IDENT.
BR-77	3.098E+02	FAIL ABUN
SR-82	1.004E+01	NOT IDENT.

RB-83	3.225E+00	NOT IDENT.
RB-84	2.781E+00	NOT IDENT.
RB-86	2.688E+01	NOT IDENT.
Y-88	2.094E+00	NOT IDENT.
NB-94	1.700E+00	NOT IDENT.
NB-95	1.408E+00	NOT IDENT.
NB-95M	4.784E+00	NOT IDENT.
ZR-95	2.228E+00	NOT IDENT.
MO-99	3.359E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.542E+00	FAIL ABUN
RH-102M	1.345E+00	FAIL ABUN
RU-103	1.543E+00	FAIL ABUN
RH-106	1.132E+01	NOT IDENT.
RU-106	1.132E+01	NOT IDENT.
AG-108M	1.250E+00	NOT IDENT.
CD-109	4.014E+01	NOT IDENT.
AG-110M	2.117E+00	NOT IDENT.
SN-113	2.134E+00	NOT IDENT.
IN-114M	9.959E+00	NOT IDENT.
CD-115	2.372E+02	NOT IDENT.
SN-117M	2.561E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.554E+00	NOT IDENT.
SB-124	4.680E+00	NOT IDENT.
SB-125	3.848E+00	NOT IDENT.
TE-125M	5.207E+02	NOT IDENT.
I-126	9.908E+00	FAIL ABUN
SB-126	6.035E+00	FAIL ABUN
SN-126	4.034E+00	FAIL ABUN
SB-127	3.743E+01	NOT IDENT.
TE-129	2.212E+01	NOT IDENT.
I-131	4.857E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.360E+01	NOT IDENT.
BA-133	1.895E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.106E+00	NOT IDENT.
CS-135	7.068E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.962E+00	NOT IDENT.
BA-137M	1.227E+00	NOT IDENT.
CS-137	1.296E+00	NOT IDENT.
CE-139	1.254E+00	NOT IDENT.
BA-140	9.331E+00	NOT IDENT.
LA-140	2.879E+00	NOT IDENT.
CE-141	3.161E+00	NOT IDENT.
CE-143	2.151E+03	NOT IDENT.
CE-144	9.581E+00	NOT IDENT.
PM-144	1.473E+00	NOT IDENT.
PR-144	1.095E+02	NOT IDENT.
PM-146	1.878E+00	NOT IDENT.
ND-147	2.098E+01	NOT IDENT.
PM-147	4.168E+04	NOT IDENT.
PM-149	2.014E+03	NOT IDENT.
EU-152	5.110E+00	NOT IDENT.
GD-153	4.572E+00	NOT IDENT.
EU-154	3.388E+00	NOT IDENT.
EU-155	5.960E+00	NOT IDENT.
HO-166M	2.594E+00	NOT IDENT.
TM-171	7.176E+02	FAIL ABUN
LU-176	1.030E+00	NOT IDENT.
LU-177	4.433E+01	NOT IDENT.
HF-181	1.393E+00	NOT IDENT.
W-181	8.088E+00	FAIL ABUN
TA-182	3.989E+00	FAIL ABUN
RE-183	7.843E+00	FAIL ABUN
RE-184	4.701E+00	NOT IDENT.
RE-188	8.445E+00	FAIL ABUN
W-188	3.228E+02	FAIL ABUN
OS-191	8.662E+00	FAIL ABUN
IR-192	1.741E+00	FAIL ABUN
HG-203	1.686E+00	NOT IDENT.
BI-207	1.970E+00	NOT IDENT.
PB-210	1.417E+02	NOT IDENT.
PO-210	1.417E+02	NOT IDENT.
PB-211	2.793E+01	NOT IDENT.
BI-212	1.778E+01	NOT IDENT.

PB-212	3.614E+00	FAIL ABUN
BI-213	4.900E+00	NOT IDENT.
PB-214	5.233E+00	FAIL ABUN
RN-219	1.375E+01	NOT IDENT.
FR-221	9.760E+00	NOT IDENT.
RA-223	2.691E+01	NOT IDENT.
RA-224	3.227E+01	NOT IDENT.
RA-226	3.941E+01	NOT IDENT.
AC-227	1.187E+01	NOT IDENT.
TH-227	1.187E+01	NOT IDENT.
AC-228	6.237E+00	NOT IDENT.
RA-228	6.237E+00	NOT IDENT.
TH-228	3.614E+00	FAIL ABUN
TH-229	2.450E+01	NOT IDENT.
TH-230	5.450E+02	NOT IDENT.
PA-231	2.509E+01	NOT IDENT.
TH-231	2.093E+01	NOT IDENT.
PA-233	2.921E+00	NOT IDENT.
PA-234	1.170E+01	NOT IDENT.
PA-234M	1.731E+02	NOT IDENT.
U-234	2.661E+03	NOT IDENT.
U-235	1.083E+01	FAIL ABUN
NP-237	2.921E+00	NOT IDENT.
NP-238	4.226E+02	NOT IDENT.
NP-239	1.313E+01	NOT IDENT.
AM-241	7.423E+00	NOT IDENT.
AM-242	3.339E+01	NOT IDENT.
AM-243	2.652E+00	NOT IDENT.
CM-243	5.898E+00	NOT IDENT.
BK-247	4.094E+00	NOT IDENT.
CM-247	1.195E+00	NOT IDENT.
CF-249	1.978E+00	NOT IDENT.
CF-251	6.564E+00	NOT IDENT.
CF-252	9.055E+03	NOT IDENT.
ANH-511	3.180E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372011.CNF;1
Acquisition date : 21-DEC-2016 09:16:32 Sensitivity : 3.000
Detector ID : GAM30 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.28 Half life ratio : *****
Sample date : 8-DEC-2016 08:09:00 Nuclide Library : LIQUID
Sample ID : G412372011 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 15-MAR-2016 05:52:58 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
AS-74	8.659E+00	1.010E+01	1.010E+01
KR-85	4.378E+02	5.789E+02	5.789E+02
SR-85	2.250E+00	2.976E+00	2.976E+00
Y-91	5.392E+02	7.488E+02	7.488E+02
TL-208	2.951E+00	3.386E+00	3.386E+00
BI-211	3.670E+01	2.769E+01	2.769E+01
BI-214	1.348E+01	8.007E+00	8.007E+00
TH-232	1.355E+03	1.946E+03	1.946E+03
TH-234	9.520E+01	1.379E+02	1.379E+02
U-238	9.520E+01	1.379E+02	1.379E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	3.340E+00	1.778E+01	1.784E+01	NOT IDENT.
NA-22	-7.596E-01	1.604E+00	1.640E+00	NOT IDENT.
NA-24	7.283E+05	3.583E+06	3.598E+06	SHORT HLIF
AL-26	-2.319E-01	2.323E+00	2.325E+00	NOT IDENT.
K-40	1.019E+00	2.436E+01	2.437E+01	NOT IDENT.
SC-46	-1.373E+00	2.082E+00	2.172E+00	FAIL ABUN
V-48	1.312E+00	2.988E+00	3.046E+00	NOT IDENT.
CR-51	2.312E+00	1.827E+01	1.830E+01	NOT IDENT.
MN-52	-6.135E+00	7.707E+00	8.188E+00	NOT IDENT.
MN-54	-1.688E-01	1.682E+00	1.684E+00	NOT IDENT.
CO-56	-9.490E-01	2.006E+00	2.051E+00	NOT IDENT.
CO-57	4.497E-01	1.619E+00	1.631E+00	NOT IDENT.
CO-58	4.041E-01	1.940E+00	1.949E+00	NOT IDENT.
FE-59	-7.376E-01	4.422E+00	4.434E+00	NOT IDENT.
CO-60	1.138E-01	1.800E+00	1.801E+00	NOT IDENT.
ZN-65	7.337E-01	3.003E+00	3.021E+00	NOT IDENT.
CU-67	-2.002E+02	1.243E+02	1.536E+02	FAIL ABUN
GE-68	1.988E+00	5.980E+01	5.981E+01	NOT IDENT.
SE-75	2.246E-03	2.839E+00	2.839E+00	NOT IDENT.
BR-77	9.628E+01	5.143E+02	5.161E+02	FAIL ABUN

SR-82	1.065E+00	1.176E+01	1.177E+01	NOT IDENT.
RB-83	1.865E+00	3.621E+00	3.718E+00	NOT IDENT.
RB-84	8.089E-01	3.187E+00	3.208E+00	NOT IDENT.
RB-86	3.995E+00	3.570E+01	3.574E+01	NOT IDENT.
Y-88	1.510E+00	2.031E+00	2.142E+00	NOT IDENT.
NB-94	-1.445E-01	2.051E+00	2.052E+00	NOT IDENT.
NB-95	9.226E-01	1.581E+00	1.635E+00	NOT IDENT.
NB-95M	-1.909E+00	6.579E+00	6.635E+00	NOT IDENT.
ZR-95	-1.549E+00	3.060E+00	3.139E+00	NOT IDENT.
MO-99	2.852E+02	3.470E+02	3.701E+02	FAIL ABUN
TC-99M	1.417E+16	1.586E+16	0.000E+00	SHORT HLIF
RH-101	-1.474E+00	2.035E+00	2.141E+00	FAIL ABUN
RH-102M	-1.125E-01	1.585E+00	1.586E+00	FAIL ABUN
RU-103	-1.455E+00	2.046E+00	2.148E+00	FAIL ABUN
RH-106	-7.118E+00	1.487E+01	1.522E+01	NOT IDENT.
RU-106	-7.118E+00	1.487E+01	1.522E+01	NOT IDENT.
AG-108M	-2.037E-01	1.481E+00	1.484E+00	NOT IDENT.
CD-109	-1.001E+01	4.880E+01	4.901E+01	NOT IDENT.
AG-110M	-4.531E-01	2.663E+00	2.671E+00	NOT IDENT.
SN-113	6.231E-01	2.384E+00	2.400E+00	NOT IDENT.
IN-114M	9.077E-01	1.218E+01	1.218E+01	NOT IDENT.
CD-115	-1.425E+02	3.036E+02	3.103E+02	NOT IDENT.
SN-117M	7.932E-01	3.046E+00	3.067E+00	NOT IDENT.
I-123	2.602E+07	2.250E+07	2.538E+07	SHORT HLIF
TE-123M	1.914E+00	1.709E+00	1.914E+00	NOT IDENT.
SB-124	3.114E+00	4.674E+00	4.880E+00	NOT IDENT.
SB-125	-2.158E+00	4.777E+00	4.875E+00	NOT IDENT.
TE-125M	-1.254E+02	6.383E+02	6.408E+02	NOT IDENT.
I-126	2.069E+01	1.500E+01	1.767E+01	FAIL ABUN
SB-126	3.829E-01	7.886E+00	7.888E+00	FAIL ABUN
SN-126	6.335E-01	4.762E+00	4.770E+00	FAIL ABUN
SB-127	1.760E+00	4.425E+01	4.426E+01	NOT IDENT.
TE-129	1.177E+01	2.412E+01	2.470E+01	NOT IDENT.
I-131	4.147E+00	5.085E+00	5.418E+00	NOT IDENT.
I-132	1.000E+41	1.084E+41	0.000E+00	SHORT HLIF
TE-132	1.047E+01	2.809E+01	2.849E+01	NOT IDENT.
BA-133	-2.855E-01	2.462E+00	2.465E+00	NOT IDENT.
I-133	2.230E+04	5.771E+04	5.858E+04	SHORT HLIF
CS-134	1.731E+00	2.236E+00	2.368E+00	NOT IDENT.
CS-135	-4.424E+00	9.477E+00	9.684E+00	NOT IDENT.
I-135	-2.156E+14	1.490E+15	1.493E+15	SHORT HLIF
CS-136	5.585E-01	4.726E+00	4.733E+00	NOT IDENT.
BA-137M	5.759E-01	1.445E+00	1.468E+00	NOT IDENT.
CS-137	6.084E-01	1.527E+00	1.551E+00	NOT IDENT.
CE-139	-1.156E+00	1.692E+00	1.770E+00	NOT IDENT.
BA-140	-3.780E+00	1.164E+01	1.176E+01	NOT IDENT.
LA-140	-9.780E-03	3.392E+00	3.392E+00	NOT IDENT.
CE-141	3.881E-01	3.809E+00	3.813E+00	NOT IDENT.
CE-143	2.085E+03	2.419E+03	2.595E+03	NOT IDENT.
CE-144	-8.804E+00	1.255E+01	1.317E+01	NOT IDENT.
PM-144	1.230E-01	1.857E+00	1.858E+00	NOT IDENT.
PR-144	7.210E+00	1.385E+02	1.385E+02	NOT IDENT.
PM-146	1.301E+00	1.985E+00	2.070E+00	NOT IDENT.
ND-147	-4.673E+00	2.540E+01	2.548E+01	NOT IDENT.
PM-147	-2.993E+03	5.062E+04	5.064E+04	NOT IDENT.
PM-149	-1.290E+03	2.743E+03	2.804E+03	NOT IDENT.
EU-152	4.524E-01	5.810E+00	5.813E+00	NOT IDENT.
GD-153	2.627E+00	5.234E+00	5.366E+00	NOT IDENT.
EU-154	-2.154E+00	4.550E+00	4.653E+00	NOT IDENT.
EU-155	3.909E-01	7.126E+00	7.128E+00	NOT IDENT.
HO-166M	1.424E-01	3.071E+00	3.072E+00	NOT IDENT.
TM-171	-1.170E+03	1.067E+03	1.190E+03	FAIL ABUN
LU-176	-5.340E-01	1.532E+00	1.550E+00	NOT IDENT.
LU-177	-1.855E+01	5.944E+01	6.003E+01	NOT IDENT.
HF-181	-1.514E+00	1.920E+00	2.038E+00	NOT IDENT.
W-181	-6.542E+00	1.039E+01	1.080E+01	FAIL ABUN
TA-182	-2.101E+00	5.305E+00	5.389E+00	FAIL ABUN
RE-183	-8.231E+00	1.018E+01	1.083E+01	FAIL ABUN
RE-184	-8.549E-01	5.907E+00	5.919E+00	NOT IDENT.
RE-188	7.704E+00	9.522E+00	1.014E+01	FAIL ABUN
W-188	2.873E+02	3.881E+02	4.092E+02	FAIL ABUN
OS-191	1.114E+01	9.506E+00	1.075E+01	FAIL ABUN
IR-192	5.797E-01	1.926E+00	1.944E+00	FAIL ABUN
HG-203	-9.921E-01	2.260E+00	2.304E+00	NOT IDENT.
BI-207	-5.247E-01	2.554E+00	2.565E+00	NOT IDENT.
PB-210	-3.406E+01	1.852E+02	1.858E+02	NOT IDENT.
PO-210	-3.406E+01	1.852E+02	1.858E+02	NOT IDENT.
PB-211	9.438E+00	3.078E+01	3.108E+01	NOT IDENT.

BI-212	-1.269E+01	2.405E+01	2.473E+01	NOT IDENT.
PB-212	1.136E+00	6.070E+00	6.092E+00	FAIL ABUN
BI-213	-5.125E-01	5.759E+00	5.764E+00	NOT IDENT.
PB-214	1.330E+01	1.004E+01	1.169E+01	FAIL ABUN
RN-219	-1.351E+01	1.825E+01	1.924E+01	NOT IDENT.
FR-221	-3.645E+00	1.255E+01	1.266E+01	NOT IDENT.
RA-223	-1.439E+01	3.257E+01	3.321E+01	NOT IDENT.
RA-224	-1.476E+01	4.573E+01	4.621E+01	NOT IDENT.
RA-226	-4.351E+01	5.006E+01	5.376E+01	NOT IDENT.
AC-227	-7.726E+00	1.592E+01	1.629E+01	NOT IDENT.
TH-227	-7.726E+00	1.592E+01	1.629E+01	NOT IDENT.
AC-228	-4.595E+00	8.023E+00	8.286E+00	NOT IDENT.
RA-228	-4.595E+00	8.023E+00	8.286E+00	NOT IDENT.
TH-228	1.136E+00	6.070E+00	6.092E+00	FAIL ABUN
TH-229	-9.776E+00	3.418E+01	3.446E+01	NOT IDENT.
TH-230	1.639E+02	6.310E+02	6.354E+02	NOT IDENT.
PA-231	3.070E+01	2.825E+01	3.146E+01	NOT IDENT.
TH-231	-2.178E+01	2.915E+01	3.075E+01	NOT IDENT.
PA-233	2.737E-01	3.648E+00	3.650E+00	NOT IDENT.
PA-234	6.050E+00	1.446E+01	1.472E+01	NOT IDENT.
PA-234M	-2.150E+02	2.537E+02	2.716E+02	NOT IDENT.
U-234	-1.944E+03	3.707E+03	3.810E+03	NOT IDENT.
U-235	-3.777E+00	1.458E+01	1.468E+01	FAIL ABUN
NP-237	2.737E-01	3.648E+00	3.650E+00	NOT IDENT.
NP-238	1.670E+02	4.743E+02	4.802E+02	NOT IDENT.
NP-239	-7.539E+00	1.663E+01	1.697E+01	NOT IDENT.
AM-241	5.113E+00	8.838E+00	9.134E+00	NOT IDENT.
AM-242	-1.462E+01	4.152E+01	4.204E+01	NOT IDENT.
AM-243	-1.434E+00	3.372E+00	3.433E+00	NOT IDENT.
CM-243	-1.908E+00	7.259E+00	7.310E+00	NOT IDENT.
BK-247	-5.352E-01	5.197E+00	5.203E+00	NOT IDENT.
CM-247	-1.294E+00	1.624E+00	1.726E+00	NOT IDENT.
CF-249	-8.215E-02	2.291E+00	2.292E+00	NOT IDENT.
CF-251	3.412E+00	7.694E+00	7.846E+00	NOT IDENT.
CF-252	-2.208E+03	1.126E+04	1.130E+04	NOT IDENT.
ANH-511	-1.055E+01	3.610E+00	5.970E+00	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	44.4833	88.03	68.5556	140.88	45.3979
46.54	35.4651	88.34	68.5883	143.76	47.7148
49.72	32.9000	88.47	67.2572	144.24	54.9744
51.35	30.1872	91.11	60.7759	145.44	54.3236
52.39	47.2731	91.27	60.7906	152.32	41.5990
53.20	35.9894	92.59	59.8962	152.43	41.6042
56.28	31.4549	93.31	59.9606	153.25	53.6954
57.36	42.0320	94.56	51.5871	154.21	54.8477
57.53	44.9132	94.65	51.5940	155.04	39.5255
57.53	44.9134	94.67	51.5956	156.02	43.9630
57.98	48.7798	97.43	48.0553	158.56	47.3875
59.32	41.2381	98.43	54.2681	158.97	0.0000
59.54	39.6569	98.44	54.2689	159.00	37.4868
61.49	53.9341	99.53	60.5070	162.33	55.3192
63.00	52.1590	100.11	54.3987	162.66	44.2706
63.29	52.1879	100.20	54.4060	163.33	39.8710
63.58	52.2165	102.03	57.6342	165.86	47.7477
63.81	52.2394	103.18	65.9741	176.31	49.3724
64.28	52.2857	103.37	63.9295	176.60	52.7538
64.99	52.3554	105.31	59.9660	177.52	40.4434
65.08	52.3643	106.12	55.8927	181.07	46.2195
66.73	52.5247	106.47	64.2038	184.41	50.8914
66.98	52.5490	109.28	62.3701	184.58	56.5552
67.24	52.5741	111.00	55.2207	185.72	41.8960
67.67	52.6153	111.76	53.1906	186.21	48.7129
67.75	52.6227	112.95	55.3635	190.27	57.9960
69.67	57.3695	116.24	59.7980	193.51	47.1452
70.83	49.6489	116.30	59.8028	198.01	36.6499
72.81	59.9831	116.74	54.5879	201.83	36.7764
72.87	59.9892	117.23	58.8237	205.31	35.3530
74.66	66.0942	119.76	66.3910	208.37	43.9253
74.82	66.1121	120.54	43.2494	210.85	44.7927
74.97	75.0120	120.90	54.8779	218.12	44.2964
77.11	64.3885	121.12	60.1711	222.11	44.4460
79.69	52.7271	121.22	60.1789	227.09	46.9794
80.12	57.7420	121.78	60.2211	227.38	55.2144
80.19	57.7487	122.06	49.6736	228.16	37.6167
80.57	64.7590	123.07	62.4350	228.18	37.6177
81.00	52.8403	123.68	56.1281	235.69	28.3861
81.07	52.8463	127.23	61.6918	235.96	28.3923
83.79	52.0770	129.43	44.7929	238.63	39.1230
84.00	65.1180	131.20	49.1628	238.98	39.1341
84.21	65.1398	133.02	55.6959	240.99	55.4295
85.43	64.2617	133.52	60.0161	242.00	52.3037
86.55	52.3047	136.00	61.6235	244.70	35.7376
86.94	51.3300	136.28	61.6437	250.62	39.4931
87.09	51.3420	136.47	55.9221	252.40	33.5551
87.57	63.4696	140.51	45.3787	252.80	34.7641

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	42.0667	383.85	25.2641	631.29	15.6647
260.90	39.8028	388.16	27.0727	632.98	13.7157
264.66	38.7061	388.63	28.8267	633.25	13.7174
265.00	39.9257	391.70	21.8765	634.78	10.7843
268.22	40.0204	400.66	16.7093	635.95	19.6167
269.46	41.2704	401.81	20.2401	636.99	16.6811
271.23	29.1702	402.40	19.3664	645.85	8.8619
273.65	35.3092	404.85	13.2220	657.76	10.8814
276.40	25.6200	410.95	19.4572	661.66	5.9441
277.37	34.1831	414.70	20.3833	664.57	10.4137
277.60	28.0839	423.72	18.7010	666.33	7.9398
278.00	28.0923	427.09	16.0580	666.50	7.9401
278.43	29.3225	427.87	23.2044	667.71	0.0000
279.20	37.8957	433.94	18.8018	677.62	11.9604
279.54	37.9052	440.45	22.4589	685.70	11.9966
280.46	25.6944	453.88	11.7593	695.00	15.0476
283.69	30.6587	459.60	15.4218	696.49	9.0337
284.31	26.9918	463.37	17.2686	696.51	9.0337
285.41	33.1518	468.07	20.9528	697.00	13.0508
285.90	31.9351	473.00	15.5245	697.49	16.0658
287.50	27.0522	475.06	20.1107	702.65	21.1256
290.67	18.0751	476.78	17.3830	706.68	23.1722
293.27	22.2231	477.60	20.1358	711.68	13.1211
295.22	22.2528	477.99	16.4780	720.70	13.1635
295.96	22.2643	482.18	17.4286	721.93	17.2214
299.98	41.3432	487.02	15.6307	722.78	18.2402
300.09	41.3462	492.35	12.9051	722.91	17.2276
300.13	36.3856	497.08	22.1729	723.31	15.2032
301.36	21.1047	511.00	15.8087	724.19	10.1388
302.85	32.3104	514.00	15.8303	727.33	14.2096
304.50	29.8586	520.40	12.3283	733.00	11.1875
304.85	11.6143	520.69	16.8135	735.93	15.2716
306.78	24.9200	522.65	0.0000	739.50	7.1356
308.46	23.7007	527.90	17.8055	744.23	17.3583
311.90	25.0055	529.59	10.3165	747.24	12.2656
316.51	28.4253	529.87	0.0000	752.31	9.2153
319.41	27.6417	531.02	16.8926	753.82	7.1715
320.08	25.1398	537.26	15.9984	756.73	11.2806
321.04	22.6401	546.56	0.0000	763.94	4.6263
323.87	28.5616	552.55	13.2646	765.80	4.6293
325.23	26.0648	563.25	18.0862	766.42	9.2604
328.76	31.1796	569.33	20.0421	766.84	9.2618
333.37	29.5811	569.50	21.9528	772.60	0.0000
334.37	28.7539	569.70	21.9546	776.52	6.1948
338.28	29.6722	583.19	13.4400	777.92	10.3296
338.32	29.6730	595.83	19.3018	778.90	8.2666
340.48	26.3171	600.60	20.3070	783.70	11.3849
340.55	26.3183	602.73	22.2607	785.37	6.2134
344.28	32.3362	604.72	17.4353	792.07	14.5304
345.93	26.5764	609.32	15.5273	795.86	10.3923
351.06	28.1982	610.33	15.5339	801.95	8.3304
351.93	28.2130	614.28	17.5034	802.10	8.3307
356.01	25.7117	618.01	10.7126	810.29	12.5303
364.49	17.2282	621.93	14.6313	810.45	11.4865
366.42	22.4220	630.19	0.0000	810.76	10.4431

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	6.2764	1129.67	5.7222		
818.51	11.5170	1131.51	0.0000		
832.01	11.5671	1173.23	8.0989		
834.85	10.5253	1189.05	4.6458		
836.80	0.0000	1204.77	8.1615		
846.77	11.0934	1221.41	5.2676		
856.80	4.7693	1231.02	13.1992		
860.56	8.4889	1235.36	9.6895		
871.09	9.5815	1238.28	5.2888		
873.19	11.7184	1260.41	0.0000		
875.33	0.0000	1274.44	7.1113		
880.51	11.7448	1274.54	7.1113		
881.60	8.5446	1291.59	9.8163		
883.24	9.6174	1298.22	0.0000		
884.68	12.8291	1312.11	7.1724		
889.28	14.9884	1332.49	6.3044		
894.76	10.7239	1365.19	7.2573		
898.04	12.8813	1368.63	0.0000		
903.28	10.7515	1384.29	7.2876		
911.20	8.6217	1408.01	7.3247		
923.98	9.7365	1434.09	6.4446		
926.36	10.8260	1457.56	0.0000		
935.54	9.7698	1460.82	2.7773		
937.49	11.9476	1489.16	2.7935		
944.13	8.7061	1596.21	3.8044		
946.00	5.4441	1620.50	5.7330		
949.00	7.6286	1678.03	0.0000		
954.55	0.0000	1690.97	2.9046		
964.08	10.9456	1764.49	6.8680		
968.97	6.5764	1770.23	6.8748		
983.53	6.6038	1771.35	5.8938		
984.45	6.6055	1791.20	0.0000		
996.26	7.7320	1808.65	6.9214		
1001.03	8.8483	1836.06	1.9869		
1004.73	8.8574				
1025.87	6.6819				
1028.54	7.8009				
1037.84	11.1727				
1038.76	0.0000				
1046.59	4.4798				
1048.07	8.9629				
1050.41	14.5742				
1063.66	10.1257				
1077.00	6.7739				
1077.34	6.7749				
1083.85	3.3931				
1085.87	9.0534				
1099.25	8.5168				
1111.64	6.8354				
1112.07	6.8359				
1112.84	4.5583				
1115.54	3.4211				
1120.29	4.5671				
1120.55	5.1383				
1121.30	6.8521				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 13:54:07.17

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372012.CNF:1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM02.CNF:504
Background date    : 18-DEC-2016 13:11:14
Sample date       : 8-DEC-2016 10:16:00. Acquisition date : 21-DEC-2016 11:53:40
Sample ID        : G412372012. Sample quantity : 2.000000E+00 LITER
Detector name    : GAM02. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00. Elapsed real time: 0 02:00:00.40 0.0%
Energy tolerance : 1.50000 keV. Analyst Initials : MXR1
Abundance limit  : 75.00000. Sensitivity : 3.00000
Batch ID        : 1624165. Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****
```

BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	74.23*	18	228	1.22	147.94	143	10	2.44E-03	174.5	
2	0	87.42	50	102	0.93	174.31	172	6	6.99E-03	35.0	
3	0	134.66	28	105	1.44	268.70	266	7	3.87E-03	64.2	
4	0	139.38	43	105	1.06	278.13	275	7	5.96E-03	43.0	
5	0	150.10	26	75	0.93	299.56	297	5	3.67E-03	53.2	
6	0	197.98*	33	104	1.91	395.24	392	8	4.59E-03	59.9	
7	5	238.57*	46	57	2.19	476.33	472	16	6.34E-03	37.6	8.11E-01
8	5	242.21	48	49	1.91	483.61	472	16	6.67E-03	32.0	
9	0	295.13*	49	60	1.92	589.35	585	8	6.75E-03	33.7	
10	0	351.59*	43	93	1.07	702.19	696	12	6.04E-03	50.3	
11	0	412.16	56	48	5.95	823.22	813	18	7.84E-03	32.0	
12	0	493.45	28	50	6.89	985.68	976	18	3.91E-03	61.6	
13	0	558.63*	21	31	0.80	1115.93	1108	14	2.86E-03	66.7	
14	0	609.18*	59	32	1.23	1216.95	1212	10	8.14E-03	24.5	
15	0	707.56	16	29	3.80	1413.57	1407	12	2.16E-03	74.8	
16	0	815.22	9	11	0.74	1628.73	1623	9	1.27E-03	81.4	
17	0	989.82*	16	27	0.59	1977.69	1968	21	2.24E-03	85.3	
18	0	1001.74*	7	12	0.70	2001.52	1997	11	9.39E-04	131.7	
19	0	1120.67*	25	12	4.46	2239.21	2232	17	3.40E-03	44.3	
20	0	1210.91	19	0	3.97	2419.58	2413	14	2.64E-03	22.9	
21	0	1237.99	12	4	0.69	2473.70	2469	9	1.68E-03	42.4	
22	0	1283.94	8	3	0.60	2565.55	2557	12	1.07E-03	57.9	
23	0	1460.93*	29	6	2.86	2919.34	2911	21	4.09E-03	32.5	
24	0	1586.48	15	4	5.70	3170.31	3162	15	2.13E-03	37.5	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 13:54:08

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Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372012.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : MXR1
Sample date       : 8-DEC-2016 10:16:00   Acquisition date : 21-DEC-2016 11:53:40
Sample ID        : G412372012             Sample quantity  : 2.0000 LITER
Sample type       : LIQUID                 Sample geometry   : 
Detector name     : GAMMA2                 Detector geometry : 2LMB
Elapsed live time : 0 02:00:00.00          Elapsed real time: 0 02:00:00.40    0.0%
Energy tolerance  : 1.50 keV               Half life ratio   : 10.00
Errors propagated : No                     Systematic Error  : 0.00 %
Efficiency type   : Linear                  Efficiencies at   : Peak Energy
Abundance limit   : 75.00
    
```

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
PB-214	74.82	BI-211	72.87
PB-214	74.82	AM-243	74.66
PB-214	351.93	BI-211	351.06
PB-214	87.09	SN-126	86.94
PB-214	87.09	SN-126	87.57
PB-214	87.09	CD-109	88.03
PB-214	242.00	RA-224	240.99

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
K-40	1460.82	10.66*	5.542E-01	9.353E+01	9.353E+01	64.91	OK
CD-109	88.03	3.70*	1.849E+00	1.203E+02	1.227E+02	80.71	OK
SN-126	64.28	9.60	9.796E-01	----- Line	Not Found	-----	Absent
	86.94	8.90	1.849E+00	5.000E+01	5.000E+01	80.71	OK
	87.57	37.00*	1.849E+00	1.203E+01	1.203E+01	80.71	OK
CE-144	80.12	1.36	1.617E+00	----- Line	Not Found	-----	Absent
	133.52	11.09*	2.500E+00	1.886E+01	1.947E+01	128.39	OK
BI-214	609.32	45.49*	1.058E+00	2.286E+01	2.286E+01	48.91	OK
	1120.29	14.92	6.784E-01	4.544E+01	4.544E+01	88.66	OK
	1764.49	15.30	4.745E-01	----- Line	Not Found	-----	Absent
PB-214	74.82	5.80	1.423E+00	----- Line	Not Found	-----	<<INT Reject
	77.11	9.70	1.509E+00	----- Line	Not Found	-----	Absent
	87.09	3.41	1.840E+00	----- Line	Not Found	-----	<<INT Reject
	242.00	7.25	2.075E+00	----- Line	Not Found	-----	<<INT Reject
	295.22	18.42	1.816E+00	2.726E+01	2.726E+01	67.39	OK
	351.93	35.60*	1.598E+00	1.434E+01	1.434E+01	100.64	OK
RA-224	240.99	4.10*	2.074E+00	7.186E+01	7.280E+01	98.50	OK
AM-243	43.53	5.90	9.975E-02	----- Line	Not Found	-----	Absent
	74.66	67.20*	1.400E+00	1.154E+00	1.154E+00	1069.43	OK

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372012.CNF;1
Acquisition date : 21-DEC-2016 11:53:40 Sensitivity : 3.000
Detector ID : GAM02 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.40 Half life ratio : *****
Sample date : 8-DEC-2016 10:16:00 Analyst initials: MXR1
Sample ID : G412372012 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 23-AUG-2016 10:34:12 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM02_2LMB.CNF;12

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
K-40	9.353E+01	5.950E+01	5.509E+01
CD-109	1.227E+02	9.703E+01	1.357E+02
SN-126	1.203E+01	9.514E+00	1.318E+01
CE-144	1.947E+01	2.449E+01	3.337E+01
BI-214	2.286E+01	1.096E+01	1.134E+01
PB-214	1.434E+01	1.414E+01	1.128E+01
RA-224	7.280E+01	7.028E+01	8.262E+01
AM-243	1.154E+00	1.210E+01	1.028E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-1.882E+01	2.648E+01	4.391E+01	NOT IDENT.
NA-22	4.629E-01	2.498E+00	5.136E+00	NOT IDENT.
NA-24	0.000E+00	5.213E+06	0.000E+00	SHORT HLIF
AL-26	-2.346E+00	2.672E+00	4.312E+00	NOT IDENT.
SC-46	1.052E+00	2.340E+00	5.021E+00	FAIL ABUN
V-48	-5.533E-01	4.892E+00	8.191E+00	NOT IDENT.
CR-51	-2.714E+00	2.701E+01	4.931E+01	NOT IDENT.
MN-52	-4.105E+00	1.141E+01	2.093E+01	NOT IDENT.
MN-54	-4.948E-02	2.918E+00	5.577E+00	NOT IDENT.
CO-56	-2.564E+00	2.985E+00	5.037E+00	FAIL ABUN
CO-57	-7.837E-01	2.576E+00	4.276E+00	NOT IDENT.
CO-58	-3.501E+00	3.814E+00	5.310E+00	NOT IDENT.
FE-59	4.641E-01	5.125E+00	1.032E+01	NOT IDENT.
CO-60	3.566E+00	2.642E+00	6.474E+00	NOT IDENT.
ZN-65	3.727E+00	5.913E+00	1.166E+01	NOT IDENT.
CU-67	-2.790E+02	2.052E+02	3.669E+02	NOT IDENT.
GE-68	1.174E+01	8.290E+01	1.657E+02	NOT IDENT.
AS-74	2.576E+00	8.015E+00	1.488E+01	NOT IDENT.
SE-75	-6.060E-01	3.600E+00	6.534E+00	FAIL ABUN
BR-77	8.100E+02	5.976E+02	8.293E+02	FAIL ABUN
SR-82	1.028E+01	2.341E+01	4.808E+01	NOT IDENT.
RB-83	-1.543E+00	5.835E+00	1.025E+01	NOT IDENT.

RB-84	2.972E+00	4.859E+00	1.025E+01	NOT IDENT.
KR-85	-1.589E+03	8.525E+02	1.238E+03	NOT IDENT.
SR-85	-8.170E+00	4.383E+00	6.363E+00	NOT IDENT.
RB-86	6.133E+00	5.053E+01	1.001E+02	NOT IDENT.
Y-88	1.257E+00	2.268E+00	5.768E+00	NOT IDENT.
Y-91	6.418E+02	1.235E+03	2.438E+03	NOT IDENT.
NB-94	-1.214E-02	2.703E+00	4.641E+00	NOT IDENT.
NB-95	2.116E+00	3.211E+00	6.619E+00	NOT IDENT.
NB-95M	1.113E+00	9.603E+00	1.615E+01	NOT IDENT.
ZR-95	-1.836E-01	4.956E+00	9.638E+00	NOT IDENT.
MO-99	3.673E+01	5.110E+02	1.012E+03	FAIL ABUN
TC-99M	0.000E+00	1.640E+16	0.000E+00	SHORT HLIF
RH-101	-7.564E-01	3.027E+00	5.042E+00	FAIL ABUN
RH-102M	1.458E+00	2.467E+00	4.790E+00	NOT IDENT.
RU-103	-6.459E-01	4.044E+00	6.333E+00	FAIL ABUN
RH-106	6.085E+00	2.526E+01	4.743E+01	NOT IDENT.
RU-106	6.085E+00	2.526E+01	4.743E+01	NOT IDENT.
AG-108M	7.623E-01	2.325E+00	4.429E+00	NOT IDENT.
AG-110M	-9.255E-01	3.401E+00	6.374E+00	FAIL ABUN
SN-113	-2.399E+00	3.510E+00	5.937E+00	NOT IDENT.
IN-114M	-1.168E+01	1.500E+01	2.631E+01	NOT IDENT.
CD-115	9.291E+01	5.136E+02	9.543E+02	FAIL ABUN
SN-117M	-6.262E-01	4.134E+00	7.631E+00	NOT IDENT.
I-123	0.000E+00	3.204E+07	0.000E+00	SHORT HLIF
TE-123M	-5.484E-01	2.351E+00	4.317E+00	NOT IDENT.
SB-124	3.567E-01	6.656E+00	1.400E+01	NOT IDENT.
SB-125	-1.080E+00	7.340E+00	1.320E+01	NOT IDENT.
TE-125M	-6.114E+02	1.021E+03	1.662E+03	NOT IDENT.
I-126	7.699E+00	1.246E+01	2.671E+01	NOT IDENT.
SB-126	6.657E+00	8.241E+00	1.805E+01	NOT IDENT.
SB-127	2.294E+01	6.083E+01	1.261E+02	NOT IDENT.
TE-129	1.648E+01	4.023E+01	7.637E+01	NOT IDENT.
I-131	-4.987E-01	7.593E+00	1.388E+01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-2.037E+01	3.737E+01	6.613E+01	NOT IDENT.
BA-133	1.019E+00	3.656E+00	6.236E+00	NOT IDENT.
I-133	0.000E+00	9.489E+04	0.000E+00	SHORT HLIF
CS-134	1.614E+00	3.110E+00	6.394E+00	NOT IDENT.
CS-135	-3.791E+00	1.277E+01	2.288E+01	NOT IDENT.
I-135	0.000E+00	2.517E+15	0.000E+00	SHORT HLIF
CS-136	-1.518E+00	6.321E+00	1.183E+01	NOT IDENT.
BA-137M	-5.958E-01	2.444E+00	4.643E+00	NOT IDENT.
CS-137	-6.294E-01	2.582E+00	4.905E+00	NOT IDENT.
CE-139	1.733E-01	2.502E+00	4.670E+00	NOT IDENT.
BA-140	-1.307E+00	1.838E+01	3.335E+01	NOT IDENT.
LA-140	-3.743E+00	5.871E+00	1.050E+01	FAIL ABUN
CE-141	-3.184E-01	5.768E+00	9.677E+00	NOT IDENT.
CE-143	2.448E+03	4.130E+03	7.191E+03	NOT IDENT.
PM-144	-6.393E-02	2.347E+00	4.577E+00	NOT IDENT.
PR-144	-4.779E+00	1.755E+02	3.422E+02	NOT IDENT.
PM-146	-4.795E-02	3.050E+00	5.627E+00	NOT IDENT.
ND-147	-1.946E+01	4.267E+01	7.277E+01	NOT IDENT.
PM-147	2.771E+04	7.167E+04	1.261E+05	NOT IDENT.
PM-149	5.280E+01	4.159E+03	7.618E+03	NOT IDENT.
EU-152	6.093E+00	8.303E+00	1.614E+01	NOT IDENT.
GD-153	-1.446E+00	9.419E+00	1.530E+01	NOT IDENT.
EU-154	1.488E+00	7.125E+00	1.470E+01	NOT IDENT.
EU-155	-2.322E+00	1.094E+01	1.843E+01	FAIL ABUN
HO-166M	-1.542E-01	4.845E+00	8.306E+00	FAIL ABUN
TM-171	7.111E+02	2.408E+03	4.343E+03	NOT IDENT.
LU-176	1.033E+00	2.263E+00	4.299E+00	FAIL ABUN
LU-177	-7.702E+00	7.163E+01	1.314E+02	NOT IDENT.
HF-181	-1.783E+00	3.262E+00	5.546E+00	NOT IDENT.
W-181	-6.158E+00	2.503E+01	4.321E+01	NOT IDENT.
TA-182	7.414E+00	1.021E+01	2.276E+01	FAIL ABUN
RE-183	1.229E+01	2.281E+01	4.179E+01	NOT IDENT.
RE-184	2.570E+00	8.577E+00	1.742E+01	NOT IDENT.
RE-188	6.015E+00	1.564E+01	2.704E+01	NOT IDENT.
W-188	-3.720E+02	6.528E+02	1.002E+03	NOT IDENT.
OS-191	-4.570E-01	1.429E+01	2.417E+01	NOT IDENT.
IR-192	1.505E+00	2.708E+00	5.234E+00	FAIL ABUN
HG-203	-1.315E+00	2.886E+00	5.104E+00	FAIL ABUN
BI-207	-3.347E-01	3.403E+00	6.539E+00	FAIL ABUN
TL-208	5.465E-01	3.678E+00	6.733E+00	NOT IDENT.
PB-210	-6.424E+01	5.343E+02	9.438E+02	NOT IDENT.
PO-210	-6.424E+01	5.343E+02	9.438E+02	NOT IDENT.
BI-211	3.956E+01	3.902E+01	4.620E+01	FAIL ABUN
PB-211	-4.538E+00	5.806E+01	9.453E+01	NOT IDENT.

BI-212	-3.101E+00	3.982E+01	7.603E+01	NOT IDENT.
PB-212	9.502E+00	7.010E+00	9.699E+00	FAIL ABUN
BI-213	3.387E+00	9.132E+00	1.723E+01	NOT IDENT.
RN-219	-3.832E+00	3.204E+01	5.795E+01	NOT IDENT.
FR-221	-8.420E+00	1.700E+01	3.025E+01	NOT IDENT.
RA-223	1.079E+01	5.169E+01	9.661E+01	NOT IDENT.
RA-226	-5.947E+01	8.353E+01	1.533E+02	NOT IDENT.
AC-227	-1.610E+00	2.065E+01	3.779E+01	NOT IDENT.
TH-227	-1.610E+00	2.065E+01	3.779E+01	NOT IDENT.
AC-228	-2.901E+00	1.180E+01	2.146E+01	NOT IDENT.
RA-228	-2.901E+00	1.180E+01	2.146E+01	NOT IDENT.
TH-228	9.502E+00	7.010E+00	9.699E+00	FAIL ABUN
TH-229	1.752E+00	4.689E+01	8.300E+01	FAIL ABUN
TH-230	-5.097E+02	1.183E+03	1.999E+03	NOT IDENT.
PA-231	-8.180E+00	3.965E+01	7.127E+01	NOT IDENT.
TH-231	-5.148E+00	5.531E+01	8.682E+01	NOT IDENT.
TH-232	-3.105E+03	2.544E+03	4.240E+03	NOT IDENT.
PA-233	2.832E+00	5.351E+00	1.026E+01	NOT IDENT.
PA-234	3.086E+00	1.825E+01	3.737E+01	NOT IDENT.
PA-234M	2.051E+02	5.294E+02	8.637E+02	FAIL ABUN
TH-234	-1.283E+02	1.811E+02	3.116E+02	NOT IDENT.
U-234	-2.157E+03	8.828E+03	1.528E+04	NOT IDENT.
U-235	8.776E+00	2.175E+01	3.597E+01	NOT IDENT.
NP-237	2.832E+00	5.351E+00	1.026E+01	NOT IDENT.
NP-238	6.129E+00	8.163E+02	1.403E+03	NOT IDENT.
U-238	-1.283E+02	1.811E+02	3.116E+02	NOT IDENT.
NP-239	-1.674E+00	2.584E+01	4.396E+01	NOT IDENT.
AM-241	-3.965E+00	1.804E+01	3.117E+01	NOT IDENT.
AM-242	-3.327E+01	7.301E+01	1.158E+02	NOT IDENT.
CM-243	-3.092E+00	1.064E+01	1.786E+01	NOT IDENT.
BK-247	-4.325E-01	6.514E+00	1.193E+01	NOT IDENT.
CM-247	7.022E-01	2.839E+00	5.363E+00	NOT IDENT.
CF-249	1.884E+00	3.177E+00	6.185E+00	NOT IDENT.
CF-251	-4.232E+00	1.099E+01	1.986E+01	NOT IDENT.
CF-252	-1.794E+04	1.852E+04	2.937E+04	NOT IDENT.
ANH-511	-1.240E+01	4.758E+00	8.311E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.38	59	159	0.91	126.27	122	8	8.21E-03	39.2	
2	0	74.23	91	228	1.22	147.94	143	10	1.26E-02	32.9	
3	0	87.42	50	102	0.93	174.31	172	6	6.99E-03	35.0	
4	0	92.12	216	206	1.15	183.69	178	11	3.00E-02	14.5	
5	0	134.66	28	105	1.44	268.70	266	7	3.87E-03	64.2	
6	0	139.38	43	105	1.06	278.13	275	7	5.96E-03	43.0	
7	0	150.10	26	75	0.93	299.56	297	5	3.67E-03	53.2	
8	0	185.47	131	173	1.22	370.23	365	10	1.82E-02	20.7	
9	0	197.98	44	104	1.91	395.24	392	8	6.04E-03	43.6	
10	5	238.57	60	57	2.19	476.33	472	16	8.31E-03	26.3	8.11E-01
11	5	242.21	48	49	1.91	483.61	472	16	6.67E-03	32.0	
12	0	295.13	55	60	1.92	589.35	585	8	7.64E-03	27.9	
13	0	351.59	65	93	1.07	702.19	696	12	8.96E-03	32.4	
14	0	412.16	56	48	5.95	823.22	813	18	7.84E-03	32.0	
15	0	493.45	28	50	6.89	985.68	976	18	3.91E-03	61.6	
16	0	510.73	135	64	2.99	1020.21	1011	17	1.88E-02	16.0	
17	0	558.63	33	31	0.80	1115.93	1108	14	4.60E-03	39.9	
18	0	609.18	76	32	1.23	1216.95	1212	10	1.06E-02	18.1	
19	0	707.56	16	29	3.80	1413.57	1407	12	2.16E-03	74.8	
20	0	815.22	9	11	0.74	1628.73	1623	9	1.27E-03	81.4	
21	0	911.09	10	10	1.42	1820.33	1812	10	1.36E-03	68.5	
22	0	989.82	20	27	0.59	1977.69	1968	21	2.82E-03	67.0	
23	0	1001.74	22	12	0.70	2001.52	1997	11	2.99E-03	39.1	
24	0	1120.67	36	12	4.46	2239.21	2232	17	5.00E-03	28.1	
25	0	1210.91	19	0	3.97	2419.58	2413	14	2.64E-03	22.9	
26	0	1237.99	12	4	0.69	2473.70	2469	9	1.68E-03	42.4	
27	0	1283.94	8	3	0.60	2565.55	2557	12	1.07E-03	57.9	
28	0	1460.93	49	6	2.86	2919.34	2911	21	6.79E-03	18.6	
29	0	1586.48	15	4	5.70	3170.31	3162	15	2.13E-03	37.5	
30	2	1762.92	13	0	2.40	3523.00	3519	13	1.74E-03	30.8	1.07E+00
31	2	1765.32	15	0	1.94	3527.79	3519	13	2.05E-03	28.7	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
K-40	1460.82	29	10.66*	5.542E-01	9.353E+01	9.353E+01	64.91
CD-109	88.03	50	3.70*	1.849E+00	1.380E+02	1.408E+02	69.92
SN-126	64.28	-----	9.60	9.796E-01	-----	Line Not Found	-----
	86.94	50	8.90	1.849E+00	5.739E+01	5.739E+01	69.92
	87.57	50	37.00*	1.849E+00	1.380E+01	1.380E+01	69.92
CE-144	80.12	-----	1.36	1.617E+00	-----	Line Not Found	-----
	133.52	28	11.09*	2.500E+00	1.886E+01	1.947E+01	128.39
BI-211	72.87	18	1.23	1.400E+00	1.916E+02	1.918E+02	349.04
	351.06	43	12.92*	1.598E+00	3.952E+01	3.956E+01	100.64
BI-214	609.32	59	45.49*	1.058E+00	2.286E+01	2.286E+01	48.91
	1120.29	25	14.92	6.784E-01	4.544E+01	4.544E+01	88.66
	1764.49	-----	15.30	4.745E-01	-----	Line Not Found	-----
PB-214	74.82	18	5.80	1.400E+00	4.063E+01	4.063E+01	349.04
	77.11	-----	9.70	1.509E+00	-----	Line Not Found	-----
	87.09	50	3.41	1.849E+00	1.498E+02	1.498E+02	69.92
	242.00	48	7.25	2.074E+00	5.991E+01	5.991E+01	64.08
	295.22	49	18.42	1.816E+00	2.726E+01	2.726E+01	67.39
	351.93	43	35.60*	1.598E+00	1.434E+01	1.434E+01	100.64
RA-224	240.99	48	4.10*	2.074E+00	1.059E+02	1.073E+02	64.08
AM-243	43.53	-----	5.90	9.975E-02	-----	Line Not Found	-----
	74.66	18	67.20*	1.400E+00	3.507E+00	3.507E+00	349.04

Flag: "*" = Keyline

Total number of lines in spectrum 24
Number of unidentified lines 6
Number of lines tentatively identified by NID 18 75.00%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	9.353E+01	9.353E+01	6.072E+01	64.91	
CD-109	461.40D	1.02	1.380E+02	1.408E+02	0.984E+02	69.92	
SN-126	2.30E+05Y	1.00	1.380E+01	1.380E+01	0.965E+01	69.92	
CE-144	284.91D	1.03	1.886E+01	1.947E+01	2.499E+01	128.39	
BI-211	21.77Y	1.00	3.952E+01	3.956E+01	3.981E+01	100.64	
BI-214	1600.00Y	1.00	2.286E+01	2.286E+01	1.118E+01	48.91	
PB-214	1600.00Y	1.00	1.434E+01	1.434E+01	1.443E+01	100.64	
RA-224	1.91Y	1.01	1.059E+02	1.073E+02	0.688E+02	64.08	
AM-243	7370.00Y	1.00	3.507E+00	3.507E+00	12.24E+00	349.04	
Total Activity :			4.504E+02	4.552E+02			

Grand Total Activity : 4.504E+02 4.552E+02

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	139.38	43	105	1.06	278.13	275	7	5.96E-03	86.0	2.51E+00	T
0	150.10	26	75	0.93	299.56	297	5	3.67E-03	****	2.51E+00	
0	197.98	33	104	1.91	395.24	392	8	4.59E-03	****	2.32E+00	T
5	238.57	46	57	2.19	476.33	472	16	6.34E-03	75.3	2.09E+00	T
0	412.16	56	48	5.95	823.22	813	18	7.84E-03	64.0	1.42E+00	T
0	493.45	28	50	6.89	985.68	976	18	3.91E-03	****	1.24E+00	T
0	558.63	21	31	0.80	1115.93	1108	14	2.86E-03	****	1.13E+00	
0	707.56	16	29	3.80	1413.57	1407	12	2.16E-03	****	9.48E-01	T
0	815.22	9	11	0.74	1628.73	1623	9	1.27E-03	****	8.55E-01	T
0	989.82	16	27	0.59	1977.69	1968	21	2.24E-03	****	7.43E-01	
0	1001.74	7	12	0.70	2001.52	1997	11	9.39E-04	****	7.37E-01	T
0	1210.91	19	0	3.97	2419.58	2413	14	2.64E-03	45.9	6.40E-01	
0	1237.99	12	4	0.69	2473.70	2469	9	1.68E-03	84.7	6.30E-01	T
0	1283.94	8	3	0.60	2565.55	2557	12	1.07E-03	****	6.13E-01	
0	1586.48	15	4	5.70	3170.31	3162	15	2.13E-03	75.0	5.19E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372012.CNF;1  *
* Acquisition date   : 21-DEC-2016 11:53:40 Sensitivity      : 3.000          *
* Detector ID       : GAM02 Energy tolerance: 1.500          *
* Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time : 0 02:00:00.40 Half life ratio : *****          *
* Sample date       : 8-DEC-2016 10:16:00 Nuclide Library : LIQUID      *
* Sample ID        : G412372012 Analyst initials: MXR1          *
* Batch Number     : 1624165 Sample Quantity : 2.0000E+00 LITER      *
* Wet wt corr      : 1.00000 Wet Weight      : 0.00000          *
*                                     Dry Weight      : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date    : 23-AUG-2016 10:34:12 Eff. Geometry   : 2LMB          *
* Eff. File        : DKA100:[CANBERRA.GAMMA]EFF_GAM02_2LMB.CNF;12          *
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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
K-40	2.326E+01
CD-109	6.415E+01
SN-126	6.223E+00
CE-144	1.574E+01
BI-214	5.145E+00
PB-214	5.194E+00
RA-224	3.831E+01
AM-243	4.874E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.969E+01	NOT IDENT.
NA-22	2.152E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.608E+00	NOT IDENT.
SC-46	2.159E+00	FAIL ABUN
V-48	3.496E+00	NOT IDENT.
CR-51	2.259E+01	NOT IDENT.
MN-52	8.170E+00	NOT IDENT.
MN-54	2.478E+00	NOT IDENT.
CO-56	2.176E+00	FAIL ABUN
CO-57	2.013E+00	NOT IDENT.
CO-58	2.318E+00	NOT IDENT.
FE-59	4.361E+00	NOT IDENT.
CO-60	2.809E+00	NOT IDENT.
ZN-65	5.068E+00	NOT IDENT.
CU-67	1.761E+02	NOT IDENT.
GE-68	7.121E+01	NOT IDENT.
AS-74	6.778E+00	NOT IDENT.
SE-75	3.031E+00	FAIL ABUN
BR-77	3.908E+02	FAIL ABUN
SR-82	2.133E+01	NOT IDENT.
RB-83	4.598E+00	NOT IDENT.
RB-84	4.525E+00	NOT IDENT.

KR-85	5.697E+02	NOT IDENT.
SR-85	2.929E+00	NOT IDENT.
RB-86	4.320E+01	NOT IDENT.
Y-88	2.276E+00	NOT IDENT.
Y-91	1.042E+03	NOT IDENT.
NB-94	2.054E+00	NOT IDENT.
NB-95	2.983E+00	NOT IDENT.
NB-95M	7.518E+00	NOT IDENT.
ZR-95	4.225E+00	NOT IDENT.
MO-99	4.438E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.370E+00	FAIL ABUN
RH-102M	2.185E+00	NOT IDENT.
RU-103	2.882E+00	FAIL ABUN
RH-106	2.121E+01	NOT IDENT.
RU-106	2.121E+01	NOT IDENT.
AG-108M	2.010E+00	NOT IDENT.
AG-110M	2.739E+00	FAIL ABUN
SN-113	2.682E+00	NOT IDENT.
IN-114M	1.233E+01	NOT IDENT.
CD-115	4.310E+02	FAIL ABUN
SN-117M	3.587E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	2.029E+00	NOT IDENT.
SB-124	5.741E+00	NOT IDENT.
SB-125	5.980E+00	NOT IDENT.
TE-125M	7.837E+02	NOT IDENT.
I-126	1.179E+01	NOT IDENT.
SB-126	7.974E+00	NOT IDENT.
SB-127	5.553E+01	NOT IDENT.
TE-129	3.489E+01	NOT IDENT.
I-131	6.320E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.078E+01	NOT IDENT.
BA-133	2.860E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.853E+00	NOT IDENT.
CS-135	1.063E+01	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	5.028E+00	NOT IDENT.
BA-137M	2.038E+00	NOT IDENT.
CS-137	2.153E+00	NOT IDENT.
CE-139	2.199E+00	NOT IDENT.
BA-140	1.485E+01	NOT IDENT.
LA-140	4.197E+00	FAIL ABUN
CE-141	4.564E+00	NOT IDENT.
CE-143	3.358E+03	NOT IDENT.
PM-144	2.016E+00	NOT IDENT.
PR-144	1.507E+02	NOT IDENT.
PM-146	2.517E+00	NOT IDENT.
ND-147	3.261E+01	NOT IDENT.
PM-147	5.940E+04	NOT IDENT.
PM-149	3.542E+03	NOT IDENT.
EU-152	7.482E+00	NOT IDENT.
GD-153	7.221E+00	NOT IDENT.
EU-154	6.172E+00	NOT IDENT.
EU-155	8.680E+00	FAIL ABUN
HO-166M	3.657E+00	FAIL ABUN
TM-171	2.046E+03	NOT IDENT.
LU-176	1.997E+00	FAIL ABUN
LU-177	6.148E+01	NOT IDENT.
HF-181	2.464E+00	NOT IDENT.
W-181	2.033E+01	NOT IDENT.
TA-182	9.783E+00	FAIL ABUN
RE-183	1.968E+01	NOT IDENT.
RE-184	7.629E+00	NOT IDENT.
RE-188	1.279E+01	NOT IDENT.
W-188	4.619E+02	NOT IDENT.
OS-191	1.139E+01	NOT IDENT.
IR-192	2.417E+00	FAIL ABUN
HG-203	2.353E+00	FAIL ABUN
BI-207	2.787E+00	FAIL ABUN
TL-208	3.091E+00	NOT IDENT.
PB-210	4.410E+02	NOT IDENT.
PO-210	4.410E+02	NOT IDENT.
BI-211	2.188E+01	FAIL ABUN
PB-211	4.260E+01	NOT IDENT.
BI-212	3.388E+01	NOT IDENT.

PB-212	4.570E+00	FAIL ABUN
BI-213	7.893E+00	NOT IDENT.
RN-219	2.632E+01	NOT IDENT.
FR-221	1.412E+01	NOT IDENT.
RA-223	4.457E+01	NOT IDENT.
RA-226	7.370E+01	NOT IDENT.
AC-227	1.756E+01	NOT IDENT.
TH-227	1.756E+01	NOT IDENT.
AC-228	9.483E+00	NOT IDENT.
RA-228	9.483E+00	NOT IDENT.
TH-228	4.570E+00	FAIL ABUN
TH-229	3.906E+01	FAIL ABUN
TH-230	9.410E+02	NOT IDENT.
PA-231	3.300E+01	NOT IDENT.
TH-231	4.123E+01	NOT IDENT.
TH-232	2.019E+03	NOT IDENT.
PA-233	4.756E+00	NOT IDENT.
PA-234	1.593E+01	NOT IDENT.
PA-234M	3.910E+02	FAIL ABUN
TH-234	1.486E+02	NOT IDENT.
U-234	7.192E+03	NOT IDENT.
U-235	1.707E+01	NOT IDENT.
NP-237	4.756E+00	NOT IDENT.
NP-238	6.037E+02	NOT IDENT.
U-238	1.486E+02	NOT IDENT.
NP-239	2.065E+01	NOT IDENT.
AM-241	1.466E+01	NOT IDENT.
AM-242	5.464E+01	NOT IDENT.
CM-243	8.388E+00	NOT IDENT.
BK-247	5.534E+00	NOT IDENT.
CM-247	2.439E+00	NOT IDENT.
CF-249	2.834E+00	NOT IDENT.
CF-251	9.330E+00	NOT IDENT.
CF-252	1.378E+04	NOT IDENT.
ANH-511	3.947E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372012.CNF;1
Acquisition date : 21-DEC-2016 11:53:40 Sensitivity : 3.000
Detector ID : GAM02 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.40 Half life ratio : *****
Sample date : 8-DEC-2016 10:16:00 Nuclide Library : LIQUID
Sample ID : G412372012 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 23-AUG-2016 10:34:12 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM02_2LMB.CNF;12

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	9.353E+01	5.970E+01	5.970E+01
CD-109	1.227E+02	9.757E+01	9.757E+01
SN-126	1.203E+01	9.546E+00	9.546E+00
CE-144	1.947E+01	2.452E+01	2.452E+01
BI-214	2.286E+01	1.100E+01	1.100E+01
PB-214	1.434E+01	1.416E+01	1.416E+01
RA-224	7.282E+01	7.042E+01	7.042E+01
AM-243	1.154E+00	1.210E+01	1.210E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.882E+01	2.649E+01	2.782E+01	NOT IDENT.
NA-22	4.629E-01	2.498E+00	2.506E+00	NOT IDENT.
NA-24	1.461E+06	5.214E+06	5.255E+06	SHORT HLIF
AL-26	-2.346E+00	2.677E+00	2.878E+00	NOT IDENT.
SC-46	1.052E+00	2.340E+00	2.388E+00	FAIL ABUN
V-48	-5.533E-01	4.892E+00	4.898E+00	NOT IDENT.
CR-51	-2.714E+00	2.701E+01	2.704E+01	NOT IDENT.
MN-52	-4.105E+00	1.142E+01	1.156E+01	NOT IDENT.
MN-54	-4.948E-02	2.918E+00	2.918E+00	NOT IDENT.
CO-56	-2.564E+00	2.987E+00	3.203E+00	FAIL ABUN
CO-57	-7.837E-01	2.576E+00	2.600E+00	NOT IDENT.
CO-58	-3.501E+00	3.816E+00	4.130E+00	NOT IDENT.
FE-59	4.641E-01	5.125E+00	5.129E+00	NOT IDENT.
CO-60	3.566E+00	2.645E+00	3.096E+00	NOT IDENT.
ZN-65	3.727E+00	5.914E+00	6.148E+00	NOT IDENT.
CU-67	-2.790E+02	2.057E+02	2.411E+02	NOT IDENT.
GE-68	1.174E+01	8.291E+01	8.307E+01	NOT IDENT.
AS-74	2.576E+00	8.018E+00	8.101E+00	NOT IDENT.
SE-75	-6.060E-01	3.600E+00	3.610E+00	FAIL ABUN
BR-77	8.100E+02	5.990E+02	7.015E+02	FAIL ABUN
SR-82	1.028E+01	2.341E+01	2.386E+01	NOT IDENT.
RB-83	-1.543E+00	5.838E+00	5.880E+00	NOT IDENT.

RB-84	2.972E+00	4.860E+00	5.042E+00	NOT IDENT.
KR-85	-1.589E+03	8.549E+02	1.115E+03	NOT IDENT.
SR-85	-8.170E+00	4.395E+00	5.734E+00	NOT IDENT.
RB-86	6.133E+00	5.053E+01	5.061E+01	NOT IDENT.
Y-88	1.257E+00	2.270E+00	2.339E+00	NOT IDENT.
Y-91	6.418E+02	1.236E+03	1.269E+03	NOT IDENT.
NB-94	-1.214E-02	2.703E+00	2.703E+00	NOT IDENT.
NB-95	2.116E+00	3.213E+00	3.351E+00	NOT IDENT.
NB-95M	1.113E+00	9.603E+00	9.616E+00	NOT IDENT.
ZR-95	-1.836E-01	4.956E+00	4.956E+00	NOT IDENT.
MO-99	3.673E+01	5.110E+02	5.113E+02	FAIL ABUN
TC-99M	1.945E+16	1.651E+16	0.000E+00	SHORT HLIF
RH-101	-7.564E-01	3.030E+00	3.049E+00	FAIL ABUN
RH-102M	1.458E+00	2.470E+00	2.556E+00	NOT IDENT.
RU-103	-6.459E-01	4.044E+00	4.055E+00	FAIL ABUN
RH-106	6.085E+00	2.526E+01	2.541E+01	NOT IDENT.
RU-106	6.085E+00	2.526E+01	2.541E+01	NOT IDENT.
AG-108M	7.623E-01	2.325E+00	2.350E+00	NOT IDENT.
AG-110M	-9.255E-01	3.402E+00	3.427E+00	FAIL ABUN
SN-113	-2.399E+00	3.511E+00	3.674E+00	NOT IDENT.
IN-114M	-1.168E+01	1.502E+01	1.591E+01	NOT IDENT.
CD-115	9.291E+01	5.137E+02	5.154E+02	FAIL ABUN
SN-117M	-6.262E-01	4.134E+00	4.143E+00	NOT IDENT.
I-123	-7.714E+06	3.204E+07	3.223E+07	SHORT HLIF
TE-123M	-5.484E-01	2.351E+00	2.364E+00	NOT IDENT.
SB-124	3.567E-01	6.656E+00	6.658E+00	NOT IDENT.
SB-125	-1.080E+00	7.340E+00	7.356E+00	NOT IDENT.
TE-125M	-6.114E+02	1.021E+03	1.058E+03	NOT IDENT.
I-126	7.699E+00	1.247E+01	1.295E+01	NOT IDENT.
SB-126	6.657E+00	8.267E+00	8.795E+00	NOT IDENT.
SB-127	2.294E+01	6.085E+01	6.173E+01	NOT IDENT.
TE-129	1.648E+01	4.032E+01	4.100E+01	NOT IDENT.
I-131	-4.987E-01	7.593E+00	7.596E+00	NOT IDENT.
I-132	-1.000E+41	2.166E+41	0.000E+00	SHORT HLIF
TE-132	-2.037E+01	3.741E+01	3.852E+01	NOT IDENT.
BA-133	1.019E+00	3.657E+00	3.685E+00	NOT IDENT.
I-133	4.822E+03	9.489E+04	9.491E+04	SHORT HLIF
CS-134	1.614E+00	3.111E+00	3.195E+00	NOT IDENT.
CS-135	-3.791E+00	1.277E+01	1.289E+01	NOT IDENT.
I-135	5.516E+14	2.522E+15	2.535E+15	SHORT HLIF
CS-136	-1.518E+00	6.322E+00	6.359E+00	NOT IDENT.
BA-137M	-5.958E-01	2.444E+00	2.459E+00	NOT IDENT.
CS-137	-6.294E-01	2.582E+00	2.597E+00	NOT IDENT.
CE-139	1.733E-01	2.502E+00	2.504E+00	NOT IDENT.
BA-140	-1.307E+00	1.838E+01	1.839E+01	NOT IDENT.
LA-140	-3.743E+00	5.873E+00	6.111E+00	FAIL ABUN
CE-141	-3.184E-01	5.768E+00	5.770E+00	NOT IDENT.
CE-143	2.448E+03	4.131E+03	4.276E+03	NOT IDENT.
PM-144	-6.393E-02	2.347E+00	2.348E+00	NOT IDENT.
PR-144	-4.779E+00	1.755E+02	1.755E+02	NOT IDENT.
PM-146	-4.795E-02	3.050E+00	3.050E+00	NOT IDENT.
ND-147	-1.946E+01	4.268E+01	4.357E+01	NOT IDENT.
PM-147	2.771E+04	7.168E+04	7.276E+04	NOT IDENT.
PM-149	5.280E+01	4.159E+03	4.159E+03	NOT IDENT.
EU-152	6.093E+00	8.310E+00	8.752E+00	NOT IDENT.
GD-153	-1.446E+00	9.420E+00	9.442E+00	NOT IDENT.
EU-154	1.488E+00	7.125E+00	7.157E+00	NOT IDENT.
EU-155	-2.322E+00	1.094E+01	1.099E+01	FAIL ABUN
HO-166M	-1.542E-01	4.845E+00	4.846E+00	FAIL ABUN
TM-171	7.111E+02	2.409E+03	2.430E+03	NOT IDENT.
LU-176	1.033E+00	2.263E+00	2.311E+00	FAIL ABUN
LU-177	-7.702E+00	7.163E+01	7.171E+01	NOT IDENT.
HF-181	-1.783E+00	3.263E+00	3.361E+00	NOT IDENT.
W-181	-6.158E+00	2.508E+01	2.524E+01	NOT IDENT.
TA-182	7.414E+00	1.021E+01	1.075E+01	FAIL ABUN
RE-183	1.229E+01	2.284E+01	2.351E+01	NOT IDENT.
RE-184	2.570E+00	8.579E+00	8.657E+00	NOT IDENT.
RE-188	6.015E+00	1.565E+01	1.588E+01	NOT IDENT.
W-188	-3.720E+02	6.541E+02	6.753E+02	NOT IDENT.
OS-191	-4.570E-01	1.429E+01	1.429E+01	NOT IDENT.
IR-192	1.505E+00	2.709E+00	2.792E+00	FAIL ABUN
HG-203	-1.315E+00	2.887E+00	2.947E+00	FAIL ABUN
BI-207	-3.347E-01	3.403E+00	3.406E+00	FAIL ABUN
TL-208	5.465E-01	3.678E+00	3.686E+00	NOT IDENT.
PB-210	-6.424E+01	5.343E+02	5.351E+02	NOT IDENT.
PO-210	-6.424E+01	5.343E+02	5.351E+02	NOT IDENT.
BI-211	3.956E+01	3.906E+01	4.294E+01	FAIL ABUN
PB-211	-4.538E+00	5.806E+01	5.810E+01	NOT IDENT.

BI-212	-3.101E+00	3.982E+01	3.985E+01	NOT IDENT.
PB-212	9.502E+00	7.028E+00	8.231E+00	FAIL ABUN
BI-213	3.387E+00	9.133E+00	9.260E+00	NOT IDENT.
RN-219	-3.832E+00	3.205E+01	3.210E+01	NOT IDENT.
FR-221	-8.420E+00	1.701E+01	1.743E+01	NOT IDENT.
RA-223	1.079E+01	5.170E+01	5.193E+01	NOT IDENT.
RA-226	-5.947E+01	8.359E+01	8.778E+01	NOT IDENT.
AC-227	-1.610E+00	2.065E+01	2.067E+01	NOT IDENT.
TH-227	-1.610E+00	2.065E+01	2.067E+01	NOT IDENT.
AC-228	-2.901E+00	1.180E+01	1.187E+01	NOT IDENT.
RA-228	-2.901E+00	1.180E+01	1.187E+01	NOT IDENT.
TH-228	9.502E+00	7.028E+00	8.231E+00	FAIL ABUN
TH-229	1.752E+00	4.689E+01	4.689E+01	FAIL ABUN
TH-230	-5.097E+02	1.186E+03	1.208E+03	NOT IDENT.
PA-231	-8.180E+00	3.969E+01	3.986E+01	NOT IDENT.
TH-231	-5.148E+00	5.531E+01	5.536E+01	NOT IDENT.
TH-232	-3.105E+03	2.570E+03	2.927E+03	NOT IDENT.
PA-233	2.832E+00	5.352E+00	5.502E+00	NOT IDENT.
PA-234	3.086E+00	1.859E+01	1.864E+01	NOT IDENT.
PA-234M	2.051E+02	5.295E+02	5.375E+02	FAIL ABUN
TH-234	-1.283E+02	1.833E+02	1.922E+02	NOT IDENT.
U-234	-2.157E+03	8.830E+03	8.883E+03	NOT IDENT.
U-235	8.776E+00	2.175E+01	2.211E+01	NOT IDENT.
NP-237	2.832E+00	5.352E+00	5.502E+00	NOT IDENT.
NP-238	6.129E+00	8.163E+02	8.163E+02	NOT IDENT.
U-238	-1.283E+02	1.833E+02	1.922E+02	NOT IDENT.
NP-239	-1.674E+00	2.584E+01	2.585E+01	NOT IDENT.
AM-241	-3.965E+00	1.804E+01	1.813E+01	NOT IDENT.
AM-242	-3.327E+01	7.324E+01	7.476E+01	NOT IDENT.
CM-243	-3.092E+00	1.064E+01	1.074E+01	NOT IDENT.
BK-247	-4.325E-01	6.515E+00	6.518E+00	NOT IDENT.
CM-247	7.022E-01	2.841E+00	2.859E+00	NOT IDENT.
CF-249	1.884E+00	3.181E+00	3.293E+00	NOT IDENT.
CF-251	-4.232E+00	1.100E+01	1.116E+01	NOT IDENT.
CF-252	-1.794E+04	2.465E+04	2.594E+04	NOT IDENT.
ANH-511	-1.240E+01	4.784E+00	7.357E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	63.0229	88.03	99.0121	140.88	107.5494
46.54	70.7422	88.34	99.0692	143.76	82.2001
49.72	77.5643	88.47	88.5828	144.24	89.6181
51.35	76.8613	91.11	202.1587	145.44	93.4495
52.39	80.1940	91.27	182.2219	152.32	76.0902
53.20	91.8417	92.59	103.2394	152.43	84.3723
56.28	92.5564	93.31	138.5866	153.25	104.3335
57.36	89.6387	94.56	249.3257	323.87	82.0760
57.53	91.7860	94.65	249.3658	155.04	89.6309
57.53	91.7864	94.67	175.3590	156.02	82.2623
57.98	73.9316	97.43	80.0932	158.56	85.8585
59.32	91.1237	98.43	79.0848	158.97	0.0000
59.54	90.1115	98.44	79.0864	159.00	86.7386
61.49	126.7380	99.53	88.4203	162.33	86.2566
63.00	85.5008	100.11	86.2083	162.66	87.9668
63.29	84.4881	100.20	103.4658	163.33	91.3922
63.58	96.3165	102.03	73.8032	165.86	84.9434
63.81	96.3669	103.18	86.6541	176.31	74.9250
64.28	116.8360	103.37	86.6816	176.60	93.6875
64.99	136.3485	105.31	93.9158	177.52	89.5230
65.08	121.3428	106.12	85.9137	181.07	79.6125
66.73	80.8348	106.47	81.3161	184.41	94.5189
66.98	78.7226	109.28	108.5246	184.58	94.5368
67.24	87.3998	111.00	102.9713	185.72	86.9119
67.67	97.2029	111.76	103.0948	186.21	88.6812
67.75	97.2194	112.95	84.5079	190.27	93.4014
69.67	96.9041	116.24	89.6586	193.51	84.3569
70.83	89.8951	116.30	89.6670	198.01	81.1006
72.81	112.4755	116.74	82.6438	201.83	57.7876
72.87	112.4897	117.23	64.9831	205.31	69.4199
74.66	112.9085	119.76	86.5811	208.37	73.1645
74.82	112.9454	99.53	90.2448	210.85	63.6284
74.97	112.9808	120.90	77.2244	218.12	77.4463
77.11	95.4793	121.12	77.2500	222.11	57.1960
79.69	86.3747	121.22	77.2614	227.09	61.9627
80.12	85.3396	121.78	93.9807	227.38	61.0813
80.19	77.5922	122.06	95.2100	228.16	72.8130
80.57	85.4148	123.07	79.8574	228.18	72.8146
81.00	98.8097	265.00	77.5431	116.74	72.8146
81.07	98.8233	127.23	88.7368	235.69	58.3954
83.79	83.7164	129.43	91.4236	235.96	58.4105
84.00	69.9774	131.20	93.2612	238.63	54.4702
84.21	80.4320	133.02	101.5611	238.98	54.4879
85.43	95.5469	133.52	93.5656	240.99	54.5892
86.55	113.7008	136.00	75.2721	242.00	54.6399
86.94	112.2864	57.53	75.3014	244.70	60.2529
87.09	112.3177	136.47	87.4698	250.62	66.0828
87.57	95.5556	140.51	99.3534	252.40	66.1875

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.80	58.8542	366.42	36.1414	630.19	0.0000
256.23	59.9556	356.01	37.5781	631.29	23.1909
260.90	52.7916	388.16	30.5548	155.04	26.6901
264.66	58.5383	388.63	30.5640	633.25	15.0873
265.00	56.6973	391.70	40.8325	634.78	9.2907
268.22	63.3778	264.66	39.0135	635.95	10.4575
269.46	56.9132	401.81	34.9325	636.99	9.2998
271.23	56.9989	402.40	29.8060	645.85	16.6302
273.65	47.7523	404.85	29.3373	657.76	22.8754
276.40	51.6162	410.95	28.9325	661.66	20.2703
277.37	53.5361	414.70	38.8390	664.57	18.5307
277.60	53.5465	423.72	40.6163	666.33	12.3632
278.00	55.4433	427.09	39.6552	666.50	12.3641
278.43	50.7634	427.87	33.4102	667.71	0.0000
279.20	55.4986	433.94	27.2441	677.62	18.6339
279.54	50.8096	440.45	33.6608	685.70	14.2456
280.46	50.8480	453.88	24.3837	695.00	19.6636
283.69	51.9273	459.60	30.8461	696.49	18.7813
284.31	58.5665	463.37	34.1100	696.51	18.7813
285.41	54.8364	468.07	27.7879	697.00	25.0469
285.90	58.6422	473.00	31.0798	697.49	18.7890
287.50	55.8767	475.06	26.8239	702.65	20.0840
290.67	59.8174	476.78	34.3672	706.68	17.9620
293.27	52.8070	477.60	36.5317	711.68	18.7186
351.93	58.1295	477.99	30.0912	720.70	10.8387
295.96	65.7923	482.18	29.0841	721.93	19.8804
299.98	59.3057	487.02	25.9209	722.78	15.3673
300.09	59.3107	492.35	28.1624	722.91	16.2724
300.13	59.3120	497.08	37.4648	723.31	19.8918
301.36	56.4973	511.00	54.7002	724.19	21.7075
302.85	49.8513	514.00	88.7544	727.33	23.5458
256.23	54.7155	520.40	29.6829	733.00	19.9691
304.85	58.5713	520.69	29.6884	735.93	17.2657
306.78	48.0804	522.65	0.0000	739.50	16.3801
308.46	52.9567	527.90	26.4873	744.23	21.8811
311.90	43.4427	529.59	28.7200	747.24	23.7323
316.51	38.7516	529.87	0.0000	752.31	13.7187
319.41	44.6617	531.02	32.0574	753.82	23.7934
320.08	41.7691	537.26	23.2875	756.73	17.4066
321.04	43.7439	546.56	0.0000	763.94	25.7236
323.87	43.8354	552.55	15.0853	765.80	19.3062
325.23	49.7310	563.25	28.6450	766.42	13.7938
328.76	46.9268	569.33	21.4067	766.84	13.7956
333.37	41.1993	946.00	21.4082	772.60	0.0000
334.37	58.8989	569.70	21.4106	776.52	15.6931
338.28	33.4708	583.19	23.8173	739.50	15.7014
338.32	33.4715	595.83	29.6647	778.90	21.2509
311.90	44.3692	427.87	22.8695	783.70	14.8101
340.55	44.3710	602.73	22.8923	785.37	14.8193
344.28	40.5345	604.72	30.9320	792.07	17.6420
345.93	41.5719	609.32	32.1460	795.86	16.7371
351.06	45.6958	610.33	37.9038	802.10	19.5721
351.93	45.7230	614.28	35.9011	810.29	31.4098
356.01	35.8850	618.01	19.5947	344.28	31.4118
364.49	36.0945	621.93	20.7847	810.76	29.9189

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	16.4855	1129.67	7.2461		
1048.07	6.0008	1131.51	0.0000		
832.01	16.9596	1173.23	12.5720		
834.85	21.6931	1189.05	8.4175		
836.80	0.0000	1204.77	6.7625		
846.77	23.6794	1221.41	6.3677		
856.80	17.1096	1231.02	8.5117		
860.56	13.3250	1235.36	11.9301		
871.09	16.2394	1238.28	6.8223		
873.19	15.2954	1260.41	0.0000		
875.33	0.0000	1274.44	7.5315		
880.51	12.4589	1274.54	7.5315		
881.60	12.4636	1291.59	12.9668		
883.24	12.4704	1298.22	0.0000		
884.68	15.3560	1312.11	8.6890		
889.28	8.6512	1332.49	3.2748		
894.76	19.2609	1365.19	11.0028		
898.04	7.7129	1368.63	0.0000		
903.28	13.5215	1384.29	9.9476		
911.20	8.7155	1408.01	4.4460		
923.98	13.6151	1434.09	6.7094		
926.36	5.8396	1457.56	0.0000		
935.54	16.5953	1460.82	9.9011		
937.49	10.7449	1489.16	6.3410		
944.13	7.8313	1596.21	10.1981		
946.00	9.7952	1620.50	3.7273		
949.00	8.8242	1678.03	0.0000		
667.71	0.0000	1690.97	6.6175		
964.08	13.7932	1764.49	2.8774		
968.97	14.8013	1063.66	9.6021		
983.53	12.6887	1771.35	3.8416		
984.45	12.6922	1791.20	0.0000		
996.26	27.8667	1808.65	8.7056		
1001.03	17.5420	1836.06	1.9446		
1274.44	9.5795				
1025.87	11.0477				
1028.54	14.0718				
1037.84	13.1031				
1038.76	0.0000				
475.06	15.1593				
1048.07	13.1436				
1050.41	11.1296				
1063.66	12.1890				
1077.00	12.2366				
1077.34	11.2182				
459.60	10.2173				
1085.87	9.2010				
1099.25	9.2368				
1111.64	16.4785				
1112.07	15.4504				
1112.84	12.9520				
1115.54	8.2485				
1120.29	12.3896				
1120.55	12.3904				
1221.41	12.3926				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 13:54:54.83

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372013.CNF:1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM06.CNF:510
Background date  : 18-DEC-2016 13:11:25
Sample date      : 8-DEC-2016 10:11:00. Acquisition date : 21-DEC-2016 11:54:02
Sample ID        : G412372013. Sample quantity : 2.00000E+00 LITER
Detector name     : GAM06. Detector geometry: 2LMB
Elapsed live time : 0 02:00:00.00. Elapsed real time: 0 02:00:00.80 0.0%
Energy tolerance  : 1.50000 keV. Analyst Initials : MXR1
Abundance limit   : 75.00000. Sensitivity : 3.00000
Batch ID          : 1624165. Detector SN# :
Matrix Spike ID   : LCS ID : 1604
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	62.53*	22	138	1.34	124.78	121	10	3.04E-03	106.7	
2	0	66.62*	19	100	0.79	132.96	130	7	2.62E-03	94.7	
3	0	92.95*	35	130	1.25	185.57	181	11	4.83E-03	71.3	
4	0	140.40*	18	97	1.06	280.40	276	8	2.53E-03	103.0	
5	4	143.96*	25	65	1.54	287.50	284	25	3.50E-03	61.3	1.85E+00
6	4	150.97	39	79	1.56	301.52	284	25	5.49E-03	44.0	
7	0	186.03*	16	104	1.11	371.58	367	12	2.16E-03	142.8	
8	0	199.00*	31	92	1.18	397.51	391	11	4.27E-03	65.8	
9	3	237.17	17	34	1.57	473.78	471	15	2.41E-03	56.5	4.18E+00
10	3	238.78*	3	51	1.18	477.00	471	15	3.50E-04	561.7	
11	3	241.28	20	56	1.19	482.00	471	15	2.74E-03	65.5	
12	0	284.93	10	28	1.27	569.24	566	5	1.32E-03	89.9	
13	0	295.60*	20	59	2.58	590.57	585	10	2.76E-03	78.2	
14	0	317.39	17	31	0.71	634.11	631	7	2.42E-03	57.5	
15	0	320.88	15	33	0.65	641.10	638	7	2.10E-03	68.1	
16	0	393.55	48	44	7.57	786.35	776	23	6.60E-03	39.7	
17	0	419.93	21	79	7.27	839.08	817	27	2.96E-03	119.5	
18	0	464.30	10	32	2.90	927.78	916	14	1.35E-03	132.0	
19	0	584.65*	5	37	2.28	1168.38	1159	16	6.44E-04	303.9	
20	0	609.74*	30	20	1.19	1218.53	1214	10	4.10E-03	35.8	
21	0	698.50	12	9	1.50	1396.00	1392	9	1.67E-03	53.5	
22	0	842.92	13	2	0.99	1684.77	1681	9	1.84E-03	33.8	
23	0	875.39	9	7	0.78	1749.71	1744	9	1.30E-03	59.8	
24	0	926.67*	7	3	0.92	1852.24	1846	10	1.01E-03	67.9	
25	0	956.88	8	9	2.56	1912.67	1908	10	1.17E-03	70.8	
26	0	970.45	15	2	2.55	1939.79	1933	11	2.06E-03	33.4	
27	0	1068.88	7	3	1.43	2136.64	2133	6	9.72E-04	54.4	
28	0	1120.30	15	5	0.81	2239.49	2234	10	2.12E-03	37.3	
29	0	1386.26	8	0	0.83	2771.50	2767	8	1.11E-03	35.4	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 13:54:56

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372013.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 8-DEC-2016 10:11:00	Acquisition date	: 21-DEC-2016 11:54:02
Sample ID	: G412372013	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA6	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.80 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Empirical	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CR-51	320.08	15	9.91*	1.529E+00	1.874E+01	2.602E+01	136.17
CU-67	91.27	-----	7.00	1.893E+00	-----	Line Not Found	-----
	93.31	35	16.10	1.933E+00	2.098E+01	7.147E+02	142.65
	184.58	16	48.70*	2.097E+00	2.859E+00	9.737E+01	285.57
NB-95M	235.69	17	24.80*	1.843E+00	7.120E+00	8.206E+00	112.93
CE-141	145.44	25	48.29*	2.279E+00	4.299E+00	5.686E+00	122.58
PM-149	285.90	10	3.10*	1.649E+00	3.489E+01	2.126E+03	179.80
TL-208	277.37	-----	6.60	1.676E+00	-----	Line Not Found	-----
	583.19	5	85.00*	1.024E+00	9.999E-01	1.013E+00	607.84
	860.56	-----	12.50	7.641E-01	-----	Line Not Found	-----
BI-214	609.32	30	45.49*	9.941E-01	1.225E+01	1.225E+01	71.59
	1120.29	15	14.92	6.141E-01	3.134E+01	3.134E+01	74.52
	1764.49	-----	15.30	4.334E-01	-----	Line Not Found	-----
RA-224	240.99	20	4.10*	1.825E+00	4.945E+01	5.009E+01	131.09
RA-226	186.21	16	3.59*	2.097E+00	3.878E+01	3.878E+01	285.57
TH-230	67.67	19	0.38*	9.959E-01	9.362E+02	9.362E+02	189.41
TH-232	63.81	22	0.26*	8.073E-01	1.956E+03	1.956E+03	213.35
	140.88	18	0.02	2.287E+00	7.478E+03	7.478E+03	205.93
TH-234	63.29	22	3.70*	8.073E-01	1.375E+02	1.375E+02	213.35
	92.59	35	4.23	1.933E+00	7.987E+01	7.987E+01	142.65
U-235	143.76	25	10.96*	2.279E+00	1.894E+01	1.894E+01	122.58
	163.33	-----	5.08	2.209E+00	-----	Line Not Found	-----
	185.72	16	57.20	2.097E+00	2.434E+00	2.434E+00	285.57
	205.31	-----	5.01	1.998E+00	-----	Line Not Found	-----
U-238	63.29	22	3.70*	8.073E-01	1.375E+02	1.375E+02	213.35
	92.59	35	4.23	1.933E+00	7.987E+01	7.987E+01	142.65

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372013.CNF;1
Acquisition date : 21-DEC-2016 11:54:02 Sensitivity : 3.000
Detector ID : GAM06 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.80 Half life ratio : *****
Sample date : 8-DEC-2016 10:11:00 Analyst initials: MXR1
Sample ID : G412372013 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 9-MAR-2016 05:50:02 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM06_2LMB.CNF;16

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
CR-51	2.602E+01	3.473E+01	4.493E+01
CU-67	9.737E+01	2.725E+02	2.004E+02
NB-95M	8.206E+00	9.082E+00	1.356E+01
CE-141	5.686E+00	6.830E+00	7.659E+00
PM-149	2.126E+03	3.746E+03	5.962E+03
TL-208	1.013E+00	6.034E+00	4.110E+00
BI-214	1.225E+01	8.593E+00	9.148E+00
RA-224	5.009E+01	6.435E+01	9.116E+01
RA-226	3.878E+01	1.085E+02	7.600E+01
TH-230	9.362E+02	1.738E+03	1.791E+03
TH-232	1.956E+03	4.090E+03	3.078E+03
TH-234	1.375E+02	2.874E+02	2.223E+02
U-235	1.894E+01	2.275E+01	2.544E+01
U-238	1.375E+02	2.874E+02	2.223E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-8.139E+00	2.131E+01	3.892E+01	NOT IDENT.
NA-22	-2.806E-01	2.198E+00	4.507E+00	NOT IDENT.
NA-24	0.000E+00	5.402E+06	0.000E+00	SHORT HLIF
AL-26	2.557E+00	2.785E+00	6.986E+00	NOT IDENT.
K-40	-2.200E+01	3.688E+01	6.208E+01	NOT IDENT.
SC-46	-1.736E-01	2.557E+00	4.834E+00	FAIL ABUN
V-48	-2.746E+00	3.163E+00	5.349E+00	NOT IDENT.
MN-52	4.363E+00	1.315E+01	2.913E+01	NOT IDENT.
MN-54	-6.144E-01	2.689E+00	4.845E+00	NOT IDENT.
CO-56	2.815E+00	2.358E+00	5.437E+00	NOT IDENT.
CO-57	-8.394E-01	1.851E+00	3.212E+00	NOT IDENT.
CO-58	-8.726E-02	1.947E+00	3.862E+00	NOT IDENT.
FE-59	2.317E+00	5.111E+00	1.137E+01	NOT IDENT.
CO-60	1.079E+00	2.075E+00	5.000E+00	NOT IDENT.
ZN-65	5.066E+00	4.204E+00	1.069E+01	NOT IDENT.
GE-68	4.645E+01	6.881E+01	1.616E+02	NOT IDENT.

AS-74	2.842E+00	7.136E+00	1.402E+01	NOT IDENT.
SE-75	-1.714E-01	3.045E+00	5.355E+00	NOT IDENT.
BR-77	5.105E+01	5.621E+02	7.929E+02	FAIL ABUN
SR-82	3.739E-01	1.815E+01	3.572E+01	NOT IDENT.
RB-83	-4.394E+00	4.592E+00	7.510E+00	NOT IDENT.
RB-84	3.332E+00	4.118E+00	9.235E+00	NOT IDENT.
KR-85	-1.721E+03	7.599E+02	1.074E+03	NOT IDENT.
SR-85	-8.849E+00	3.907E+00	5.522E+00	NOT IDENT.
RB-86	1.967E+01	3.830E+01	8.889E+01	NOT IDENT.
Y-88	1.002E-01	3.583E+00	7.226E+00	NOT IDENT.
Y-91	5.008E+01	1.243E+03	2.525E+03	NOT IDENT.
NB-94	3.802E-01	2.706E+00	4.685E+00	NOT IDENT.
NB-95	-1.299E+00	2.273E+00	3.880E+00	NOT IDENT.
ZR-95	2.271E+00	3.146E+00	7.495E+00	NOT IDENT.
MO-99	-8.693E+01	3.296E+02	6.290E+02	FAIL ABUN
TC-99M	0.000E+00	1.847E+16	0.000E+00	SHORT HLIF
RH-101	1.991E+00	2.447E+00	4.721E+00	FAIL ABUN
RH-102M	8.153E-01	1.981E+00	4.033E+00	FAIL ABUN
RU-103	-5.609E-01	2.410E+00	4.532E+00	FAIL ABUN
RH-106	-1.272E+00	1.824E+01	3.531E+01	NOT IDENT.
RU-106	-1.272E+00	1.824E+01	3.531E+01	NOT IDENT.
AG-108M	-8.056E-01	1.984E+00	3.634E+00	NOT IDENT.
CD-109	3.463E-01	5.419E+01	9.977E+01	NOT IDENT.
AG-110M	3.171E-01	3.365E+00	6.543E+00	NOT IDENT.
SN-113	1.628E-01	2.617E+00	5.182E+00	NOT IDENT.
IN-114M	-3.047E+00	1.393E+01	2.215E+01	NOT IDENT.
CD-115	-1.142E+02	4.395E+02	8.106E+02	NOT IDENT.
SN-117M	-6.834E-01	4.102E+00	7.164E+00	NOT IDENT.
I-123	0.000E+00	3.237E+07	0.000E+00	SHORT HLIF
TE-123M	1.367E-01	2.362E+00	4.205E+00	NOT IDENT.
SB-124	-2.353E+00	5.185E+00	9.572E+00	NOT IDENT.
SB-125	1.392E+00	6.054E+00	1.207E+01	FAIL ABUN
TE-125M	3.004E+02	7.605E+02	1.424E+03	NOT IDENT.
I-126	5.213E+00	1.175E+01	2.458E+01	NOT IDENT.
SB-126	4.619E+00	7.065E+00	1.561E+01	NOT IDENT.
SN-126	1.736E+00	5.360E+00	1.014E+01	NOT IDENT.
SB-127	-1.891E+00	6.135E+01	1.170E+02	NOT IDENT.
TE-129	3.141E+00	2.760E+01	5.511E+01	NOT IDENT.
I-131	2.941E-01	6.427E+00	1.257E+01	FAIL ABUN
I-132	0.000E+00	1.904E+41	0.000E+00	SHORT HLIF
TE-132	-3.211E+01	3.336E+01	5.177E+01	NOT IDENT.
BA-133	3.281E-01	2.544E+00	5.064E+00	NOT IDENT.
I-133	0.000E+00	7.174E+04	0.000E+00	SHORT HLIF
CS-134	1.446E-01	2.198E+00	4.396E+00	NOT IDENT.
CS-135	-6.561E-01	1.138E+01	1.985E+01	NOT IDENT.
I-135	0.000E+00	2.548E+15	0.000E+00	SHORT HLIF
CS-136	-2.070E+00	4.875E+00	9.026E+00	NOT IDENT.
BA-137M	2.270E+00	2.282E+00	5.070E+00	NOT IDENT.
CS-137	2.398E+00	2.411E+00	5.356E+00	NOT IDENT.
CE-139	-1.056E+00	2.177E+00	3.691E+00	NOT IDENT.
BA-140	-1.322E+00	1.450E+01	2.794E+01	NOT IDENT.
LA-140	-1.536E+00	5.667E+00	1.092E+01	NOT IDENT.
CE-143	7.092E+02	3.266E+03	5.490E+03	NOT IDENT.
CE-144	-2.145E+00	1.573E+01	2.788E+01	NOT IDENT.
PM-144	-1.664E+00	2.716E+00	3.942E+00	NOT IDENT.
PR-144	-1.225E+02	2.034E+02	2.960E+02	NOT IDENT.
PM-146	8.327E-01	2.338E+00	4.885E+00	NOT IDENT.
ND-147	2.311E+00	3.092E+01	6.098E+01	FAIL ABUN
PM-147	-7.522E+03	5.544E+04	9.927E+04	NOT IDENT.
EU-152	-3.378E+00	6.217E+00	1.132E+01	NOT IDENT.
GD-153	-6.994E-01	6.667E+00	1.120E+01	NOT IDENT.
EU-154	-7.960E-01	6.235E+00	1.278E+01	NOT IDENT.
EU-155	-3.480E-01	8.592E+00	1.553E+01	NOT IDENT.
HO-166M	-1.498E+00	3.990E+00	7.127E+00	NOT IDENT.
TM-171	-9.941E+02	1.998E+03	3.596E+03	FAIL ABUN
LU-176	4.501E-01	1.790E+00	3.566E+00	NOT IDENT.
LU-177	-1.588E+01	6.619E+01	1.139E+02	NOT IDENT.
HF-181	8.797E-01	2.863E+00	5.763E+00	NOT IDENT.
W-181	-1.080E+01	1.893E+01	3.376E+01	FAIL ABUN
TA-182	-5.887E-02	9.322E+00	1.936E+01	FAIL ABUN
RE-183	-1.163E+01	1.830E+01	3.239E+01	FAIL ABUN
RE-184	-6.858E+00	7.939E+00	1.215E+01	NOT IDENT.
RE-188	1.227E+00	1.308E+01	2.182E+01	FAIL ABUN
W-188	1.887E+02	5.078E+02	8.820E+02	FAIL ABUN
OS-191	-1.087E+01	1.101E+01	1.794E+01	FAIL ABUN
IR-192	2.901E+00	3.267E+00	5.130E+00	FAIL ABUN
HG-203	-1.047E+00	2.755E+00	4.587E+00	NOT IDENT.
BI-207	5.565E-01	3.897E+00	7.480E+00	NOT IDENT.

PB-210	4.506E+01	3.873E+02	7.471E+02	NOT IDENT.
PO-210	4.506E+01	3.873E+02	7.471E+02	NOT IDENT.
BI-211	1.645E+01	1.652E+01	3.417E+01	NOT IDENT.
PB-211	2.652E+01	4.244E+01	8.995E+01	NOT IDENT.
BI-212	-1.039E+01	2.259E+01	4.055E+01	NOT IDENT.
PB-212	5.982E-01	6.586E+00	9.420E+00	FAIL ABUN
BI-213	-5.431E+00	6.933E+00	1.195E+01	NOT IDENT.
PB-214	1.314E+01	6.072E+00	1.361E+01	FAIL ABUN
RN-219	5.852E+00	2.364E+01	4.448E+01	NOT IDENT.
FR-221	-4.722E-01	1.598E+01	2.804E+01	NOT IDENT.
RA-223	3.045E+01	4.557E+01	8.763E+01	FAIL ABUN
AC-227	-6.476E+00	1.891E+01	3.181E+01	FAIL ABUN
TH-227	-6.476E+00	1.891E+01	3.181E+01	FAIL ABUN
AC-228	-8.267E+00	1.171E+01	1.942E+01	FAIL ABUN
RA-228	-8.267E+00	1.171E+01	1.942E+01	FAIL ABUN
TH-228	5.982E-01	6.586E+00	9.420E+00	FAIL ABUN
TH-229	1.295E+01	4.050E+01	6.918E+01	NOT IDENT.
PA-231	-2.001E+01	2.934E+01	5.294E+01	FAIL ABUN
TH-231	1.011E+01	3.422E+01	6.170E+01	NOT IDENT.
PA-233	-2.450E+00	4.834E+00	8.835E+00	NOT IDENT.
PA-234	3.267E+00	1.918E+01	4.029E+01	FAIL ABUN
PA-234M	6.710E+01	3.423E+02	6.871E+02	NOT IDENT.
U-234	-1.840E+03	7.644E+03	1.402E+04	NOT IDENT.
NP-237	-2.450E+00	4.834E+00	8.835E+00	NOT IDENT.
NP-238	-2.375E+02	5.404E+02	1.039E+03	NOT IDENT.
NP-239	8.298E+00	2.067E+01	3.879E+01	NOT IDENT.
AM-241	1.356E+01	1.494E+01	2.853E+01	NOT IDENT.
AM-242	-1.011E+01	5.006E+01	8.968E+01	NOT IDENT.
AM-243	9.896E-01	4.512E+00	8.006E+00	NOT IDENT.
CM-243	-2.175E+00	9.005E+00	1.599E+01	NOT IDENT.
BK-247	-1.516E+00	5.875E+00	9.999E+00	NOT IDENT.
CM-247	4.936E-01	2.104E+00	4.148E+00	NOT IDENT.
CF-249	1.066E-01	2.843E+00	5.010E+00	NOT IDENT.
CF-251	2.622E+00	9.940E+00	1.810E+01	FAIL ABUN
CF-252	-6.802E+03	1.407E+04	2.453E+04	NOT IDENT.
ANH-511	-9.091E+00	4.453E+00	8.459E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	62.53	39	138	1.34	124.78	121	10	5.36E-03	59.1	
2	0	66.62	28	100	0.79	132.96	130	7	3.89E-03	62.1	
3	0	92.95	89	130	1.25	185.57	181	11	1.24E-02	26.8	
4	0	140.40	32	97	1.06	280.40	276	8	4.49E-03	56.2	
5	4	143.96	32	65	1.54	287.50	284	25	4.50E-03	45.3	1.85E+00
6	4	150.97	39	79	1.56	301.52	284	25	5.49E-03	44.0	
7	0	186.03	50	104	1.11	371.58	367	12	6.99E-03	42.6	
8	0	199.00	38	92	1.18	397.51	391	11	5.33E-03	51.3	
9	3	237.17	17	34	1.57	473.78	471	15	2.41E-03	56.5	4.18E+00
10	3	238.78	24	51	1.18	477.00	471	15	3.30E-03	56.3	
11	3	241.28	20	56	1.19	482.00	471	15	2.74E-03	65.5	
12	0	284.93	10	28	1.27	569.24	566	5	1.32E-03	89.9	
13	0	295.60	24	59	2.58	590.57	585	10	3.36E-03	62.3	
14	0	317.39	17	31	0.71	634.11	631	7	2.42E-03	57.5	
15	0	320.88	15	33	0.65	641.10	638	7	2.10E-03	68.1	
16	0	393.55	48	44	7.57	786.35	776	23	6.60E-03	39.7	
17	0	419.93	21	79	7.27	839.08	817	27	2.96E-03	119.5	
18	0	464.30	10	32	2.90	927.78	916	14	1.35E-03	132.0	
19	0	511.26	107	36	1.93	1021.65	1016	13	1.48E-02	15.1	
20	0	584.65	10	37	2.28	1168.38	1159	16	1.36E-03	140.7	
21	0	609.74	38	20	1.19	1218.53	1214	10	5.28E-03	26.5	
22	0	698.50	12	9	1.50	1396.00	1392	9	1.67E-03	53.5	
23	0	842.92	13	2	0.99	1684.77	1681	9	1.84E-03	33.8	
24	0	875.39	9	7	0.78	1749.71	1744	9	1.30E-03	59.8	
25	0	926.67	10	3	0.92	1852.24	1846	10	1.43E-03	42.6	
26	0	956.88	8	9	2.56	1912.67	1908	10	1.17E-03	70.8	
27	0	970.45	15	2	2.55	1939.79	1933	11	2.06E-03	33.4	
28	0	1068.88	7	3	1.43	2136.64	2133	6	9.72E-04	54.4	
29	0	1120.30	15	5	0.81	2239.49	2234	10	2.12E-03	37.3	
30	0	1386.26	8	0	0.83	2771.50	2767	8	1.11E-03	35.4	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CR-51	320.08	15	9.91*	1.529E+00	1.874E+01	2.602E+01	136.17
CU-67	91.27	-----	7.00	1.893E+00	-----	Line Not Found	-----
	93.31	35	16.10	1.933E+00	2.098E+01	7.147E+02	142.65
	184.58	16	48.70*	2.097E+00	2.859E+00	9.737E+01	285.57
NB-95M	235.69	17	24.80*	1.843E+00	7.120E+00	8.206E+00	112.93
CE-141	145.44	25	48.29*	2.279E+00	4.299E+00	5.686E+00	122.58
PM-149	285.90	10	3.10*	1.649E+00	3.489E+01	2.126E+03	179.80
TL-208	277.37	-----	6.60	1.676E+00	-----	Line Not Found	-----
	583.19	5	85.00*	1.024E+00	9.999E-01	1.013E+00	607.84
	860.56	-----	12.50	7.641E-01	-----	Line Not Found	-----
BI-214	609.32	30	45.49*	9.941E-01	1.225E+01	1.225E+01	71.59
	1120.29	15	14.92	6.141E-01	3.134E+01	3.134E+01	74.52
	1764.49	-----	15.30	4.334E-01	-----	Line Not Found	-----
RA-224	240.99	20	4.10*	1.825E+00	4.945E+01	5.009E+01	131.09
RA-226	186.21	16	3.59*	2.097E+00	3.878E+01	3.878E+01	285.57
TH-230	67.67	19	0.38*	9.959E-01	9.362E+02	9.362E+02	189.41
TH-232	63.81	22	0.26*	8.073E-01	1.956E+03	1.956E+03	213.35
	140.88	18	0.02	2.287E+00	7.478E+03	7.478E+03	205.93
TH-234	63.29	22	3.70*	8.073E-01	1.375E+02	1.375E+02	213.35
	92.59	35	4.23	1.933E+00	7.987E+01	7.987E+01	142.65
U-235	143.76	25	10.96*	2.279E+00	1.894E+01	1.894E+01	122.58
	163.33	-----	5.08	2.209E+00	-----	Line Not Found	-----
	185.72	16	57.20	2.097E+00	2.434E+00	2.434E+00	285.57
	205.31	-----	5.01	1.998E+00	-----	Line Not Found	-----
U-238	63.29	22	3.70*	8.073E-01	1.375E+02	1.375E+02	213.35
	92.59	35	4.23	1.933E+00	7.987E+01	7.987E+01	142.65

Flag: "*" = Keyline

Total number of lines in spectrum 29
Number of unidentified lines 6
Number of lines tentatively identified by NID 23 79.31%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CR-51	27.70D	1.39	1.874E+01	2.602E+01	3.544E+01	136.17	
CU-67	61.83H	34.1	2.859E+00	9.737E+01	27.81E+01	285.57	
NB-95M	64.03D	1.15	7.120E+00	8.206E+00	9.267E+00	112.93	
CE-141	32.51D	1.32	4.299E+00	5.686E+00	6.970E+00	122.58	
PM-149	53.08H	60.9	3.489E+01	2.126E+03	3.822E+03	179.80	
TL-208	1.91Y	1.01	9.999E-01	1.013E+00	6.158E+00	607.84	
BI-214	1600.00Y	1.00	1.225E+01	1.225E+01	0.877E+01	71.59	
RA-224	1.91Y	1.01	4.945E+01	5.009E+01	6.567E+01	131.09	
RA-226	1600.00Y	1.00	3.878E+01	3.878E+01	11.07E+01	285.57	
TH-230	7.54E+04Y	1.00	9.362E+02	9.362E+02	17.73E+02	189.41	
TH-232	1.41E+10Y	1.00	1.956E+03	1.956E+03	4.174E+03	213.35	
TH-234	4.47E+09Y	1.00	1.375E+02	1.375E+02	2.933E+02	213.35	
U-235	7.04E+08Y	1.00	1.894E+01	1.894E+01	2.322E+01	122.58	
U-238	4.47E+09Y	1.00	1.375E+02	1.375E+02	2.933E+02	213.35	
Total Activity :			3.356E+03	5.551E+03			

Grand Total Activity : 3.356E+03 5.551E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
4	150.97	39	79	1.56	301.52	284	25	5.49E-03	88.0	2.26E+00	T
0	199.00	31	92	1.18	397.51	391	11	4.27E-03	****	2.03E+00	T
3	238.78	3	51	1.18	477.00	471	15	3.50E-04	****	1.84E+00	T
0	295.60	20	59	2.58	590.57	585	10	2.76E-03	****	1.61E+00	T
0	317.39	17	31	0.71	634.11	631	7	2.42E-03	****	1.54E+00	T
0	393.55	48	44	7.57	786.35	776	23	6.60E-03	79.4	1.34E+00	
0	419.93	21	79	7.27	839.08	817	27	2.96E-03	****	1.28E+00	
0	464.30	10	32	2.90	927.78	916	14	1.35E-03	****	1.20E+00	T
0	698.50	12	9	1.50	1396.00	1392	9	1.67E-03	****	8.99E-01	T
0	842.92	13	2	0.99	1684.77	1681	9	1.84E-03	67.7	7.77E-01	
0	875.39	9	7	0.78	1749.71	1744	9	1.30E-03	****	7.54E-01	T
0	926.67	7	3	0.92	1852.24	1846	10	1.01E-03	****	7.19E-01	T
0	956.88	8	9	2.56	1912.67	1908	10	1.17E-03	****	7.01E-01	
0	970.45	15	2	2.55	1939.79	1933	11	2.06E-03	66.9	6.92E-01	T
0	1068.88	7	3	1.43	2136.64	2133	6	9.72E-04	****	6.39E-01	
0	1386.26	8	0	0.83	2771.50	2767	8	1.11E-03	70.7	5.15E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                    *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372013.CNF;1  *
* Acquisition date   : 21-DEC-2016 11:54:02 Sensitivity      : 3.000          *
* Detector ID        : GAM06 Energy tolerance: 1.500         *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:00.80 Half life ratio  : *****          *
* Sample date        : 8-DEC-2016 10:11:00 Nuclide Library : LIQUID       *
* Sample ID          : G412372013 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER    *
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000         *
*                                     Dry Weight    : 0.00000         *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 9-MAR-2016 05:50:02 Eff. Geometry    : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM06_2LMB.CNF;16          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
CR-51	2.015E+01
CU-67	9.179E+01
NB-95M	6.147E+00
CE-141	3.526E+00
PM-149	2.679E+03
TL-208	1.761E+00
BI-214	4.014E+00
RA-224	4.217E+01
RA-226	3.464E+01
TH-230	8.321E+02
TH-232	1.427E+03
TH-234	1.030E+02
U-235	1.171E+01
U-238	1.030E+02

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.702E+01	NOT IDENT.
NA-22	1.789E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.898E+00	NOT IDENT.
K-40	2.623E+01	NOT IDENT.
SC-46	2.037E+00	FAIL ABUN
V-48	2.019E+00	NOT IDENT.
MN-52	1.199E+01	NOT IDENT.
MN-54	2.089E+00	NOT IDENT.
CO-56	2.350E+00	NOT IDENT.
CO-57	1.472E+00	NOT IDENT.
CO-58	1.569E+00	NOT IDENT.
FE-59	4.804E+00	NOT IDENT.
CO-60	2.021E+00	NOT IDENT.
ZN-65	4.501E+00	NOT IDENT.
GE-68	6.799E+01	NOT IDENT.
AS-74	6.304E+00	NOT IDENT.

SE-75	2.409E+00	NOT IDENT.
BR-77	3.692E+02	FAIL ABUN
SR-82	1.496E+01	NOT IDENT.
RB-83	3.192E+00	NOT IDENT.
RB-84	3.970E+00	NOT IDENT.
KR-85	4.844E+02	NOT IDENT.
SR-85	2.491E+00	NOT IDENT.
RB-86	3.691E+01	NOT IDENT.
Y-88	2.956E+00	NOT IDENT.
Y-91	1.066E+03	NOT IDENT.
NB-94	2.059E+00	NOT IDENT.
NB-95	1.591E+00	NOT IDENT.
ZR-95	3.112E+00	NOT IDENT.
MO-99	2.481E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.197E+00	FAIL ABUN
RH-102M	1.790E+00	FAIL ABUN
RU-103	1.960E+00	FAIL ABUN
RH-106	1.499E+01	NOT IDENT.
RU-106	1.499E+01	NOT IDENT.
AG-108M	1.594E+00	NOT IDENT.
CD-109	4.603E+01	NOT IDENT.
AG-110M	2.788E+00	NOT IDENT.
SN-113	2.277E+00	NOT IDENT.
IN-114M	1.014E+01	NOT IDENT.
CD-115	3.558E+02	NOT IDENT.
SN-117M	3.326E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.957E+00	NOT IDENT.
SB-124	3.391E+00	NOT IDENT.
SB-125	5.359E+00	FAIL ABUN
TE-125M	6.622E+02	NOT IDENT.
I-126	1.062E+01	NOT IDENT.
SB-126	6.683E+00	NOT IDENT.
SN-126	4.692E+00	NOT IDENT.
SB-127	5.049E+01	NOT IDENT.
TE-129	2.399E+01	NOT IDENT.
I-131	5.600E+00	FAIL ABUN
I-132	0.000E+00	SHORT HLIF
TE-132	2.327E+01	NOT IDENT.
BA-133	2.246E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.829E+00	NOT IDENT.
CS-135	9.002E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.538E+00	NOT IDENT.
BA-137M	2.234E+00	NOT IDENT.
CS-137	2.360E+00	NOT IDENT.
CE-139	1.692E+00	NOT IDENT.
BA-140	1.202E+01	NOT IDENT.
LA-140	4.288E+00	NOT IDENT.
CE-143	2.476E+03	NOT IDENT.
CE-144	1.291E+01	NOT IDENT.
PM-144	1.681E+00	NOT IDENT.
PR-144	1.263E+02	NOT IDENT.
PM-146	2.122E+00	NOT IDENT.
ND-147	2.645E+01	FAIL ABUN
PM-147	4.570E+04	NOT IDENT.
EU-152	5.010E+00	NOT IDENT.
GD-153	5.153E+00	NOT IDENT.
EU-154	5.073E+00	NOT IDENT.
EU-155	7.207E+00	NOT IDENT.
HO-166M	3.035E+00	NOT IDENT.
TM-171	1.651E+03	FAIL ABUN
LU-176	1.611E+00	NOT IDENT.
LU-177	5.211E+01	NOT IDENT.
HF-181	2.549E+00	NOT IDENT.
W-181	1.541E+01	FAIL ABUN
TA-182	7.900E+00	FAIL ABUN
RE-183	1.480E+01	FAIL ABUN
RE-184	4.903E+00	NOT IDENT.
RE-188	1.009E+01	FAIL ABUN
W-188	3.970E+02	FAIL ABUN
OS-191	8.220E+00	FAIL ABUN
IR-192	2.341E+00	FAIL ABUN
HG-203	2.068E+00	NOT IDENT.
BI-207	3.210E+00	NOT IDENT.
PB-210	3.411E+02	NOT IDENT.

PO-210	3.411E+02	NOT IDENT.
BI-211	1.573E+01	NOT IDENT.
PB-211	3.988E+01	NOT IDENT.
BI-212	1.586E+01	NOT IDENT.
PB-212	4.391E+00	FAIL ABUN
BI-213	5.191E+00	NOT IDENT.
PB-214	6.314E+00	FAIL ABUN
RN-219	1.934E+01	NOT IDENT.
FR-221	1.287E+01	NOT IDENT.
RA-223	3.964E+01	FAIL ABUN
AC-227	1.439E+01	FAIL ABUN
TH-227	1.439E+01	FAIL ABUN
AC-228	8.357E+00	FAIL ABUN
RA-228	8.357E+00	FAIL ABUN
TH-228	4.391E+00	FAIL ABUN
TH-229	3.181E+01	NOT IDENT.
PA-231	2.350E+01	FAIL ABUN
TH-231	2.859E+01	NOT IDENT.
PA-233	3.996E+00	NOT IDENT.
PA-234	1.716E+01	FAIL ABUN
PA-234M	2.989E+02	NOT IDENT.
U-234	6.485E+03	NOT IDENT.
NP-237	3.996E+00	NOT IDENT.
NP-238	4.122E+02	NOT IDENT.
NP-239	1.798E+01	NOT IDENT.
AM-241	1.322E+01	NOT IDENT.
AM-242	4.144E+01	NOT IDENT.
AM-243	3.724E+00	NOT IDENT.
CM-243	7.424E+00	NOT IDENT.
BK-247	4.511E+00	NOT IDENT.
CM-247	1.807E+00	NOT IDENT.
CF-249	2.221E+00	NOT IDENT.
CF-251	8.366E+00	FAIL ABUN
CF-252	1.132E+04	NOT IDENT.
ANH-511	4.006E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372013.CNF;1
Acquisition date : 21-DEC-2016 11:54:02 Sensitivity : 3.000
Detector ID : GAM06 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.80 Half life ratio : *****
Sample date : 8-DEC-2016 10:11:00 Nuclide Library : LIQUID
Sample ID : G412372013 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 9-MAR-2016 05:50:02 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM06_2LMB.CNF;16

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CR-51	2.602E+01	3.487E+01	3.487E+01
CU-67	9.737E+01	2.726E+02	2.726E+02
NB-95M	8.206E+00	9.144E+00	9.144E+00
CE-141	5.686E+00	6.844E+00	6.844E+00
PM-149	2.126E+03	3.767E+03	3.767E+03
TL-208	1.013E+00	6.035E+00	6.035E+00
BI-214	1.225E+01	8.660E+00	8.660E+00
RA-224	5.009E+01	6.462E+01	6.462E+01
RA-226	3.878E+01	1.086E+02	1.086E+02
TH-230	9.362E+02	1.747E+03	1.747E+03
TH-232	1.956E+03	4.100E+03	4.100E+03
TH-234	1.375E+02	2.893E+02	2.893E+02
U-235	1.894E+01	2.280E+01	2.280E+01
U-238	1.375E+02	2.893E+02	2.893E+02

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-8.139E+00	2.132E+01	2.163E+01	NOT IDENT.
NA-22	-2.806E-01	2.198E+00	2.202E+00	NOT IDENT.
NA-24	1.305E+06	5.403E+06	5.435E+06	SHORT HLIF
AL-26	2.557E+00	2.791E+00	3.020E+00	NOT IDENT.
K-40	-2.200E+01	3.692E+01	3.823E+01	NOT IDENT.
SC-46	-1.736E-01	2.557E+00	2.558E+00	FAIL ABUN
V-48	-2.746E+00	3.182E+00	3.414E+00	NOT IDENT.
MN-52	4.363E+00	1.316E+01	1.330E+01	NOT IDENT.
MN-54	-6.144E-01	2.690E+00	2.704E+00	NOT IDENT.
CO-56	2.815E+00	2.376E+00	2.694E+00	NOT IDENT.
CO-57	-8.394E-01	1.853E+00	1.891E+00	NOT IDENT.
CO-58	-8.726E-02	1.947E+00	1.948E+00	NOT IDENT.
FE-59	2.317E+00	5.125E+00	5.231E+00	NOT IDENT.
CO-60	1.079E+00	2.076E+00	2.132E+00	NOT IDENT.
ZN-65	5.066E+00	4.275E+00	4.846E+00	NOT IDENT.
GE-68	4.645E+01	6.914E+01	7.224E+01	NOT IDENT.

AS-74	2.842E+00	7.143E+00	7.257E+00	NOT IDENT.
SE-75	-1.714E-01	3.045E+00	3.046E+00	NOT IDENT.
BR-77	5.105E+01	5.621E+02	5.626E+02	FAIL ABUN
SR-82	3.739E-01	1.815E+01	1.816E+01	NOT IDENT.
RB-83	-4.394E+00	4.643E+00	5.048E+00	NOT IDENT.
RB-84	3.332E+00	4.134E+00	4.398E+00	NOT IDENT.
KR-85	-1.721E+03	7.736E+02	1.096E+03	NOT IDENT.
SR-85	-8.849E+00	3.977E+00	5.633E+00	NOT IDENT.
RB-86	1.967E+01	3.841E+01	3.942E+01	NOT IDENT.
Y-88	1.002E-01	3.583E+00	3.583E+00	NOT IDENT.
Y-91	5.008E+01	1.243E+03	1.243E+03	NOT IDENT.
NB-94	3.802E-01	2.706E+00	2.712E+00	NOT IDENT.
NB-95	-1.299E+00	2.277E+00	2.351E+00	NOT IDENT.
ZR-95	2.271E+00	3.153E+00	3.315E+00	NOT IDENT.
MO-99	-8.693E+01	3.297E+02	3.320E+02	FAIL ABUN
TC-99M	9.154E+15	1.850E+16	0.000E+00	SHORT HLIF
RH-101	1.991E+00	2.477E+00	2.634E+00	FAIL ABUN
RH-102M	8.153E-01	1.983E+00	2.017E+00	FAIL ABUN
RU-103	-5.609E-01	2.411E+00	2.424E+00	FAIL ABUN
RH-106	-1.272E+00	1.824E+01	1.825E+01	NOT IDENT.
RU-106	-1.272E+00	1.824E+01	1.825E+01	NOT IDENT.
AG-108M	-8.056E-01	1.986E+00	2.018E+00	NOT IDENT.
CD-109	3.463E-01	5.419E+01	5.419E+01	NOT IDENT.
AG-110M	3.171E-01	3.366E+00	3.369E+00	NOT IDENT.
SN-113	1.628E-01	2.617E+00	2.618E+00	NOT IDENT.
IN-114M	-3.047E+00	1.393E+01	1.400E+01	NOT IDENT.
CD-115	-1.142E+02	4.397E+02	4.427E+02	NOT IDENT.
SN-117M	-6.834E-01	4.103E+00	4.114E+00	NOT IDENT.
I-123	1.962E+06	3.237E+07	3.238E+07	SHORT HLIF
TE-123M	1.367E-01	2.362E+00	2.363E+00	NOT IDENT.
SB-124	-2.353E+00	5.188E+00	5.295E+00	NOT IDENT.
SB-125	1.392E+00	6.055E+00	6.087E+00	FAIL ABUN
TE-125M	3.004E+02	7.609E+02	7.729E+02	NOT IDENT.
I-126	5.213E+00	1.176E+01	1.199E+01	NOT IDENT.
SB-126	4.619E+00	7.090E+00	7.389E+00	NOT IDENT.
SN-126	1.736E+00	5.363E+00	5.419E+00	NOT IDENT.
SB-127	-1.891E+00	6.136E+01	6.136E+01	NOT IDENT.
TE-129	3.141E+00	2.760E+01	2.764E+01	NOT IDENT.
I-131	2.941E-01	6.427E+00	6.428E+00	FAIL ABUN
I-132	-1.000E+41	2.070E+41	0.000E+00	SHORT HLIF
TE-132	-3.211E+01	3.361E+01	3.660E+01	NOT IDENT.
BA-133	3.281E-01	2.545E+00	2.549E+00	NOT IDENT.
I-133	1.326E+04	7.176E+04	7.201E+04	SHORT HLIF
CS-134	1.446E-01	2.198E+00	2.199E+00	NOT IDENT.
CS-135	-6.561E-01	1.138E+01	1.139E+01	NOT IDENT.
I-135	-3.818E+14	2.551E+15	2.557E+15	SHORT HLIF
CS-136	-2.070E+00	4.886E+00	4.975E+00	NOT IDENT.
BA-137M	2.270E+00	2.291E+00	2.509E+00	NOT IDENT.
CS-137	2.398E+00	2.420E+00	2.651E+00	NOT IDENT.
CE-139	-1.056E+00	2.188E+00	2.239E+00	NOT IDENT.
BA-140	-1.322E+00	1.450E+01	1.451E+01	NOT IDENT.
LA-140	-1.536E+00	5.668E+00	5.710E+00	NOT IDENT.
CE-143	7.092E+02	3.268E+03	3.283E+03	NOT IDENT.
CE-144	-2.145E+00	1.573E+01	1.576E+01	NOT IDENT.
PM-144	-1.664E+00	2.721E+00	2.822E+00	NOT IDENT.
PR-144	-1.225E+02	2.037E+02	2.110E+02	NOT IDENT.
PM-146	8.327E-01	2.340E+00	2.370E+00	NOT IDENT.
ND-147	2.311E+00	3.092E+01	3.094E+01	FAIL ABUN
PM-147	-7.522E+03	5.544E+04	5.555E+04	NOT IDENT.
EU-152	-3.378E+00	6.230E+00	6.413E+00	NOT IDENT.
GD-153	-6.994E-01	6.667E+00	6.675E+00	NOT IDENT.
EU-154	-7.960E-01	6.235E+00	6.245E+00	NOT IDENT.
EU-155	-3.480E-01	8.592E+00	8.593E+00	NOT IDENT.
HO-166M	-1.498E+00	3.993E+00	4.050E+00	NOT IDENT.
TM-171	-9.941E+02	2.002E+03	2.052E+03	FAIL ABUN
LU-176	4.501E-01	1.791E+00	1.803E+00	NOT IDENT.
LU-177	-1.588E+01	6.621E+01	6.660E+01	NOT IDENT.
HF-181	8.797E-01	2.864E+00	2.891E+00	NOT IDENT.
W-181	-1.080E+01	1.916E+01	1.977E+01	FAIL ABUN
TA-182	-5.887E-02	9.322E+00	9.322E+00	FAIL ABUN
RE-183	-1.163E+01	1.837E+01	1.910E+01	FAIL ABUN
RE-184	-6.858E+00	7.987E+00	8.565E+00	NOT IDENT.
RE-188	1.227E+00	1.309E+01	1.310E+01	FAIL ABUN
W-188	1.887E+02	5.088E+02	5.159E+02	FAIL ABUN
OS-191	-1.087E+01	1.105E+01	1.209E+01	FAIL ABUN
IR-192	2.901E+00	3.287E+00	3.538E+00	FAIL ABUN
HG-203	-1.047E+00	2.759E+00	2.799E+00	NOT IDENT.
BI-207	5.565E-01	3.898E+00	3.906E+00	NOT IDENT.

PB-210	4.506E+01	3.873E+02	3.878E+02	NOT IDENT.
PO-210	4.506E+01	3.873E+02	3.878E+02	NOT IDENT.
BI-211	1.645E+01	1.661E+01	1.819E+01	NOT IDENT.
PB-211	2.652E+01	4.250E+01	4.415E+01	NOT IDENT.
BI-212	-1.039E+01	2.262E+01	2.310E+01	NOT IDENT.
PB-212	5.982E-01	6.587E+00	6.592E+00	FAIL ABUN
BI-213	-5.431E+00	6.947E+00	7.366E+00	NOT IDENT.
PB-214	1.314E+01	6.226E+00	8.592E+00	FAIL ABUN
RN-219	5.852E+00	2.366E+01	2.380E+01	NOT IDENT.
FR-221	-4.722E-01	1.598E+01	1.598E+01	NOT IDENT.
RA-223	3.045E+01	4.574E+01	4.776E+01	FAIL ABUN
AC-227	-6.476E+00	1.894E+01	1.916E+01	FAIL ABUN
TH-227	-6.476E+00	1.894E+01	1.916E+01	FAIL ABUN
AC-228	-8.267E+00	1.175E+01	1.233E+01	FAIL ABUN
RA-228	-8.267E+00	1.175E+01	1.233E+01	FAIL ABUN
TH-228	5.982E-01	6.587E+00	6.592E+00	FAIL ABUN
TH-229	1.295E+01	4.051E+01	4.093E+01	NOT IDENT.
PA-231	-2.001E+01	2.975E+01	3.109E+01	FAIL ABUN
TH-231	1.011E+01	3.426E+01	3.456E+01	NOT IDENT.
PA-233	-2.450E+00	4.844E+00	4.969E+00	NOT IDENT.
PA-234	3.267E+00	1.955E+01	1.960E+01	FAIL ABUN
PA-234M	6.710E+01	3.424E+02	3.437E+02	NOT IDENT.
U-234	-1.840E+03	7.647E+03	7.692E+03	NOT IDENT.
NP-237	-2.450E+00	4.844E+00	4.969E+00	NOT IDENT.
NP-238	-2.375E+02	5.412E+02	5.517E+02	NOT IDENT.
NP-239	8.298E+00	2.068E+01	2.102E+01	NOT IDENT.
AM-241	1.356E+01	1.503E+01	1.622E+01	NOT IDENT.
AM-242	-1.011E+01	5.009E+01	5.030E+01	NOT IDENT.
AM-243	9.896E-01	4.513E+00	4.535E+00	NOT IDENT.
CM-243	-2.175E+00	9.009E+00	9.062E+00	NOT IDENT.
BK-247	-1.516E+00	5.886E+00	5.925E+00	NOT IDENT.
CM-247	4.936E-01	2.106E+00	2.117E+00	NOT IDENT.
CF-249	1.066E-01	2.843E+00	2.843E+00	NOT IDENT.
CF-251	2.622E+00	9.946E+00	1.002E+01	FAIL ABUN
CF-252	-6.802E+03	1.537E+04	1.567E+04	NOT IDENT.
ANH-511	-9.091E+00	4.518E+00	6.100E+00	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	39.9740	88.03	47.7318	140.88	50.2859
46.54	35.2147	88.34	47.7627	143.76	44.8913
49.72	38.1685	88.47	56.0568	144.24	44.9232
51.35	52.3052	91.11	49.9572	145.44	45.0026
52.39	51.5928	91.27	49.9737	152.32	45.4525
53.20	56.0984	92.59	49.1440	152.43	45.4596
56.28	47.7532	93.31	49.2152	153.25	45.5124
57.36	44.3501	94.56	49.3382	154.21	55.5436
57.53	47.0333	94.65	49.3471	155.04	48.4793
57.53	47.0335	94.67	49.3491	156.02	44.2623
57.98	48.8690	97.43	46.6989	158.56	60.1810
59.32	40.4281	98.43	44.8398	158.97	0.0000
59.54	35.6932	98.44	44.8408	159.00	59.1416
61.49	53.8211	99.53	53.7265	162.33	60.4921
63.00	54.0358	100.11	57.6982	162.66	51.8738
63.29	54.0768	100.20	57.7081	163.33	37.8588
63.58	54.1176	102.03	50.0568	165.86	49.9272
63.81	54.1498	103.18	61.9685	176.31	57.2162
64.28	54.2157	103.37	61.9906	176.60	49.5319
64.99	36.2099	105.31	56.2890	177.52	45.1822
65.08	36.2183	106.12	50.4389	181.07	38.7437
66.73	56.3739	106.47	63.3364	184.41	40.0172
66.98	56.4093	109.28	50.7292	184.58	40.0254
67.24	56.4462	111.00	52.8811	185.72	35.6284
67.67	57.1144	111.76	59.9460	186.21	35.6499
67.75	57.1259	112.95	44.0530	190.27	43.2906
69.67	54.9550	116.24	54.3753	193.51	37.4654
70.83	50.5177	116.30	54.3807	198.01	44.0690
72.81	52.6034	116.74	46.3594	201.83	31.7807
72.87	60.9178	117.23	51.4416	205.31	50.1418
74.66	50.0523	119.76	57.7415	208.37	43.4557
74.82	50.0709	120.54	43.6164	210.85	30.9625
74.97	52.8713	120.90	43.6428	218.12	42.7739
77.11	58.7256	121.12	47.7204	222.11	38.3154
79.69	49.6928	121.22	47.7283	227.09	46.6913
80.12	49.7405	121.78	47.7727	227.38	43.2030
80.19	49.7482	122.06	48.8119	228.16	43.2386
80.57	51.6691	123.07	50.9312	228.18	43.2397
81.00	57.3606	123.68	44.8647	235.69	31.4095
81.07	57.3695	127.23	44.0995	235.96	29.8475
83.79	35.9512	129.43	59.6939	238.63	50.8014
84.00	39.7534	131.20	44.3805	238.98	50.8197
84.21	39.7714	133.02	53.8234	240.99	50.9241
85.43	60.7627	133.52	55.9372	242.00	53.7420
86.55	39.9704	136.00	54.0733	244.70	33.2846
86.94	33.3359	136.28	54.0963	250.62	38.2642
87.09	40.9686	136.47	47.1747	252.40	29.9465
87.57	44.8248	140.51	50.2581	252.80	32.3550

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	36.0706	383.85	24.9460	631.29	10.2889
260.90	30.1949	388.16	20.1077	632.98	12.3564
264.66	27.8789	388.63	22.7960	633.25	10.2983
265.00	32.7373	391.70	17.0220	634.78	10.3060
268.22	32.8370	400.66	10.8181	635.95	9.2805
269.46	38.9639	401.81	12.1800	636.99	10.3170
271.23	39.0283	402.40	12.9973	645.85	15.5408
273.65	35.4482	404.85	13.5617	657.76	14.5862
276.40	34.3130	410.95	15.4339	661.66	8.3499
277.37	23.3047	414.70	15.4730	664.57	15.6775
277.60	23.3093	423.72	10.9880	666.33	9.4142
278.00	22.0908	427.09	16.5187	666.50	9.4149
278.43	27.0106	427.87	18.3634	667.71	0.0000
279.20	34.4010	433.94	22.1235	677.62	12.6172
279.54	41.7851	440.45	24.0682	685.70	13.7189
280.46	36.9003	453.88	11.2034	695.00	9.5376
283.69	36.1860	459.60	14.0543	696.49	19.0876
284.31	32.0914	463.37	14.0872	696.51	19.0876
285.41	34.5941	468.07	12.4325	697.00	15.9100
285.90	26.3691	473.00	19.8383	697.49	12.7307
287.50	39.6104	475.06	16.0797	702.65	15.9497
290.67	21.5159	476.78	21.7778	706.68	18.1088
293.27	24.8828	477.60	20.8412	711.68	14.9456
295.22	32.4032	477.99	18.9510	720.70	6.4305
295.96	32.4238	482.18	16.1488	721.93	6.4341
299.98	29.0333	487.02	14.2899	722.78	11.7998
300.09	29.0361	492.35	14.3350	722.91	12.8735
300.13	29.0368	497.08	16.2913	723.31	10.7296
301.36	30.0703	511.00	23.1851	724.19	8.5869
302.85	29.2721	514.00	72.5769	727.33	7.5238
304.50	24.2882	520.40	21.3662	733.00	8.6195
304.85	28.4848	520.69	17.4844	735.93	9.7090
306.78	26.0137	522.65	0.0000	739.50	6.4827
308.46	31.0930	527.90	20.4813	744.23	3.2478
311.90	37.9257	529.59	14.6429	747.24	7.5879
316.51	38.0713	529.87	0.0000	752.31	4.3451
319.41	25.4419	531.02	13.6776	753.82	7.6087
320.08	25.4553	537.26	13.7249	756.73	3.2649
321.04	25.4755	546.56	0.0000	763.94	8.7324
323.87	20.4277	552.55	8.8967	765.80	12.0160
325.23	32.7203	563.25	12.9238	766.42	13.1118
328.76	27.3451	569.33	9.9736	766.84	9.8357
333.37	29.1613	569.50	9.9744	772.60	0.0000
334.37	26.6097	569.70	9.9752	776.52	8.7777
323.87	18.9425	583.19	12.0547	777.92	9.8804
338.32	25.8319	595.83	21.2316	778.90	10.9827
340.48	24.1502	600.60	21.2828	783.70	15.4054
340.55	24.1519	602.73	18.2615	785.37	9.9104
344.28	26.8172	604.72	30.4663	792.07	11.0413
345.93	25.1195	609.32	17.3037	795.86	7.7406
351.06	28.6971	610.33	17.3127	801.95	12.1933
351.93	19.1439	614.28	9.1835	802.10	12.1937
356.01	19.2035	618.01	11.2448	810.29	8.8971
364.49	21.9615	621.93	11.2663	810.45	6.6733
366.42	14.9552	630.19	0.0000	810.76	6.6741

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	12.2600	1129.67	11.1636		
818.51	13.3887	1131.51	0.0000		
832.01	11.2158	1173.23	4.7116		
834.85	15.7192	1189.05	7.5728		
836.80	0.0000	1204.77	9.5087		
846.77	3.3838	1221.41	6.6873		
856.80	15.8508	1235.36	9.5905		
860.56	9.0706	1238.28	5.7587		
871.09	13.6592	1260.41	0.0000		
873.19	3.4175	1274.44	5.8162		
875.33	0.0000	1274.54	5.8162		
880.51	13.7070	1291.59	3.8953		
881.60	5.7135	1298.22	0.0000		
946.00	12.5773	1312.11	2.9374		
884.68	10.2960	1332.49	2.9531		
889.28	10.3132	1365.19	6.9487		
894.76	11.4819	1368.63	0.0000		
898.04	9.1966	1384.29	4.7880		
903.28	13.8208	1408.01	5.0174		
911.20	13.8604	1434.09	5.0494		
923.98	8.7021	1457.56	0.0000		
926.36	5.8063	1460.82	9.1483		
935.54	8.1550	1489.16	4.0935		
937.49	12.8239	1596.21	6.2933		
944.13	10.5165	1620.50	4.2180		
946.00	9.6465	1678.03	0.0000		
949.00	7.0229	1690.97	4.2830		
954.55	0.0000	1764.49	2.1746		
964.08	5.6475	1770.23	2.1770		
968.97	6.1872	1771.35	0.0000		
983.53	8.8824	1260.41	0.0000		
984.45	7.9967	1808.65	2.1941		
996.26	7.1362	1836.06	6.6182		
1001.03	8.9343				
1004.73	14.3125				
1025.87	8.1067				
1028.54	9.0149				
1037.84	8.1381				
1038.76	0.0000				
1046.59	5.4404				
1048.07	5.4430				
1050.41	6.3549				
1063.66	10.9402				
1077.00	4.5773				
1077.34	4.5779				
1083.85	9.1742				
1085.87	9.1797				
1099.25	6.4523				
1111.64	8.3271				
344.28	12.0296				
1112.84	12.0328				
1115.54	1.4821				
1120.29	8.3491				
1120.55	4.4531				
1121.30	7.4238				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 13:55:41.34

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372014.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM41.CNF;135
Background date : 18-DEC-2016 13:13:22
Sample date     : 7-DEC-2016 15:09:00. Acquisition date : 21-DEC-2016 11:54:24
Sample ID      : G412372014. Sample quantity : 2.00000E+00 LITER
Detector name  : GAM41. Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00. Elapsed real time: 0 02:00:11.43 0.2%
Energy tolerance: 1.50000 keV. Analyst Initials : MXR1
Abundance limit: 75.00000. Sensitivity : 3.00000
Batch ID      : 1624165. Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.69*	24	147	1.05	93.68	88	10	3.27E-03	111.4	
2	3	63.34*	60	113	1.22	126.97	121	21	8.31E-03	41.1	1.59E+00
3	3	66.97	35	170	1.62	134.21	121	21	4.82E-03	72.8	
4	0	84.10*	41	143	2.21	168.47	162	12	5.73E-03	63.6	
5	0	92.89*	11	163	1.10	186.06	181	11	1.56E-03	270.5	
6	0	109.01	36	85	2.38	218.27	216	8	4.96E-03	47.3	
7	0	140.76	19	85	0.94	281.76	277	8	2.62E-03	88.6	
8	0	144.80*	7	87	0.69	289.83	285	11	1.00E-03	273.8	
9	0	168.56	91	189	11.38	337.34	324	27	1.26E-02	43.6	
10	0	185.76*	35	97	1.06	371.73	366	12	4.90E-03	67.2	
11	0	238.96*	23	71	1.31	478.11	471	12	3.22E-03	83.1	
12	0	353.05*	17	43	1.48	706.23	699	11	2.34E-03	85.6	
13	0	523.97	9	9	0.61	1048.04	1044	7	1.26E-03	63.5	
14	0	526.80	12	10	0.56	1053.70	1050	8	1.62E-03	55.5	
15	0	583.50*	8	10	0.99	1167.10	1163	7	1.10E-03	96.2	
16	0	596.22	8	17	0.98	1192.53	1188	8	1.15E-03	91.2	
17	0	609.52*	48	16	0.75	1219.14	1212	16	6.60E-03	26.6	
18	0	709.70	11	19	0.85	1419.48	1411	13	1.56E-03	85.8	
19	0	830.34	9	3	0.55	1660.77	1652	11	1.19E-03	51.5	
20	0	864.78	6	7	1.37	1729.67	1725	7	8.33E-04	83.7	
21	0	941.23	6	12	0.66	1882.59	1875	12	8.10E-04	126.0	
22	0	994.25	12	11	0.92	1988.65	1981	15	1.60E-03	69.9	
23	0	1001.64*	9	8	2.01	2003.41	1996	11	1.28E-03	78.5	
24	0	1014.51	12	7	4.19	2029.16	2021	15	1.61E-03	59.3	
25	0	1096.49	5	14	1.00	2193.15	2183	15	6.51E-04	185.2	
26	0	1119.64	14	9	0.59	2239.46	2235	11	2.01E-03	46.8	
27	0	1277.56	15	0	1.54	2555.40	2551	10	2.08E-03	25.8	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 13:55:43

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372014.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 7-DEC-2016 15:09:00	Acquisition date	: 21-DEC-2016 11:54:24
Sample ID	: G412372014	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA41	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:11.43 0.2%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Empirical	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CU-67	91.27	-----	7.00	2.726E+00	-----	Line Not Found	-----
	93.31	11	16.10	2.718E+00	4.820E+00	2.033E+02	540.96
	184.58	35	48.70*	2.131E+00	6.380E+00	2.690E+02	134.35
AS-74	595.83	8	59.00*	9.141E-01	2.882E+00	4.957E+00	182.36
	634.78	-----	15.40	8.662E-01	-----	Line Not Found	-----
	109.28	36	0.27*	2.630E+00	9.443E+02	1.117E+03	94.50
CE-141	145.44	7	48.29*	2.394E+00	1.170E+00	1.573E+00	547.68
TL-208	277.37	-----	6.60	1.669E+00	-----	Line Not Found	-----
	583.19	8	85.00*	9.311E-01	1.886E+00	1.912E+00	192.50
	860.56	-----	12.50	6.660E-01	-----	Line Not Found	-----
PB-210	46.54	24	4.25*	2.616E+00	3.978E+01	3.983E+01	222.71
PO-210	46.54	24	4.25*	2.616E+00	3.978E+01	3.983E+01	222.71
BI-214	609.32	48	45.49*	8.970E-01	2.187E+01	2.187E+01	53.24
	1120.29	14	14.92	5.326E-01	3.414E+01	3.414E+01	93.51
	1764.49	-----	15.30	3.742E-01	-----	Line Not Found	-----
RA-226	186.21	35	3.59*	2.131E+00	8.655E+01	8.655E+01	134.35
TH-230	67.67	35	0.38*	2.772E+00	6.179E+02	6.179E+02	145.60
TH-231	84.21	41	6.60*	2.754E+00	4.260E+01	4.260E+01	127.14
TH-232	63.81	60	0.26*	2.763E+00	1.563E+03	1.563E+03	82.18
	140.88	19	0.02	2.421E+00	7.319E+03	7.319E+03	177.22
	63.29	60	3.70*	2.763E+00	1.099E+02	1.099E+02	82.18
U-235	92.59	11	4.23	2.718E+00	1.835E+01	1.835E+01	540.96
	143.76	7	10.96*	2.394E+00	5.154E+00	5.154E+00	547.68
	163.33	-----	5.08	2.272E+00	-----	Line Not Found	-----
U-238	185.72	35	57.20	2.131E+00	5.432E+00	5.432E+00	134.35
	205.31	-----	5.01	2.017E+00	-----	Line Not Found	-----
	63.29	60	3.70*	2.763E+00	1.099E+02	1.099E+02	82.18
	92.59	11	4.23	2.718E+00	1.835E+01	1.835E+01	540.96

Flag: "*" = Keyline

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372014.CNF;1  *
* Acquisition date   : 21-DEC-2016 11:54:24 Sensitivity      : 3.000          *
* Detector ID        : GAM41 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:11.43 Half life ratio : *****      *
* Sample date        : 7-DEC-2016 15:09:00 Analyst initials: MXR1      *
* Sample ID          : G412372014 Sample Quantity : 2.0000E+00 LITER  *
* Batch Number       : 1624165 Wet Weight : 0.00000        *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000         *
* Nuclide Library    : LIQUID.NLB;10
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 27-JAN-2016 05:57:05 Eff. Geometry   : 2LMB        *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3      *
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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
CU-67	2.690E+02	3.542E+02	2.536E+02
AS-74	4.957E+00	8.859E+00	1.430E+01
TE-125M	1.117E+03	1.035E+03	1.342E+03
CE-141	1.573E+00	8.445E+00	7.251E+00
TL-208	1.912E+00	3.608E+00	5.289E+00
PB-210	3.983E+01	8.693E+01	7.380E+01
PO-210	3.983E+01	8.693E+01	7.380E+01
BI-214	2.187E+01	1.141E+01	9.547E+00
RA-226	8.655E+01	1.140E+02	8.200E+01
TH-230	6.179E+02	8.817E+02	8.071E+02
TH-231	4.260E+01	5.307E+01	4.364E+01
TH-232	1.563E+03	1.259E+03	1.180E+03
TH-234	1.099E+02	8.848E+01	8.294E+01
U-235	5.154E+00	2.766E+01	2.362E+01
U-238	1.099E+02	8.848E+01	8.294E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	1.179E+00	2.348E+01	4.408E+01	NOT IDENT.
NA-22	5.424E-01	3.402E+00	6.299E+00	NOT IDENT.
NA-24	0.000E+00	1.428E+07	0.000E+00	SHORT HLIF
AL-26	2.679E+00	2.654E+00	7.290E+00	NOT IDENT.
K-40	2.337E+01	3.624E+01	8.399E+01	NOT IDENT.
SC-46	-3.960E-01	2.793E+00	5.480E+00	FAIL ABUN
V-48	-8.415E-01	5.721E+00	1.095E+01	NOT IDENT.
CR-51	-2.537E+01	2.641E+01	4.297E+01	NOT IDENT.
MN-52	7.884E+00	1.495E+01	3.515E+01	NOT IDENT.
MN-54	1.719E+00	2.442E+00	5.421E+00	NOT IDENT.
CO-56	1.789E+00	2.901E+00	6.361E+00	NOT IDENT.
CO-57	-1.714E+00	2.011E+00	3.502E+00	NOT IDENT.
CO-58	-1.678E+00	2.555E+00	4.532E+00	NOT IDENT.
FE-59	4.905E+00	6.513E+00	1.396E+01	NOT IDENT.
CO-60	9.086E-01	2.643E+00	5.927E+00	NOT IDENT.

ZN-65	1.444E+00	6.797E+00	1.261E+01	NOT IDENT.
GE-68	2.955E+01	8.241E+01	1.802E+02	NOT IDENT.
SE-75	2.370E+00	3.511E+00	6.876E+00	NOT IDENT.
BR-77	5.907E+02	9.627E+02	1.195E+03	FAIL ABUN
SR-82	-1.170E+01	1.992E+01	3.611E+01	NOT IDENT.
RB-83	-2.945E+00	5.198E+00	7.446E+00	NOT IDENT.
RB-84	-9.117E-01	4.749E+00	9.249E+00	NOT IDENT.
KR-85	-1.364E+03	8.176E+02	1.173E+03	NOT IDENT.
SR-85	-7.071E+00	4.239E+00	6.082E+00	NOT IDENT.
RB-86	-4.931E-02	4.849E+01	9.930E+01	NOT IDENT.
Y-88	-1.454E+00	3.183E+00	6.125E+00	NOT IDENT.
Y-91	3.347E+02	1.515E+03	3.105E+03	NOT IDENT.
NB-94	-1.091E+00	2.971E+00	4.777E+00	NOT IDENT.
NB-95	1.545E+00	2.881E+00	6.200E+00	NOT IDENT.
NB-95M	-7.525E-01	7.706E+00	1.278E+01	NOT IDENT.
ZR-95	-2.479E+00	4.916E+00	9.029E+00	NOT IDENT.
MO-99	-3.223E+02	7.303E+02	1.345E+03	FAIL ABUN
TC-99M	0.000E+00	1.394E+17	0.000E+00	SHORT HLIF
RH-101	-2.587E-01	2.419E+00	4.455E+00	NOT IDENT.
RH-102M	-1.173E+00	2.083E+00	3.529E+00	NOT IDENT.
RU-103	-2.107E+00	3.504E+00	5.852E+00	FAIL ABUN
RH-106	-1.333E+01	2.789E+01	4.697E+01	NOT IDENT.
RU-106	-1.333E+01	2.789E+01	4.697E+01	NOT IDENT.
AG-108M	-1.680E-02	2.391E+00	4.404E+00	NOT IDENT.
CD-109	-8.709E+00	6.085E+01	8.354E+01	NOT IDENT.
AG-110M	2.948E-01	2.990E+00	6.324E+00	NOT IDENT.
SN-113	-6.184E-01	3.557E+00	5.918E+00	NOT IDENT.
IN-114M	-1.200E+00	1.485E+01	2.443E+01	NOT IDENT.
CD-115	5.948E+02	6.467E+02	1.178E+03	FAIL ABUN
SN-117M	3.761E+00	3.954E+00	7.842E+00	NOT IDENT.
I-123	0.000E+00	8.203E+07	0.000E+00	SHORT HLIF
TE-123M	1.809E+00	2.273E+00	4.297E+00	NOT IDENT.
SB-124	-2.587E+00	5.117E+00	1.000E+01	NOT IDENT.
SB-125	1.330E+00	6.573E+00	1.261E+01	NOT IDENT.
I-126	-2.577E+00	1.465E+01	2.846E+01	NOT IDENT.
SB-126	3.328E+00	8.724E+00	1.874E+01	NOT IDENT.
SN-126	-6.837E+00	5.576E+00	7.642E+00	FAIL ABUN
SB-127	5.757E+00	7.706E+01	1.554E+02	NOT IDENT.
TE-129	1.139E+01	3.245E+01	6.432E+01	NOT IDENT.
I-131	5.218E+00	8.207E+00	1.628E+01	NOT IDENT.
I-132	0.000E+00	1.103E+41	0.000E+00	SHORT HLIF
TE-132	2.569E+00	3.958E+01	7.378E+01	NOT IDENT.
BA-133	-6.077E-01	3.215E+00	5.177E+00	NOT IDENT.
I-133	0.000E+00	1.652E+05	0.000E+00	SHORT HLIF
CS-134	-3.992E+00	3.481E+00	5.304E+00	NOT IDENT.
CS-135	-5.327E+00	1.175E+01	2.063E+01	NOT IDENT.
I-135	0.000E+00	1.851E+16	0.000E+00	SHORT HLIF
CS-136	4.613E+00	7.040E+00	1.588E+01	NOT IDENT.
BA-137M	-2.924E+00	2.687E+00	4.435E+00	NOT IDENT.
CS-137	-3.089E+00	2.838E+00	4.685E+00	NOT IDENT.
CE-139	-1.855E-01	2.079E+00	3.842E+00	NOT IDENT.
BA-140	1.488E+00	1.822E+01	3.455E+01	NOT IDENT.
LA-140	4.635E-01	6.400E+00	1.353E+01	NOT IDENT.
CE-143	0.000E+00	5.489E+03	0.000E+00	SHORT HLIF
CE-144	-5.752E+00	1.743E+01	2.877E+01	NOT IDENT.
PM-144	-1.362E+00	2.373E+00	4.309E+00	NOT IDENT.
PR-144	-8.490E+01	1.748E+02	3.228E+02	NOT IDENT.
PM-146	3.500E+00	2.993E+00	6.524E+00	NOT IDENT.
ND-147	-2.630E+01	4.794E+01	6.921E+01	NOT IDENT.
PM-147	-1.085E+04	5.698E+04	1.045E+05	NOT IDENT.
PM-149	8.144E+02	4.107E+03	7.864E+03	NOT IDENT.
EU-152	-6.028E+00	7.442E+00	1.234E+01	NOT IDENT.
GD-153	4.211E-01	6.801E+00	1.115E+01	NOT IDENT.
EU-154	1.482E+00	9.633E+00	1.781E+01	NOT IDENT.
EU-155	-7.678E-01	7.792E+00	1.379E+01	NOT IDENT.
HO-166M	-6.968E-01	5.280E+00	8.966E+00	FAIL ABUN
TM-171	-2.522E+02	4.282E+02	6.702E+02	FAIL ABUN
LU-176	1.139E+00	1.981E+00	3.898E+00	NOT IDENT.
LU-177	6.834E+00	7.449E+01	1.383E+02	NOT IDENT.
HF-181	-3.038E-01	3.526E+00	6.416E+00	NOT IDENT.
W-181	6.355E+00	6.282E+00	1.152E+01	FAIL ABUN
TA-182	2.758E+00	1.134E+01	2.419E+01	FAIL ABUN
RE-183	7.603E+00	6.853E+00	1.180E+01	FAIL ABUN
RE-184	-4.258E+00	8.015E+00	1.455E+01	NOT IDENT.
RE-188	-4.757E+00	1.239E+01	2.225E+01	FAIL ABUN
W-188	-6.644E+01	5.193E+02	9.477E+02	FAIL ABUN
OS-191	-2.660E+00	1.193E+01	2.175E+01	FAIL ABUN
IR-192	2.093E+00	2.476E+00	5.044E+00	NOT IDENT.

HG-203	-1.611E-01	2.909E+00	5.323E+00	NOT IDENT.
BI-207	9.222E-01	3.757E+00	7.886E+00	NOT IDENT.
BI-211	1.579E+01	1.890E+01	3.603E+01	NOT IDENT.
PB-211	-4.440E+00	5.780E+01	1.051E+02	NOT IDENT.
BI-212	7.067E+00	3.318E+01	6.938E+01	NOT IDENT.
PB-212	5.497E+00	8.958E+00	1.090E+01	FAIL ABUN
BI-213	8.168E+00	8.060E+00	1.690E+01	NOT IDENT.
PB-214	6.340E+00	1.064E+01	1.316E+01	FAIL ABUN
RN-219	-1.347E+01	3.207E+01	5.580E+01	NOT IDENT.
FR-221	-1.553E+00	1.408E+01	2.592E+01	NOT IDENT.
RA-223	-2.841E+01	5.053E+01	8.693E+01	FAIL ABUN
RA-224	-8.762E+00	5.842E+01	9.383E+01	NOT IDENT.
AC-227	2.019E+01	1.843E+01	3.782E+01	NOT IDENT.
TH-227	2.019E+01	1.843E+01	3.782E+01	NOT IDENT.
AC-228	-2.170E+00	1.156E+01	2.205E+01	NOT IDENT.
RA-228	-2.170E+00	1.156E+01	2.205E+01	NOT IDENT.
TH-228	5.497E+00	8.958E+00	1.090E+01	FAIL ABUN
TH-229	1.834E+00	3.962E+01	7.345E+01	FAIL ABUN
PA-231	-6.397E+00	3.642E+01	6.579E+01	NOT IDENT.
PA-233	5.565E+00	4.660E+00	9.802E+00	NOT IDENT.
PA-234	-1.884E+01	2.449E+01	3.329E+01	NOT IDENT.
PA-234M	3.517E+02	5.409E+02	8.975E+02	FAIL ABUN
U-234	-2.996E+02	1.635E+03	2.649E+03	NOT IDENT.
NP-237	5.565E+00	4.660E+00	9.802E+00	NOT IDENT.
NP-238	-8.638E+02	1.257E+03	2.167E+03	NOT IDENT.
NP-239	-1.251E+01	1.983E+01	3.521E+01	NOT IDENT.
AM-241	-3.201E+00	6.091E+00	9.011E+00	NOT IDENT.
AM-242	1.908E+01	4.350E+01	8.356E+01	NOT IDENT.
AM-243	5.577E-01	3.165E+00	5.338E+00	NOT IDENT.
CM-243	3.512E+00	7.462E+00	1.437E+01	NOT IDENT.
BK-247	5.078E+00	6.218E+00	1.237E+01	FAIL ABUN
CM-247	3.441E-01	2.910E+00	5.447E+00	NOT IDENT.
CF-249	1.420E+00	2.953E+00	5.820E+00	NOT IDENT.
CF-251	-8.293E+00	1.037E+01	1.688E+01	NOT IDENT.
CF-252	-3.985E+03	1.197E+04	2.184E+04	NOT IDENT.
ANH-511	-7.298E+00	4.928E+00	9.005E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.69	121	147	1.05	93.68	88	10	1.69E-02	20.8	1.59E+00
2	3	63.34	236	113	1.22	126.97	121	21	3.27E-02	9.8	
3	3	66.97	35	170	1.62	134.21	121	21	4.82E-03	72.8	
4	0	84.10	68	143	2.21	168.47	162	12	9.44E-03	37.6	
5	0	92.89	244	163	1.10	186.06	181	11	3.39E-02	12.1	
6	0	109.01	36	85	2.38	218.27	216	8	4.96E-03	47.3	
7	0	140.76	19	85	0.94	281.76	277	8	2.62E-03	88.6	
8	0	144.80	31	87	0.69	289.83	285	11	4.31E-03	61.2	
9	0	168.56	91	189	11.38	337.34	324	27	1.26E-02	43.6	
10	0	185.76	128	97	1.06	371.73	366	12	1.78E-02	17.6	
11	0	238.96	54	71	1.31	478.11	471	12	7.47E-03	34.3	
12	0	353.05	24	43	1.48	706.23	699	11	3.27E-03	59.3	
13	0	511.28	81	65	2.82	1022.67	1012	16	1.13E-02	24.7	
14	0	523.97	9	9	0.61	1048.04	1044	7	1.26E-03	63.5	
15	0	526.80	12	10	0.56	1053.70	1050	8	1.62E-03	55.5	
16	0	583.50	14	10	0.99	1167.10	1163	7	1.92E-03	48.9	
17	0	596.22	8	17	0.98	1192.53	1188	8	1.15E-03	91.2	
18	0	609.52	52	16	0.75	1219.14	1212	16	7.27E-03	23.2	
19	0	709.70	11	19	0.85	1419.48	1411	13	1.56E-03	85.8	
20	0	830.34	9	3	0.55	1660.77	1652	11	1.19E-03	51.5	
21	0	864.78	6	7	1.37	1729.67	1725	7	8.33E-04	83.7	
22	0	941.23	6	12	0.66	1882.59	1875	12	8.10E-04	126.0	
23	0	994.25	12	11	0.92	1988.65	1981	15	1.60E-03	69.9	
24	0	1001.64	14	8	2.01	2003.41	1996	11	1.88E-03	49.3	
25	0	1014.51	12	7	4.19	2029.16	2021	15	1.61E-03	59.3	
26	0	1096.49	5	14	1.00	2193.15	2183	15	6.51E-04	185.2	
27	0	1119.64	14	9	0.59	2239.46	2235	11	2.01E-03	46.8	
28	0	1277.56	15	0	1.54	2555.40	2551	10	2.08E-03	25.8	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CU-67	91.27	-----	7.00	2.726E+00	-----	Line Not Found	-----
	93.31	11	16.10	2.718E+00	4.820E+00	2.033E+02	540.96
	184.58	35	48.70*	2.131E+00	6.380E+00	2.690E+02	134.35
AS-74	595.83	8	59.00*	9.141E-01	2.882E+00	4.957E+00	182.36
	634.78	-----	15.40	8.662E-01	-----	Line Not Found	-----
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CE-141	145.44	7	48.29*	2.394E+00	1.170E+00	1.573E+00	547.68
TL-208	277.37	-----	6.60	1.669E+00	-----	Line Not Found	-----
	583.19	8	85.00*	9.311E-01	1.886E+00	1.912E+00	192.50
	860.56	-----	12.50	6.660E-01	-----	Line Not Found	-----
PB-210	46.54	24	4.25*	2.616E+00	3.978E+01	3.983E+01	222.71
PO-210	46.54	24	4.25*	2.616E+00	3.978E+01	3.983E+01	222.71
BI-214	609.32	48	45.49*	8.970E-01	2.187E+01	2.187E+01	53.24
	1120.29	14	14.92	5.326E-01	3.414E+01	3.414E+01	93.51
	1764.49	-----	15.30	3.742E-01	-----	Line Not Found	-----
RA-226	186.21	35	3.59*	2.131E+00	8.655E+01	8.655E+01	134.35
TH-230	67.67	35	0.38*	2.772E+00	6.179E+02	6.179E+02	145.60
TH-231	84.21	41	6.60*	2.754E+00	4.260E+01	4.260E+01	127.14
TH-232	63.81	60	0.26*	2.763E+00	1.563E+03	1.563E+03	82.18
	140.88	19	0.02	2.421E+00	7.319E+03	7.319E+03	177.22
TH-234	63.29	60	3.70*	2.763E+00	1.099E+02	1.099E+02	82.18
	92.59	11	4.23	2.718E+00	1.835E+01	1.835E+01	540.96
U-235	143.76	7	10.96*	2.394E+00	5.154E+00	5.154E+00	547.68
	163.33	-----	5.08	2.272E+00	-----	Line Not Found	-----
	185.72	35	57.20	2.131E+00	5.432E+00	5.432E+00	134.35
	205.31	-----	5.01	2.017E+00	-----	Line Not Found	-----
U-238	63.29	60	3.70*	2.763E+00	1.099E+02	1.099E+02	82.18
	92.59	11	4.23	2.718E+00	1.835E+01	1.835E+01	540.96

Flag: "*" = Keyline

Total number of lines in spectrum 27
Number of unidentified lines 9
Number of lines tentatively identified by NID 18 66.67%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CU-67	61.83H	42.2	6.380E+00	2.690E+02	3.614E+02	134.35	
AS-74	17.77D	1.72	2.882E+00	4.957E+00	9.040E+00	182.36	
TE-125M	57.40D	1.18	9.443E+02	1.117E+03	1.056E+03	94.50	
CE-141	32.51D	1.35	1.170E+00	1.573E+00	8.617E+00	547.68	
TL-208	1.91Y	1.01	1.886E+00	1.912E+00	3.681E+00	192.50	
PB-210	22.20Y	1.00	3.978E+01	3.983E+01	8.870E+01	222.71	
PO-210	22.20Y	1.00	3.978E+01	3.983E+01	8.870E+01	222.71	
BI-214	1600.00Y	1.00	2.187E+01	2.187E+01	1.164E+01	53.24	
RA-226	1600.00Y	1.00	8.655E+01	8.655E+01	11.63E+01	134.35	
TH-230	7.54E+04Y	1.00	6.179E+02	6.179E+02	8.997E+02	145.60	
TH-231	7.04E+08Y	1.00	4.260E+01	4.260E+01	5.416E+01	127.14	
TH-232	1.41E+10Y	1.00	1.563E+03	1.563E+03	1.285E+03	82.18	
TH-234	4.47E+09Y	1.00	1.099E+02	1.099E+02	0.903E+02	82.18	
U-235	7.04E+08Y	1.00	5.154E+00	5.154E+00	28.23E+00	547.68	
U-238	4.47E+09Y	1.00	1.099E+02	1.099E+02	0.903E+02	82.18	
Total Activity :			3.594E+03	4.031E+03			

Grand Total Activity : 3.594E+03 4.031E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	168.56	91	189	11.38	337.34	324	27	1.26E-02	87.1	2.24E+00	
0	238.96	23	71	1.31	478.11	471	12	3.22E-03	****	1.84E+00	T
0	353.05	17	43	1.48	706.23	699	11	2.34E-03	****	1.40E+00	T
0	523.97	9	9	0.61	1048.04	1044	7	1.26E-03	****	1.02E+00	T
0	526.80	12	10	0.56	1053.70	1050	8	1.62E-03	****	1.02E+00	T
0	709.70	11	19	0.85	1419.48	1411	13	1.56E-03	****	7.87E-01	
0	830.34	9	3	0.55	1660.77	1652	11	1.19E-03	****	6.87E-01	
0	864.78	6	7	1.37	1729.67	1725	7	8.33E-04	****	6.63E-01	
0	941.23	6	12	0.66	1882.59	1875	12	8.10E-04	****	6.17E-01	
0	994.25	12	11	0.92	1988.65	1981	15	1.60E-03	****	5.89E-01	
0	1001.64	9	8	2.01	2003.41	1996	11	1.28E-03	****	5.85E-01	T
0	1014.51	12	7	4.19	2029.16	2021	15	1.61E-03	****	5.79E-01	
0	1096.49	5	14	1.00	2193.15	2183	15	6.51E-04	****	5.42E-01	
0	1277.56	15	0	1.54	2555.40	2551	10	2.08E-03	51.6	4.78E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372014.CNF;1  *
* Acquisition date   : 21-DEC-2016 11:54:24 Sensitivity      : 3.000          *
* Detector ID        : GAM41 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:11.43 Half life ratio  : *****          *
* Sample date        : 7-DEC-2016 15:09:00 Nuclide Library : LIQUID          *
* Sample ID          : G412372014 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER          *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 27-JAN-2016 05:57:05 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
CU-67	1.165E+02
AS-74	6.342E+00
TE-125M	6.290E+02
CE-141	3.331E+00
TL-208	2.320E+00
PB-210	3.463E+01
PO-210	3.463E+01
BI-214	4.153E+00
RA-226	3.770E+01
TH-230	3.797E+02
TH-231	2.043E+01
TH-232	5.550E+02
TH-234	3.901E+01
U-235	1.085E+01
U-238	3.901E+01

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.940E+01	NOT IDENT.
NA-22	2.614E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.954E+00	NOT IDENT.
K-40	3.647E+01	NOT IDENT.
SC-46	2.301E+00	FAIL ABUN
V-48	4.695E+00	NOT IDENT.
CR-51	1.909E+01	NOT IDENT.
MN-52	1.431E+01	NOT IDENT.
MN-54	2.328E+00	NOT IDENT.
CO-56	2.755E+00	NOT IDENT.
CO-57	1.631E+00	NOT IDENT.
CO-58	1.849E+00	NOT IDENT.
FE-59	5.951E+00	NOT IDENT.
CO-60	2.412E+00	NOT IDENT.
ZN-65	5.329E+00	NOT IDENT.

GE-68	7.527E+01	NOT IDENT.
SE-75	3.168E+00	NOT IDENT.
BR-77	5.634E+02	FAIL ABUN
SR-82	1.467E+01	NOT IDENT.
RB-83	3.109E+00	NOT IDENT.
RB-84	3.868E+00	NOT IDENT.
KR-85	5.297E+02	NOT IDENT.
SR-85	2.746E+00	NOT IDENT.
RB-86	4.070E+01	NOT IDENT.
Y-88	2.293E+00	NOT IDENT.
Y-91	1.323E+03	NOT IDENT.
NB-94	2.068E+00	NOT IDENT.
NB-95	2.699E+00	NOT IDENT.
NB-95M	5.753E+00	NOT IDENT.
ZR-95	3.786E+00	NOT IDENT.
MO-99	5.806E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.079E+00	NOT IDENT.
RH-102M	1.522E+00	NOT IDENT.
RU-103	2.593E+00	FAIL ABUN
RH-106	2.052E+01	NOT IDENT.
RU-106	2.052E+01	NOT IDENT.
AG-108M	1.967E+00	NOT IDENT.
CD-109	3.923E+01	NOT IDENT.
AG-110M	2.604E+00	NOT IDENT.
SN-113	2.632E+00	NOT IDENT.
IN-114M	1.128E+01	NOT IDENT.
CD-115	5.201E+02	FAIL ABUN
SN-117M	3.663E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	2.007E+00	NOT IDENT.
SB-124	3.375E+00	NOT IDENT.
SB-125	5.595E+00	NOT IDENT.
I-126	1.228E+01	NOT IDENT.
SB-126	8.044E+00	NOT IDENT.
SN-126	3.573E+00	FAIL ABUN
SB-127	6.733E+01	NOT IDENT.
TE-129	2.831E+01	NOT IDENT.
I-131	7.386E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.381E+01	NOT IDENT.
BA-133	2.295E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.230E+00	NOT IDENT.
CS-135	9.391E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	6.770E+00	NOT IDENT.
BA-137M	1.880E+00	NOT IDENT.
CS-137	1.986E+00	NOT IDENT.
CE-139	1.771E+00	NOT IDENT.
BA-140	1.506E+01	NOT IDENT.
LA-140	5.358E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.343E+01	NOT IDENT.
PM-144	1.827E+00	NOT IDENT.
PR-144	1.369E+02	NOT IDENT.
PM-146	2.922E+00	NOT IDENT.
ND-147	2.999E+01	NOT IDENT.
PM-147	4.873E+04	NOT IDENT.
PM-149	3.542E+03	NOT IDENT.
EU-152	5.501E+00	NOT IDENT.
GD-153	5.239E+00	NOT IDENT.
EU-154	7.389E+00	NOT IDENT.
EU-155	6.444E+00	NOT IDENT.
HO-166M	3.886E+00	FAIL ABUN
TM-171	3.149E+02	FAIL ABUN
LU-176	1.775E+00	NOT IDENT.
LU-177	6.398E+01	NOT IDENT.
HF-181	2.847E+00	NOT IDENT.
W-181	5.446E+00	FAIL ABUN
TA-182	1.004E+01	FAIL ABUN
RE-183	5.593E+00	FAIL ABUN
RE-184	5.909E+00	NOT IDENT.
RE-188	1.033E+01	FAIL ABUN
W-188	4.292E+02	FAIL ABUN
OS-191	1.016E+01	FAIL ABUN
IR-192	2.293E+00	NOT IDENT.
HG-203	2.432E+00	NOT IDENT.

BI-207	3.331E+00	NOT IDENT.
BI-211	1.663E+01	NOT IDENT.
PB-211	4.725E+01	NOT IDENT.
BI-212	2.969E+01	NOT IDENT.
PB-212	5.131E+00	FAIL ABUN
BI-213	7.621E+00	NOT IDENT.
PB-214	6.074E+00	FAIL ABUN
RN-219	2.487E+01	NOT IDENT.
FR-221	1.182E+01	NOT IDENT.
RA-223	3.922E+01	FAIL ABUN
RA-224	4.351E+01	NOT IDENT.
AC-227	1.740E+01	NOT IDENT.
TH-227	1.740E+01	NOT IDENT.
AC-228	9.467E+00	NOT IDENT.
RA-228	9.467E+00	NOT IDENT.
TH-228	5.131E+00	FAIL ABUN
TH-229	3.398E+01	FAIL ABUN
PA-231	2.989E+01	NOT IDENT.
PA-233	4.474E+00	NOT IDENT.
PA-234	1.320E+01	NOT IDENT.
PA-234M	3.973E+02	FAIL ABUN
U-234	1.247E+03	NOT IDENT.
NP-237	4.474E+00	NOT IDENT.
NP-238	9.235E+02	NOT IDENT.
NP-239	1.637E+01	NOT IDENT.
AM-241	4.250E+00	NOT IDENT.
AM-242	3.917E+01	NOT IDENT.
AM-243	2.534E+00	NOT IDENT.
CM-243	6.730E+00	NOT IDENT.
BK-247	5.695E+00	FAIL ABUN
CM-247	2.446E+00	NOT IDENT.
CF-249	2.616E+00	NOT IDENT.
CF-251	7.768E+00	NOT IDENT.
CF-252	1.019E+04	NOT IDENT.
ANH-511	4.261E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G412372014.CNF;1
Acquisition date : 21-DEC-2016 11:54:24 Sensitivity : 3.000
Detector ID : GAM41 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:11.43 Half life ratio : *****
Sample date : 7-DEC-2016 15:09:00 Nuclide Library : LIQUID
Sample ID : G412372014 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 27-JAN-2016 05:57:05 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM41_2LMB.CNF;3

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CU-67	2.690E+02	3.549E+02	3.549E+02
AS-74	4.957E+00	8.877E+00	8.877E+00
TE-125M	1.117E+03	1.040E+03	1.040E+03
CE-141	1.573E+00	8.446E+00	8.446E+00
TL-208	1.912E+00	3.612E+00	3.612E+00
PB-210	3.983E+01	8.714E+01	8.714E+01
PO-210	3.983E+01	8.714E+01	8.714E+01
BI-214	2.187E+01	1.159E+01	1.159E+01
RA-226	8.655E+01	1.142E+02	1.142E+02
TH-230	6.179E+02	8.907E+02	8.907E+02
TH-231	4.260E+01	5.345E+01	5.345E+01
TH-232	1.563E+03	1.288E+03	1.288E+03
TH-234	1.099E+02	9.284E+01	9.284E+01
U-235	5.154E+00	2.767E+01	2.767E+01
U-238	1.099E+02	9.284E+01	9.284E+01

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	1.179E+00	2.348E+01	2.348E+01	NOT IDENT.
NA-22	5.424E-01	3.403E+00	3.411E+00	NOT IDENT.
NA-24	1.201E+07	1.431E+07	1.530E+07	SHORT HLIF
AL-26	2.679E+00	2.663E+00	2.924E+00	NOT IDENT.
K-40	2.337E+01	3.629E+01	3.779E+01	NOT IDENT.
SC-46	-3.960E-01	2.793E+00	2.798E+00	FAIL ABUN
V-48	-8.415E-01	5.722E+00	5.734E+00	NOT IDENT.
CR-51	-2.537E+01	2.651E+01	2.887E+01	NOT IDENT.
MN-52	7.884E+00	1.496E+01	1.538E+01	NOT IDENT.
MN-54	1.719E+00	2.447E+00	2.566E+00	NOT IDENT.
CO-56	1.789E+00	2.905E+00	3.015E+00	NOT IDENT.
CO-57	-1.714E+00	2.019E+00	2.162E+00	NOT IDENT.
CO-58	-1.678E+00	2.559E+00	2.669E+00	NOT IDENT.
FE-59	4.905E+00	6.558E+00	6.921E+00	NOT IDENT.
CO-60	9.086E-01	2.644E+00	2.676E+00	NOT IDENT.

ZN-65	1.444E+00	6.800E+00	6.831E+00	NOT IDENT.
GE-68	2.955E+01	8.251E+01	8.358E+01	NOT IDENT.
SE-75	2.370E+00	3.516E+00	3.675E+00	NOT IDENT.
BR-77	5.907E+02	9.639E+02	1.000E+03	FAIL ABUN
SR-82	-1.170E+01	1.995E+01	2.063E+01	NOT IDENT.
RB-83	-2.945E+00	5.221E+00	5.387E+00	NOT IDENT.
RB-84	-9.117E-01	4.750E+00	4.767E+00	NOT IDENT.
KR-85	-1.364E+03	8.296E+02	1.033E+03	NOT IDENT.
SR-85	-7.071E+00	4.301E+00	5.353E+00	NOT IDENT.
RB-86	-4.931E-02	4.849E+01	4.849E+01	NOT IDENT.
Y-88	-1.454E+00	3.185E+00	3.251E+00	NOT IDENT.
Y-91	3.347E+02	1.516E+03	1.523E+03	NOT IDENT.
NB-94	-1.091E+00	2.973E+00	3.013E+00	NOT IDENT.
NB-95	1.545E+00	2.884E+00	2.967E+00	NOT IDENT.
NB-95M	-7.525E-01	7.706E+00	7.713E+00	NOT IDENT.
ZR-95	-2.479E+00	4.921E+00	5.046E+00	NOT IDENT.
MO-99	-3.223E+02	7.309E+02	7.452E+02	FAIL ABUN
TC-99M	8.025E+16	1.397E+17	0.000E+00	SHORT HLIF
RH-101	-2.587E-01	2.419E+00	2.422E+00	NOT IDENT.
RH-102M	-1.173E+00	2.089E+00	2.155E+00	NOT IDENT.
RU-103	-2.107E+00	3.512E+00	3.638E+00	FAIL ABUN
RH-106	-1.333E+01	2.792E+01	2.856E+01	NOT IDENT.
RU-106	-1.333E+01	2.792E+01	2.856E+01	NOT IDENT.
AG-108M	-1.680E-02	2.391E+00	2.391E+00	NOT IDENT.
CD-109	-8.709E+00	6.085E+01	6.098E+01	NOT IDENT.
AG-110M	2.948E-01	2.990E+00	2.993E+00	NOT IDENT.
SN-113	-6.184E-01	3.558E+00	3.569E+00	NOT IDENT.
IN-114M	-1.200E+00	1.485E+01	1.486E+01	NOT IDENT.
CD-115	5.948E+02	6.501E+02	7.032E+02	FAIL ABUN
SN-117M	3.761E+00	3.966E+00	4.313E+00	NOT IDENT.
I-123	8.795E+07	8.234E+07	9.139E+07	SHORT HLIF
TE-123M	1.809E+00	2.278E+00	2.419E+00	NOT IDENT.
SB-124	-2.587E+00	5.121E+00	5.252E+00	NOT IDENT.
SB-125	1.330E+00	6.575E+00	6.602E+00	NOT IDENT.
I-126	-2.577E+00	1.465E+01	1.470E+01	NOT IDENT.
SB-126	3.328E+00	8.733E+00	8.861E+00	NOT IDENT.
SN-126	-6.837E+00	5.604E+00	6.396E+00	FAIL ABUN
SB-127	5.757E+00	7.707E+01	7.711E+01	NOT IDENT.
TE-129	1.139E+01	3.252E+01	3.292E+01	NOT IDENT.
I-131	5.218E+00	8.225E+00	8.554E+00	NOT IDENT.
I-132	-1.000E+41	1.399E+41	0.000E+00	SHORT HLIF
TE-132	2.569E+00	3.958E+01	3.959E+01	NOT IDENT.
BA-133	-6.077E-01	3.216E+00	3.227E+00	NOT IDENT.
I-133	3.409E+04	1.653E+05	1.660E+05	SHORT HLIF
CS-134	-3.992E+00	3.498E+00	3.933E+00	NOT IDENT.
CS-135	-5.327E+00	1.176E+01	1.200E+01	NOT IDENT.
I-135	8.886E+15	1.874E+16	0.000E+00	SHORT HLIF
CS-136	4.613E+00	7.072E+00	7.371E+00	NOT IDENT.
BA-137M	-2.924E+00	2.698E+00	3.003E+00	NOT IDENT.
CS-137	-3.089E+00	2.850E+00	3.172E+00	NOT IDENT.
CE-139	-1.855E-01	2.080E+00	2.081E+00	NOT IDENT.
BA-140	1.488E+00	1.822E+01	1.823E+01	NOT IDENT.
LA-140	4.635E-01	6.400E+00	6.404E+00	NOT IDENT.
CE-143	-3.233E+03	5.497E+03	5.687E+03	SHORT HLIF
CE-144	-5.752E+00	1.744E+01	1.763E+01	NOT IDENT.
PM-144	-1.362E+00	2.376E+00	2.454E+00	NOT IDENT.
PR-144	-8.490E+01	1.749E+02	1.790E+02	NOT IDENT.
PM-146	3.500E+00	3.023E+00	3.410E+00	NOT IDENT.
ND-147	-2.630E+01	4.801E+01	4.945E+01	NOT IDENT.
PM-147	-1.085E+04	5.699E+04	5.720E+04	NOT IDENT.
PM-149	8.144E+02	4.109E+03	4.125E+03	NOT IDENT.
EU-152	-6.028E+00	7.468E+00	7.947E+00	NOT IDENT.
GD-153	4.211E-01	6.801E+00	6.804E+00	NOT IDENT.
EU-154	1.482E+00	9.634E+00	9.657E+00	NOT IDENT.
EU-155	-7.678E-01	7.792E+00	7.800E+00	NOT IDENT.
HO-166M	-6.968E-01	5.280E+00	5.290E+00	FAIL ABUN
TM-171	-2.522E+02	4.300E+02	4.448E+02	FAIL ABUN
LU-176	1.139E+00	1.983E+00	2.049E+00	NOT IDENT.
LU-177	6.834E+00	7.449E+01	7.455E+01	NOT IDENT.
HF-181	-3.038E-01	3.526E+00	3.529E+00	NOT IDENT.
W-181	6.355E+00	6.545E+00	7.144E+00	FAIL ABUN
TA-182	2.758E+00	1.134E+01	1.141E+01	FAIL ABUN
RE-183	7.603E+00	6.975E+00	7.771E+00	FAIL ABUN
RE-184	-4.258E+00	8.028E+00	8.254E+00	NOT IDENT.
RE-188	-4.757E+00	1.240E+01	1.259E+01	FAIL ABUN
W-188	-6.644E+01	5.193E+02	5.202E+02	FAIL ABUN
OS-191	-2.660E+00	1.194E+01	1.200E+01	FAIL ABUN
IR-192	2.093E+00	2.483E+00	2.656E+00	NOT IDENT.

HG-203	-1.611E-01	2.909E+00	2.910E+00	NOT IDENT.
BI-207	9.222E-01	3.759E+00	3.782E+00	NOT IDENT.
BI-211	1.579E+01	1.897E+01	2.026E+01	NOT IDENT.
PB-211	-4.440E+00	5.780E+01	5.784E+01	NOT IDENT.
BI-212	7.067E+00	3.319E+01	3.334E+01	NOT IDENT.
PB-212	5.497E+00	8.970E+00	9.306E+00	FAIL ABUN
BI-213	8.168E+00	8.106E+00	8.904E+00	NOT IDENT.
PB-214	6.340E+00	1.065E+01	1.103E+01	FAIL ABUN
RN-219	-1.347E+01	3.214E+01	3.271E+01	NOT IDENT.
FR-221	-1.553E+00	1.408E+01	1.410E+01	NOT IDENT.
RA-223	-2.841E+01	5.061E+01	5.221E+01	FAIL ABUN
RA-224	-8.762E+00	5.843E+01	5.856E+01	NOT IDENT.
AC-227	2.019E+01	1.867E+01	2.077E+01	NOT IDENT.
TH-227	2.019E+01	1.867E+01	2.077E+01	NOT IDENT.
AC-228	-2.170E+00	1.156E+01	1.160E+01	NOT IDENT.
RA-228	-2.170E+00	1.156E+01	1.160E+01	NOT IDENT.
TH-228	5.497E+00	8.970E+00	9.306E+00	FAIL ABUN
TH-229	1.834E+00	3.962E+01	3.962E+01	FAIL ABUN
PA-231	-6.397E+00	3.645E+01	3.656E+01	NOT IDENT.
PA-233	5.565E+00	4.688E+00	5.317E+00	NOT IDENT.
PA-234	-1.884E+01	3.266E+01	3.375E+01	NOT IDENT.
PA-234M	3.517E+02	5.424E+02	5.651E+02	FAIL ABUN
U-234	-2.996E+02	1.636E+03	1.641E+03	NOT IDENT.
NP-237	5.565E+00	4.688E+00	5.317E+00	NOT IDENT.
NP-238	-8.638E+02	1.260E+03	1.319E+03	NOT IDENT.
NP-239	-1.251E+01	1.987E+01	2.065E+01	NOT IDENT.
AM-241	-3.201E+00	6.112E+00	6.280E+00	NOT IDENT.
AM-242	1.908E+01	4.364E+01	4.448E+01	NOT IDENT.
AM-243	5.577E-01	3.165E+00	3.175E+00	NOT IDENT.
CM-243	3.512E+00	7.473E+00	7.639E+00	NOT IDENT.
BK-247	5.078E+00	6.311E+00	6.713E+00	FAIL ABUN
CM-247	3.441E-01	2.911E+00	2.915E+00	NOT IDENT.
CF-249	1.420E+00	2.959E+00	3.027E+00	NOT IDENT.
CF-251	-8.293E+00	1.043E+01	1.108E+01	NOT IDENT.
CF-252	-3.985E+03	1.251E+04	1.264E+04	NOT IDENT.
ANH-511	-7.298E+00	4.985E+00	5.972E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	82.3626	88.03	70.2102	140.88	45.3072
46.54	77.3928	88.34	70.2397	143.76	42.7642
49.72	69.2197	88.47	80.2876	144.24	42.7847
51.35	93.4976	91.11	91.9005	145.44	42.8350
52.39	85.3778	91.27	91.9200	152.32	62.8849
53.20	78.3795	92.59	85.7725	152.43	62.8913
56.28	103.8923	93.31	85.8529	153.25	55.7473
57.36	0.0000	94.56	70.8169	154.21	52.1979
57.53	74.2009	94.65	70.8250	155.04	63.9480
57.53	74.2014	94.67	70.8267	156.02	57.6960
57.98	76.6545	97.43	63.4613	158.56	47.8932
59.32	108.8454	98.43	62.6942	158.97	0.0000
59.54	108.8865	98.44	62.6949	159.00	49.9015
61.49	83.1399	99.53	65.3255	162.33	54.4073
63.00	83.3491	100.11	72.1649	162.66	43.5391
63.29	83.3889	100.20	72.1731	163.33	48.1035
63.58	83.4289	102.03	70.6345	165.86	48.2140
63.81	83.4602	103.18	65.6204	176.31	46.8252
64.28	83.5246	103.37	63.0785	176.60	37.1938
64.99	83.6210	105.31	69.7208	177.52	61.7634
65.08	83.6331	106.12	69.2753	181.07	44.2510
66.73	83.8553	106.47	64.1708	184.41	43.4520
66.98	83.8890	109.28	74.6869	184.58	43.4582
67.24	83.9237	111.00	85.1597	185.72	43.4998
67.67	83.9808	111.76	81.3609	186.21	43.5175
67.75	83.9911	112.95	64.6610	190.27	50.1674
69.67	86.2797	116.24	68.3660	193.51	50.3009
70.83	89.6962	116.30	68.3708	198.01	44.8750
72.81	114.5041	116.74	72.7339	201.83	61.8918
72.87	105.5172	117.23	84.0368	205.31	56.4197
74.66	98.4198	119.76	62.5547	208.37	49.0140
74.82	98.4430	120.54	61.7393	210.85	41.5530
74.97	112.0039	120.90	62.6338	218.12	37.9850
77.11	106.1845	121.12	68.7397	222.11	45.7188
79.69	115.6698	121.22	68.7473	227.09	43.0193
80.12	84.3256	121.78	76.6267	227.38	45.8970
80.19	84.3339	122.06	81.0051	228.16	39.2258
80.57	79.4160	123.07	60.1672	228.18	39.2266
81.00	84.4314	123.68	58.4621	235.69	28.8586
81.07	84.4397	127.23	67.4451	235.96	28.8641
83.79	72.2973	129.43	72.8715	238.63	37.5948
84.00	72.3186	131.20	64.2114	238.98	37.6043
84.21	72.3394	133.02	74.0272	240.99	57.9346
85.43	76.6255	133.52	67.0118	242.00	59.4255
86.55	80.0796	136.00	70.2774	244.70	44.5326
86.94	93.8931	136.28	70.2976	250.62	42.7709
87.09	93.9119	136.47	65.0049	252.40	36.0105
87.57	91.8849	140.51	63.9390	252.80	37.9673

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	26.3463	383.85	32.5976	631.29	16.6499
260.90	45.0276	388.16	20.0228	632.98	10.5223
264.66	34.3456	388.63	20.0279	633.25	10.5231
265.00	31.4089	391.70	23.2264	634.78	14.9160
268.22	42.2949	400.66	30.7541	635.95	12.2889
269.46	41.3455	401.81	28.6496	636.99	15.8060
271.23	26.6100	402.40	24.4122	645.85	17.6178
273.65	30.6001	404.85	27.6303	657.76	13.2687
276.40	28.6767	410.95	21.3175	661.66	22.1443
277.37	28.6944	414.70	24.5601	664.57	0.0000
277.60	28.6985	423.72	20.3773	666.33	15.0825
278.00	34.6454	427.09	19.3359	666.50	14.1963
278.43	35.6448	427.87	18.2683	667.71	0.0000
279.20	38.6342	433.94	23.7094	677.62	16.0318
279.54	38.6429	440.45	15.1339	685.70	13.3969
280.46	33.7081	453.88	10.8771	695.00	17.0228
283.69	35.7642	459.60	14.1770	696.49	16.1345
284.31	41.7411	463.37	24.0325	696.51	15.2382
285.41	34.8085	468.07	20.7990	697.00	14.3442
285.90	24.8708	473.00	13.1650	697.49	12.5533
287.50	28.8790	475.06	19.7655	702.65	18.6831
290.67	32.9275	476.78	14.2859	706.68	14.3906
293.27	0.0000	477.60	17.5889	711.68	15.8560
295.22	34.0208	477.99	16.4926	720.70	9.0356
295.96	33.0349	482.18	22.0304	721.93	0.0000
299.98	36.1267	487.02	22.0768	722.78	5.4250
300.09	36.1289	492.35	23.2341	722.91	6.3297
300.13	36.1304	497.08	28.8244	723.31	7.2349
301.36	36.1567	511.00	36.8007	724.19	14.4736
302.85	33.1739	514.00	61.4117	727.33	9.9607
304.50	30.1880	520.40	15.1139	733.00	9.9792
304.85	42.2726	520.69	15.1155	735.93	14.5288
306.78	26.1989	522.65	0.0000	739.50	18.1818
308.46	29.2513	527.90	13.4761	744.23	13.6569
311.90	19.2037	529.59	11.7997	747.24	21.8723
316.51	21.2828	529.87	0.0000	752.31	15.5178
319.41	38.5767	531.02	21.9264	753.82	15.5251
320.08	35.5455	537.26	14.6546	756.73	13.7114
321.04	23.3715	546.56	0.0000	763.94	11.9098
323.87	37.6594	552.55	18.1478	765.80	10.0836
325.23	26.4840	563.25	22.7799	766.42	11.9193
328.76	41.8475	569.33	17.1252	766.84	11.0039
333.37	36.8408	569.50	15.9847	772.60	0.0000
334.37	45.0527	569.70	15.9858	776.52	11.0369
338.28	26.6808	583.19	17.2168	777.92	7.3611
338.32	26.6813	595.83	20.7590	778.90	8.2837
340.48	28.7685	600.60	29.1149	783.70	11.0614
340.55	28.7696	602.73	13.8755	785.37	13.8336
344.28	35.0065	604.72	10.4143	792.07	9.2413
345.93	23.7028	609.32	15.0683	795.86	19.4292
351.06	25.8362	610.33	15.0741	801.95	18.5382
351.93	25.8484	614.28	6.9673	802.10	17.6119
356.01	23.3153	618.01	19.7676	810.29	9.2923
364.49	22.9010	621.93	22.1249	810.45	9.2929
366.42	25.0083	630.19	0.0000	810.76	12.0820

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	8.3768	1129.67	5.0537		
818.51	10.2467	1131.51	0.0000		
832.01	7.4819	1173.23	9.1884		
834.85	6.4185	1189.05	7.1722		
836.80	0.0000	1204.77	9.2538		
846.77	8.4534	1221.41	6.1919		
856.80	14.1302	1231.02	3.1024		
860.56	7.5442	1235.36	8.2808		
871.09	15.1338	1238.28	4.1431		
873.19	9.4641	1260.41	0.0000		
875.33	0.0000	1274.44	6.6805		
880.51	12.3287	1274.54	6.6809		
881.60	10.4354	1291.59	6.2860		
883.24	7.5928	1298.22	0.0000		
884.68	6.6465	1312.11	4.2085		
889.28	10.4579	1332.49	4.2263		
894.76	12.3783	1365.19	9.5729		
898.04	12.3894	1368.63	0.0000		
903.28	10.4985	1384.29	4.2710		
911.20	14.3477	1408.01	8.5820		
923.98	8.6385	1434.09	3.2347		
926.36	11.5254	1457.56	0.0000		
935.54	3.0812	1460.82	2.1676		
937.49	10.7895	1489.16	5.4483		
944.13	9.2646	1596.21	4.4451		
946.00	12.3590	1620.50	2.2321		
949.00	7.7305	1678.03	0.0000		
954.55	0.0000	1690.97	3.6152		
964.08	8.7317	1764.49	6.4053		
968.97	12.6287	1770.23	4.5793		
983.53	13.6518	1771.35	1.8321		
984.45	18.5315	1791.20	0.0000		
996.26	7.8267	1808.65	0.9216		
1001.03	6.2689	1836.06	5.5544		
1004.73	3.1374				
1025.87	7.8857				
1028.54	9.8639				
1037.84	13.8411				
1038.76	0.0000				
1046.59	6.9355				
1048.07	5.9469				
1050.41	4.9588				
1063.66	7.9600				
1077.00	6.9872				
1077.34	5.9897				
1083.85	1.9996				
1085.87	7.0021				
1099.25	4.8170				
1111.64	9.0582				
1112.07	8.0527				
1112.84	8.0542				
1115.54	8.0596				
1120.29	13.1111				
1120.55	13.1119				
1121.30	8.0703				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 13:56:26.75

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690078.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM40.CNF;163
Background date    : 18-DEC-2016 13:13:15
Sample date       : 19-DEC-2016 00:00:00 Acquisition date : 21-DEC-2016 11:54:51
Sample ID        : G1203690078 Sample quantity : 2.000000E+00 LITER
Detector name    : GAM40 Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.68 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	186.13*	5	60	1.27	372.37	371	7	6.53E-04	335.0	0.00E+00
2	0	245.17	25	31	0.86	490.47	485	9	3.41E-03	45.9	
3	0	339.18	7	36	0.54	678.50	673	8	9.72E-04	153.2	
4	0	363.19	11	44	1.45	726.54	721	11	1.56E-03	120.7	
5	2	446.61	19	8	1.78	893.38	890	13	2.70E-03	32.3	1.30E+00
6	2	449.77	15	5	1.20	899.69	890	13	2.03E-03	40.0	
7	0	510.84*	8	67	2.46	1021.84	1015	15	1.15E-03	270.9	
8	0	537.06	21	3	0.70	1074.28	1069	12	2.87E-03	27.8	
9	0	612.19	21	26	0.56	1224.53	1216	18	2.97E-03	60.7	
10	0	637.35	22	10	4.78	1274.86	1267	14	3.09E-03	37.3	
11	0	645.72	8	16	0.77	1291.61	1283	11	1.12E-03	103.6	
12	0	840.97	12	6	3.44	1682.08	1677	11	1.68E-03	47.5	
13	0	1137.67	7	0	1.37	2275.43	2270	9	9.72E-04	37.8	
14	0	1338.65	9	0	0.58	2677.33	2671	12	1.25E-03	33.3	
15	0	1471.80	7	3	1.44	2943.58	2936	10	9.86E-04	56.8	
16	0	1958.36	9	0	0.56	3916.44	3911	12	1.25E-03	33.3	

Flag: "*" = Peak area was modified by background subtraction

VMS Nuclide Identification Report V3.1 Generated 21-DEC-2016 13:56:28

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690078.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: MXR1		
Sample date	: 19-DEC-2016 00:00:00	Acquisition date	: 21-DEC-2016 11:54:51
Sample ID	: G1203690078	Sample quantity	: 2.0000 LITER
Sample type	: LIQUID	Sample geometry	:
Detector name	: GAMMA40	Detector geometry	: 2LMB
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.68 0.0%
Energy tolerance	: 1.50 keV	Half life ratio	: 10.00
Errors propagated	: No	Systematic Error	: 0.00 %
Efficiency type	: Empirical	Efficiencies at	: Peak Energy
Abundance limit	: 75.00		

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
I-131	80.19	-----	2.62	1.289E+00	-----	Line Not Found	-----
	284.31	-----	6.12	1.675E+00	-----	Line Not Found	-----
	364.49	11	81.50*	1.429E+00	1.810E+00	2.253E+00	241.35
	636.99	22	7.16	9.685E-01	6.022E+01	7.497E+01	74.53
RA-226	186.21	5	3.59*	2.112E+00	1.163E+01	1.163E+01	670.06
ANH-511	511.00	8	100.00*	1.134E+00	1.373E+00	1.373E+00	541.90

Flag: "*" = Keyline


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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690078.CNF;1 *
* Acquisition date   : 21-DEC-2016 11:54:51 Sensitivity      : 3.000          *
* Detector ID        : GAM40 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:00.68 Half life ratio : *****          *
* Sample date        : 19-DEC-2016 00:00:00 Analyst initials: MXR1          *
* Sample ID          : G1203690078 Sample Quantity : 2.0000E+00 LITER      *
* Batch Number       : 1624165 Wet Weight : 0.00000          *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : LIQUID.NLB;10
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 11-NOV-2016 10:53:00 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4          *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
I-131	2.253E+00	5.328E+00	4.235E+00
RA-226	1.163E+01	7.639E+01	7.968E+01
ANH-511	1.373E+00	7.294E+00	4.395E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-1.088E+01	2.005E+01	3.505E+01	NOT IDENT.
NA-22	1.061E+00	1.947E+00	4.747E+00	NOT IDENT.
NA-24	1.890E+01	3.466E+01	8.407E+01	NOT IDENT.
AL-26	-5.348E-01	2.069E+00	3.965E+00	NOT IDENT.
K-40	-1.979E+01	3.334E+01	6.089E+01	NOT IDENT.
SC-46	1.507E+00	2.664E+00	5.492E+00	NOT IDENT.
V-48	-3.333E+00	2.486E+00	3.679E+00	NOT IDENT.
CR-51	-4.346E+00	1.949E+01	3.600E+01	NOT IDENT.
MN-52	-9.695E-01	2.388E+00	4.678E+00	NOT IDENT.
MN-54	4.792E-01	1.909E+00	3.955E+00	NOT IDENT.
CO-56	-2.372E+00	2.996E+00	3.923E+00	NOT IDENT.
CO-57	4.952E-01	1.850E+00	3.344E+00	NOT IDENT.
CO-58	4.486E-01	2.275E+00	4.515E+00	NOT IDENT.
FE-59	-2.473E-01	3.951E+00	8.161E+00	NOT IDENT.
CO-60	9.102E-01	2.203E+00	4.806E+00	NOT IDENT.
ZN-65	-1.107E+00	4.662E+00	9.175E+00	NOT IDENT.
CU-67	-1.775E+00	8.126E+00	1.402E+01	NOT IDENT.
GE-68	4.386E+00	6.372E+01	1.361E+02	NOT IDENT.
AS-74	-9.159E-01	4.673E+00	8.248E+00	NOT IDENT.
SE-75	1.435E+00	2.799E+00	5.603E+00	NOT IDENT.
BR-77	-1.923E+01	1.825E+01	3.153E+01	NOT IDENT.
SR-82	5.842E-01	1.193E+01	2.408E+01	NOT IDENT.
RB-83	1.526E+00	3.983E+00	8.145E+00	NOT IDENT.
RB-84	3.245E-01	2.713E+00	5.584E+00	NOT IDENT.
KR-85	5.686E+02	5.515E+02	1.088E+03	NOT IDENT.
SR-85	2.616E+00	2.537E+00	5.004E+00	NOT IDENT.
RB-86	-6.665E+00	2.536E+01	5.063E+01	NOT IDENT.

Y-88	-1.348E-01	1.728E+00	3.936E+00	NOT IDENT.
Y-91	-2.071E+02	8.940E+02	1.776E+03	NOT IDENT.
NB-94	1.825E+00	2.531E+00	5.210E+00	NOT IDENT.
NB-95	1.177E+00	2.396E+00	4.634E+00	NOT IDENT.
NB-95M	2.503E-01	6.670E+00	1.274E+01	NOT IDENT.
ZR-95	1.051E-01	3.327E+00	6.613E+00	NOT IDENT.
MO-99	1.420E+01	2.998E+01	6.354E+01	NOT IDENT.
TC-99M	1.685E+03	1.912E+03	3.659E+03	NOT IDENT.
RH-101	-1.946E-01	2.537E+00	4.373E+00	NOT IDENT.
RH-102M	5.267E-01	1.922E+00	3.821E+00	NOT IDENT.
RU-103	5.598E-01	2.293E+00	4.491E+00	NOT IDENT.
RH-106	-2.767E+00	2.108E+01	3.922E+01	NOT IDENT.
RU-106	-2.767E+00	2.108E+01	3.922E+01	NOT IDENT.
AG-108M	2.464E-01	2.172E+00	4.166E+00	NOT IDENT.
CD-109	-1.768E+01	5.841E+01	1.002E+02	NOT IDENT.
AG-110M	-8.595E-02	2.799E+00	5.426E+00	NOT IDENT.
SN-113	4.037E-01	2.895E+00	5.587E+00	NOT IDENT.
IN-114M	-5.197E-01	1.147E+01	1.961E+01	NOT IDENT.
CD-115	-4.209E-01	1.366E+01	2.635E+01	NOT IDENT.
SN-117M	-1.314E+00	2.269E+00	3.660E+00	NOT IDENT.
I-123	-4.131E+00	4.831E+01	8.273E+01	NOT IDENT.
TE-123M	-1.155E-01	2.000E+00	3.436E+00	NOT IDENT.
SB-124	5.584E-01	6.318E+00	1.319E+01	FAIL ABUN
SB-125	4.271E-01	5.264E+00	1.035E+01	FAIL ABUN
TE-125M	2.723E+02	6.442E+02	1.186E+03	NOT IDENT.
I-126	-1.662E+00	7.883E+00	1.437E+01	NOT IDENT.
SB-126	-1.177E+00	4.244E+00	7.743E+00	NOT IDENT.
SN-126	3.812E-01	5.933E+00	1.060E+01	NOT IDENT.
SB-127	-4.922E+00	7.961E+00	1.346E+01	NOT IDENT.
TE-129	-3.699E+00	2.393E+01	4.492E+01	NOT IDENT.
I-132	0.000E+00	1.972E+08	0.000E+00	SHORT HLIF
TE-132	2.390E-02	3.198E+00	6.084E+00	NOT IDENT.
BA-133	1.354E+00	2.954E+00	5.885E+00	NOT IDENT.
I-133	6.028E+00	1.384E+01	2.915E+01	NOT IDENT.
CS-134	-1.817E+00	2.715E+00	4.468E+00	NOT IDENT.
CS-135	8.106E-01	9.673E+00	1.869E+01	NOT IDENT.
I-135	-3.759E+03	5.031E+03	8.643E+03	NOT IDENT.
CS-136	-6.158E-01	2.802E+00	5.655E+00	FAIL ABUN
BA-137M	-2.127E+00	2.306E+00	3.628E+00	NOT IDENT.
CS-137	-2.247E+00	2.436E+00	3.833E+00	NOT IDENT.
CE-139	-1.635E+00	2.155E+00	3.390E+00	NOT IDENT.
BA-140	1.668E+01	9.081E+00	1.707E+01	FAIL ABUN
LA-140	-4.658E-01	3.132E+00	6.296E+00	NOT IDENT.
CE-141	-3.025E+00	3.831E+00	6.049E+00	NOT IDENT.
CE-143	-2.852E+00	1.585E+01	2.932E+01	NOT IDENT.
CE-144	-9.944E+00	1.451E+01	2.329E+01	NOT IDENT.
PM-144	-1.740E+00	2.333E+00	3.822E+00	NOT IDENT.
PR-144	-1.331E+02	1.728E+02	2.816E+02	NOT IDENT.
PM-146	8.793E-01	2.275E+00	4.606E+00	NOT IDENT.
ND-147	2.497E+00	1.408E+01	2.850E+01	NOT IDENT.
PM-147	-2.455E+04	5.620E+04	9.357E+04	NOT IDENT.
PM-149	8.575E+01	1.133E+02	2.342E+02	NOT IDENT.
EU-152	7.083E-01	6.378E+00	1.234E+01	FAIL ABUN
GD-153	1.811E+00	5.918E+00	1.093E+01	NOT IDENT.
EU-154	3.026E+00	5.552E+00	1.354E+01	NOT IDENT.
EU-155	-9.030E-01	9.019E+00	1.562E+01	NOT IDENT.
HO-166M	1.026E+00	3.846E+00	7.711E+00	NOT IDENT.
TM-171	5.130E+02	2.910E+03	5.408E+03	NOT IDENT.
LU-176	-1.172E+00	1.742E+00	3.063E+00	NOT IDENT.
LU-177	1.427E+01	2.144E+01	4.273E+01	NOT IDENT.
HF-181	2.002E-01	2.643E+00	5.043E+00	NOT IDENT.
W-181	9.794E+00	3.010E+01	5.555E+01	NOT IDENT.
TA-182	-1.893E+00	6.574E+00	1.337E+01	NOT IDENT.
RE-183	-1.505E+01	2.745E+01	4.627E+01	NOT IDENT.
RE-184	3.951E+00	5.422E+00	1.233E+01	NOT IDENT.
RE-188	2.816E-01	1.117E+01	1.934E+01	NOT IDENT.
W-188	1.702E+02	4.738E+02	9.238E+02	NOT IDENT.
OS-191	-1.728E+00	6.793E+00	1.152E+01	NOT IDENT.
IR-192	1.522E+00	2.248E+00	4.546E+00	NOT IDENT.
HG-203	-5.770E-02	2.127E+00	4.034E+00	NOT IDENT.
BI-207	1.129E+00	2.947E+00	6.547E+00	NOT IDENT.
TL-208	-8.284E-01	3.012E+00	5.083E+00	NOT IDENT.
PB-210	-4.706E+02	9.205E+02	1.409E+03	NOT IDENT.
PO-210	-4.706E+02	9.205E+02	1.409E+03	NOT IDENT.
BI-211	-7.375E+00	1.758E+01	2.966E+01	NOT IDENT.
PB-211	-1.805E+01	4.441E+01	8.040E+01	NOT IDENT.
BI-212	-2.872E+01	3.382E+01	5.086E+01	NOT IDENT.
PB-212	-5.507E+00	4.595E+00	7.830E+00	NOT IDENT.

BI-213	-3.354E+00	6.674E+00	1.185E+01	NOT IDENT.
BI-214	5.269E-01	5.309E+00	9.541E+00	NOT IDENT.
PB-214	-4.994E+00	5.907E+00	9.348E+00	NOT IDENT.
RN-219	4.176E-01	2.505E+01	4.832E+01	NOT IDENT.
FR-221	-4.051E+00	1.487E+01	2.748E+01	NOT IDENT.
RA-223	-9.992E-01	3.889E+01	7.459E+01	FAIL ABUN
RA-224	-1.808E+01	5.043E+01	8.184E+01	NOT IDENT.
AC-227	1.297E+00	1.624E+01	3.133E+01	NOT IDENT.
TH-227	1.297E+00	1.624E+01	3.133E+01	NOT IDENT.
AC-228	1.315E+00	8.433E+00	1.685E+01	FAIL ABUN
RA-228	1.315E+00	8.433E+00	1.685E+01	FAIL ABUN
TH-228	-5.507E+00	4.595E+00	7.830E+00	NOT IDENT.
TH-229	-3.459E+00	3.426E+01	6.485E+01	NOT IDENT.
TH-230	-2.132E+02	1.287E+03	2.150E+03	NOT IDENT.
PA-231	-1.302E+01	3.204E+01	5.818E+01	NOT IDENT.
TH-231	-3.677E+01	3.985E+01	6.188E+01	NOT IDENT.
TH-232	-4.163E+02	2.156E+03	3.892E+03	NOT IDENT.
PA-233	1.277E+00	4.417E+00	8.672E+00	FAIL ABUN
PA-234	7.124E+00	1.911E+01	4.134E+01	NOT IDENT.
PA-234M	-1.407E+02	2.863E+02	5.534E+02	NOT IDENT.
TH-234	-3.445E+02	1.684E+02	2.409E+02	NOT IDENT.
U-234	6.954E+03	1.110E+04	2.141E+04	NOT IDENT.
U-235	5.364E+00	1.477E+01	2.665E+01	FAIL ABUN
NP-237	1.277E+00	4.417E+00	8.672E+00	FAIL ABUN
NP-238	-1.744E+01	2.156E+01	3.750E+01	NOT IDENT.
U-238	-3.445E+02	1.684E+02	2.409E+02	NOT IDENT.
NP-239	1.714E+01	2.049E+01	3.916E+01	NOT IDENT.
AM-241	3.361E+00	2.130E+01	3.880E+01	NOT IDENT.
AM-242	-5.245E+00	4.791E+01	8.399E+01	NOT IDENT.
AM-243	2.374E+00	5.014E+00	9.317E+00	NOT IDENT.
CM-243	-3.030E-01	8.017E+00	1.414E+01	NOT IDENT.
BK-247	1.821E+00	5.450E+00	1.072E+01	NOT IDENT.
CM-247	7.664E-01	2.236E+00	4.521E+00	NOT IDENT.
CF-249	5.288E-01	2.575E+00	5.064E+00	NOT IDENT.
CF-251	2.256E+00	9.731E+00	1.721E+01	NOT IDENT.
CF-252	-3.376E+03	1.298E+04	2.236E+04	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	91.95	46	40	1.14	184.00	178	14	6.41E-03	30.5	2.56E+00
2	1	93.45	36	41	1.14	187.00	178	14	5.01E-03	38.3	
3	0	186.13	36	60	1.27	372.37	371	7	5.07E-03	40.5	
4	0	245.17	25	31	0.86	490.47	485	9	3.41E-03	45.9	
5	0	339.18	7	36	0.54	678.50	673	8	9.72E-04	153.2	1.30E+00
6	0	363.19	11	44	1.45	726.54	721	11	1.56E-03	120.7	
7	2	446.61	19	8	1.78	893.38	890	13	2.70E-03	32.3	
8	2	449.77	15	5	1.20	899.69	890	13	2.03E-03	40.0	
9	0	510.84	136	67	2.46	1021.84	1015	15	1.89E-02	15.7	
10	0	537.06	21	3	0.70	1074.28	1069	12	2.87E-03	27.8	
11	0	612.19	21	26	0.56	1224.53	1216	18	2.97E-03	60.7	
12	0	637.35	22	10	4.78	1274.86	1267	14	3.09E-03	37.3	
13	0	645.72	8	16	0.77	1291.61	1283	11	1.12E-03	103.6	
14	0	840.97	12	6	3.44	1682.08	1677	11	1.68E-03	47.5	
15	0	1137.67	7	0	1.37	2275.43	2270	9	9.72E-04	37.8	
16	0	1338.65	9	0	0.58	2677.33	2671	12	1.25E-03	33.3	
17	0	1471.80	7	3	1.44	2943.58	2936	10	9.86E-04	56.8	
18	0	1958.36	9	0	0.56	3916.44	3911	12	1.25E-03	33.3	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
I-131	80.19	-----	2.62	1.289E+00	-----	Line Not Found	-----
	284.31	-----	6.12	1.675E+00	-----	Line Not Found	-----
	364.49	11	81.50*	1.429E+00	1.810E+00	2.253E+00	241.35
	636.99	22	7.16	9.685E-01	6.022E+01	7.497E+01	74.53
RA-226	186.21	5	3.59*	2.112E+00	1.163E+01	1.163E+01	670.06
ANH-511	511.00	8	100.00*	1.134E+00	1.373E+00	1.373E+00	541.90

Flag: "*" = Keyline

Total number of lines in spectrum 16
Number of unidentified lines 8
Number of lines tentatively identified by NID 8 50.00%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
I-131	8.03D	1.24	1.810E+00	2.253E+00	5.437E+00	241.35	
RA-226	1600.00Y	1.00	1.163E+01	1.163E+01	7.795E+01	670.06	
ANH-511	1.00E+09Y	1.00	1.373E+00	1.373E+00	7.443E+00	541.90	
Total Activity :			1.482E+01	1.526E+01			

Grand Total Activity : 1.482E+01 1.526E+01

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	245.17	25	31	0.86	490.47	485	9	3.41E-03	91.8	1.83E+00	T
0	339.18	7	36	0.54	678.50	673	8	9.72E-04	****	1.49E+00	T
2	446.61	19	8	1.78	893.38	890	13	2.70E-03	64.5	1.24E+00	
2	449.77	15	5	1.20	899.69	890	13	2.03E-03	80.0	1.24E+00	
0	537.06	21	3	0.70	1074.28	1069	12	2.87E-03	55.5	1.10E+00	T
0	612.19	21	26	0.56	1224.53	1216	18	2.97E-03	****	9.97E-01	
0	645.72	8	16	0.77	1291.61	1283	11	1.12E-03	****	9.59E-01	T
0	840.97	12	6	3.44	1682.08	1677	11	1.68E-03	95.0	7.83E-01	
0	1137.67	7	0	1.37	2275.43	2270	9	9.72E-04	75.6	6.13E-01	
0	1338.65	9	0	0.58	2677.33	2671	12	1.25E-03	66.7	5.38E-01	
0	1471.80	7	3	1.44	2943.58	2936	10	9.86E-04	****	5.01E-01	
0	1958.36	9	0	0.56	3916.44	3911	12	1.25E-03	66.7	4.26E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690078.CNF;1 *
* Acquisition date   : 21-DEC-2016 11:54:51 Sensitivity      : 3.000          *
* Detector ID       : GAM40 Energy tolerance: 1.500          *
* Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time : 0 02:00:00.68 Half life ratio : *****          *
* Sample date       : 19-DEC-2016 00:00:00 Nuclide Library : LIQUID      *
* Sample ID        : G1203690078 Analyst initials: MXR1          *
* Batch Number     : 1624165 Sample Quantity : 2.0000E+00 LITER *
* Wet wt corr      : 1.00000 Wet Weight      : 0.00000          *
*                                     Dry Weight      : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date    : 11-NOV-2016 10:53:00 Eff. Geometry   : 2LMB          *
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
I-131	1.846E+00
RA-226	3.651E+01
ANH-511	1.974E+00

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.542E+01	NOT IDENT.
NA-22	1.919E+00	NOT IDENT.
NA-24	3.403E+01	NOT IDENT.
AL-26	1.405E+00	NOT IDENT.
K-40	2.572E+01	NOT IDENT.
SC-46	2.400E+00	NOT IDENT.
V-48	1.429E+00	NOT IDENT.
CR-51	1.625E+01	NOT IDENT.
MN-52	1.657E+00	NOT IDENT.
MN-54	1.654E+00	NOT IDENT.
CO-56	1.628E+00	NOT IDENT.
CO-57	1.536E+00	NOT IDENT.
CO-58	1.934E+00	NOT IDENT.
FE-59	3.339E+00	NOT IDENT.
CO-60	1.932E+00	NOT IDENT.
ZN-65	3.777E+00	NOT IDENT.
CU-67	6.524E+00	NOT IDENT.
GE-68	5.570E+01	NOT IDENT.
AS-74	3.658E+00	NOT IDENT.
SE-75	2.553E+00	NOT IDENT.
BR-77	1.453E+01	NOT IDENT.
SR-82	9.879E+00	NOT IDENT.
RB-83	3.559E+00	NOT IDENT.
RB-84	2.277E+00	NOT IDENT.
KR-85	4.918E+02	NOT IDENT.
SR-85	2.262E+00	NOT IDENT.
RB-86	2.028E+01	NOT IDENT.
Y-88	1.373E+00	NOT IDENT.

Y-91	7.162E+02	NOT IDENT.
NB-94	2.323E+00	NOT IDENT.
NB-95	2.008E+00	NOT IDENT.
NB-95M	5.811E+00	NOT IDENT.
ZR-95	2.743E+00	NOT IDENT.
MO-99	2.719E+01	NOT IDENT.
TC-99M	1.690E+03	NOT IDENT.
RH-101	2.019E+00	NOT IDENT.
RH-102M	1.687E+00	NOT IDENT.
RU-103	1.994E+00	NOT IDENT.
RH-106	1.701E+01	NOT IDENT.
RU-106	1.701E+01	NOT IDENT.
AG-108M	1.862E+00	NOT IDENT.
CD-109	4.571E+01	NOT IDENT.
AG-110M	2.246E+00	NOT IDENT.
SN-113	2.503E+00	NOT IDENT.
IN-114M	9.001E+00	NOT IDENT.
CD-115	1.135E+01	NOT IDENT.
SN-117M	1.680E+00	NOT IDENT.
I-123	3.803E+01	NOT IDENT.
TE-123M	1.580E+00	NOT IDENT.
SB-124	5.393E+00	FAIL ABUN
SB-125	4.509E+00	FAIL ABUN
TE-125M	5.459E+02	NOT IDENT.
I-126	6.242E+00	NOT IDENT.
SB-126	3.256E+00	NOT IDENT.
SN-126	4.861E+00	NOT IDENT.
SB-127	5.545E+00	NOT IDENT.
TE-129	1.962E+01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.781E+00	NOT IDENT.
BA-133	2.661E+00	NOT IDENT.
I-133	1.257E+01	NOT IDENT.
CS-134	1.871E+00	NOT IDENT.
CS-135	8.434E+00	NOT IDENT.
I-135	3.363E+03	NOT IDENT.
CS-136	2.274E+00	FAIL ABUN
BA-137M	1.515E+00	NOT IDENT.
CS-137	1.600E+00	NOT IDENT.
CE-139	1.549E+00	NOT IDENT.
BA-140	7.447E+00	FAIL ABUN
LA-140	2.503E+00	NOT IDENT.
CE-141	2.779E+00	NOT IDENT.
CE-143	1.337E+01	NOT IDENT.
CE-144	1.062E+01	NOT IDENT.
PM-144	1.629E+00	NOT IDENT.
PR-144	1.198E+02	NOT IDENT.
PM-146	1.986E+00	NOT IDENT.
ND-147	1.219E+01	NOT IDENT.
PM-147	4.271E+04	NOT IDENT.
PM-149	1.063E+02	NOT IDENT.
EU-152	5.525E+00	FAIL ABUN
GD-153	4.986E+00	NOT IDENT.
EU-154	5.471E+00	NOT IDENT.
EU-155	7.207E+00	NOT IDENT.
HO-166M	3.330E+00	NOT IDENT.
TM-171	2.455E+03	NOT IDENT.
LU-176	1.362E+00	NOT IDENT.
LU-177	1.978E+01	NOT IDENT.
HF-181	2.244E+00	NOT IDENT.
W-181	2.564E+01	NOT IDENT.
TA-182	5.035E+00	NOT IDENT.
RE-183	2.120E+01	NOT IDENT.
RE-184	5.218E+00	NOT IDENT.
RE-188	8.924E+00	NOT IDENT.
W-188	4.229E+02	NOT IDENT.
OS-191	5.279E+00	NOT IDENT.
IR-192	2.073E+00	NOT IDENT.
HG-203	1.827E+00	NOT IDENT.
BI-207	2.749E+00	NOT IDENT.
TL-208	2.252E+00	NOT IDENT.
PB-210	6.401E+02	NOT IDENT.
PO-210	6.401E+02	NOT IDENT.
BI-211	1.349E+01	NOT IDENT.
PB-211	3.516E+01	NOT IDENT.
BI-212	2.109E+01	NOT IDENT.
PB-212	3.603E+00	NOT IDENT.
BI-213	5.149E+00	NOT IDENT.

BI-214	4.214E+00	NOT IDENT.
PB-214	4.187E+00	NOT IDENT.
RN-219	2.129E+01	NOT IDENT.
FR-221	1.261E+01	NOT IDENT.
RA-223	3.318E+01	FAIL ABUN
RA-224	3.759E+01	NOT IDENT.
AC-227	1.417E+01	NOT IDENT.
TH-227	1.417E+01	NOT IDENT.
AC-228	7.085E+00	FAIL ABUN
RA-228	7.085E+00	FAIL ABUN
TH-228	3.603E+00	NOT IDENT.
TH-229	2.967E+01	NOT IDENT.
TH-230	9.894E+02	NOT IDENT.
PA-231	2.616E+01	NOT IDENT.
TH-231	2.828E+01	NOT IDENT.
TH-232	1.788E+03	NOT IDENT.
PA-233	3.920E+00	FAIL ABUN
PA-234	1.771E+01	NOT IDENT.
PA-234M	2.323E+02	NOT IDENT.
TH-234	1.089E+02	NOT IDENT.
U-234	9.827E+03	NOT IDENT.
U-235	1.230E+01	FAIL ABUN
NP-237	3.920E+00	FAIL ABUN
NP-238	1.540E+01	NOT IDENT.
U-238	1.089E+02	NOT IDENT.
NP-239	1.809E+01	NOT IDENT.
AM-241	1.783E+01	NOT IDENT.
AM-242	3.825E+01	NOT IDENT.
AM-243	4.307E+00	NOT IDENT.
CM-243	6.451E+00	NOT IDENT.
BK-247	4.880E+00	NOT IDENT.
CM-247	1.997E+00	NOT IDENT.
CF-249	2.251E+00	NOT IDENT.
CF-251	7.924E+00	NOT IDENT.
CF-252	1.015E+04	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690078.CNF;1
Acquisition date : 21-DEC-2016 11:54:51 Sensitivity : 3.000
Detector ID : GAM40 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.68 Half life ratio : *****
Sample date : 19-DEC-2016 00:00:00 Nuclide Library : LIQUID
Sample ID : G1203690078 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 11-NOV-2016 10:53:00 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
I-131	2.253E+00	5.331E+00	5.331E+00
RA-226	1.163E+01	7.640E+01	7.640E+01
ANH-511	1.373E+00	7.295E+00	7.295E+00

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.088E+01	2.007E+01	2.066E+01	NOT IDENT.
NA-22	1.061E+00	1.949E+00	2.007E+00	NOT IDENT.
NA-24	1.890E+01	3.469E+01	3.572E+01	NOT IDENT.
AL-26	-5.348E-01	2.070E+00	2.084E+00	NOT IDENT.
K-40	-1.979E+01	3.339E+01	3.456E+01	NOT IDENT.
SC-46	1.507E+00	2.667E+00	2.752E+00	NOT IDENT.
V-48	-3.333E+00	2.502E+00	2.918E+00	NOT IDENT.
CR-51	-4.346E+00	1.949E+01	1.959E+01	NOT IDENT.
MN-52	-9.695E-01	2.390E+00	2.429E+00	NOT IDENT.
MN-54	4.792E-01	1.909E+00	1.921E+00	NOT IDENT.
CO-56	-2.372E+00	3.003E+00	3.188E+00	NOT IDENT.
CO-57	4.952E-01	1.851E+00	1.864E+00	NOT IDENT.
CO-58	4.486E-01	2.275E+00	2.284E+00	NOT IDENT.
FE-59	-2.473E-01	3.952E+00	3.953E+00	NOT IDENT.
CO-60	9.102E-01	2.204E+00	2.242E+00	NOT IDENT.
ZN-65	-1.107E+00	4.663E+00	4.690E+00	NOT IDENT.
CU-67	-1.775E+00	8.128E+00	8.167E+00	NOT IDENT.
GE-68	4.386E+00	6.372E+01	6.375E+01	NOT IDENT.
AS-74	-9.159E-01	4.674E+00	4.692E+00	NOT IDENT.
SE-75	1.435E+00	2.801E+00	2.875E+00	NOT IDENT.
BR-77	-1.923E+01	1.831E+01	2.026E+01	NOT IDENT.
SR-82	5.842E-01	1.193E+01	1.194E+01	NOT IDENT.
RB-83	1.526E+00	3.990E+00	4.049E+00	NOT IDENT.
RB-84	3.245E-01	2.714E+00	2.718E+00	NOT IDENT.
KR-85	5.686E+02	5.535E+02	6.100E+02	NOT IDENT.
SR-85	2.616E+00	2.546E+00	2.806E+00	NOT IDENT.
RB-86	-6.665E+00	2.537E+01	2.555E+01	NOT IDENT.

Y-88	-1.348E-01	1.728E+00	1.730E+00	NOT IDENT.
Y-91	-2.071E+02	8.941E+02	8.990E+02	NOT IDENT.
NB-94	1.825E+00	2.536E+00	2.666E+00	NOT IDENT.
NB-95	1.177E+00	2.398E+00	2.456E+00	NOT IDENT.
NB-95M	2.503E-01	6.670E+00	6.671E+00	NOT IDENT.
ZR-95	1.051E-01	3.327E+00	3.327E+00	NOT IDENT.
MO-99	1.420E+01	3.001E+01	3.069E+01	NOT IDENT.
TC-99M	1.685E+03	1.922E+03	2.066E+03	NOT IDENT.
RH-101	-1.946E-01	2.537E+00	2.539E+00	NOT IDENT.
RH-102M	5.267E-01	1.923E+00	1.938E+00	NOT IDENT.
RU-103	5.598E-01	2.293E+00	2.307E+00	NOT IDENT.
RH-106	-2.767E+00	2.108E+01	2.111E+01	NOT IDENT.
RU-106	-2.767E+00	2.108E+01	2.111E+01	NOT IDENT.
AG-108M	2.464E-01	2.172E+00	2.175E+00	NOT IDENT.
CD-109	-1.768E+01	5.844E+01	5.898E+01	NOT IDENT.
AG-110M	-8.595E-02	2.799E+00	2.799E+00	NOT IDENT.
SN-113	4.037E-01	2.895E+00	2.900E+00	NOT IDENT.
IN-114M	-5.197E-01	1.147E+01	1.147E+01	NOT IDENT.
CD-115	-4.209E-01	1.366E+01	1.367E+01	NOT IDENT.
SN-117M	-1.314E+00	2.271E+00	2.347E+00	NOT IDENT.
I-123	-4.131E+00	4.831E+01	4.835E+01	NOT IDENT.
TE-123M	-1.155E-01	2.000E+00	2.001E+00	NOT IDENT.
SB-124	5.584E-01	6.318E+00	6.323E+00	FAIL ABUN
SB-125	4.271E-01	5.264E+00	5.267E+00	FAIL ABUN
TE-125M	2.723E+02	6.445E+02	6.561E+02	NOT IDENT.
I-126	-1.662E+00	7.884E+00	7.920E+00	NOT IDENT.
SB-126	-1.177E+00	4.247E+00	4.280E+00	NOT IDENT.
SN-126	3.812E-01	5.933E+00	5.936E+00	NOT IDENT.
SB-127	-4.922E+00	7.971E+00	8.274E+00	NOT IDENT.
TE-129	-3.699E+00	2.394E+01	2.400E+01	NOT IDENT.
I-132	-5.781E+06	1.972E+08	1.973E+08	SHORT HLIF
TE-132	2.390E-02	3.198E+00	3.198E+00	NOT IDENT.
BA-133	1.354E+00	2.956E+00	3.018E+00	NOT IDENT.
I-133	6.028E+00	1.385E+01	1.411E+01	NOT IDENT.
CS-134	-1.817E+00	2.720E+00	2.840E+00	NOT IDENT.
CS-135	8.106E-01	9.674E+00	9.680E+00	NOT IDENT.
I-135	-3.759E+03	5.051E+03	5.327E+03	NOT IDENT.
CS-136	-6.158E-01	2.803E+00	2.817E+00	FAIL ABUN
BA-137M	-2.127E+00	2.312E+00	2.503E+00	NOT IDENT.
CS-137	-2.247E+00	2.443E+00	2.644E+00	NOT IDENT.
CE-139	-1.635E+00	2.182E+00	2.303E+00	NOT IDENT.
BA-140	1.668E+01	9.185E+00	1.187E+01	FAIL ABUN
LA-140	-4.658E-01	3.132E+00	3.139E+00	NOT IDENT.
CE-141	-3.025E+00	3.838E+00	4.073E+00	NOT IDENT.
CE-143	-2.852E+00	1.585E+01	1.590E+01	NOT IDENT.
CE-144	-9.944E+00	1.453E+01	1.521E+01	NOT IDENT.
PM-144	-1.740E+00	2.337E+00	2.466E+00	NOT IDENT.
PR-144	-1.331E+02	1.732E+02	1.833E+02	NOT IDENT.
PM-146	8.793E-01	2.276E+00	2.311E+00	NOT IDENT.
ND-147	2.497E+00	1.408E+01	1.413E+01	NOT IDENT.
PM-147	-2.455E+04	5.623E+04	5.731E+04	NOT IDENT.
PM-149	8.575E+01	1.141E+02	1.204E+02	NOT IDENT.
EU-152	7.083E-01	6.378E+00	6.386E+00	FAIL ABUN
GD-153	1.811E+00	5.920E+00	5.976E+00	NOT IDENT.
EU-154	3.026E+00	5.558E+00	5.723E+00	NOT IDENT.
EU-155	-9.030E-01	9.019E+00	9.029E+00	NOT IDENT.
HO-166M	1.026E+00	3.847E+00	3.874E+00	NOT IDENT.
TM-171	5.130E+02	2.910E+03	2.919E+03	NOT IDENT.
LU-176	-1.172E+00	1.745E+00	1.823E+00	NOT IDENT.
LU-177	1.427E+01	2.147E+01	2.241E+01	NOT IDENT.
HF-181	2.002E-01	2.643E+00	2.645E+00	NOT IDENT.
W-181	9.794E+00	3.021E+01	3.053E+01	NOT IDENT.
TA-182	-1.893E+00	6.576E+00	6.631E+00	NOT IDENT.
RE-183	-1.505E+01	2.750E+01	2.832E+01	NOT IDENT.
RE-184	3.951E+00	5.437E+00	5.722E+00	NOT IDENT.
RE-188	2.816E-01	1.117E+01	1.117E+01	NOT IDENT.
W-188	1.702E+02	4.743E+02	4.805E+02	NOT IDENT.
OS-191	-1.728E+00	6.794E+00	6.838E+00	NOT IDENT.
IR-192	1.522E+00	2.251E+00	2.353E+00	NOT IDENT.
HG-203	-5.770E-02	2.127E+00	2.127E+00	NOT IDENT.
BI-207	1.129E+00	2.949E+00	2.993E+00	NOT IDENT.
TL-208	-8.284E-01	3.013E+00	3.036E+00	NOT IDENT.
PB-210	-4.706E+02	9.216E+02	9.457E+02	NOT IDENT.
PO-210	-4.706E+02	9.216E+02	9.457E+02	NOT IDENT.
BI-211	-7.375E+00	1.759E+01	1.790E+01	NOT IDENT.
PB-211	-1.805E+01	4.443E+01	4.517E+01	NOT IDENT.
BI-212	-2.872E+01	3.392E+01	3.630E+01	NOT IDENT.
PB-212	-5.507E+00	4.616E+00	5.241E+00	NOT IDENT.

BI-213	-3.354E+00	6.680E+00	6.849E+00	NOT IDENT.
BI-214	5.269E-01	5.309E+00	5.314E+00	NOT IDENT.
PB-214	-4.994E+00	5.920E+00	6.334E+00	NOT IDENT.
RN-219	4.176E-01	2.505E+01	2.505E+01	NOT IDENT.
FR-221	-4.051E+00	1.487E+01	1.499E+01	NOT IDENT.
RA-223	-9.992E-01	3.889E+01	3.889E+01	FAIL ABUN
RA-224	-1.808E+01	5.045E+01	5.110E+01	NOT IDENT.
AC-227	1.297E+00	1.624E+01	1.625E+01	NOT IDENT.
TH-227	1.297E+00	1.624E+01	1.625E+01	NOT IDENT.
AC-228	1.315E+00	8.434E+00	8.455E+00	FAIL ABUN
RA-228	1.315E+00	8.434E+00	8.455E+00	FAIL ABUN
TH-228	-5.507E+00	4.616E+00	5.241E+00	NOT IDENT.
TH-229	-3.459E+00	3.427E+01	3.430E+01	NOT IDENT.
TH-230	-2.132E+02	1.287E+03	1.291E+03	NOT IDENT.
PA-231	-1.302E+01	3.217E+01	3.270E+01	NOT IDENT.
TH-231	-3.677E+01	4.020E+01	4.348E+01	NOT IDENT.
TH-232	-4.163E+02	2.156E+03	2.164E+03	NOT IDENT.
PA-233	1.277E+00	4.418E+00	4.455E+00	FAIL ABUN
PA-234	7.124E+00	2.078E+01	2.103E+01	NOT IDENT.
PA-234M	-1.407E+02	2.865E+02	2.935E+02	NOT IDENT.
TH-234	-3.445E+02	1.856E+02	2.420E+02	NOT IDENT.
U-234	6.954E+03	1.112E+04	1.156E+04	NOT IDENT.
U-235	5.364E+00	1.478E+01	1.497E+01	FAIL ABUN
NP-237	1.277E+00	4.418E+00	4.455E+00	FAIL ABUN
NP-238	-1.744E+01	2.161E+01	2.299E+01	NOT IDENT.
U-238	-3.445E+02	1.856E+02	2.420E+02	NOT IDENT.
NP-239	1.714E+01	2.053E+01	2.194E+01	NOT IDENT.
AM-241	3.361E+00	2.130E+01	2.135E+01	NOT IDENT.
AM-242	-5.245E+00	4.792E+01	4.798E+01	NOT IDENT.
AM-243	2.374E+00	5.017E+00	5.130E+00	NOT IDENT.
CM-243	-3.030E-01	8.017E+00	8.018E+00	NOT IDENT.
BK-247	1.821E+00	5.464E+00	5.525E+00	NOT IDENT.
CM-247	7.664E-01	2.241E+00	2.267E+00	NOT IDENT.
CF-249	5.288E-01	2.575E+00	2.586E+00	NOT IDENT.
CF-251	2.256E+00	9.735E+00	9.788E+00	NOT IDENT.
CF-252	-3.376E+03	1.334E+04	1.343E+04	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	37.8219	88.03	41.8765	140.88	32.5161
46.54	35.9430	88.34	48.6880	143.76	41.0660
49.72	18.0851	88.47	48.6965	144.24	37.4605
51.35	45.8884	91.11	61.3733	145.44	59.2829
52.39	29.9398	91.27	61.3865	152.32	49.9412
53.20	31.0562	92.59	48.9681	152.43	46.2916
56.28	37.6941	93.31	37.6160	153.25	47.5479
57.36	42.0833	94.56	68.5057	154.21	47.5914
57.53	42.0961	94.65	68.5135	155.04	47.6294
57.53	42.0963	94.67	68.5153	156.02	48.8965
57.98	50.7717	97.43	30.9427	158.56	53.9164
59.32	40.0637	98.43	33.2775	158.97	45.3563
59.54	40.0791	98.44	33.2779	159.00	45.3574
61.49	42.3880	99.53	36.7717	162.33	54.1071
63.00	55.5727	100.11	36.7988	162.66	49.2035
63.29	52.3293	100.20	36.8030	163.33	39.3872
63.58	50.1733	102.03	35.7352	165.86	53.0499
63.81	28.3698	103.18	33.4775	176.31	46.0789
64.28	32.7600	103.37	36.9495	176.60	32.3881
64.99	44.8247	105.31	49.7699	177.52	41.1412
65.08	44.8316	106.12	41.7093	181.07	36.6832
66.73	54.8206	106.47	41.7269	184.41	41.3875
66.98	51.5526	109.28	37.2168	184.58	33.8674
67.24	50.4767	111.00	41.9551	185.72	40.1782
67.67	40.6291	111.76	36.1604	186.21	40.1948
67.75	40.6345	112.95	25.6983	190.27	42.8538
69.67	38.5563	116.24	36.3501	193.51	40.4424
70.83	46.3521	116.30	36.3525	198.01	30.4442
72.81	53.1372	116.74	34.0244	201.83	48.3529
72.87	53.1423	117.23	43.4350	205.31	51.0400
74.66	41.0762	119.76	41.2057	208.37	40.0784
74.82	36.6444	120.54	40.0637	210.85	34.1760
74.97	36.6527	120.90	40.0801	218.12	46.3980
77.11	40.1136	121.12	44.8064	222.11	43.9537
79.69	53.6887	121.22	44.8113	227.09	37.1976
80.12	39.1726	121.78	44.8394	227.38	37.2060
80.19	39.1766	122.06	37.7715	228.16	38.0931
80.57	35.8384	123.07	51.9942	228.18	38.0936
81.00	40.3432	123.68	44.9345	235.69	35.6932
81.07	40.3473	127.23	49.8583	235.96	40.9242
83.79	47.2554	129.43	45.2178	238.63	43.6208
84.00	40.5165	131.20	40.5348	238.98	42.7594
84.21	42.7802	133.02	43.0021	240.99	49.8124
85.43	38.3426	133.52	49.0009	242.00	34.1068
86.55	37.2730	136.00	40.7408	244.70	35.0484
86.94	32.7728	136.28	40.7527	250.62	44.8730
87.09	35.0403	136.47	43.1581	252.40	32.5956
87.57	39.5878	140.51	32.5037	252.80	37.0106

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	29.1488	383.85	12.3885	631.29	11.1353
260.90	27.4694	388.16	19.1020	632.98	4.7752
264.66	27.5394	388.63	11.4641	633.25	4.7758
265.00	29.3228	391.70	22.9644	634.78	10.1938
268.22	27.6050	400.66	20.1857	635.95	10.1980
269.46	26.7365	401.81	18.2737	636.99	10.2020
271.23	32.1218	402.40	15.3929	645.85	14.3926
273.65	28.5983	404.85	21.1912	657.76	11.7770
276.40	29.5450	410.95	20.2899	661.66	18.2264
277.37	35.8350	414.70	11.6157	664.57	6.4395
277.60	35.8398	423.72	17.5005	666.33	17.1823
278.00	34.9534	427.09	18.5029	666.50	17.1829
278.43	28.6875	427.87	14.6130	667.71	0.0000
279.20	31.3926	433.94	22.4722	677.62	11.8594
279.54	34.0911	440.45	20.5817	685.70	12.9736
280.46	29.6229	453.88	9.4680	695.00	17.3529
283.69	30.5842	459.60	17.7993	696.49	19.5322
284.31	35.0962	463.37	19.8112	696.51	19.5322
285.41	24.3144	468.07	20.8462	697.00	19.5352
285.90	21.6196	473.00	22.8821	697.49	15.1969
287.50	36.9711	475.06	15.9329	702.65	14.1357
290.67	33.4311	476.78	14.9484	706.68	15.2441
293.27	38.9163	477.60	24.9232	711.68	10.9070
295.22	36.2451	477.99	22.9336	720.70	12.0335
295.96	28.1026	482.18	20.9782	721.93	14.2272
299.98	25.4468	487.02	16.0176	722.78	9.8525
300.09	19.9952	492.35	15.0516	722.91	8.7581
300.13	19.9957	497.08	18.0992	723.31	8.7591
301.36	32.7451	511.00	26.2999	724.19	8.7617
302.85	36.4168	514.00	15.1923	727.33	14.2526
304.50	20.0494	520.40	12.1865	733.00	6.5903
304.85	19.1419	520.69	12.1880	735.93	12.0939
306.78	31.0283	522.65	0.0000	739.50	7.7050
308.46	31.0601	527.90	13.2439	744.23	9.9218
311.90	25.6319	529.59	13.2528	747.24	9.9313
316.51	25.7026	529.87	9.1761	752.31	7.7369
319.41	43.2182	531.02	10.2006	753.82	8.8464
320.08	32.1966	537.26	10.2266	756.73	7.7480
321.04	23.9312	546.56	10.2657	763.94	12.2031
323.87	22.1270	552.55	9.2615	765.80	4.4401
325.23	26.7580	563.25	14.4683	766.42	11.1027
328.76	20.3408	569.33	14.5030	766.84	11.1039
333.37	21.1366	569.50	14.5041	772.60	0.0000
334.37	22.2617	569.70	13.4692	776.52	6.6826
338.28	23.2412	583.19	15.6232	777.92	12.2568
338.32	23.2417	595.83	18.8386	778.90	4.4585
340.48	29.3204	600.60	20.9701	783.70	15.6281
340.55	29.3217	602.73	24.1352	785.37	12.2855
344.28	23.3200	604.72	17.6422	792.07	10.0726
345.93	30.8113	609.32	8.4157	795.86	15.6868
351.06	30.8992	610.33	8.4186	801.95	7.8582
351.93	28.1036	614.28	8.4310	802.10	7.8585
356.01	23.4726	618.01	15.8301	810.29	4.5018
364.49	15.5634	621.93	15.8533	810.45	5.6274
366.42	22.6611	630.19	0.0000	810.76	10.1305

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	7.8912	1129.67	3.6763		
818.51	7.8978	1131.51	6.1300		
832.01	9.0625	1173.23	3.7136		
834.85	6.8025	1189.05	6.5223		
836.80	13.6128	1204.77	7.4810		
846.77	12.2875	1221.41	4.6930		
856.80	13.6934	1231.02	8.4655		
860.56	11.4233	1235.36	7.5317		
871.09	6.8750	1238.28	4.7104		
873.19	9.1722	1260.41	9.4666		
875.33	12.6194	1274.44	2.8486		
880.51	12.6382	1274.54	2.8486		
881.60	5.7463	1291.59	6.6710		
883.24	10.3484	1298.22	6.6804		
884.68	8.0519	1312.11	8.6144		
889.28	10.3660	1332.49	3.0760		
894.76	11.5356	1365.19	5.8063		
898.04	6.9277	1368.63	2.9052		
903.28	4.6253	1384.29	3.8860		
911.20	8.1123	1408.01	3.9045		
923.98	8.1407	1434.09	3.9246		
926.36	10.4736	1457.56	8.8709		
935.54	7.0000	1460.82	5.9176		
937.49	10.5055	1489.16	2.9749		
944.13	11.4016	1596.21	6.0692		
946.00	8.7747	1620.50	3.0478		
949.00	7.0256	1678.03	6.1575		
954.55	0.0000	1690.97	6.1714		
964.08	10.5809	1764.49	2.0829		
968.97	10.5948	1770.23	3.1274		
983.53	15.0670	1771.35	3.1280		
984.45	14.1841	1791.20	3.1382		
996.26	8.0033	1808.65	2.0981		
1001.03	7.1228	1836.06	2.1075		
1004.73	3.5647				
1025.87	8.9600				
1028.54	5.3796				
1037.84	5.3925				
1038.76	4.4946				
1046.59	4.5035				
1048.07	7.2085				
1050.41	5.4093				
1063.66	6.3318				
1077.00	7.2603				
1077.34	6.3531				
1083.85	6.3634				
1085.87	7.2759				
1099.25	7.2993				
1111.64	8.2365				
1112.07	8.2370				
1112.84	6.4078				
1115.54	9.1602				
1120.29	5.5023				
1120.55	6.4198				
1121.30	8.2551				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 13:57:11.62

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690079.CNF;1
Background file     : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM30.CNF;312
Background date      : 18-DEC-2016 13:20:06
Sample date         : 6-DEC-2016 16:21:00. Acquisition date : 21-DEC-2016 11:55:34
Sample ID          : G1203690079. Sample quantity : 2.00000E+00 LITER
Detector name      : GAM30. Detector geometry: 2LMB
Elapsed live time   : 0 02:00:00.00. Elapsed real time: 0 02:00:02.24 0.0%
Energy tolerance    : 1.50000 keV. Analyst Initials : MXR1
Abundance limit     : 75.00000. Sensitivity : 3.00000
Batch ID           : 1624165. Detector SN# :
Matrix Spike ID    : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	62.85*	26	142	1.04	125.43	122	9	3.55E-03	91.1	
2	0	66.31	35	85	1.53	132.33	130	6	4.90E-03	45.0	
3	0	77.77	27	146	1.05	155.26	149	10	3.76E-03	86.4	
4	0	109.51	30	127	0.55	218.74	214	11	4.17E-03	74.9	
5	0	139.58*	57	125	1.58	278.88	273	12	7.92E-03	42.8	
6	0	185.73*	12	94	1.04	371.19	366	9	1.70E-03	164.6	
7	0	281.98	31	37	2.46	563.71	559	9	4.30E-03	40.1	
8	0	294.64*	44	40	1.33	589.04	584	10	6.15E-03	32.1	
9	0	352.07*	39	33	1.03	703.90	700	7	5.39E-03	32.8	
10	0	398.90	21	96	11.78	797.57	777	28	2.87E-03	137.0	
11	0	452.35	20	14	2.69	904.49	900	9	2.71E-03	40.8	
12	0	609.62*	77	16	1.49	1219.10	1214	13	1.07E-02	17.0	
13	2	690.67	12	9	1.82	1381.23	1378	25	1.61E-03	50.6	8.39E-01
14	2	698.19*	12	8	1.82	1396.29	1378	25	1.65E-03	69.0	
15	0	757.81	43	27	10.61	1515.54	1502	27	5.99E-03	36.8	
16	4	782.91	9	3	1.72	1565.77	1564	11	1.24E-03	38.9	8.93E-01
17	4	786.00	10	8	1.50	1571.95	1564	11	1.36E-03	54.3	
18	0	821.17	13	0	1.18	1642.31	1638	8	1.81E-03	27.7	
19	0	892.40	11	2	0.95	1784.81	1781	8	1.57E-03	36.6	
20	0	991.01	10	2	1.70	1982.11	1979	7	1.38E-03	39.1	
21	0	1001.62*	8	3	2.42	2003.33	2000	8	1.14E-03	73.0	
22	0	1120.78	18	6	1.92	2241.76	2238	8	2.47E-03	33.8	
23	0	1154.35	11	4	0.91	2308.91	2304	9	1.53E-03	45.6	
24	0	1238.93	10	3	1.62	2478.15	2472	10	1.44E-03	42.4	
25	0	1297.44	8	4	1.36	2595.23	2589	8	1.05E-03	59.0	
26	0	1327.78	7	4	1.10	2655.93	2650	9	9.34E-04	68.3	
27	0	1765.17*	3	7	0.92	3531.22	3526	10	3.69E-04	239.1	
28	0	1828.54	8	2	1.71	3658.04	3655	6	1.17E-03	41.4	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690079.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title : MXR1
Sample date : 6-DEC-2016 16:21:00 Acquisition date : 21-DEC-2016 11:55:34
Sample ID : G1203690079 Sample quantity : 2.0000 LITER
Sample type : LIQUID Sample geometry :
Detector name : GAMMA30 Detector geometry: 2LMB
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:02.24 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
PB-214	351.93	BI-211	351.06

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
TE-125M	109.28	0.27*	2.775E+00	7.521E+02	8.999E+02	149.70	OK
BI-214	609.32	45.49*	1.276E+00	2.491E+01	2.491E+01	34.05	OK
	1120.29	14.92	8.255E-01	2.708E+01	2.708E+01	67.53	OK
	1764.49	15.30	5.842E-01	5.577E+00	5.577E+00	478.27	OK
PB-214	74.82	5.80	1.937E+00	----- Line	Not Found	-----	Absent
	77.11	9.70	2.057E+00	2.548E+01	2.548E+01	172.85	OK
	87.09	3.41	2.371E+00	----- Line	Not Found	-----	Absent
	242.00	7.25	2.312E+00	----- Line	Not Found	-----	Absent
	295.22	18.42	2.056E+00	2.193E+01	2.193E+01	64.29	OK
	351.93	35.60*	1.837E+00	1.113E+01	1.113E+01	65.64	OK
RA-226	186.21	3.59*	2.641E+00	2.428E+01	2.428E+01	329.23	OK
TH-230	67.67	0.38*	1.535E+00	1.136E+03	1.136E+03	90.06	OK
TH-232	63.81	0.26*	1.353E+00	1.362E+03	1.362E+03	182.22	OK
	140.88	0.02	2.856E+00	1.875E+04	1.875E+04	85.57	OK

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690079.CNF;1
Acquisition date : 21-DEC-2016 11:55:34 Sensitivity : 3.000
Detector ID : GAM30 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.24 Half life ratio : *****
Sample date : 6-DEC-2016 16:21:00 Analyst initials: MXR1
Sample ID : G1203690079 Sample Quantity : 2.0000E+00 LITER
Batch Number : 1624165 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : LIQUID.NLB;10

CALIBRATION INFORMATION

Eff. Cal. date : 15-MAR-2016 05:52:58 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
TE-125M	8.999E+02	1.320E+03	1.146E+03
BI-214	2.491E+01	8.312E+00	6.981E+00
PB-214	1.113E+01	7.162E+00	8.283E+00
RA-226	2.428E+01	7.835E+01	7.679E+01
TH-230	1.136E+03	1.002E+03	1.202E+03
TH-232	1.362E+03	2.433E+03	2.020E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	-7.834E+00	1.989E+01	3.627E+01	NOT IDENT.
NA-22	1.485E+00	1.876E+00	4.471E+00	NOT IDENT.
NA-24	0.000E+00	2.299E+07	0.000E+00	SHORT HLIF
AL-26	1.223E+00	1.994E+00	4.834E+00	NOT IDENT.
K-40	-3.936E+00	2.430E+01	5.261E+01	NOT IDENT.
SC-46	6.194E-02	1.753E+00	3.198E+00	FAIL ABUN
V-48	6.384E-01	3.457E+00	6.970E+00	NOT IDENT.
CR-51	-2.465E+00	2.078E+01	3.971E+01	NOT IDENT.
MN-52	5.606E+00	9.919E+00	2.441E+01	NOT IDENT.
MN-54	5.937E-01	1.763E+00	3.639E+00	NOT IDENT.
CO-56	-7.733E-02	1.816E+00	3.547E+00	FAIL ABUN
CO-57	3.128E-01	1.562E+00	2.854E+00	NOT IDENT.
CO-58	4.086E-02	1.801E+00	3.569E+00	NOT IDENT.
FE-59	-2.940E+00	4.199E+00	6.793E+00	NOT IDENT.
CO-60	-1.057E-01	1.619E+00	3.347E+00	NOT IDENT.
ZN-65	1.500E+00	4.034E+00	8.152E+00	NOT IDENT.
CU-67	9.748E+01	3.145E+02	3.563E+02	FAIL ABUN
GE-68	-1.608E+01	5.750E+01	1.055E+02	NOT IDENT.
AS-74	5.187E+00	6.285E+00	1.290E+01	NOT IDENT.
SE-75	3.976E-01	2.774E+00	4.939E+00	NOT IDENT.
BR-77	-4.336E+01	6.023E+02	1.098E+03	NOT IDENT.
SR-82	-1.232E+00	1.528E+01	2.966E+01	NOT IDENT.
RB-83	-5.927E-01	3.801E+00	7.222E+00	NOT IDENT.
RB-84	-2.450E+00	3.497E+00	5.813E+00	NOT IDENT.

KR-85	-1.217E+03	6.369E+02	9.741E+02	NOT IDENT.
SR-85	-6.374E+00	3.335E+00	5.101E+00	NOT IDENT.
RB-86	-1.002E+01	3.583E+01	6.573E+01	NOT IDENT.
Y-88	-1.312E+00	2.522E+00	4.568E+00	NOT IDENT.
Y-91	2.642E+02	9.043E+02	1.868E+03	NOT IDENT.
NB-94	8.391E-01	1.435E+00	2.969E+00	NOT IDENT.
NB-95	4.532E-01	2.434E+00	4.334E+00	NOT IDENT.
NB-95M	-1.215E+00	6.954E+00	1.212E+01	NOT IDENT.
ZR-95	0.000E+00	1.150E+01	7.791E+00	FAIL ABUN
MO-99	-4.867E+01	6.098E+02	1.162E+03	FAIL ABUN
TC-99M	0.000E+00	2.385E+18	0.000E+00	SHORT HLIF
RH-101	2.698E-01	2.002E+00	3.614E+00	NOT IDENT.
RH-102M	1.517E+00	1.695E+00	3.600E+00	FAIL ABUN
RU-103	-1.234E+00	2.204E+00	3.940E+00	FAIL ABUN
RH-106	-1.679E+01	1.415E+01	2.133E+01	NOT IDENT.
RU-106	-1.679E+01	1.415E+01	2.133E+01	NOT IDENT.
AG-108M	-3.223E-01	1.670E+00	3.154E+00	NOT IDENT.
CD-109	-3.440E+00	4.722E+01	8.440E+01	NOT IDENT.
AG-110M	2.762E-01	2.178E+00	4.450E+00	NOT IDENT.
SN-113	-3.054E-01	2.492E+00	4.751E+00	NOT IDENT.
IN-114M	2.200E+00	1.146E+01	2.053E+01	NOT IDENT.
CD-115	-1.701E+02	5.396E+02	1.005E+03	NOT IDENT.
SN-117M	-1.374E+00	3.339E+00	5.671E+00	NOT IDENT.
I-123	0.000E+00	2.091E+08	0.000E+00	SHORT HLIF
TE-123M	-9.666E-02	1.740E+00	3.067E+00	NOT IDENT.
SB-124	-2.101E+00	5.385E+00	1.020E+01	NOT IDENT.
SB-125	2.903E-01	5.249E+00	1.018E+01	NOT IDENT.
I-126	-4.234E+00	1.085E+01	1.973E+01	NOT IDENT.
SB-126	4.661E-01	7.512E+00	1.303E+01	FAIL ABUN
SN-126	9.154E-01	4.749E+00	8.660E+00	FAIL ABUN
SB-127	-2.886E+01	5.701E+01	1.018E+02	FAIL ABUN
TE-129	1.208E+01	2.669E+01	5.449E+01	NOT IDENT.
I-131	-3.237E+00	5.810E+00	1.058E+01	NOT IDENT.
I-132	0.000E+00	1.641E+41	0.000E+00	SHORT HLIF
TE-132	-3.008E+00	4.556E+01	7.879E+01	NOT IDENT.
BA-133	5.543E-01	2.335E+00	4.468E+00	NOT IDENT.
I-133	0.000E+00	2.692E+05	0.000E+00	SHORT HLIF
CS-134	-6.672E-01	1.941E+00	3.545E+00	NOT IDENT.
CS-135	-4.216E+00	9.949E+00	1.646E+01	NOT IDENT.
I-135	0.000E+00	1.179E+17	0.000E+00	SHORT HLIF
CS-136	3.514E+00	3.789E+00	9.466E+00	NOT IDENT.
BA-137M	1.764E-01	1.816E+00	3.577E+00	NOT IDENT.
CS-137	1.864E-01	1.919E+00	3.779E+00	NOT IDENT.
CE-139	-1.349E+00	1.600E+00	2.577E+00	NOT IDENT.
BA-140	5.666E+00	1.452E+01	2.955E+01	NOT IDENT.
LA-140	-1.824E+00	4.800E+00	9.179E+00	NOT IDENT.
CE-141	-3.138E+00	4.206E+00	6.920E+00	NOT IDENT.
CE-143	0.000E+00	1.054E+04	0.000E+00	SHORT HLIF
CE-144	8.206E+00	1.375E+01	2.553E+01	NOT IDENT.
PM-144	-6.550E-01	2.012E+00	3.441E+00	NOT IDENT.
PR-144	-4.801E+01	1.507E+02	2.581E+02	NOT IDENT.
PM-146	-7.226E-01	2.429E+00	4.028E+00	NOT IDENT.
ND-147	-8.675E-02	3.238E+01	6.224E+01	NOT IDENT.
PM-147	2.701E+04	4.544E+04	8.604E+04	NOT IDENT.
PM-149	3.271E+03	5.329E+03	9.424E+03	NOT IDENT.
EU-152	9.286E-01	4.988E+00	9.925E+00	NOT IDENT.
GD-153	4.971E-01	5.307E+00	9.633E+00	NOT IDENT.
EU-154	4.495E+00	5.390E+00	1.288E+01	NOT IDENT.
EU-155	-3.776E+00	7.219E+00	1.127E+01	NOT IDENT.
HO-166M	-1.832E+00	2.535E+00	4.281E+00	FAIL ABUN
TM-171	-2.320E+02	1.105E+03	1.829E+03	FAIL ABUN
LU-176	9.108E-01	1.615E+00	3.033E+00	NOT IDENT.
LU-177	-2.258E+01	6.826E+01	1.101E+02	NOT IDENT.
HF-181	2.442E+00	2.424E+00	5.259E+00	NOT IDENT.
W-181	-6.233E+00	1.159E+01	2.025E+01	FAIL ABUN
TA-182	-3.519E+00	6.467E+00	1.217E+01	FAIL ABUN
RE-183	-1.387E+00	1.138E+01	2.066E+01	FAIL ABUN
RE-184	-4.129E+00	5.733E+00	9.438E+00	NOT IDENT.
RE-188	2.408E+00	1.046E+01	1.887E+01	FAIL ABUN
W-188	-2.876E+02	4.455E+02	6.379E+02	FAIL ABUN
OS-191	7.179E+00	9.805E+00	1.864E+01	FAIL ABUN
IR-192	-1.288E+00	1.814E+00	3.258E+00	FAIL ABUN
HG-203	6.754E-01	2.134E+00	3.679E+00	NOT IDENT.
BI-207	6.007E-01	1.746E+00	3.971E+00	NOT IDENT.
TL-208	-1.010E+00	2.507E+00	4.450E+00	NOT IDENT.
PB-210	-7.293E+01	2.045E+02	3.389E+02	NOT IDENT.
PO-210	-7.293E+01	2.045E+02	3.389E+02	NOT IDENT.
BI-211	3.072E+01	1.976E+01	3.224E+01	FAIL ABUN

PB-211	-2.303E+01	4.149E+01	7.089E+01	NOT IDENT.
BI-212	2.297E+01	2.693E+01	5.840E+01	FAIL ABUN
PB-212	3.943E-02	4.276E+00	7.841E+00	FAIL ABUN
BI-213	-8.295E-01	6.058E+00	1.148E+01	NOT IDENT.
RN-219	-9.456E-01	2.446E+01	4.242E+01	NOT IDENT.
FR-221	1.607E-01	1.327E+01	2.324E+01	NOT IDENT.
RA-223	-9.721E+00	3.424E+01	6.450E+01	NOT IDENT.
RA-224	-4.800E+00	4.391E+01	7.506E+01	NOT IDENT.
AC-227	7.870E+00	1.653E+01	3.033E+01	NOT IDENT.
TH-227	7.870E+00	1.653E+01	3.033E+01	NOT IDENT.
AC-228	-7.351E+00	1.004E+01	1.727E+01	NOT IDENT.
RA-228	-7.351E+00	1.004E+01	1.727E+01	NOT IDENT.
TH-228	3.943E-02	4.276E+00	7.841E+00	FAIL ABUN
TH-229	1.848E+01	3.539E+01	6.481E+01	NOT IDENT.
PA-231	-1.320E+01	3.112E+01	5.115E+01	NOT IDENT.
TH-231	5.036E+00	2.913E+01	4.960E+01	NOT IDENT.
PA-233	1.870E+00	3.260E+00	6.760E+00	NOT IDENT.
PA-234	-2.412E+00	1.590E+01	2.974E+01	FAIL ABUN
PA-234M	2.045E+02	2.928E+02	5.789E+02	FAIL ABUN
TH-234	9.574E+01	1.710E+02	1.895E+02	FAIL ABUN
U-234	1.195E+03	4.098E+03	7.112E+03	NOT IDENT.
U-235	-3.027E+00	1.464E+01	2.351E+01	FAIL ABUN
NP-237	1.870E+00	3.260E+00	6.760E+00	NOT IDENT.
NP-238	5.832E+02	8.548E+02	1.915E+03	NOT IDENT.
U-238	9.574E+01	1.710E+02	1.895E+02	FAIL ABUN
NP-239	1.951E+00	1.701E+01	3.077E+01	NOT IDENT.
AM-241	5.095E+00	9.319E+00	1.677E+01	NOT IDENT.
AM-242	-1.498E+01	3.748E+01	6.517E+01	NOT IDENT.
AM-243	1.260E-01	3.664E+00	6.016E+00	NOT IDENT.
CM-243	3.413E+00	6.726E+00	1.264E+01	NOT IDENT.
BK-247	-4.158E-01	5.288E+00	9.129E+00	NOT IDENT.
CM-247	-6.879E-01	2.225E+00	3.691E+00	NOT IDENT.
CF-249	2.923E-01	2.425E+00	4.309E+00	NOT IDENT.
CF-251	-4.046E+00	8.792E+00	1.474E+01	NOT IDENT.
CF-252	-3.251E+03	1.054E+04	1.850E+04	NOT IDENT.
ANH-511	-1.258E+01	3.756E+00	6.902E+00	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	62.85	55	142	1.04	125.43	122	9	7.66E-03	41.0	
2	0	66.31	35	85	1.53	132.33	130	6	4.90E-03	45.0	
3	0	77.77	27	146	1.05	155.26	149	10	3.76E-03	86.4	
4	0	92.45	47	119	1.23	184.63	181	7	6.51E-03	38.5	
5	0	109.51	30	127	0.55	218.74	214	11	4.17E-03	74.9	
6	0	139.58	69	125	1.58	278.88	273	12	9.63E-03	34.5	
7	0	185.73	59	94	1.04	371.19	366	9	8.13E-03	32.9	
8	0	238.36	30	67	1.34	476.47	473	8	4.16E-03	50.5	
9	0	281.98	31	37	2.46	563.71	559	9	4.30E-03	40.1	
10	0	294.64	50	40	1.33	589.04	584	10	6.95E-03	27.6	
11	0	352.07	48	33	1.03	703.90	700	7	6.62E-03	24.8	
12	0	398.90	21	96	11.78	797.57	777	28	2.87E-03	137.0	
13	0	452.35	20	14	2.69	904.49	900	9	2.71E-03	40.8	
14	0	510.95	129	50	1.89	1021.72	1014	15	1.79E-02	15.1	
15	0	609.62	83	16	1.49	1219.10	1214	13	1.16E-02	14.8	
16	2	690.67	12	9	1.82	1381.23	1378	25	1.61E-03	50.6	8.39E-01
17	2	698.19	17	8	1.82	1396.29	1378	25	2.31E-03	45.9	
18	0	757.81	43	27	10.61	1515.54	1502	27	5.99E-03	36.8	
19	4	782.91	9	3	1.72	1565.77	1564	11	1.24E-03	38.9	8.93E-01
20	4	786.00	10	8	1.50	1571.95	1564	11	1.36E-03	54.3	
21	0	821.17	13	0	1.18	1642.31	1638	8	1.81E-03	27.7	
22	0	892.40	11	2	0.95	1784.81	1781	8	1.57E-03	36.6	
23	0	991.01	10	2	1.70	1982.11	1979	7	1.38E-03	39.1	
24	0	1001.62	17	3	2.42	2003.33	2000	8	2.35E-03	31.2	
25	0	1120.78	18	6	1.92	2241.76	2238	8	2.47E-03	33.8	
26	0	1125.69	11	2	0.58	2251.57	2248	8	1.58E-03	36.3	
27	0	1154.35	11	4	0.91	2308.91	2304	9	1.53E-03	45.6	
28	0	1238.93	10	3	1.62	2478.15	2472	10	1.44E-03	42.4	
29	0	1297.44	8	4	1.36	2595.23	2589	8	1.05E-03	59.0	
30	0	1327.78	7	4	1.10	2655.93	2650	9	9.34E-04	68.3	
31	0	1765.17	11	7	0.92	3531.22	3526	10	1.50E-03	56.1	
32	0	1828.54	8	2	1.71	3658.04	3655	6	1.17E-03	41.4	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
TE-125M	109.28	30	0.27*	2.775E+00	7.521E+02	8.999E+02	149.70
BI-211	72.87	-----	1.23	1.852E+00	-----	Line Not Found	-----
	351.06	39	12.92*	1.837E+00	3.068E+01	3.072E+01	65.64
BI-214	609.32	77	45.49*	1.276E+00	2.491E+01	2.491E+01	34.05
	1120.29	18	14.92	8.255E-01	2.708E+01	2.708E+01	67.53
	1764.49	3	15.30	5.842E-01	5.577E+00	5.577E+00	478.27
PB-214	74.82	-----	5.80	1.937E+00	-----	Line Not Found	-----
	77.11	27	9.70	2.057E+00	2.548E+01	2.548E+01	172.85
	87.09	-----	3.41	2.371E+00	-----	Line Not Found	-----
	242.00	-----	7.25	2.312E+00	-----	Line Not Found	-----
	295.22	44	18.42	2.056E+00	2.193E+01	2.193E+01	64.29
	351.93	39	35.60*	1.837E+00	1.113E+01	1.113E+01	65.64
RA-226	186.21	12	3.59*	2.641E+00	2.428E+01	2.428E+01	329.23
TH-230	67.67	35	0.38*	1.535E+00	1.136E+03	1.136E+03	90.06
TH-232	63.81	26	0.26*	1.353E+00	1.362E+03	1.362E+03	182.22
	140.88	57	0.02	2.856E+00	1.875E+04	1.875E+04	85.57

Flag: "*" = Keyline

Total number of lines in spectrum 28
Number of unidentified lines 10
Number of lines tentatively identified by NID 18 64.29%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
TE-125M	57.40D	1.20	7.521E+02	8.999E+02	13.47E+02	149.70	
BI-211	21.77Y	1.00	3.068E+01	3.072E+01	2.016E+01	65.64	
BI-214	1600.00Y	1.00	2.491E+01	2.491E+01	0.848E+01	34.05	
PB-214	1600.00Y	1.00	1.113E+01	1.113E+01	0.731E+01	65.64	
RA-226	1600.00Y	1.00	2.428E+01	2.428E+01	7.995E+01	329.23	
TH-230	7.54E+04Y	1.00	1.136E+03	1.136E+03	1.023E+03	90.06	
TH-232	1.41E+10Y	1.00	1.362E+03	1.362E+03	2.483E+03	182.22	
Total Activity :			3.341E+03	3.489E+03			

Grand Total Activity : 3.341E+03 3.489E+03

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	281.98	31	37	2.46	563.71	559	9	4.30E-03	80.3	2.11E+00	
0	398.90	21	96	11.78	797.57	777	28	2.87E-03	****	1.69E+00	
0	452.35	20	14	2.69	904.49	900	9	2.71E-03	81.6	1.56E+00	
2	690.67	12	9	1.82	1381.23	1378	25	1.61E-03	****	1.17E+00	
2	698.19	12	8	1.82	1396.29	1378	25	1.65E-03	****	1.16E+00	T
0	757.81	43	27	10.61	1515.54	1502	27	5.99E-03	73.7	1.10E+00	T
4	782.91	9	3	1.72	1565.77	1564	11	1.24E-03	77.9	1.07E+00	T
4	786.00	10	8	1.50	1571.95	1564	11	1.36E-03	****	1.07E+00	T
0	821.17	13	0	1.18	1642.31	1638	8	1.81E-03	55.5	1.04E+00	
0	892.40	11	2	0.95	1784.81	1781	8	1.57E-03	73.2	9.77E-01	
0	991.01	10	2	1.70	1982.11	1979	7	1.38E-03	78.3	9.05E-01	
0	1001.62	8	3	2.42	2003.33	2000	8	1.14E-03	****	8.98E-01	T
0	1154.35	11	4	0.91	2308.91	2304	9	1.53E-03	91.1	8.07E-01	
0	1238.93	10	3	1.62	2478.15	2472	10	1.44E-03	84.8	7.65E-01	T
0	1297.44	8	4	1.36	2595.23	2589	8	1.05E-03	****	7.39E-01	T
0	1327.78	7	4	1.10	2655.93	2650	9	9.34E-04	****	7.26E-01	
0	1828.54	8	2	1.71	3658.04	3655	6	1.17E-03	82.8	5.69E-01	

Flags: "T" = Tentatively associated

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690079.CNF;1 *
* Acquisition date   : 21-DEC-2016 11:55:34 Sensitivity      : 3.000          *
* Detector ID        : GAM30 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:02.24 Half life ratio  : *****          *
* Sample date        : 6-DEC-2016 16:21:00 Nuclide Library : LIQUID          *
* Sample ID          : G1203690079 Analyst initials: MXR1          *
* Batch Number       : 1624165 Sample Quantity : 2.0000E+00 LITER          *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 15-MAR-2016 05:52:58 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7          *
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
TE-125M	5.325E+02
BI-214	3.054E+00
PB-214	3.755E+00
RA-226	3.573E+01
TH-230	5.595E+02
TH-232	9.408E+02

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

Nuclide	Lc (pCi/LITER)	
BE-7	1.618E+01	NOT IDENT.
NA-22	1.893E+00	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.974E+00	NOT IDENT.
K-40	2.278E+01	NOT IDENT.
SC-46	1.306E+00	FAIL ABUN
V-48	2.954E+00	NOT IDENT.
CR-51	1.796E+01	NOT IDENT.
MN-52	9.866E+00	NOT IDENT.
MN-54	1.564E+00	NOT IDENT.
CO-56	1.488E+00	FAIL ABUN
CO-57	1.320E+00	NOT IDENT.
CO-58	1.503E+00	NOT IDENT.
FE-59	2.721E+00	NOT IDENT.
CO-60	1.321E+00	NOT IDENT.
ZN-65	3.445E+00	NOT IDENT.
CU-67	1.675E+02	FAIL ABUN
GE-68	4.311E+01	NOT IDENT.
AS-74	5.862E+00	NOT IDENT.
SE-75	2.257E+00	NOT IDENT.
BR-77	5.134E+02	NOT IDENT.
SR-82	1.249E+01	NOT IDENT.
RB-83	3.164E+00	NOT IDENT.
RB-84	2.395E+00	NOT IDENT.
KR-85	4.459E+02	NOT IDENT.

SR-85	2.335E+00	NOT IDENT.
RB-86	2.687E+01	NOT IDENT.
Y-88	1.787E+00	NOT IDENT.
Y-91	7.853E+02	NOT IDENT.
NB-94	1.265E+00	NOT IDENT.
NB-95	1.893E+00	NOT IDENT.
NB-95M	5.549E+00	NOT IDENT.
ZR-95	3.398E+00	FAIL ABUN
MO-99	5.016E+02	FAIL ABUN
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.676E+00	NOT IDENT.
RH-102M	1.622E+00	FAIL ABUN
RU-103	1.723E+00	FAIL ABUN
RH-106	8.578E+00	NOT IDENT.
RU-106	8.578E+00	NOT IDENT.
AG-108M	1.402E+00	NOT IDENT.
CD-109	3.929E+01	NOT IDENT.
AG-110M	1.855E+00	NOT IDENT.
SN-113	2.127E+00	NOT IDENT.
IN-114M	9.500E+00	NOT IDENT.
CD-115	4.356E+02	NOT IDENT.
SN-117M	2.612E+00	NOT IDENT.
I-123	0.000E+00	SHORT HLIF
TE-123M	1.416E+00	NOT IDENT.
SB-124	4.052E+00	NOT IDENT.
SB-125	4.561E+00	NOT IDENT.
I-126	8.443E+00	NOT IDENT.
SB-126	5.560E+00	FAIL ABUN
SN-126	4.044E+00	FAIL ABUN
SB-127	4.241E+01	FAIL ABUN
TE-129	2.435E+01	NOT IDENT.
I-131	4.669E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	3.639E+01	NOT IDENT.
BA-133	2.010E+00	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.489E+00	NOT IDENT.
CS-135	7.502E+00	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.934E+00	NOT IDENT.
BA-137M	1.555E+00	NOT IDENT.
CS-137	1.643E+00	NOT IDENT.
CE-139	1.165E+00	NOT IDENT.
BA-140	1.310E+01	NOT IDENT.
LA-140	3.643E+00	NOT IDENT.
CE-141	3.207E+00	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.194E+01	NOT IDENT.
PM-144	1.495E+00	NOT IDENT.
PR-144	1.122E+02	NOT IDENT.
PM-146	1.762E+00	NOT IDENT.
ND-147	2.760E+01	NOT IDENT.
PM-147	3.988E+04	NOT IDENT.
PM-149	4.302E+03	NOT IDENT.
EU-152	4.451E+00	NOT IDENT.
GD-153	4.469E+00	NOT IDENT.
EU-154	5.468E+00	NOT IDENT.
EU-155	5.194E+00	NOT IDENT.
HO-166M	1.732E+00	FAIL ABUN
TM-171	8.443E+02	FAIL ABUN
LU-176	1.382E+00	NOT IDENT.
LU-177	5.046E+01	NOT IDENT.
HF-181	2.361E+00	NOT IDENT.
W-181	9.315E+00	FAIL ABUN
TA-182	4.756E+00	FAIL ABUN
RE-183	9.546E+00	FAIL ABUN
RE-184	3.799E+00	NOT IDENT.
RE-188	8.767E+00	FAIL ABUN
W-188	2.838E+02	FAIL ABUN
OS-191	8.673E+00	FAIL ABUN
IR-192	1.450E+00	FAIL ABUN
HG-203	1.657E+00	NOT IDENT.
BI-207	1.589E+00	NOT IDENT.
TL-208	1.995E+00	NOT IDENT.
PB-210	1.570E+02	NOT IDENT.
PO-210	1.570E+02	NOT IDENT.
BI-211	1.506E+01	FAIL ABUN
PB-211	3.145E+01	NOT IDENT.

BI-212	2.579E+01	FAIL ABUN
PB-212	3.669E+00	FAIL ABUN
BI-213	5.125E+00	NOT IDENT.
RN-219	1.893E+01	NOT IDENT.
FR-221	1.072E+01	NOT IDENT.
RA-223	2.897E+01	NOT IDENT.
RA-224	3.484E+01	NOT IDENT.
AC-227	1.398E+01	NOT IDENT.
TH-227	1.398E+01	NOT IDENT.
AC-228	7.611E+00	NOT IDENT.
RA-228	7.611E+00	NOT IDENT.
TH-228	3.669E+00	FAIL ABUN
TH-229	3.020E+01	NOT IDENT.
PA-231	2.324E+01	NOT IDENT.
TH-231	2.313E+01	NOT IDENT.
PA-233	3.049E+00	NOT IDENT.
PA-234	1.261E+01	FAIL ABUN
PA-234M	2.559E+02	FAIL ABUN
TH-234	8.979E+01	FAIL ABUN
U-234	3.299E+03	NOT IDENT.
U-235	1.094E+01	FAIL ABUN
NP-237	3.049E+00	NOT IDENT.
NP-238	8.151E+02	NOT IDENT.
U-238	8.979E+01	FAIL ABUN
NP-239	1.426E+01	NOT IDENT.
AM-241	7.783E+00	NOT IDENT.
AM-242	2.993E+01	NOT IDENT.
AM-243	2.814E+00	NOT IDENT.
CM-243	5.874E+00	NOT IDENT.
BK-247	4.180E+00	NOT IDENT.
CM-247	1.636E+00	NOT IDENT.
CF-249	1.932E+00	NOT IDENT.
CF-251	6.827E+00	NOT IDENT.
CF-252	8.509E+03	NOT IDENT.
ANH-511	3.276E+00	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690079.CNF;1
Acquisition date : 21-DEC-2016 11:55:34 Sensitivity : 3.000
Detector ID : GAM30 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.24 Half life ratio : *****
Sample date : 6-DEC-2016 16:21:00 Nuclide Library : LIQUID
Sample ID : G1203690079 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 15-MAR-2016 05:52:58 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM30_2LMB.CNF;7

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
TE-125M	8.999E+02	1.322E+03	1.322E+03
BI-214	2.491E+01	8.552E+00	8.552E+00
PB-214	1.113E+01	7.227E+00	7.227E+00
RA-226	2.428E+01	7.838E+01	7.838E+01
TH-230	1.136E+03	1.021E+03	1.021E+03
TH-232	1.362E+03	2.439E+03	2.439E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-7.834E+00	1.990E+01	2.021E+01	NOT IDENT.
NA-22	1.485E+00	1.880E+00	1.996E+00	NOT IDENT.
NA-24	3.465E+06	2.299E+07	2.304E+07	SHORT HLIF
AL-26	1.223E+00	1.996E+00	2.071E+00	NOT IDENT.
K-40	-3.936E+00	2.430E+01	2.437E+01	NOT IDENT.
SC-46	6.194E-02	1.753E+00	1.753E+00	FAIL ABUN
V-48	6.384E-01	3.458E+00	3.470E+00	NOT IDENT.
CR-51	-2.465E+00	2.078E+01	2.081E+01	NOT IDENT.
MN-52	5.606E+00	9.929E+00	1.025E+01	NOT IDENT.
MN-54	5.937E-01	1.764E+00	1.784E+00	NOT IDENT.
CO-56	-7.733E-02	1.816E+00	1.816E+00	FAIL ABUN
CO-57	3.128E-01	1.562E+00	1.569E+00	NOT IDENT.
CO-58	4.086E-02	1.801E+00	1.801E+00	NOT IDENT.
FE-59	-2.940E+00	4.226E+00	4.429E+00	NOT IDENT.
CO-60	-1.057E-01	1.619E+00	1.620E+00	NOT IDENT.
ZN-65	1.500E+00	4.040E+00	4.096E+00	NOT IDENT.
CU-67	9.748E+01	3.146E+02	3.177E+02	FAIL ABUN
GE-68	-1.608E+01	5.754E+01	5.800E+01	NOT IDENT.
AS-74	5.187E+00	6.308E+00	6.728E+00	NOT IDENT.
SE-75	3.976E-01	2.774E+00	2.780E+00	NOT IDENT.
BR-77	-4.336E+01	6.023E+02	6.026E+02	NOT IDENT.
SR-82	-1.232E+00	1.528E+01	1.529E+01	NOT IDENT.
RB-83	-5.927E-01	3.802E+00	3.812E+00	NOT IDENT.
RB-84	-2.450E+00	3.507E+00	3.677E+00	NOT IDENT.

KR-85	-1.217E+03	6.444E+02	8.464E+02	NOT IDENT.
SR-85	-6.374E+00	3.374E+00	4.432E+00	NOT IDENT.
RB-86	-1.002E+01	3.586E+01	3.614E+01	NOT IDENT.
Y-88	-1.312E+00	2.524E+00	2.592E+00	NOT IDENT.
Y-91	2.642E+02	9.046E+02	9.124E+02	NOT IDENT.
NB-94	8.391E-01	1.437E+00	1.486E+00	NOT IDENT.
NB-95	4.532E-01	2.435E+00	2.443E+00	NOT IDENT.
NB-95M	-1.215E+00	6.956E+00	6.977E+00	NOT IDENT.
ZR-95	1.593E+01	1.159E+01	1.363E+01	FAIL ABUN
MO-99	-4.867E+01	6.099E+02	6.103E+02	FAIL ABUN
TC-99M	2.844E+18	2.407E+18	0.000E+00	SHORT HLIF
RH-101	2.698E-01	2.003E+00	2.007E+00	NOT IDENT.
RH-102M	1.517E+00	1.704E+00	1.836E+00	FAIL ABUN
RU-103	-1.234E+00	2.206E+00	2.275E+00	FAIL ABUN
RH-106	-1.679E+01	1.424E+01	1.612E+01	NOT IDENT.
RU-106	-1.679E+01	1.424E+01	1.612E+01	NOT IDENT.
AG-108M	-3.223E-01	1.670E+00	1.676E+00	NOT IDENT.
CD-109	-3.440E+00	4.722E+01	4.724E+01	NOT IDENT.
AG-110M	2.762E-01	2.179E+00	2.182E+00	NOT IDENT.
SN-113	-3.054E-01	2.492E+00	2.496E+00	NOT IDENT.
IN-114M	2.200E+00	1.147E+01	1.151E+01	NOT IDENT.
CD-115	-1.701E+02	5.399E+02	5.453E+02	NOT IDENT.
SN-117M	-1.374E+00	3.340E+00	3.397E+00	NOT IDENT.
I-123	9.076E+06	2.091E+08	2.091E+08	SHORT HLIF
TE-123M	-9.666E-02	1.740E+00	1.741E+00	NOT IDENT.
SB-124	-2.101E+00	5.388E+00	5.470E+00	NOT IDENT.
SB-125	2.903E-01	5.250E+00	5.251E+00	NOT IDENT.
I-126	-4.234E+00	1.086E+01	1.103E+01	NOT IDENT.
SB-126	4.661E-01	7.513E+00	7.515E+00	FAIL ABUN
SN-126	9.154E-01	4.749E+00	4.767E+00	FAIL ABUN
SB-127	-2.886E+01	5.709E+01	5.855E+01	FAIL ABUN
TE-129	1.208E+01	2.677E+01	2.732E+01	NOT IDENT.
I-131	-3.237E+00	5.816E+00	5.997E+00	NOT IDENT.
I-132	1.000E+41	1.880E+41	0.000E+00	SHORT HLIF
TE-132	-3.008E+00	4.556E+01	4.558E+01	NOT IDENT.
BA-133	5.543E-01	2.336E+00	2.349E+00	NOT IDENT.
I-133	1.601E+05	2.700E+05	2.795E+05	SHORT HLIF
CS-134	-6.672E-01	1.942E+00	1.965E+00	NOT IDENT.
CS-135	-4.216E+00	9.960E+00	1.014E+01	NOT IDENT.
I-135	-3.398E+16	1.185E+17	0.000E+00	SHORT HLIF
CS-136	3.514E+00	3.829E+00	4.144E+00	NOT IDENT.
BA-137M	1.764E-01	1.817E+00	1.818E+00	NOT IDENT.
CS-137	1.864E-01	1.919E+00	1.921E+00	NOT IDENT.
CE-139	-1.349E+00	1.625E+00	1.735E+00	NOT IDENT.
BA-140	5.666E+00	1.453E+01	1.475E+01	NOT IDENT.
LA-140	-1.824E+00	4.803E+00	4.872E+00	NOT IDENT.
CE-141	-3.138E+00	4.213E+00	4.444E+00	NOT IDENT.
CE-143	1.673E+04	1.067E+04	1.307E+04	SHORT HLIF
CE-144	8.206E+00	1.376E+01	1.425E+01	NOT IDENT.
PM-144	-6.550E-01	2.012E+00	2.034E+00	NOT IDENT.
PR-144	-4.801E+01	1.507E+02	1.523E+02	NOT IDENT.
PM-146	-7.226E-01	2.430E+00	2.451E+00	NOT IDENT.
ND-147	-8.675E-02	3.238E+01	3.238E+01	NOT IDENT.
PM-147	2.701E+04	4.548E+04	4.708E+04	NOT IDENT.
PM-149	3.271E+03	5.355E+03	5.554E+03	NOT IDENT.
EU-152	9.286E-01	4.989E+00	5.006E+00	NOT IDENT.
GD-153	4.971E-01	5.307E+00	5.312E+00	NOT IDENT.
EU-154	4.495E+00	5.404E+00	5.771E+00	NOT IDENT.
EU-155	-3.776E+00	7.226E+00	7.424E+00	NOT IDENT.
HO-166M	-1.832E+00	2.540E+00	2.671E+00	FAIL ABUN
TM-171	-2.320E+02	1.106E+03	1.111E+03	FAIL ABUN
LU-176	9.108E-01	1.617E+00	1.669E+00	NOT IDENT.
LU-177	-2.258E+01	6.828E+01	6.904E+01	NOT IDENT.
HF-181	2.442E+00	2.432E+00	2.670E+00	NOT IDENT.
W-181	-6.233E+00	1.170E+01	1.203E+01	FAIL ABUN
TA-182	-3.519E+00	6.474E+00	6.666E+00	FAIL ABUN
RE-183	-1.387E+00	1.138E+01	1.140E+01	FAIL ABUN
RE-184	-4.129E+00	5.758E+00	6.051E+00	NOT IDENT.
RE-188	2.408E+00	1.046E+01	1.052E+01	FAIL ABUN
W-188	-2.876E+02	4.473E+02	4.658E+02	FAIL ABUN
OS-191	7.179E+00	9.819E+00	1.034E+01	FAIL ABUN
IR-192	-1.288E+00	1.818E+00	1.908E+00	FAIL ABUN
HG-203	6.754E-01	2.136E+00	2.157E+00	NOT IDENT.
BI-207	6.007E-01	1.748E+00	1.769E+00	NOT IDENT.
TL-208	-1.010E+00	2.508E+00	2.549E+00	NOT IDENT.
PB-210	-7.293E+01	2.046E+02	2.072E+02	NOT IDENT.
PO-210	-7.293E+01	2.046E+02	2.072E+02	NOT IDENT.
BI-211	3.072E+01	1.995E+01	2.428E+01	FAIL ABUN

PB-211	-2.303E+01	4.154E+01	4.282E+01	NOT IDENT.
BI-212	2.297E+01	2.701E+01	2.893E+01	FAIL ABUN
PB-212	3.943E-02	4.276E+00	4.276E+00	FAIL ABUN
BI-213	-8.295E-01	6.058E+00	6.070E+00	NOT IDENT.
RN-219	-9.456E-01	2.446E+01	2.446E+01	NOT IDENT.
FR-221	1.607E-01	1.327E+01	1.327E+01	NOT IDENT.
RA-223	-9.721E+00	3.426E+01	3.454E+01	NOT IDENT.
RA-224	-4.800E+00	4.392E+01	4.397E+01	NOT IDENT.
AC-227	7.870E+00	1.657E+01	1.695E+01	NOT IDENT.
TH-227	7.870E+00	1.657E+01	1.695E+01	NOT IDENT.
AC-228	-7.351E+00	1.008E+01	1.061E+01	NOT IDENT.
RA-228	-7.351E+00	1.008E+01	1.061E+01	NOT IDENT.
TH-228	3.943E-02	4.276E+00	4.276E+00	FAIL ABUN
TH-229	1.848E+01	3.542E+01	3.639E+01	NOT IDENT.
PA-231	-1.320E+01	3.127E+01	3.183E+01	NOT IDENT.
TH-231	5.036E+00	2.914E+01	2.923E+01	NOT IDENT.
PA-233	1.870E+00	3.265E+00	3.372E+00	NOT IDENT.
PA-234	-2.412E+00	1.614E+01	1.617E+01	FAIL ABUN
PA-234M	2.045E+02	2.940E+02	3.081E+02	FAIL ABUN
TH-234	9.574E+01	1.723E+02	1.776E+02	FAIL ABUN
U-234	1.195E+03	4.099E+03	4.134E+03	NOT IDENT.
U-235	-3.027E+00	1.464E+01	1.470E+01	FAIL ABUN
NP-237	1.870E+00	3.265E+00	3.372E+00	NOT IDENT.
NP-238	5.832E+02	8.580E+02	8.973E+02	NOT IDENT.
U-238	9.574E+01	1.723E+02	1.776E+02	FAIL ABUN
NP-239	1.951E+00	1.701E+01	1.703E+01	NOT IDENT.
AM-241	5.095E+00	9.328E+00	9.607E+00	NOT IDENT.
AM-242	-1.498E+01	3.757E+01	3.817E+01	NOT IDENT.
AM-243	1.260E-01	3.664E+00	3.664E+00	NOT IDENT.
CM-243	3.413E+00	6.736E+00	6.910E+00	NOT IDENT.
BK-247	-4.158E-01	5.289E+00	5.292E+00	NOT IDENT.
CM-247	-6.879E-01	2.229E+00	2.250E+00	NOT IDENT.
CF-249	2.923E-01	2.425E+00	2.429E+00	NOT IDENT.
CF-251	-4.046E+00	8.806E+00	8.993E+00	NOT IDENT.
CF-252	-3.251E+03	1.095E+04	1.105E+04	NOT IDENT.
ANH-511	-1.258E+01	3.891E+00	6.878E+00	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	43.5565	88.03	62.5066	140.88	55.1260
46.54	49.4645	88.34	62.5364	143.76	47.7148
49.72	39.4799	88.47	67.5935	144.24	63.6546
51.35	49.9975	91.11	108.3837	145.44	70.6207
52.39	42.5458	91.27	108.4098	152.32	42.6937
53.20	38.8307	92.59	61.9266	152.43	42.6991
56.28	43.8462	93.31	61.9931	153.25	49.3121
57.36	0.0000	94.56	115.0527	154.21	70.2051
57.53	54.4692	94.65	115.0682	155.04	52.7007
57.53	54.4695	94.67	115.0717	156.02	39.5667
57.98	51.6492	97.43	53.1676	158.56	53.9997
59.32	35.8036	98.43	54.2681	158.97	0.0000
59.54	44.7740	98.44	54.2689	159.00	49.6149
61.49	51.3658	99.53	50.2516	162.33	57.5320
63.00	61.8181	100.11	50.2931	162.66	50.9112
63.29	61.8523	100.20	50.2998	163.33	33.2259
63.58	61.8862	102.03	51.4591	165.86	44.4165
63.81	61.9133	103.18	55.6657	176.31	56.1050
64.28	61.9683	103.37	47.4315	176.60	59.4883
64.99	58.1727	105.31	57.8983	177.52	62.9120
65.08	58.1826	106.12	62.1030	181.07	70.6444
66.73	67.1149	106.47	53.8484	184.41	59.9388
66.98	50.6027	109.28	58.2121	184.58	59.9485
67.24	50.6269	111.00	58.3464	185.72	60.0132
67.67	61.0597	111.76	62.5772	186.21	60.0415
67.75	61.0684	112.95	57.1045	190.27	47.7614
69.67	61.2811	116.24	49.3071	193.51	51.3274
70.83	52.9152	116.30	49.3111	198.01	48.1030
72.81	65.5553	116.74	51.4386	201.83	41.3734
72.87	65.5619	117.23	53.5716	205.31	54.1824
74.66	63.1348	119.76	51.6374	208.37	39.3016
74.82	63.1519	120.54	48.5237	210.85	46.3373
74.97	60.5360	120.90	42.2137	218.12	46.6278
77.11	65.3791	121.12	42.2253	222.11	43.2764
79.69	74.2821	121.22	42.2308	227.09	41.1069
80.12	59.7331	121.78	45.4300	227.38	39.9423
80.19	59.7400	122.06	46.5029	228.16	50.5474
80.57	43.8369	123.07	50.7946	228.18	50.5488
81.00	59.8192	123.68	55.0691	235.69	35.4826
81.07	59.8260	127.23	52.1189	235.96	47.3206
83.79	62.0918	129.43	44.7929	238.63	40.3086
84.00	55.0999	131.20	65.1941	238.98	40.3200
84.21	55.1183	133.02	62.1224	240.99	58.2010
85.43	73.2985	133.52	56.8010	242.00	41.6052
86.55	53.3105	136.00	71.6553	244.70	40.5026
86.94	54.3494	136.28	71.6787	250.62	37.0996
87.09	54.3621	136.47	65.9594	252.40	37.1502
87.57	62.4621	140.51	55.1027	252.80	35.9628

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	37.2590	383.85	24.3929	631.29	7.8324
260.90	33.7721	388.16	23.5794	632.98	18.6142
264.66	35.0774	388.63	23.5854	633.25	18.6165
265.00	41.1356	391.70	26.2518	634.78	21.5685
268.22	43.6586	400.66	26.3831	635.95	11.7700
269.46	37.6289	401.81	23.7601	636.99	11.7749
271.23	37.6781	402.40	25.0883	645.85	16.7392
273.65	28.0039	404.85	28.5596	657.76	13.8490
276.40	28.0600	410.95	19.4572	661.66	13.8695
277.37	19.5332	414.70	23.9282	664.57	0.0000
277.60	21.1647	423.72	19.5915	666.33	15.8796
278.00	22.7996	427.09	26.7633	666.50	15.8802
278.43	29.3225	427.87	24.0969	667.71	0.0000
279.20	22.8189	433.94	24.1738	677.62	14.9506
279.54	22.8246	440.45	25.1540	685.70	12.9963
280.46	30.9964	453.88	20.3526	695.00	14.0444
283.69	27.7972	459.60	18.1433	696.49	14.0524
284.31	31.0814	463.37	28.1751	696.51	14.0524
285.41	26.1940	468.07	22.7748	697.00	14.0547
285.90	26.2031	473.00	23.7434	697.49	14.0575
287.50	35.6597	475.06	16.4542	702.65	6.0359
290.67	32.8638	476.78	21.0426	706.68	17.1273
293.27	0.0000	477.60	28.3731	711.68	12.1118
295.22	29.6704	477.99	29.2943	720.70	8.1006
295.96	39.5811	482.18	13.7595	721.93	0.0000
299.98	39.6895	487.02	17.4696	722.78	11.1468
300.09	39.6924	492.35	10.1397	722.91	15.2008
300.13	28.5296	497.08	23.0967	723.31	18.2439
301.36	40.9680	511.00	38.1268	724.19	17.2359
302.85	31.0677	514.00	79.1514	727.33	10.1497
304.50	31.1028	520.40	18.6792	733.00	14.2387
304.85	32.3540	520.69	18.6816	735.93	8.1449
306.78	26.1660	522.65	0.0000	739.50	14.2712
308.46	24.9481	527.90	17.8055	744.23	11.2319
311.90	20.8379	529.59	15.0059	747.24	8.1771
316.51	31.7695	529.87	0.0000	752.31	10.7512
319.41	25.9664	531.02	20.6465	753.82	12.2939
320.08	31.8437	537.26	15.9984	756.73	12.3062
321.04	31.8638	546.56	0.0000	763.94	16.9633
323.87	30.2417	552.55	20.8443	765.80	13.8878
325.23	36.1544	563.25	14.2786	766.42	13.8906
328.76	26.9661	569.33	18.1333	766.84	16.0539
333.37	19.4390	569.50	21.9528	772.60	0.0000
334.37	27.9082	569.70	21.9546	776.52	10.3247
338.28	23.7378	583.19	19.2000	777.92	7.2307
338.32	23.7384	595.83	21.2319	778.90	8.6799
340.48	27.1660	600.60	26.1090	783.70	7.2450
340.55	27.1673	602.73	23.2285	785.37	7.2489
344.28	22.9757	604.72	18.8882	792.07	11.4167
345.93	25.5542	609.32	16.4978	795.86	12.4707
351.06	29.4800	610.33	16.5047	801.95	14.5782
351.93	31.6328	614.28	10.2103	802.10	14.5788
356.01	23.6547	618.01	14.6082	810.29	7.3093
364.49	25.8423	621.93	16.5822	810.45	7.3096
366.42	20.6973	630.19	0.0000	810.76	9.3988

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	2.5105	1129.67	6.8667		
818.51	10.9935	1131.51	0.0000		
832.01	8.4124	1173.23	5.7849		
834.85	9.4728	1189.05	4.6458		
836.80	0.0000	1204.77	6.9956		
846.77	9.5087	1221.41	7.9014		
856.80	14.8380	1231.02	6.1596		
860.56	11.6723	1235.36	4.2281		
871.09	18.0985	1238.28	4.4073		
873.19	14.9143	1260.41	0.0000		
875.33	0.0000	1274.44	4.4446		
880.51	9.6094	1274.54	4.4446		
881.60	13.8850	1291.59	5.7113		
883.24	8.5488	1298.22	0.0000		
884.68	7.4836	1312.11	4.4827		
889.28	6.4236	1332.49	5.1465		
894.76	9.6515	1365.19	2.7215		
898.04	11.8079	1368.63	0.0000		
903.28	11.8267	1384.29	10.0204		
911.20	18.3212	1408.01	1.8312		
923.98	7.5728	1434.09	2.7620		
926.36	12.9912	1457.56	0.0000		
935.54	9.7698	1460.82	3.7031		
937.49	11.9476	1489.16	4.6558		
944.13	10.8826	1596.21	7.6089		
946.00	11.9771	1620.50	5.7330		
949.00	9.8082	1678.03	0.0000		
954.55	0.0000	1690.97	7.7456		
964.08	8.7565	1764.49	4.9057		
968.97	10.9607	1770.23	6.2855		
983.53	8.8050	1771.35	1.9646		
984.45	5.5046	1791.20	0.0000		
996.26	7.7320	1808.65	2.9663		
1001.03	14.9315	1836.06	7.9478		
1004.73	6.6431				
1025.87	4.4546				
1028.54	10.0298				
1037.84	7.8209				
1038.76	0.0000				
1046.59	4.4798				
1048.07	2.2407				
1050.41	7.8477				
1063.66	3.3752				
1077.00	9.0319				
1077.34	9.0332				
1083.85	10.1792				
1085.87	6.7900				
1099.25	11.3558				
1111.64	10.2532				
1112.07	12.5326				
1112.84	12.5352				
1115.54	6.8423				
1120.29	11.9885				
1120.55	10.2766				
1121.30	6.8521				

VAX/VMS Nuclide Identification Report Generated 21-DEC-2016 11:06:44.42

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690080.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM40.CNF;163
Background date    : 18-DEC-2016 13:13:15
Sample date       : 19-DEC-2016 00:00:00 Acquisition date : 21-DEC-2016 10:51:15
Sample ID        : G1203690080 Sample quantity : 2.00000E+00 LITER
Detector name    : GAM40 Detector geometry: 2LMB
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.74 0.5%
Energy tolerance : 1.50000 keV Analyst Initials : MXR1
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 1624165 Detector SN# :
Matrix Spike ID : LCS ID : 1604
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	6	44.63	111	742	1.19	89.35	87	13	1.23E-01	38.4	4.26E+00
2	6	46.48*	1085	917	1.07	93.05	87	13	1.21E+00	5.4	
3	6	48.45	33	944	0.99	97.00	87	13	3.72E-02	153.5	
4	0	59.42	4301	1981	1.11	118.94	113	12	4.78E+00	2.6	
5	0	88.05	1469	1341	1.09	176.20	171	10	1.63E+00	5.3	
6	0	121.59	176	1036	0.97	243.30	239	9	1.96E-01	33.7	
7	0	136.39	101	727	1.14	272.89	270	7	1.12E-01	45.3	
8	0	273.13	47	530	2.20	546.40	543	8	5.25E-02	85.6	
9	0	326.20	38	305	1.51	652.55	650	6	4.23E-02	74.5	
10	0	347.41	53	404	1.56	694.96	691	8	5.87E-02	67.9	
11	0	420.15	70	460	3.90	840.46	835	11	7.82E-02	60.4	
12	0	437.26	16	410	1.32	874.68	873	8	1.75E-02	224.6	
13	0	661.16	7198	312	1.49	1322.49	1316	14	8.00E+00	1.3	
14	0	936.30	22	218	1.31	1872.73	1868	7	2.47E-02	112.4	
15	0	1026.97	11	212	0.68	2054.05	2047	10	1.20E-02	254.8	
16	0	1052.04	46	213	3.02	2104.19	2099	11	5.06E-02	64.3	
17	0	1115.21	80	281	2.03	2230.51	2224	14	8.87E-02	46.1	
18	0	1172.30	5162	220	1.85	2344.68	2337	18	5.74E+00	1.5	
19	0	1285.63	11	19	0.51	2571.31	2567	7	1.17E-02	75.5	
20	0	1331.50	4729	80	1.86	2663.03	2655	18	5.25E+00	1.5	
21	0	1381.28	9	3	1.04	2762.56	2759	7	1.00E-02	47.3	
22	0	1398.55	6	5	1.40	2797.11	2790	9	7.07E-03	72.2	
23	0	1597.21	9	0	0.73	3194.33	3190	9	1.00E-02	33.3	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690080.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title : MXR1
Sample date : 19-DEC-2016 00:00:00 Acquisition date : 21-DEC-2016 10:51:15
Sample ID : G1203690080 Sample quantity : 2.0000 LITER
Sample type : LIQUID Sample geometry :
Detector name : GAMMA40 Detector geometry: 2LMB
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:04.74 0.5%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

Interfering		Interfered	
-----		-----	
Nuclide	Line	Nuclide	Line
CO-57	122.06	PM-147	121.22

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error	Status
CO-57	122.06	85.60*	2.180E+00	1.418E+02	1.427E+02	67.42	OK
	136.47	10.68	2.242E+00	6.348E+02	6.387E+02	90.65	OK
CO-60	1173.23	99.85	5.977E-01	1.299E+04	1.300E+04	3.09	OK
	1332.49	99.98*	5.399E-01	1.315E+04	1.317E+04	3.04	OK
ZN-65	1115.54	50.60*	6.226E-01	3.805E+02	3.832E+02	92.15	OK
CD-109	88.03	3.70*	1.565E+00	3.810E+04	3.824E+04	10.70	OK
SN-126	64.28	9.60	6.330E-01	----- Line	Not Found	-----	Absent
	86.94	8.90	1.565E+00	1.584E+04	1.584E+04	10.70	OK
	87.57	37.00*	1.565E+00	3.810E+03	3.810E+03	10.70	OK
BA-137M	661.66	89.90*	9.426E-01	1.275E+04	1.276E+04	2.58	OK
CS-137	661.66	85.10*	9.426E-01	1.347E+04	1.348E+04	2.58	OK
PB-210	46.54	4.25*	9.141E-02	4.192E+05	4.193E+05	10.75	OK
PO-210	46.54	4.25*	9.141E-02	4.192E+05	4.193E+05	10.75	OK
AM-241	59.54	35.90*	4.429E-01	4.062E+04	4.062E+04	5.18	OK

Flag: "*" = Keyline

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*                                     DETECTOR AND SAMPLE DATA                 *
*                                     *                                     *
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690080.CNF;1 *
* Acquisition date   : 21-DEC-2016 10:51:15 Sensitivity      : 3.000          *
* Detector ID        : GAM40 Energy tolerance: 1.500          *
* Elapsed live time  : 0 00:15:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 00:15:04.74 Half life ratio : *****          *
* Sample date        : 19-DEC-2016 00:00:00 Analyst initials: MXR1          *
* Sample ID          : G1203690080 Sample Quantity : 2.0000E+00 LITER      *
* Batch Number       : 1624165 Wet Weight : 0.00000          *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : LIQUID.NLB;10                                         *
*****
*                                     CALIBRATION INFORMATION                 *
*                                     *                                     *
* Eff. Cal. date     : 11-NOV-2016 10:53:00 Eff. Geometry   : 2LMB          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4          *
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Cnt uncert (1.96-sigma)	MDA (pCi/LITER)
CO-57	1.427E+02	9.428E+01	9.203E+01
CO-60	1.317E+04	3.917E+02	6.976E+01
ZN-65	3.832E+02	3.460E+02	2.703E+02
CD-109	3.824E+04	4.010E+03	3.077E+03
SN-126	3.810E+03	3.995E+02	3.094E+02
BA-137M	1.276E+04	3.224E+02	1.141E+02
CS-137	1.348E+04	3.405E+02	1.206E+02
PB-210	4.193E+05	4.416E+04	4.759E+04
PO-210	4.193E+05	4.416E+04	4.759E+04
AM-241	4.062E+04	2.063E+03	1.188E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/LITER)	
BE-7	4.882E+01	5.772E+02	1.006E+03	NOT IDENT.
NA-22	1.878E+01	3.785E+01	7.562E+01	NOT IDENT.
NA-24	-2.141E+02	3.786E+02	6.752E+02	NOT IDENT.
AL-26	-1.158E+01	1.838E+01	3.172E+01	NOT IDENT.
K-40	1.111E+02	1.988E+02	4.690E+02	NOT IDENT.
SC-46	8.112E+01	8.256E+01	1.461E+02	NOT IDENT.
V-48	3.403E+01	8.685E+01	1.593E+02	NOT IDENT.
CR-51	7.167E+00	4.988E+02	8.827E+02	NOT IDENT.
MN-52	1.342E+01	3.032E+01	6.725E+01	FAIL ABUN
MN-54	1.549E+01	6.797E+01	1.171E+02	NOT IDENT.
CO-56	1.777E+01	7.358E+01	1.265E+02	NOT IDENT.
CO-58	6.674E+01	6.894E+01	1.237E+02	NOT IDENT.
FE-59	-7.958E+01	1.465E+02	2.559E+02	NOT IDENT.
CU-67	-7.984E+01	1.674E+02	2.974E+02	NOT IDENT.
GE-68	3.061E+02	2.408E+03	4.362E+03	NOT IDENT.
AS-74	-4.521E+01	1.032E+02	1.746E+02	NOT IDENT.
SE-75	3.048E+01	8.121E+01	1.458E+02	FAIL ABUN
BR-77	-2.301E+02	4.119E+02	7.227E+02	NOT IDENT.
SR-82	-3.107E+02	4.634E+02	7.603E+02	NOT IDENT.
RB-83	5.760E+00	1.241E+02	2.160E+02	NOT IDENT.

RB-84	-1.738E+01	1.131E+02	1.897E+02	NOT IDENT.
KR-85	-3.813E+02	1.243E+04	2.160E+04	NOT IDENT.
SR-85	-1.753E+00	5.715E+01	9.929E+01	NOT IDENT.
RB-86	4.393E+02	9.891E+02	1.819E+03	NOT IDENT.
Y-88	-1.871E+01	1.908E+01	2.588E+01	NOT IDENT.
Y-91	1.532E+04	1.883E+04	3.731E+04	NOT IDENT.
NB-94	2.935E+01	5.120E+01	9.183E+01	NOT IDENT.
NB-95	-1.120E+01	5.912E+01	1.004E+02	NOT IDENT.
NB-95M	-3.173E+01	1.974E+02	3.498E+02	NOT IDENT.
ZR-95	-5.119E+01	1.090E+02	1.817E+02	NOT IDENT.
MO-99	8.898E+02	8.691E+02	1.586E+03	NOT IDENT.
TC-99M	4.329E+02	4.579E+04	7.501E+04	NOT IDENT.
RH-101	4.820E+01	6.937E+01	1.165E+02	FAIL ABUN
RH-102M	-6.781E-01	6.251E+01	1.085E+02	NOT IDENT.
RU-103	-1.769E+01	6.429E+01	1.104E+02	NOT IDENT.
RH-106	3.864E+02	5.480E+02	9.841E+02	NOT IDENT.
RU-106	3.864E+02	5.480E+02	9.841E+02	NOT IDENT.
AG-108M	-3.559E+01	7.103E+01	1.080E+02	NOT IDENT.
AG-110M	4.123E+01	1.068E+02	1.840E+02	FAIL ABUN
SN-113	4.710E+01	8.039E+01	1.441E+02	NOT IDENT.
IN-114M	-7.760E+01	2.953E+02	5.257E+02	NOT IDENT.
CD-115	-5.606E+01	4.168E+02	7.200E+02	NOT IDENT.
SN-117M	-5.962E+00	5.977E+01	9.712E+01	NOT IDENT.
I-123	4.991E+02	1.201E+03	1.986E+03	NOT IDENT.
TE-123M	2.338E+01	5.487E+01	9.076E+01	NOT IDENT.
SB-124	1.665E+01	4.085E+01	9.624E+01	NOT IDENT.
SB-125	1.745E+01	1.887E+02	3.304E+02	NOT IDENT.
TE-125M	1.013E+04	1.911E+04	3.211E+04	NOT IDENT.
I-126	2.732E+02	1.981E+02	3.389E+02	NOT IDENT.
SB-126	2.579E+01	1.255E+02	2.182E+02	NOT IDENT.
SB-127	1.186E+02	2.092E+02	3.759E+02	NOT IDENT.
TE-129	6.199E+02	8.531E+02	1.519E+03	NOT IDENT.
I-131	2.442E+01	7.636E+01	1.359E+02	NOT IDENT.
I-132	0.000E+00	3.017E+09	0.000E+00	SHORT HLIF
TE-132	-1.660E+01	9.410E+01	1.668E+02	FAIL ABUN
BA-133	2.846E+01	7.815E+01	1.395E+02	NOT IDENT.
I-133	-3.313E+02	4.348E+02	7.278E+02	NOT IDENT.
CS-134	-3.155E+01	7.662E+01	1.275E+02	NOT IDENT.
CS-135	6.541E+01	2.919E+02	5.219E+02	NOT IDENT.
I-135	3.118E+04	7.150E+04	1.402E+05	NOT IDENT.
CS-136	-3.674E+01	1.268E+02	1.973E+02	FAIL ABUN
CE-139	1.801E+01	5.532E+01	9.120E+01	NOT IDENT.
BA-140	-5.083E+01	2.491E+02	4.287E+02	NOT IDENT.
LA-140	3.420E+01	2.234E+01	6.025E+01	FAIL ABUN
CE-141	-7.048E+00	9.823E+01	1.603E+02	NOT IDENT.
CE-143	-1.987E+02	3.681E+02	6.407E+02	NOT IDENT.
CE-144	-9.153E+01	4.543E+02	6.801E+02	NOT IDENT.
PM-144	2.751E+01	5.225E+01	9.334E+01	NOT IDENT.
PR-144	2.060E+03	3.885E+03	6.942E+03	NOT IDENT.
PM-146	1.060E+00	9.181E+01	1.597E+02	NOT IDENT.
ND-147	-3.292E+02	4.785E+02	8.039E+02	NOT IDENT.
PM-147	0.000E+00	2.819E+06	3.045E+06	FAIL ABUN
PM-149	2.889E+03	3.151E+03	5.760E+03	NOT IDENT.
EU-152	-6.636E+01	2.036E+02	3.170E+02	FAIL ABUN
GD-153	2.805E+02	1.901E+02	3.303E+02	NOT IDENT.
EU-154	5.511E+01	1.081E+02	2.163E+02	FAIL ABUN
EU-155	9.008E+01	2.418E+02	4.051E+02	FAIL ABUN
HO-166M	-2.006E+01	1.005E+02	1.713E+02	NOT IDENT.
TM-171	-6.641E+03	1.219E+05	2.048E+05	NOT IDENT.
LU-176	1.280E+01	5.150E+01	9.183E+01	FAIL ABUN
LU-177	-2.844E+02	5.485E+02	9.674E+02	NOT IDENT.
HF-181	1.637E+01	7.373E+01	1.293E+02	FAIL ABUN
W-181	0.000E+00	1.093E+03	2.047E+03	FAIL ABUN
TA-182	9.949E+00	1.539E+02	2.906E+02	NOT IDENT.
RE-183	0.000E+00	2.212E+03	2.313E+03	FAIL ABUN
RE-184	-4.510E+01	2.261E+02	3.764E+02	NOT IDENT.
RE-188	2.183E+02	2.847E+02	4.777E+02	NOT IDENT.
W-188	9.214E+03	1.148E+04	2.091E+04	NOT IDENT.
OS-191	-1.875E+02	1.993E+02	3.173E+02	NOT IDENT.
IR-192	2.361E+01	5.767E+01	1.035E+02	NOT IDENT.
HG-203	-2.103E+01	5.921E+01	1.039E+02	NOT IDENT.
BI-207	-5.919E+01	1.058E+02	1.851E+02	NOT IDENT.
TL-208	8.565E+00	6.292E+01	1.100E+02	NOT IDENT.
BI-211	3.435E+02	4.065E+02	6.713E+02	NOT IDENT.
PB-211	5.255E+02	1.375E+03	2.445E+03	NOT IDENT.
BI-212	-4.878E+02	8.441E+02	1.401E+03	NOT IDENT.
PB-212	-3.799E+01	1.069E+02	1.888E+02	NOT IDENT.
BI-213	-5.297E+01	2.488E+02	3.838E+02	NOT IDENT.

BI-214	1.270E+02	1.199E+02	2.192E+02	NOT IDENT.
PB-214	1.142E+02	1.388E+02	2.422E+02	FAIL ABUN
RN-219	-4.089E+02	8.025E+02	1.378E+03	NOT IDENT.
FR-221	1.888E+02	4.213E+02	7.599E+02	NOT IDENT.
RA-223	-3.462E+02	1.315E+03	2.060E+03	NOT IDENT.
RA-224	-3.386E+02	1.146E+03	2.023E+03	NOT IDENT.
RA-226	3.812E+02	1.195E+03	2.167E+03	NOT IDENT.
AC-227	-1.989E+02	4.920E+02	8.641E+02	NOT IDENT.
TH-227	-1.989E+02	4.920E+02	8.641E+02	NOT IDENT.
AC-228	-4.647E+01	3.212E+02	5.359E+02	NOT IDENT.
RA-228	-4.647E+01	3.212E+02	5.359E+02	NOT IDENT.
TH-228	-3.799E+01	1.069E+02	1.888E+02	NOT IDENT.
TH-229	-1.958E+02	1.013E+03	1.805E+03	FAIL ABUN
TH-230	-2.821E+04	3.356E+04	5.486E+04	NOT IDENT.
PA-231	-3.334E+02	8.826E+02	1.543E+03	NOT IDENT.
TH-231	4.840E+02	1.255E+03	1.954E+03	NOT IDENT.
TH-232	-1.783E+04	6.524E+04	1.004E+05	NOT IDENT.
PA-233	2.928E+01	1.230E+02	2.193E+02	NOT IDENT.
PA-234	4.790E+02	7.186E+02	1.326E+03	NOT IDENT.
PA-234M	6.319E+03	8.909E+03	1.664E+04	NOT IDENT.
TH-234	-9.019E+02	4.728E+03	7.299E+03	NOT IDENT.
U-234	-2.991E+04	4.376E+05	7.344E+05	FAIL ABUN
U-235	1.671E+02	4.188E+02	6.942E+02	NOT IDENT.
NP-237	2.928E+01	1.230E+02	2.193E+02	NOT IDENT.
NP-238	3.579E+02	6.920E+02	1.277E+03	FAIL ABUN
U-238	-9.019E+02	4.728E+03	7.299E+03	NOT IDENT.
NP-239	-1.582E+02	6.068E+02	9.921E+02	NOT IDENT.
AM-242	-1.592E+03	1.503E+03	2.406E+03	FAIL ABUN
AM-243	-2.546E+01	1.440E+02	2.395E+02	FAIL ABUN
CM-243	-1.647E+02	2.536E+02	4.111E+02	NOT IDENT.
BK-247	9.256E+01	1.557E+02	2.814E+02	NOT IDENT.
CM-247	1.832E+01	7.290E+01	1.289E+02	NOT IDENT.
CF-249	-2.641E+01	7.700E+01	1.334E+02	NOT IDENT.
CF-251	-8.158E+01	2.640E+02	4.240E+02	NOT IDENT.
CF-252	-2.968E+05	4.058E+05	6.570E+05	NOT IDENT.
ANH-511	-4.454E+01	5.622E+01	9.575E+01	NOT IDENT.

PEAK REPORT WITHOUT BACKGROUND SUBTRACTION

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	6	44.63	111	742	1.19	89.35	87	13	1.23E-01	38.4	4.26E+00
2	6	46.48	1085	917	1.07	93.05	87	13	1.21E+00	5.4	
3	6	48.45	33	944	0.99	97.00	87	13	3.72E-02	153.5	
4	0	59.42	4301	1981	1.11	118.94	113	12	4.78E+00	2.6	
5	0	88.05	1469	1341	1.09	176.20	171	10	1.63E+00	5.3	
6	0	121.59	176	1036	0.97	243.30	239	9	1.96E-01	33.7	
7	0	136.39	101	727	1.14	272.89	270	7	1.12E-01	45.3	
8	0	273.13	47	530	2.20	546.40	543	8	5.25E-02	85.6	
9	0	326.20	38	305	1.51	652.55	650	6	4.23E-02	74.5	
10	0	347.41	53	404	1.56	694.96	691	8	5.87E-02	67.9	
11	0	420.15	70	460	3.90	840.46	835	11	7.82E-02	60.4	
12	0	437.26	16	410	1.32	874.68	873	8	1.75E-02	224.6	
13	0	661.16	7198	312	1.49	1322.49	1316	14	8.00E+00	1.3	
14	0	936.30	22	218	1.31	1872.73	1868	7	2.47E-02	112.4	
15	0	1026.97	11	212	0.68	2054.05	2047	10	1.20E-02	254.8	
16	0	1052.04	46	213	3.02	2104.19	2099	11	5.06E-02	64.3	
17	0	1115.21	80	281	2.03	2230.51	2224	14	8.87E-02	46.1	
18	0	1172.30	5162	220	1.85	2344.68	2337	18	5.74E+00	1.5	
19	0	1285.63	11	19	0.51	2571.31	2567	7	1.17E-02	75.5	
20	0	1331.50	4729	80	1.86	2663.03	2655	18	5.25E+00	1.5	
21	0	1381.28	9	3	1.04	2762.56	2759	7	1.00E-02	47.3	
22	0	1398.55	6	5	1.40	2797.11	2790	9	7.07E-03	72.2	
23	0	1597.21	9	0	0.73	3194.33	3190	9	1.00E-02	33.3	

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/LITER	Decay Corr pCi/LITER	2-Sigma %Error
CO-57	122.06	176	85.60*	2.180E+00	1.418E+02	1.427E+02	67.42
	136.47	101	10.68	2.242E+00	6.348E+02	6.387E+02	90.65
CO-60	1173.23	5162	99.85	5.977E-01	1.299E+04	1.300E+04	3.09
	1332.49	4729	99.98*	5.399E-01	1.315E+04	1.317E+04	3.04
ZN-65	1115.54	80	50.60*	6.226E-01	3.805E+02	3.832E+02	92.15
CD-109	88.03	1469	3.70*	1.565E+00	3.810E+04	3.824E+04	10.70
SN-126	64.28	-----	9.60	6.330E-01	-----	Line Not Found	-----
	86.94	1469	8.90	1.565E+00	1.584E+04	1.584E+04	10.70
	87.57	1469	37.00*	1.565E+00	3.810E+03	3.810E+03	10.70
BA-137M	661.66	7198	89.90*	9.426E-01	1.275E+04	1.276E+04	2.58
CS-137	661.66	7198	85.10*	9.426E-01	1.347E+04	1.348E+04	2.58
PM-147	121.22	176	0.00*	2.180E+00	4.259E+06	4.267E+06	67.42
PB-210	46.54	1085	4.25*	9.141E-02	4.192E+05	4.193E+05	10.75
PO-210	46.54	1085	4.25*	9.141E-02	4.192E+05	4.193E+05	10.75
AM-241	59.54	4301	35.90*	4.429E-01	4.062E+04	4.062E+04	5.18

Flag: "*" = Keyline

Total number of lines in spectrum 23
Number of unidentified lines 6
Number of lines tentatively identified by NID 17 73.91%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/LITER	Decay Corr pCi/LITER	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.74D	1.01	1.418E+02	1.427E+02	0.962E+02	67.42	
CO-60	1925.28D	1.00	1.315E+04	1.317E+04	0.040E+04	3.04	
ZN-65	244.06D	1.01	3.805E+02	3.832E+02	3.531E+02	92.15	
CD-109	461.40D	1.00	3.810E+04	3.824E+04	0.409E+04	10.70	
SN-126	2.30E+05Y	1.00	3.810E+03	3.810E+03	0.408E+03	10.70	
BA-137M	30.08Y	1.00	1.275E+04	1.276E+04	0.033E+04	2.58	
CS-137	30.08Y	1.00	1.347E+04	1.348E+04	0.035E+04	2.58	
PM-147	2.62Y	1.00	4.259E+06	4.267E+06	2.877E+06	67.42	
PB-210	22.20Y	1.00	4.192E+05	4.193E+05	0.451E+05	10.75	
PO-210	22.20Y	1.00	4.192E+05	4.193E+05	0.451E+05	10.75	
AM-241	432.60Y	1.00	4.062E+04	4.062E+04	0.210E+04	5.18	
Total Activity :			5.220E+06	5.228E+06			

Grand Total Activity : 5.220E+06 5.228E+06

Flags: "K" = Keyline not found "M" = Manually accepted
"E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
6	44.63	111	742	1.19	89.35	87	13	1.23E-01	76.9	6.51E-02	T
6	48.45	33	944	0.99	97.00	87	13	3.72E-02	****	1.26E-01	T
0	273.13	47	530	2.20	546.40	543	8	5.25E-02	****	1.72E+00	T
0	326.20	38	305	1.51	652.55	650	6	4.23E-02	****	1.53E+00	T
0	347.41	53	404	1.56	694.96	691	8	5.87E-02	****	1.47E+00	T
0	420.15	70	460	3.90	840.46	835	11	7.82E-02	****	1.30E+00	
0	437.26	16	410	1.32	874.68	873	8	1.75E-02	****	1.26E+00	
0	936.30	22	218	1.31	1872.73	1868	7	2.47E-02	****	7.18E-01	T
0	1026.97	11	212	0.68	2054.05	2047	10	1.20E-02	****	6.66E-01	T
0	1052.04	46	213	3.02	2104.19	2099	11	5.06E-02	****	6.53E-01	
0	1285.63	11	19	0.51	2571.31	2567	7	1.17E-02	****	5.55E-01	
0	1381.28	9	3	1.04	2762.56	2759	7	1.00E-02	94.6	5.25E-01	
0	1398.55	6	5	1.40	2797.11	2790	9	7.07E-03	****	5.20E-01	
0	1597.21	9	0	0.73	3194.33	3190	9	1.00E-02	66.7	4.73E-01	T

Flags: "T" = Tentatively associated

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DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690080.CNF;1
Acquisition date : 21-DEC-2016 10:51:15 Sensitivity : 3.000
Detector ID : GAM40 Energy tolerance: 1.500
Elapsed live time: 0 00:15:00.00 Abundance limit : 75.000
Elapsed real time: 0 00:15:04.74 Half life ratio : *****
Sample date : 19-DEC-2016 00:00:00 Nuclide Library : LIQUID
Sample ID : G1203690080 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 11-NOV-2016 10:53:00 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4

Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/LITER)
CO-57	4.495E+01
CO-60	3.112E+01
ZN-65	1.287E+02
CD-109	1.504E+03
SN-126	1.513E+02
BA-137M	5.470E+01
CS-137	5.778E+01
PB-210	2.329E+04
PO-210	2.329E+04
AM-241	5.818E+02

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

Nuclide	Lc (pCi/LITER)	
BE-7	4.865E+02	NOT IDENT.
NA-22	3.418E+01	NOT IDENT.
NA-24	2.790E+02	NOT IDENT.
AL-26	1.124E+01	NOT IDENT.
K-40	1.967E+02	NOT IDENT.
SC-46	7.031E+01	NOT IDENT.
V-48	7.644E+01	NOT IDENT.
CR-51	4.275E+02	NOT IDENT.
MN-52	2.823E+01	FAIL ABUN
MN-54	5.600E+01	NOT IDENT.
CO-56	6.062E+01	NOT IDENT.
CO-58	5.930E+01	NOT IDENT.
FE-59	1.221E+02	NOT IDENT.
CU-67	1.450E+02	NOT IDENT.
GE-68	2.083E+03	NOT IDENT.
AS-74	8.363E+01	NOT IDENT.
SE-75	7.096E+01	FAIL ABUN
BR-77	3.519E+02	NOT IDENT.
SR-82	3.631E+02	NOT IDENT.
RB-83	1.040E+02	NOT IDENT.
RB-84	9.076E+01	NOT IDENT.

KR-85	1.039E+04	NOT IDENT.
SR-85	4.774E+01	NOT IDENT.
RB-86	8.696E+02	NOT IDENT.
Y-88	8.180E+00	NOT IDENT.
Y-91	1.729E+04	NOT IDENT.
NB-94	4.368E+01	NOT IDENT.
NB-95	4.775E+01	NOT IDENT.
NB-95M	1.705E+02	NOT IDENT.
ZR-95	8.636E+01	NOT IDENT.
MO-99	7.574E+02	NOT IDENT.
TC-99M	3.662E+04	NOT IDENT.
RH-101	5.693E+01	FAIL ABUN
RH-102M	5.250E+01	NOT IDENT.
RU-103	5.321E+01	NOT IDENT.
RH-106	4.714E+02	NOT IDENT.
RU-106	4.714E+02	NOT IDENT.
AG-108M	5.228E+01	NOT IDENT.
AG-110M	8.832E+01	FAIL ABUN
SN-113	6.977E+01	NOT IDENT.
IN-114M	2.566E+02	NOT IDENT.
CD-115	3.459E+02	NOT IDENT.
SN-117M	4.739E+01	NOT IDENT.
I-123	9.695E+02	NOT IDENT.
TE-123M	4.430E+01	NOT IDENT.
SB-124	3.851E+01	NOT IDENT.
SB-125	1.600E+02	NOT IDENT.
TE-125M	1.569E+04	NOT IDENT.
I-126	1.620E+02	NOT IDENT.
SB-126	1.042E+02	NOT IDENT.
SB-127	1.787E+02	NOT IDENT.
TE-129	7.373E+02	NOT IDENT.
I-131	6.580E+01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	8.138E+01	FAIL ABUN
BA-133	6.754E+01	NOT IDENT.
I-133	3.490E+02	NOT IDENT.
CS-134	6.088E+01	NOT IDENT.
CS-135	2.538E+02	NOT IDENT.
I-135	6.387E+04	NOT IDENT.
CS-136	9.429E+01	FAIL ABUN
CE-139	4.446E+01	NOT IDENT.
BA-140	2.058E+02	NOT IDENT.
LA-140	2.499E+01	FAIL ABUN
CE-141	7.824E+01	NOT IDENT.
CE-143	3.106E+02	NOT IDENT.
CE-144	3.320E+02	NOT IDENT.
PM-144	4.443E+01	NOT IDENT.
PR-144	3.305E+03	NOT IDENT.
PM-146	7.736E+01	NOT IDENT.
ND-147	3.857E+02	NOT IDENT.
PM-147	1.490E+06	FAIL ABUN
PM-149	2.797E+03	NOT IDENT.
EU-152	1.534E+02	FAIL ABUN
GD-153	1.614E+02	NOT IDENT.
EU-154	9.781E+01	FAIL ABUN
EU-155	1.978E+02	FAIL ABUN
HO-166M	8.146E+01	NOT IDENT.
TM-171	1.005E+05	NOT IDENT.
LU-176	4.458E+01	FAIL ABUN
LU-177	4.713E+02	NOT IDENT.
HF-181	6.248E+01	FAIL ABUN
W-181	1.007E+03	FAIL ABUN
TA-182	1.322E+02	NOT IDENT.
RE-183	1.142E+03	FAIL ABUN
RE-184	1.807E+02	NOT IDENT.
RE-188	2.330E+02	NOT IDENT.
W-188	1.015E+04	NOT IDENT.
OS-191	1.549E+02	NOT IDENT.
IR-192	5.015E+01	NOT IDENT.
HG-203	5.043E+01	NOT IDENT.
BI-207	8.838E+01	NOT IDENT.
TL-208	5.272E+01	NOT IDENT.
BI-211	3.251E+02	NOT IDENT.
PB-211	1.183E+03	NOT IDENT.
BI-212	6.661E+02	NOT IDENT.
PB-212	9.192E+01	NOT IDENT.
BI-213	1.858E+02	NOT IDENT.
BI-214	1.052E+02	NOT IDENT.

PB-214	1.172E+02	FAIL ABUN
RN-219	6.663E+02	NOT IDENT.
FR-221	3.711E+02	NOT IDENT.
RA-223	9.977E+02	NOT IDENT.
RA-224	9.853E+02	NOT IDENT.
RA-226	1.057E+03	NOT IDENT.
AC-227	4.203E+02	NOT IDENT.
TH-227	4.203E+02	NOT IDENT.
AC-228	2.574E+02	NOT IDENT.
RA-228	2.574E+02	NOT IDENT.
TH-228	9.192E+01	NOT IDENT.
TH-229	8.810E+02	FAIL ABUN
TH-230	2.675E+04	NOT IDENT.
PA-231	7.482E+02	NOT IDENT.
TH-231	9.560E+02	NOT IDENT.
TH-232	4.893E+04	NOT IDENT.
PA-233	1.063E+02	NOT IDENT.
PA-234	6.393E+02	NOT IDENT.
PA-234M	7.969E+03	NOT IDENT.
TH-234	3.559E+03	NOT IDENT.
U-234	3.603E+05	FAIL ABUN
U-235	3.390E+02	NOT IDENT.
NP-237	1.063E+02	NOT IDENT.
NP-238	6.125E+02	FAIL ABUN
U-238	3.559E+03	NOT IDENT.
NP-239	4.844E+02	NOT IDENT.
AM-242	1.174E+03	FAIL ABUN
AM-243	1.170E+02	FAIL ABUN
CM-243	2.007E+02	NOT IDENT.
BK-247	1.369E+02	NOT IDENT.
CM-247	6.239E+01	NOT IDENT.
CF-249	6.447E+01	NOT IDENT.
CF-251	2.066E+02	NOT IDENT.
CF-252	3.204E+05	NOT IDENT.
ANH-511	4.611E+01	NOT IDENT.

GEL Laboratories LLC
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DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1203690080.CNF;1
Acquisition date : 21-DEC-2016 10:51:15 Sensitivity : 3.000
Detector ID : GAM40 Energy tolerance: 1.500
Elapsed live time: 0 00:15:00.00 Abundance limit : 75.000
Elapsed real time: 0 00:15:04.74 Half life ratio : *****
Sample date : 19-DEC-2016 00:00:00 Nuclide Library : LIQUID
Sample ID : G1203690080 Analyst initials: MXR1
Batch Number : 1624165 Sample Quantity : 2.0000E+00 LITER
Quantity Err(%) : 5.0000E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 11-NOV-2016 10:53:00 Eff. Geometry : 2LMB
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM40_2LMB.CNF;4

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/LITER)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CO-57	1.427E+02	9.491E+01	9.491E+01
CO-60	1.317E+04	1.145E+03	1.145E+03
ZN-65	3.832E+02	3.475E+02	3.475E+02
CD-109	3.824E+04	5.449E+03	5.449E+03
SN-126	3.810E+03	5.040E+02	5.040E+02
BA-137M	1.276E+04	1.087E+03	1.087E+03
CS-137	1.348E+04	1.147E+03	1.147E+03
PB-210	4.193E+05	6.062E+04	6.062E+04
PO-210	4.193E+05	6.062E+04	6.062E+04
AM-241	4.062E+04	3.901E+03	3.901E+03

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

Nuclide	Key-Line Activity (pCi/LITER)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	4.882E+01	5.772E+02	5.776E+02	NOT IDENT.
NA-22	1.878E+01	3.788E+01	3.881E+01	NOT IDENT.
NA-24	-2.141E+02	3.790E+02	3.911E+02	NOT IDENT.
AL-26	-1.158E+01	1.840E+01	1.912E+01	NOT IDENT.
K-40	1.111E+02	1.990E+02	2.053E+02	NOT IDENT.
SC-46	8.112E+01	8.285E+01	9.056E+01	NOT IDENT.
V-48	3.403E+01	8.689E+01	8.824E+01	NOT IDENT.
CR-51	7.167E+00	4.988E+02	4.988E+02	NOT IDENT.
MN-52	1.342E+01	3.034E+01	3.093E+01	FAIL ABUN
MN-54	1.549E+01	6.799E+01	6.834E+01	NOT IDENT.
CO-56	1.777E+01	7.360E+01	7.403E+01	NOT IDENT.
CO-58	6.674E+01	6.917E+01	7.543E+01	NOT IDENT.
FE-59	-7.958E+01	1.467E+02	1.510E+02	NOT IDENT.
CU-67	-7.984E+01	1.675E+02	1.714E+02	NOT IDENT.
GE-68	3.061E+02	2.408E+03	2.412E+03	NOT IDENT.
AS-74	-4.521E+01	1.033E+02	1.053E+02	NOT IDENT.
SE-75	3.048E+01	8.125E+01	8.240E+01	FAIL ABUN
BR-77	-2.301E+02	4.123E+02	4.251E+02	NOT IDENT.
SR-82	-3.107E+02	4.642E+02	4.848E+02	NOT IDENT.
RB-83	5.760E+00	1.241E+02	1.241E+02	NOT IDENT.

RB-84	-1.738E+01	1.132E+02	1.134E+02	NOT IDENT.
KR-85	-3.813E+02	1.243E+04	1.244E+04	NOT IDENT.
SR-85	-1.753E+00	5.715E+01	5.716E+01	NOT IDENT.
RB-86	4.393E+02	9.898E+02	1.009E+03	NOT IDENT.
Y-88	-1.871E+01	1.913E+01	2.090E+01	NOT IDENT.
Y-91	1.532E+04	1.887E+04	2.010E+04	NOT IDENT.
NB-94	2.935E+01	5.126E+01	5.294E+01	NOT IDENT.
NB-95	-1.120E+01	5.913E+01	5.935E+01	NOT IDENT.
NB-95M	-3.173E+01	1.974E+02	1.979E+02	NOT IDENT.
ZR-95	-5.119E+01	1.091E+02	1.115E+02	NOT IDENT.
MO-99	8.898E+02	8.728E+02	9.606E+02	NOT IDENT.
TC-99M	4.329E+02	4.579E+04	4.579E+04	NOT IDENT.
RH-101	4.820E+01	6.996E+01	7.326E+01	FAIL ABUN
RH-102M	-6.781E-01	6.251E+01	6.251E+01	NOT IDENT.
RU-103	-1.769E+01	6.430E+01	6.480E+01	NOT IDENT.
RH-106	3.864E+02	5.492E+02	5.762E+02	NOT IDENT.
RU-106	3.864E+02	5.492E+02	5.762E+02	NOT IDENT.
AG-108M	-3.559E+01	7.109E+01	7.287E+01	NOT IDENT.
AG-110M	4.123E+01	1.069E+02	1.085E+02	FAIL ABUN
SN-113	4.710E+01	8.047E+01	8.323E+01	NOT IDENT.
IN-114M	-7.760E+01	2.953E+02	2.974E+02	NOT IDENT.
CD-115	-5.606E+01	4.168E+02	4.176E+02	NOT IDENT.
SN-117M	-5.962E+00	5.977E+01	5.983E+01	NOT IDENT.
I-123	4.991E+02	1.202E+03	1.223E+03	NOT IDENT.
TE-123M	2.338E+01	5.490E+01	5.590E+01	NOT IDENT.
SB-124	1.665E+01	4.087E+01	4.155E+01	NOT IDENT.
SB-125	1.745E+01	1.887E+02	1.889E+02	NOT IDENT.
TE-125M	1.013E+04	1.912E+04	1.966E+04	NOT IDENT.
I-126	2.732E+02	1.997E+02	2.346E+02	NOT IDENT.
SB-126	2.579E+01	1.255E+02	1.261E+02	NOT IDENT.
SB-127	1.186E+02	2.094E+02	2.161E+02	NOT IDENT.
TE-129	6.199E+02	8.598E+02	9.041E+02	NOT IDENT.
I-131	2.442E+01	7.638E+01	7.717E+01	NOT IDENT.
I-132	-8.467E+08	3.021E+09	3.045E+09	SHORT HLIF
TE-132	-1.660E+01	9.411E+01	9.441E+01	FAIL ABUN
BA-133	2.846E+01	7.818E+01	7.923E+01	NOT IDENT.
I-133	-3.313E+02	4.361E+02	4.609E+02	NOT IDENT.
CS-134	-3.155E+01	7.666E+01	7.797E+01	NOT IDENT.
CS-135	6.541E+01	2.920E+02	2.934E+02	NOT IDENT.
I-135	3.118E+04	7.159E+04	7.296E+04	NOT IDENT.
CS-136	-3.674E+01	1.268E+02	1.279E+02	FAIL ABUN
CE-139	1.801E+01	5.545E+01	5.604E+01	NOT IDENT.
BA-140	-5.083E+01	2.492E+02	2.502E+02	NOT IDENT.
LA-140	3.420E+01	2.251E+01	2.728E+01	FAIL ABUN
CE-141	-7.048E+00	9.823E+01	9.828E+01	NOT IDENT.
CE-143	-1.987E+02	3.685E+02	3.792E+02	NOT IDENT.
CE-144	-9.153E+01	4.543E+02	4.562E+02	NOT IDENT.
PM-144	2.751E+01	5.230E+01	5.375E+01	NOT IDENT.
PR-144	2.060E+03	3.889E+03	3.998E+03	NOT IDENT.
PM-146	1.060E+00	9.181E+01	9.181E+01	NOT IDENT.
ND-147	-3.292E+02	4.793E+02	5.018E+02	NOT IDENT.
PM-147	4.267E+06	2.838E+06	3.428E+06	FAIL ABUN
PM-149	2.889E+03	3.180E+03	3.436E+03	NOT IDENT.
EU-152	-6.636E+01	2.037E+02	2.059E+02	FAIL ABUN
GD-153	2.805E+02	1.913E+02	2.293E+02	NOT IDENT.
EU-154	5.511E+01	1.082E+02	1.110E+02	FAIL ABUN
EU-155	9.008E+01	2.420E+02	2.454E+02	FAIL ABUN
HO-166M	-2.006E+01	1.006E+02	1.010E+02	NOT IDENT.
TM-171	-6.641E+03	1.219E+05	1.220E+05	NOT IDENT.
LU-176	1.280E+01	5.151E+01	5.184E+01	FAIL ABUN
LU-177	-2.844E+02	5.490E+02	5.637E+02	NOT IDENT.
HF-181	1.637E+01	7.374E+01	7.411E+01	FAIL ABUN
W-181	5.729E+03	1.841E+03	3.172E+03	FAIL ABUN
TA-182	9.949E+00	1.539E+02	1.540E+02	NOT IDENT.
RE-183	4.356E+04	5.203E+03	2.031E+04	FAIL ABUN
RE-184	-4.510E+01	2.262E+02	2.271E+02	NOT IDENT.
RE-188	2.183E+02	2.852E+02	3.017E+02	NOT IDENT.
W-188	9.214E+03	1.154E+04	1.226E+04	NOT IDENT.
OS-191	-1.875E+02	1.998E+02	2.170E+02	NOT IDENT.
IR-192	2.361E+01	5.770E+01	5.867E+01	NOT IDENT.
HG-203	-2.103E+01	5.923E+01	5.999E+01	NOT IDENT.
BI-207	-5.919E+01	1.059E+02	1.092E+02	NOT IDENT.
TL-208	8.565E+00	6.293E+01	6.305E+01	NOT IDENT.
BI-211	3.435E+02	4.074E+02	4.358E+02	NOT IDENT.
PB-211	5.255E+02	1.376E+03	1.396E+03	NOT IDENT.
BI-212	-4.878E+02	8.451E+02	8.733E+02	NOT IDENT.
PB-212	-3.799E+01	1.070E+02	1.083E+02	NOT IDENT.
BI-213	-5.297E+01	2.488E+02	2.500E+02	NOT IDENT.

BI-214	1.270E+02	1.204E+02	1.333E+02	NOT IDENT.
PB-214	1.142E+02	1.391E+02	1.483E+02	FAIL ABUN
RN-219	-4.089E+02	8.046E+02	8.255E+02	NOT IDENT.
FR-221	1.888E+02	4.217E+02	4.302E+02	NOT IDENT.
RA-223	-3.462E+02	1.315E+03	1.324E+03	NOT IDENT.
RA-224	-3.386E+02	1.147E+03	1.157E+03	NOT IDENT.
RA-226	3.812E+02	1.196E+03	1.208E+03	NOT IDENT.
AC-227	-1.989E+02	4.929E+02	5.010E+02	NOT IDENT.
TH-227	-1.989E+02	4.929E+02	5.010E+02	NOT IDENT.
AC-228	-4.647E+01	3.212E+02	3.219E+02	NOT IDENT.
RA-228	-4.647E+01	3.212E+02	3.219E+02	NOT IDENT.
TH-228	-3.799E+01	1.070E+02	1.083E+02	NOT IDENT.
TH-229	-1.958E+02	1.013E+03	1.017E+03	FAIL ABUN
TH-230	-2.821E+04	3.391E+04	3.622E+04	NOT IDENT.
PA-231	-3.334E+02	8.857E+02	8.984E+02	NOT IDENT.
TH-231	4.840E+02	1.257E+03	1.276E+03	NOT IDENT.
TH-232	-1.783E+04	6.528E+04	6.577E+04	NOT IDENT.
PA-233	2.928E+01	1.230E+02	1.237E+02	NOT IDENT.
PA-234	4.790E+02	9.044E+02	9.298E+02	NOT IDENT.
PA-234M	6.319E+03	8.925E+03	9.369E+03	NOT IDENT.
TH-234	-9.019E+02	4.732E+03	4.750E+03	NOT IDENT.
U-234	-2.991E+04	4.376E+05	4.378E+05	FAIL ABUN
U-235	1.671E+02	4.190E+02	4.257E+02	NOT IDENT.
NP-237	2.928E+01	1.230E+02	1.237E+02	NOT IDENT.
NP-238	3.579E+02	6.927E+02	7.112E+02	FAIL ABUN
U-238	-9.019E+02	4.732E+03	4.750E+03	NOT IDENT.
NP-239	-1.582E+02	6.069E+02	6.111E+02	NOT IDENT.
AM-242	-1.592E+03	1.530E+03	1.690E+03	FAIL ABUN
AM-243	-2.546E+01	1.440E+02	1.445E+02	FAIL ABUN
CM-243	-1.647E+02	2.541E+02	2.648E+02	NOT IDENT.
BK-247	9.256E+01	1.569E+02	1.623E+02	NOT IDENT.
CM-247	1.832E+01	7.298E+01	7.345E+01	NOT IDENT.
CF-249	-2.641E+01	7.705E+01	7.797E+01	NOT IDENT.
CF-251	-8.158E+01	2.642E+02	2.667E+02	NOT IDENT.
CF-252	-2.968E+05	4.871E+05	5.051E+05	NOT IDENT.
ANH-511	-4.454E+01	5.634E+01	5.981E+01	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	633.1674	88.03	616.8298	140.88	555.1823
46.54	685.0319	88.34	617.0917	143.76	543.5211
49.72	802.8381	88.47	617.1999	144.24	542.5737
51.35	811.0515	91.11	492.5021	145.44	535.9654
52.39	860.7693	91.27	492.6079	152.32	492.1038
53.20	881.3538	92.59	580.7849	152.43	479.9711
56.28	930.5046	93.31	571.0786	153.25	519.3695
57.36	712.1793	94.56	549.1874	154.21	532.0469
57.53	712.3959	94.65	549.2498	155.04	464.0817
57.53	712.3984	94.67	549.2645	156.02	493.8545
57.98	712.9648	97.43	491.6454	158.56	534.2623
59.32	714.6492	98.43	555.3896	158.97	514.8550
59.54	714.9236	98.44	555.3970	159.00	514.8679
61.49	479.6729	99.53	584.9003	162.33	514.0170
63.00	499.7910	100.11	553.1324	162.66	547.3889
63.29	510.2102	100.20	553.1948	163.33	520.6497
63.58	490.0991	102.03	547.5554	165.86	467.5795
63.81	516.4751	103.18	594.5140	176.31	494.4145
64.28	511.0565	103.37	593.5007	176.60	498.2788
64.99	485.4192	105.31	537.0522	177.52	504.9152
65.08	485.4929	106.12	553.8071	181.07	487.7202
66.73	537.2422	106.47	570.2676	184.41	498.3218
66.98	545.1408	109.28	545.4587	184.58	513.4468
67.24	558.5362	111.00	545.4168	185.72	518.1317
67.67	562.2188	111.76	578.5670	186.21	503.2727
67.75	562.2930	112.95	566.5314	190.27	550.3775
69.67	529.8736	116.24	567.5309	193.51	545.9722
70.83	571.6765	116.30	567.5679	198.01	540.3848
72.81	575.6531	116.74	572.5489	201.83	516.6130
72.87	575.7086	117.23	554.0901	205.31	491.6857
74.66	590.6096	119.76	549.4100	208.37	501.4066
74.82	611.8500	120.54	570.3188	210.85	488.7172
74.97	611.9887	120.90	570.5515	218.12	534.4363
77.11	590.5607	121.12	570.6918	222.11	565.3649
79.69	642.0276	121.22	570.7546	227.09	547.5839
80.12	621.1654	121.78	571.1128	227.38	547.7062
80.19	621.2289	122.06	571.2937	228.16	540.2300
80.57	624.9318	123.07	554.6049	228.18	540.2363
81.00	633.1636	123.68	600.7037	235.69	498.8336
81.07	633.2283	127.23	552.0031	235.96	491.9611
83.79	639.0737	129.43	612.8198	238.63	471.9771
84.00	616.7509	131.20	556.7573	238.98	476.4614
84.21	640.9517	133.02	598.8446	240.99	473.6545
85.43	676.6342	133.52	564.1083	242.00	420.6499
86.55	615.5699	136.00	551.1984	244.70	474.0299
86.94	615.9026	136.28	551.3599	250.62	443.4507
87.09	616.0314	136.47	551.4651	252.40	476.5999
87.57	616.4390	140.51	554.9713	252.80	470.5636

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
256.23	438.9980	383.85	303.9950	631.29	185.5886
260.90	428.8765	388.16	293.2152	632.98	172.9686
264.66	405.9836	388.63	323.8611	633.25	175.1111
265.00	390.9709	391.70	274.6154	634.78	156.0918
268.22	395.3743	400.66	316.2421	635.95	180.5904
269.46	395.6995	401.81	306.8052	636.99	165.7817
271.23	413.5685	402.40	282.8446	645.85	166.3149
273.65	374.4591	404.85	271.6327	657.76	158.9897
276.40	369.3130	410.95	276.3293	661.66	175.8315
277.37	377.6109	414.70	315.9477	664.57	144.8877
277.60	390.2959	423.72	280.0078	666.33	107.9263
278.00	395.7797	427.09	311.6276	666.50	107.9304
278.43	398.9355	427.87	300.0544	667.71	0.0000
279.20	388.3715	433.94	322.4268	677.62	130.4531
279.54	399.2253	440.45	311.6661	685.70	105.9513
280.46	371.6331	453.88	312.6402	695.00	126.8928
283.69	383.2024	459.60	318.4100	696.49	113.9380
284.31	382.4585	463.37	333.8187	696.51	113.9380
285.41	354.8100	468.07	337.5098	697.00	106.3581
285.90	321.5920	473.00	314.3799	697.49	116.1474
287.50	371.5142	475.06	289.7804	702.65	108.7362
290.67	314.4333	476.78	293.9857	706.68	124.1309
293.27	355.6765	477.60	276.1490	711.68	133.0652
295.22	342.5164	477.99	289.1622	720.70	145.4958
295.96	339.9506	482.18	256.7333	721.93	144.4609
299.98	357.1637	487.02	234.2571	722.78	137.9355
300.09	359.0054	492.35	217.7461	722.91	131.3721
300.13	359.0135	497.08	247.3563	723.31	132.4816
301.36	361.1059	511.00	241.7570	724.19	139.0923
302.85	343.2286	514.00	209.6532	727.33	142.5260
304.50	350.8644	520.40	214.2797	733.00	148.2825
304.85	361.8732	520.69	201.1018	735.93	145.1270
306.78	350.4375	522.65	0.0000	739.50	116.6750
308.46	368.1540	527.90	202.7329	744.23	119.0610
311.90	330.4687	529.59	192.6760	747.24	139.0378
316.51	309.3486	529.87	211.0514	752.31	133.7371
319.41	310.8029	531.02	214.2126	753.82	144.8591
320.08	312.7665	537.26	197.3742	756.73	139.4634
321.04	314.7872	546.56	197.1016	763.94	104.2813
323.87	322.2238	552.55	171.8518	765.80	130.9831
325.23	315.5596	563.25	186.0205	766.42	125.4605
328.76	316.2067	569.33	150.2097	766.84	128.8055
333.37	303.1429	569.50	150.2216	772.60	0.0000
334.37	294.9678	569.70	154.3777	776.52	173.7480
338.28	319.7985	583.19	168.7302	777.92	164.9102
338.32	321.6649	595.83	186.2930	778.90	137.0988
340.48	305.3045	600.60	176.1484	783.70	138.4202
340.55	305.3179	602.73	175.2426	785.37	137.3740
344.28	316.2193	604.72	181.6725	792.07	157.8046
345.93	312.3143	609.32	148.3265	795.86	162.4701
351.06	264.0480	610.33	175.7387	801.95	158.2865
351.93	263.0500	614.28	158.0811	802.10	151.5564
356.01	284.4879	618.01	166.7435	810.29	142.9318
364.49	298.0630	621.93	147.9639	810.45	147.4390
366.42	306.8695	630.19	0.0000	810.76	141.8269

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
815.77	149.9335	1129.67	120.3978		
818.51	176.0078	1131.51	117.6953		
832.01	134.8047	1173.23	90.0554		
834.85	149.6548	1189.05	62.4281		
836.80	174.6975	1204.77	38.3399		
846.77	164.9717	1221.41	32.8510		
856.80	179.1548	1231.02	33.8621		
860.56	153.0728	1235.36	35.7758		
871.09	163.8542	1238.28	18.8416		
873.19	190.3232	1260.41	28.3997		
875.33	159.4631	1274.44	22.7886		
880.51	170.0410	1274.54	22.7886		
881.60	170.0892	1291.59	24.7781		
883.24	171.3233	1298.22	20.9956		
884.68	173.6906	1312.11	20.1002		
889.28	178.5250	1332.49	23.0698		
894.76	214.5630	1365.19	8.7094		
898.04	178.9665	1368.63	12.5890		
903.28	201.2017	1384.29	1.5544		
911.20	200.4888	1408.01	12.6898		
923.98	231.4298	1434.09	5.8868		
926.36	215.2914	1457.56	9.8566		
935.54	219.6250	1460.82	3.9451		
937.49	252.1318	1489.16	8.9247		
944.13	252.5889	1596.21	6.4738		
946.00	217.6130	1620.50	7.1115		
949.00	229.2113	1678.03	4.1050		
954.55	0.0000	1690.97	3.0857		
964.08	216.9091	1764.49	5.2072		
968.97	160.6885	1770.23	4.1699		
983.53	170.1680	1771.35	5.2133		
984.45	167.5495	1791.20	3.1382		
996.26	168.9578	1808.65	5.2454		
1001.03	145.1271	1836.06	6.3226		
1004.73	152.3908				
1025.87	144.2554				
1028.54	159.2373				
1037.84	142.0013				
1038.76	142.0303				
1046.59	151.3169				
1048.07	165.7954				
1050.41	152.9029				
1063.66	168.2446				
1077.00	143.3900				
1077.34	145.2148				
1083.85	141.8130				
1085.87	139.1512				
1099.25	161.4974				
1111.64	147.8900				
1112.07	140.5781				
1112.84	140.6063				
1115.54	132.8223				
1120.29	126.1865				
1120.55	126.1949				
1121.30	123.2766				

Continuing Calibration Data

★ = Locked Out

Review of Gamma Spectrometer QA results (Daily calibration & background checks)
 20-DEC-2016 11:53:47.08

Run Date	Detector	Parameter	Flag

20-DEC-2016	GAM01	All Parameters Passed	
		Weekly Background check completed on 20-DEC-2016.	
		No daily Bkg Check necessary.	
20-DEC-2016	GAM02	All Parameters Passed	
1-DEC-2016	GAM03	Cal Check may not have run since 20-DEC-2016	★
29-NOV-2016	GAM03	Bkg Check may not have run since 20-DEC-2016	★
7-DEC-2016	GAM04	Cal Check may not have run since 20-DEC-2016	★
11-DEC-2016	GAM04	Bkg Check may not have run since 20-DEC-2016	★
20-DEC-2016	GAM05	Cal Check NLACTVTY-59	Investigate OK
20-DEC-2016	GAM05	Cal Check PSFWHM-59	Investigate OK
20-DEC-2016	GAM06	Cal Check NLACTVTY-662	Investigate OK
20-DEC-2016	GAM07	All Parameters Passed	
20-DEC-2016	GAM08	All Parameters Passed	
20-DEC-2016	GAM09	Cal Check PSFWHM-662	Investigate OK
20-DEC-2016	GAM10	All Parameters Passed	
20-DEC-2016	GAM11	All Parameters Passed	
20-DEC-2016	GAM12	Cal Check NLACTVTY-1332	Investigate OK
-----	GAM13	Cal Check may not have run since 20-DEC-2016	★
29-OCT-2016	GAM13	Bkg Check may not have run since 20-DEC-2016	★
20-DEC-2016	GAM14	All Parameters Passed	
		Weekly Background check completed on 20-DEC-2016.	
		No daily Bkg Check necessary.	
20-DEC-2016	GAM16	All Parameters Passed	
14-DEC-2016	GAM17	Cal Check may not have run since 20-DEC-2016	★
14-DEC-2016	GAM17	Bkg Check may not have run since 20-DEC-2016	★
20-DEC-2016	GAM18	Cal Check NLACTVTY-662	Investigate OK
20-DEC-2016	GAM19	All Parameters Passed	
20-DEC-2016	GAM20	Cal Check PSFWHM-662	Investigate OK
8-JUL-2016	GAM22	Cal Check may not have run since 20-DEC-2016	★
9-OCT-2016	GAM22	Bkg Check may not have run since 20-DEC-2016	★

20-DEC-2016	GAM24	Cal Check	PSFWHM-59	Investigate <i>OK</i>
20-DEC-2016	GAM24	Cal Check	NLACTVTY-662	Investigate <i>OK</i>
20-DEC-2016	GAM25	Cal Check	PSFWHM-1332	Investigate <i>OK</i>
20-DEC-2016	GAM26	All Parameters Passed		
20-DEC-2016	GAM27	All Parameters Passed		
20-DEC-2016	GAM28	Cal Check	NLACTVTY-59	Investigate <i>OK</i>
20-DEC-2016	GAM28	Bkg Check	BACKRATE	Action <i>Bounds</i> <i>need adjusted</i> <i>OK</i>
20-DEC-2016	GAM29	All Parameters Passed		
20-DEC-2016	GAM30	All Parameters Passed		
20-DEC-2016	GAM31	All Parameters Passed		
20-DEC-2016	GAM32	Cal Check	PSFWHM-662	Investigate <i>OK</i>
20-DEC-2016	GAM33	Cal Check	NLACTVTY-662	Investigate <i>OK</i>
20-DEC-2016	GAM33	Bkg Check	BACKRATE	Investigate <i>OK</i>
20-DEC-2016	GAM36	All Parameters Passed		
20-DEC-2016	GAM39	Cal Check	PSFWHM-59	Investigate <i>OK</i>
20-DEC-2016	GAM39	Cal Check	NLACTVTY-1332	Investigate <i>OK</i>
20-DEC-2016	GAM40	All Parameters Passed		
20-DEC-2016	GAM41	All Parameters Passed		
20-DEC-2016	GAM43	Cal Check	NLACTVTY-59	Investigate <i>OK</i>
20-DEC-2016	GAM43	Bkg Check	BACKRATE	Investigate <i>OK</i>
20-DEC-2016	GAM44	All Parameters Passed		
Weekly Background check completed on 20-DEC-2016.				
No daily Bkg Check necessary.				
20-DEC-2016	WELL	All Parameters Passed		
20-DEC-2016	XRAY1	Bkg Check	BACKRATE	Investigate <i>OK</i>
20-DEC-2016	XRAY2	All Parameters Passed		
20-DEC-2016	XRAY3	Cal Check	PSFWHM-109	Investigate <i>OK</i>
20-DEC-2016	XRAY3	Cal Check	PSFWHM-210	Investigate <i>OK</i>
20-DEC-2016	XRAY4	All Parameters Passed		
20-DEC-2016	XRAY5	Cal Check	NLACTVTY-59	Investigate <i>OK</i>
20-DEC-2016	XRAY6	All Parameters Passed		

APPROVAL DATE: 12/20/16

APPROVAL TIME: 12:19

APPROVED BY: *RF*

PROCEDURE # GL-RAD-I-001

** = looked out*

Review of Gamma Spectrometer QA results (Daily calibration & background checks)
21-DEC-2016 09:11:18.00

Run Date	Detector	Parameter	Flag
21-DEC-2016	GAM01	All Parameters Passed	
21-DEC-2016	GAM02	Bkg Check BACKRATE	Investigate <i>OK</i>
1-DEC-2016	GAM03	Cal Check may not have run since 21-DEC-2016	<i>*</i>
29-NOV-2016	GAM03	Bkg Check may not have run since 21-DEC-2016	
-----	GAM04	Cal Check may not have run since 21-DEC-2016	<i>*</i>
11-DEC-2016	GAM04	Bkg Check may not have run since 21-DEC-2016	
21-DEC-2016	GAM05	All Parameters Passed	
21-DEC-2016	GAM06	Cal Check NLACTVTY-59	Investigate <i>OK</i>
21-DEC-2016	GAM07	All Parameters Passed	
21-DEC-2016	GAM08	All Parameters Passed	
21-DEC-2016	GAM09	All Parameters Passed	
21-DEC-2016	GAM10	All Parameters Passed	
21-DEC-2016	GAM11	All Parameters Passed	
21-DEC-2016	GAM12	All Parameters Passed	
-----	GAM13	Cal Check may not have run since 21-DEC-2016	<i>*</i>
29-OCT-2016	GAM13	Bkg Check may not have run since 21-DEC-2016	
21-DEC-2016	GAM14	All Parameters Passed	
21-DEC-2016	GAM16	Cal Check NLACTVTY-59	Investigate <i>OK</i>
14-DEC-2016	GAM17	Cal Check may not have run since 21-DEC-2016	
14-DEC-2016	GAM17	Bkg Check may not have run since 21-DEC-2016	<i>*</i>
21-DEC-2016	GAM18	All Parameters Passed	
21-DEC-2016	GAM19	Cal Check PSFWHM-59	Investigate <i>OK</i>
21-DEC-2016	GAM20	All Parameters Passed	
-----	GAM22	Cal Check may not have run since 21-DEC-2016	<i>*</i>
21-DEC-2016	GAM24	All Parameters Passed	
21-DEC-2016	GAM25	Cal Check PSFWHM-59	Investigate <i>OK</i>
21-DEC-2016	GAM25	Cal Check PSFWHM-662	Investigate <i>OK</i>
21-DEC-2016	GAM25	Cal Check NLACTVTY-59	Investigate <i>OK</i>

21-DEC-2016	GAM26	Cal Check	NLACTVTY-662	Investigate <i>OK</i>
21-DEC-2016	GAM27	Cal Check	PSFWHM-59	Investigate <i>OK</i>
21-DEC-2016	GAM27	Cal Check	NLACTVTY-59	Investigate <i>OK</i>
21-DEC-2016	GAM27	Bkg Check	BACKRATE	Investigate <i>OK</i>
21-DEC-2016	GAM28	Bkg Check	BACKRATE	Action Bounds <i>nee</i>
21-DEC-2016	GAM29	All Parameters Passed		Set, <i>OK</i>
21-DEC-2016	GAM30	All Parameters Passed		
21-DEC-2016	GAM31	All Parameters Passed		
21-DEC-2016	GAM32	All Parameters Passed		
21-DEC-2016	GAM33	All Parameters Passed		
21-DEC-2016	GAM36	Cal Check	PSFWHM-662	Investigate <i>OK</i>
21-DEC-2016	GAM39	All Parameters Passed		
21-DEC-2016	GAM40	All Parameters Passed		
21-DEC-2016	GAM41	All Parameters Passed		
21-DEC-2016	GAM43	Cal Check	NLACTVTY-1332	Investigate <i>OK</i>
21-DEC-2016	GAM44	All Parameters Passed		
21-DEC-2016	WELL	All Parameters Passed		
21-DEC-2016	XRAY1	Cal Check	NLACTVTY-46	Investigate <i>OK</i>
21-DEC-2016	XRAY2	All Parameters Passed		
21-DEC-2016	XRAY3	Cal Check	PSFWHM-210	Investigate <i>OK</i>
21-DEC-2016	XRAY4	All Parameters Passed		
21-DEC-2016	XRAY5	All Parameters Passed		
21-DEC-2016	XRAY6	Cal Check	NLACTVTY-59	Investigate <i>OK</i>
21-DEC-2016	XRAY6	Cal Check	NLACTVTY-210	Investigate <i>OK</i>

APPROVAL DATE: 12/20/16

APPROVAL TIME: 9:25

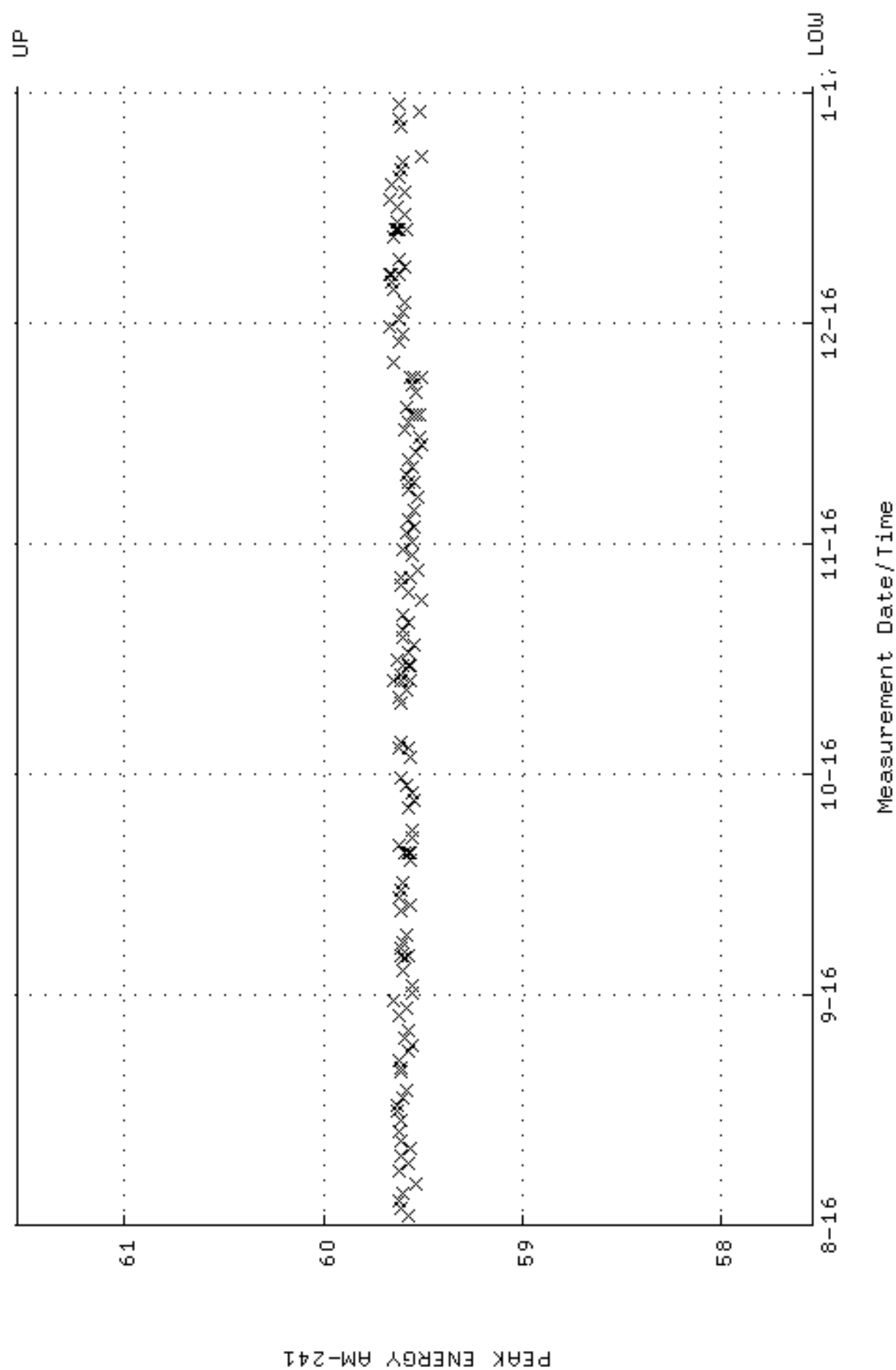
APPROVED BY: *RF*

PROCEDURE # GL-RAD-I-001

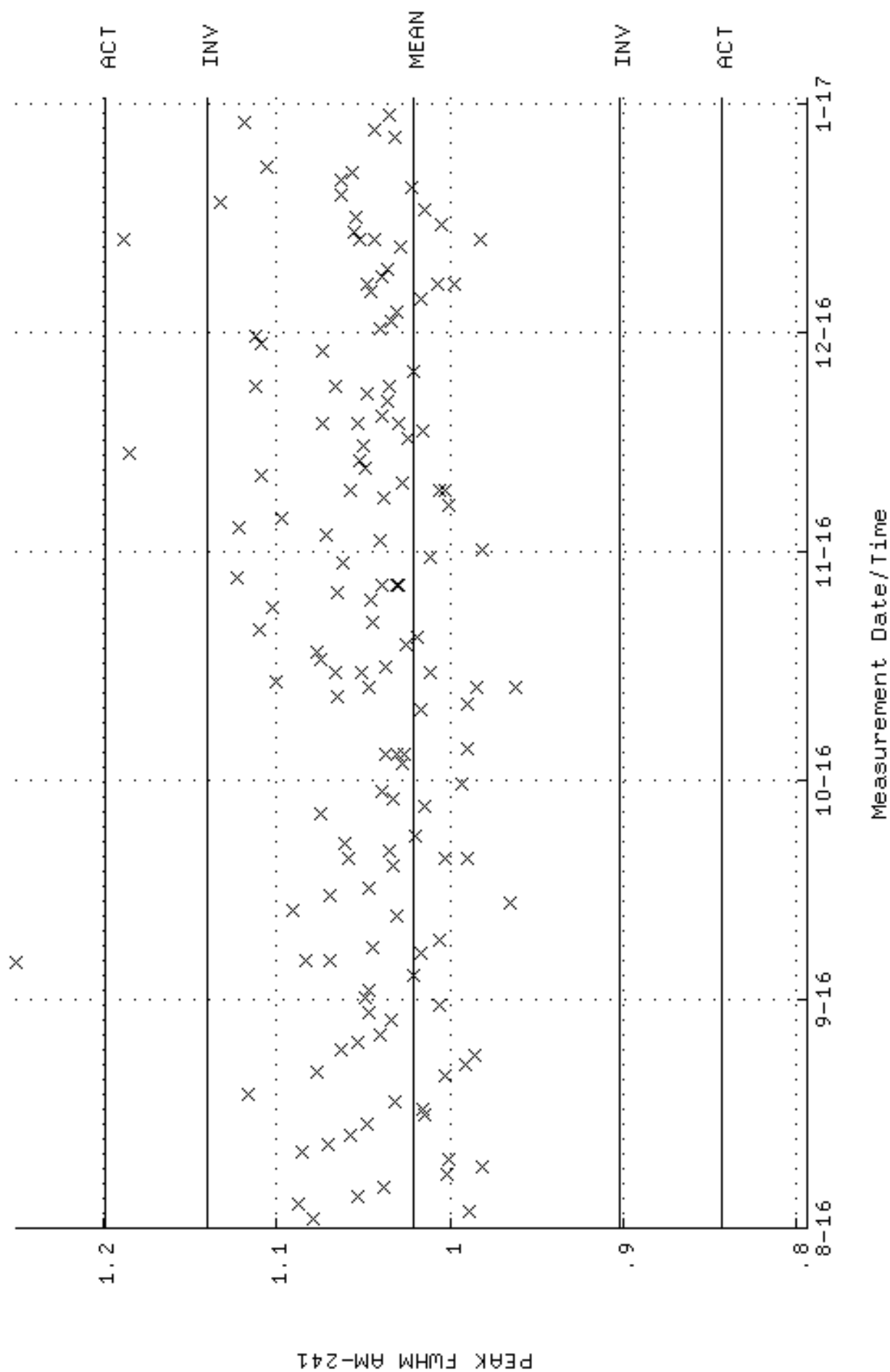
Report completed at 21-DEC-2016 09:15:42.56

Background and Efficiency Data

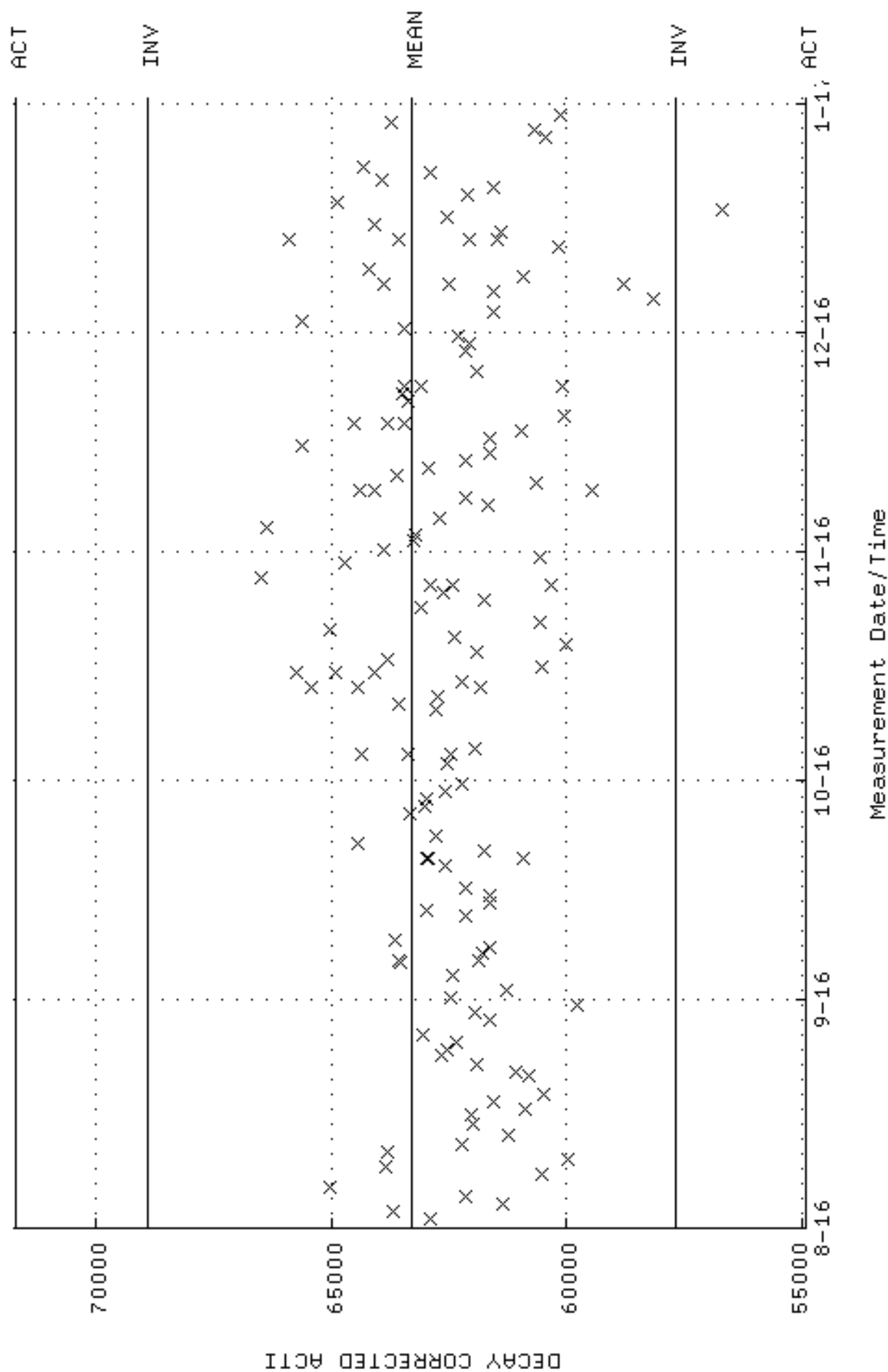
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM01_500MLMB.QAF;1
Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
Start/End Dates : 2-AUG-2016 07:36:32 through 1-JAN-2017 12:00:00
Lower/Upper Lmts: 57.5400 through 61.5400



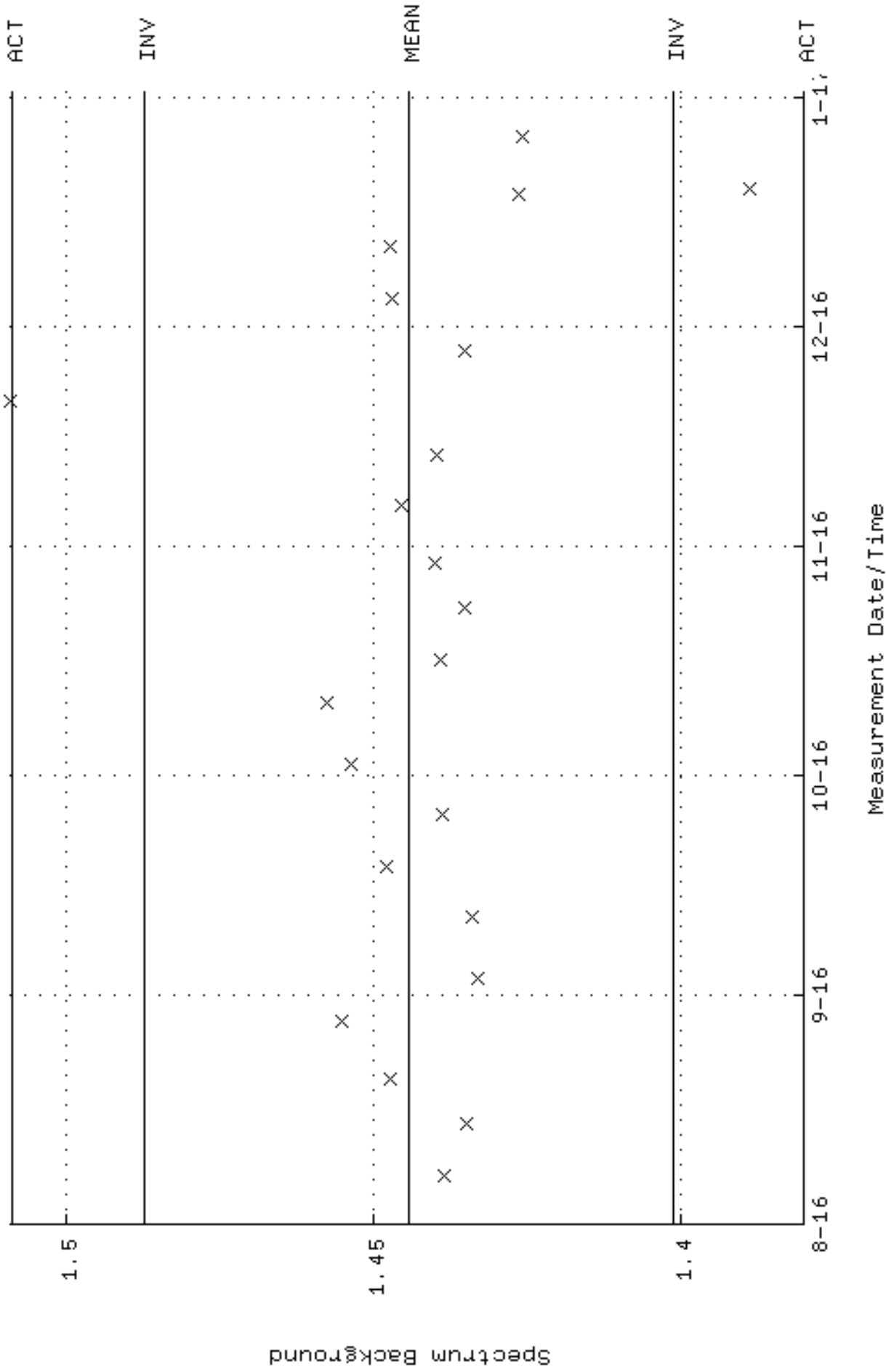
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM01_500MLMB.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 07:36:32 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.02147 +- 5.951646E-02 (5.83 %)



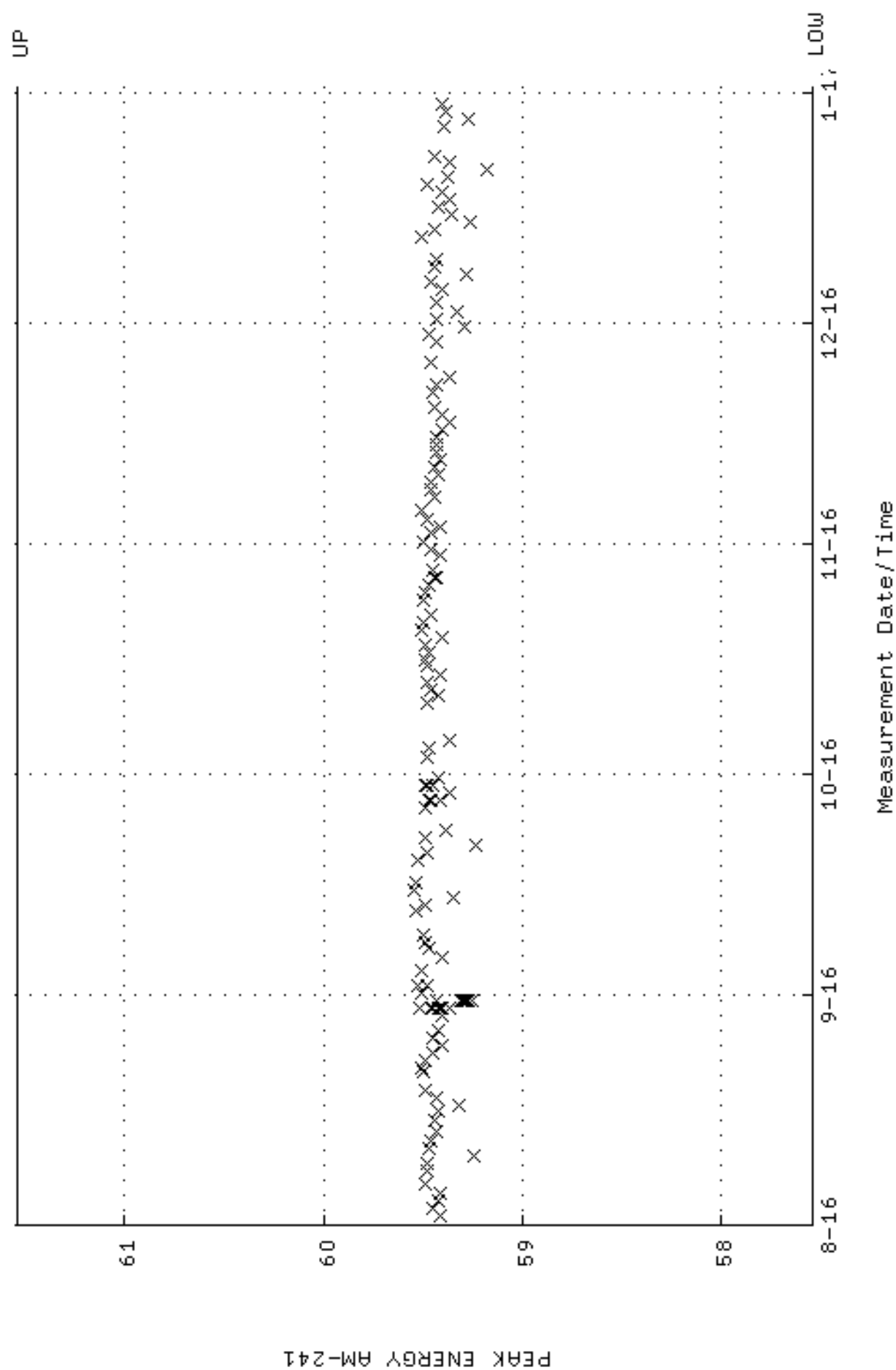
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM01_500MLMB.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:36:32 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 63306.3 +- 2800.78 (4.42 %)



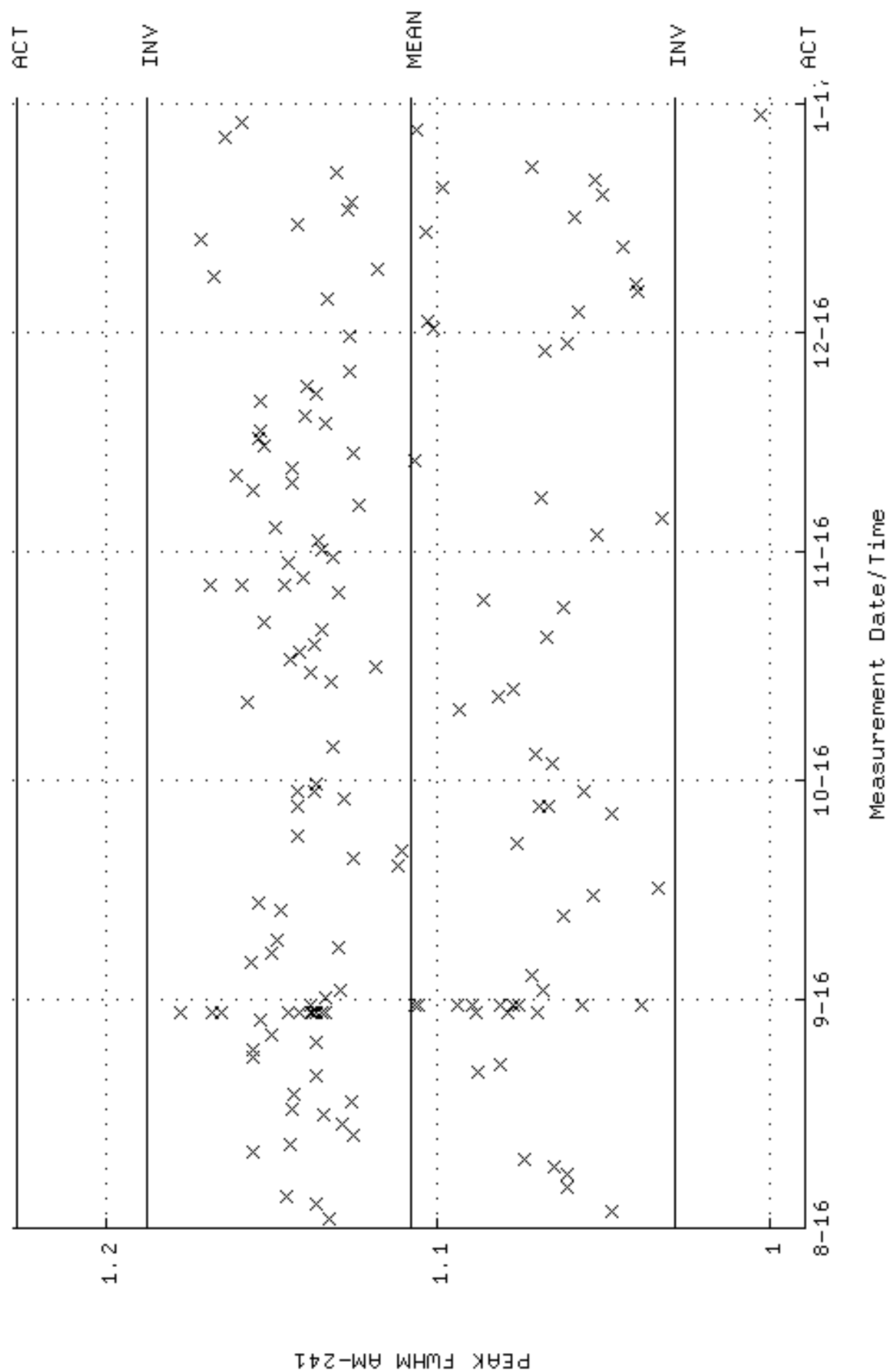
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Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 7-AUG-2016 16:00:31 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.44447 +- 2.145394E-02 (1.49 %)



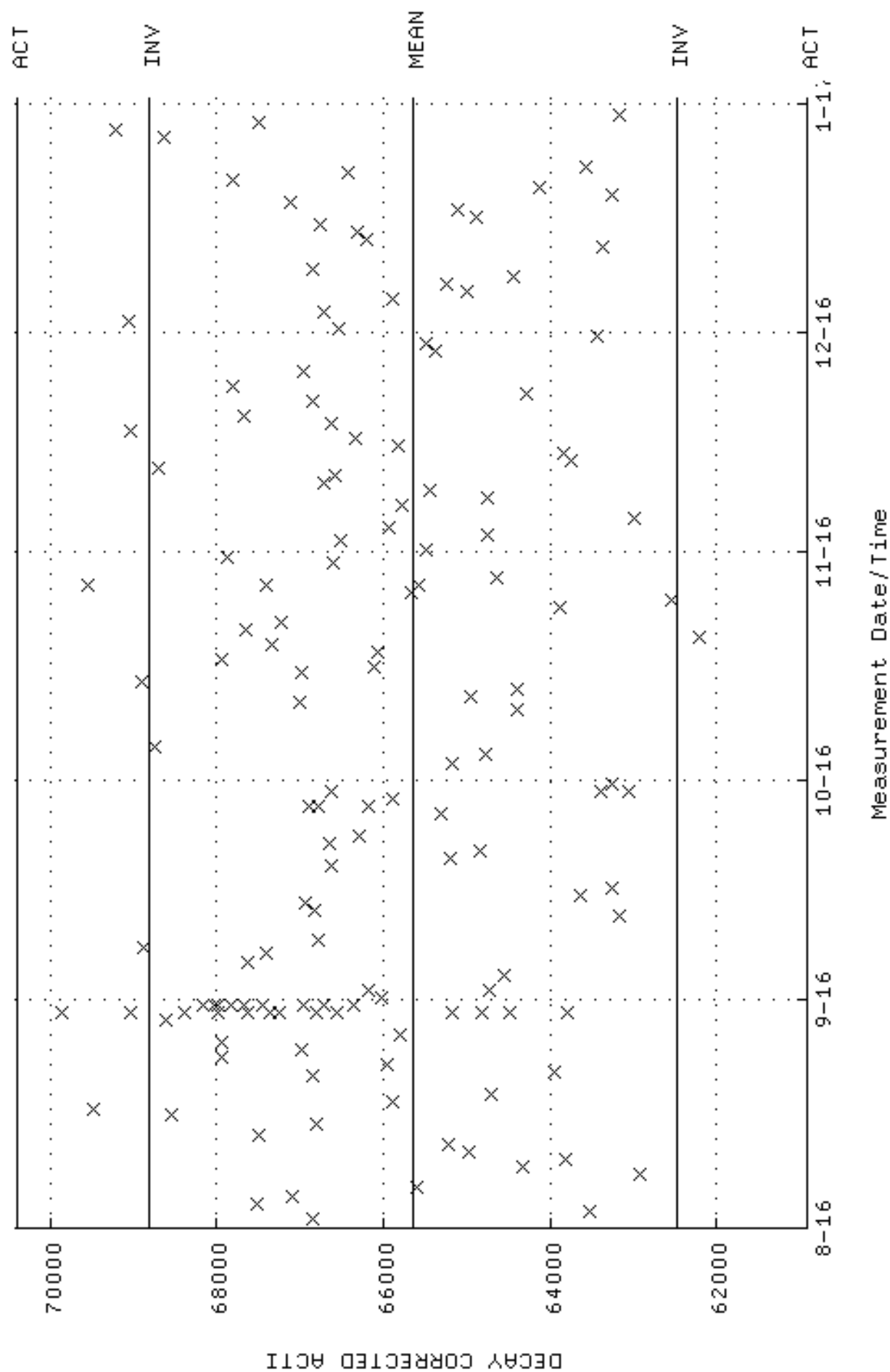
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 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 07:46:10 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



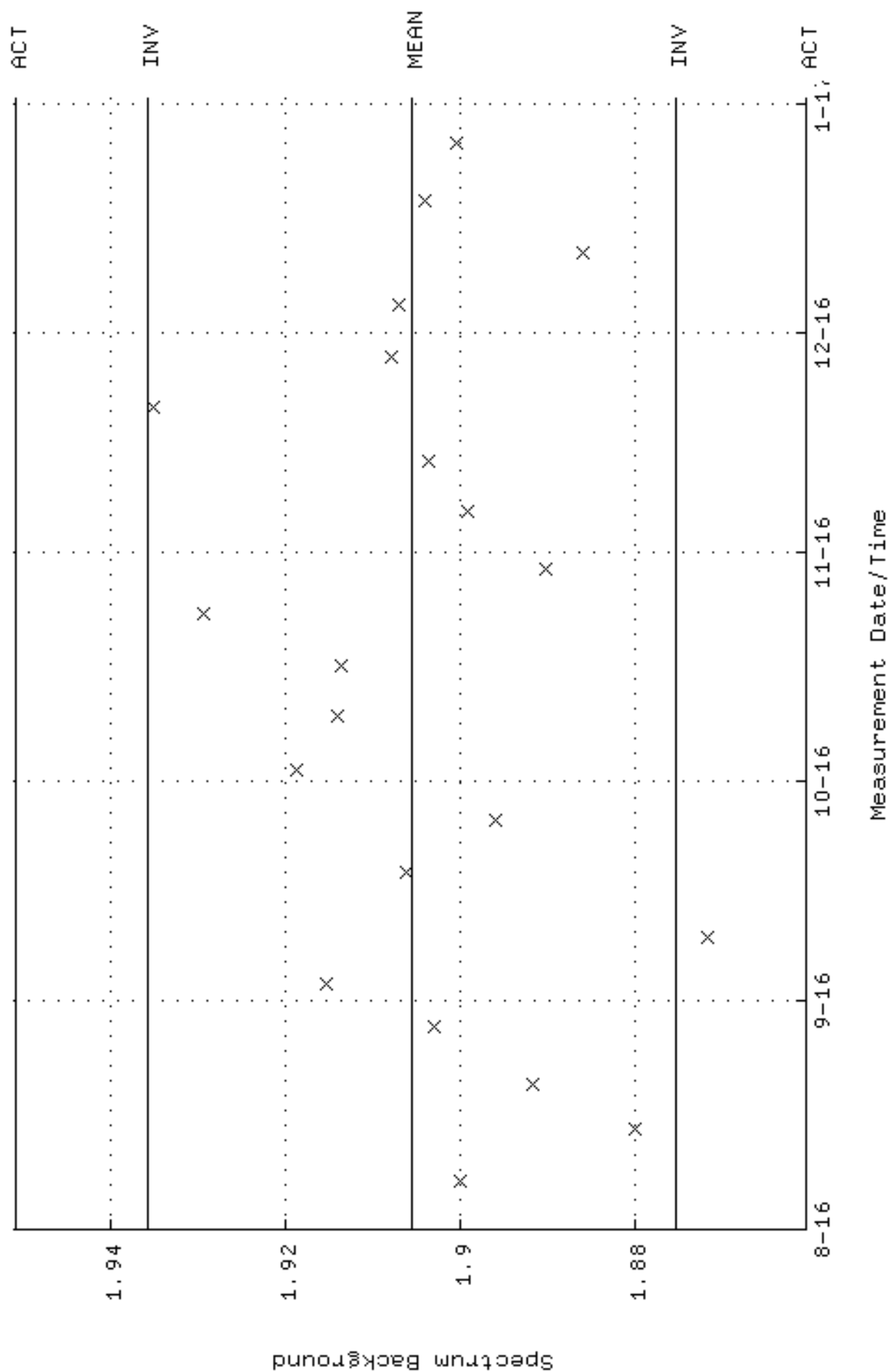
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM02_CAN.QAF;1
 Parameter Name : PSFUHM-59 (PEAK FUHM AM-241)
 Start/End Dates : 2-AUG-2016 07:46:10 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.10827 +- 3.966528E-02 (3.58 %)



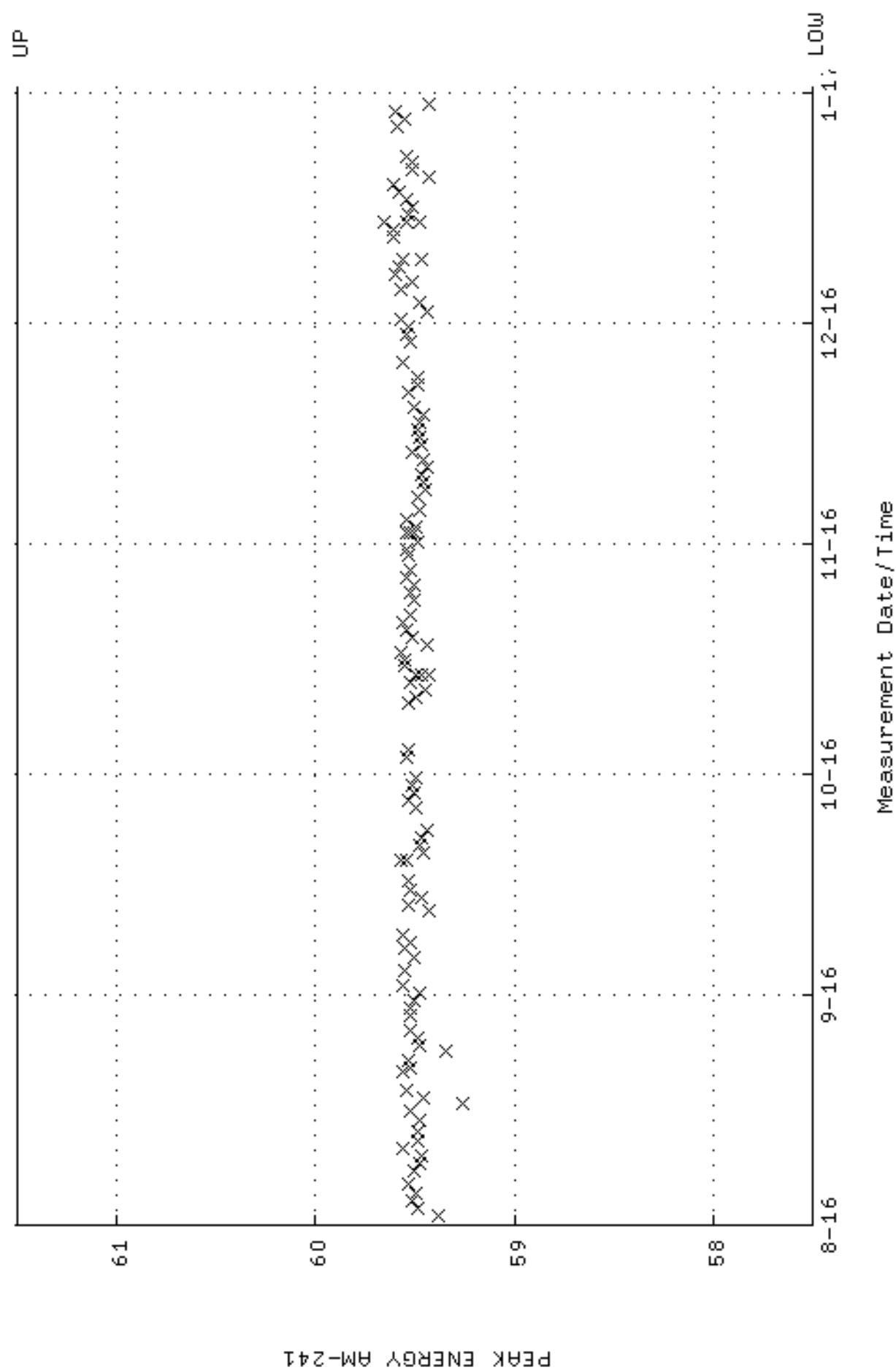
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM02_CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:46:10 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 65652.8 +- 1581.92 (2.41 %)



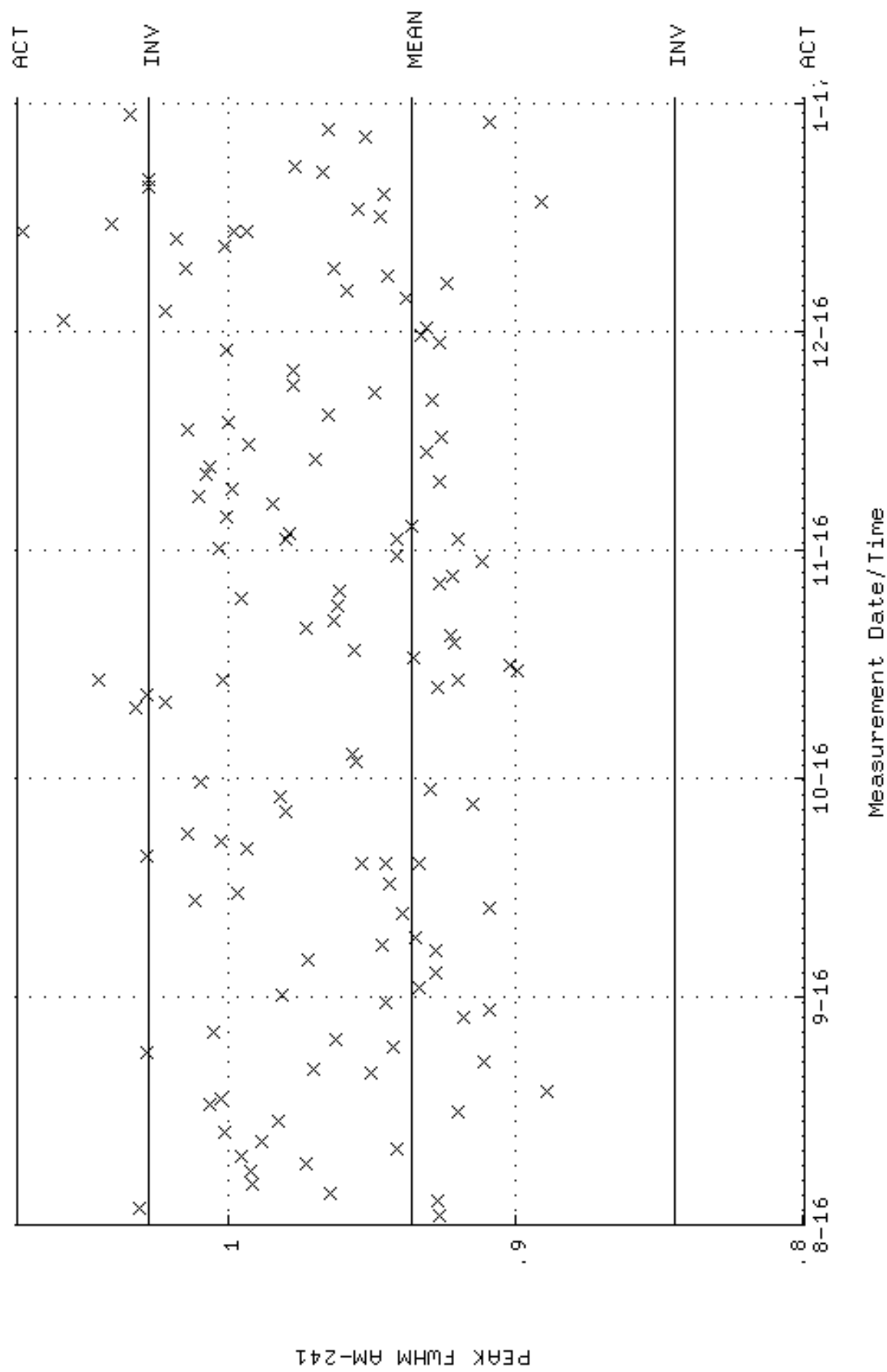
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 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 7-AUG-2016 16:00:38 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.90568 +- 1.505658E-02 (0.79 %)



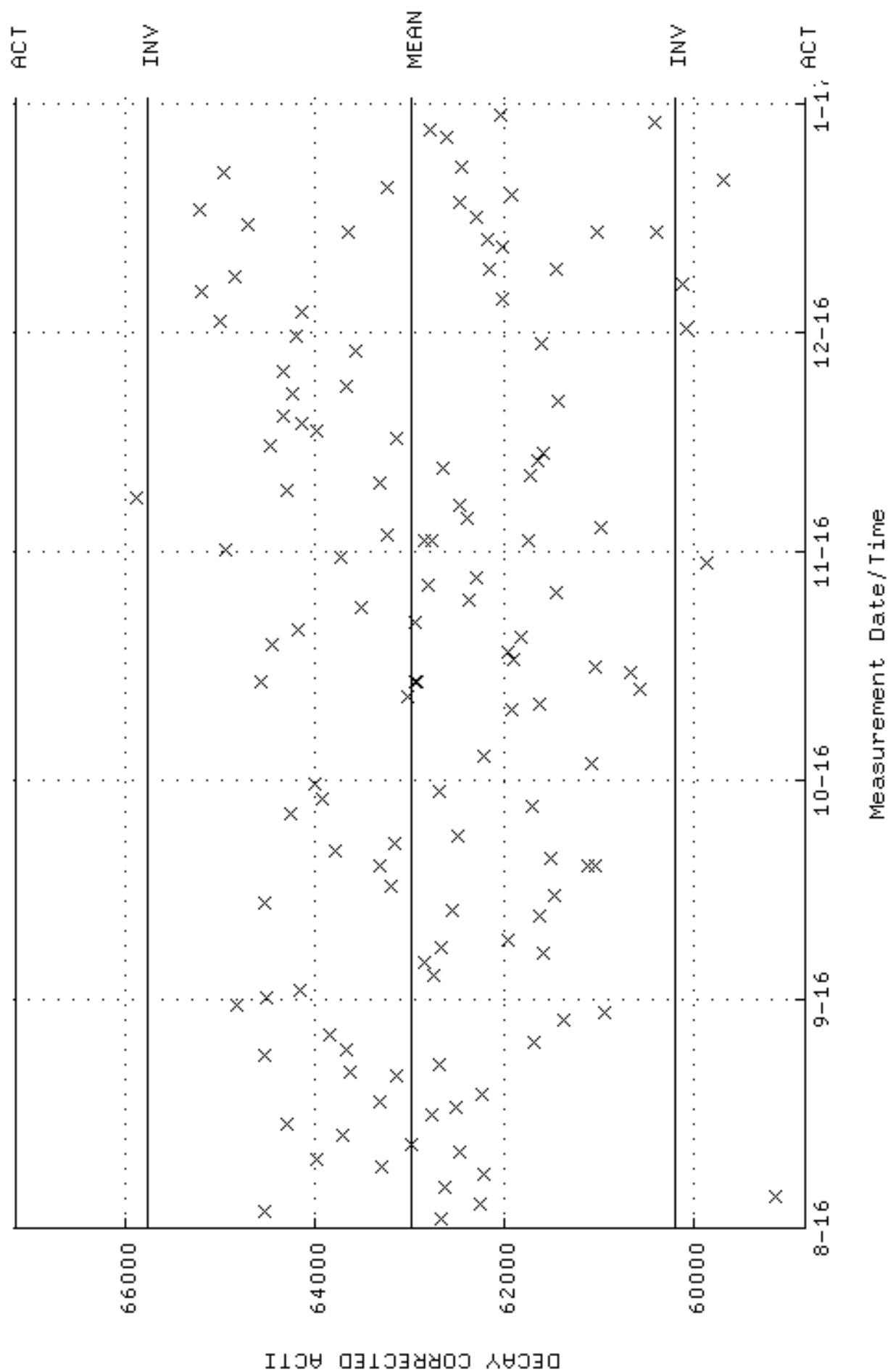
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM06_500MLMB.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 08:03:53 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5000 through 61.5000



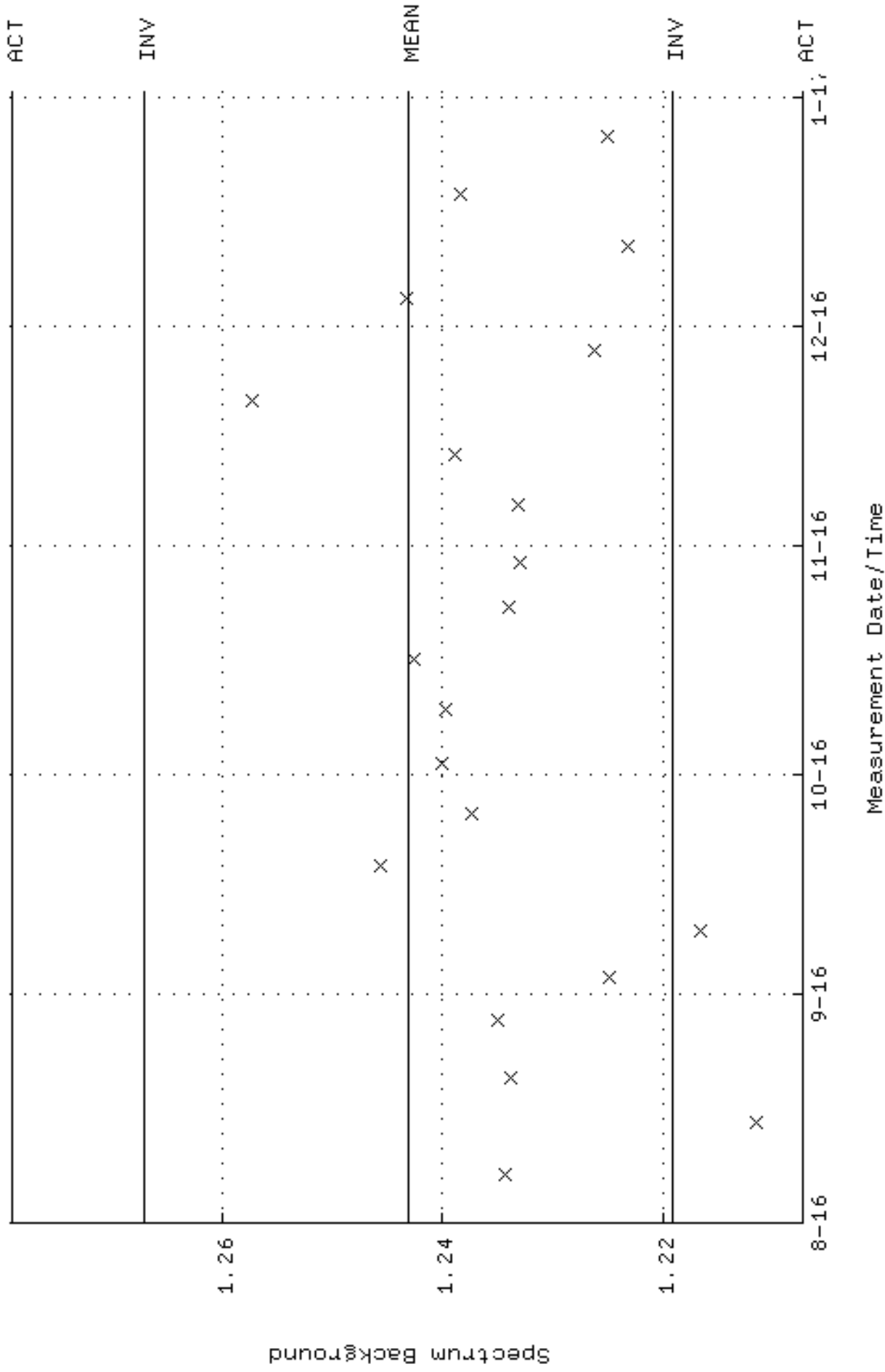
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 Parameter Name : PSFUHM-59 (PEAK FUHM AM-241)
 Start/End Dates : 2-AUG-2016 08:03:53 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 0.936438 +- 4.566342E-02 (4.88 %)



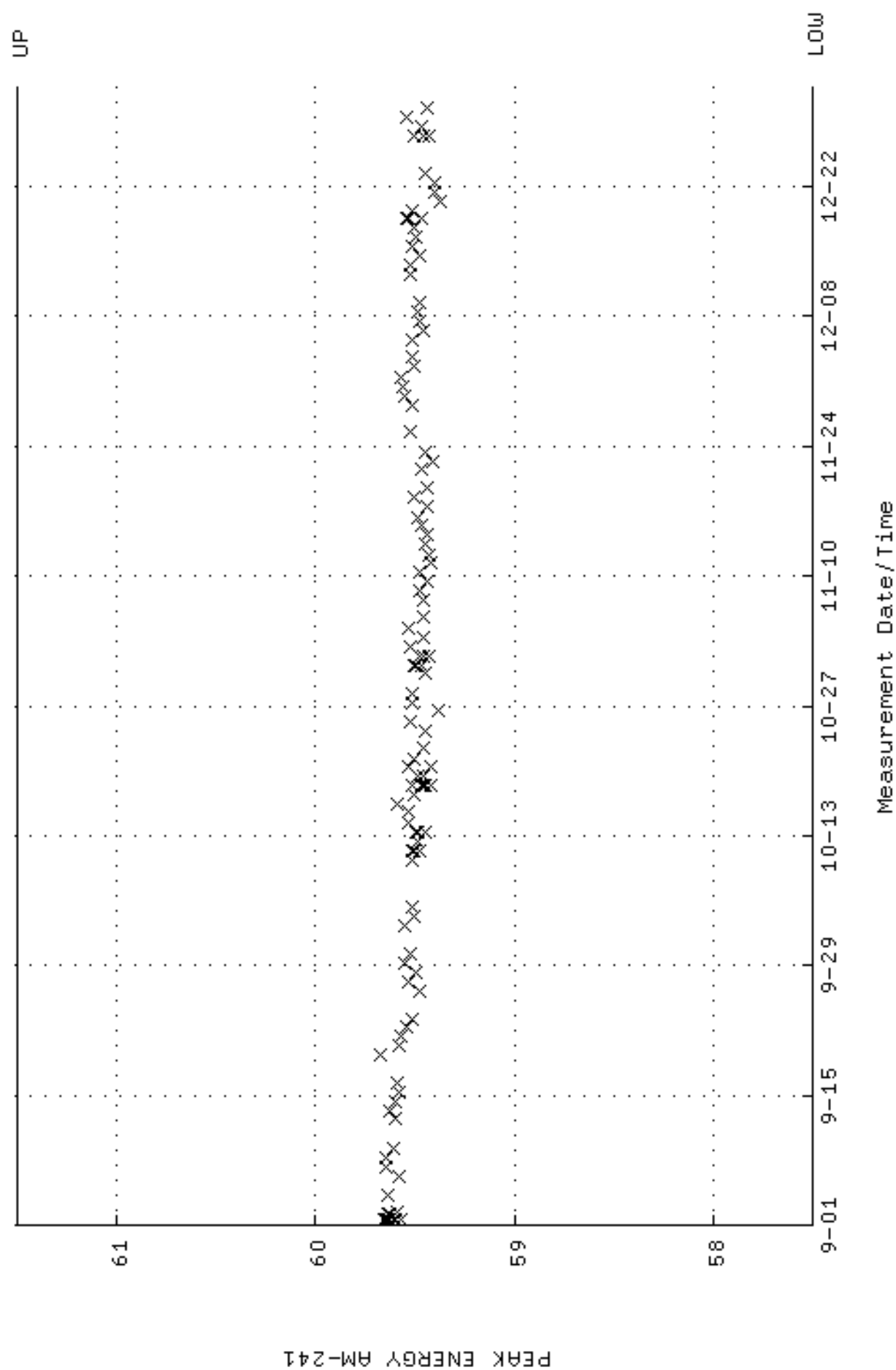
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM06_500MLMB.QAF;1
 Parameter Name : NLACTVY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 08:03:53 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 62995.7 +- 1389.67 (2.21 %)



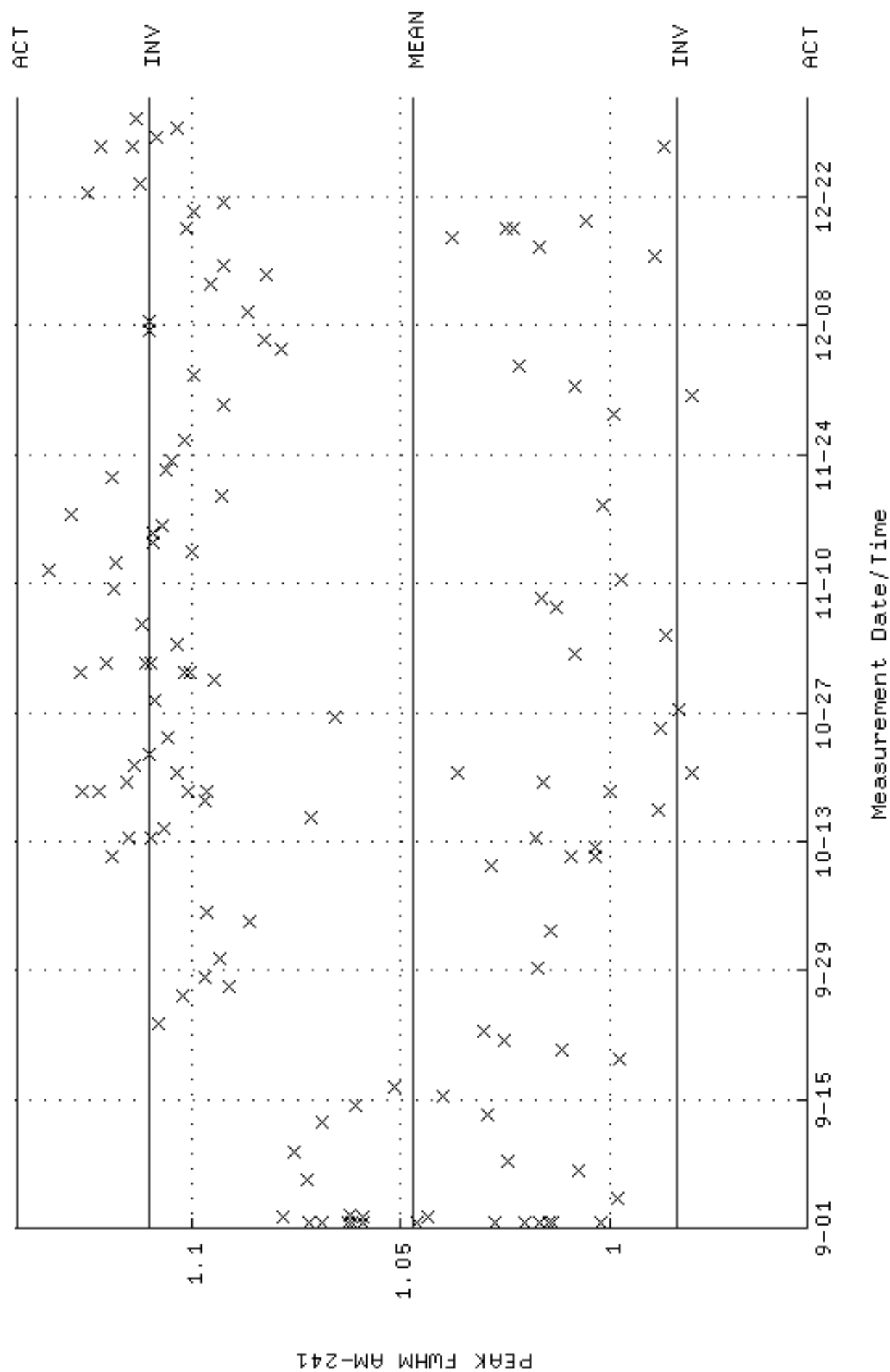
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM06.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 7-AUG-2016 16:00:49 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.24317 +- 1.196123E-02 (0.96 %)



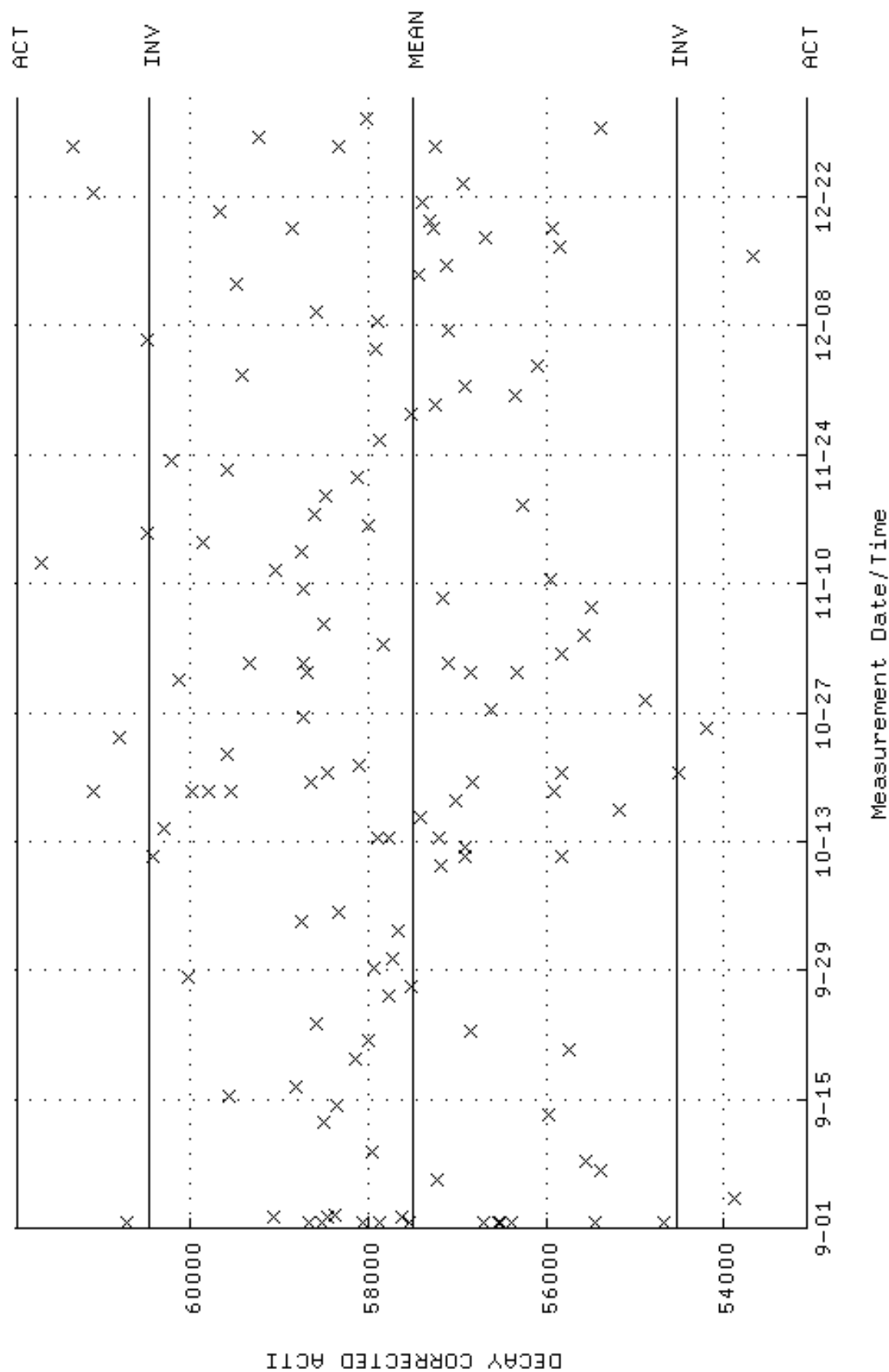
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM07_JAR.QAF;1
Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
Start/End Dates : 1-SEP-2016 13:47:02 through 1-JAN-2017 12:00:00
Lower/Upper Lmts: 57.5000 through 61.5000



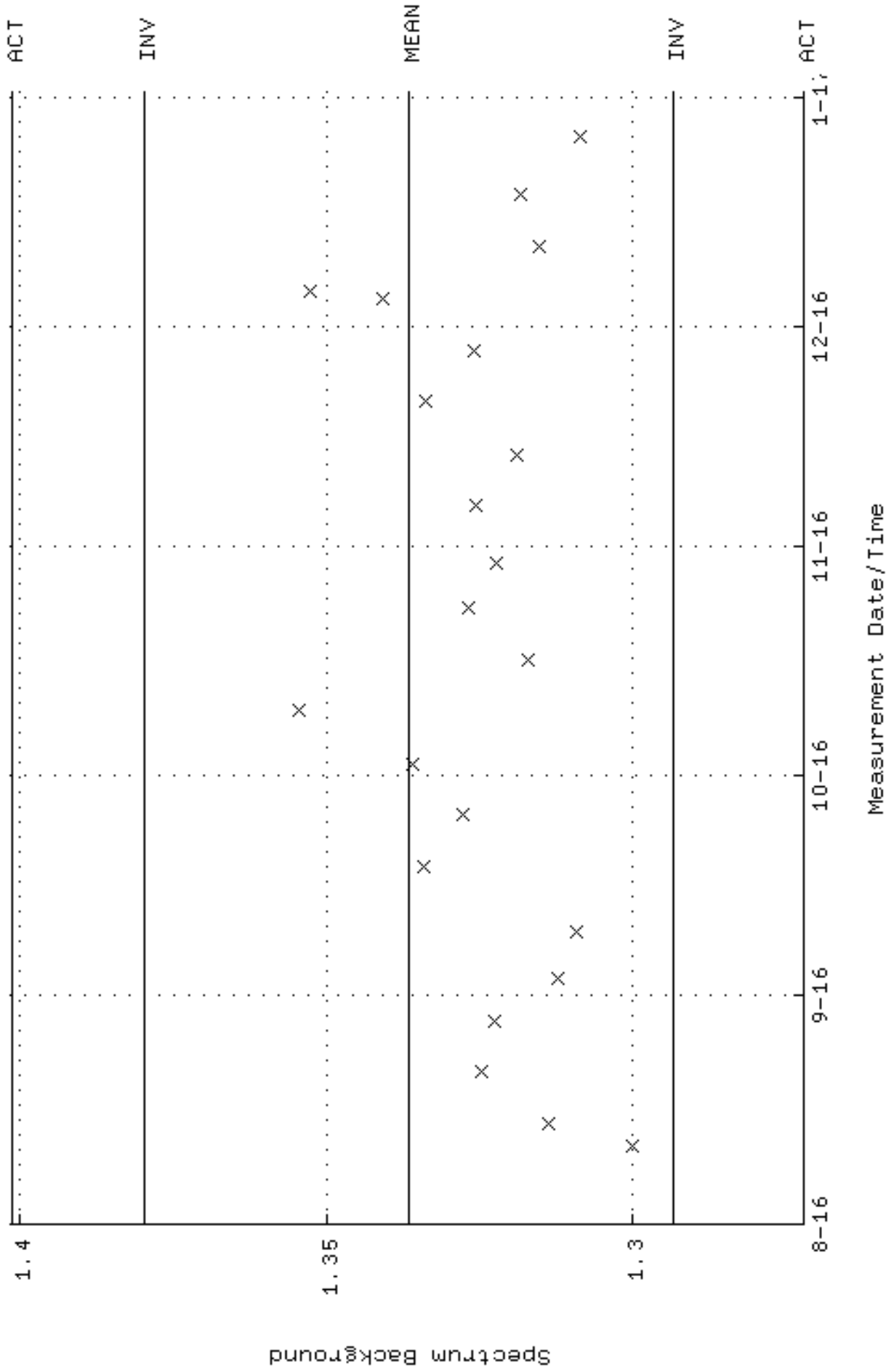
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 Parameter Name : PSFUHM-59 (PEAK FUHM AM-241)
 Start/End Dates : 1-SEP-2016 13:47:02 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.04732 +- 3.153323E-02 (3.01 %)



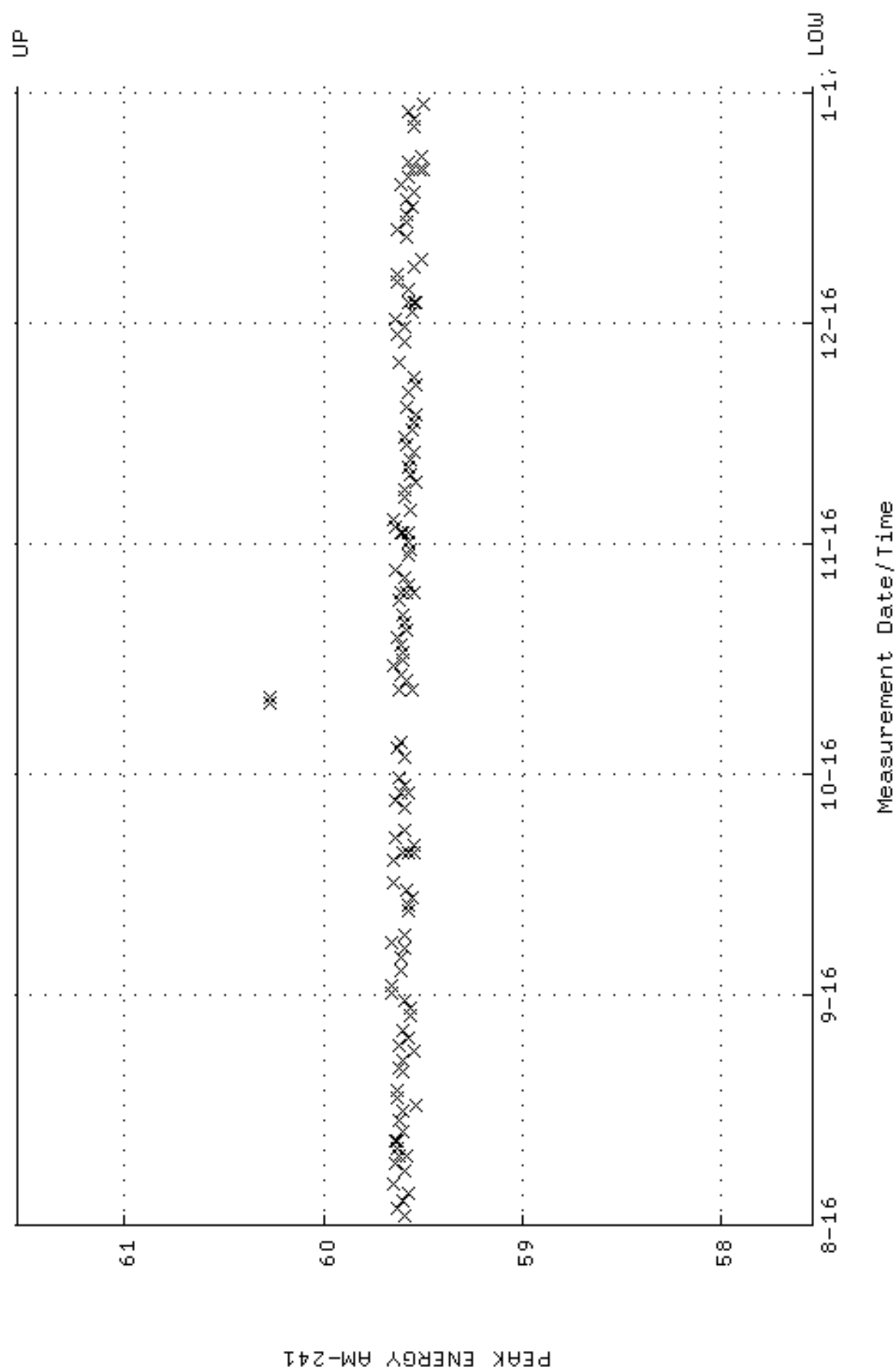
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM07_JAR.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 1-SEP-2016 13:47:02 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 57506.9 +- 1481.18 (2.58 %)



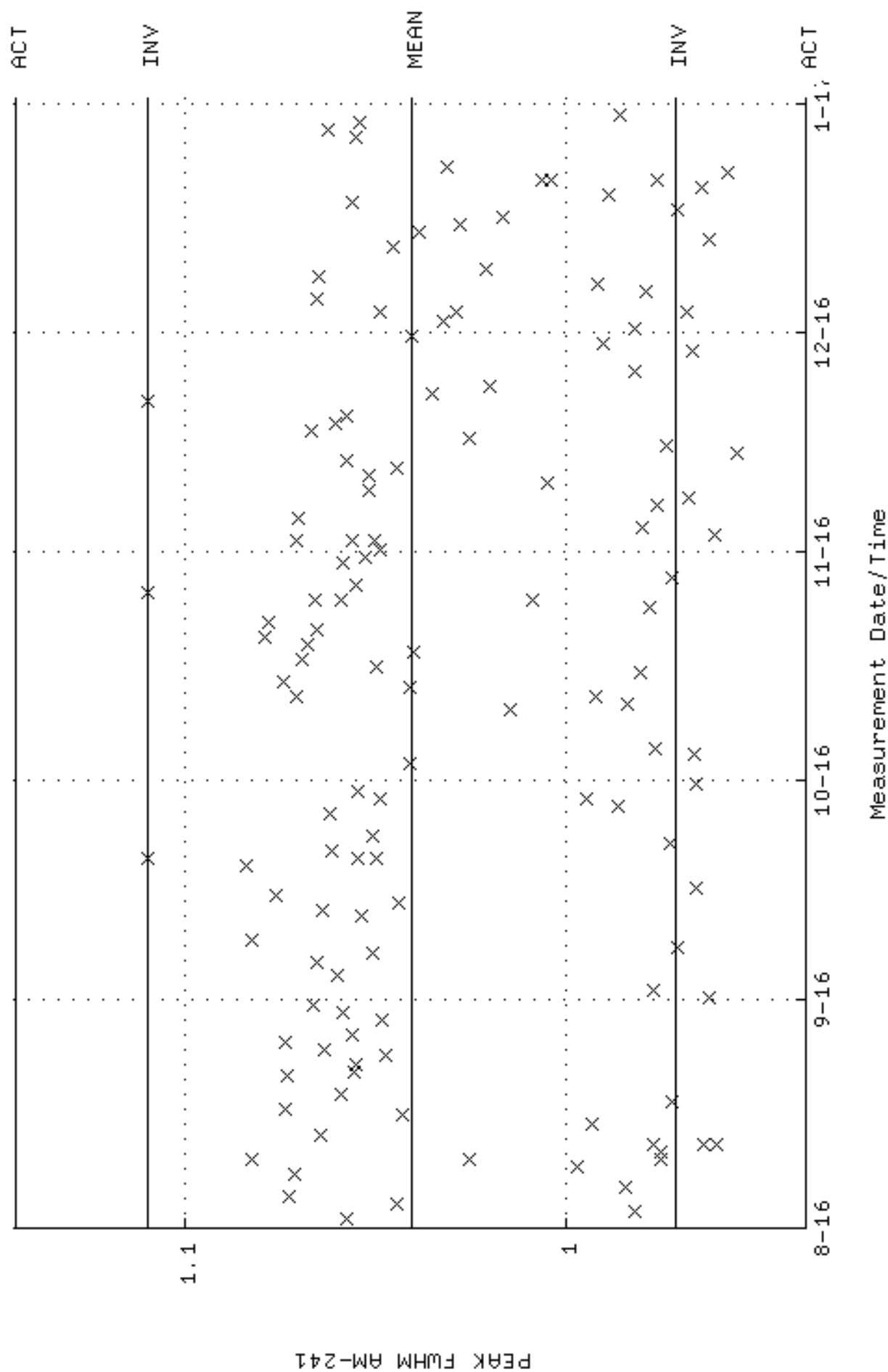
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM07.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 11-AUG-2016 11:34:04 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.33664 +- 2.151268E-02 (1.61 %)



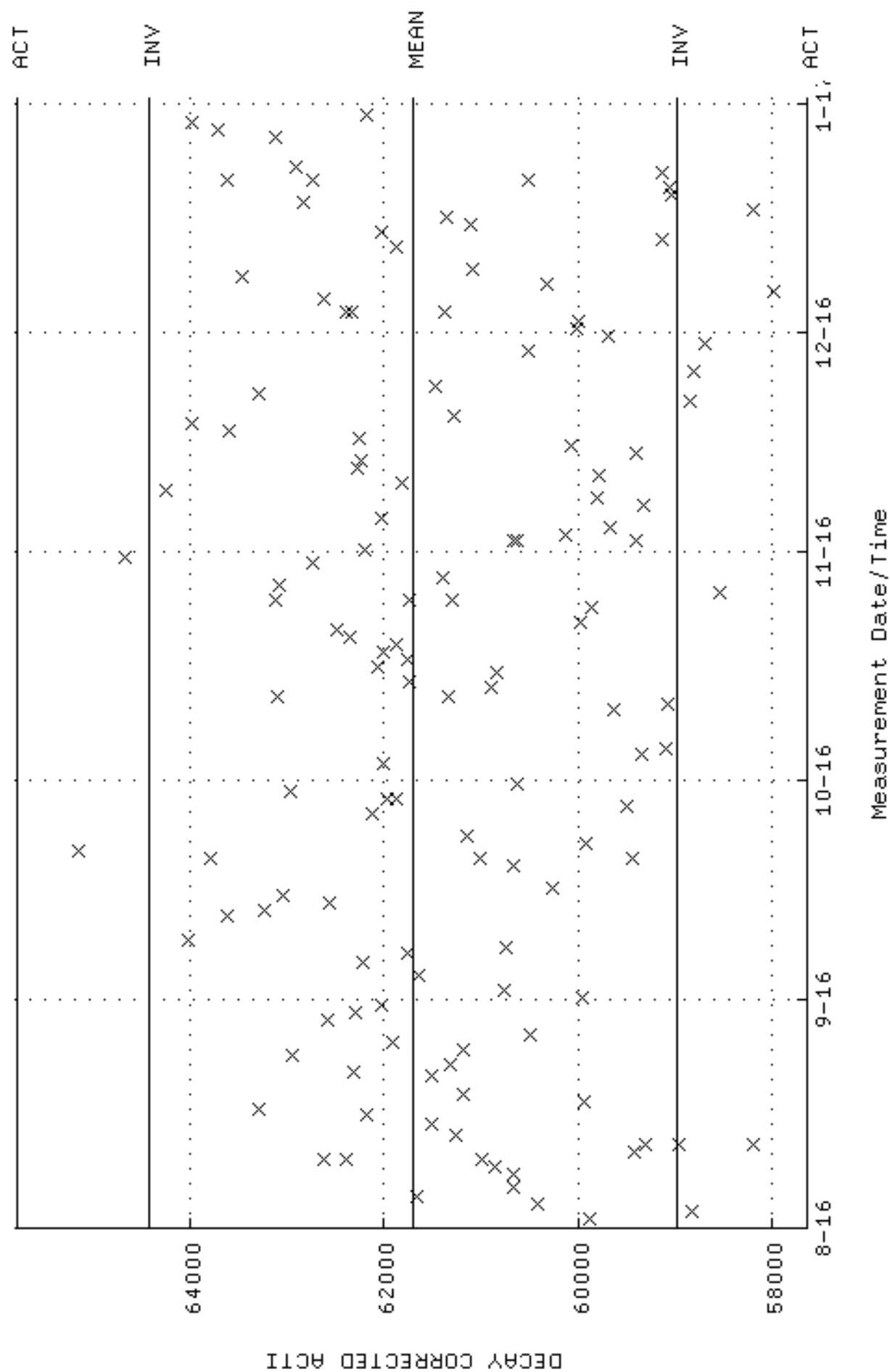
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM24_JAR.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 06:51:38 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



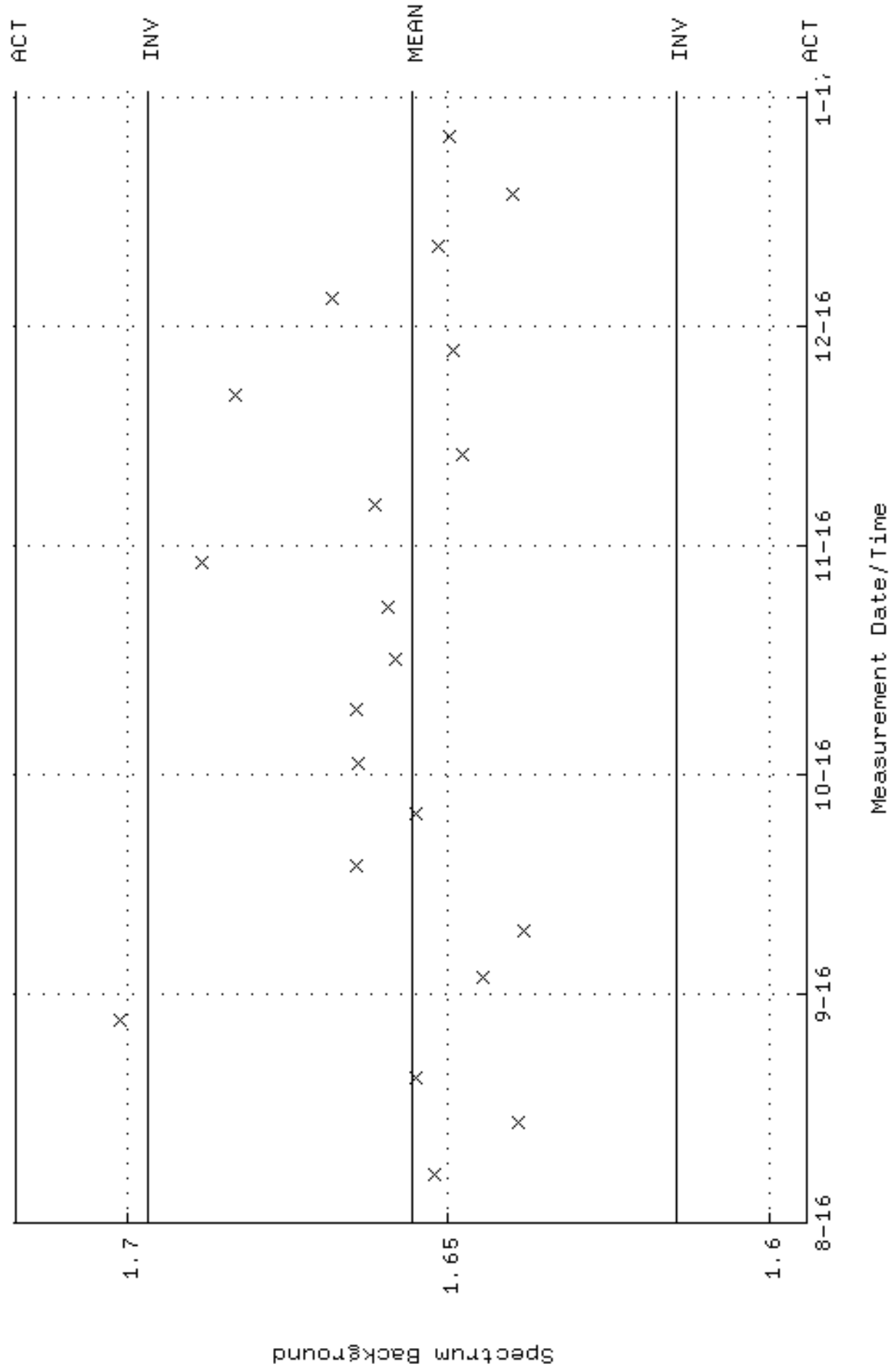
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM24_JAR.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 06:51:38 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.04071 +- 3.445093E-02 (3.31 %)



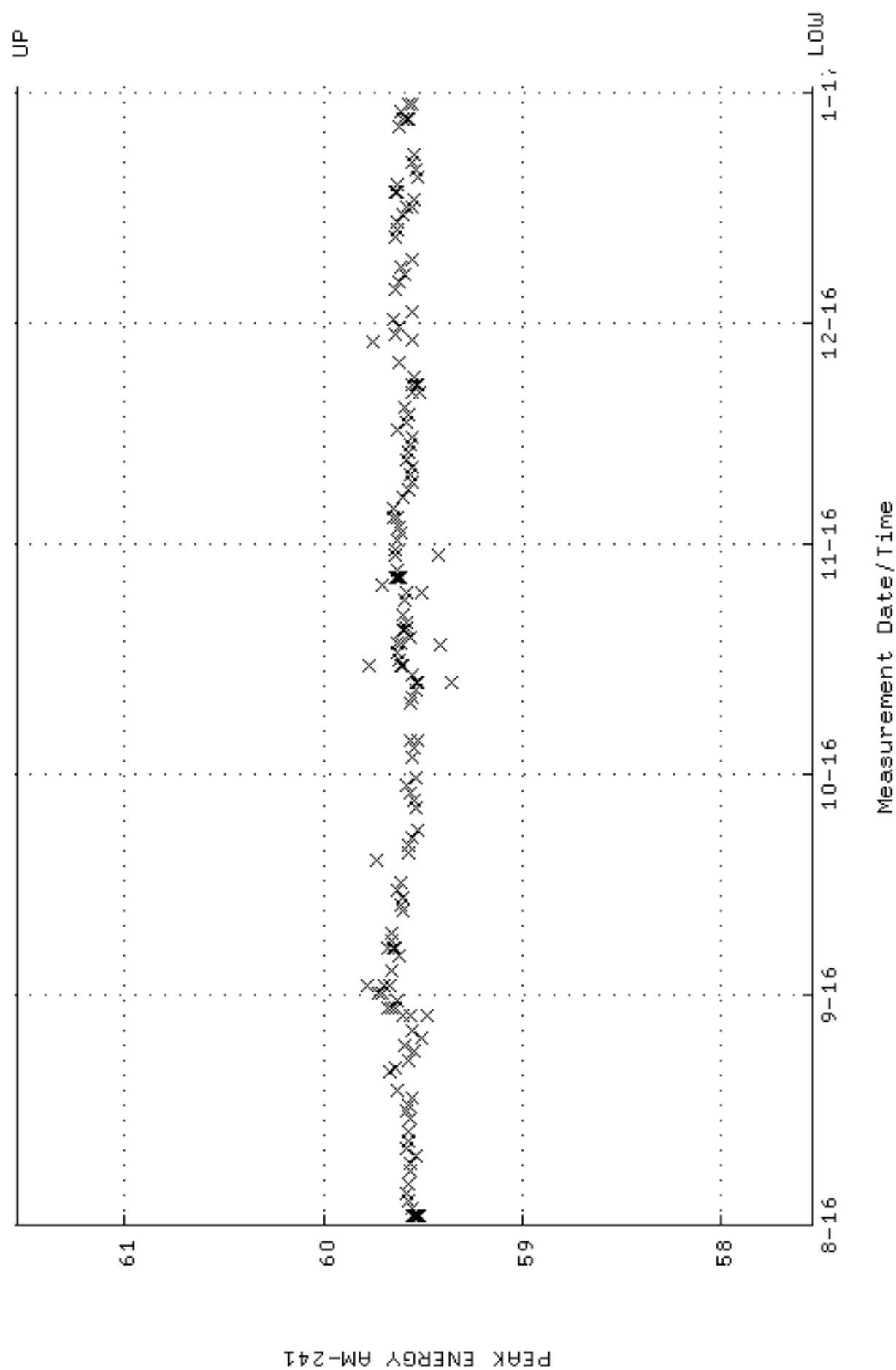
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM24_JAR.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 06:51:38 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 61710.4 +- 1354.76 (2.20 %)



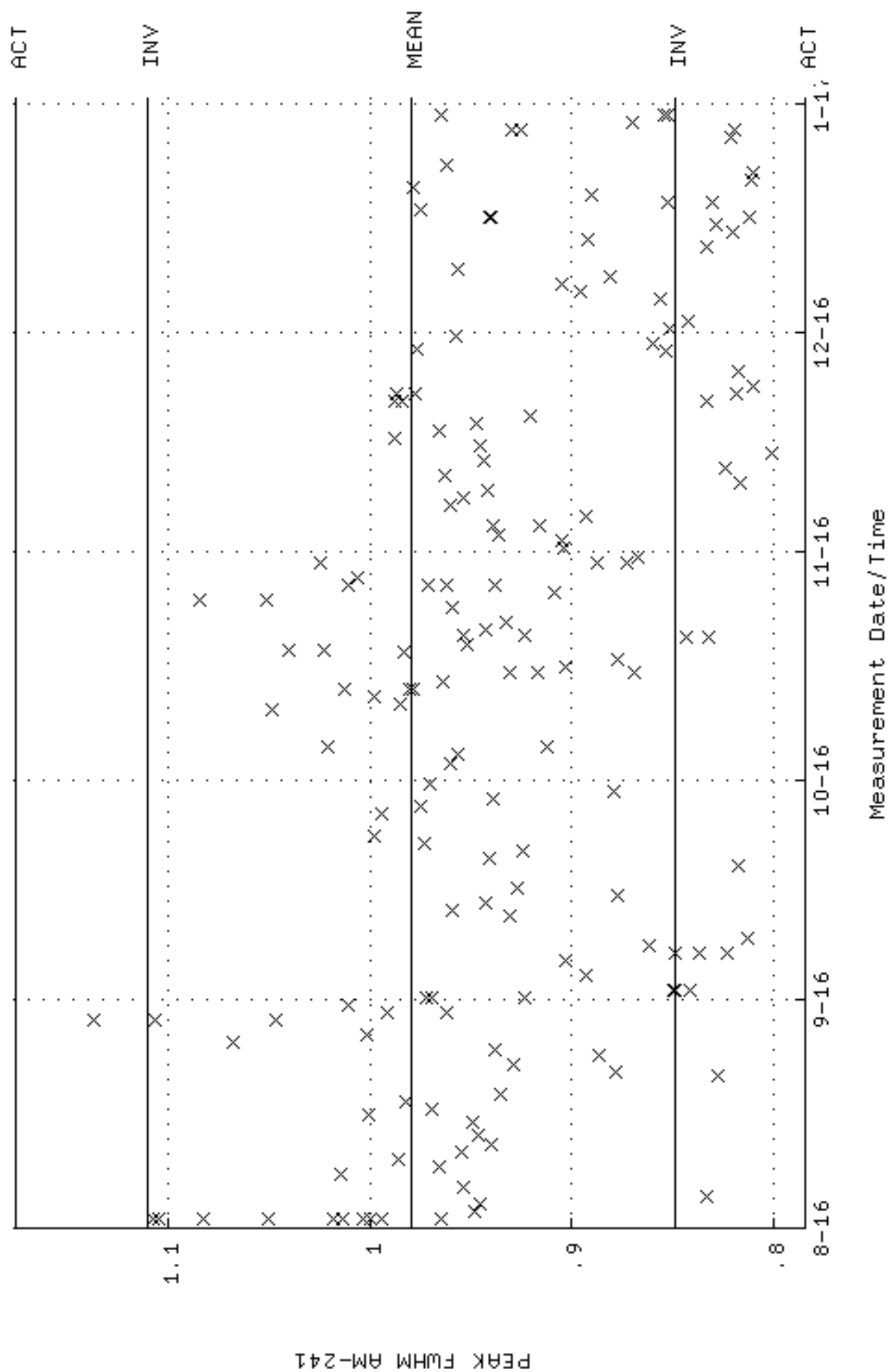
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM24.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 7-AUG-2016 16:01:49 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.65570 +- 2.053930E-02 (1.24 %)



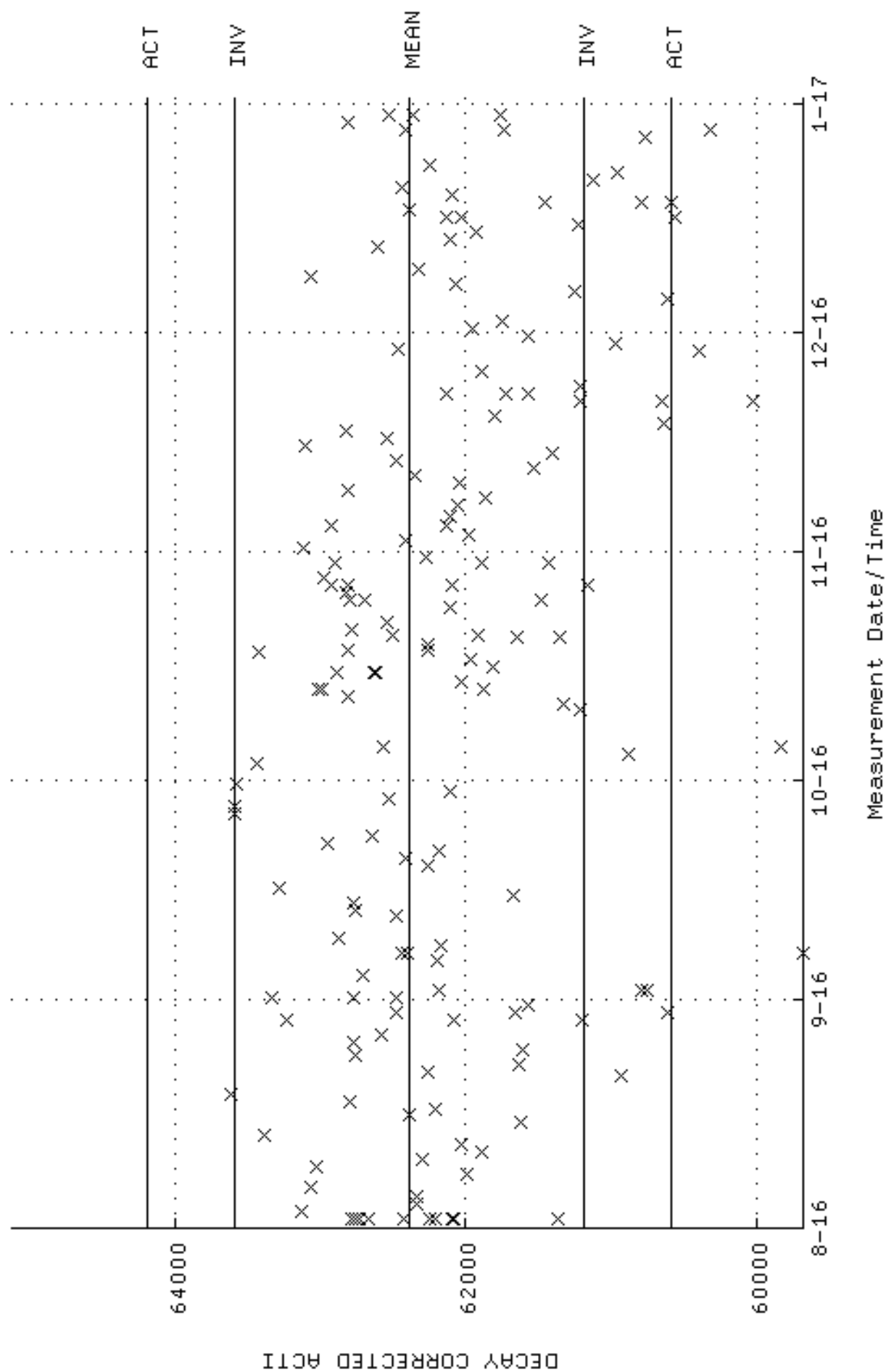
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM25_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 07:31:08 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



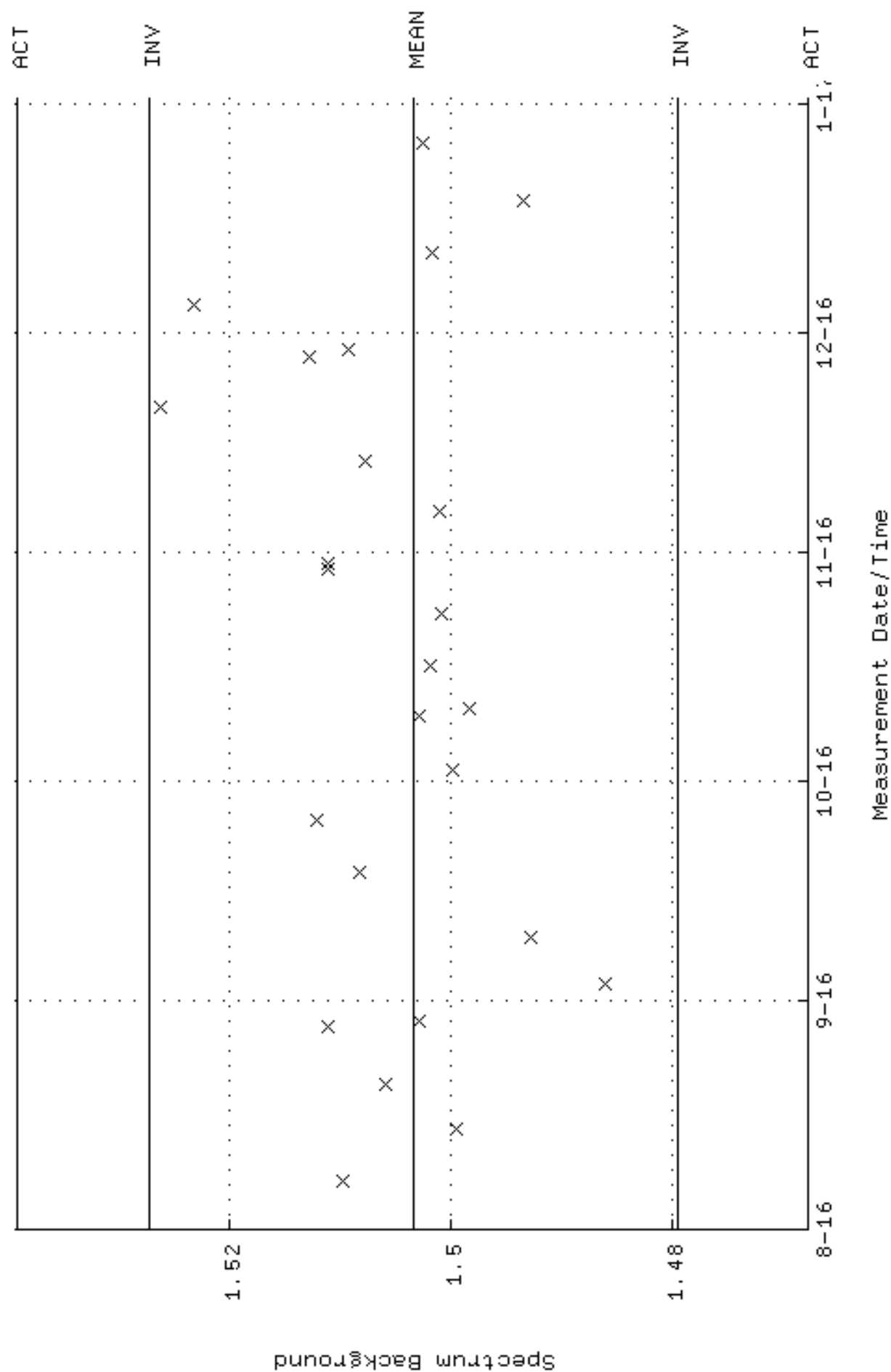
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM25_CAN.QAF;1
 Parameter Name : PSFUHM-59 (PEAK FUHM AM-241)
 Start/End Dates : 2-AUG-2016 07:31:08 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 0.980027 +- 6.517756E-02 (6.65 %)



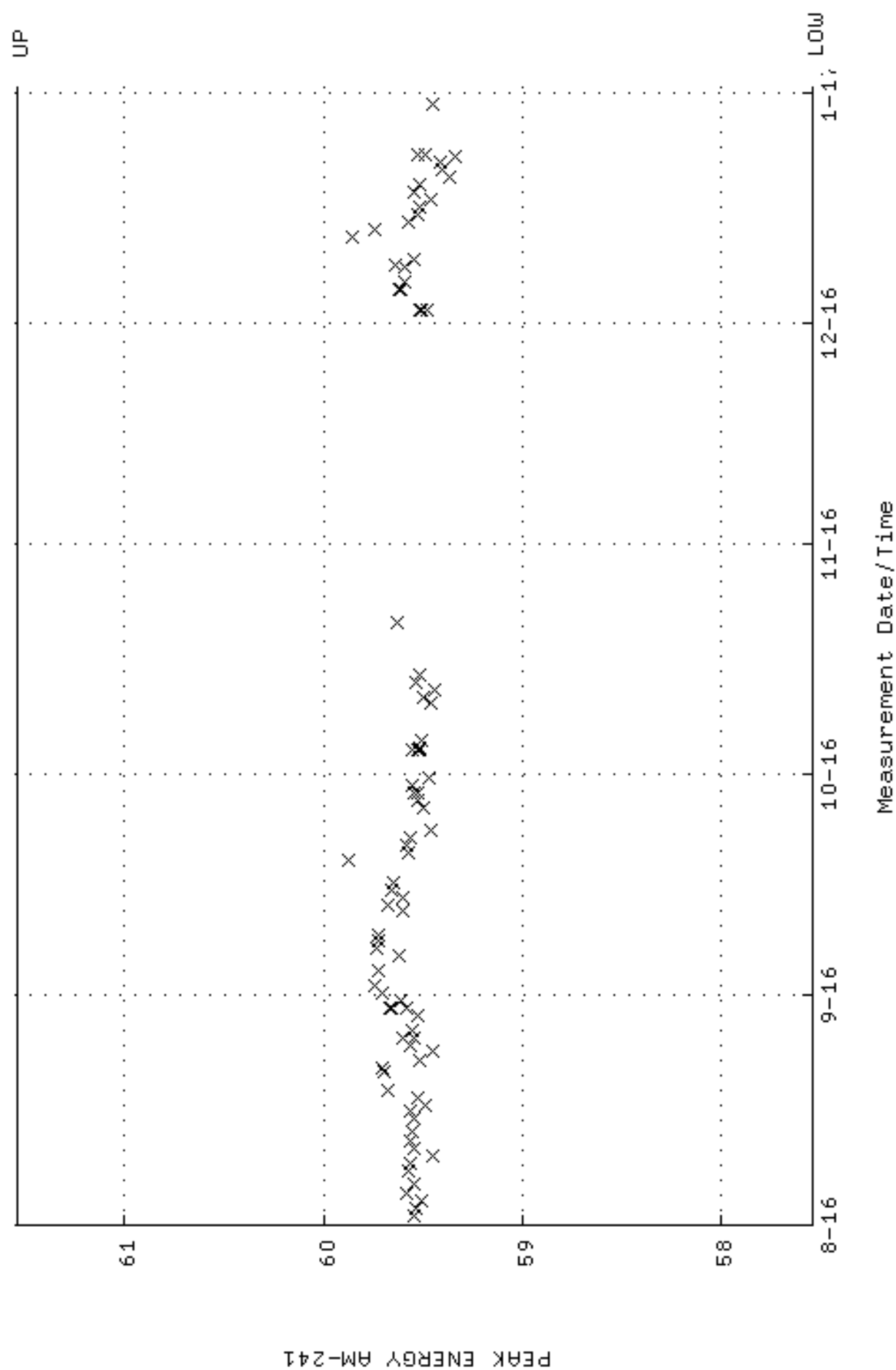
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM25_CAN.QAF;1
 Parameter Name : NLACTVY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:31:08 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 62396.6 +- 604.147 (0.97 %)



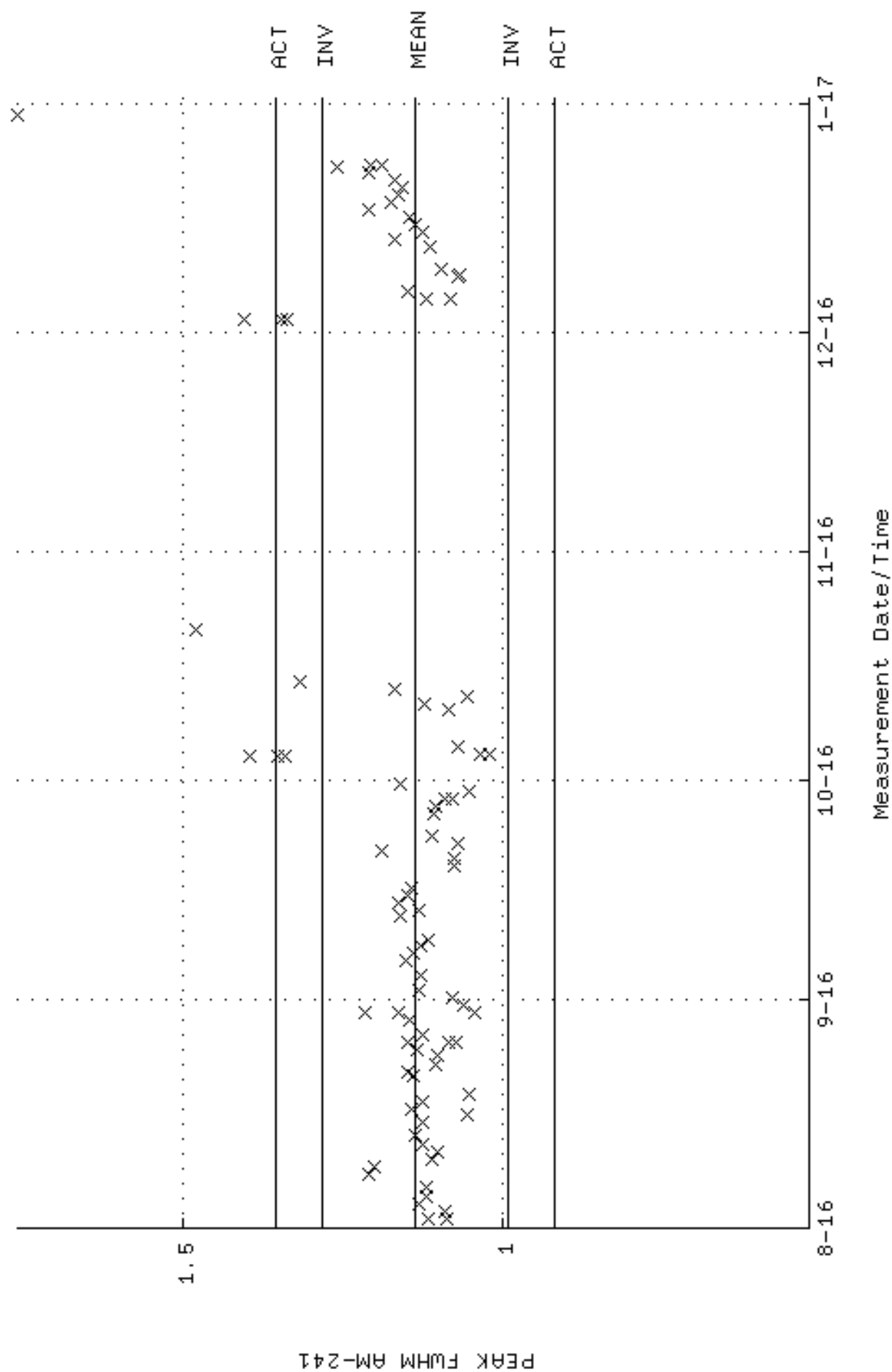
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM25.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 7-AUG-2016 16:01:54 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.50341 +- 1.187922E-02 (0.79 %)



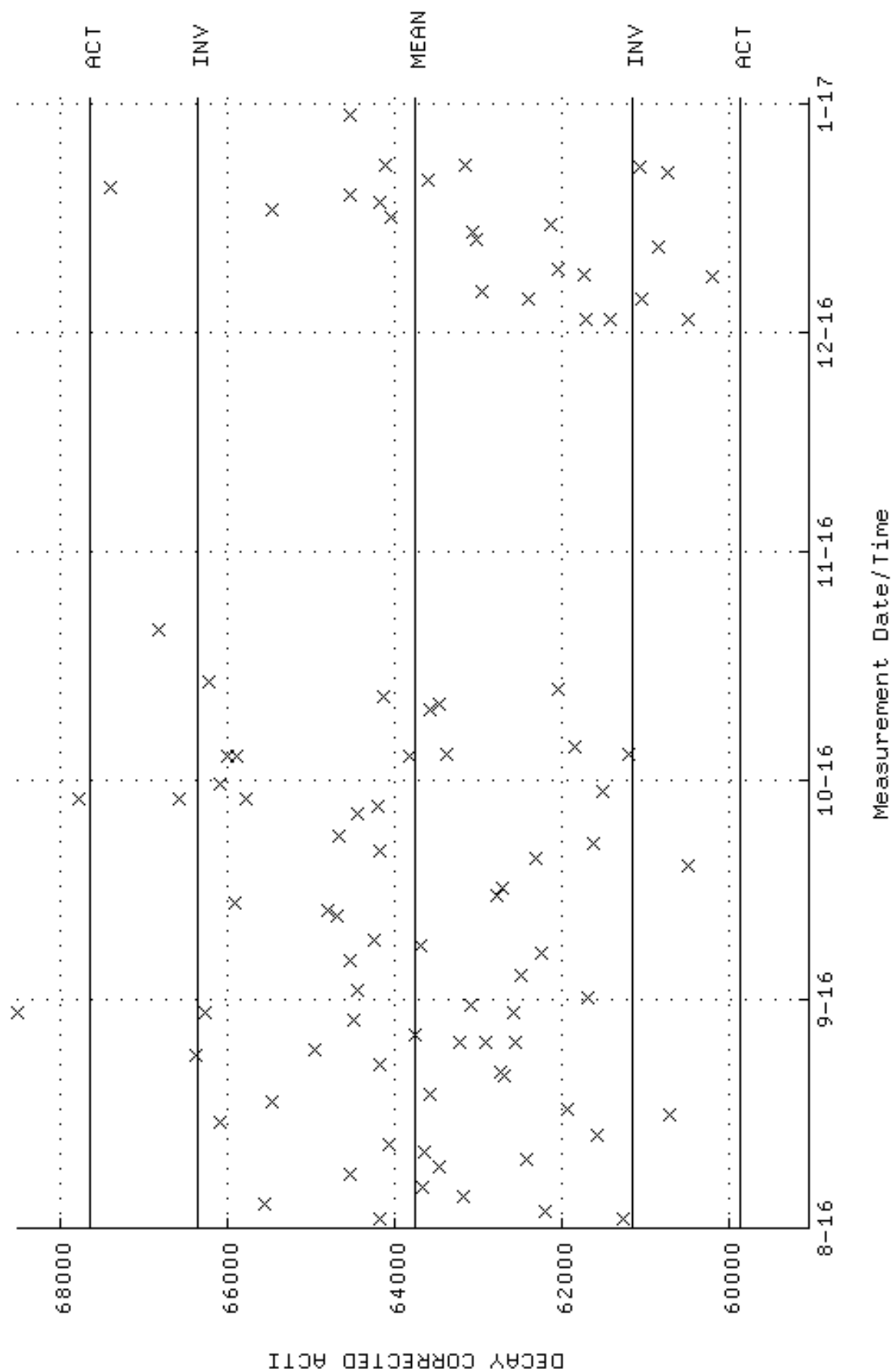
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM28_JAR.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 07:25:53 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



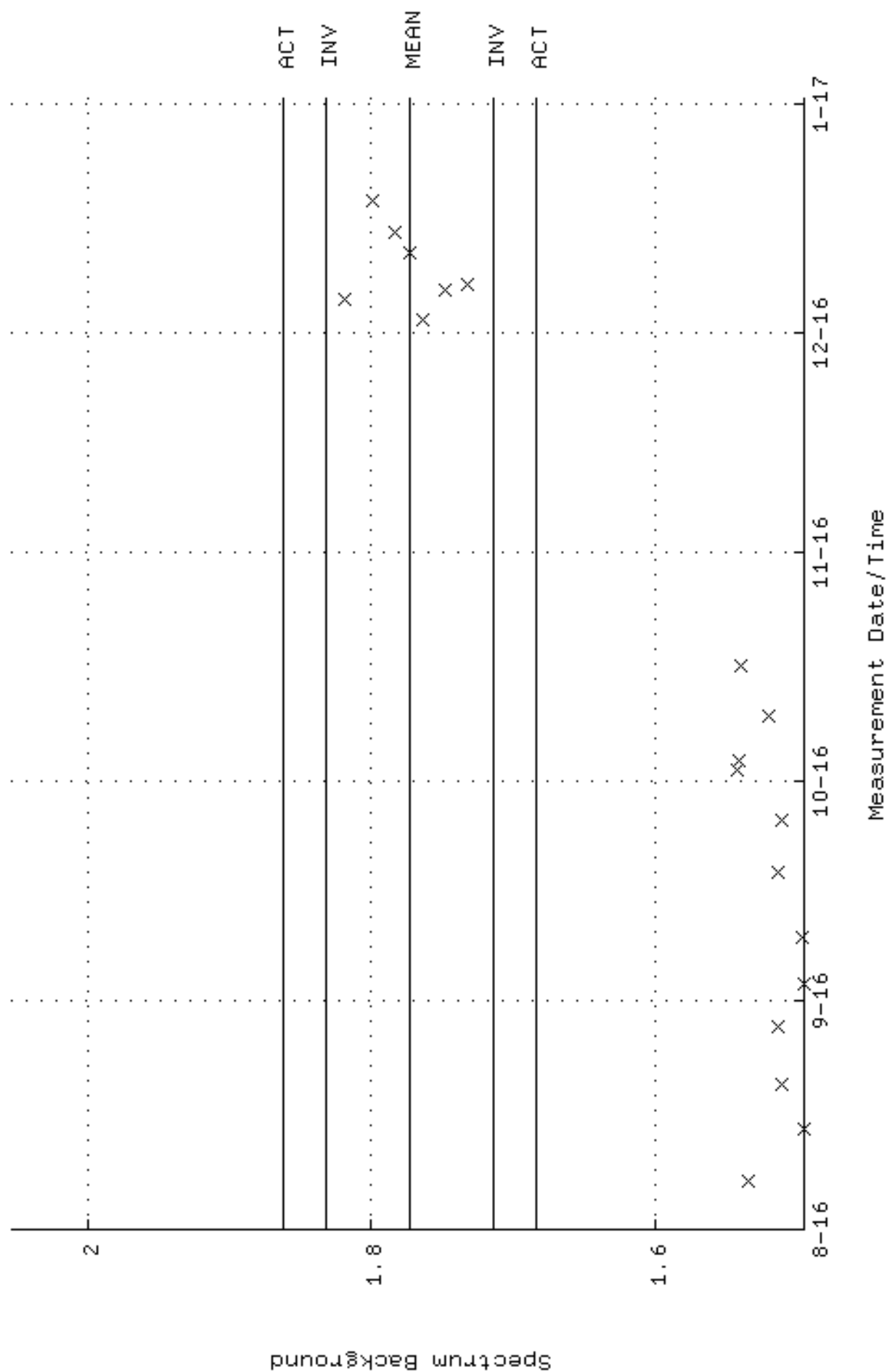
QA filename : DKA100:[CANBERRA,GAMMA,SCUSR,QA]QCC_GAM28_JAR.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 07:25:53 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.13880 +- 7.316274E-02 (6.42 %)



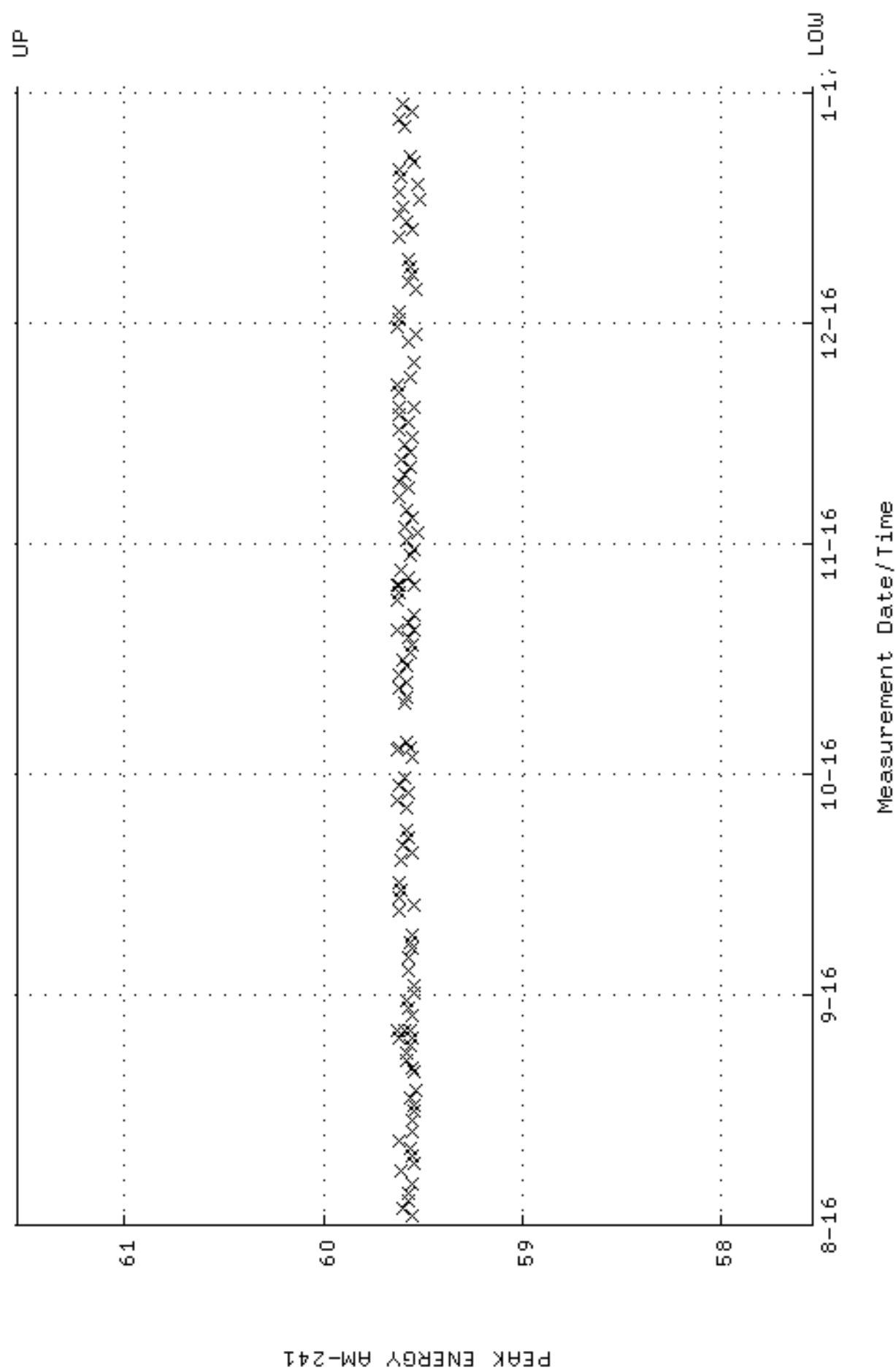
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM28-JAR.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:25:53 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 63769.8 +- 1297.66 (2.03 %)



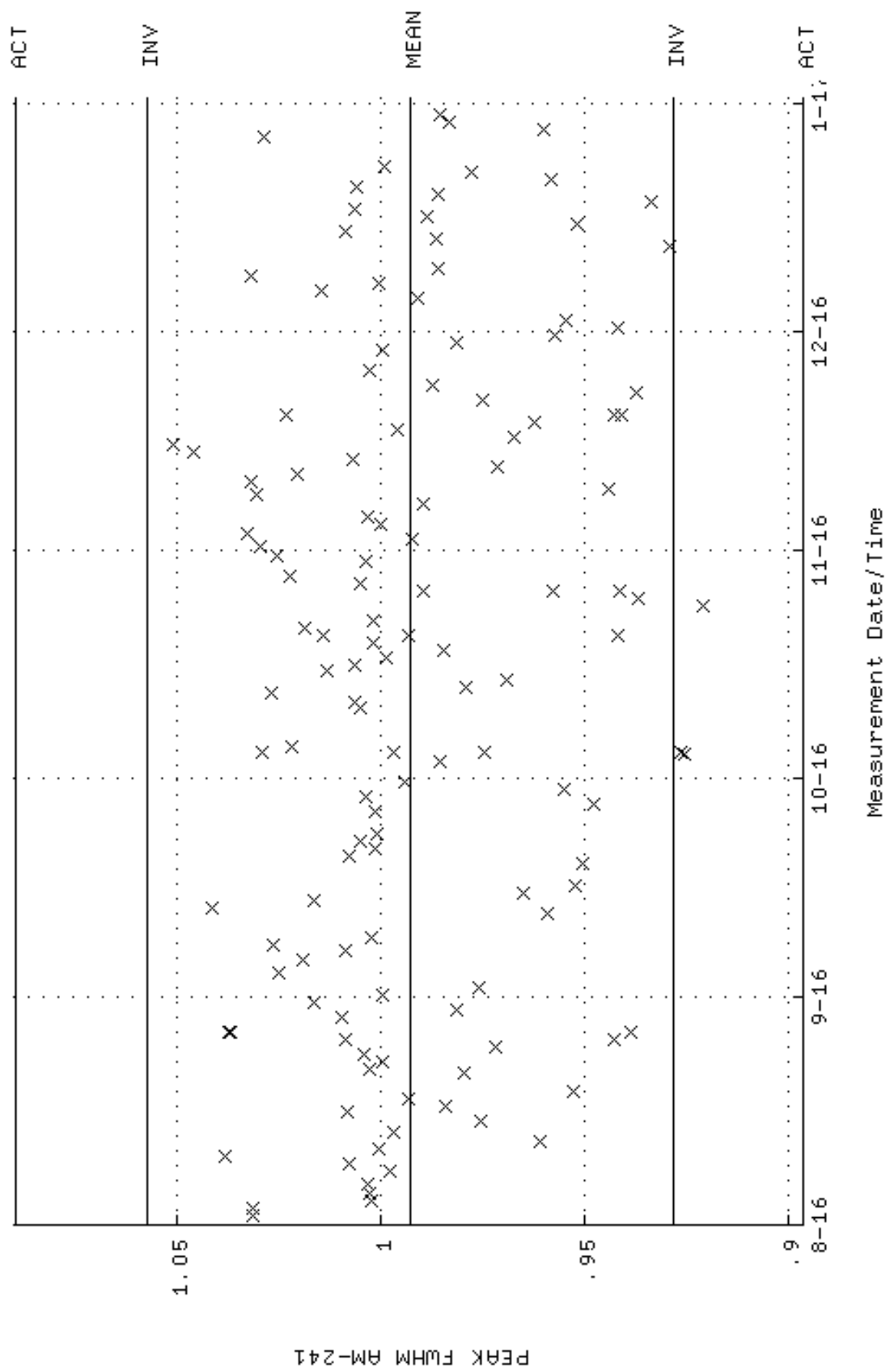
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM28.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 7-AUG-2016 16:02:05 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.77352 +- 2.958371E-02 (1.67 %)



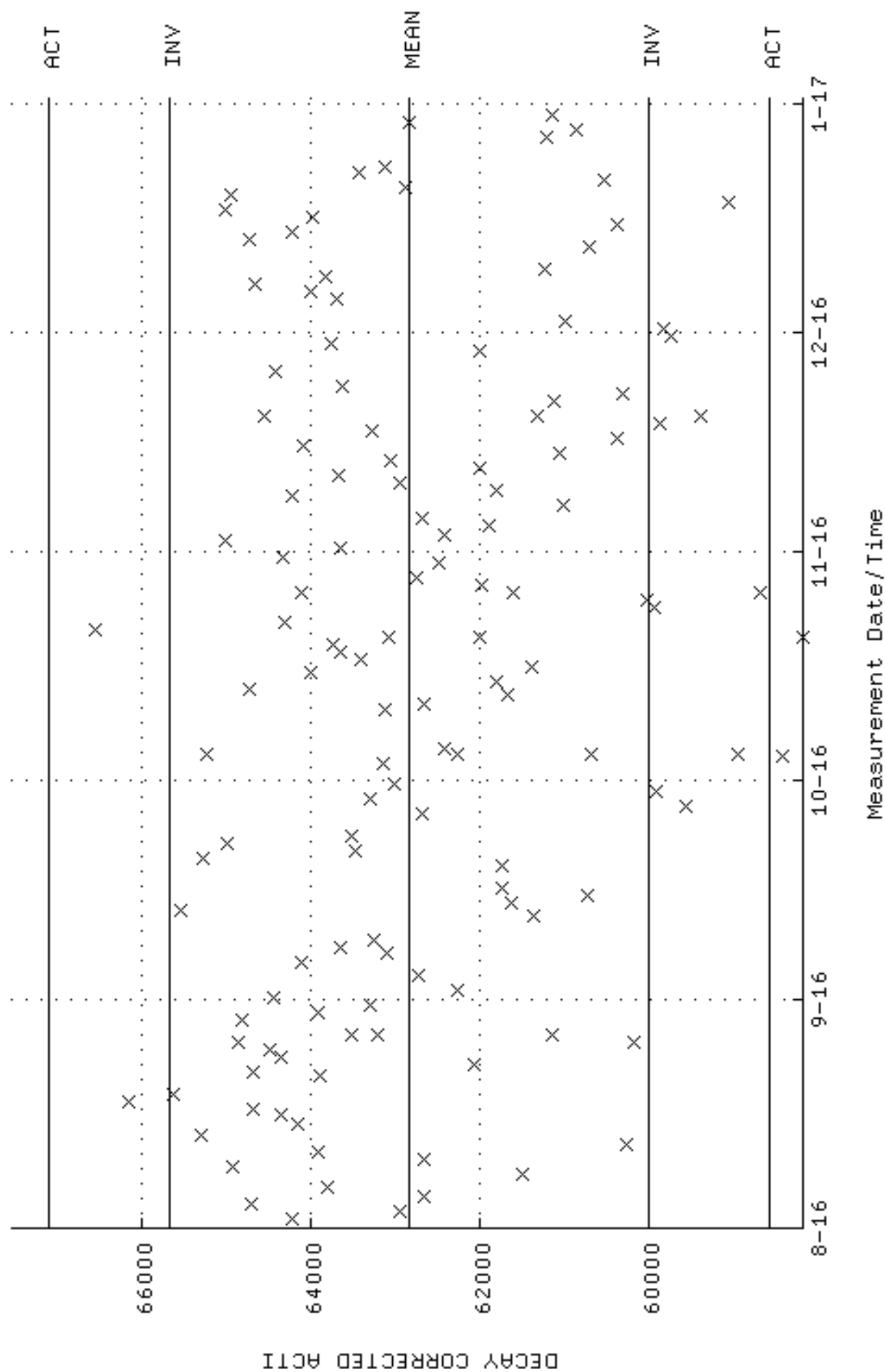
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM29_CAN.QAF;1
Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
Start/End Dates : 2-AUG-2016 07:57:27 through 1-JAN-2017 12:00:00
Lower/Upper Lmts: 57.5400 through 61.5400



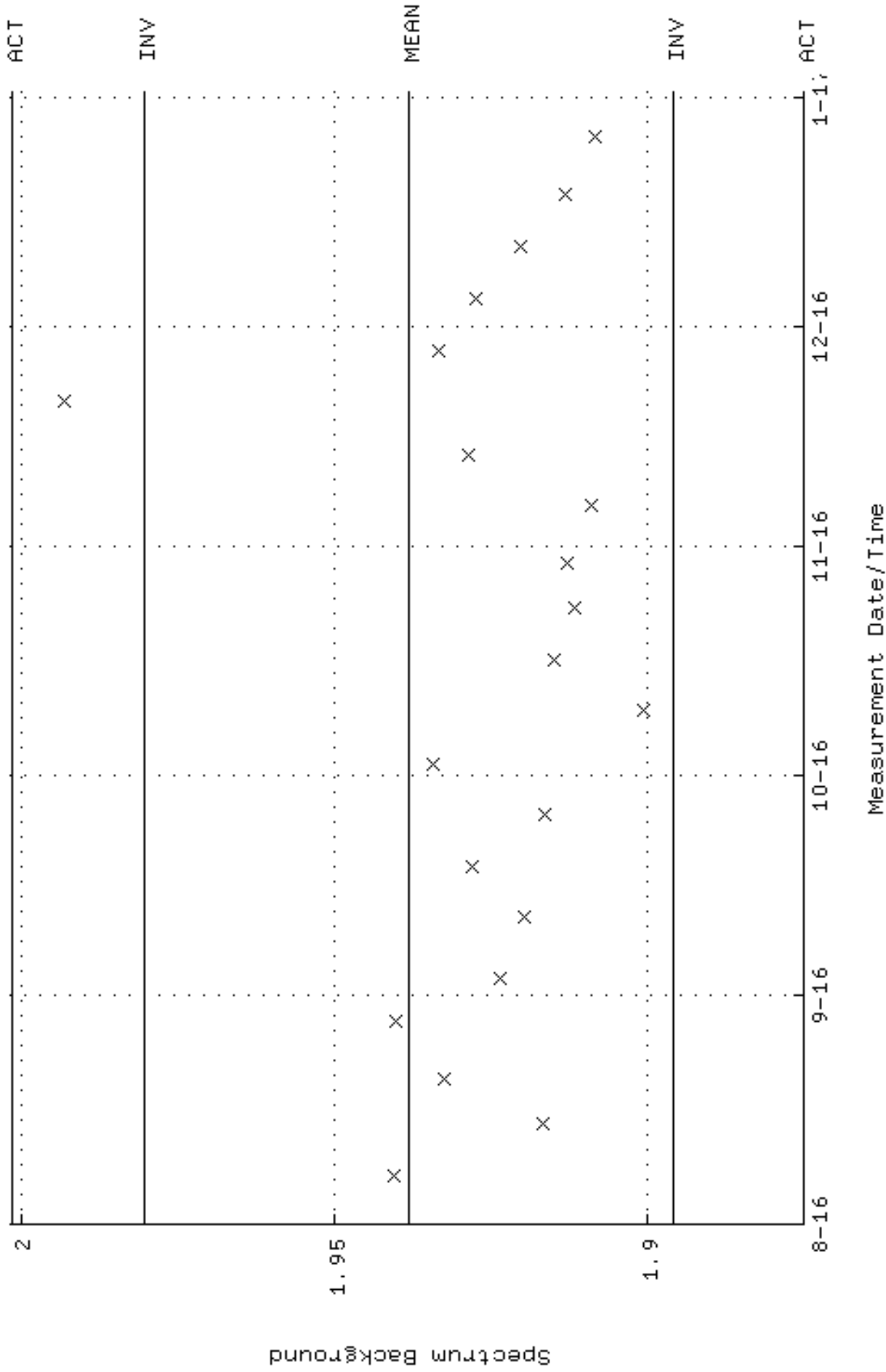
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 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 07:57:27 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 0.992983 +- 3.213267E-02 (3.24 %)



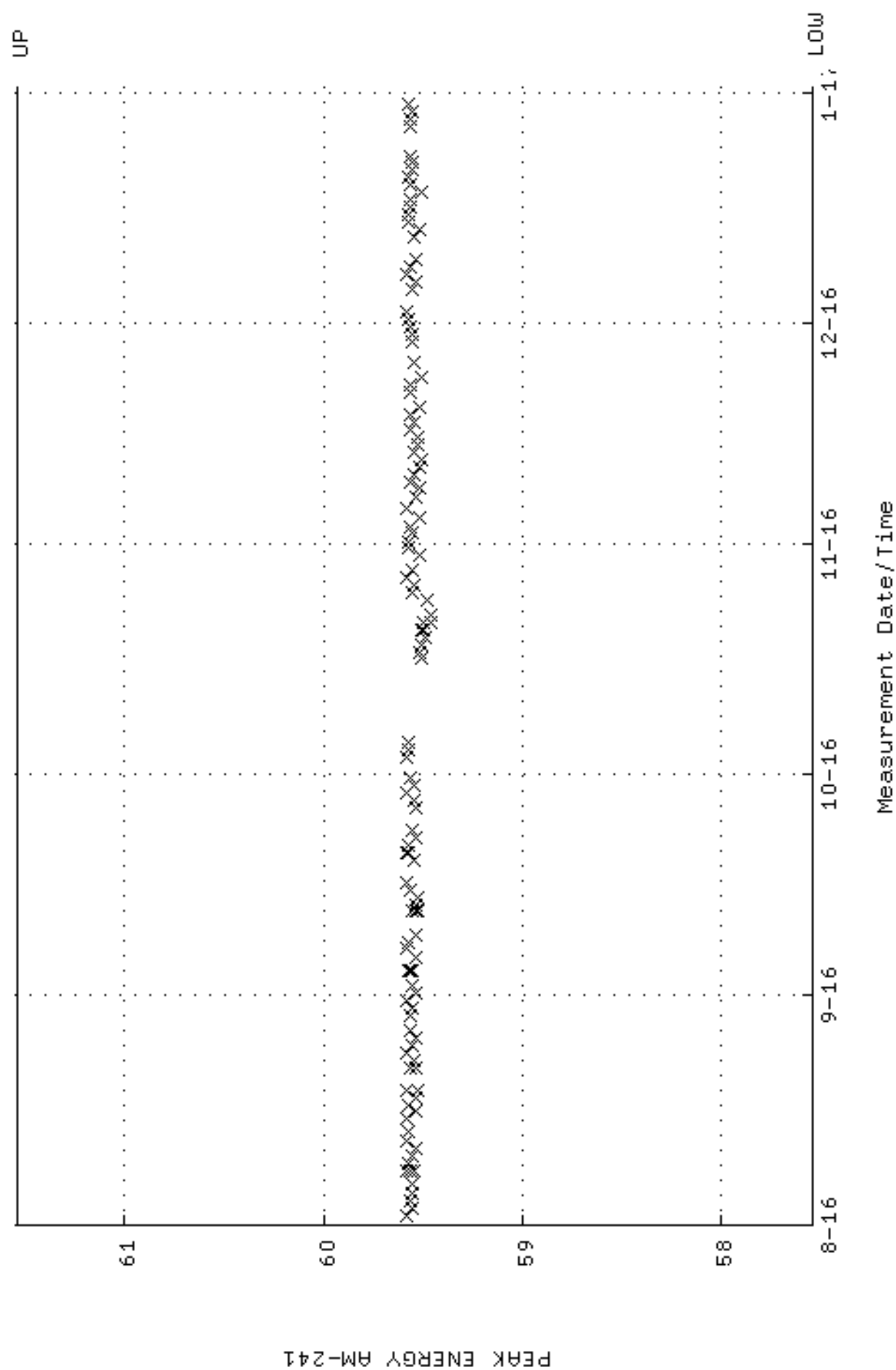
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM29_CAN.QAF;1
 Parameter Name : NLACTVY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:57:27 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 62841.9 +- 1422.21 (2.26 %)



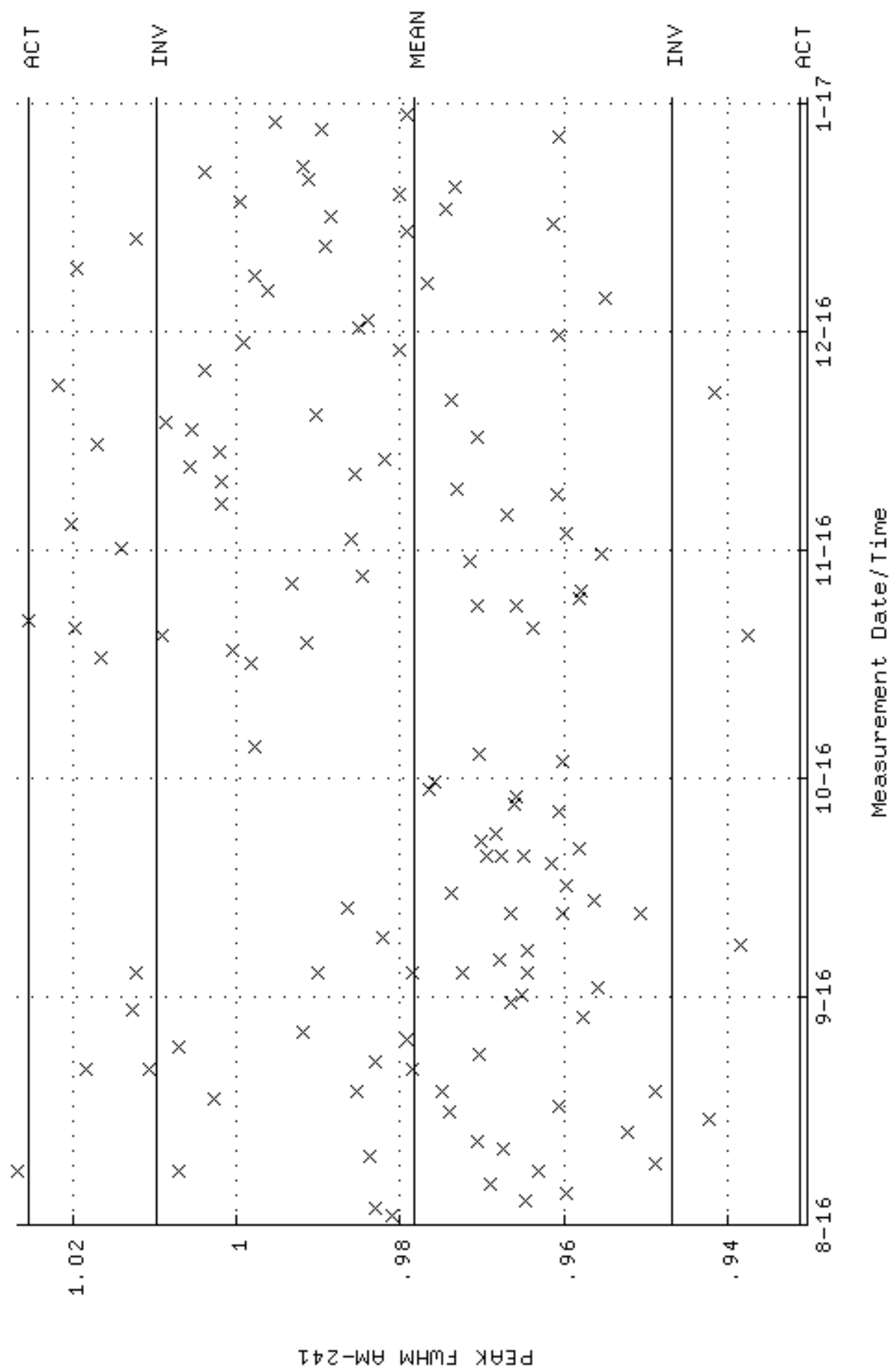
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 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 7-AUG-2016 16:02:11 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.93820 +- 2.105615E-02 (1.09 %)



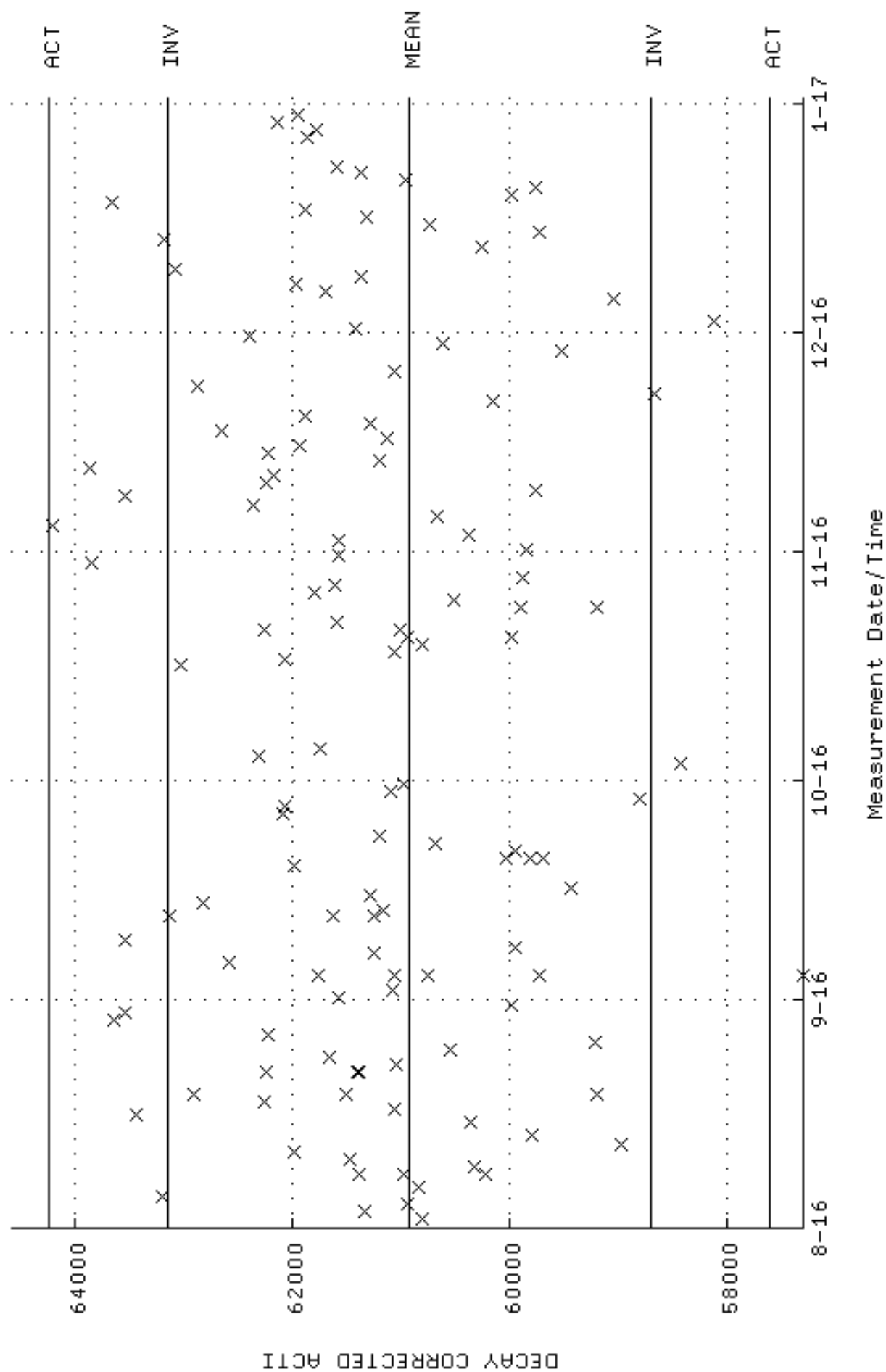
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM30_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 07:00:14 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



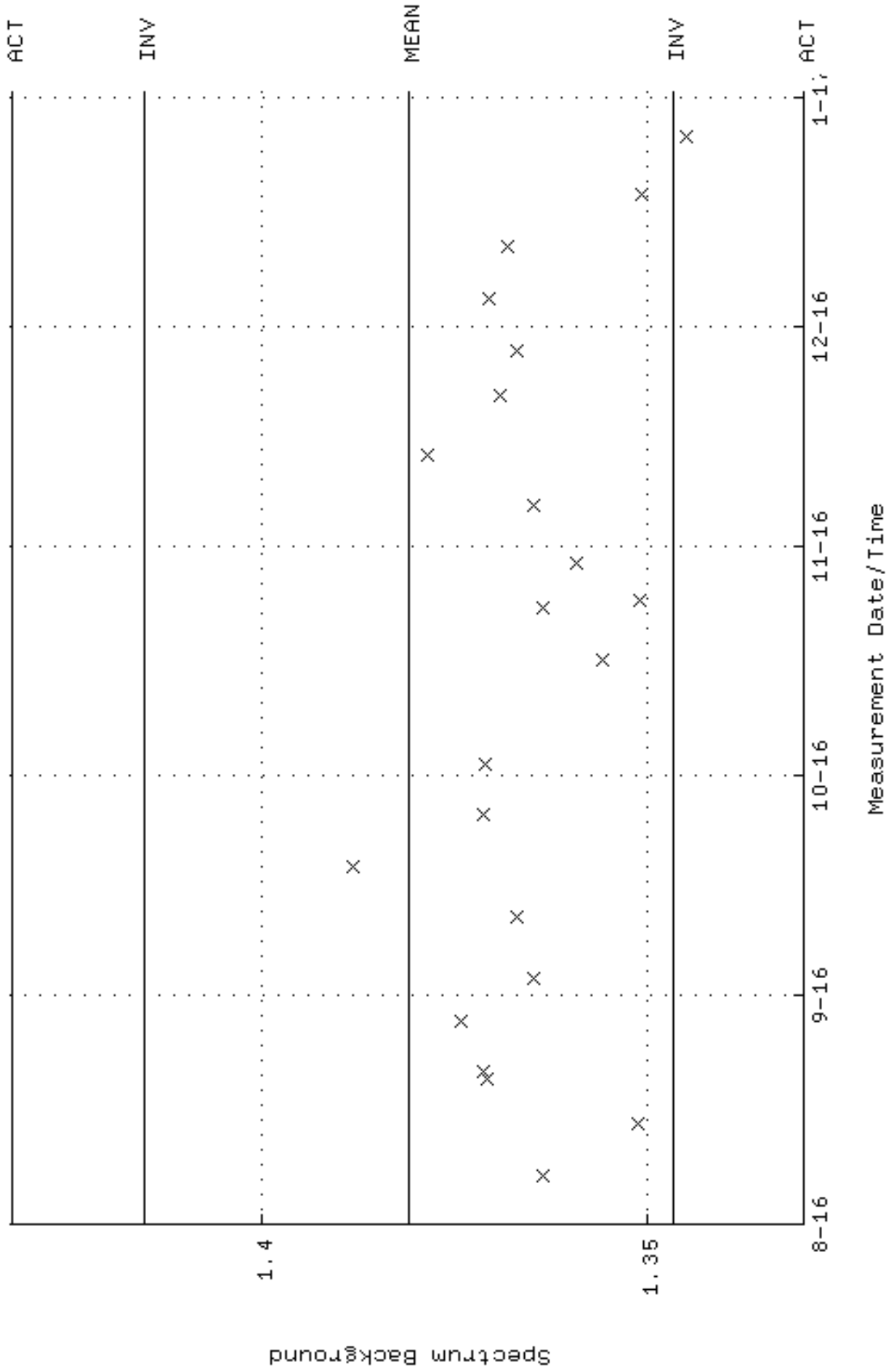
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM30_CAN.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 07:00:14 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 0.978411 +- 1.572215E-02 (1.61 %)



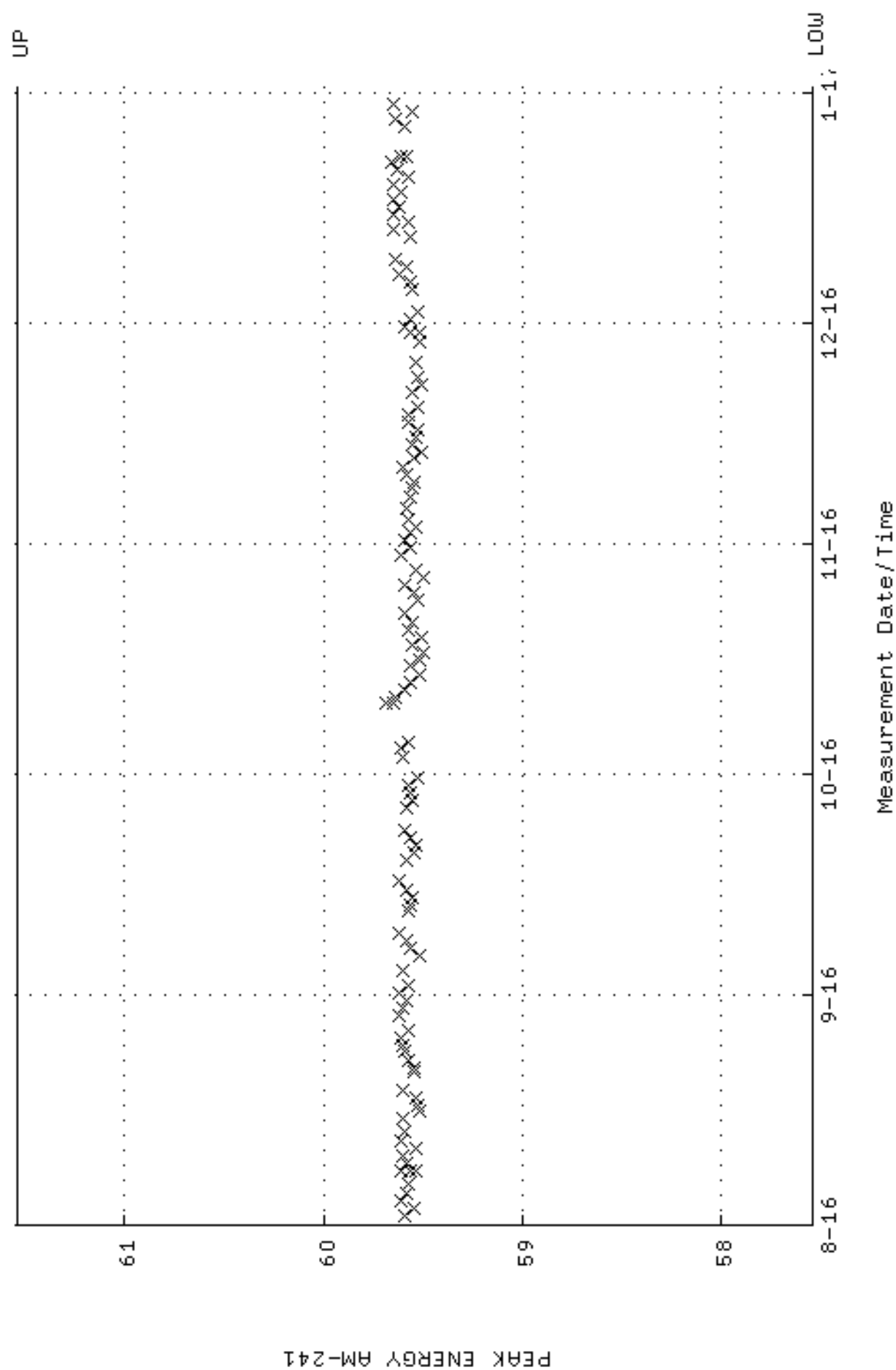
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM30-CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:00:14 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 60927.3 +- 1107.45 (1.82 %)



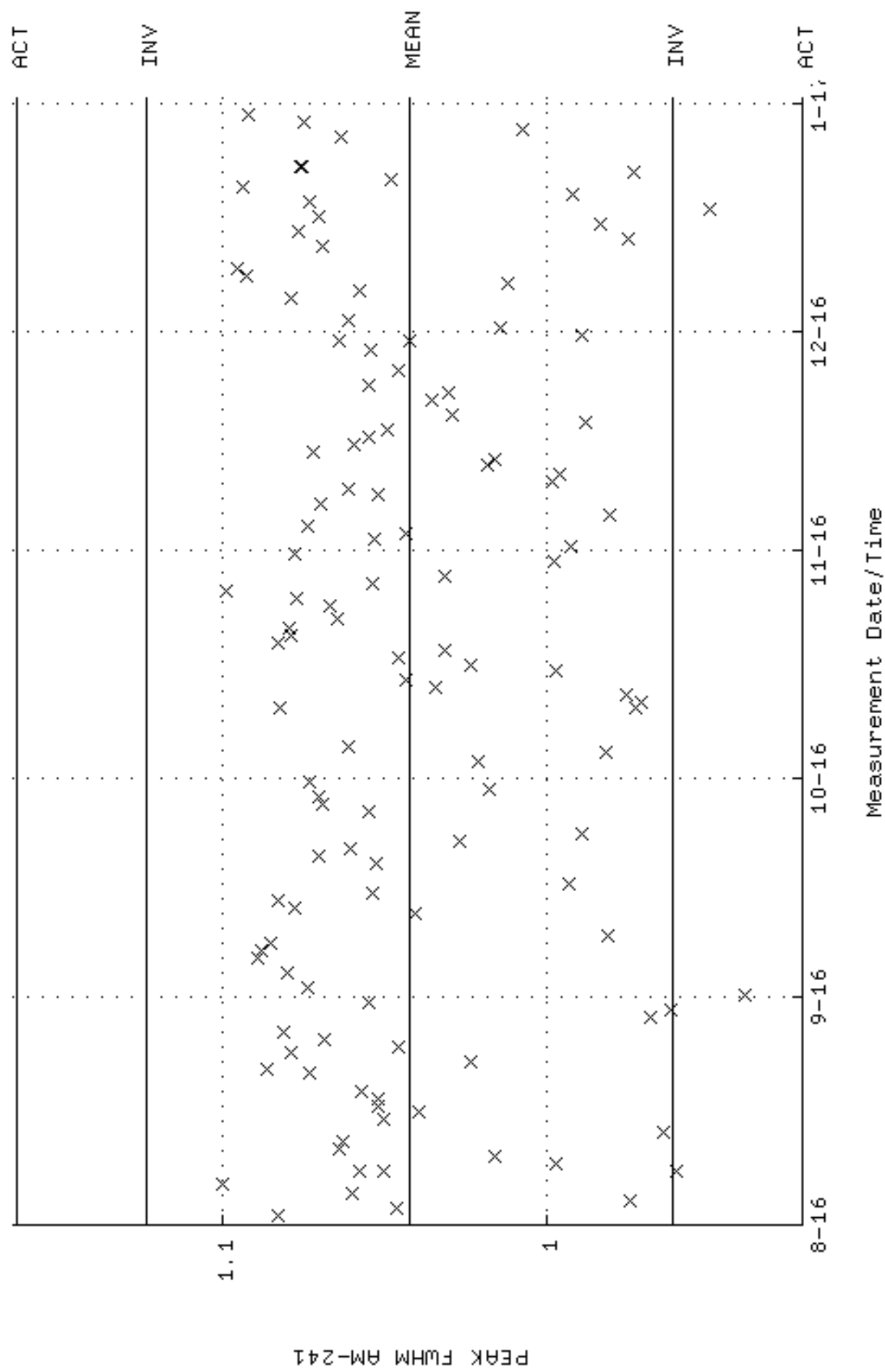
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM30.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 7-AUG-2016 16:02:17 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.38100 +- 1.713672E-02 (1.24 %)



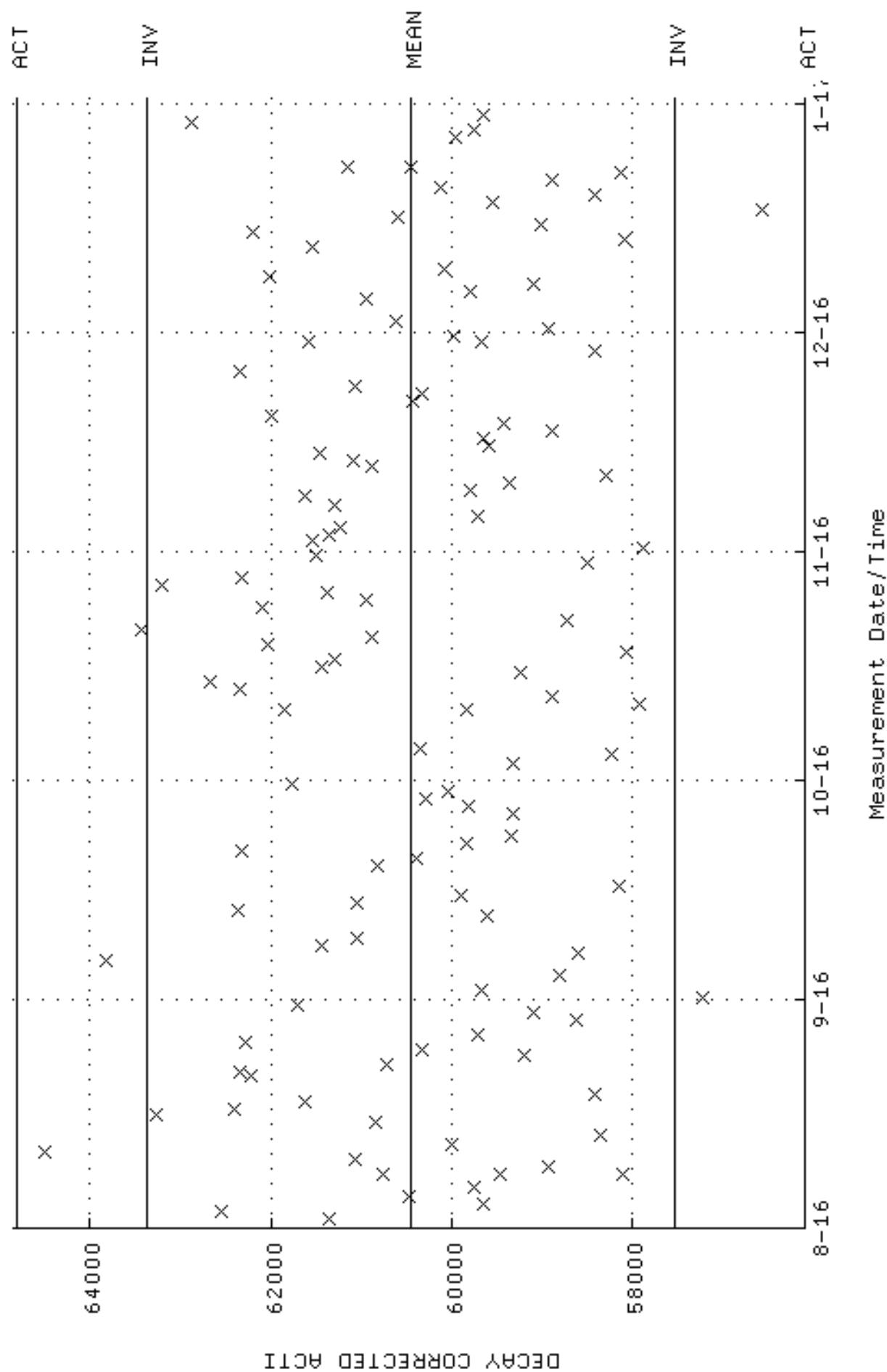
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM33_CAN.QAF;1
Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
Start/End Dates : 2-AUG-2016 08:48:24 through 1-JAN-2017 12:00:00
Lower/Upper Lmts: 57.5400 through 61.5400



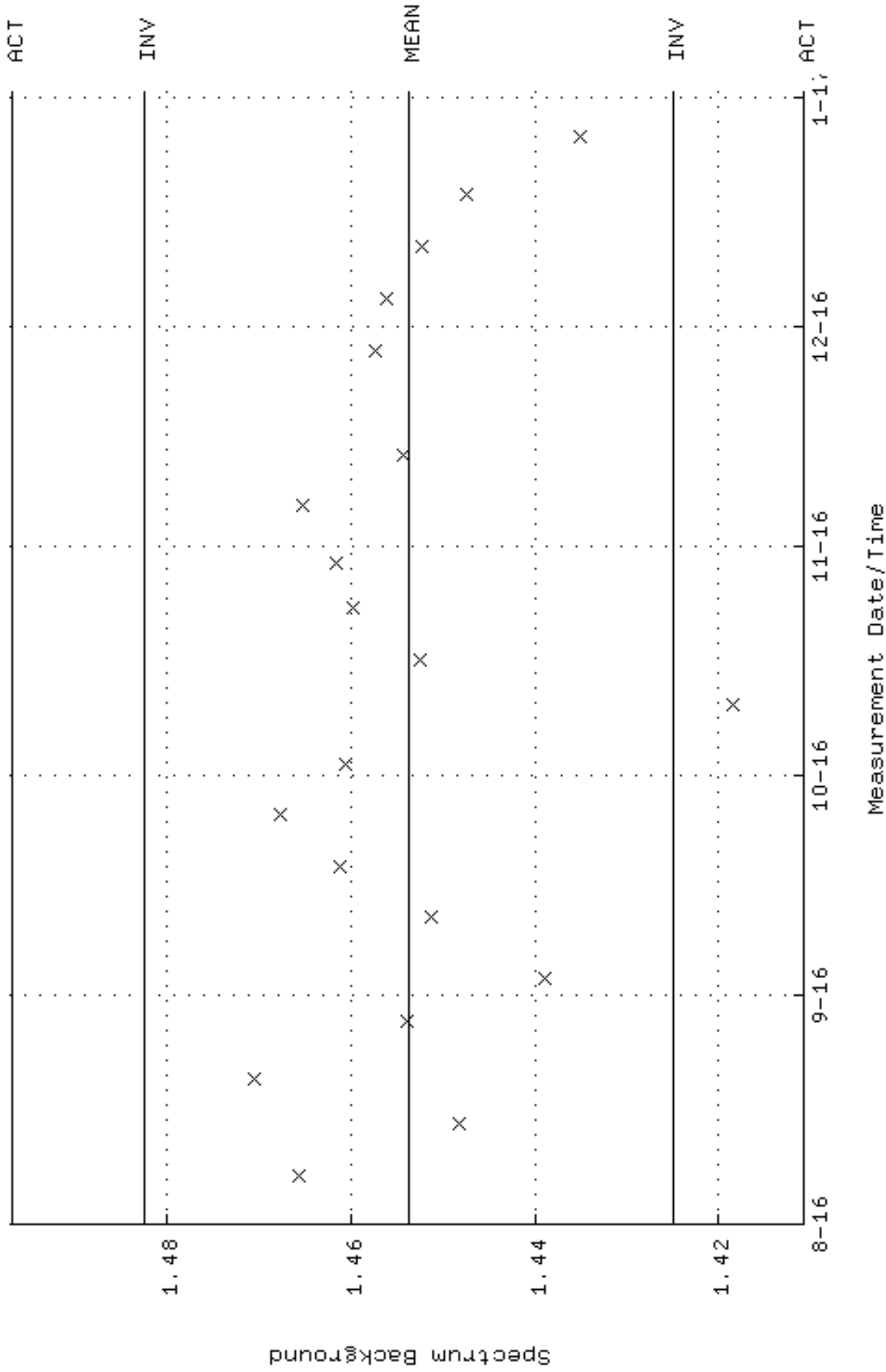
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 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 08:48:24 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 1.04259 +- 4.028326E-02 (3.86 %)



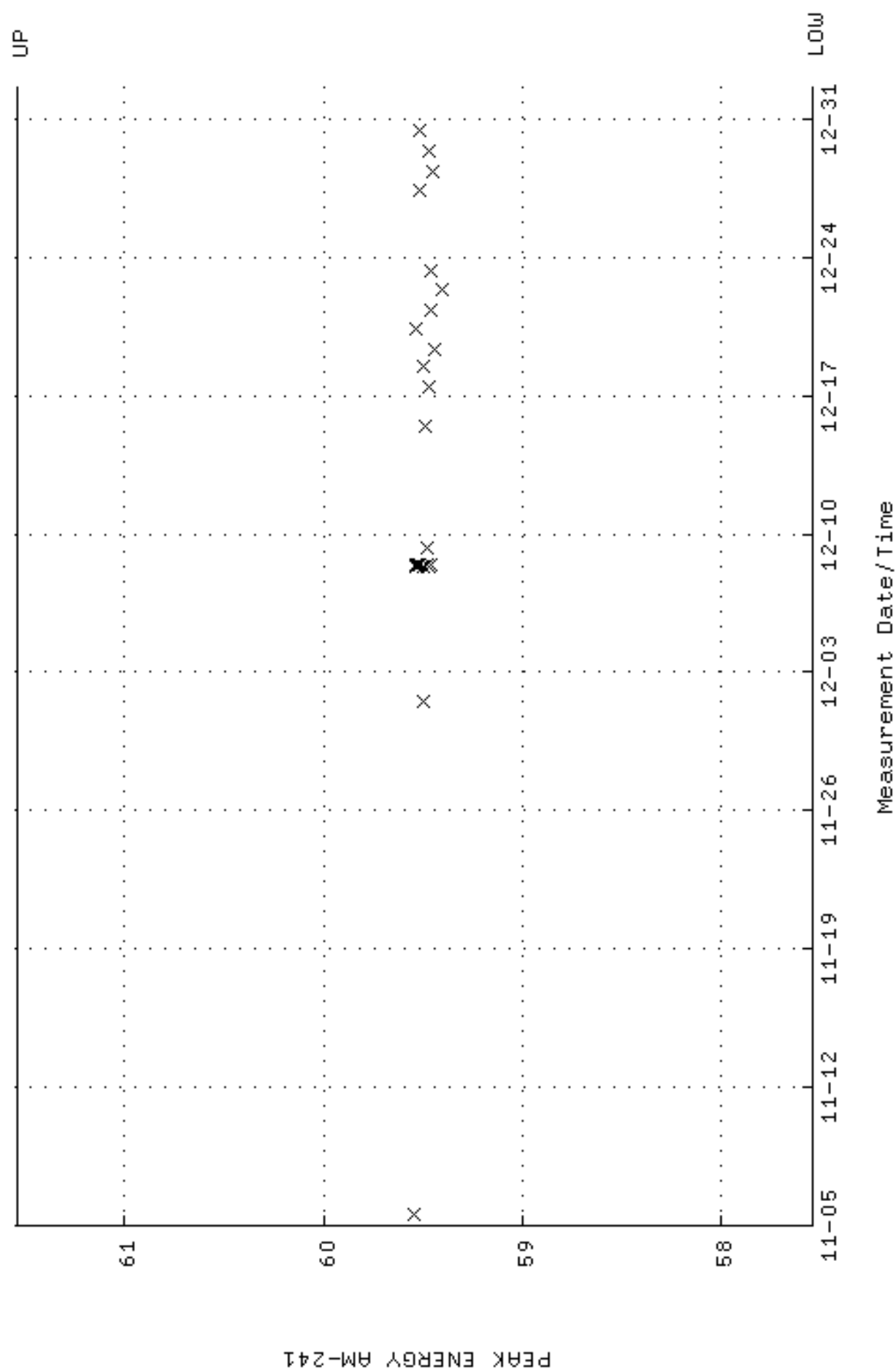
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM33_CAN.QAF;1
 Parameter Name : NLACTVY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 08:48:24 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 60458.0 +- 1456.56 (2.41 %)



QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM33.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 7-AUG-2016 16:02:35 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.45378 +- 1.435508E-02 (0.99 %)



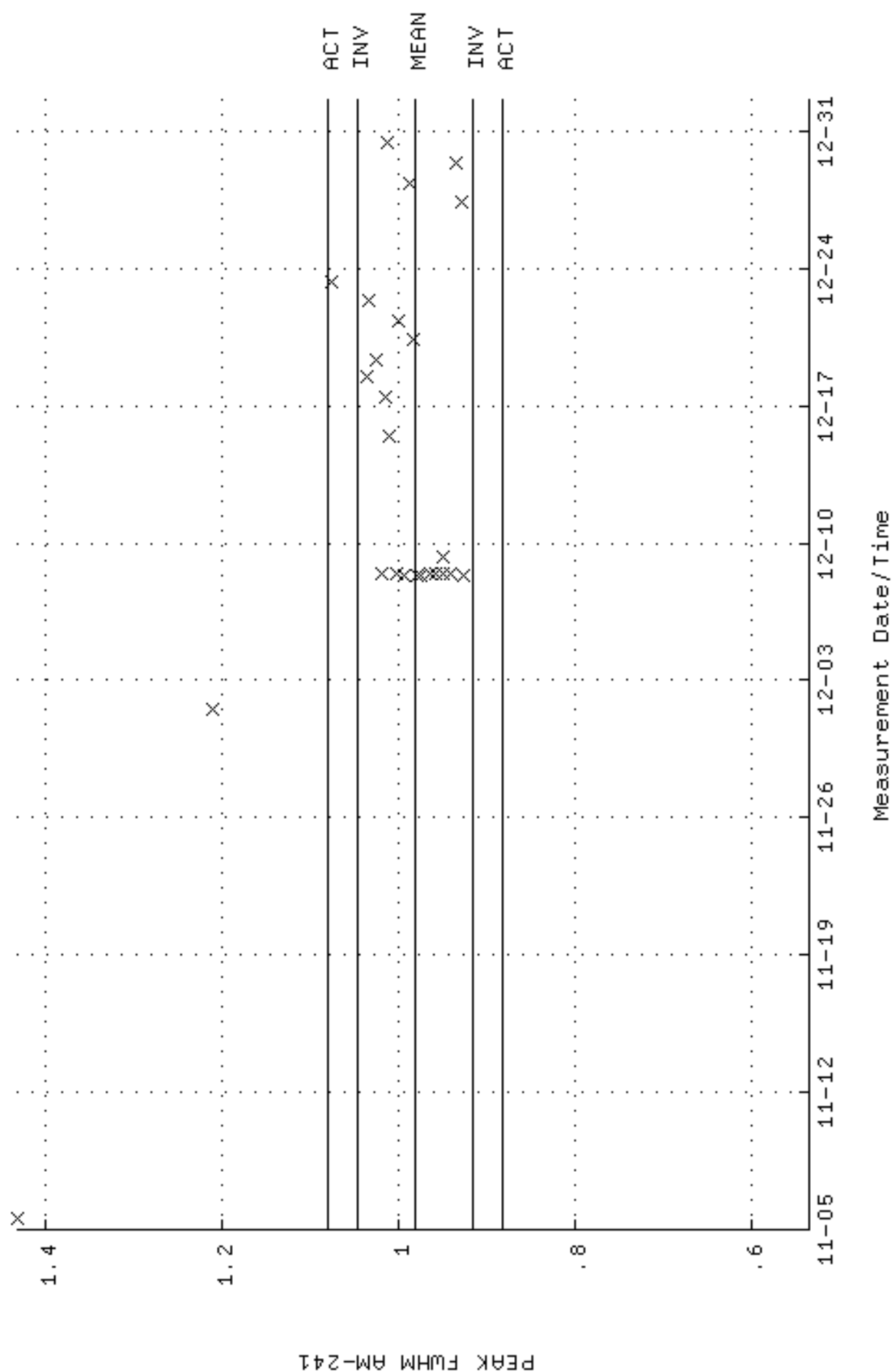
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM40_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 5-NOV-2016 13:49:58 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



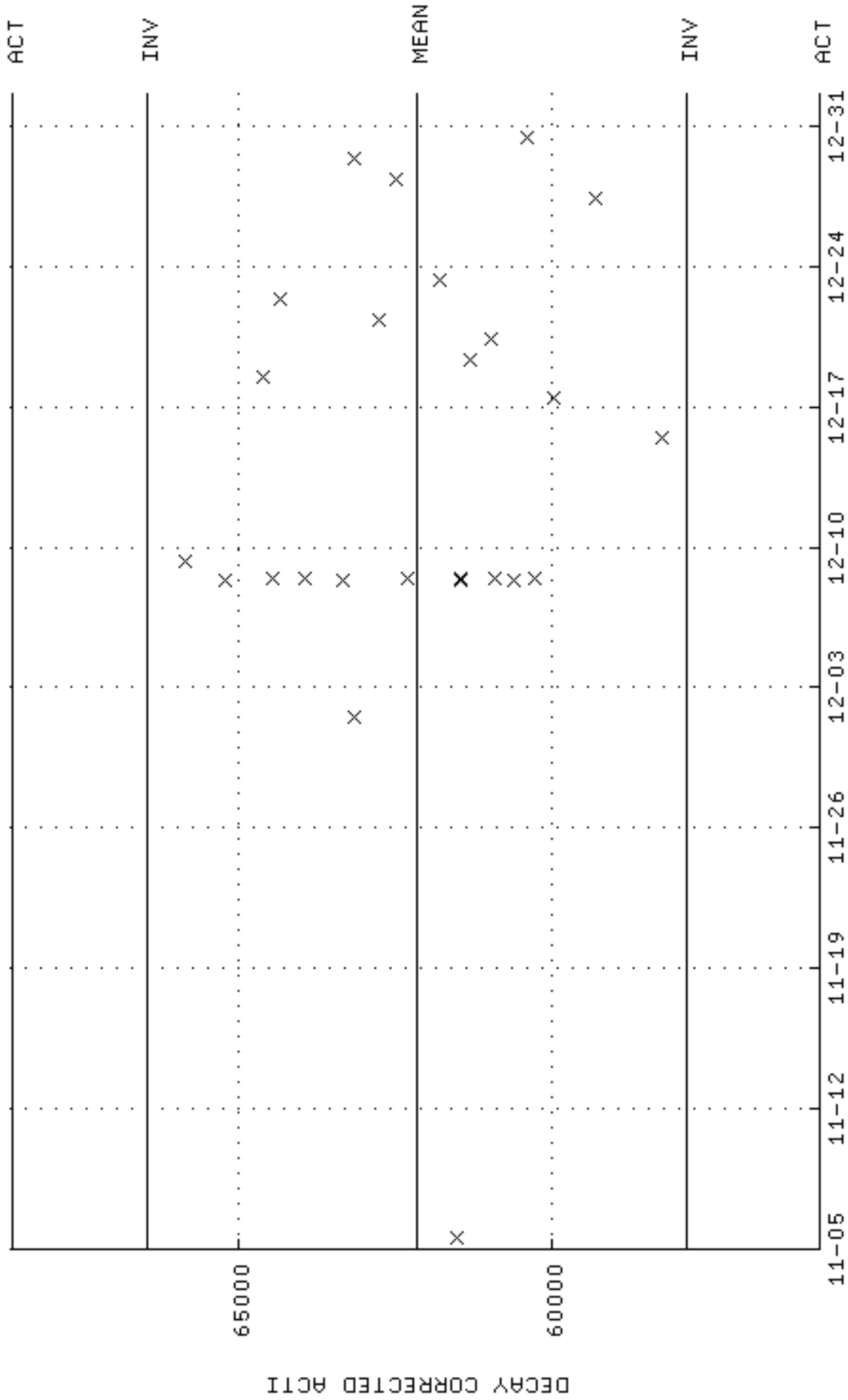
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QA filename      : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM40_CAN.QAF;1
Parameter Name   : PSFWHM-59 (PEAK FWHM AM-241)
Start/End Dates  : 5-NOV-2016 13:49:58 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 0.981988 +- 3.301333E-02 (3.36 %)

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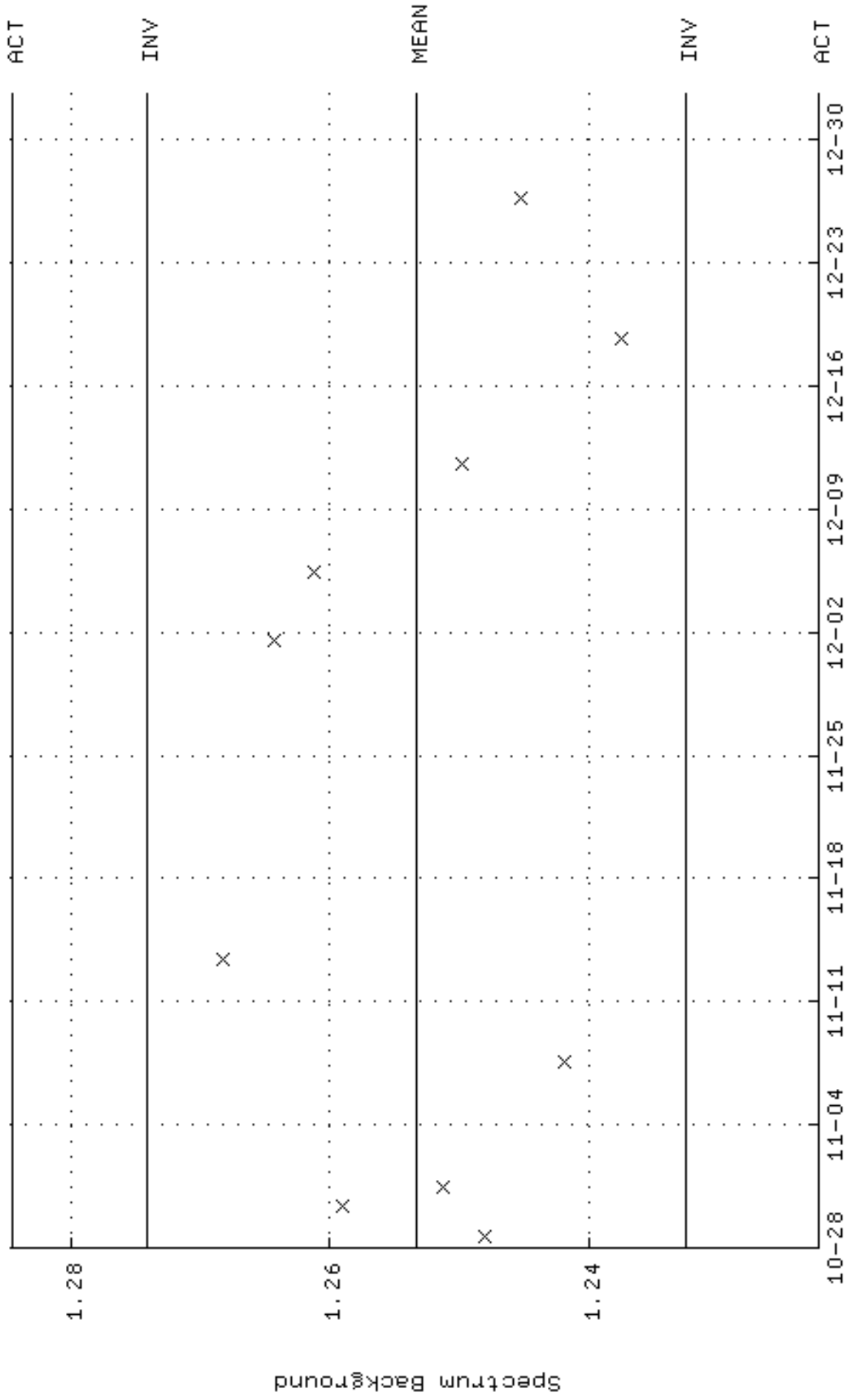


QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM40_CAN.QAF;1
Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
Start/End Dates : 5-NOV-2016 13:49:58 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 62167.9 +- 2139.46 (3.44 %)

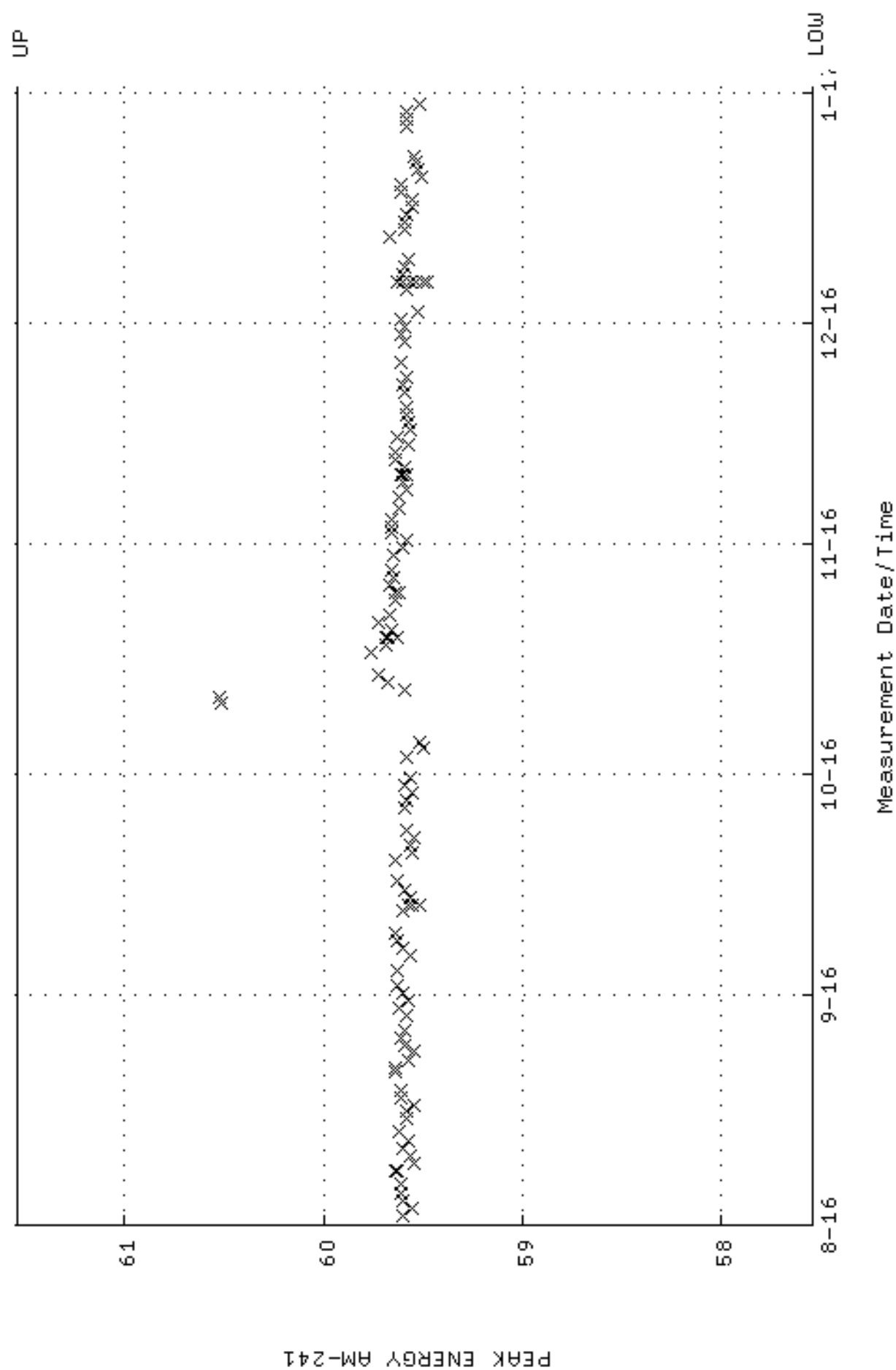


Measurement Date/Time

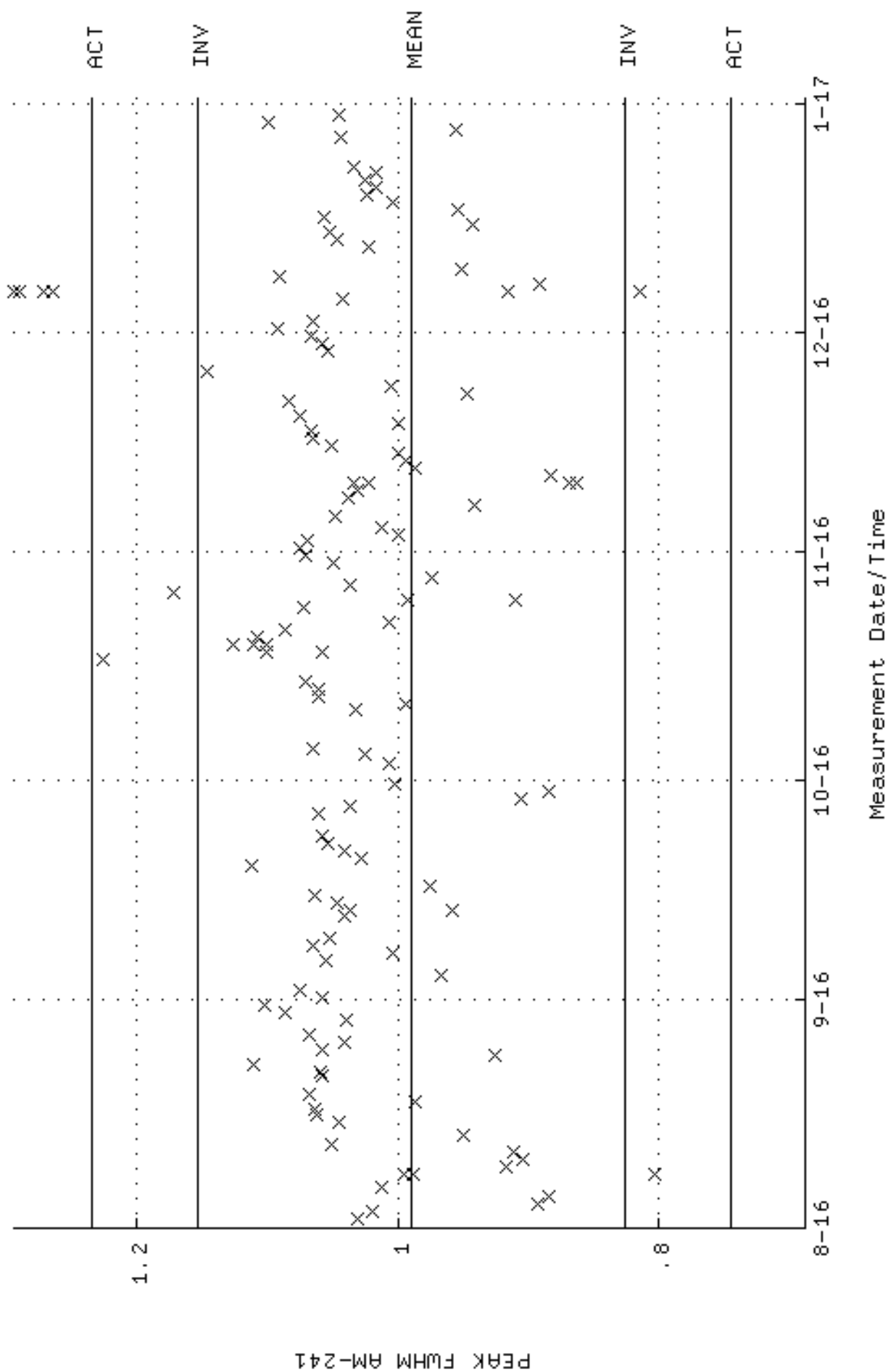
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM40.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 28-OCT-2016 14:31:46 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.25338 +- 1.041276E-02 (0.83 %)



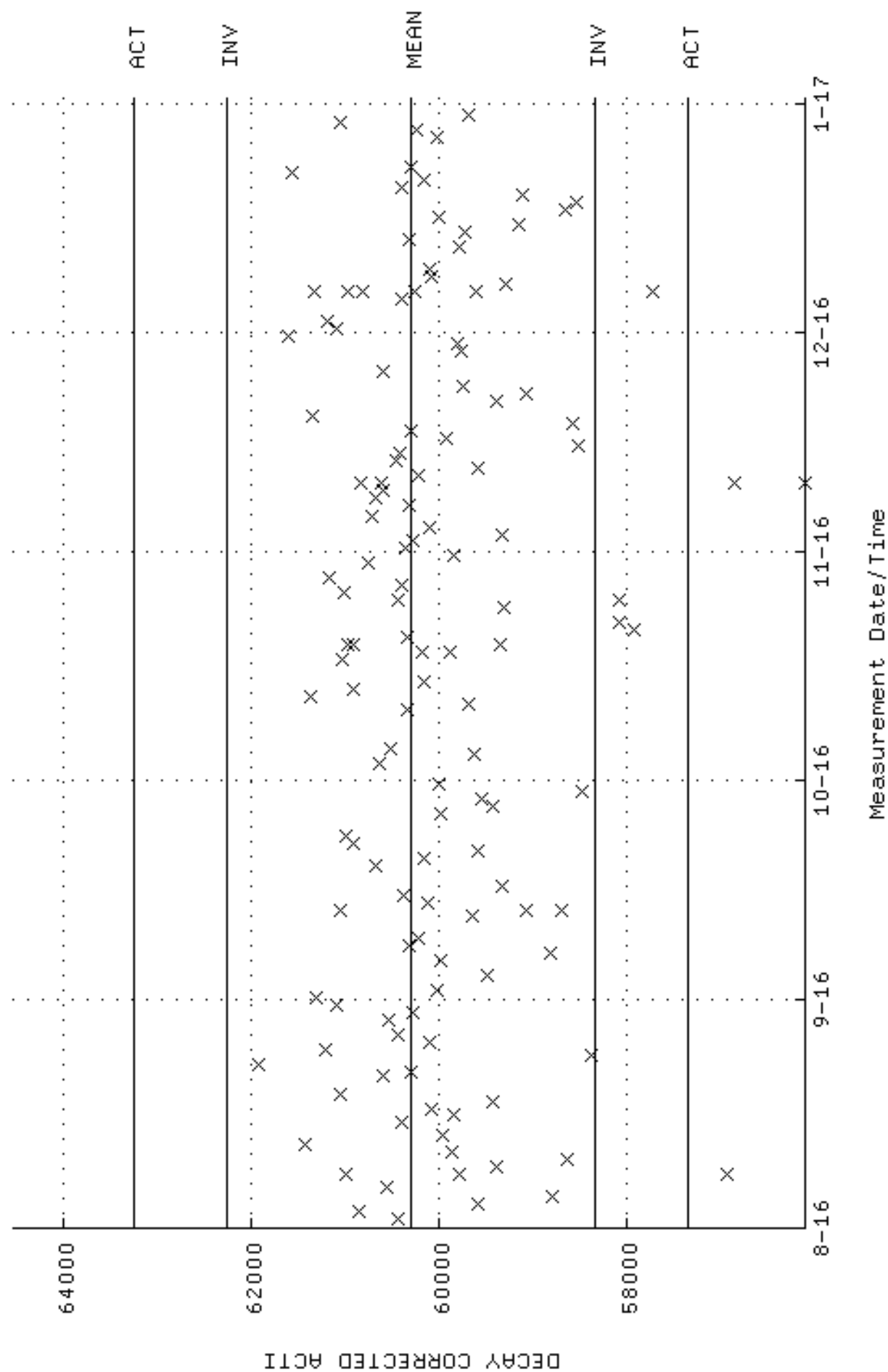
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM41_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-AUG-2016 07:05:38 through 1-JAN-2017 12:00:00
 Lower/Upper Lmts: 57.5400 through 61.5400



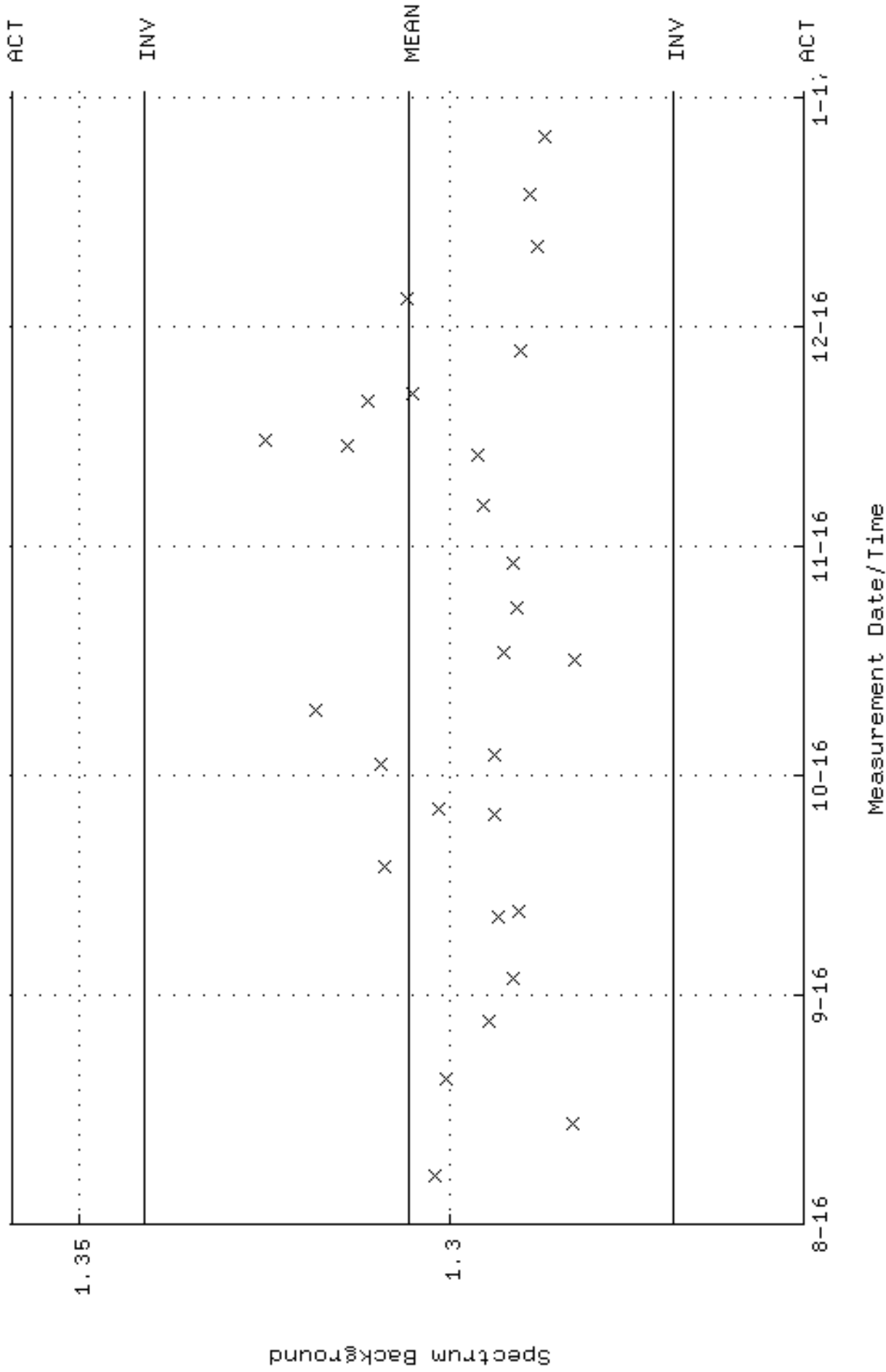
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM41-CAN.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-AUG-2016 07:05:38 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 0.990192 +- 8.157611E-02 (8.24 %)



QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM41-CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-AUG-2016 07:05:38 through 1-JAN-2017 12:00:00
 Mean +- Std Dev : 60310.9 +- 980.348 (1.63 %)



QA filename : DKA100:[CANSBERRA.GAMMA.SCUSR.QA]LBC_GAM41.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 7-AUG-2016 16:02:53 through 1-JAN-2017 12:00:00
Mean +- Std Dev : 1.30554 +- 1.779819E-02 (1.36 %)



RAD Standards Traceability

1604

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

90616

2.0 Liter Solid in 230G GA-MA Beaker

Customer: GEL Laboratories, LLC

P.O. No.: 188182RD, Item 1

Reference Date: 01-Apr-2012

12:00 PM EST

Grams of Master Source: 0.0083625

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Additional radionuclides were added gravimetrically from solutions calibrated by gamma-ray spectrometry, ionization chamber, or liquid scintillation counting. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST." EZA is accredited by the Health Physics Society (HPS) for the production of NIST-traceable sources, and this source was produced in accordance with the HPS accreditation requirements. Customers may report any concerns with the accreditation program to the HPS Secretariat, 1313 Dolley Madison Blvd., Ste. 402, McLean, VA 22101.

Density of solid matrix 1.15 g/cc.

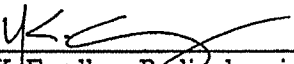
Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* yps/gram	This Source yps	Uncertainty*, %			Calibration Method*
					Type	u _A	u _B	U
Pb-210	46.5	8.109E+03	—	1.469E+03	0.1	2.1	4.1	4π LS
Am-241	59.5	1.580E+05	—	9.196E+02	0.1	1.7	3.5	4π LS
Cd-109	88.0	4.626E+02	1.664E+05	1.391E+03	0.5	2.3	4.7	HPGe
Co-57	122.1	2.718E+02	8.863E+04	7.411E+02	0.4	2.0	4.1	HPGe
Ce-139	165.9	1.376E+02	1.239E+05	1.036E+03	0.4	1.9	3.9	HPGe
Hg-203	279.2	4.661E+01	2.641E+05	2.208E+03	0.3	1.9	3.8	HPGe
Sn-113	391.7	1.151E+02	1.742E+05	1.456E+03	0.4	1.9	3.9	HPGe
Cs-137	661.7	1.098E+04	1.114E+05	9.317E+02	0.7	1.9	4.0	HPGe
Y-88	898.0	1.066E+02	4.157E+05	3.476E+03	0.5	1.9	3.9	HPGe
Zn-65	1115.6	2.441E+02	—	1.695E+03	0.1	1.7	3.5	IC
Co-60	1173.2	1.925E+03	2.084E+05	1.743E+03	0.6	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.084E+05	1.743E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.401E+05	3.680E+03	0.7	1.9	4.0	HPGe

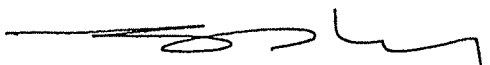
* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

(Certificate continued on reverse side)



Source Prepared by: 
K. Eardley, Radiochemist

QA Approved: 
J.D. McCorvey, Counting Room Manager

Date: 26 APR 12



Standard Logbook

Serial ID:	<u>1604</u>	Open/Reference Date:	<u>01-APR-12</u>	Aliquot :	<u>1 mL</u>
Name:	<u>Mixed Gamma LCS 2LMB</u>	Received:	<u>01-APR-12</u>	Density :	<u>Hand Calculated</u>
Type:	<u>Source Material</u>	Expires:	<u>01-APR-38</u>	Lot Number :	<u>90616</u>
Employee:	<u>Maggie Stamps</u>	Verified:	<u>10-SEP-13</u>		
Supplier:	<u>Eckert & Zeigler Analytics</u>				
Description:	<u>90616</u>				
Comments:	<u>None</u>				

Analyte	Concentration	Analyte	Concentration
Americium-241	153693.59 dpm/mL	Cesium-137	65689.78 dpm/mL
Cobalt-60	104600.92 dpm/mL		

Verification for Mixed Gamma Standard

1604

2LMB

V1.1.1

M. Stamps
9/10/2013

Isotope	Result
Am-241	pCi/L
Mixed Gamma N1	75130
Mixed Gamma N2	74490
Mixed Gamma N3	74280

Isotopic Abundance:
Certificate Value (dps):

0.359
919.6

Mean Value (Counting) =
Stdev =

74633.33
442.757

pCi/L
pCi/L

107.8028
Rule B (Pass/Fail)

*Exception taken due to the high uncertainty of the certified value

Certificate Value =
Two sigma =
10 % of Mean =
Rule A (Pass/Fail)

69231.3
885.513034
7463.333333
Pass

pCi/L

Stamp 9/11/13
R. Futed 9/11/13

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

Verification for Mixed Gamma Standard

1604

2LMB

VI.1.1

M. Stamps
9/10/2013

Isotope	Result
Cs-137	pCi/L
Mixed Gamma N1	30140
Mixed Gamma N2	29700
Mixed Gamma N3	30170

Isotopic Abundance:
Certificate Value (dps):
0.851
931.7

Mean Value (Counting) =
Stdev =

101.3969

Pass
Rule B (Pass/Fail)

Certificate Value =
Two sigma =
10 % of Mean =
Rule A (Pass/Fail)

30003.33
263.122
29590.0
526.2445566
3000.333333
Pass

pCi/L
pCi/L
pCi/L

Handwritten:
Hoffman 9/11/13
R. Eitel 9/11/13

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
Rule B = The determined mean value shall be within 5% of the certificate value.

Verification for Mixed Gamma Standard 1604 2LMB

v1.1.1

M. Stamps
9/10/2013

Isotope	Result
Co-60 (1173)	pCi/L
Mixed Gamma N1	47190
Mixed Gamma N2	47310
Mixed Gamma N3	46930

Isotopic Abundance:
Certificate Value (dps):
0.9985
1743

Mean Value (Counting) =
Stdev =

pCi/L 99.92466
pCi/L

Pass
Rule B (Pass/Fail)

Certificate Value =
Two sigma =
10 % of Mean =
Rule A (Pass/Fail)

47143.33
194.251
47178.9
388.5013942
4714.333333
Pass

pCi/L

Verification Rules

Rule A = The two sigma value used for the 95% confidence Interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

M. Stamps 9/10/13

R. Finkel 9/10/13

Verification for Mixed Gamma Standard 1604 2LMB

v1.1.1

M. Stamps
9/10/2013

Isotope	Result
Co-60 (1332.50)	pCi/L
Mixed Gamma N1	47960
Mixed Gamma N2	47810
Mixed Gamma N3	47610

Isotopic Abundance:
Certificate Value (dps):
0.9998
1743

Mean Value (Counting) =
Stddev =

47793.33
175.594

101.4343
Pass
Rule B (Pass/Fail)

Certificate Value =
Two sigma =
10 % of Mean =
Rule A (Pass/Fail)

47117.5
351.1884584
4779.333333
Pass

M. Stamps 9/10/13
R. Fiedel 9/11/13

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

```

*****
*                                     *
*               GEL Laboratories LLC   *
*               2040 Savage Road       *
*               Charleston, SC 29407   *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_1604_1.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM02.CNF;337
Background date    : 8-SEP-2013 12:49:53.
Sample date       : 1-APR-2012 12:00:00. Acquisition date : 10-SEP-2013 11:37:30
Sample ID        : VER_1604_1         Sample quantity   : 1.00000E+00 SAMPLE
Detector name     : GAM02             Detector geometry: 2LMB
Elapsed live time : 0 01:00:00.00     Elapsed real time: 0 01:00:19.23 0.5%
Energy tolerance  : 1.50000 keV       Analyst Initials :
Abundance limit   : 75.00000          Sensitivity       : 3.00000
Batch ID          :                   Detector SN#        :
Matrix Spike ID   :                   LCS ID              :
*****

```

BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.36*	9384	12119	1.02	93.25	89	8	2.61E+00	2.2	
2	0	49.48	326	8652	2.23	99.50	98	6	9.05E-02	45.4	
3	0	59.40	26066	15259	1.06	119.34	114	11	7.24E+00	1.1	
4	0	74.53*	360	8984	1.12	149.57	147	6	1.00E-01	42.1	
5	0	87.94	45653	15875	1.07	176.38	170	11	1.27E+01	0.7	
6	0	121.99	17866	9583	1.09	244.45	239	11	4.96E+00	1.3	
7	0	136.43	2455	6695	1.14	273.32	269	9	6.82E-01	6.3	
8	0	165.80	6854	6504	1.06	332.03	327	10	1.90E+00	2.5	
9	0	255.01	236	3077	1.27	510.37	508	6	6.56E-02	37.7	
10	0	362.97	150	2202	1.12	726.22	724	7	4.18E-02	52.4	
11	0	391.65	3391	3151	1.24	783.56	779	10	9.42E-01	3.5	
12	0	486.03	51	1773	1.10	972.25	969	7	1.42E-02	137.0	
13	0	511.19*	1082	4028	2.64	1022.56	1014	17	3.00E-01	13.8	
14	0	645.71	75	1237	1.05	1291.52	1289	7	2.10E-02	78.1	
15	0	661.60*	34258	2748	1.51	1323.29	1315	16	9.52E+00	0.6	
16	0	688.94	66	1093	1.43	1377.95	1373	7	1.83E-02	84.4	
17	0	897.97	3274	2348	1.67	1795.91	1790	11	9.09E-01	3.4	
18	0	948.95	137	1261	1.37	1897.85	1895	6	3.79E-02	42.2	
19	0	1107.34	43	1003	1.68	2214.56	2209	7	1.20E-02	123.3	
20	0	1115.50	10172	2229	1.91	2230.90	2223	16	2.83E+00	1.4	
21	0	1173.18*	34369	1384	1.94	2346.24	2336	20	9.55E+00	0.6	
22	0	1285.81	29	225	1.50	2571.47	2566	11	8.05E-03	102.0	
23	0	1332.45	31522	482	2.03	2664.74	2654	20	8.76E+00	0.6	
24	0	1441.92	24	140	0.55	2883.67	2873	14	6.67E-03	106.6	
25	0	1453.76	42	115	5.04	2907.33	2901	13	1.17E-02	54.5	
26	0	1835.97	1994	109	2.37	3671.77	3662	19	5.54E-01	2.6	
27	0	1915.22	42	22	5.44	3830.27	3822	16	1.16E-02	30.3	
28	0	1983.72	26	51	6.03	3967.28	3957	20	7.32E-03	68.7	
29	0	2035.45	21	36	1.42	4070.77	4064	13	5.96E-03	61.4	
30	0	2043.53	19	3	1.49	4086.92	4085	6	5.15E-03	30.0	

Flag: "*" = Peak area was modified by background subtraction

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/SAMPLE	Decay Corr pCi/SAMPLE	2-Sigma %Error
CO-57	122.06	17866	85.60*	2.569E+00	6.100E+03	2.340E+04	2.60
	136.47	2455	10.68	2.594E+00	6.654E+03	2.552E+04	12.68
CO-60	1173.23	34369	99.85	6.620E-01	3.903E+04	4.719E+04	1.20
	1332.49	31522	99.98*	5.967E-01	3.967E+04	4.796E+04	1.18
ZN-65	1115.54	10172	50.60*	6.899E-01	2.188E+04	9.772E+04	2.87
Y-88	898.04	3274	93.70	8.218E-01	3.192E+03	9.814E+04	6.71
	1836.06	1994	99.20*	4.697E-01	3.212E+03	9.877E+04	5.14
CD-109	88.03	45653	3.70*	2.009E+00	4.611E+05	1.018E+06	1.42
SN-113	391.70	3391	64.97*	1.496E+00	2.619E+03	6.260E+04	7.08
CS-137	661.66	34258	85.10*	1.037E+00	2.915E+04	3.014E+04	1.28
CE-139	165.86	6854	80.00*	2.492E+00	2.581E+03	3.667E+04	5.03
PB-210	46.54	9384	4.25*	1.966E-01	8.432E+05	8.821E+05	4.46
AM-241	59.54	26066	35.90*	7.272E-01	7.496E+04	7.513E+04	2.23

Flag: "*" = Keyline

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_1604_2.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM02.CNF;337
Background date    : 8-SEP-2013 12:49:53.
Sample date       : 1-APR-2012 12:00:00. Acquisition date : 10-SEP-2013 13:16:34
Sample ID        : VER_1604_2          Sample quantity   : 1.00000E+00 SAMPLE
Detector name    : GAM02              Detector geometry  : 2LMB
Elapsed live time: 0 01:00:00.00      Elapsed real time: 0 01:00:19.27 0.5%
Energy tolerance : 1.50000 keV        Analyst Initials  :
Abundance limit  : 75.00000           Sensitivity       : 3.00000
Batch ID        :                     Detector SN#       :
Matrix Spike ID :                     LCS ID            :
*****

```

BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.32*	10422	13762	1.07	93.18	88	10	2.90E+00	2.3	
2	0	59.42	25879	14577	1.06	119.38	114	10	7.19E+00	1.1	
3	0	87.94	45177	15299	1.06	176.39	171	11	1.25E+01	0.7	
4	0	121.99	17996	9705	1.10	244.44	239	11	5.00E+00	1.3	
5	0	136.41	2598	6698	1.09	273.29	269	9	7.22E-01	6.0	
6	0	165.82	6770	6608	1.08	332.07	328	10	1.88E+00	2.6	
7	0	185.74*	168	4402	1.70	371.90	369	7	4.66E-02	66.1	
8	0	254.58	141	3659	0.71	509.51	508	7	3.93E-02	71.5	
9	0	310.16	180	2182	1.83	620.64	618	6	5.01E-02	41.7	
10	0	343.60	51	2738	2.13	687.49	685	8	1.42E-02	177.4	
11	0	391.63	3275	3565	1.25	783.52	778	11	9.10E-01	3.9	
12	0	451.64	99	2120	1.61	903.48	900	7	2.74E-02	78.1	
13	0	510.95*	1238	3587	2.26	1022.07	1014	16	3.44E-01	11.2	
14	0	556.03	120	1368	1.81	1112.21	1109	7	3.34E-02	51.9	
15	0	601.63	162	1985	0.65	1203.38	1198	11	4.49E-02	53.9	
16	0	661.59*	33762	2749	1.50	1323.25	1316	15	9.38E+00	0.6	
17	0	897.98	3328	2599	1.74	1795.93	1790	12	9.24E-01	3.5	
18	0	905.64	139	1635	1.44	1811.24	1809	8	3.85E-02	51.3	
19	0	955.55	125	2001	2.34	1911.05	1906	9	3.48E-02	65.0	
20	0	1115.46	10046	2283	1.92	2230.80	2221	17	2.79E+00	1.5	
21	0	1173.13*	34458	1515	1.93	2346.14	2336	20	9.57E+00	0.6	
22	0	1325.60	21	303	1.55	2651.04	2642	11	5.85E-03	161.4	
23	0	1332.42	31424	499	2.06	2664.67	2654	20	8.73E+00	0.6	
24	0	1483.08	10	157	3.71	2965.98	2963	13	2.89E-03	249.7	
25	0	1765.99*	21	56	4.06	3531.79	3524	14	5.78E-03	80.8	
26	0	1836.00	2057	75	2.59	3671.82	3661	22	5.71E-01	2.5	
27	1	1994.40*	32	6	2.75	3988.66	3983	29	8.86E-03	24.7	1.23E+00
28	1	1998.57	28	11	2.50	3997.00	3983	29	7.71E-03	37.5	
29	1	2004.07	32	8	2.51	4008.00	3983	29	8.91E-03	22.5	
30	0	2044.20	12	5	0.91	4088.27	4087	4	3.33E-03	43.3	

Flag: "*" = Peak area was modified by background subtraction

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/SAMPLE	Decay Corr pCi/SAMPLE	2-Sigma %Error
CO-57	122.06	17996	85.60*	2.569E+00	6.144E+03	2.357E+04	2.60
	136.47	2598	10.68	2.594E+00	7.041E+03	2.701E+04	12.03
CO-60	1173.23	34458	99.85	6.620E-01	3.913E+04	4.731E+04	1.21
	1332.49	31424	99.98*	5.967E-01	3.954E+04	4.781E+04	1.18
ZN-65	1115.54	10046	50.60*	6.899E-01	2.160E+04	9.652E+04	2.95
Y-88	898.04	3328	93.70	8.218E-01	3.245E+03	9.981E+04	7.04
	1836.06	2057	99.20*	4.697E-01	3.314E+03	1.019E+05	4.92
CD-109	88.03	45177	3.70*	2.009E+00	4.562E+05	1.007E+06	1.42
SN-113	391.70	3275	64.97*	1.496E+00	2.529E+03	6.048E+04	7.88
CS-137	661.66	33762	85.10*	1.037E+00	2.873E+04	2.970E+04	1.28
CE-139	165.86	6770	80.00*	2.492E+00	2.549E+03	3.623E+04	5.11
PB-210	46.54	10422	4.25*	1.955E-01	9.416E+05	9.850E+05	4.65
AM-241	59.54	25879	35.90*	7.282E-01	7.431E+04	7.449E+04	2.15

Flag: "*" = Keyline


```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]VER_1604_3.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM02.CNF;337
Background date    : 8-SEP-2013 12:49:53.
Sample date       : 1-APR-2012 12:00:00. Acquisition date : 10-SEP-2013 14:47:41
Sample ID        : VER_1604_3          Sample quantity   : 1.00000E+00 SAMPLE
Detector name    : GAM02              Detector geometry: 2LMB
Elapsed live time: 0 01:00:00.00      Elapsed real time: 0 01:00:19.26 0.5%
Energy tolerance : 1.50000 keV        Analyst Initials  :
Abundance limit  : 75.00000           Sensitivity      : 3.00000
Batch ID        :                     Detector SN#       :
Matrix Spike ID :                     LCS ID            :
*****

```

BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.36*	10375	12772	1.06	93.26	88	9	2.88E+00	2.2	
2	0	49.80	266	8735	1.41	100.14	98	6	7.40E-02	55.7	
3	0	59.40	25771	14375	1.05	119.34	114	10	7.16E+00	1.1	
4	0	66.59	319	11783	1.88	133.70	132	8	8.87E-02	59.0	
5	0	87.96	44634	13685	1.06	176.42	172	10	1.24E+01	0.7	
6	0	121.99	17524	9604	1.09	244.46	239	11	4.87E+00	1.3	
7	0	136.41	2439	6746	1.04	273.28	269	9	6.77E-01	6.4	
8	0	165.78	6865	6531	1.04	332.00	327	10	1.91E+00	2.5	
9	0	178.02	192	3059	1.31	356.46	355	5	5.33E-02	43.8	
10	0	254.79	183	3186	1.82	509.93	508	6	5.10E-02	49.2	
11	0	300.38	167	2351	1.52	601.09	599	6	4.64E-02	46.5	
12	0	391.64	3394	3141	1.32	783.54	779	10	9.43E-01	3.5	
13	0	459.40	104	2491	1.19	919.01	914	8	2.88E-02	83.9	
14	0	473.29	152	2337	2.24	946.78	943	8	4.23E-02	55.7	
15	0	510.81*	882	3183	2.08	1021.80	1016	13	2.45E-01	13.7	
16	0	573.13	166	1590	1.41	1146.39	1142	9	4.60E-02	44.0	
17	0	599.01	66	1705	2.31	1198.14	1196	9	1.85E-02	112.8	
18	0	661.58*	34292	2697	1.52	1323.24	1316	15	9.53E+00	0.6	
19	0	688.76	66	1331	1.58	1377.59	1375	8	1.82E-02	97.0	
20	0	813.79	134	1629	1.93	1627.57	1623	9	3.73E-02	54.8	
21	0	898.08	3504	3356	1.64	1796.13	1789	16	9.73E-01	4.1	
22	0	911.00*	78	1429	1.17	1821.95	1820	7	2.16E-02	81.3	
23	0	965.31*	81	1294	1.54	1930.56	1928	7	2.25E-02	74.7	
24	0	991.06	61	1347	1.06	1982.04	1979	8	1.69E-02	105.1	
25	0	1043.88	167	1514	4.20	2087.66	2082	11	4.65E-02	45.8	
26	0	1115.47	10278	1965	1.83	2230.82	2223	15	2.85E+00	1.4	
27	0	1173.14*	34180	1684	1.96	2346.15	2335	22	9.49E+00	0.6	
28	0	1293.89	41	418	5.28	2587.61	2573	18	1.14E-02	117.8	
29	0	1332.40	31292	466	2.09	2664.63	2655	19	8.69E+00	0.6	
30	0	1430.52	23	83	0.74	2860.86	2857	8	6.48E-03	71.5	
31	0	1548.49	38	179	0.58	3096.80	3087	15	1.04E-02	80.1	
32	0	1807.47	13	37	1.38	3614.75	3607	10	3.51E-03	86.1	
33	0	1835.95	2048	119	2.56	3671.72	3659	22	5.69E-01	2.6	
34	0	1942.51	19	48	1.42	3884.86	3878	17	5.39E-03	84.1	

Sample ID : VER_1604_3

Acquisition date : 10-SEP-2013 14:47:41

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	1987.25	14	24	0.88	3974.36	3969	9	3.90E-03	68.9	

Flag: "*" = Peak area was modified by background subtraction

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/SAMPLE	Decay Corr pCi/SAMPLE	2-Sigma %Error
CO-57	122.06	17524	85.60*	2.569E+00	5.983E+03	2.295E+04	2.65
	136.47	2439	10.68	2.594E+00	6.609E+03	2.536E+04	12.82
CO-60	1173.23	34180	99.85	6.620E-01	3.882E+04	4.693E+04	1.24
	1332.49	31292	99.98*	5.967E-01	3.938E+04	4.761E+04	1.18
ZN-65	1115.54	10278	50.60*	6.899E-01	2.210E+04	9.877E+04	2.72
Y-88	898.04	3504	93.70	8.217E-01	3.417E+03	1.051E+05	8.14
	1836.06	2048	99.20*	4.697E-01	3.299E+03	1.015E+05	5.17
CD-109	88.03	44634	3.70*	2.010E+00	4.506E+05	9.948E+05	1.37
SN-113	391.70	3394	64.97*	1.496E+00	2.621E+03	6.271E+04	7.07
CS-137	661.66	34292	85.10*	1.037E+00	2.918E+04	3.017E+04	1.27
CE-139	165.86	6865	80.00*	2.493E+00	2.585E+03	3.675E+04	5.03
PB-210	46.54	10375	4.25*	1.967E-01	9.316E+05	9.746E+05	4.39
AM-241	59.54	25771	35.90*	7.272E-01	7.411E+04	7.428E+04	2.14

Flag: "*" = Keyline

Runlogs

Instrument Run Log

Instrument Type: GAMMA SPECTROMETER

Batch ID: 1624165

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
412372001	SAMPLE	MXR1	GAM24	DEC-20-16 15:57:00	DONE 2LMB		13-JUN-16 00:00
412372002	SAMPLE	MXR1	GAM33	DEC-20-16 15:57:21	DONE 2LMB		08-JUN-16 00:00
412372003	SAMPLE	MXR1	GAM24	DEC-21-16 08:38:51	DONE 2LMB		13-JUN-16 00:00
412372004	SAMPLE	MXR1	GAM25	DEC-21-16 08:39:11	DONE 2LMB		01-AUG-16 00:00
412372005	SAMPLE	MXR1	GAM28	DEC-21-16 08:39:29	DONE 2LMB		01-AUG-16 00:00
412372006	SAMPLE	MXR1	GAM40	DEC-21-16 08:39:51	DONE 2LMB		11-NOV-16 00:00
412372007	SAMPLE	MXR1	GAM41	DEC-21-16 08:40:20	DONE 2LMB		27-JAN-16 00:00
412372008	SAMPLE	MXR1	GAM01	DEC-21-16 09:14:49	DONE 2LMB		21-JUL-16 00:00
412372009	SAMPLE	MXR1	GAM07	DEC-21-16 09:15:39	DONE 2LMB		22-AUG-16 00:00
412372010	SAMPLE	MXR1	GAM29	DEC-21-16 09:16:06	DONE 2LMB		30-JUN-16 00:00
412372011	SAMPLE	MXR1	GAM30	DEC-21-16 09:16:32	DONE 2LMB		15-MAR-16 00:00
1203690080	LCS	MXR1	GAM40	DEC-21-16 10:51:15	DONE 2LMB		11-NOV-16 00:00
412372012	SAMPLE	MXR1	GAM02	DEC-21-16 11:53:40	DONE 2LMB		23-AUG-16 00:00
412372013	SAMPLE	MXR1	GAM06	DEC-21-16 11:54:02	DONE 2LMB		09-MAR-16 00:00
412372014	SAMPLE	MXR1	GAM41	DEC-21-16 11:54:24	DONE 2LMB		27-JAN-16 00:00
1203690078	MB	MXR1	GAM40	DEC-21-16 11:54:51	DONE 2LMB		11-NOV-16 00:00
1203690079	DUP	MXR1	GAM30	DEC-21-16 11:55:34	DONE 2LMB		15-MAR-16 00:00

Gas Flow Raw Data

Batch# 1625914 Product: Sr-90 Date: 1/6/17

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required). Blank correction reported included (if required).			NA
If activity less than 10x MDA/MDC, error is less than or equal to 150% of sample activity. If greater than 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5* MDA/ MDC, then RPD is 100% or less, If greater 5* MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).	✓		
Method blank is less than the RDL/ LLD. (If rad samples. < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved If required.	✓		
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs Initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stasured.	✓		
MS, LCS, and Duplicate RPD/RER values uploaded to LIM5 and values verified	✓		
Hit notification complete (if necessary)			NA
Batch entered into Case Narrative.	✓		
Batch Data Exception Reports (DER) completed, if applicable.			NA
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.			NA
Aliquot Correction completed If required.			NA
Review sample historical results if available (If REMF, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

Primary Review Performed By: Wost 1/6/17

Secondary Review Performed By: mkh [signature]

HAA
1/10

Prep Logbook

Sr Drinking Water

The Determination of Strontium-89/90 in Drinking Water by EPA Method 905.0

Batch ID: 1625914

Analyst: Bethany Fiem

Method: EPA 905.0

Lab SOP: GL-RAD-A-029 REV# 13

Instrument: GFC-51204863

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203694694	Strontium-90 SPIKE	1243-Q	.1	mL

Sample ID	Prep Date	Aliquot (mL)	Initial Weight (g)	Final Weight (g)	Net Weight (mg)	Sr Separation (date)	Strontium Carrier Yield (percent)
412372003	29-DEC-2016 16:20	300	0.0777	0.0998	22.1	01/05/17 13:46	71
1203694692 MB	29-DEC-2016 16:20	300	0.0771	0.1003	23.2	01/05/17 13:46	75
1203694693 DUP (412372003)	29-DEC-2016 16:20	300	0.0771	0.0977	20.6	01/05/17 13:46	66
1203694694 LCS	29-DEC-2016 16:20	300	0.0748	0.0989	24.1	01/05/17 13:46	75

Comments:
Spike Pipet ID: RAD-GFC-1795419
Carrier Pipet ID: RAD-GFC-15505391
Data Entry Date2: 05-JAN-2017 09:24 GFC-F30560 Bethany Fiem
Data Entry Date3: 29-DEC-2016 00:00

Reagent/Solvent Lot ID	Description	Amount
2064611.2	Phenolphthalein, 1.0% in 50% Alcohol	1 mL
2092660	RGF-Methyl Red Indicator	.5 mL
2234994	Barium Carrier 10mg/mL (Sr)	2 mL
2235023	RGF-Ammonium Acetate Buffer	5 mL
2236342	RGF-5.8M Acetic Acid	3 mL
2238278	RGF-2M Sodium Carbonate	60 mL
2243751	RGF-6M Sodium Hydroxide	5 mL
2387997	RGF-6M Nitric Acid	5 mL
2443640	RGF-0.5M Sodium Chromate	2 mL
2467154.2	14m Ammonium Hydroxide poly Coated Bottle	24 mL
2473254	Sr 0.5mL = 7.75; 2.0 mL = 31.00 mg	2 mL
2490809	1M HNO3	6 mL
2493929.3	16M Nitric Acid Poly Coated Bottle	45 mL
2496523	RGF-Yttrium Carrier	.5 mL

Strontium-90 Liquid

Filename : SR90.XLS
 File type : Excel
 Version # : 1.3.10

Carrier S/N : 2473254
 Carrier Exp Date : 11/2/2017
 Carrier Volume Added: 2.00
 Carrier Weight (mg/ml): 15.50
 Carrier Weight StDev.: 0.12

Batch : 1625914
 Analyst : BET01177
 Prep Date : 12/29/2016
 Method Uncertainty : 0.1344

Procedure Code : GFC90SRD
 Parmname : Strontium-90
 Required MDA : 2 pCi/L
 Sr-90 Abundance : 1.00 years
 Half-life of Sr-90 : 28.90 hours
 Half-life of Y-90 : 64.053 hours

Geometry: Tuffryn Filter

Sample Characteristics			Carrier Calculations			
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Carrier Weight (mg) (Standard)	Net Weight (mg) (Sample)
1	412372003.1	0.3000	1.8459E-05	12/7/2016 7:59	15.50	22.10
2	1203694692.1	0.3000	1.8459E-05	12/29/2016 0:00	15.50	23.20
3	1203694693.1	0.3000	1.8459E-05	12/7/2016 7:59	15.50	20.60
4	1203694694.1	0.3000	1.8459E-05	12/29/2016 0:00	15.50	24.10
					Net Weight StDev. (mg)	Carrier Aliquot (mL)
					0.102316	2.0
					0.107044	2.0
					0.095869	2.0
					0.110912	2.0
					Carrier Aliquot StDev. (mL)	Carrier Aliquot StDev. (mL)
					0.000200	0.000200
					0.000200	0.000200
					0.000200	0.000200

Analytical SOP: GL-RAD-A-029
Instrument SOP: GL-RAD-I-016

Page 2

Calibration Data				Calibration		Detector		Alpha		Weekly Bkg	Weekly Bkg	Weekly Bkg
Pos.	Counted on	Calibration Date	Due Date	Sr-90	Y-90	Efficiency (cpm/dpm)	Error (cpm/dpm)	X-Talk	CPM	Count Start Date/Time	Count Time (min.)	Count Time (min.)
1	PIC	3/1/2016	2/28/2017	0.4861	0.5091	0.00988	0.05397	0.544	0.544	12/30/2016 17:23	500	500
2	PIC	3/1/2016	2/28/2017	0.4753	0.4951	0.02297	0.06642	0.610	0.610	12/30/2016 17:23	500	500
3	PIC	3/1/2016	2/28/2017	0.4810	0.5105	0.01123	0.04915	0.746	0.746	12/30/2016 17:23	500	500
4	PIC	3/1/2016	2/28/2017	0.4749	0.5072	0.01614	0.03573	1.322	1.322	12/30/2016 17:23	500	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1243-Q
 LCS Exp Date : 9/27/2017
 LCS Activity (dpm/ml): 490.91
 LCS Volume Added: 0.10

Results													
Pos.	Decision Level		Critical Level	Required MDA	MDA pCi/L	Sample Act. Conc.		Sample Act. Error %	Net Count Rate		Net Count Rate Error		Total Prop. Uncertainty
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	CPM	CPM	pCi/L
1	0.8229	0.5810	2	1.3014	0.8697	0.8697	0.8697	46.75%	0.2080	0.0972	0.7965	0.8293	2 SIGMA
2	0.8480	0.5987	2	1.3330	-0.3420	-0.3420	-0.3420	100.03%	-0.0840	0.0840	0.6704	0.6705	2 SIGMA
3	0.9247	0.6528	2	1.4187	-0.1468	-0.1468	-0.1468	265.64%	-0.0325	0.0862	0.7641	0.7641	Total Prop. Uncertainty
4	1.4374	1.0148	2	2.2260	79.0764	79.0764	79.0764	3.54%	20.1357	0.6002	4.6201	21.6848	Counting Uncertainty
Sample QC													
Sample Type													
Sample RPD													
Sample RER													
Sample Nominal pCi/L													
Sample Recovery													
Sample MB													
Sample DUP													
Sample LCS													
Sample 412372003.1													
Sample 0.0%													
Sample 1.7666													
Sample 73.7105													
Sample 107.3%													

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
412372003	3C	90	6	68	1/5/2017 16:26	1/5/2017 17:56	PIC	1625914
1203694692	3D	90	10	48	1/5/2017 16:26	1/5/2017 17:56	PIC	1625914
1203694693	4A	120	28	87	1/5/2017 16:26	1/5/2017 18:26	PIC	1625914
1203694694	3B	60	43	1289	1/5/2017 16:26	1/5/2017 17:26	PIC	1625914

10-Jan-2017

Batch# 1625919 Product: Sr-90 Date: 1/10/17

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required). Blank correction reported included (if required).			NA
If activity less than 10x MDA/MDC, error is less than or equal to 150% of sample activity. If greater than 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.			
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5* MDA/ MDC, then RPD is 100% or less, If greater 5* MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		Case narrative
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).	✓		
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stasured.	✓		
MS, LCS, and Duplicate RPD/RER values uploaded to LIM5 and values verified	✓		
Hit notification complete (if necessary)			NA
Batch entered into Case Narrative.	✓		
Batch Data Exception Reports (DER) completed, if applicable.			NA
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.			NA
Aliquot Correction completed if required.			NA
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

Primary Review Performed By: W. Post 1/10/17

Secondary Review Performed By: [Signature]

HAAL
1/10

Prep Logbook

The Determination of Strontium 89/90 in Water, Soil, Milk, Filters, Vegetation and Tissues

Batch ID: 1625919

Analyst: Bethany Fiem

Method: EPA 905.0 Modified/DOE RP501 Rev. 1
Modified

Lab SOP: GL-RAD-A-004 REV# 17

Instrument: GFC-51204863

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203694708	Strontium-90 SPIKE	1243-Q	.1	mL

Sample ID	Prep Date	Aliquot (mL)	Initial Wt (g)	Final Wt (g)	Net Wt (mg)	Sr Separation (date)	Strontium Carrier Yield (percent)
412372001	04-JAN-2017 08:21	300	0.0214	0.0285	7.1	01/05/17 11:47	92
412372002	04-JAN-2017 08:21	300	0.0203	0.0274	7.1	01/05/17 11:47	92
412372004	04-JAN-2017 08:21	300	0.0208	0.028	7.2	01/05/17 11:47	93
412372005	04-JAN-2017 08:21	300	0.0224	0.0295	7.1	01/05/17 11:47	92
412372006	04-JAN-2017 08:21	300	0.0219	0.0292	7.3	01/05/17 11:47	94
412372007	04-JAN-2017 08:21	300	0.0225	0.0295	7	01/05/17 11:47	90
412372008	04-JAN-2017 08:21	300	0.0222	0.0295	7.3	01/05/17 11:47	94
412372009	04-JAN-2017 08:21	300	0.0214	0.0284	7	01/05/17 11:47	90
412372010	04-JAN-2017 08:21	300	0.0244	0.0303	5.9	01/09/17 17:11	76
412372011	04-JAN-2017 08:21	300	0.0215	0.0283	6.8	01/05/17 11:47	88
412372012	04-JAN-2017 08:21	300	0.0217	0.0287	7	01/05/17 11:47	90
412372013	04-JAN-2017 08:21	300	0.0223	0.0295	7.2	01/05/17 11:47	93
412372014	04-JAN-2017 08:21	300	0.0219	0.0288	6.9	01/05/17 11:47	89
1203694706 MB	04-JAN-2017 08:21	300	0.0205	0.0277	7.2	01/05/17 11:47	93
1203694707 DUP (412372002)	04-JAN-2017 08:21	300	0.0226	0.0279	5.3	01/09/17 17:11	68
1203694708 LCS	04-JAN-2017 08:21	300	0.0215	0.0287	7.2	01/05/17 11:47	93

Comments:

Data Entry Date2: 05-JAN-2017 14:18 GFC-F30560 Bethany Fiem

Data Entry Date3: 04-JAN-2017 00:00

Reagent/Solvent Lot ID	Description	Amount
20646112	Phenolphthalein, 1.0% in 50% Alcohol	2 mL
2213530	0.05M HNO3	15 mL
2243751	RGF-6M Sodium Hydroxide	10 mL
2243757	RGF-0.75M Sodium Carbonate	13 mL
2334614	Thymol Blue Indicator	1 mL
2388714	RGF-80% Ethanol	3 mL
2433863.1	SR SPEC RESIN Cleaned	2 g
2434028	RGF-Sr Filters	1 L
2473254	Sr 0.5mL= 7.75, 2.0 mL= 31.00 mg	.5 mL
2475663	RGF-3M Nitric0.05M Oxalic	10 mL
2490132	RGF-8M Nitric Acid	40 mL

Carrier S/N :	2473254
Carrier Exp Date :	11/2/2017
Carrier Volume Added:	0.50
Carrier Weight (mg/ml):	15.50
Carrier Weight StDev.:	0.12

Procedure Code :	GFC90SRL
Parname :	Strontium-90
Required MDA :	2
r-90 Abundance :	1.00
Halflife of Sr-90 :	28.90
Halflife of Y-90 :	64.053
	pCi/L
	years
	hours

Geometry: Tuffryn Filter

Sample Characteristics				Carrier Calculations					
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Carrier Weight (mg) (Standard)	Net Weight (mg) (Sample)	Net Weight StDev. (mg)	Carrier Aliquot (mL)	Carrier Aliquot StDev. (mL)
1	412372001.1	0.3000	1.8459E-05	12/6/2016 16:21	15.50	7.10	0.037846	0.5	0.001000
2	412372002.1	0.3000	1.8459E-05	12/6/2016 16:46	15.50	7.10	0.037846	0.5	0.001000
3	412372004.1	0.3000	1.8459E-05	12/7/2016 15:17	15.50	7.20	0.038276	0.5	0.001000
4	412372005.1	0.3000	1.8459E-05	12/7/2016 10:01	15.50	7.10	0.037846	0.5	0.001000
5	412372006.1	0.3000	1.8459E-05	12/7/2016 10:00	15.50	7.30	0.038705	0.5	0.001000
6	412372007.1	0.3000	1.8459E-05	12/7/2016 11:33	15.50	7.00	0.037416	0.5	0.001000
7	412372008.1	0.3000	1.8459E-05	12/7/2016 11:30	15.50	7.30	0.038705	0.5	0.001000
8	412372009.1	0.3000	1.8459E-05	12/7/2016 11:30	15.50	7.00	0.037416	0.5	0.001000
9	412372010.1	0.3000	1.8459E-05	12/8/2016 8:16	15.50	5.90	0.032688	0.5	0.001000
10	412372011.1	0.3000	1.8459E-05	12/8/2016 8:09	15.50	6.80	0.036556	0.5	0.001000
11	412372012.1	0.3000	1.8459E-05	12/8/2016 10:16	15.50	7.00	0.037416	0.5	0.001000
12	412372013.1	0.3000	1.8459E-05	12/8/2016 10:11	15.50	7.20	0.038276	0.5	0.001000
13	412372014.1	0.3000	1.8459E-05	12/7/2016 15:09	15.50	6.90	0.036986	0.5	0.001000
14	1203694706.1	0.3000	1.8459E-05	1/4/2017 0:00	15.50	7.20	0.038276	0.5	0.001000
15	1203694707.1	0.3000	1.8459E-05	12/6/2016 16:46	15.50	5.30	0.030109	0.5	0.001000
16	1203694708.1	0.3000	1.8459E-05	1/4/2017 0:00	15.50	7.20	0.038276	0.5	0.001000

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-004
 Instrument SOP: GL-RAD-I-016, GL-RAD-I-006

Count Raw Data													
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Gross Beta CPM	Count Start Date/Time	Strontium Separation Date/Time	Yttrium Ingrowth	Sr-90 Decay	Calculated Sample Recovery %	Sample Recovery Error %		
			Alpha	Beta									
1	2B	60	2	30	0.497	1/6/2017 8:42	1/5/2017 11:47	0.207	0.998	91.6%	1.10%		
2	7D	60	6	31	0.511	1/7/2017 14:06	1/5/2017 11:47	0.423	0.998	91.6%	1.10%		
3	8B	60	8	41	0.674	1/6/2017 8:46	1/5/2017 11:47	0.208	0.998	92.9%	1.10%		
4	9C	60	7	49	0.810	1/7/2017 14:06	1/5/2017 11:47	0.423	0.998	91.6%	1.10%		
5	H3	60	10	87	1.446	1/6/2017 9:14	1/5/2017 11:47	0.212	0.998	94.2%	1.10%		
6	9D	60	14	66	1.087	1/7/2017 14:06	1/5/2017 11:47	0.423	0.998	90.3%	1.10%		
7	12A	60	5	55	0.908	1/7/2017 14:09	1/5/2017 11:47	0.423	0.998	94.2%	1.10%		
8	13D	60	3	69	1.143	1/7/2017 14:09	1/5/2017 11:47	0.423	0.998	90.3%	1.10%		
9	5D	90	10	115	1.274	1/10/2017 12:04	1/9/2017 17:11	0.192	0.998	76.1%	1.12%		
10	2B	60	5	38	0.625	1/9/2017 12:30	1/5/2017 11:47	0.651	0.998	87.7%	1.10%		
11	2B	60	2	31	0.513	1/6/2017 11:04	1/5/2017 11:47	0.227	0.998	90.3%	1.10%		
12	8B	60	5	22	0.361	1/6/2017 11:07	1/5/2017 11:47	0.227	0.998	92.9%	1.10%		
13	14A	60	2	89	1.472	1/6/2017 11:11	1/5/2017 11:47	0.228	0.998	89.0%	1.10%		
14	14B	60	9	70	1.121	1/6/2017 11:11	1/5/2017 11:47	0.228	1.000	92.9%	1.10%		
15	7C	60	4	50	0.829	1/9/2017 18:06	1/9/2017 17:11	0.015	0.998	68.4%	1.13%		
16	C3	60	6	1708	28.463	1/6/2017 11:27	1/5/2017 11:47	0.230	1.000	92.9%	1.10%		

Calibration Data				Detector		Alpha		Weekly Bkg		Weekly Bkg		Weekly Bkg	
Pos.	Counted on	Calibration Date	Calibration Due Date	Efficiency Sr-90	Efficiency Y-90	Error (cpm/dpm)	X-Talk	CPM	Start Date/Time	Count	Time (min.)	Count	Time (min.)
1	PIC	4/1/2016	2/28/2017	0.4006	0.5091	0.0211	0.10456	0.420	12/30/2016 17:23		500		500
2	PIC	4/1/2016	2/28/2017	0.4132	0.5455	0.01113	0.05783	0.786	1/6/2017 18:11		1000		1000
3	PIC	4/1/2016	2/28/2017	0.4289	0.5567	0.02148	0.07292	0.432	12/30/2016 17:24		500		500
4	PIC	4/1/2016	2/28/2017	0.4143	0.5526	0.00584	0.05820	0.727	1/6/2017 18:11		1000		1000
5	LB4100	4/1/2016	2/28/2017	0.4899	0.6108	0.00824	0.02156	1.054	12/30/2016 17:29		500		500
6	PIC	4/1/2016	2/28/2017	0.4211	0.5596	0.02610	0.05437	1.030	1/6/2017 18:11		1000		1000
7	PIC	4/1/2016	2/28/2017	0.4042	0.5410	0.01964	0.09960	0.815	1/6/2017 18:12		1000		1000
8	PIC	4/1/2016	2/28/2017	0.3803	0.4297	0.01144	0.13989	0.998	1/6/2017 18:11		1000		1000
9	PIC	4/1/2016	2/28/2017	0.4258	0.5641	0.00925	0.03443	1.760	1/6/2017 18:10		1000		1000
10	PIC	4/1/2016	2/28/2017	0.4006	0.5091	0.0211	0.10356	0.398	12/30/2016 17:23		500		500
11	PIC	4/1/2016	2/28/2017	0.4006	0.5091	0.0211	0.10423	0.420	12/30/2016 17:24		500		500
12	PIC	4/1/2016	2/28/2017	0.4289	0.5567	0.02148	0.07292	0.432	12/30/2016 17:24		1000		1000
13	PIC	4/1/2016	2/28/2017	0.4306	0.5582	0.02119	0.32703	1.331	12/30/2016 17:26		1000		1000
14	PIC	4/1/2016	2/28/2017	0.4223	0.5524	0.01028	0.30233	0.777	12/30/2016 17:26		1000		1000
15	PIC	4/1/2016	2/28/2017	0.4155	0.5415	0.00790	0.05762	0.505	1/6/2017 18:10		1000		1000
16	LB4100	4/1/2016	2/28/2017	0.4876	0.6371	0.02588	0.03423	1.068	12/30/2016 17:48		500		500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

LCS S/N : 1243-Q
 LCS Exp Date : 9/27/2017
 LCS Activity (dpm/ml): 490.72
 LCS Volume Added: 0.10

* - RPD changed to 0% due to sample & dup activity below MDA

Results Pos.	Decision Level		Critical Level		Required MDA		Sample Act. Conc.		Sample Act. Error %		Net Count Rate CPM		Net Count Rate Error CPM		2 SIGMA Counting Uncertainty pCi/L		2 SIGMA Total Prop. Uncertainty pCi/L		Sample QC		Sample Type		RPD		RER		Nominal pCi/L		Recovery	
	pCi/L	pCi/L	pCi/L	pCi/L	MDA pCi/L	MDA pCi/L	Conc. pCi/L	Conc. pCi/L	%	%	CPM	CPM	CPM	CPM	pCi/L	pCi/L	pCi/L	pCi/L	QC	QC	Type	Type								
1	0.6696	0.4728	2	1.1078	0.2483	0.2483	0.2483	0.2483	124.80%	124.80%	0.0765	0.0765	0.0955	0.0955	0.6074	0.6088	0.6088	0.6088			SAMPLE	SAMPLE								
2	0.7003	0.4944	2	1.1163	-0.7017	-0.7017	-0.7017	-0.7017	35.09%	35.09%	-0.2751	-0.2751	0.0964	0.0964	0.4821	0.4821	0.4821	0.4821			SAMPLE	SAMPLE								
3	0.6223	0.4394	2	1.0274	0.7186	0.7186	0.7186	0.7186	45.57%	45.57%	0.2416	0.2416	0.1100	0.1100	0.6410	0.6520	0.6520	0.6520			SAMPLE	SAMPLE								
4	0.6692	0.4725	2	1.0716	0.2100	0.2100	0.2100	0.2100	143.92%	143.92%	0.0829	0.0829	0.1193	0.1193	0.5924	0.5933	0.5933	0.5933			SAMPLE	SAMPLE								
5	0.8431	0.5952	2	1.3194	1.0123	1.0123	1.0123	1.0123	41.28%	41.28%	0.3924	0.3924	0.1619	0.1619	0.8186	0.8339	0.8339	0.8339			SAMPLE	SAMPLE								
6	0.7959	0.5619	2	1.2504	0.1451	0.1451	0.1451	0.1451	241.48%	241.48%	0.0573	0.0573	0.1384	0.1384	0.6868	0.6873	0.6873	0.6873			SAMPLE	SAMPLE								
7	0.7053	0.4979	2	1.1220	0.2355	0.2355	0.2355	0.2355	135.30%	135.30%	0.0934	0.0934	0.1263	0.1263	0.6245	0.6257	0.6257	0.6257			SAMPLE	SAMPLE								
8	0.9167	0.6472	2	1.4426	0.4297	0.4297	0.4297	0.4297	97.66%	97.66%	0.1450	0.1450	0.1416	0.1416	0.8223	0.8251	0.8251	0.8251			SAMPLE	SAMPLE								
9	1.2596	0.8893	2	1.9021	-1.7998	-1.7998	-1.7998	-1.7998	26.00%	26.00%	-0.4860	-0.4860	0.1262	0.1262	0.9156	0.9156	0.9156	0.9156			SAMPLE	SAMPLE								
10	0.4577	0.3232	2	0.7635	0.5311	0.5311	0.5311	0.5311	45.92%	45.92%	0.2267	0.2267	0.1040	0.1040	0.4774	0.4855	0.4855	0.4855			SAMPLE	SAMPLE								
11	0.6656	0.4700	2	1.1012	0.3007	0.3007	0.3007	0.3007	104.03%	104.03%	0.0932	0.0932	0.0969	0.0969	0.6129	0.6149	0.6149	0.6149			SAMPLE	SAMPLE								
12	0.6099	0.4306	2	1.0069	-0.2081	-0.2081	-0.2081	-0.2081	116.13%	116.13%	-0.0714	-0.0714	0.0829	0.0829	0.4737	0.4737	0.4737	0.4737			SAMPLE	SAMPLE								
13	1.0822	0.7641	2	1.6796	0.4284	0.4284	0.4284	0.4284	113.75%	113.75%	0.1414	0.1414	0.1608	0.1608	0.9549	0.9576	0.9576	0.9576			SAMPLE	SAMPLE								
14	0.8050	0.5683	2	1.2841	1.0153	1.0153	1.0153	1.0153	40.55%	40.55%	0.3443	0.3443	0.1395	0.1395	0.8064	0.8221	0.8221	0.8221			MB	MB								
15	1.1429	0.8069	2	1.8734	1.6851	1.6851	1.6851	1.6851	36.92%	36.92%	0.3245	0.3245	0.1197	0.1197	1.2184	1.2467	1.2467	1.2467	412372002.1	412372002.1	DUP	DUP	* 0.0%	* 0.0%	3.4997	3.4997				
16	0.8385	0.5920	2	1.3113	69.8203	69.8203	69.8203	69.8203	3.78%	3.78%	27.3952	27.3952	0.6903	0.6903	3.4483	12.4238	12.4238	12.4238			LCS	LCS					73.6815	73.6815	94.8%	94.8%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
412372001	2B	60	2	30	1/6/2017 8:42	1/6/2017 9:42	PIC	1625919
412372002	7D	60	6	31	1/7/2017 14:06	1/7/2017 15:06	PIC	1625919
412372004	8B	60	8	41	1/6/2017 8:46	1/6/2017 9:46	PIC	1625919
412372005	9C	60	7	49	1/7/2017 14:06	1/7/2017 15:06	PIC	1625919
412372006	H3	60	10	87	1/6/2017 9:14	1/6/2017 10:14	LB4100	1625919
412372007	9D	60	14	66	1/7/2017 14:06	1/7/2017 15:06	PIC	1625919
412372008	12A	60	5	55	1/7/2017 14:09	1/7/2017 15:09	PIC	1625919
412372009	13D	60	3	69	1/7/2017 14:09	1/7/2017 15:09	PIC	1625919
412372010	5D	90	10	115	1/10/2017 12:04	1/10/2017 13:34	PIC	1625919
412372011	2B	60	5	38	1/9/2017 12:30	1/9/2017 13:30	PIC	1625919
412372012	2B	60	2	31	1/6/2017 11:04	1/6/2017 12:04	PIC	1625919
412372013	8B	60	5	22	1/6/2017 11:07	1/6/2017 12:07	PIC	1625919
412372014	14A	60	2	89	1/6/2017 11:11	1/6/2017 12:11	PIC	1625919
1203694706	14B	60	9	70	1/6/2017 11:11	1/6/2017 12:11	PIC	1625919
1203694707	7C	60	4	50	1/9/2017 18:06	1/9/2017 19:06	PIC	1625919
1203694708	C3	60	6	1708	1/6/2017 11:27	1/6/2017 12:27	LB4100	1625919

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 05-Jan-2017

Detectors LB4100 A1 through J4 and PIC 1A through 14D

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100C1	need 2nd	Alpha bkg	05-Jan 05:28	60	0.267	0.149	0.367	+0.24
LB4100C4	Above	Alpha bkg	05-Jan 05:28	60	0.417	4.08E-6	0.304	+5.22
LB4100C4	Above	Beta bkg	05-Jan 05:28	60	2.183	0.686	2.113	+3.30
LB4100F4	Below	Alpha eff	05-Jan 06:49	5	8192	8605	10580	-4.26
LB4100F4	Above	Beta bkg	05-Jan 05:26	60	4.667	0.561	2.674	+8.66
LB4100G3	Above	Alpha bkg	05-Jan 07:08	60	0.333	-6.83E-3	0.333	+3.00
LB4100H2	Below	Beta eff	05-Jan 06:49	5	17551	17600	18430	-3.35
LB4100H3	need 2nd	Beta bkg	05-Jan 05:26	60	1.050	0.866	2.018	-2.04
LB4100H3	Below	Beta eff	05-Jan 07:13	5	21333	21460	22580	-3.68
LB4100H4	Below	Beta eff	05-Jan 06:49	5	33555	33810	34750	-4.63
LB4100J3	Below	Beta eff	05-Jan 06:36	5	19137	19380	20950	-3.93
PIC1A	Above	Beta bkg	05-Jan 08:58	60	3.650	-1.63E-1	1.950	+7.83
PIC2B	Above	Beta bkg	05-Jan 10:32	60	2.033	-3.40E-1	2.607	+1.83
PIC5B	Above	Alpha bkg	05-Jan 07:00	60	0.367	0.107	0.374	+2.84
PIC8A	Above	Alpha bkg	05-Jan 05:57	60	0.333	0.055	0.370	+2.30
PIC8A	Above	Alpha eff	05-Jan 05:48	5	11409	10880	11320	+4.22
PIC8A	Above	Beta eff	05-Jan 05:40	5	56925	53590	55900	+5.66
PIC8C	Below	Beta bkg	05-Jan 09:28	60	0.433	0.434	2.119	-3.00
PIC10A	Above	Alpha bkg	05-Jan 06:10	60	0.350	-6.34E-2	0.328	+3.33
PIC10A	Above	Alpha eff	05-Jan 05:54	5	10830	8854	10610	+3.75
PIC10A	Above	Beta eff	05-Jan 06:03	5	55229	44740	53240	+4.40
PIC10A	Above	Beta XTalk	05-Jan 06:03	5	0.001	4.49E-5	2.24E-4	+31.59
PIC10B	Above	Alpha bkg	05-Jan 06:11	60	0.367	-3.42E-2	0.325	+3.69
PIC10B	Above	Beta XTalk	05-Jan 06:03	5	0.003	4.70E-5	0.001	+12.81
PIC10C	Above	Alpha bkg	05-Jan 06:11	60	0.500	-5.80E-2	0.296	+6.45
PIC10C	Above	Beta XTalk	05-Jan 06:03	5	0.002	-4.95E-5	8.07E-4	+8.12
PIC10D	Above	Alpha bkg	05-Jan 06:11	60	0.467	-6.34E-2	0.362	+4.48
PIC10D	Above	Alpha eff	05-Jan 05:57	5	17156	15350	16570	+5.88
PIC10D	Below	Alpha XTalk	05-Jan 05:57	5	0.272	0.303	0.427	-4.48

PIC10D	Above	Beta bkg	05-Jan 06:11	60	1.517	-1.50E-1	1.265	+4.07
PIC10D	Above	Beta XTalk	05-Jan 06:03	5	8.81E-4	2.87E-5	7.46E-4	+4.13
PIC12C	Above	Alpha bkg	05-Jan 06:22	60	0.333	0.010	0.413	+1.82
PIC12D	Below	Alpha XTalk	05-Jan 06:12	5	0.266	0.274	0.301	-4.72

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by R. Bink-Ham

Date 1-5-17

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 06-Jan-2017

Detectors LB4100 A1 through J4 and PIC 1A through 14D

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100B1	need 2nd	Alpha bkg	06-Jan 06:37	60	0.150	-7.77E-2	0.363	+0.10
LB4100B1	Above	Beta bkg	06-Jan 06:37	60	1.783	0.703	1.635	+3.96
LB4100C4	Above	Alpha bkg	06-Jan 05:07	60	0.367	4.08E-6	0.304	+4.24
LB4100C4	Above	Beta bkg	06-Jan 05:07	60	2.567	0.686	2.113	+4.91
LB4100F4	Below	Alpha eff	06-Jan 06:38	5	8221	8605	10580	-4.17
LB4100F4	Above	Beta bkg	06-Jan 05:05	60	5.083	0.561	2.674	+9.84
LB4100G2	Above	Beta bkg	06-Jan 07:13	60	2.000	0.696	1.712	+4.70
LB4100H2	Below	Beta eff	06-Jan 07:13	5	17533	17600	18430	-3.48
LB4100H4	Below	Beta eff	06-Jan 07:13	5	33775	33810	34750	-3.22
LB4100J3	Below	Alpha eff	06-Jan 06:08	5	21073	21130	22490	-3.25
LB4100J3	need 2nd	Beta eff	06-Jan 06:16	5	19659	19380	20950	-1.93
PIC1A	Above	Beta bkg	06-Jan 05:22	60	4.633	-1.63E-1	1.950	+10.62
PIC4C	Above	Alpha bkg	06-Jan 06:29	60	0.400	0.019	0.367	+3.58
PIC5A	Above	Alpha bkg	06-Jan 07:05	60	0.350	-5.56E-3	0.380	+2.54
PIC5A	need 2nd	Beta bkg	06-Jan 07:05	60	1.600	0.681	2.227	+0.57
PIC5B	Above	Alpha bkg	06-Jan 07:05	60	0.367	0.107	0.374	+2.84
PIC6B	Above	Beta bkg	06-Jan 07:07	60	3.933	0.586	2.451	+7.77
PIC8A	Above	Alpha bkg	06-Jan 05:41	60	0.517	0.055	0.370	+5.79
PIC8A	Above	Alpha eff	06-Jan 05:32	5	11457	10880	11320	+4.87
PIC8A	Below	Alpha XTalk	06-Jan 05:32	5	0.236	0.238	0.256	-3.71
PIC8A	Above	Beta eff	06-Jan 05:24	5	56696	53590	55900	+5.07
PIC8C	Above	Alpha bkg	06-Jan 07:08	60	0.367	0.102	0.372	+2.87
PIC8C	Below	Beta bkg	06-Jan 07:08	60	0.433	0.434	2.119	-3.00
PIC8D	Above	Alpha bkg	06-Jan 07:08	60	0.833	0.004	0.401	+9.52
PIC9B	Above	Beta bkg	06-Jan 07:36	60	1.833	0.041	1.754	+3.28
PIC10A	need 2nd	Alpha bkg	06-Jan 05:53	60	0.250	-6.34E-2	0.328	+1.80
PIC10A	Above	Alpha eff	06-Jan 05:39	5	10739	8854	10610	+3.44
PIC10A	Above	Beta eff	06-Jan 05:46	5	54850	44740	53240	+4.14
PIC10A	Above	Beta XTalk	06-Jan 05:46	5	9.51E-4	4.49E-5	2.24E-4	+27.31

PIC10B	need 2nd	Alpha bkg	06-Jan 05:53	60	0.133	-3.42E-2	0.325	-0.20
PIC10B	Above	Beta XTalk	06-Jan 05:46	5	0.003	4.70E-5	0.001	+11.41
PIC10C	need 2nd	Alpha bkg	06-Jan 05:53	60	0.250	-5.80E-2	0.296	+2.22
PIC10C	Above	Beta XTalk	06-Jan 05:46	5	0.001	-4.95E-5	8.07E-4	+6.65
PIC10D	need 2nd	Alpha bkg	06-Jan 05:54	60	0.250	-6.34E-2	0.362	+1.42
PIC10D	Above	Alpha eff	06-Jan 05:39	5	17185	15350	16570	+6.02
PIC10D	Below	Alpha XTalk	06-Jan 05:39	5	0.273	0.303	0.427	-4.44
PIC10D	need 2nd	Beta bkg	06-Jan 05:54	60	0.683	-1.50E-1	1.265	+0.53
PIC10D	Above	Beta XTalk	06-Jan 05:46	5	8.24E-4	2.87E-5	7.46E-4	+3.65
PIC12B	Below	Alpha eff	06-Jan 07:12	5	9310	9380	9920	-3.78
PIC12C	need 2nd	Alpha bkg	06-Jan 06:02	60	0.267	0.010	0.413	+0.83
PIC12D	Above	Alpha bkg	06-Jan 06:02	60	0.317	-3.91E-2	0.386	+2.02
PIC12D	Below	Alpha XTalk	06-Jan 07:12	5	0.267	0.274	0.301	-4.42
PIC13A	Above	Alpha bkg	06-Jan 07:12	60	0.333	-5.13E-2	0.389	+2.24
PIC13B	Above	Alpha bkg	06-Jan 07:12	60	0.417	-4.30E-2	0.410	+3.08
PIC14C	Above	Alpha bkg	06-Jan 06:02	60	0.417	0.027	0.372	+3.78
PIC14D	Above	Alpha bkg	06-Jan 07:12	60	0.367	0.120	0.376	+2.78

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by R. Gierke - Van

Date 1-6-17

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 07-Jan-2017

Detectors LB4100 A1 through J4 and PIC 1A through 14D

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100B1	need 2nd	Beta bkg	07-Jan 07:48	299.78	1.608	0.703	1.635	+2.83
LB4100B3	Above	Alpha bkg	07-Jan 07:48	299.78	0.387	0.121	0.383	+3.08
LB4100B3	Below	Alpha eff	07-Jan 13:53	5	13149	13770	17610	-3.97
LB4100B3	Above	Alpha XTalk	07-Jan 13:53	5	0.421	0.308	0.393	+4.94
LB4100B3	Above	Beta bkg	07-Jan 07:48	299.78	2.652	0.965	1.943	+7.35
LB4100B4	Above	Beta bkg	07-Jan 07:48	299.78	2.068	0.979	1.970	+3.59
LB4100C4	need 2nd	Alpha bkg	06-Jan 18:53	1000	0.281	4.08E-6	0.304	+2.55
LB4100C4	Above	Beta bkg	06-Jan 18:53	1000	2.166	0.686	2.113	+3.22
LB4100F3	Below	Alpha eff	07-Jan 14:08	5	16977	17030	20450	-3.09
LB4100F4	Below	Alpha eff	07-Jan 14:08	5	7819	8605	10580	-5.39
LB4100F4	Above	Beta bkg	06-Jan 18:18	1000	5.089	0.561	2.674	+9.86
LB4100G2	Below	Alpha eff	07-Jan 14:00	5	9960	10140	12310	-3.50
LB4100G2	Above	Beta bkg	06-Jan 18:16	1000	1.735	0.696	1.712	+3.14
LB4100H4	Below	Beta eff	07-Jan 14:08	5	33472	33810	34750	-5.16
PIC1A	Above	Beta bkg	06-Jan 18:09	1000	4.079	-1.63E-1	1.950	+9.04
PIC2C	Above	Beta bkg	06-Jan 18:10	1000	2.012	0.100	0.947	+10.55
PIC5B	Above	Alpha bkg	07-Jan 13:19	60	0.317	0.107	0.374	+1.72
PIC6B	Above	Beta bkg	06-Jan 18:10	1000	2.218	0.586	2.451	+2.25
PIC8A	need 2nd	Alpha bkg	06-Jan 18:11	1000	0.173	0.055	0.370	-0.75
PIC8A	Above	Alpha eff	07-Jan 13:08	5	11365	10880	11320	+3.62
PIC8A	need 2nd	Alpha XTalk	07-Jan 13:08	5	0.241	0.238	0.256	-2.23
PIC8A	Above	Beta eff	07-Jan 13:00	5	56316	53590	55900	+4.08
PIC8C	Above	Alpha bkg	06-Jan 18:11	1000	0.330	0.102	0.372	+2.06
PIC8C	need 2nd	Beta bkg	06-Jan 18:11	1000	0.532	0.434	2.119	-2.65
PIC8D	Above	Alpha bkg	07-Jan 13:50	60	0.333	0.004	0.401	+1.98
PIC10A	Above	Alpha eff	07-Jan 13:13	5	10733	8854	10610	+3.42
PIC10A	Above	Beta eff	07-Jan 13:21	5	55143	44740	53240	+4.34
PIC10A	Above	Beta XTalk	07-Jan 13:21	5	0.001	4.49E-5	2.24E-4	+31.65
PIC10B	Above	Beta XTalk	07-Jan 13:20	5	0.002	4.70E-5	0.001	+9.10

PIC10C	Above	Beta XTalk	07-Jan 13:21	5	0.001	-4.95E-5	8.07E-4	+5.95
PIC10D	Above	Alpha eff	07-Jan 13:13	5	17066	15350	16570	+5.44
PIC10D	Below	Alpha XTalk	07-Jan 13:13	5	0.278	0.303	0.427	-4.20
PIC10D	Above	Beta XTalk	07-Jan 13:21	5	7.58E-4	2.87E-5	7.46E-4	+3.11
PIC12B	Below	Alpha eff	07-Jan 13:30	5	9281	9380	9920	-4.10
PIC12C	Above	Alpha bkg	06-Jan 18:12	1000	0.322	0.010	0.413	+1.65
PIC12D	need 2nd	Alpha bkg	06-Jan 18:12	1000	0.199	-3.91E-2	0.386	+0.36
PIC12D	Below	Alpha XTalk	07-Jan 13:30	5	0.266	0.274	0.301	-4.55
PIC13A	Above	Alpha bkg	07-Jan 13:54	60	0.367	-5.13E-2	0.389	+2.69
PIC14A	Above	Beta bkg	06-Jan 18:11	1000	1.664	-3.06E-2	1.386	+4.18
PIC14C	Above	Alpha bkg	07-Jan 13:54	60	0.617	0.027	0.372	+7.25

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by R. Smith - Han

Date 1-7-17

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 09-Jan-2017

Detectors LB4100 A1 through J4 and PIC 1A through 14D

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100B3	Below	Alpha eff	09-Jan 08:34	5	10989	13770	17610	-7.35
LB4100B3	Above	Alpha XTalk	09-Jan 08:34	5	0.492	0.308	0.393	+9.95
LB4100B4	Below	Alpha eff	09-Jan 08:34	5	11929	12260	14720	-3.81
LB4100B4	Above	Alpha XTalk	09-Jan 08:34	5	0.348	0.273	0.337	+4.07
LB4100C4	Above	Alpha bkg	09-Jan 06:37	60	0.317	4.08E-6	0.304	+3.25
LB4100C4	Below	Alpha eff	09-Jan 08:13	5	5137	5350	8599	-3.39
LB4100C4	need 2nd	Beta bkg	09-Jan 06:37	60	1.450	0.686	2.113	+0.21
LB4100E2	Below	Alpha eff	09-Jan 09:20	5	5853	6923	8889	-6.26
LB4100E2	Above	Alpha XTalk	09-Jan 09:20	5	0.574	0.332	0.534	+4.18
LB4100F1	Below	Beta eff	09-Jan 07:51	5	43300	44370	47100	-5.35
LB4100F2	Below	Alpha eff	09-Jan 07:45	5	4924	5370	6879	-4.77
LB4100F2	Above	Alpha XTalk	09-Jan 07:45	5	0.509	0.335	0.467	+4.91
LB4100F2	Below	Beta eff	09-Jan 07:51	5	17384	17950	18920	-6.50
LB4100F3	Below	Alpha eff	09-Jan 07:45	5	15740	17030	20450	-5.26
LB4100F3	Above	Alpha XTalk	09-Jan 07:45	5	0.345	0.265	0.332	+4.21
LB4100F3	Below	Beta eff	09-Jan 07:51	5	26467	26770	29370	-3.70
LB4100F4	Below	Alpha eff	09-Jan 07:45	5	6551	8605	10580	-9.24
LB4100F4	Above	Alpha XTalk	09-Jan 07:45	5	0.663	0.346	0.576	+5.27
LB4100F4	Above	Beta bkg	09-Jan 06:36	60	4.083	0.561	2.674	+7.00
LB4100F4	Below	Beta eff	09-Jan 07:51	5	34065	35400	39550	-4.93
LB4100G2	Below	Alpha eff	09-Jan 07:51	5	9145	10140	12310	-5.75
LB4100G2	Above	Alpha XTalk	09-Jan 07:51	5	0.368	0.235	0.366	+3.08
LB4100G2	need 2nd	Beta bkg	09-Jan 06:35	60	0.967	0.696	1.712	-1.40
LB4100G3	Below	Alpha eff	09-Jan 09:21	5	6464	6731	7753	-4.57
LB4100G3	Above	Alpha XTalk	09-Jan 09:21	5	0.384	0.320	0.376	+3.84
LB4100H1	Below	Alpha eff	09-Jan 07:51	5	10475	10690	11570	-4.47
LB4100H1	Above	Alpha XTalk	09-Jan 07:51	5	0.252	0.184	0.247	+3.48
LB4100H2	Below	Alpha eff	09-Jan 07:51	5	8593	8710	9579	-3.81
LB4100H2	Above	Alpha XTalk	09-Jan 07:51	5	0.288	0.260	0.287	+3.26
LB4100H3	Below	Alpha eff	09-Jan 07:51	5	18131	18430	20870	-3.73
LB4100H3	Above	Alpha XTalk	09-Jan 07:51	5	0.307	0.265	0.294	+5.83
LB4100H3	Below	Beta eff	09-Jan 08:34	5	21202	21460	22580	-4.38

LB4100H4	Below	Alpha eff	09-Jan 07:51	5	8404	9614	11880	-6.20
LB4100H4	Above	Alpha XTalk	09-Jan 07:51	5	0.486	0.336	0.463	+4.10
LB4100H4	Below	Beta eff	09-Jan 08:34	5	33432	33810	34750	-5.41
LB4100I2	Below	Alpha eff	09-Jan 08:31	5	13566	13970	15220	-4.94
LB4100I4	Above	Alpha XTalk	09-Jan 08:31	5	0.217	0.178	0.211	+4.07
LB4100I4	Above	Beta eff	09-Jan 08:57	5	20659	19710	20650	+3.05
LB4100J1	Above	Alpha XTalk	09-Jan 09:10	5	0.191	0.149	0.186	+3.74
PIC1A	Above	Alpha bkg	09-Jan 06:56	60	0.750	-5.51E-2	0.373	+8.29
PIC1A	Above	Beta bkg	09-Jan 06:56	60	3.600	-1.63E-1	1.950	+7.68
PIC2C	Above	Alpha bkg	09-Jan 06:56	60	0.550	-6.36E-3	0.372	+5.82
PIC2C	Above	Beta bkg	09-Jan 06:56	60	3.883	0.100	0.947	+23.81
PIC5A	Above	Alpha bkg	09-Jan 10:39	60	0.383	-5.56E-3	0.380	+3.06
PIC5A	Above	Beta bkg	09-Jan 10:39	60	2.183	0.681	2.227	+2.83
PIC5B	Above	Alpha bkg	09-Jan 08:44	60	0.450	0.107	0.374	+4.72
PIC5B	Below	Alpha eff	09-Jan 06:38	5	13354	13380	13950	-3.28
PIC5C	Above	Alpha bkg	09-Jan 08:22	60	0.467	-1.62E-2	0.377	+4.37
PIC8A	Above	Alpha eff	09-Jan 06:48	5	11345	10880	11320	+3.34
PIC8A	Above	Beta eff	09-Jan 09:14	5	56695	53590	55900	+5.06
PIC8B	Above	Beta eff	09-Jan 09:28	5	23132	21720	22840	+4.57
PIC8D	Above	Alpha bkg	09-Jan 08:41	60	0.333	0.004	0.401	+1.98
PIC9C	Below	Alpha eff	09-Jan 10:37	5	9639	9741	10420	-3.90
PIC9D	Above	Alpha bkg	09-Jan 07:22	60	0.667	0.014	0.368	+8.07
PIC9D	Above	Beta bkg	09-Jan 07:22	60	2.100	0.210	2.011	+3.30
PIC10A	Above	Alpha bkg	09-Jan 07:10	60	0.367	-6.34E-2	0.328	+3.59
PIC10A	Above	Alpha eff	09-Jan 06:56	5	10800	8854	10610	+3.65
PIC10A	Above	Beta eff	09-Jan 07:03	5	54863	44740	53240	+4.15
PIC10A	Above	Beta XTalk	09-Jan 07:03	5	6.25E-4	4.49E-5	2.24E-4	+16.40
PIC10B	Above	Alpha bkg	09-Jan 07:10	60	0.517	-3.42E-2	0.325	+6.20
PIC10B	Above	Beta XTalk	09-Jan 07:03	5	0.001	4.70E-5	0.001	+4.40
PIC10C	Above	Alpha bkg	09-Jan 07:21	60	0.400	-5.80E-2	0.296	+4.76
PIC10C	Above	Beta XTalk	09-Jan 07:03	5	8.45E-4	-4.95E-5	8.07E-4	+3.26
PIC10D	Above	Alpha bkg	09-Jan 07:21	60	0.700	-6.34E-2	0.362	+7.77
PIC10D	Above	Alpha eff	09-Jan 06:56	5	17133	15350	16570	+5.77
PIC10D	Below	Alpha XTalk	09-Jan 06:56	5	0.275	0.303	0.427	-4.33
PIC10D	need 2nd	Beta XTalk	09-Jan 07:03	5	4.53E-4	2.87E-5	7.46E-4	+0.55

PIC11B	Below	Alpha eff	09-Jan 07:06	5	13366	13400	13790	-3.53
PIC11D	Above	Alpha bkg	09-Jan 09:21	60	0.317	0.001	0.361	+2.26
PIC12B	Below	Alpha eff	09-Jan 09:19	5	9331	9380	9920	-3.54
PIC12C	Above	Alpha bkg	09-Jan 07:14	60	0.500	0.010	0.413	+4.30
PIC12D	Below	Alpha XTalk	09-Jan 09:20	5	0.263	0.274	0.301	-5.24
PIC13A	Above	Beta bkg	09-Jan 10:43	60	2.183	-1.82E-1	2.040	+3.39
PIC13B	Above	Alpha bkg	09-Jan 10:43	60	0.600	-4.30E-2	0.410	+5.51
PIC13B	Below	Alpha eff	09-Jan 07:12	5	12862	12890	13980	-3.16
PIC13B	Below	Beta eff	09-Jan 07:19	5	20463	20630	22540	-3.53
PIC13D	Above	Beta bkg	09-Jan 10:43	60	1.617	-2.41E-1	1.419	+3.71
PIC14B	Above	Alpha eff	09-Jan 07:12	5	8881	7900	8853	+3.18
PIC14B	Below	Alpha XTalk	09-Jan 07:12	5	0.347	0.363	0.532	-3.56
PIC14C	Above	Alpha bkg	09-Jan 10:43	60	0.317	0.027	0.372	+2.04
PIC14D	need 2nd	Alpha bkg	09-Jan 10:43	60	0.267	0.120	0.376	+0.44
PIC14D	Below	Beta eff	09-Jan 07:19	5	40411	40480	42120	-3.25

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by



Date

1/9/17

GEL Laboratories LLC

Gas Flow Proportional Counter Checks for 10-Jan-2017

Detectors LB4100 A1 through J4 and PIC 1A through 14D

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stddev
LB4100B3	Below	Alpha eff	10-Jan 06:46	5	11790	13770	17610	-6.09
LB4100B3	Above	Alpha XTalk	10-Jan 06:46	5	0.468	0.308	0.393	+8.26
LB4100B4	Above	Alpha XTalk	10-Jan 06:46	5	0.339	0.273	0.337	+3.23
LB4100C1	Above	Alpha bkg	10-Jan 05:13	60	0.367	0.149	0.367	+2.98
LB4100C4	Above	Alpha bkg	10-Jan 05:13	60	0.367	4.08E-6	0.304	+4.24
LB4100C4	Below	Alpha eff	10-Jan 06:48	5	4947	5350	8599	-3.74
LB4100E2	Below	Alpha eff	10-Jan 08:47	5	5021	6923	8889	-8.81
LB4100F2	Above	Alpha eff	10-Jan 08:48	5	7249	5370	6879	+4.47
LB4100F2	need 2nd	Beta eff	10-Jan 06:27	5	18369	17950	18920	-0.41
LB4100F3	Below	Alpha eff	10-Jan 06:34	5	16452	17030	20450	-4.01
LB4100F3	Above	Alpha XTalk	10-Jan 06:34	5	0.333	0.265	0.332	+3.18
LB4100F3	need 2nd	Beta eff	10-Jan 06:27	5	27350	26770	29370	-1.66
LB4100F4	Below	Alpha eff	10-Jan 06:34	5	7218	8605	10580	-7.21
LB4100F4	Above	Alpha XTalk	10-Jan 06:34	5	0.611	0.346	0.576	+3.90
LB4100F4	Above	Beta bkg	10-Jan 05:10	60	4.633	0.561	2.674	+8.56
LB4100F4	need 2nd	Beta eff	10-Jan 06:27	5	35765	35400	39550	-2.47
LB4100F4	Above	Beta XTalk	10-Jan 06:27	5	2.96E-4	8.32E-5	2.90E-4	+3.20
LB4100G2	Below	Alpha eff	10-Jan 06:27	5	9567	10140	12310	-4.58
LB4100G2	need 2nd	Alpha XTalk	10-Jan 06:27	5	0.351	0.235	0.366	+2.29
LB4100G3	Below	Alpha eff	10-Jan 06:27	5	6586	6731	7753	-3.85
LB4100G3	Above	Alpha XTalk	10-Jan 06:27	5	0.377	0.320	0.376	+3.04
LB4100H3	need 2nd	Alpha eff	10-Jan 06:27	5	18632	18430	20870	-2.50
LB4100H3	Above	Alpha XTalk	10-Jan 06:27	5	0.301	0.265	0.294	+4.61
LB4100H3	Below	Beta eff	10-Jan 07:07	5	21089	21460	22580	-4.99
LB4100H4	Below	Alpha eff	10-Jan 06:27	5	9217	9614	11880	-4.05
LB4100H4	need 2nd	Alpha XTalk	10-Jan 06:27	5	0.441	0.336	0.463	+1.98
LB4100H4	Below	Beta eff	10-Jan 07:07	5	33437	33810	34750	-5.38
LB4100I2	Below	Alpha eff	10-Jan 06:13	5	13869	13970	15220	-3.48
LB4100J1	Above	Alpha XTalk	10-Jan 08:49	5	0.199	0.149	0.186	+5.12
LB4100J3	Below	Alpha eff	10-Jan 08:49	5	21043	21130	22490	-3.38

LB4100J4	Above	Alpha XTalk	10-Jan 08:49	5	0.194	0.143	0.193	+3.10
PIC1A	need 2nd	Alpha bkg	10-Jan 05:23	60	0.150	-5.51E-2	0.373	-0.12
PIC1A	Above	Beta bkg	10-Jan 05:23	60	2.217	-1.63E-1	1.950	+3.76
PIC2C	need 2nd	Alpha bkg	10-Jan 05:24	60	0.200	-6.36E-3	0.372	+0.27
PIC2C	Above	Beta bkg	10-Jan 05:24	60	3.733	0.100	0.947	+22.74
PIC4B	Above	Beta bkg	10-Jan 08:10	60	2.133	1.052	2.243	+2.45
PIC5A	Above	Alpha bkg	10-Jan 06:59	60	0.433	-5.56E-3	0.380	+3.83
PIC5B	Below	Alpha eff	10-Jan 08:11	5	13330	13380	13950	-3.52
PIC8A	Above	Alpha eff	10-Jan 07:03	5	11440	10880	11320	+4.63
PIC8A	Above	Beta eff	10-Jan 05:26	5	56533	53590	55900	+4.64
PIC8C	Above	Alpha bkg	10-Jan 10:49	60	0.483	0.102	0.372	+5.46
PIC8D	Above	Alpha bkg	10-Jan 10:49	60	0.400	0.004	0.401	+2.98
PIC9C	Above	Alpha bkg	10-Jan 10:50	5	9713	-2.53E-2	0.365	+149,514.01
PIC9C	Below	Alpha eff	10-Jan 11:17	5	9731	9741	10420	-3.09
PIC9C	Above	Beta bkg	10-Jan 10:50	5	2529	0.067	1.756	+8,980.52
PIC10A	need 2nd	Alpha bkg	10-Jan 05:55	60	0.233	-6.34E-2	0.328	+1.55
PIC10A	Above	Alpha eff	10-Jan 05:41	5	10733	8854	10610	+3.42
PIC10A	Above	Beta eff	10-Jan 05:48	5	54360	44740	53240	+3.79
PIC10A	Above	Beta XTalk	10-Jan 05:48	5	7.48E-4	4.49E-5	2.24E-4	+20.53
PIC10B	need 2nd	Alpha bkg	10-Jan 05:55	60	0.200	-3.42E-2	0.325	+0.91
PIC10B	Above	Beta XTalk	10-Jan 05:48	5	0.002	4.70E-5	0.001	+6.93
PIC10C	need 2nd	Alpha bkg	10-Jan 05:55	60	0.150	-5.80E-2	0.296	+0.52
PIC10C	Above	Beta XTalk	10-Jan 05:48	5	0.001	-4.95E-5	8.07E-4	+4.93
PIC10D	need 2nd	Alpha bkg	10-Jan 05:55	60	0.267	-6.34E-2	0.362	+1.66
PIC10D	Above	Alpha eff	10-Jan 05:41	5	17057	15350	16570	+5.39
PIC10D	Below	Alpha XTalk	10-Jan 05:41	5	0.275	0.303	0.427	-4.32
PIC11B	Above	Alpha bkg	10-Jan 08:17	60	0.350	-2.26E-2	0.358	+2.87
PIC11B	need 2nd	Alpha eff	10-Jan 05:57	5	13487	13400	13790	-1.66
PIC11C	Above	Alpha bkg	10-Jan 08:17	60	0.400	-6.44E-2	0.379	+3.29
PIC12A	Below	Beta eff	10-Jan 05:43	5	41588	41650	44170	-3.15
PIC12B	Below	Alpha eff	10-Jan 05:57	5	9320	9380	9920	-3.67
PIC12C	Above	Alpha bkg	10-Jan 06:04	60	0.333	0.010	0.413	+1.82
PIC12D	Above	Alpha bkg	10-Jan 06:04	60	0.417	-3.91E-2	0.386	+3.43

PIC12D	Below	Alpha XTalk	10-Jan 05:57	5	0.265	0.274	0.301	-4.79
PIC13A	Above	Alpha bkg	10-Jan 07:09	60	0.367	-5.13E-2	0.389	+2.69
PIC13B	Above	Alpha bkg	10-Jan 07:09	60	0.333	-4.30E-2	0.410	+1.98
PIC13B	Below	Alpha eff	10-Jan 05:50	5	12827	12890	13980	-3.34
PIC13B	Below	Beta eff	10-Jan 05:57	5	20584	20630	22540	-3.14
PIC14B	Above	Alpha eff	10-Jan 05:50	5	8856	7900	8853	+3.02
PIC14B	Below	Alpha XTalk	10-Jan 05:50	5	0.356	0.363	0.532	-3.25
PIC14C	Above	Alpha bkg	10-Jan 06:05	60	0.383	0.027	0.372	+3.20

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

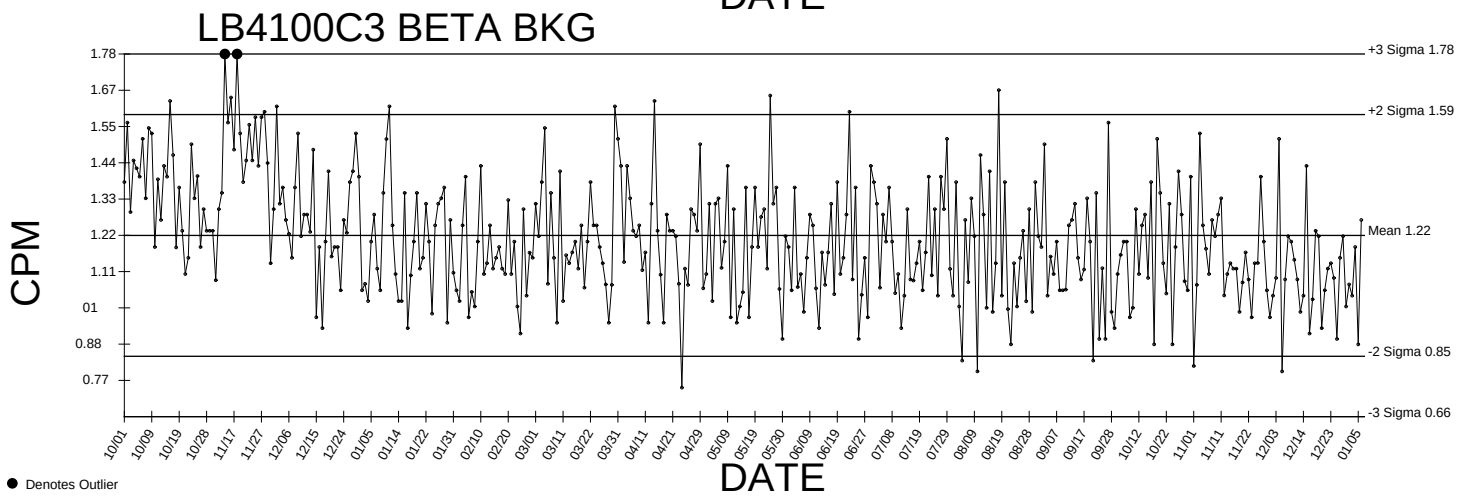
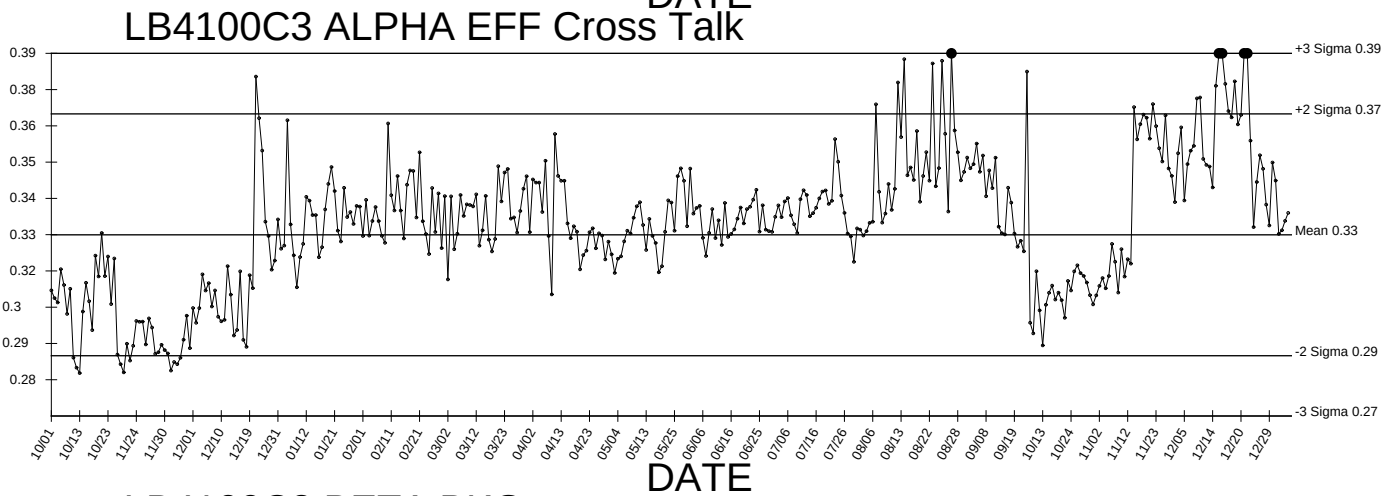
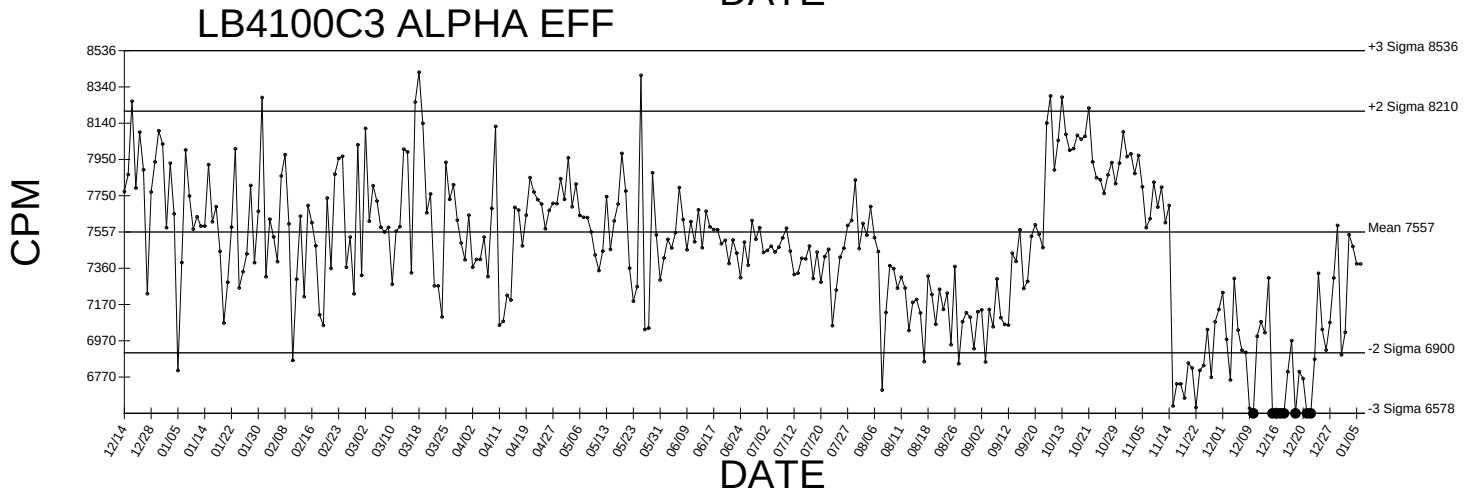
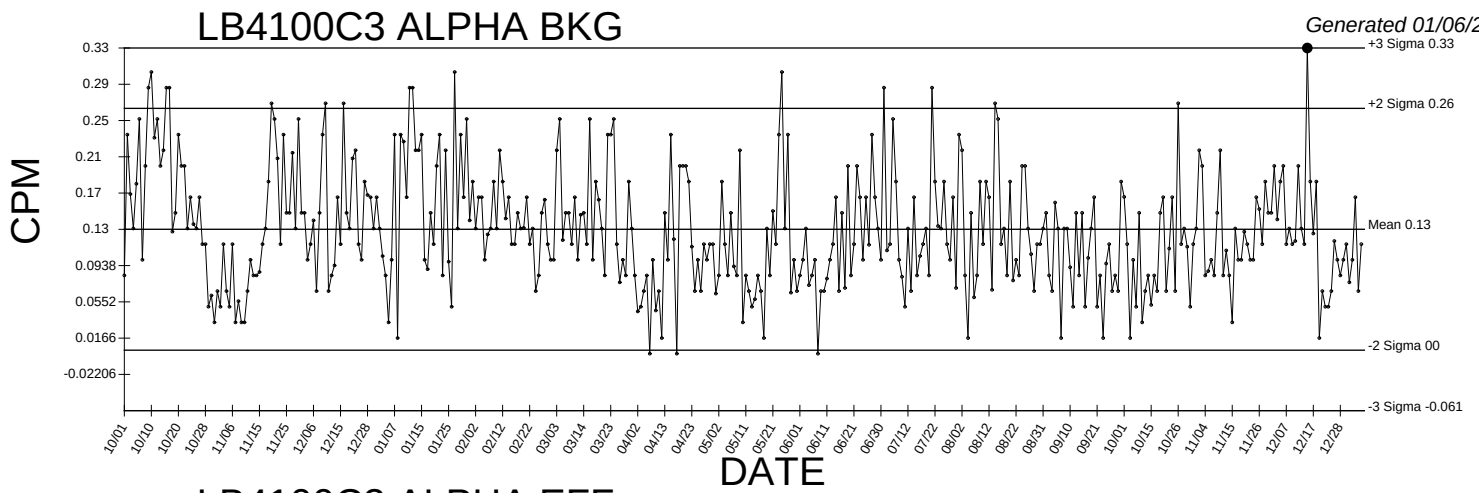
LB4100D1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100D4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC6D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC13C	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by *R. Birch-Hall*

Date 1-10-17

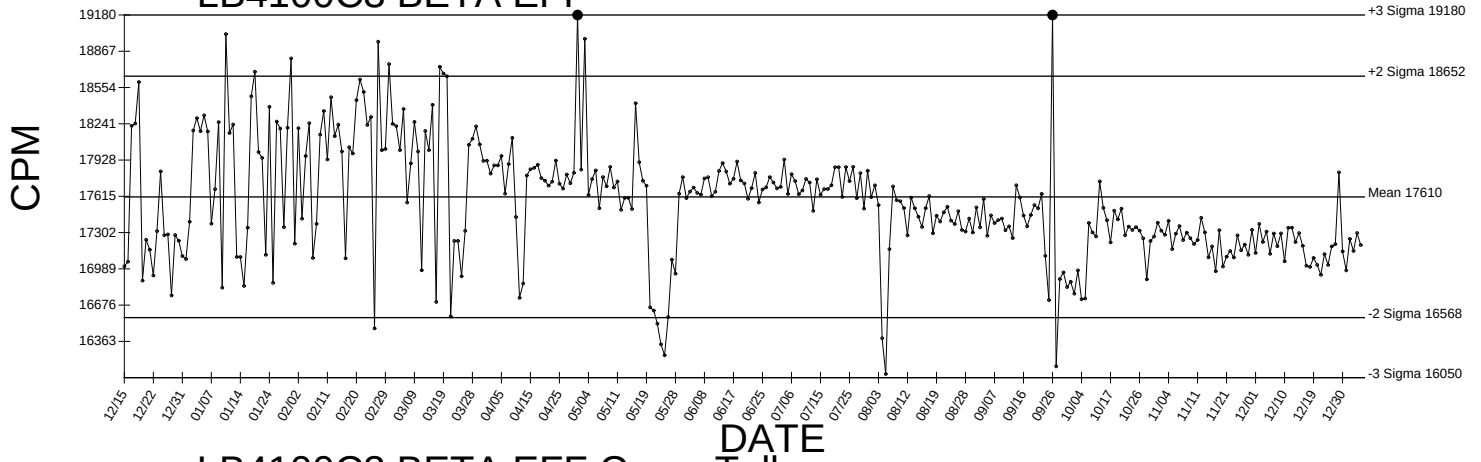
GEL Laboratories LLC

Background and Efficiency Data

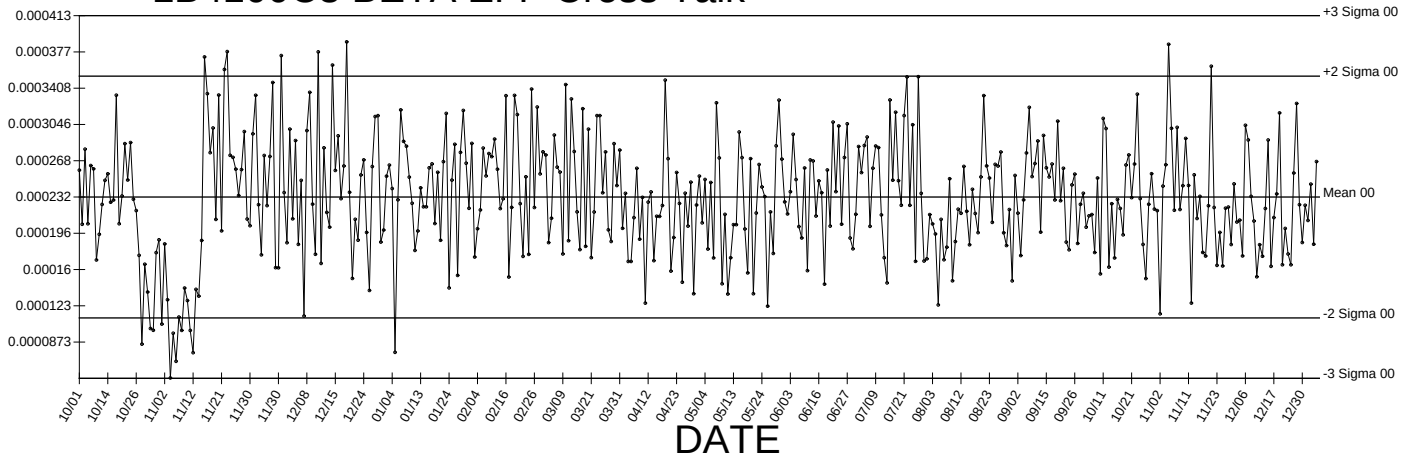


LB4100C3 BETA EFF

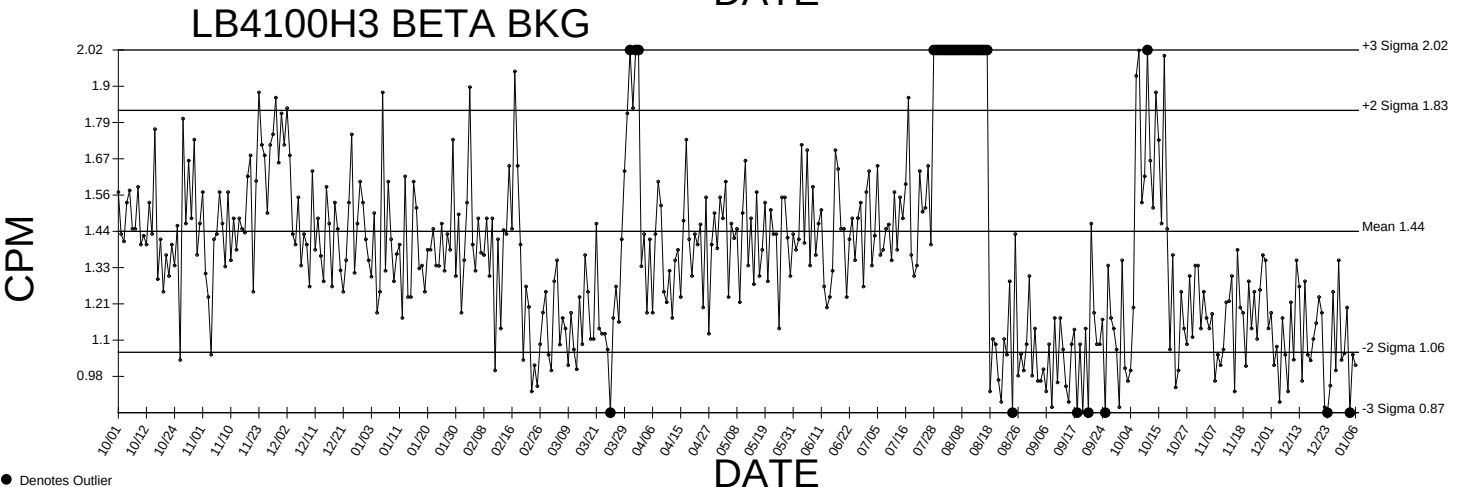
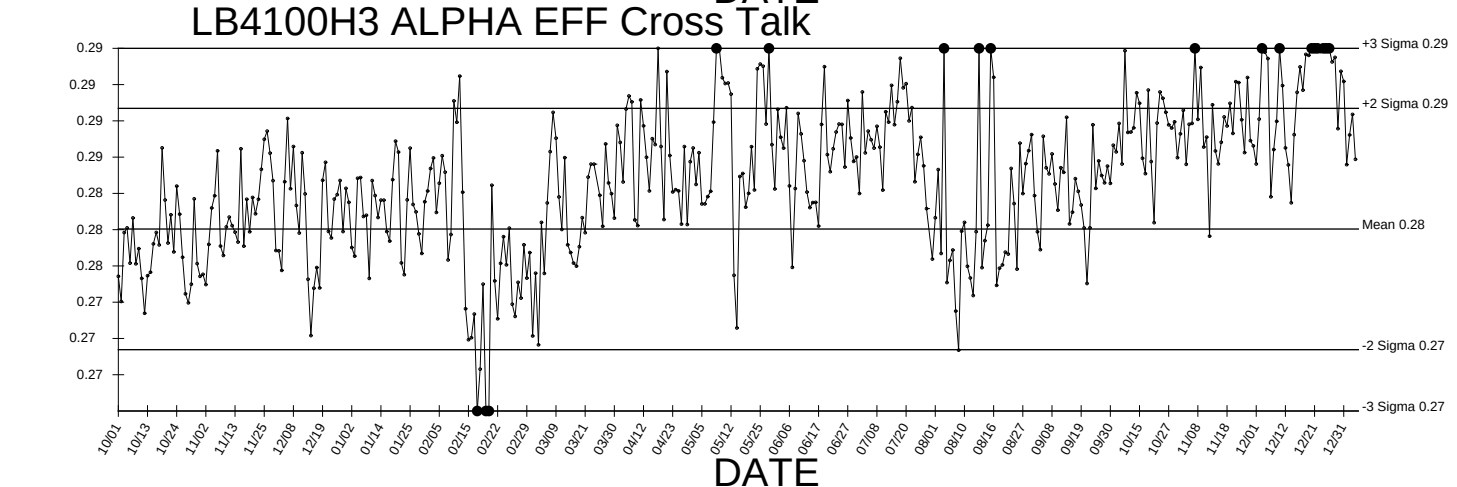
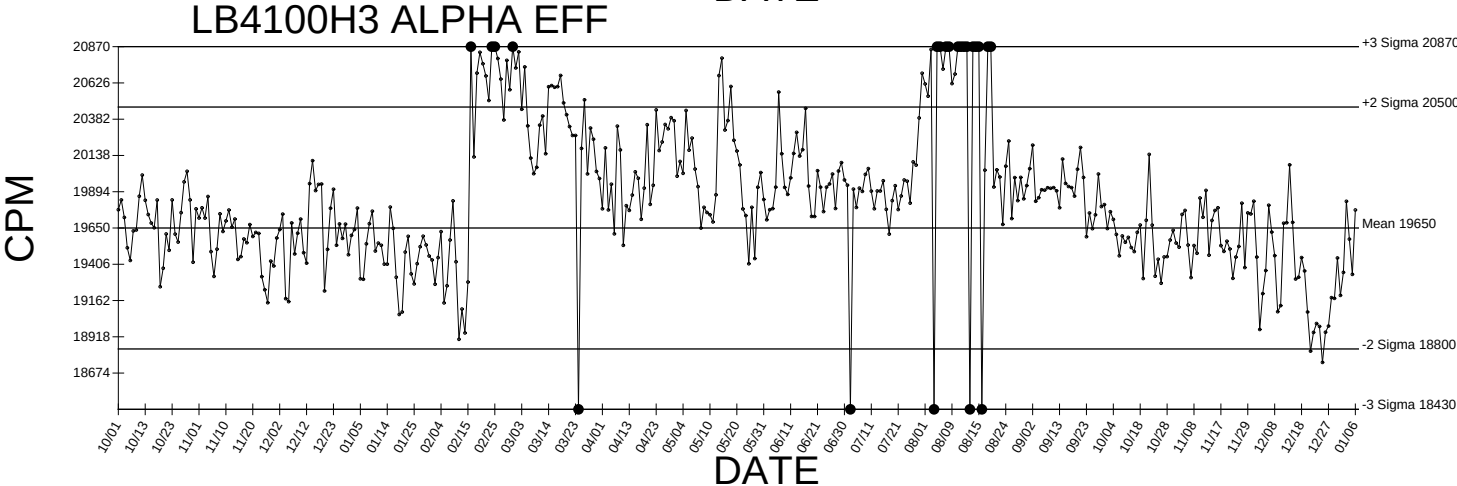
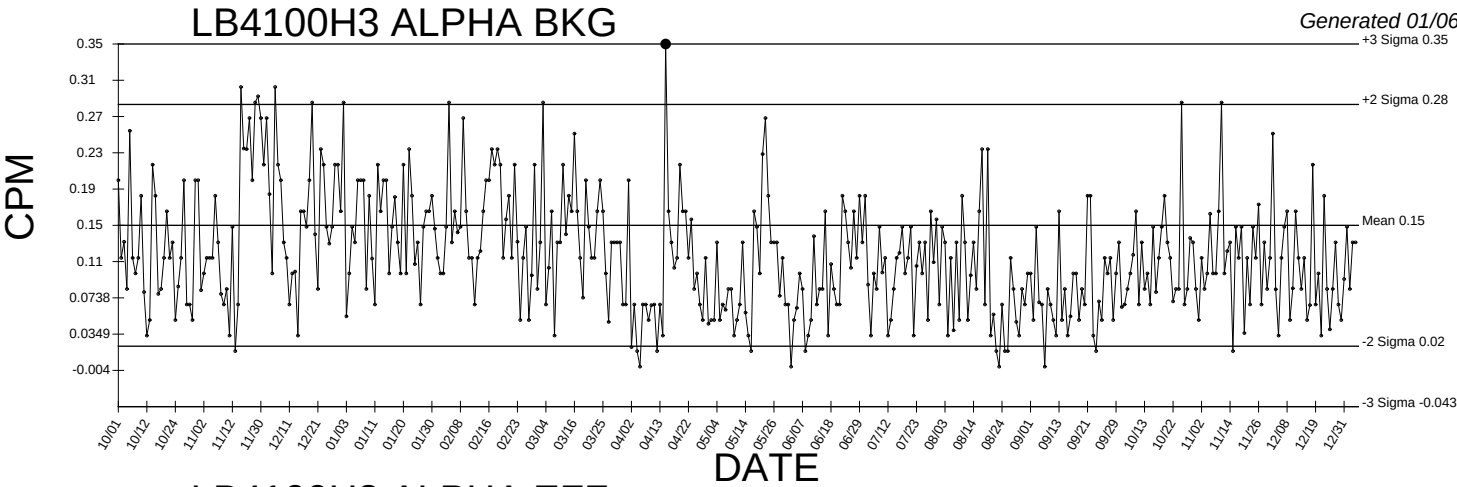
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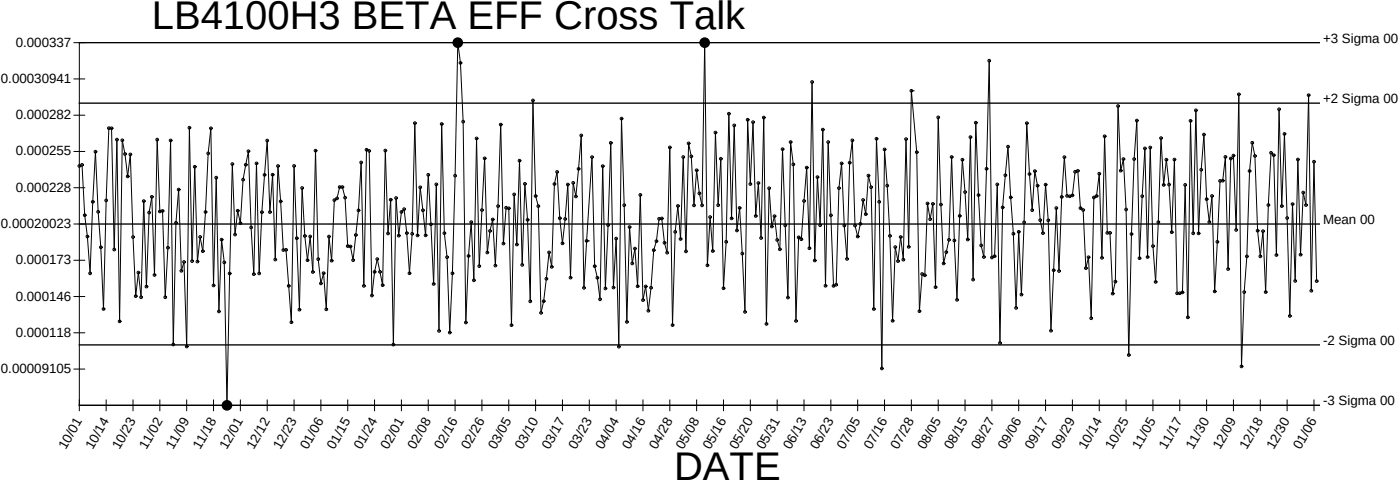
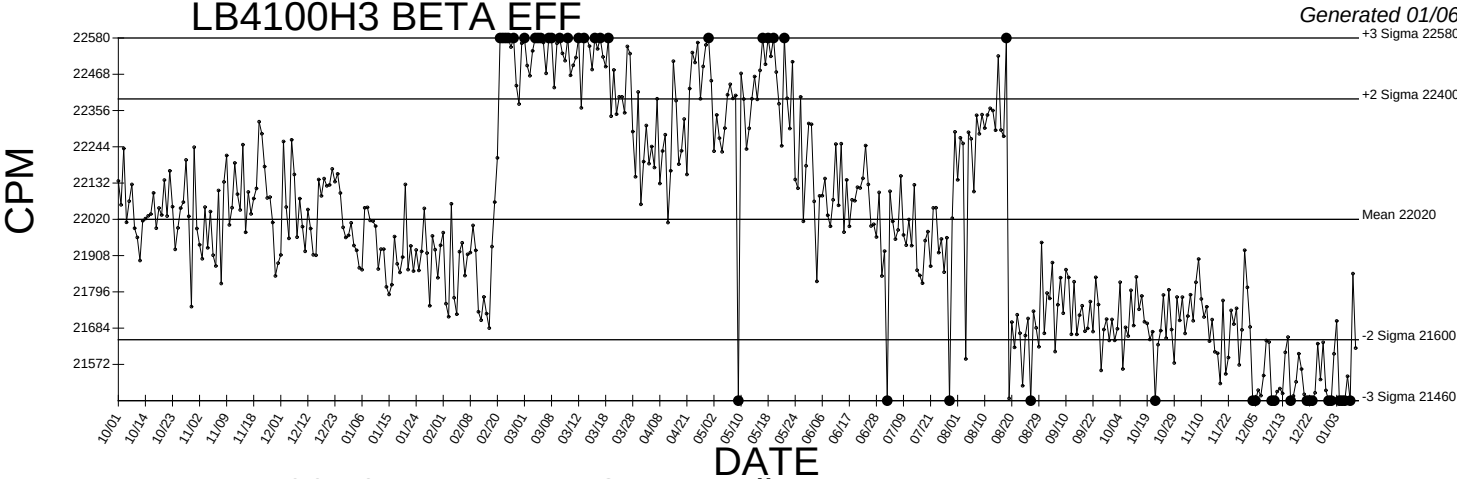
LB4100C3 BETA EFF Cross Talk



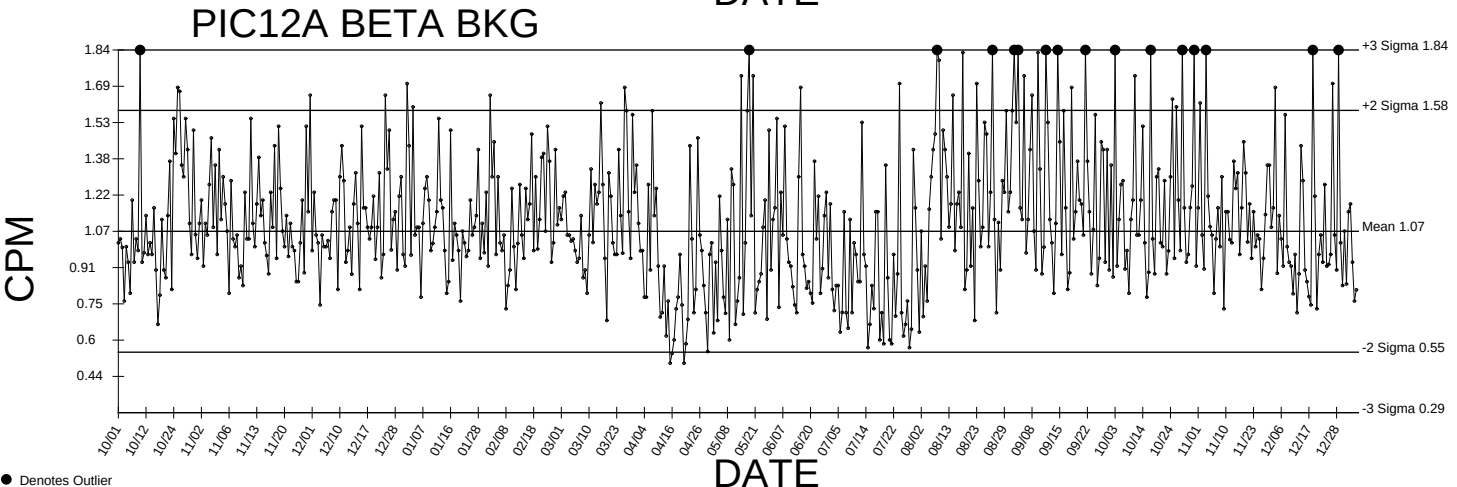
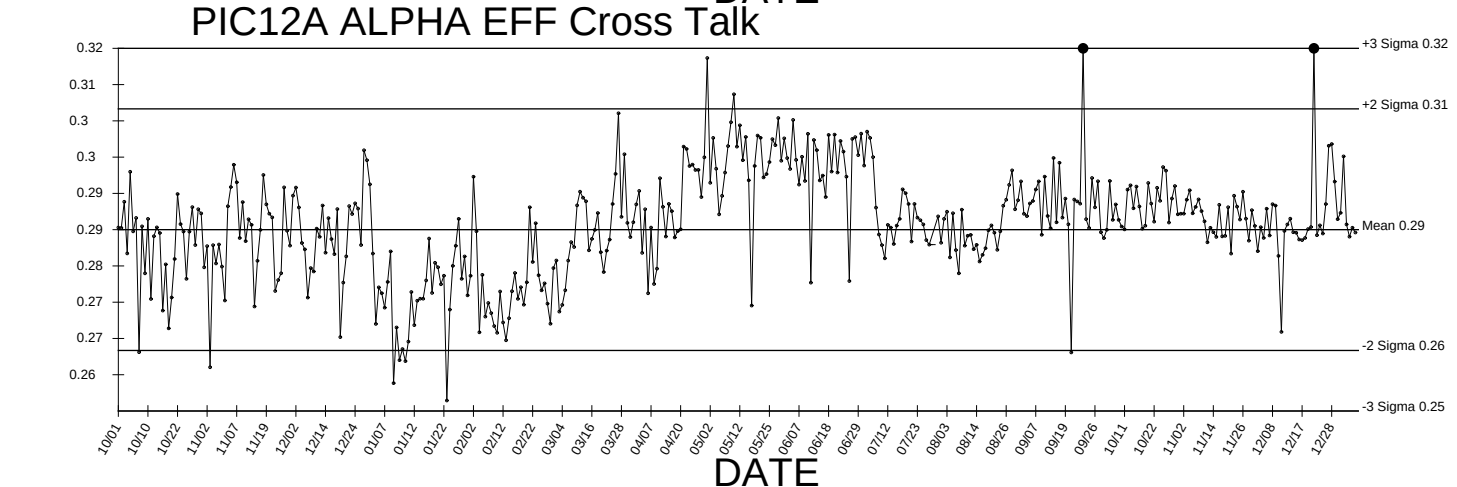
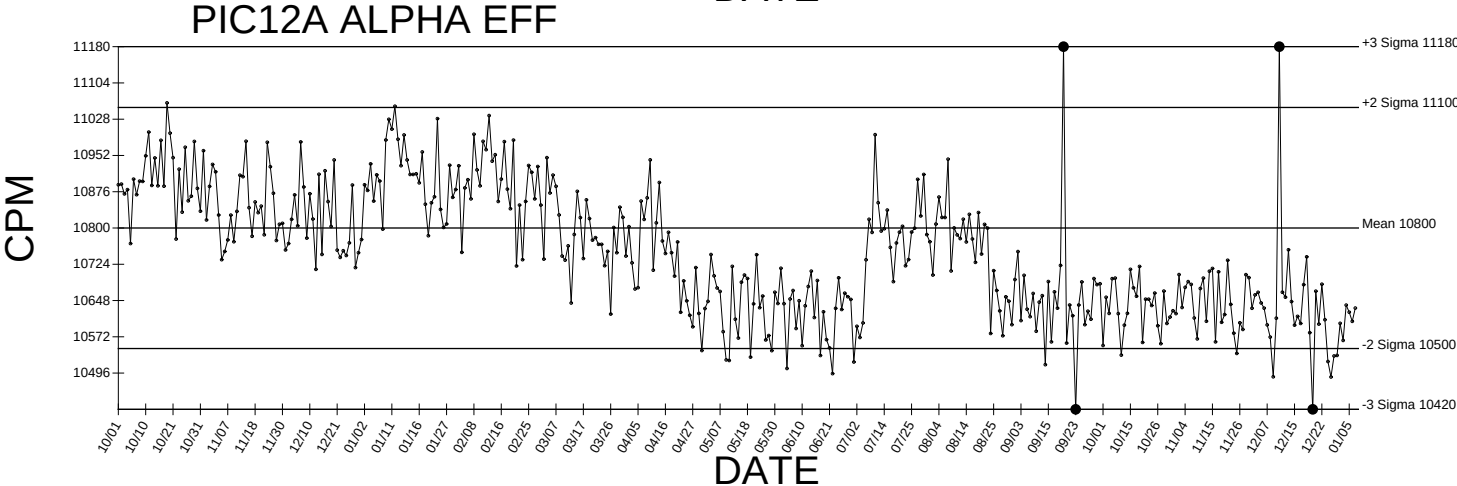
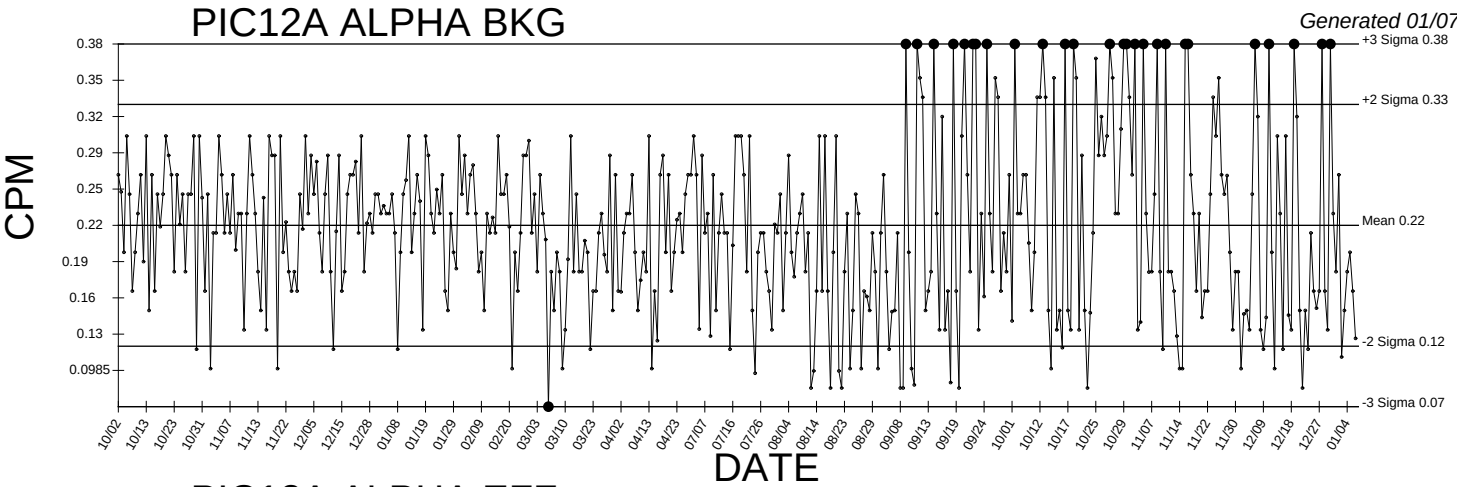
● Denotes Outlier



● Denotes Outlier



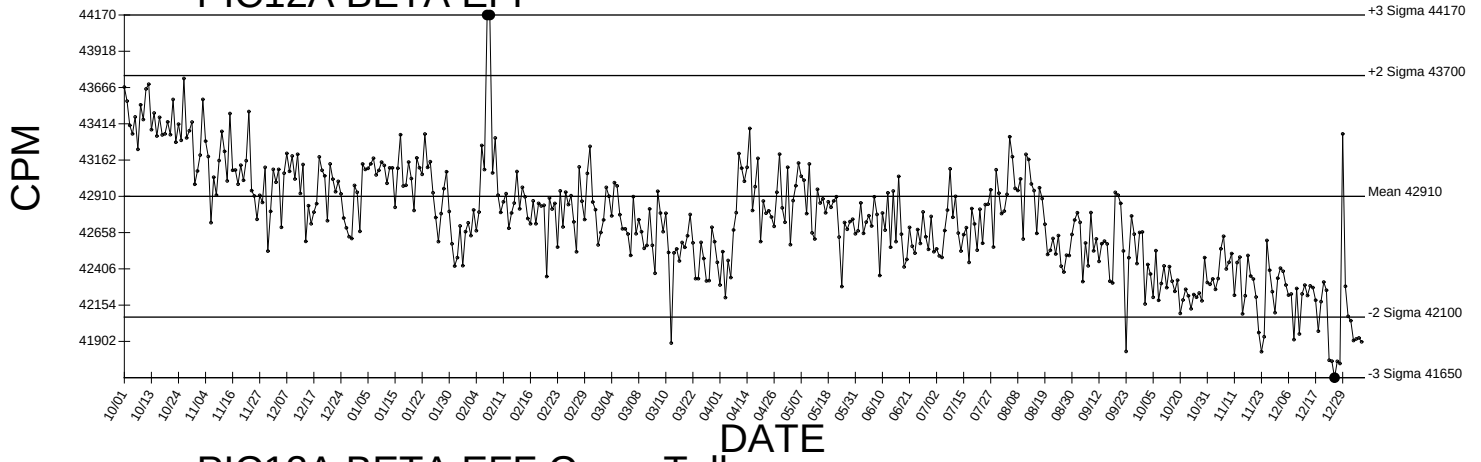
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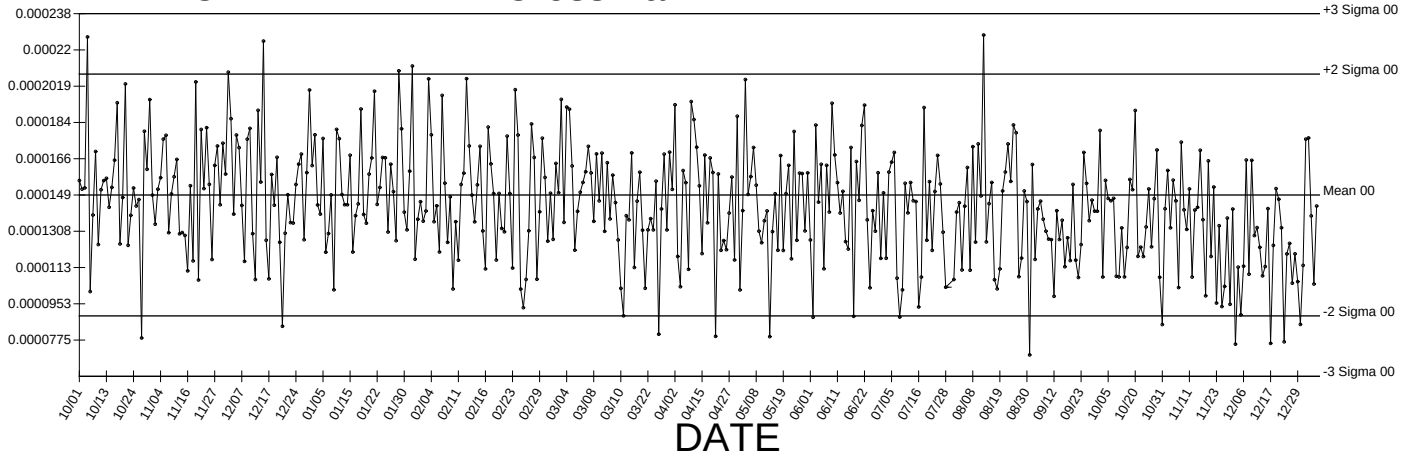
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PIC12A BETA EFF

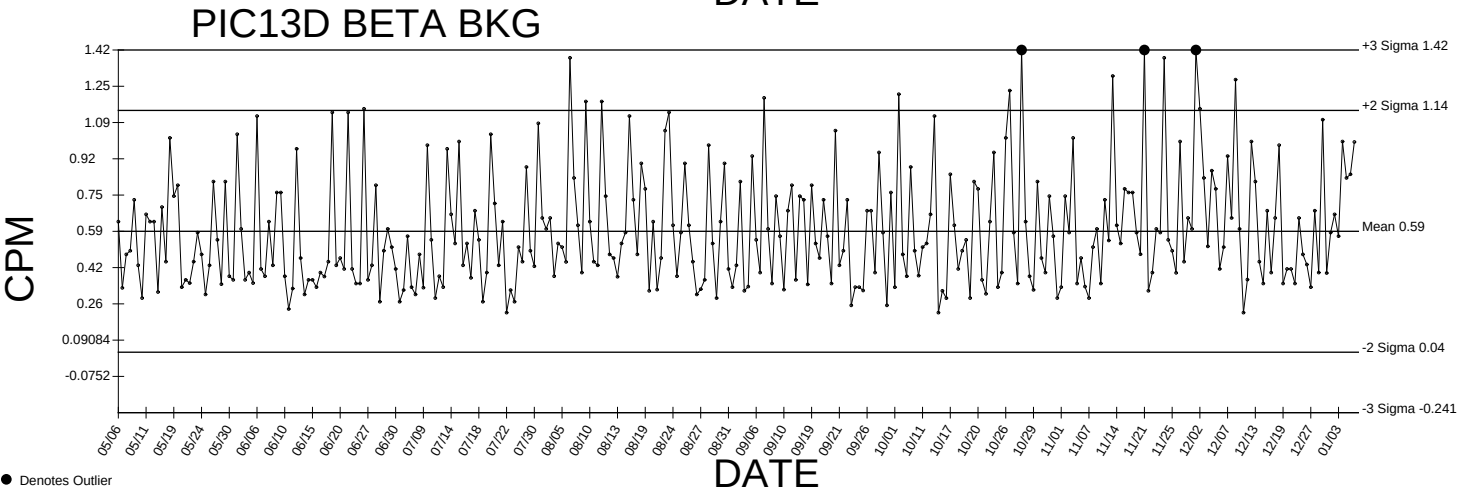
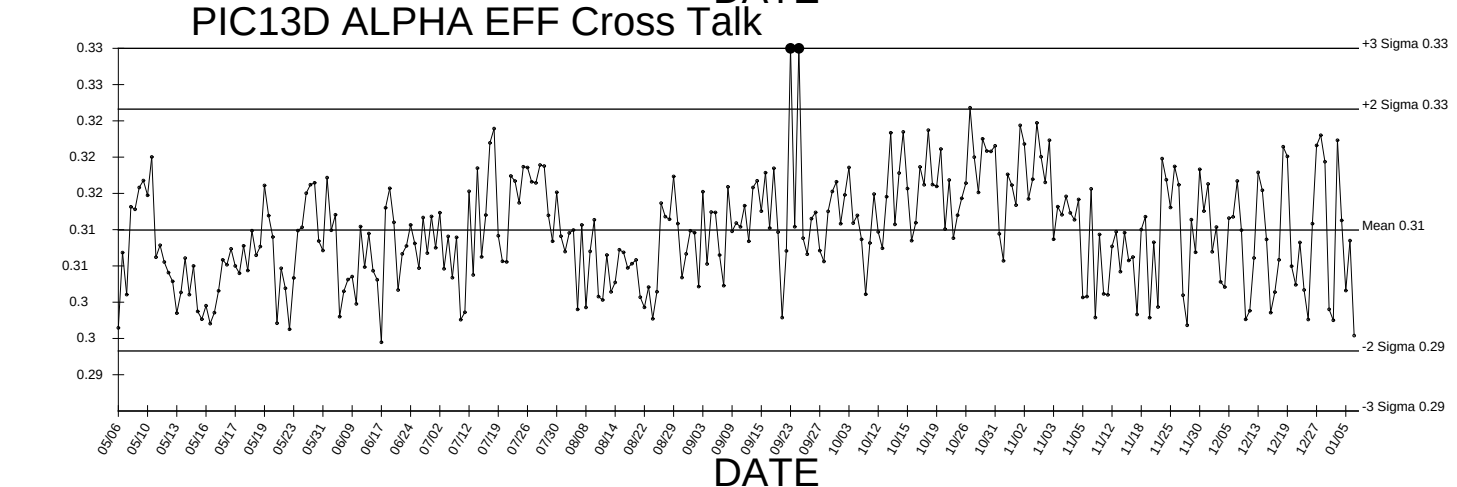
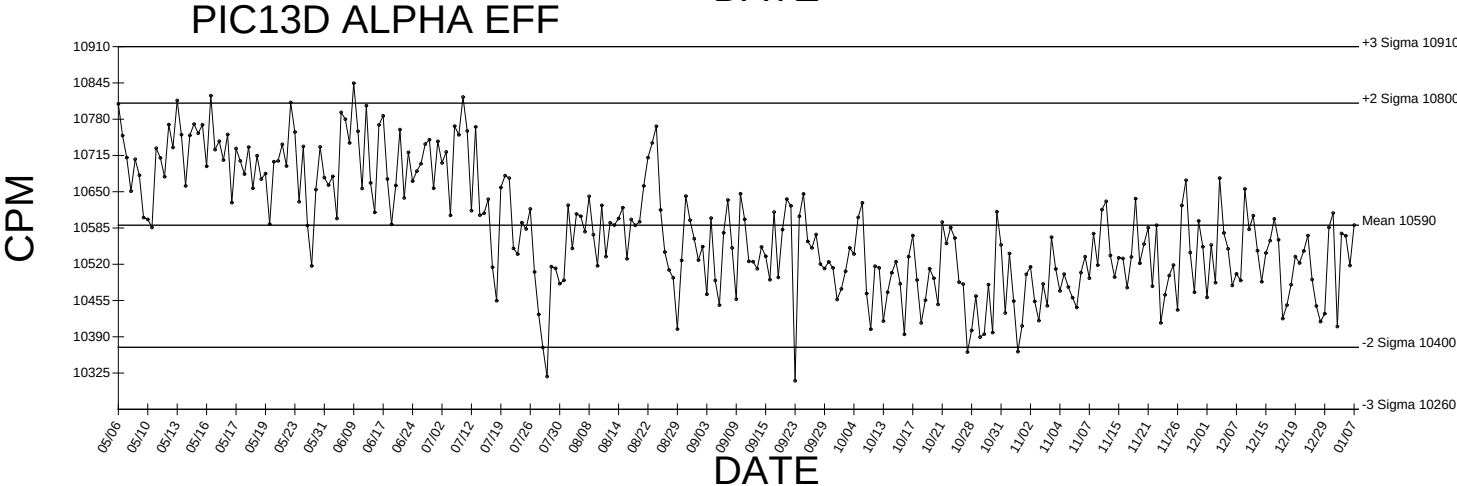
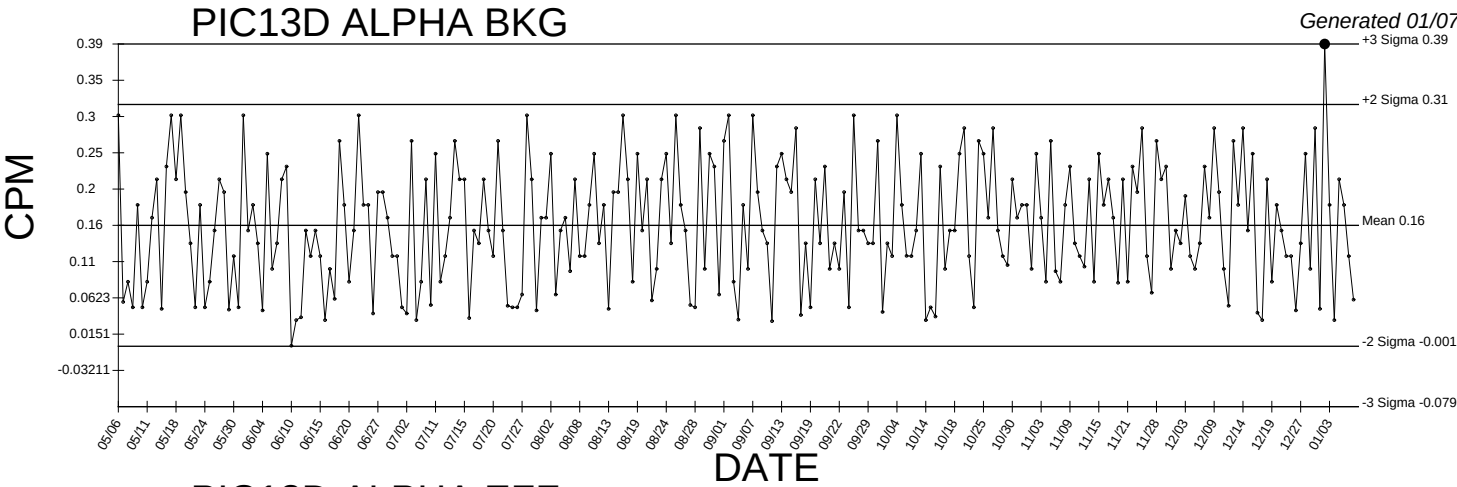
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+3 Sigma 44170



PIC12A BETA EFF Cross Talk



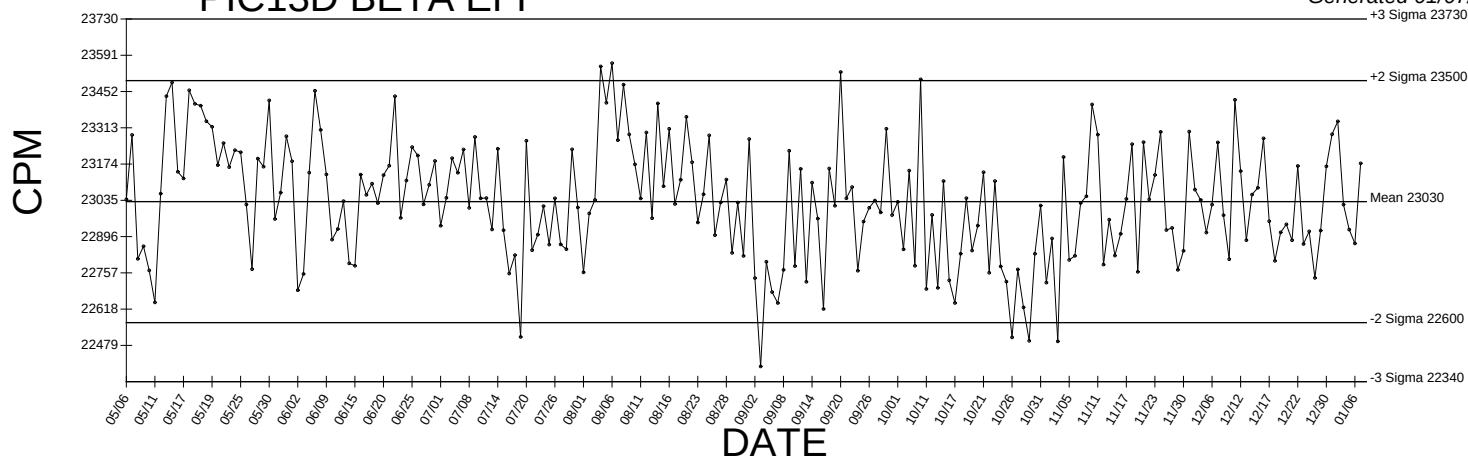
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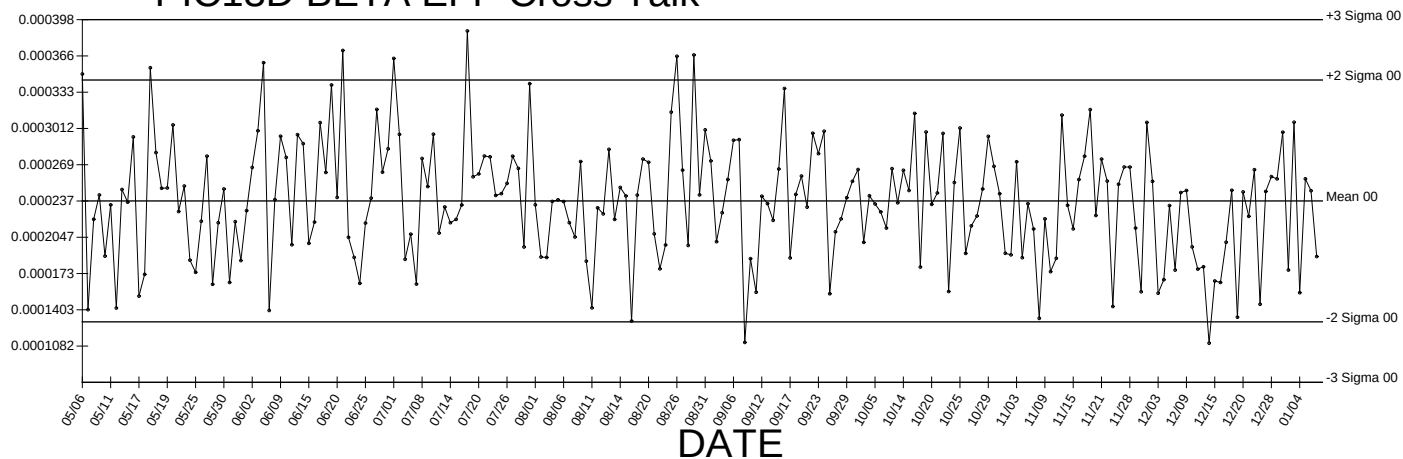
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PIC13D BETA EFF

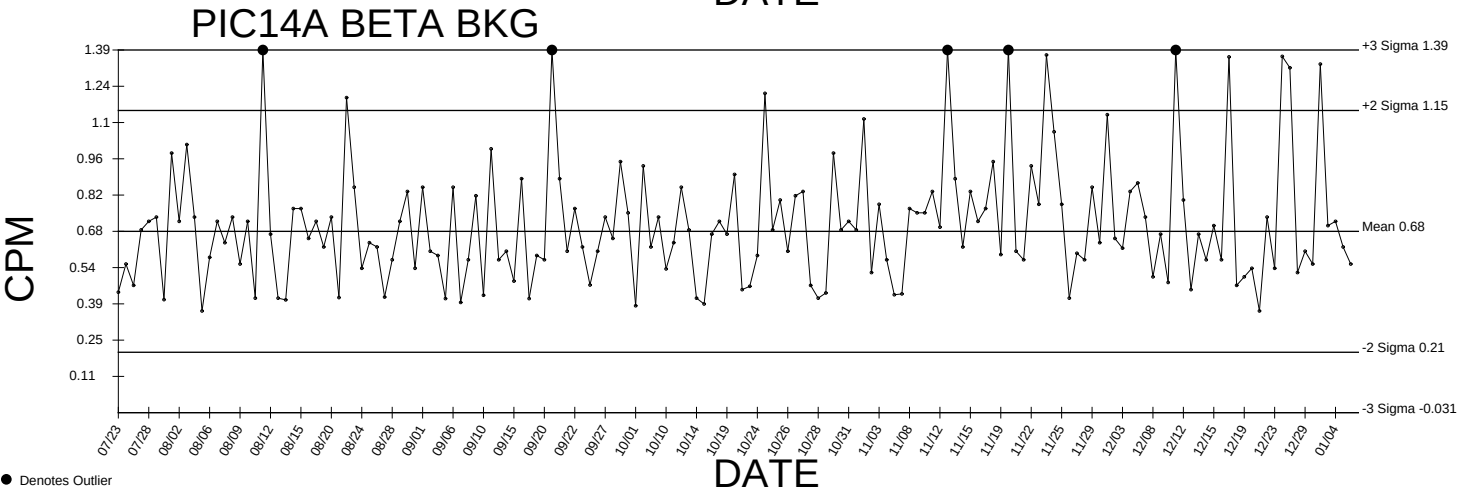
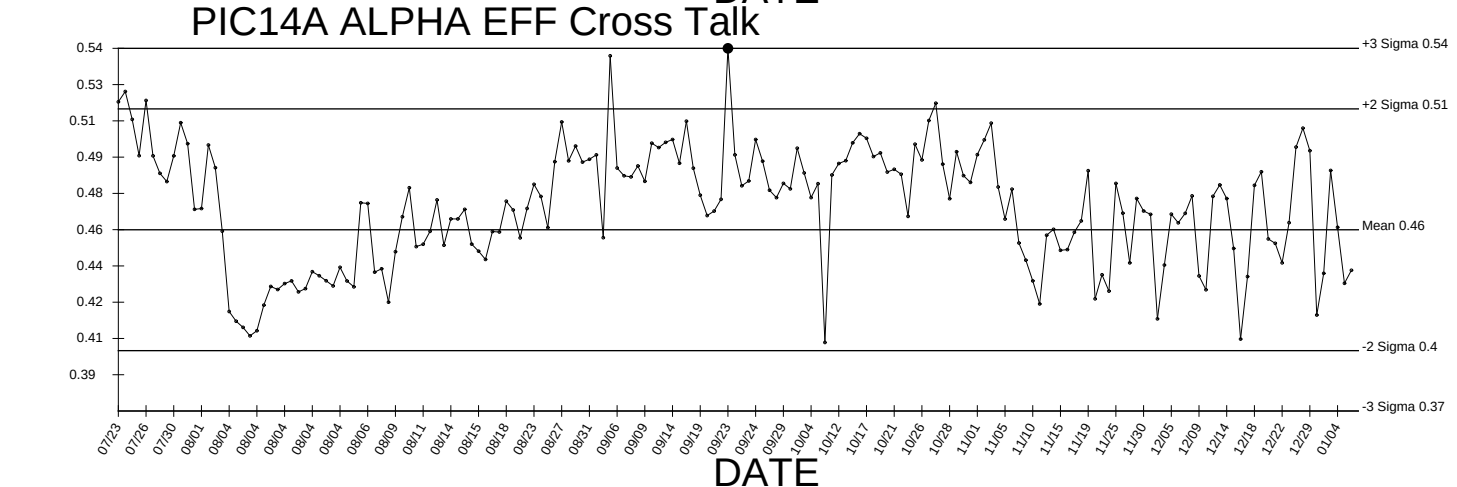
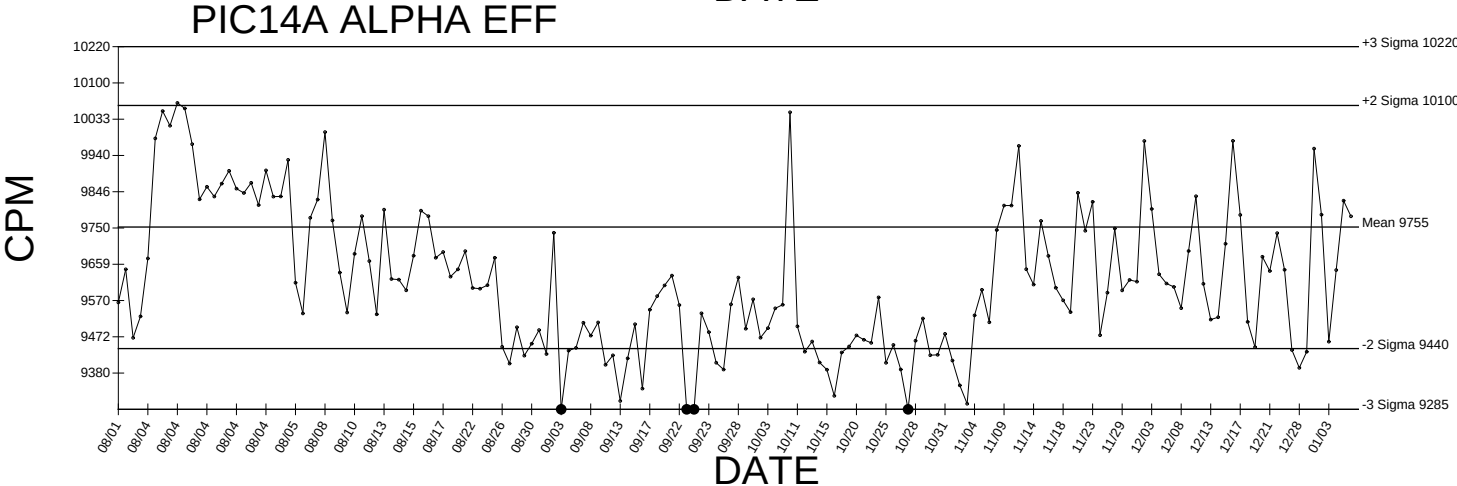
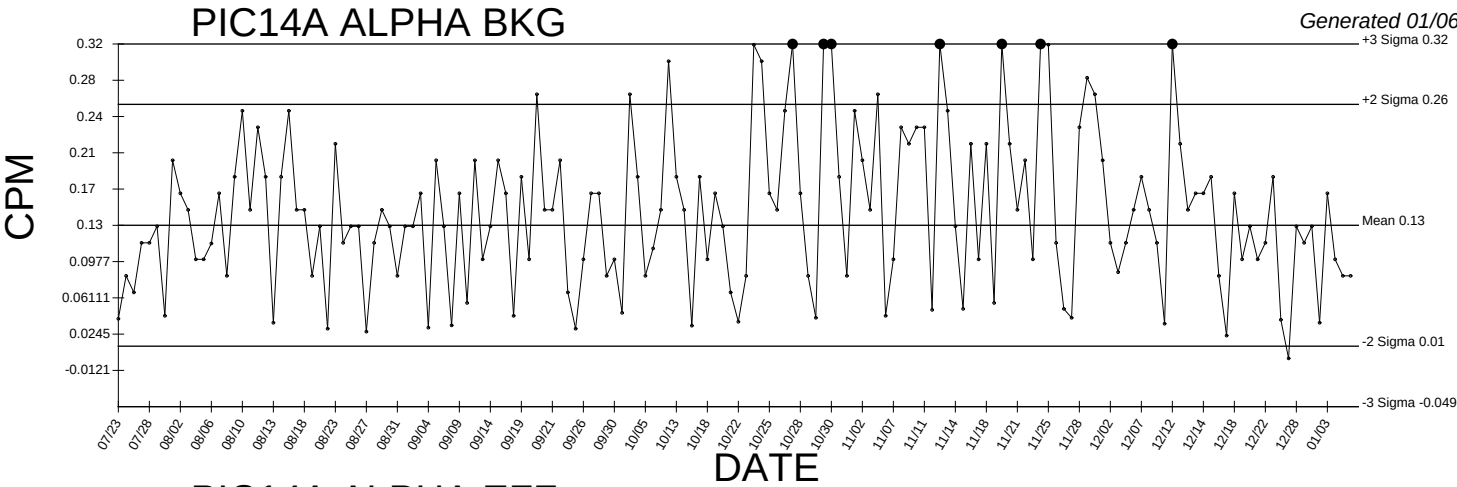
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PIC13D BETA EFF Cross Talk



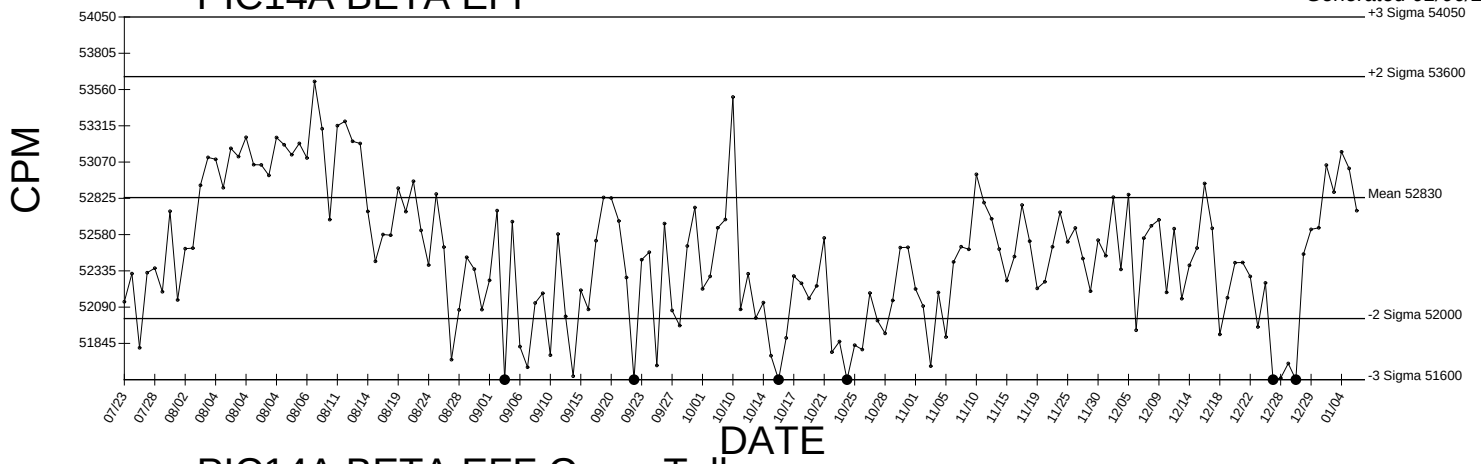
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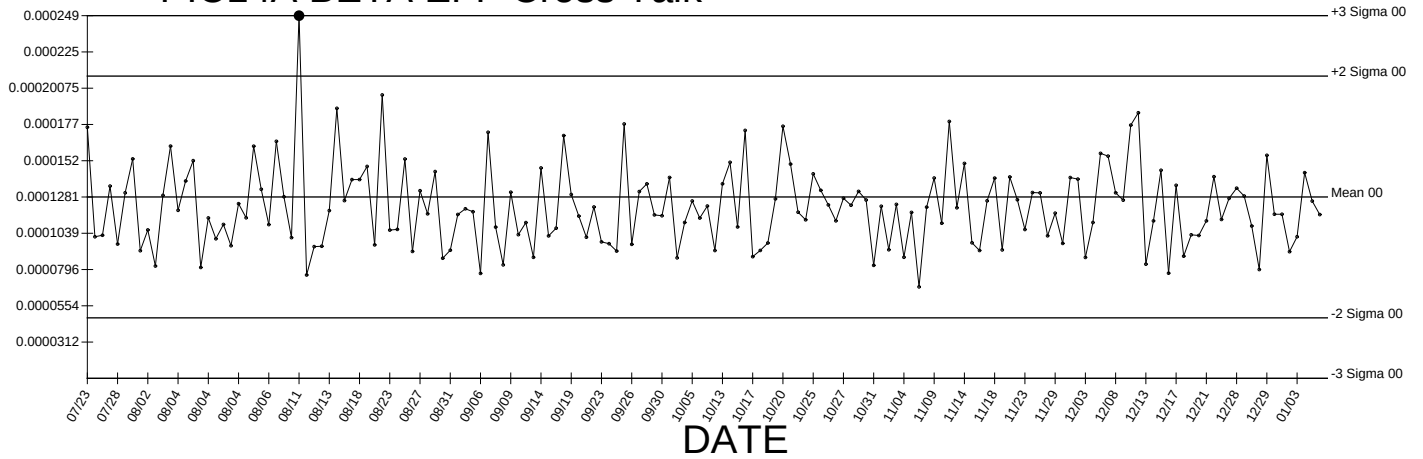
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PIC14A BETA EFF

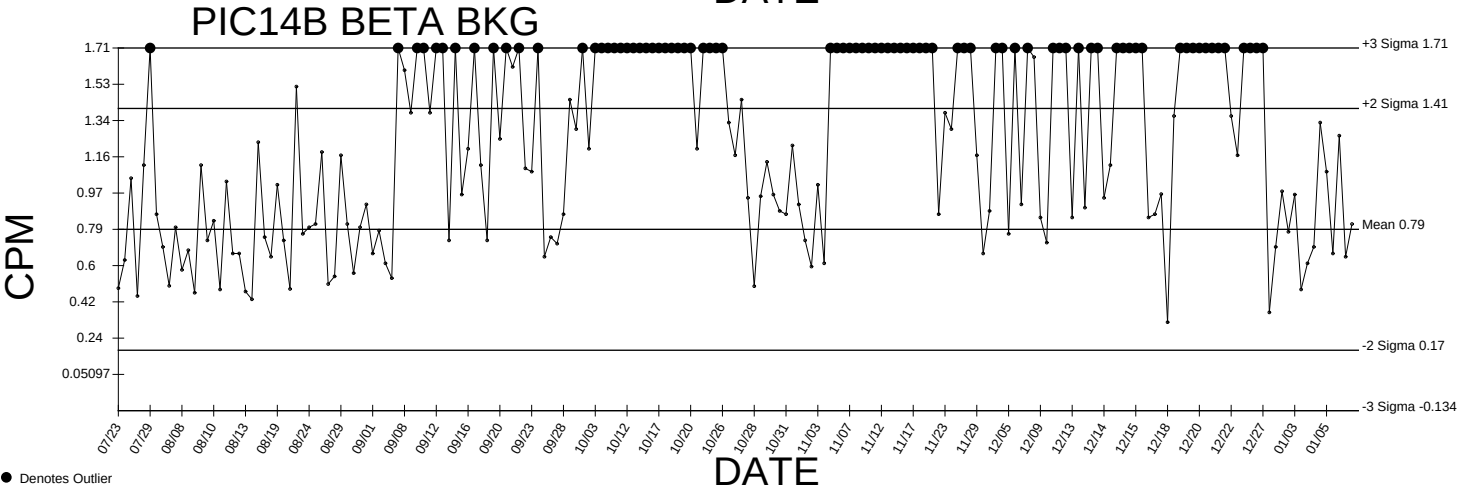
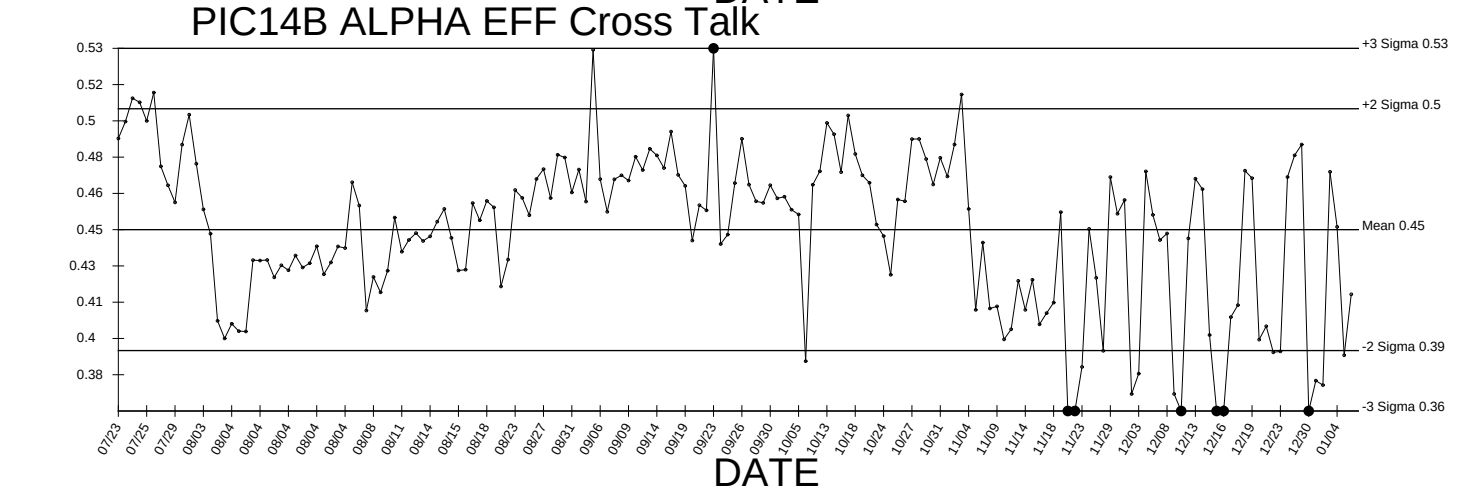
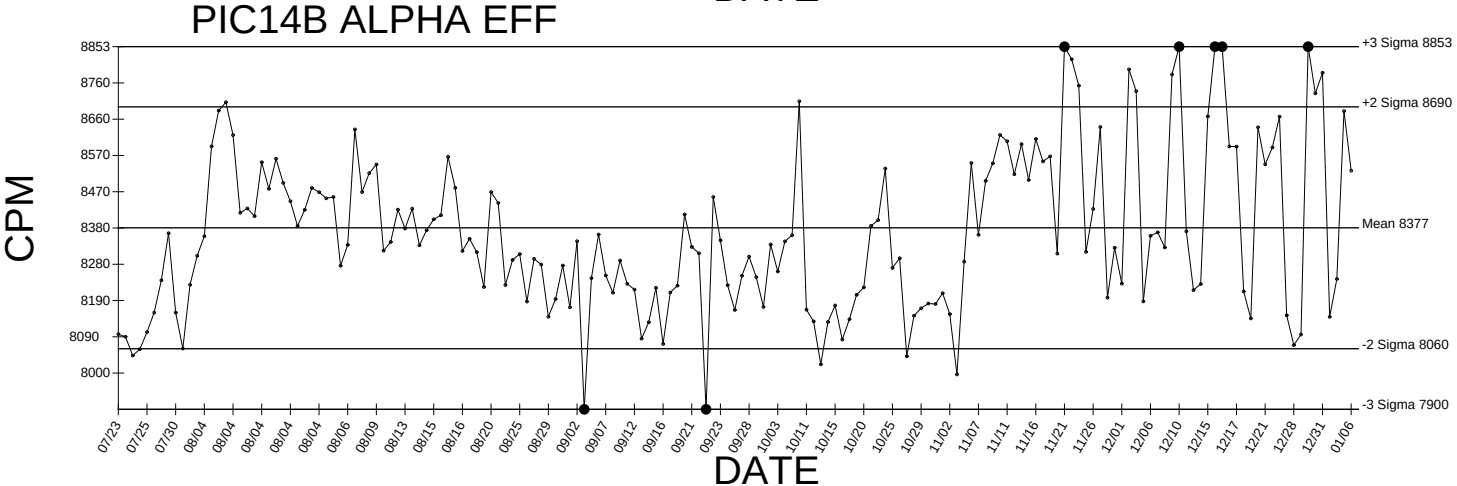
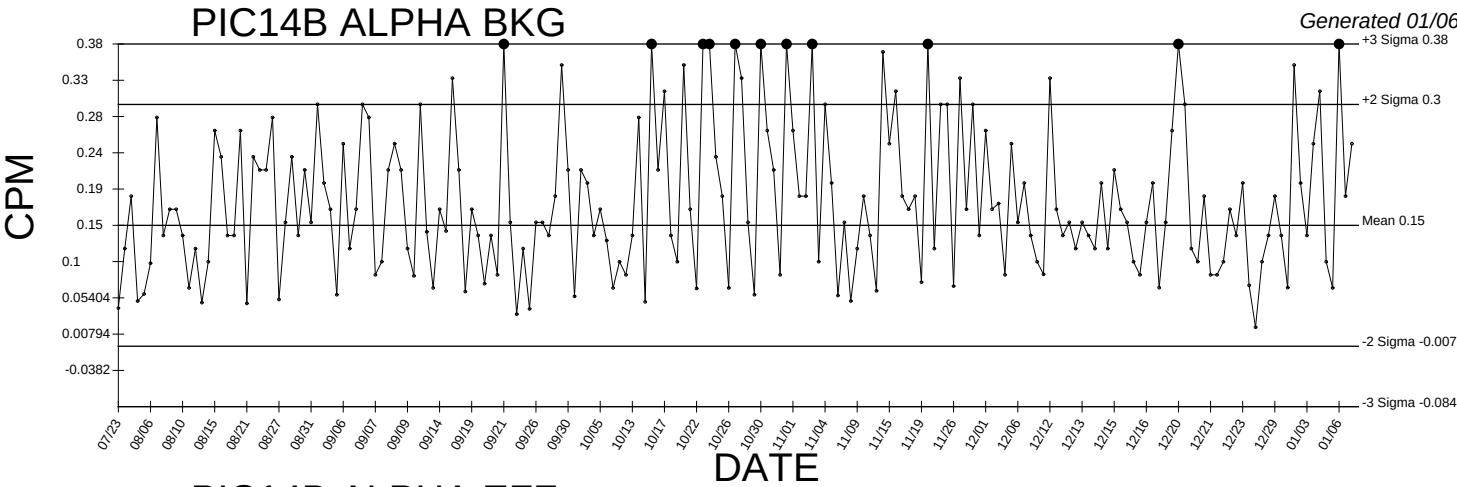
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+3 Sigma 54050



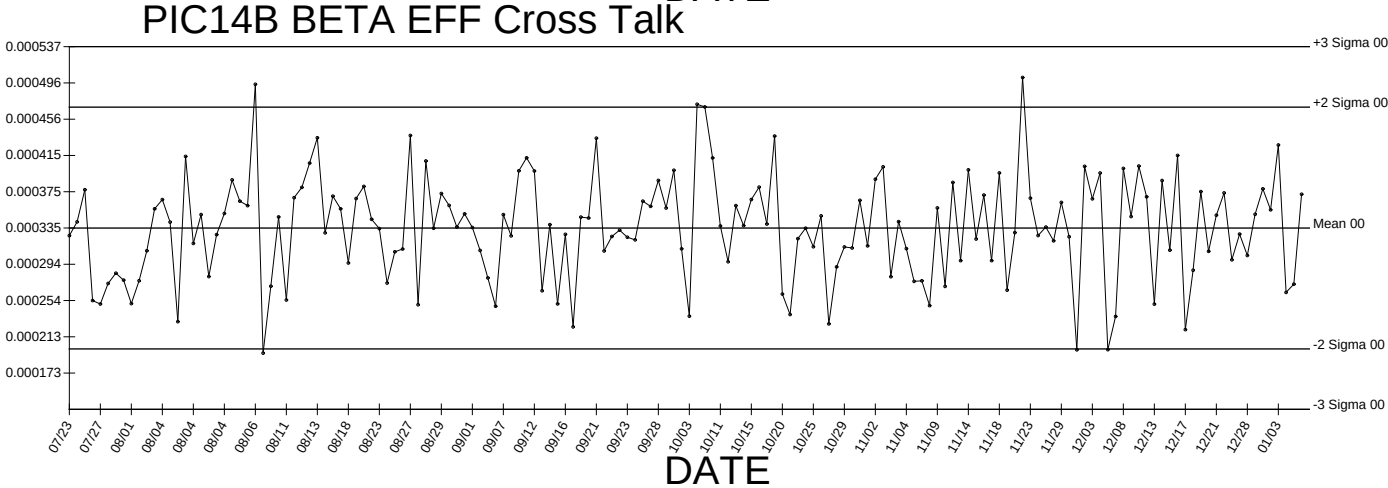
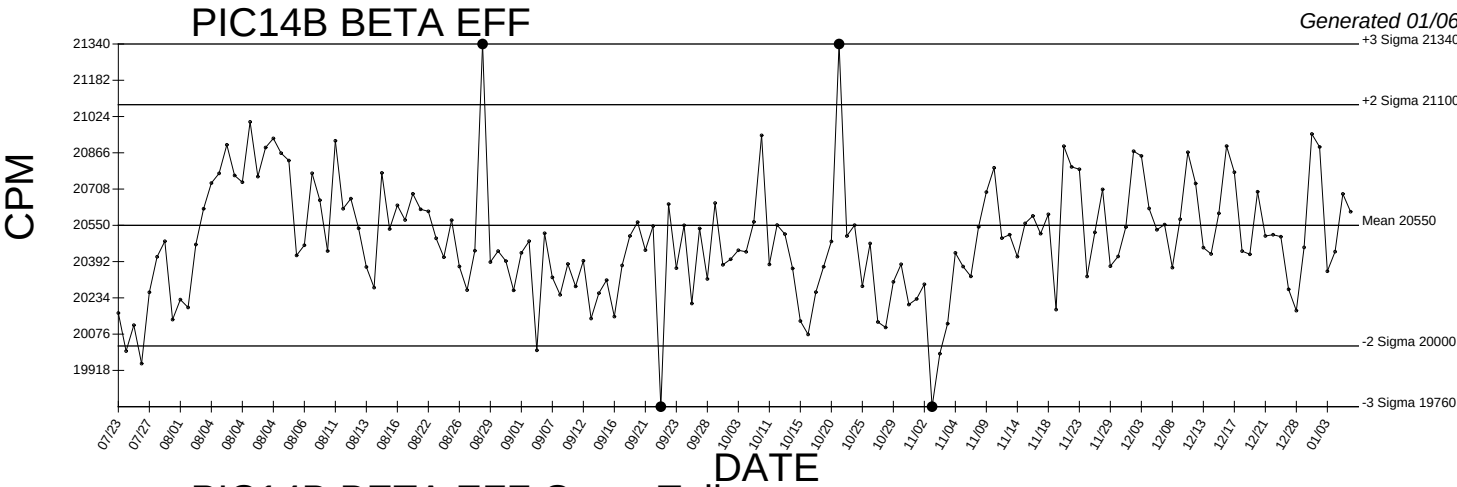
PIC14A BETA EFF Cross Talk



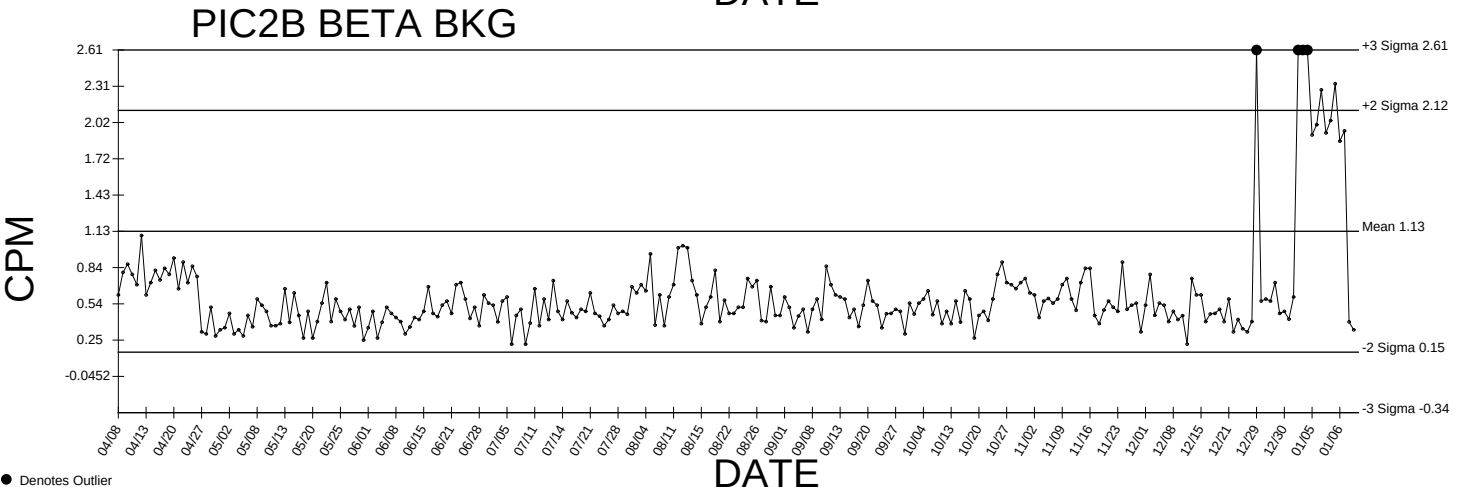
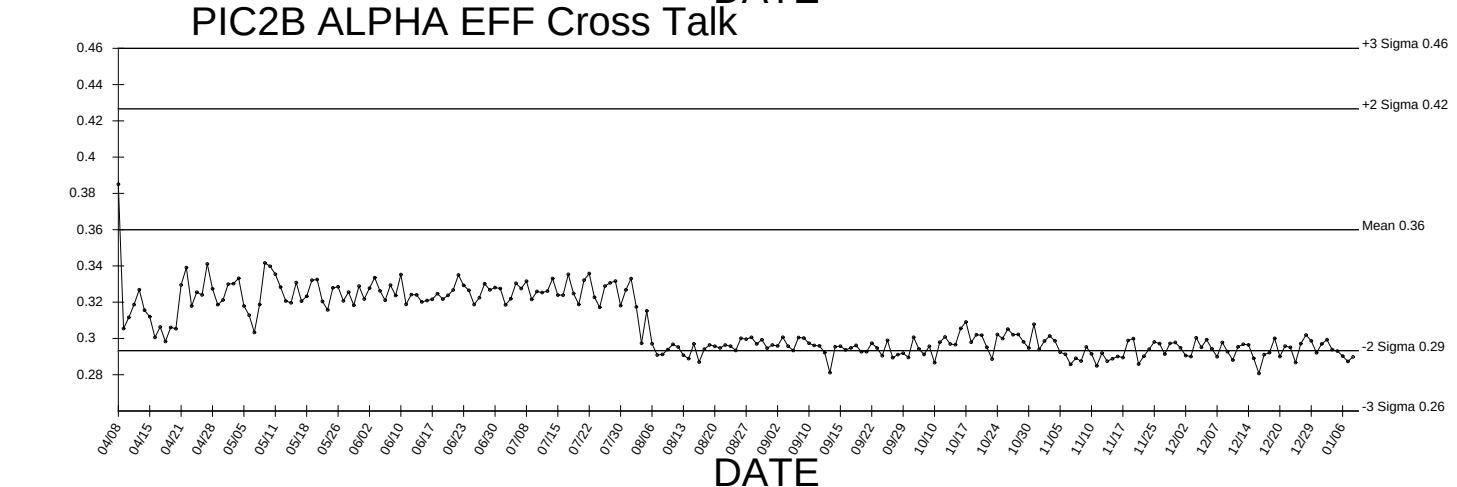
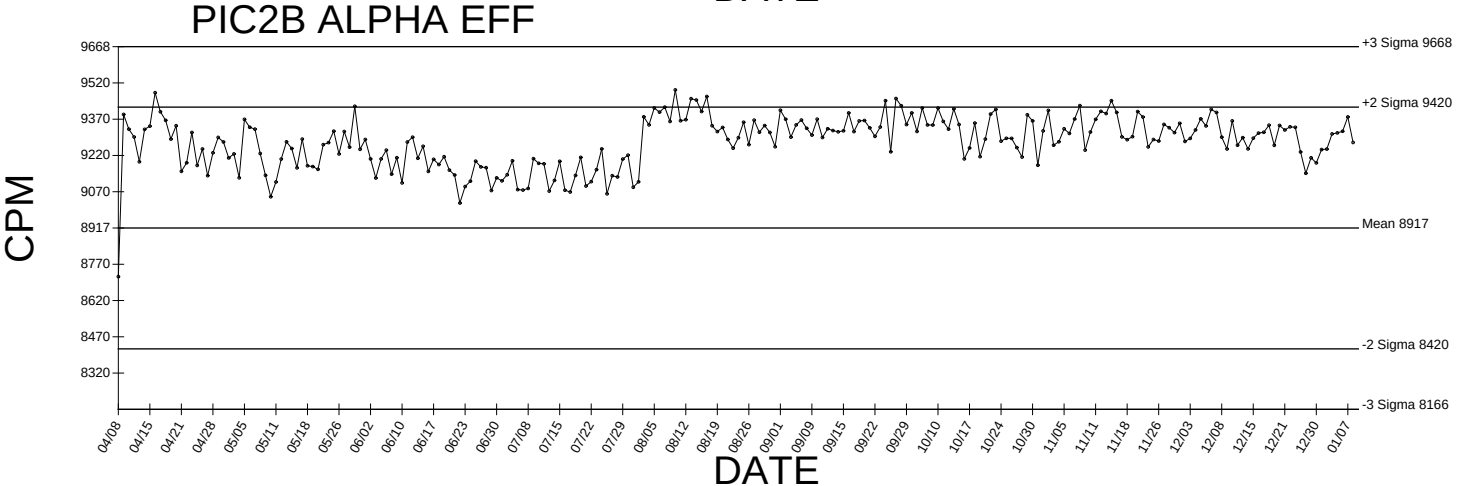
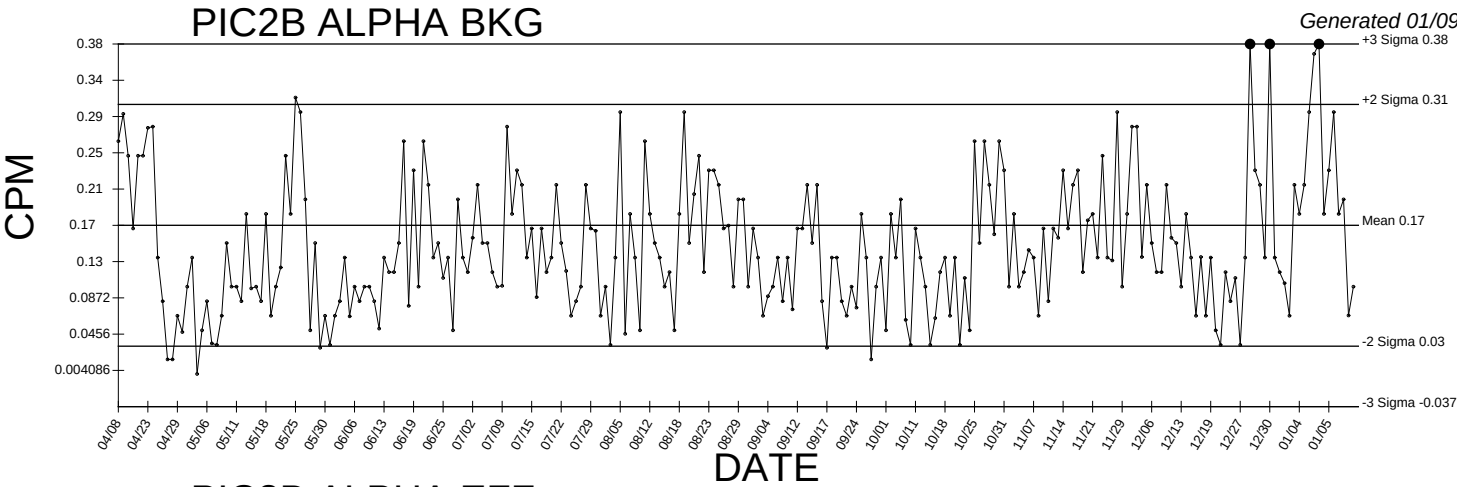
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● Denotes Outlier



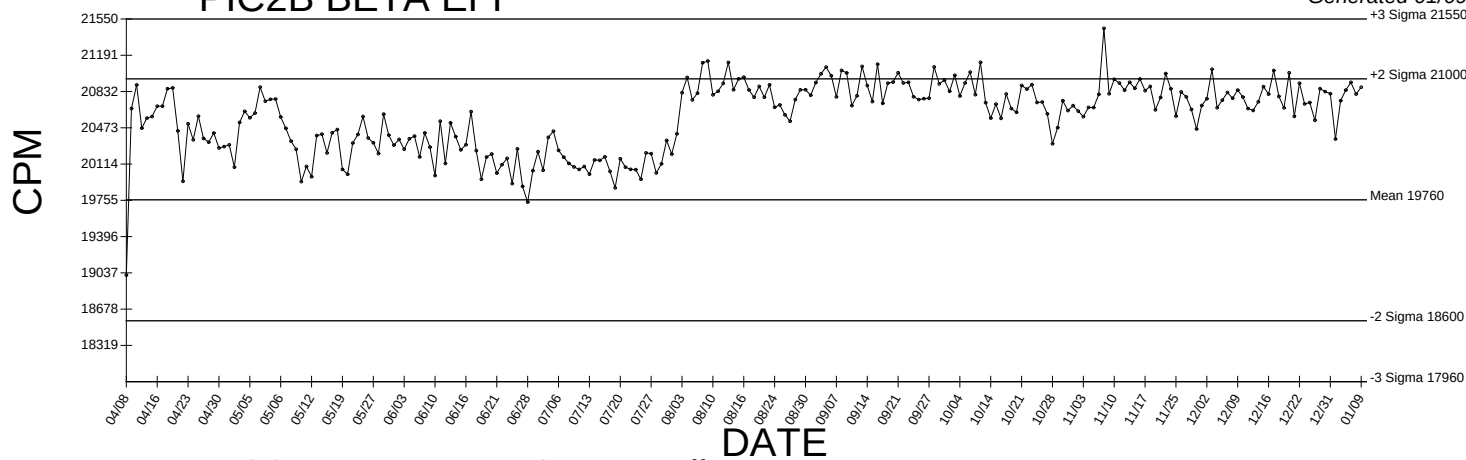
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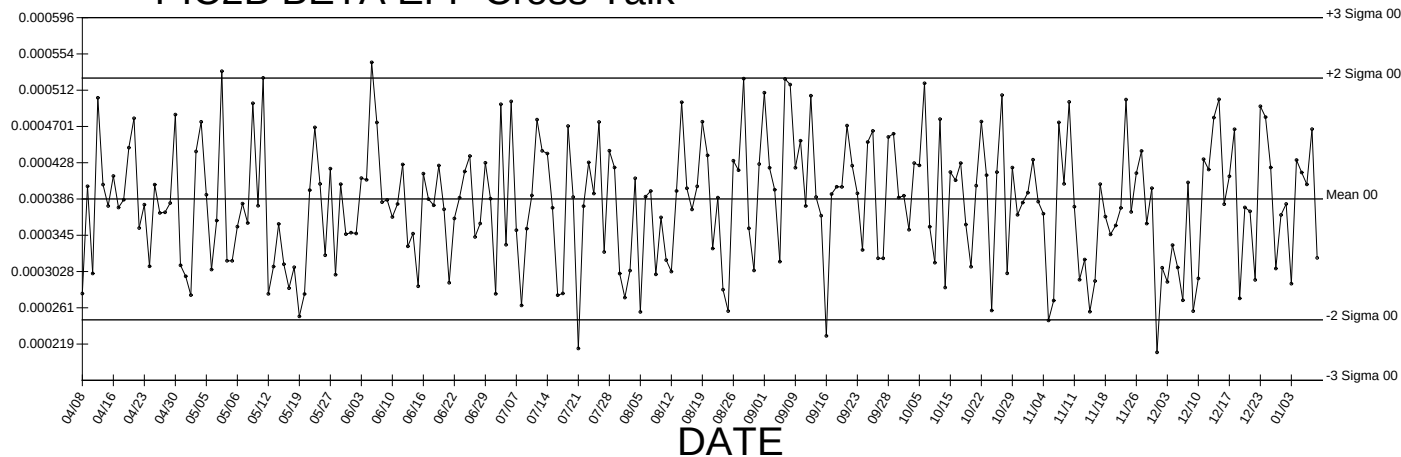
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PIC2B BETA EFF

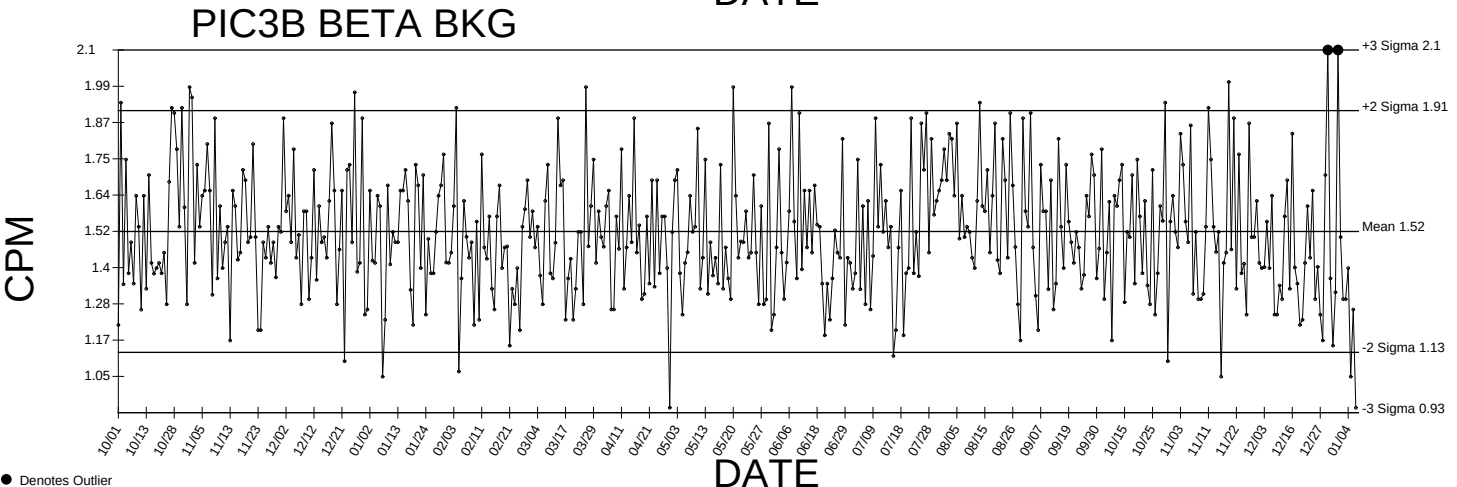
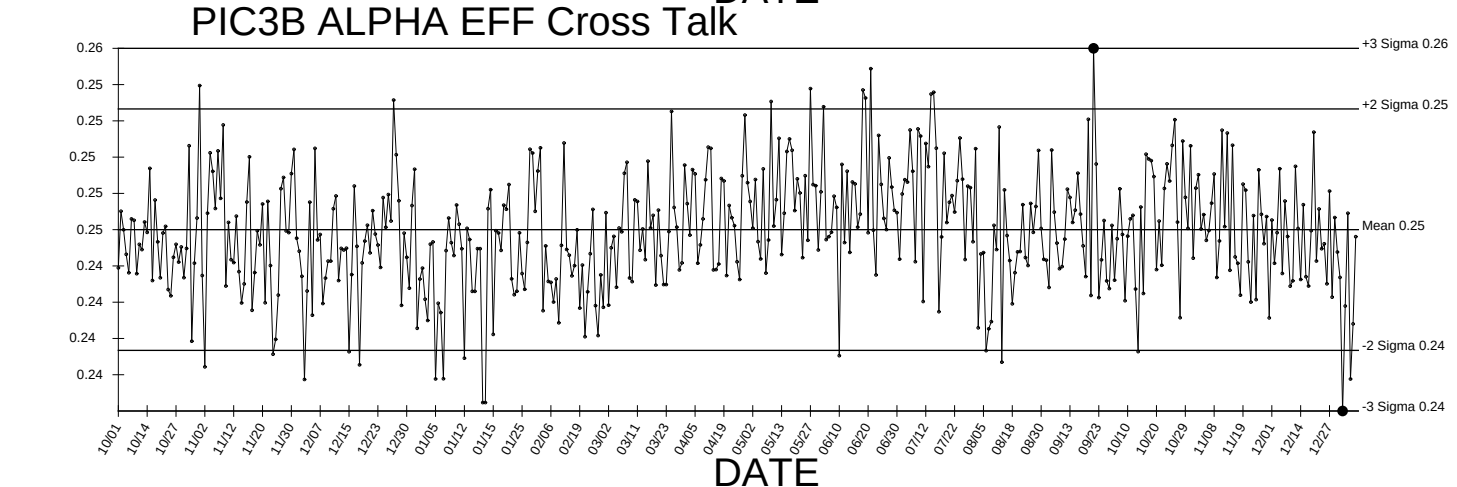
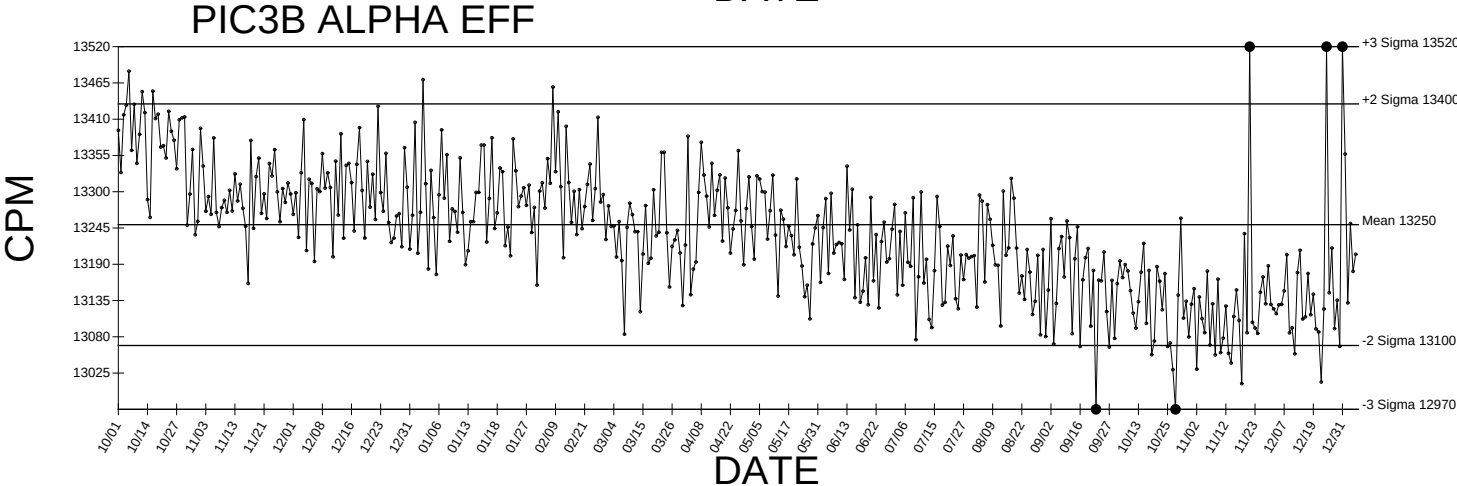
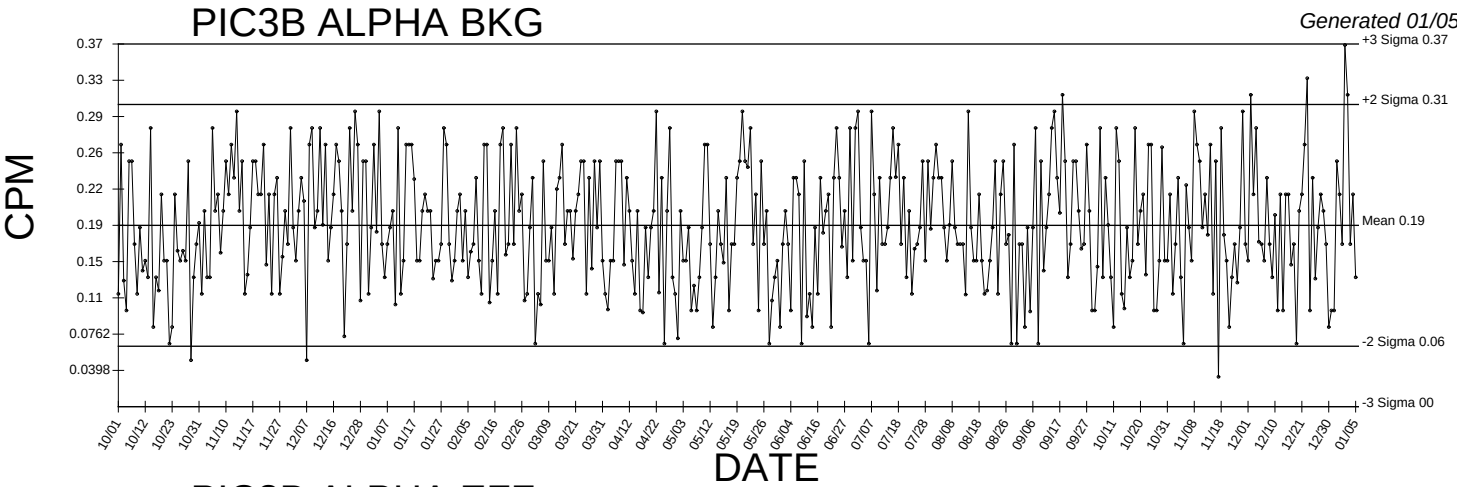
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PIC2B BETA EFF Cross Talk



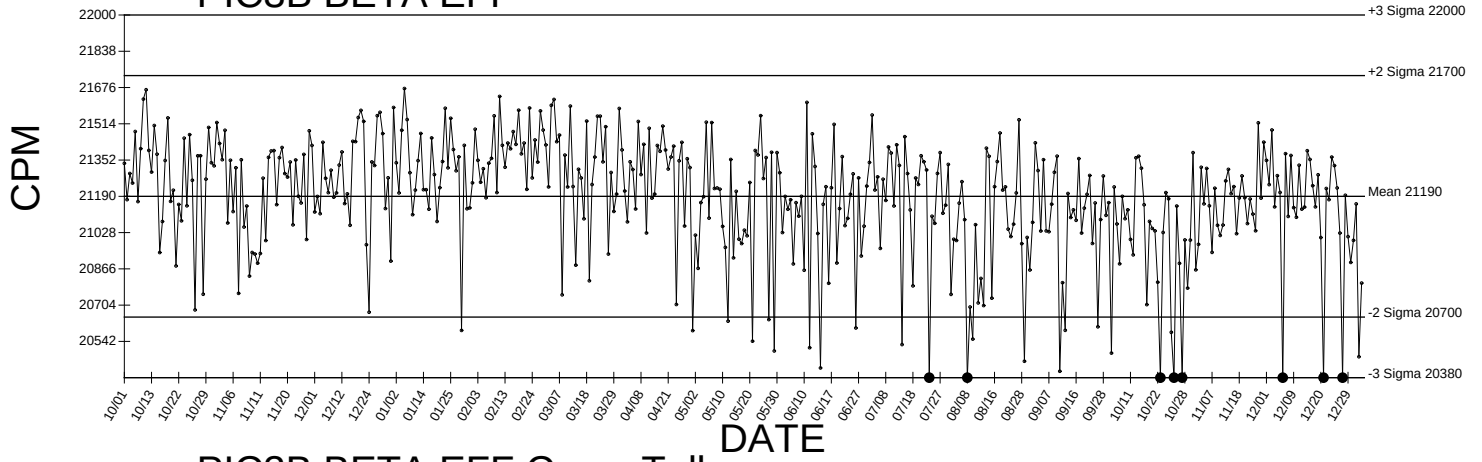
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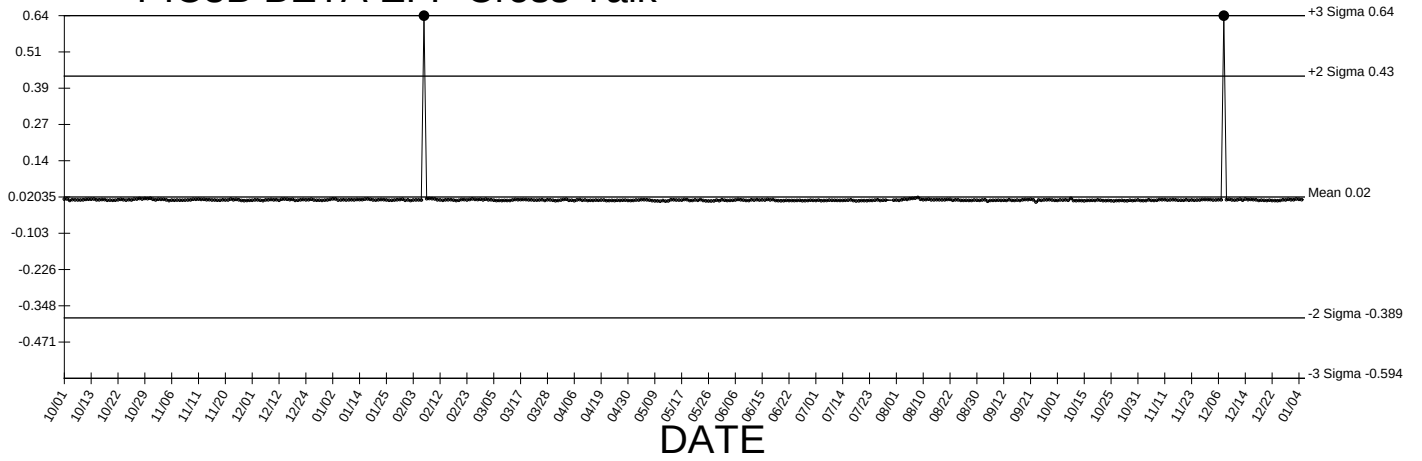
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PIC3B BETA EFF

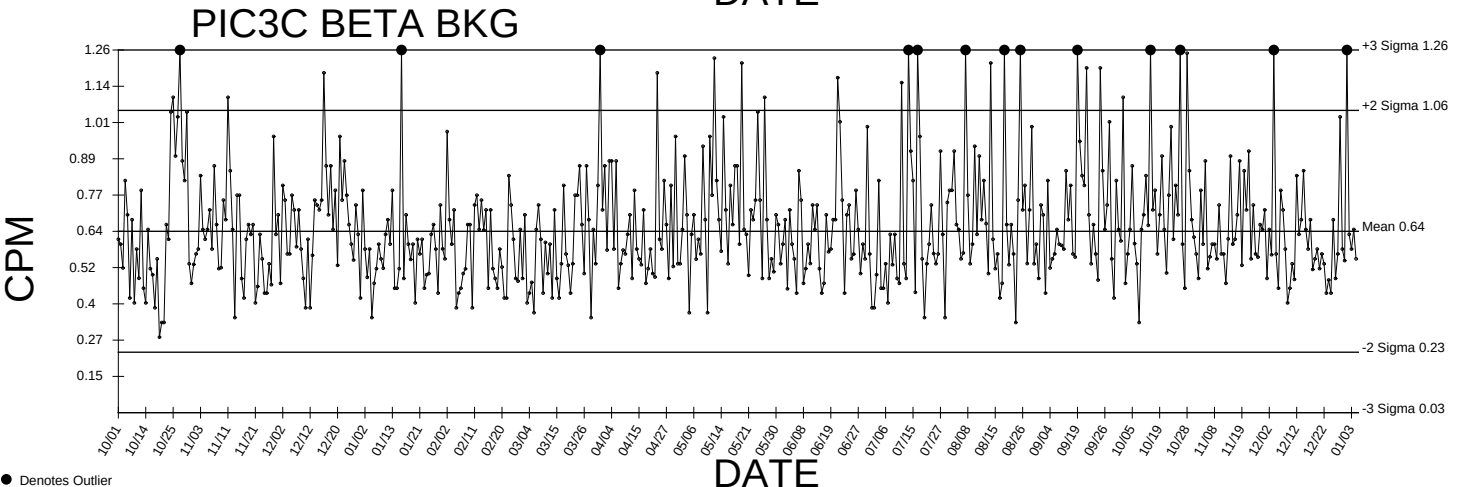
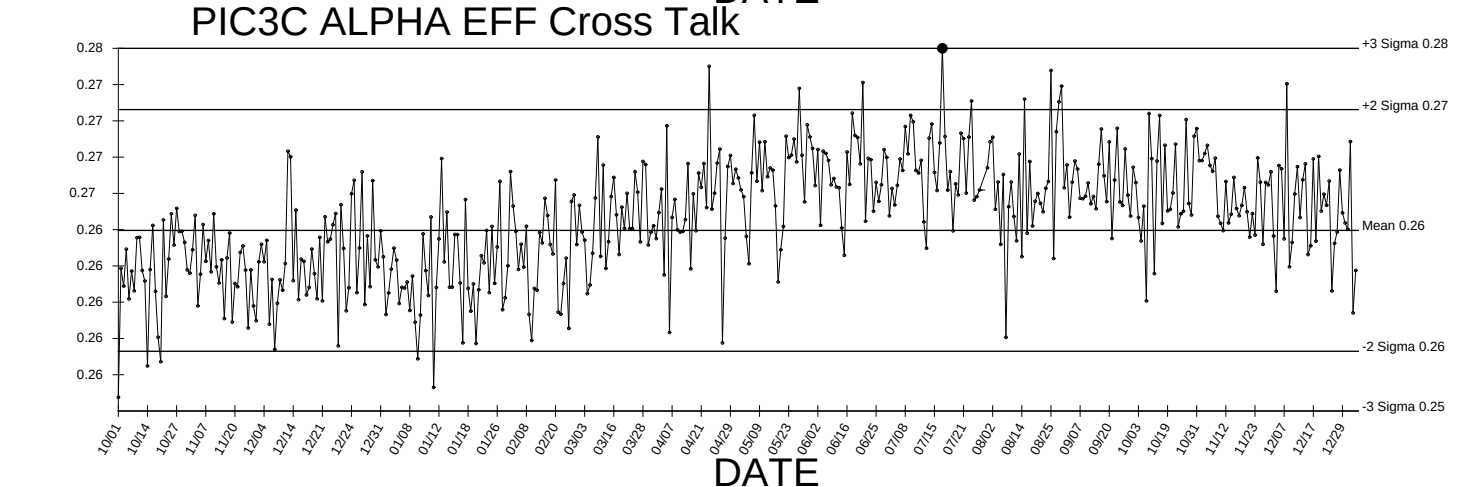
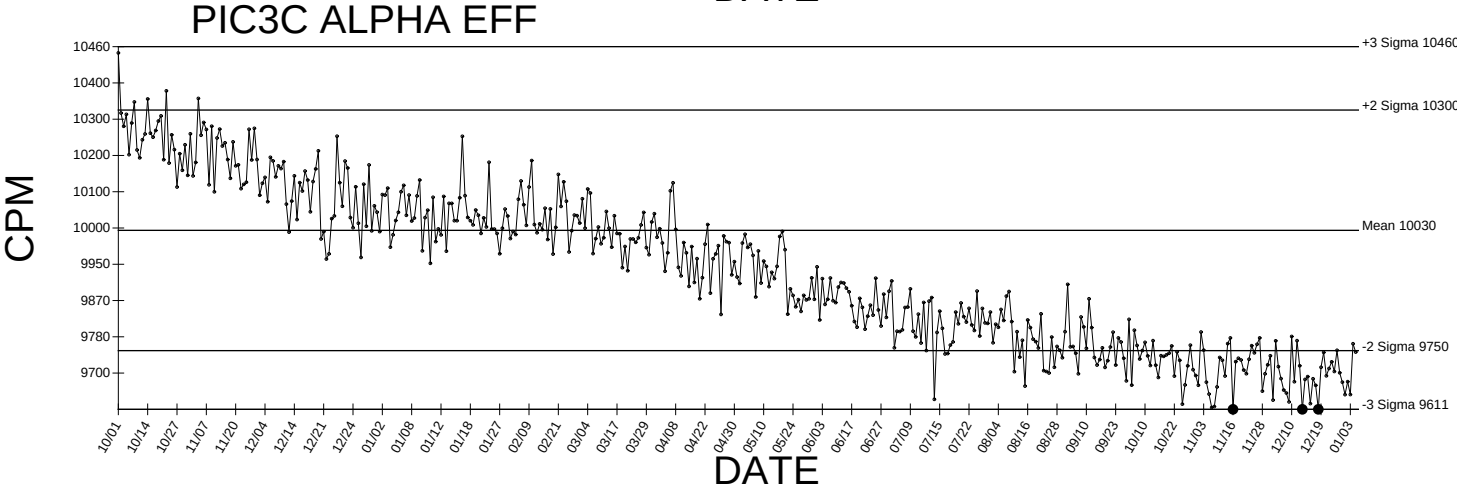
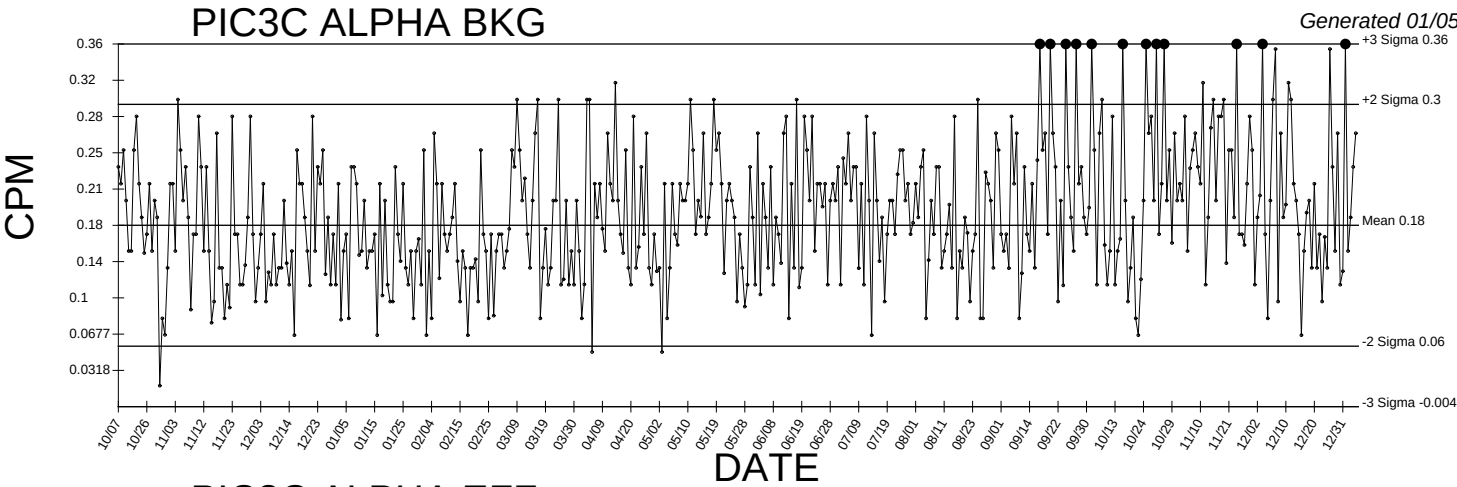
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PIC3B BETA EFF Cross Talk



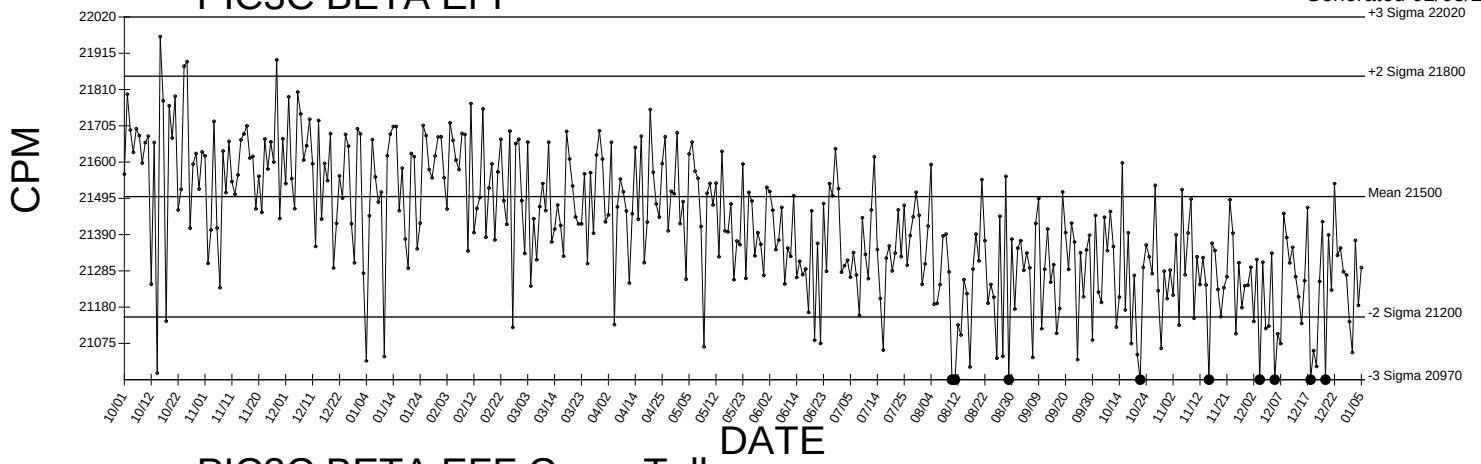
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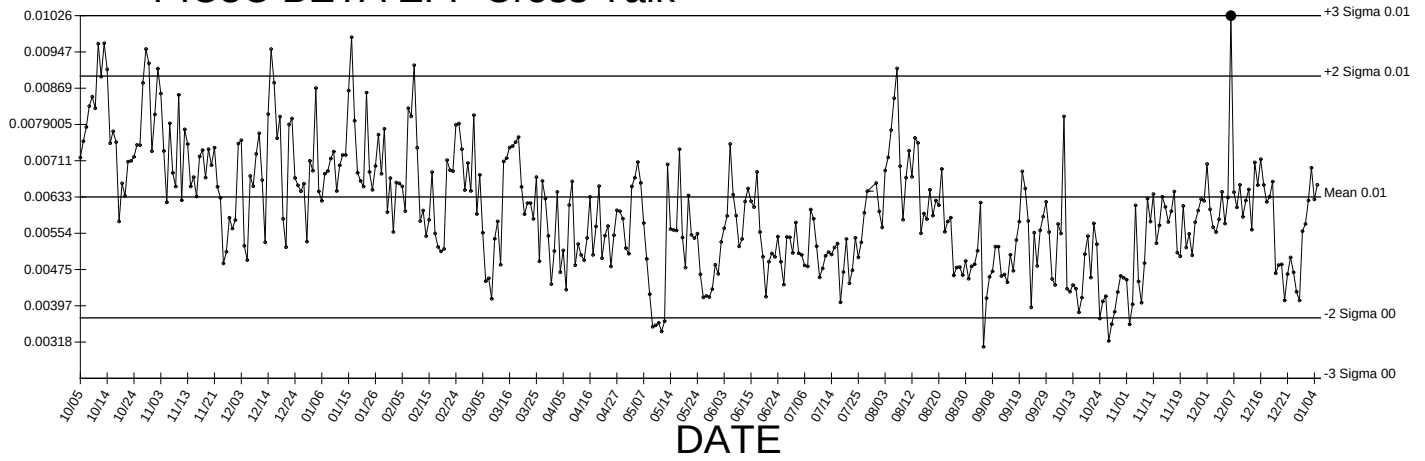
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PIC3C BETA EFF

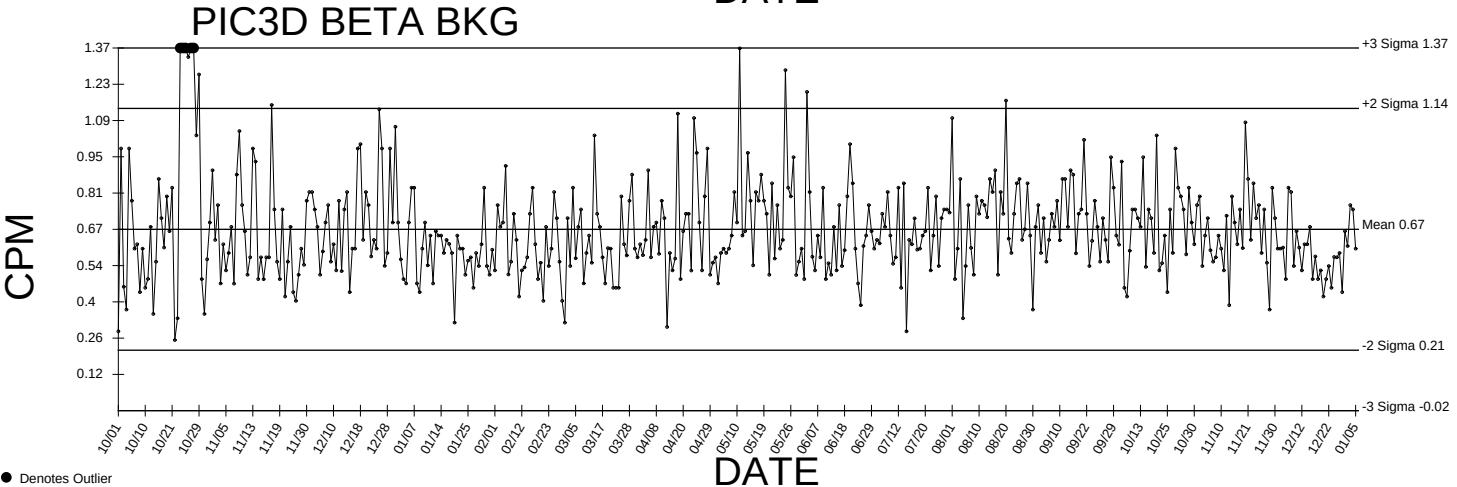
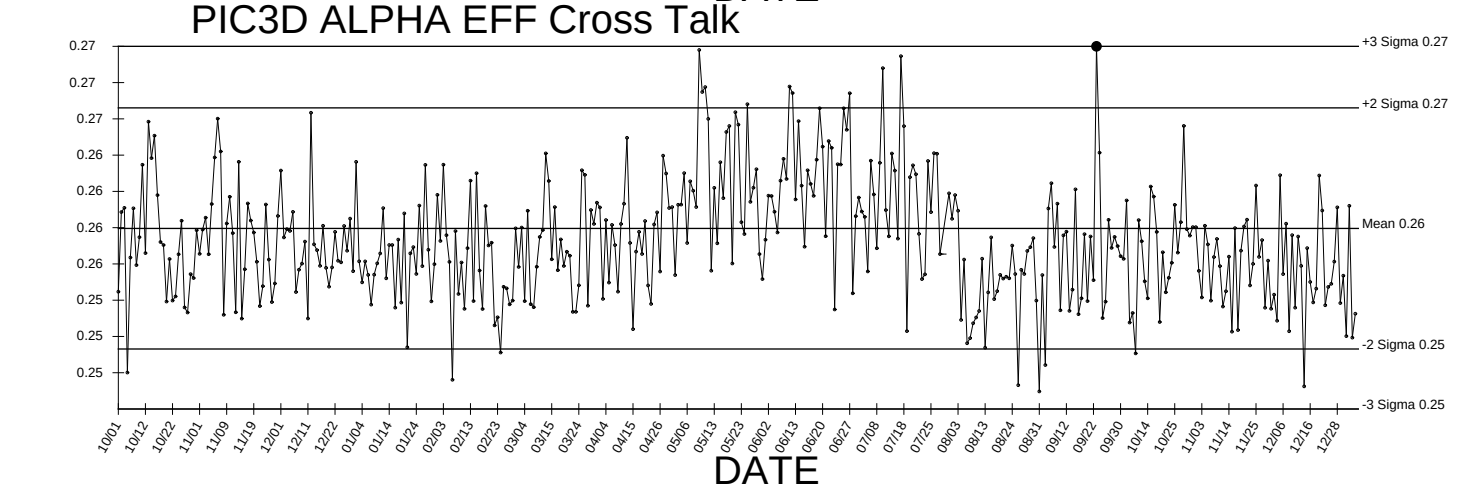
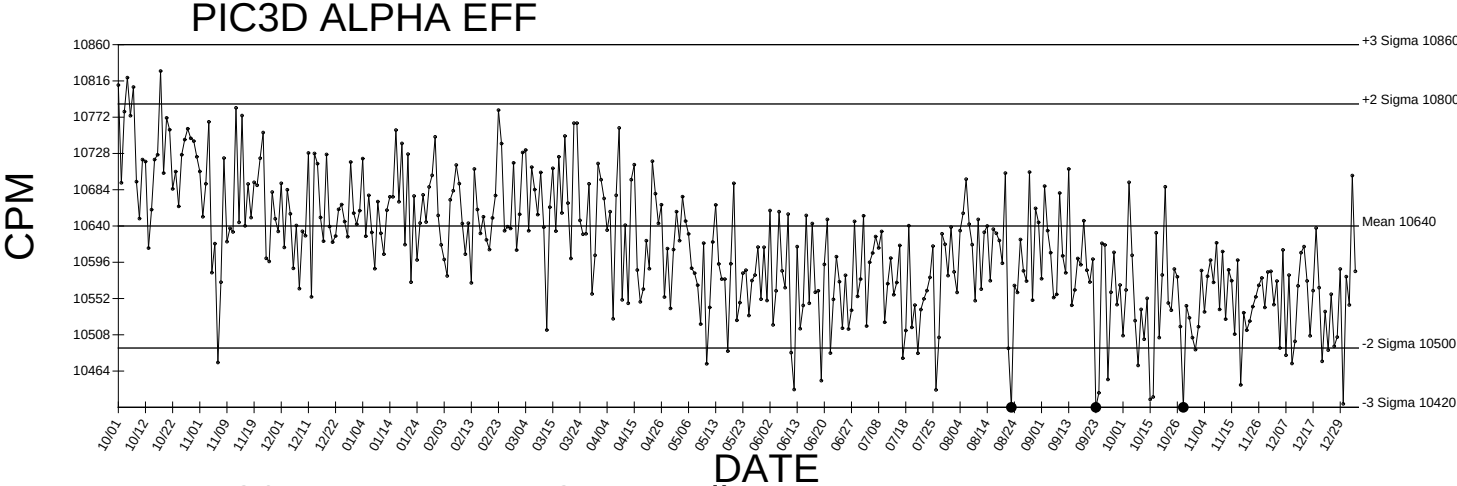
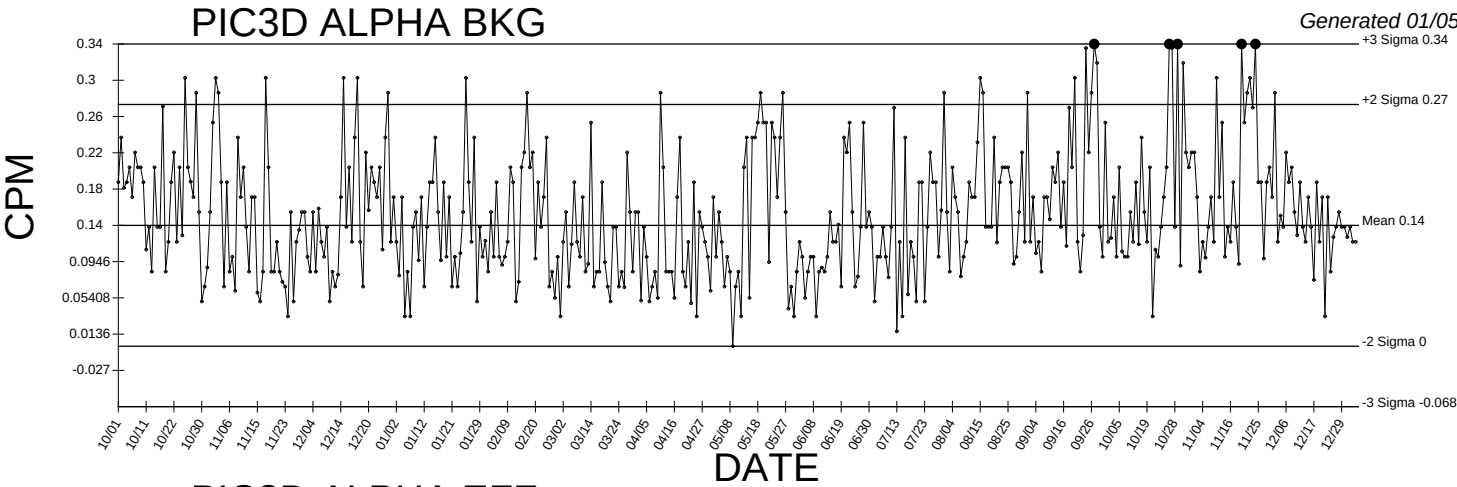
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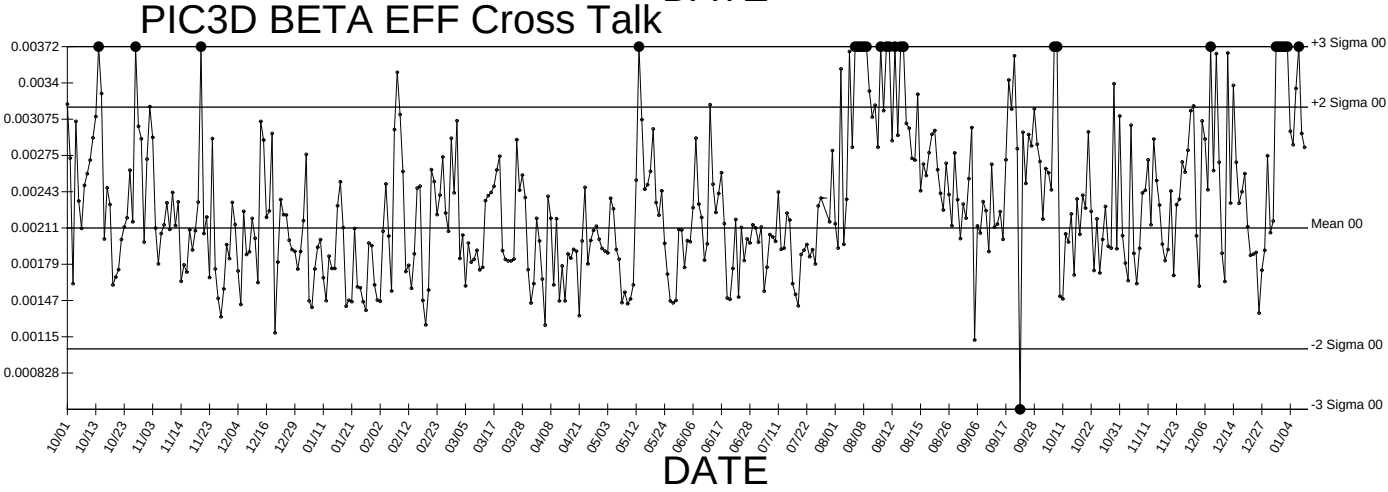
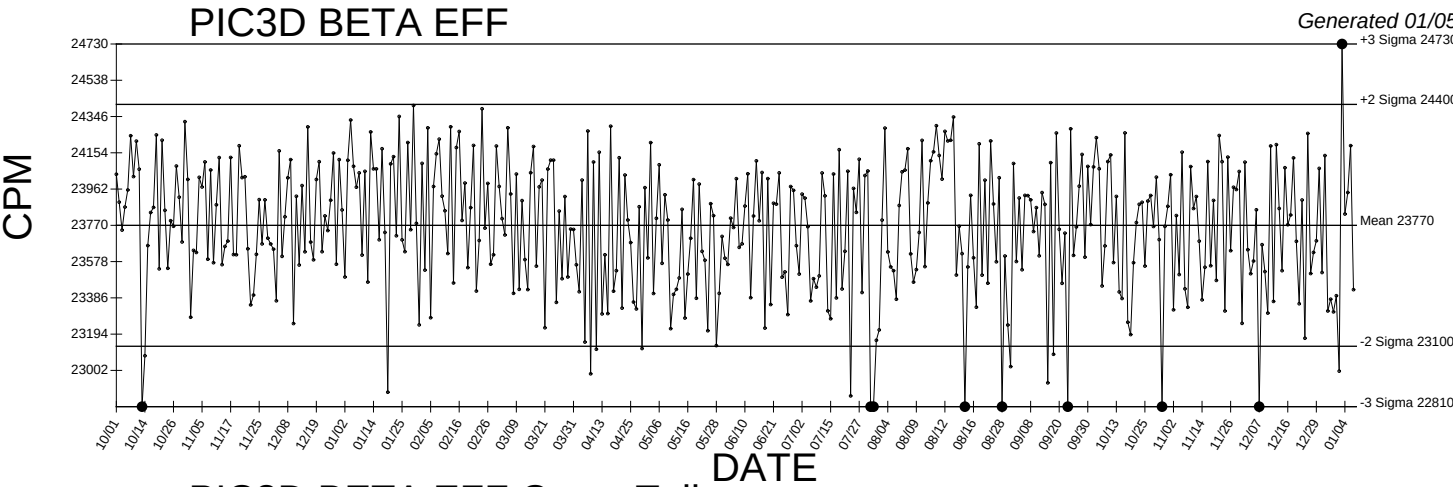
PIC3C BETA EFF Cross Talk



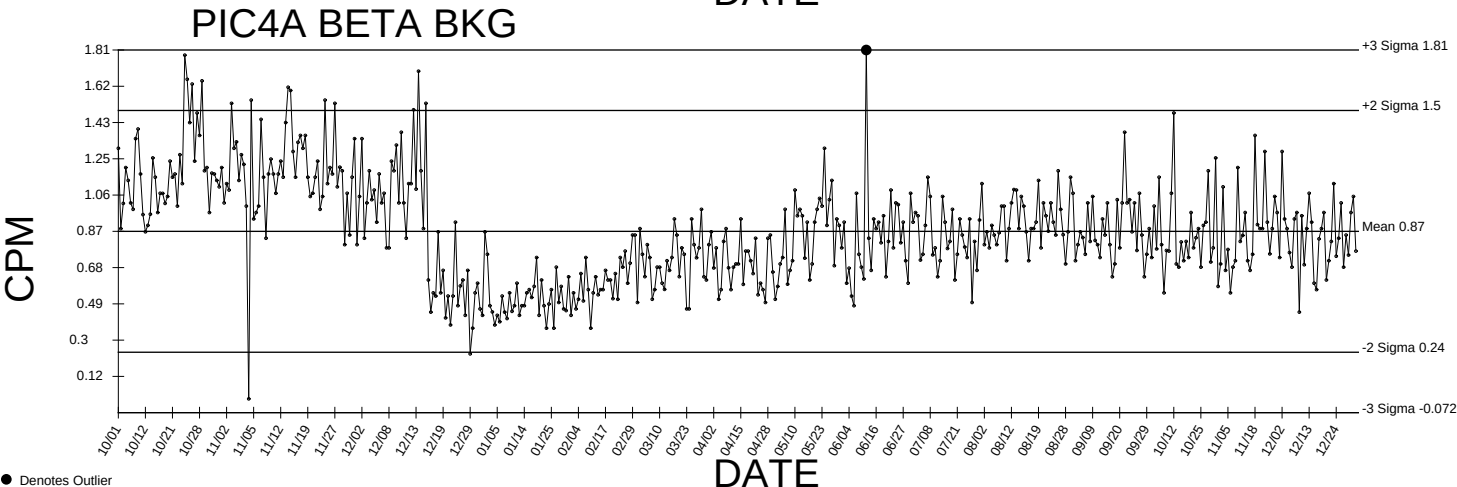
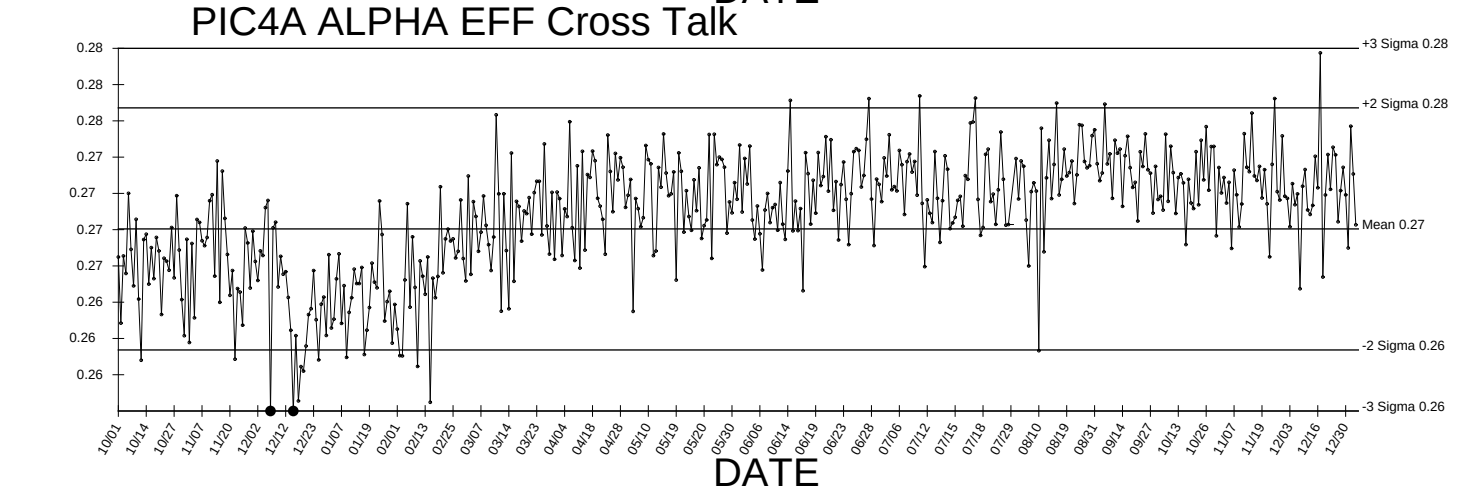
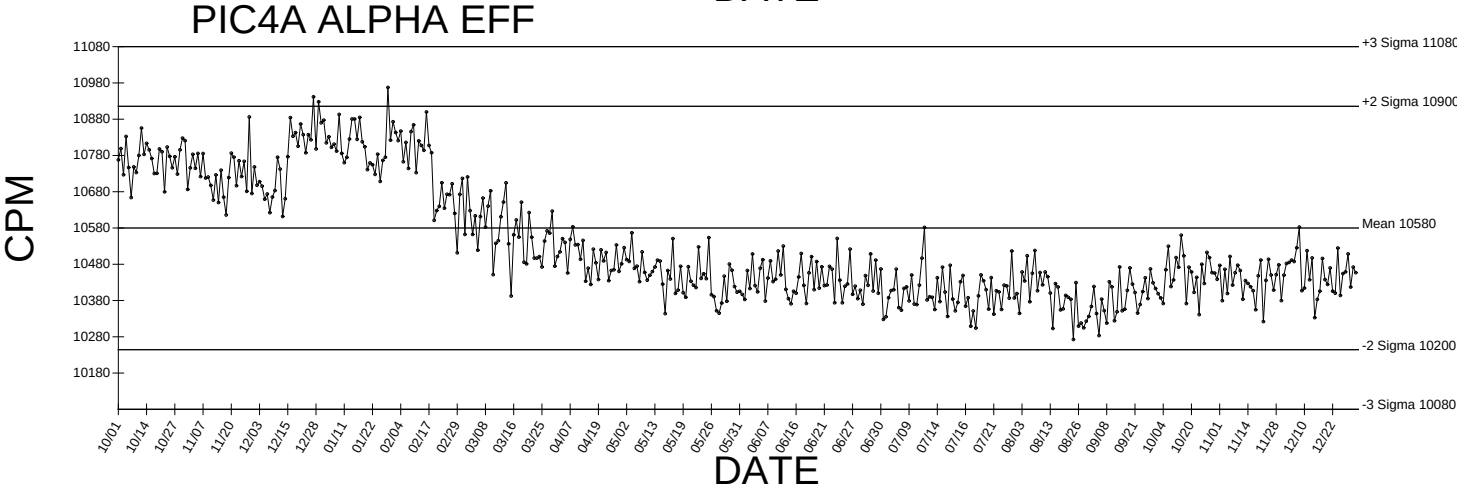
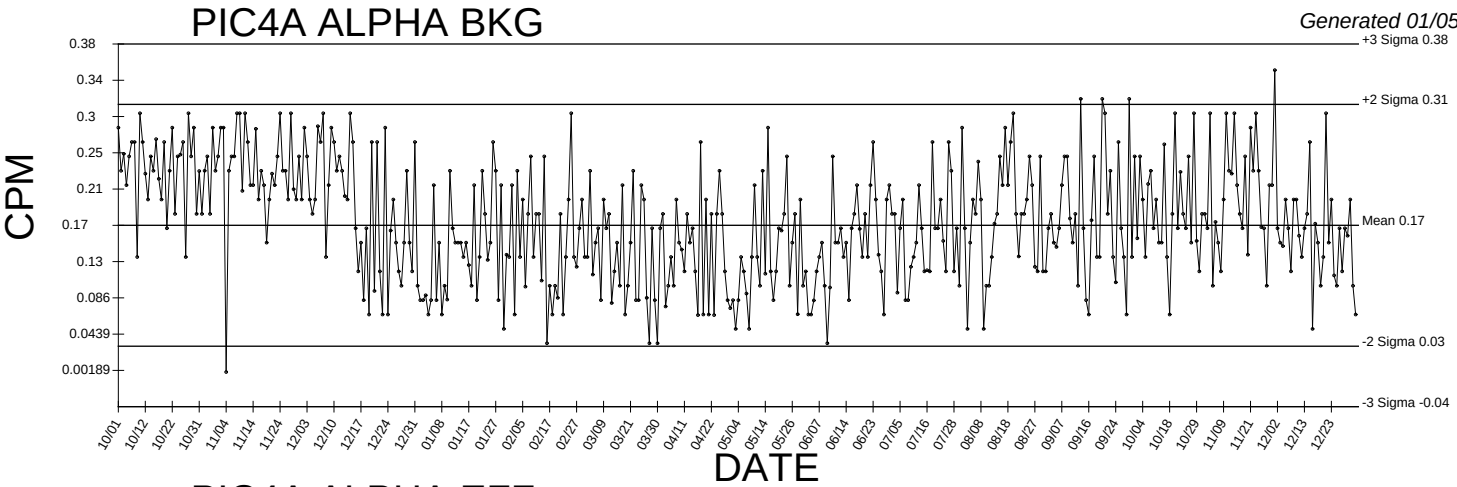
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● Denotes Outlier



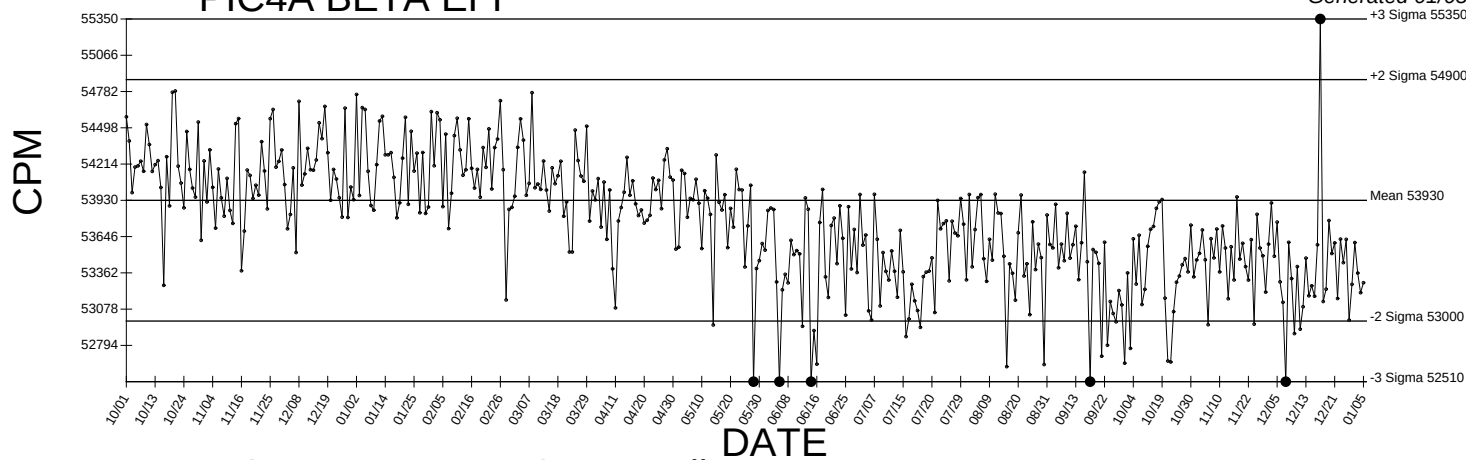
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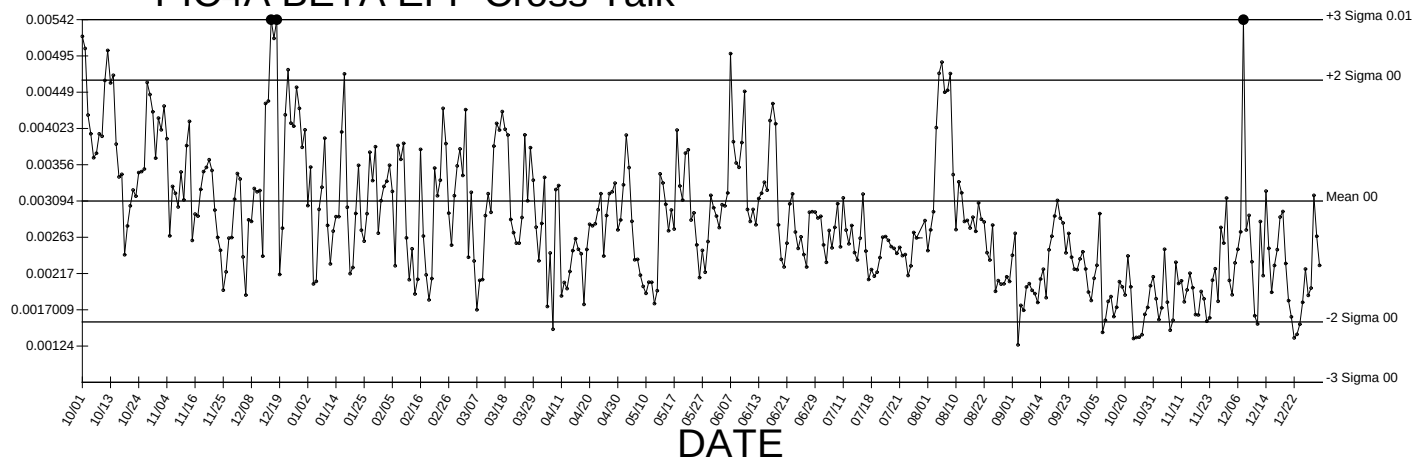
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PIC4A BETA EFF

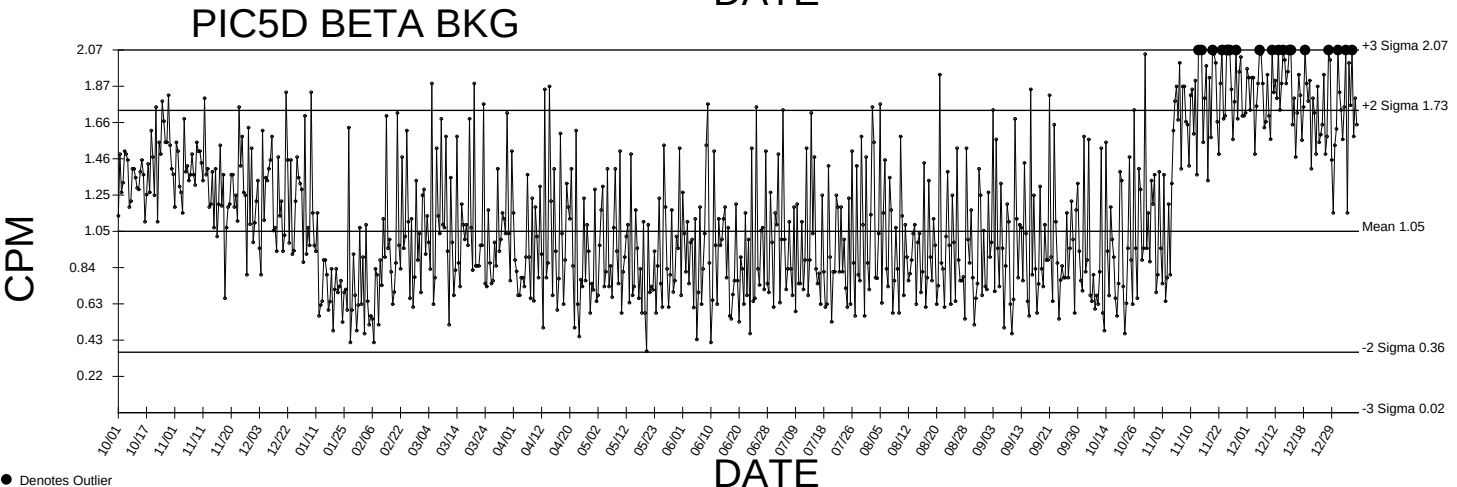
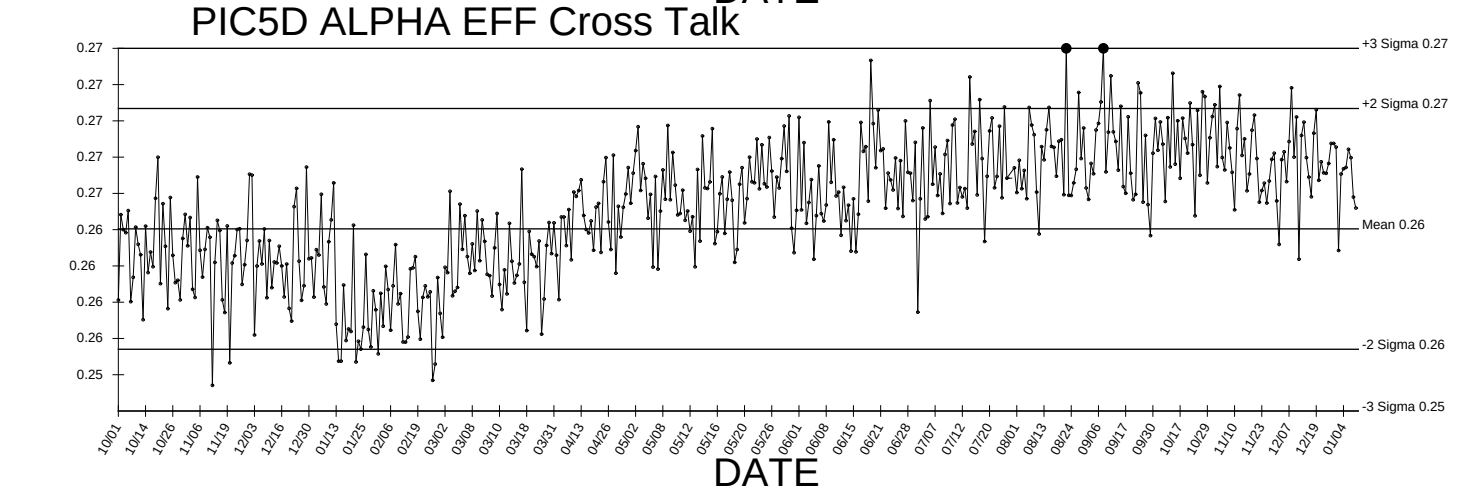
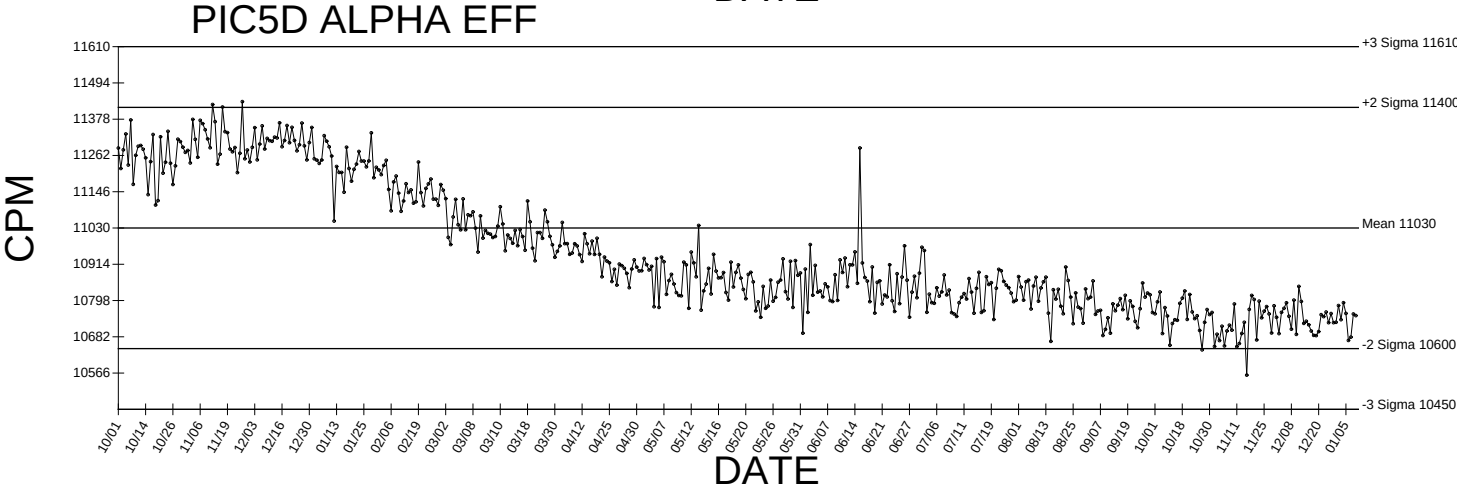
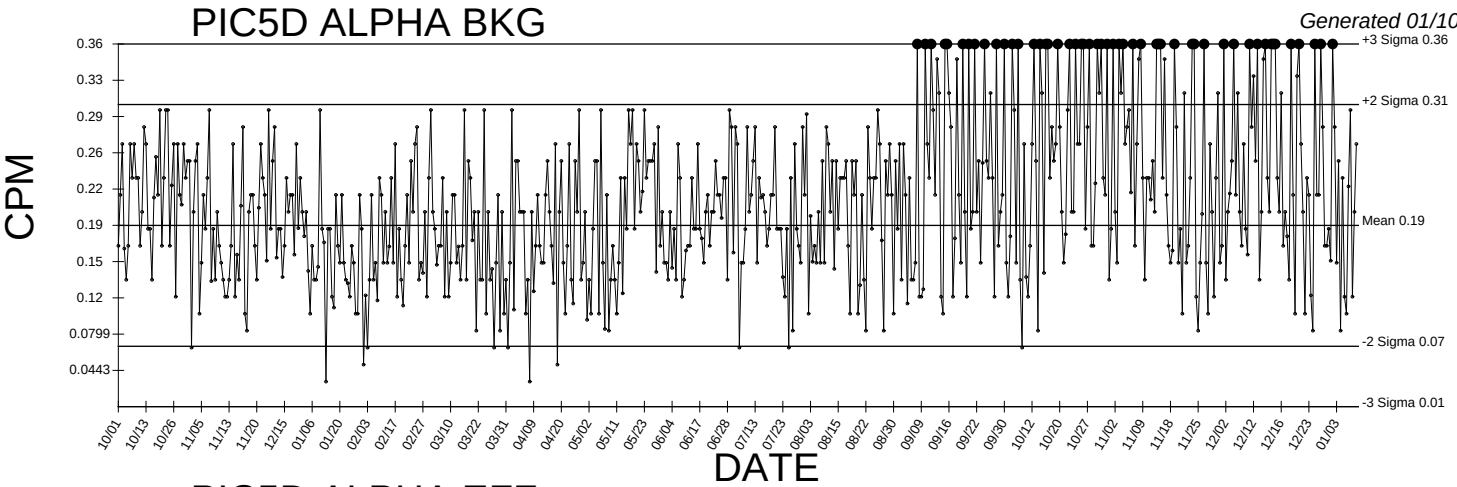
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PIC4A BETA EFF Cross Talk



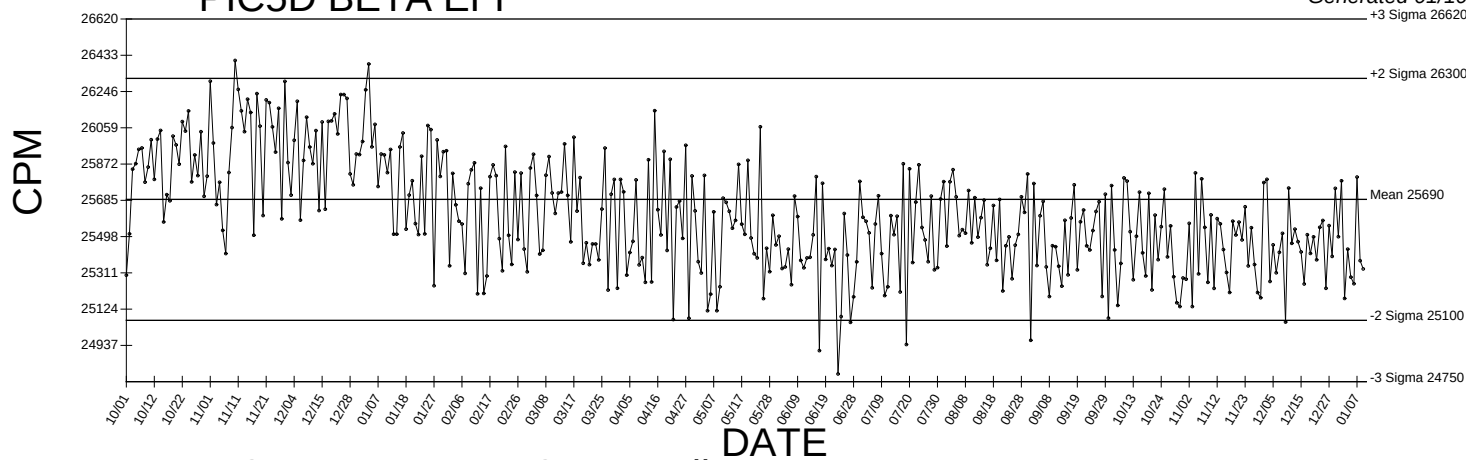
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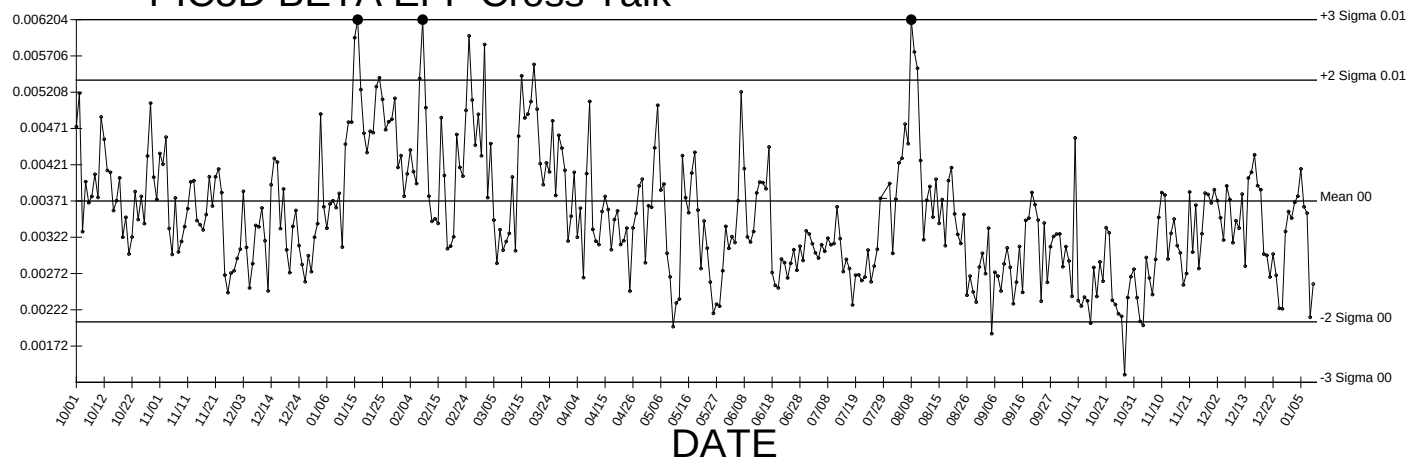
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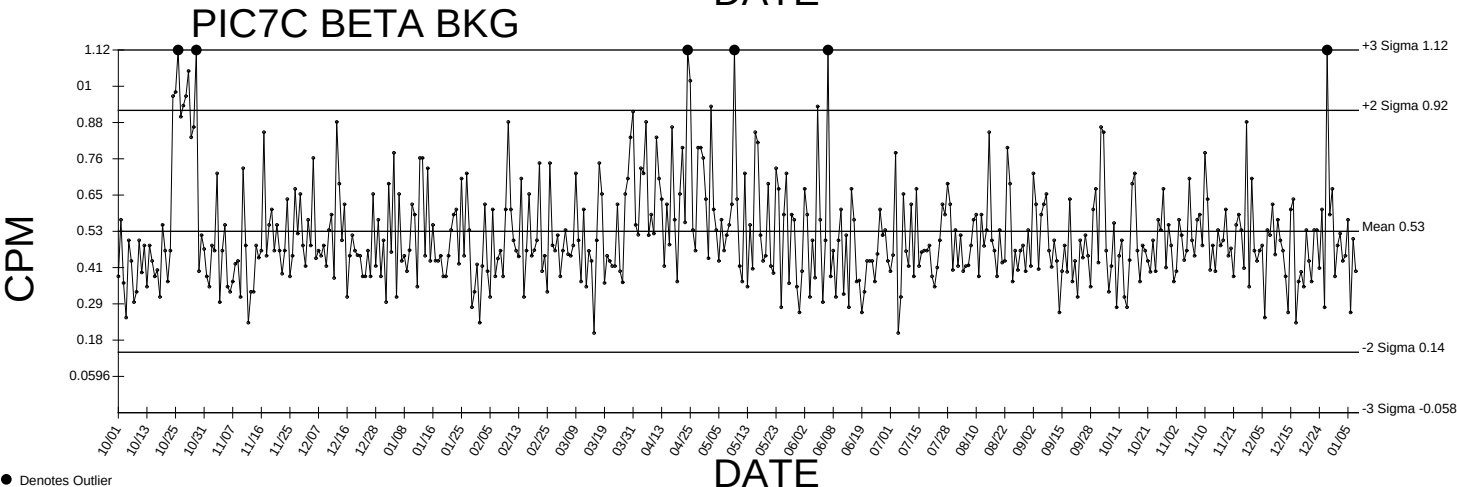
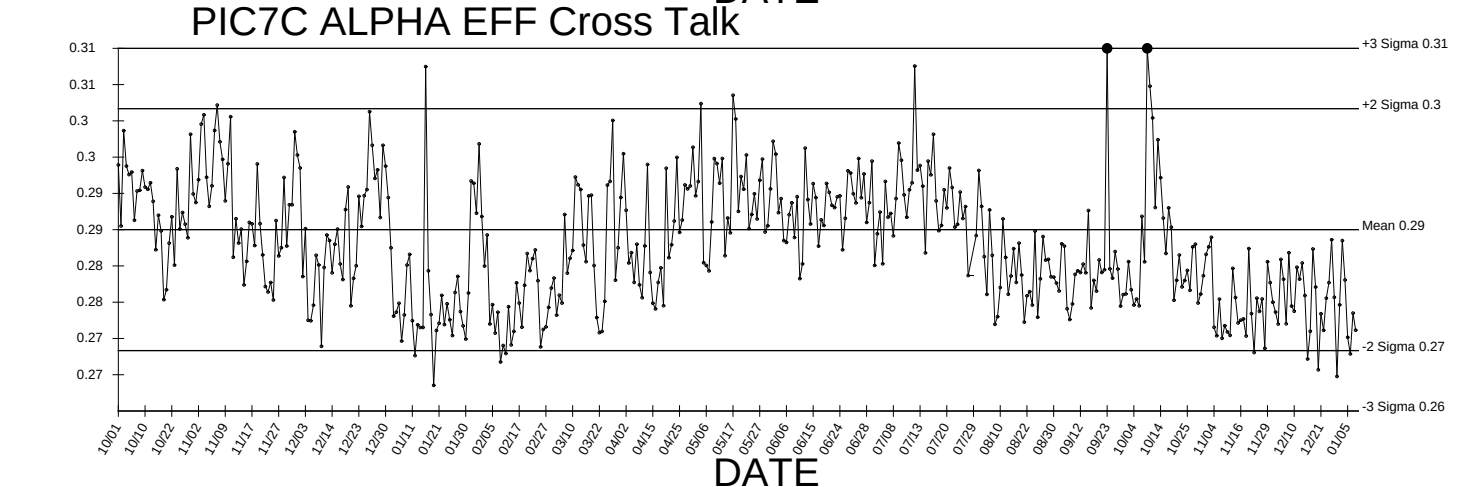
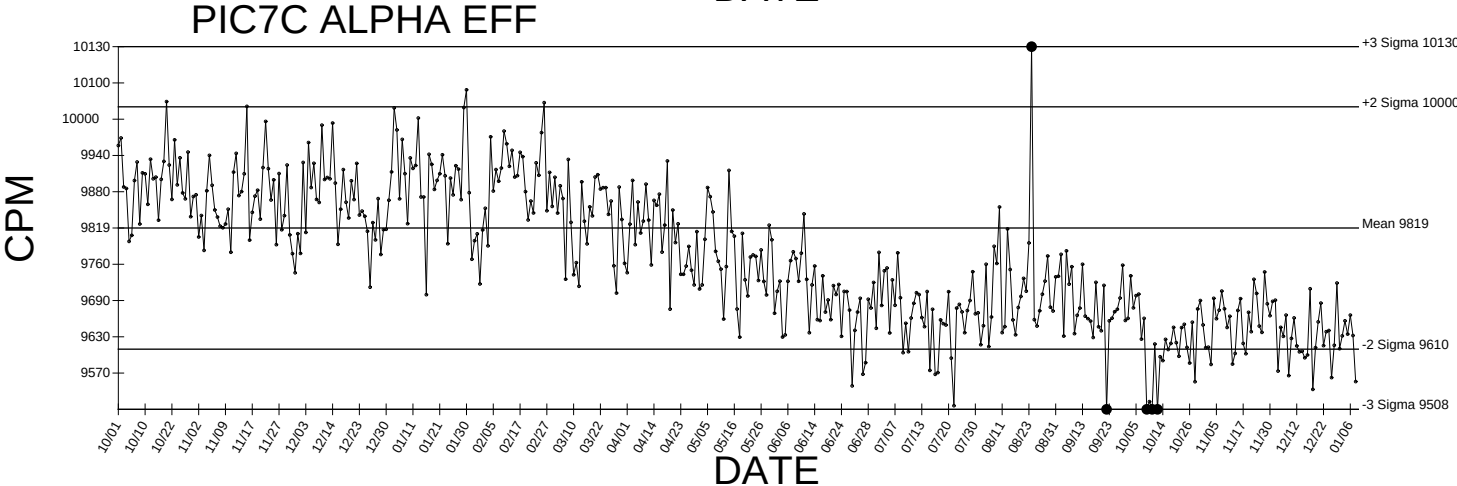
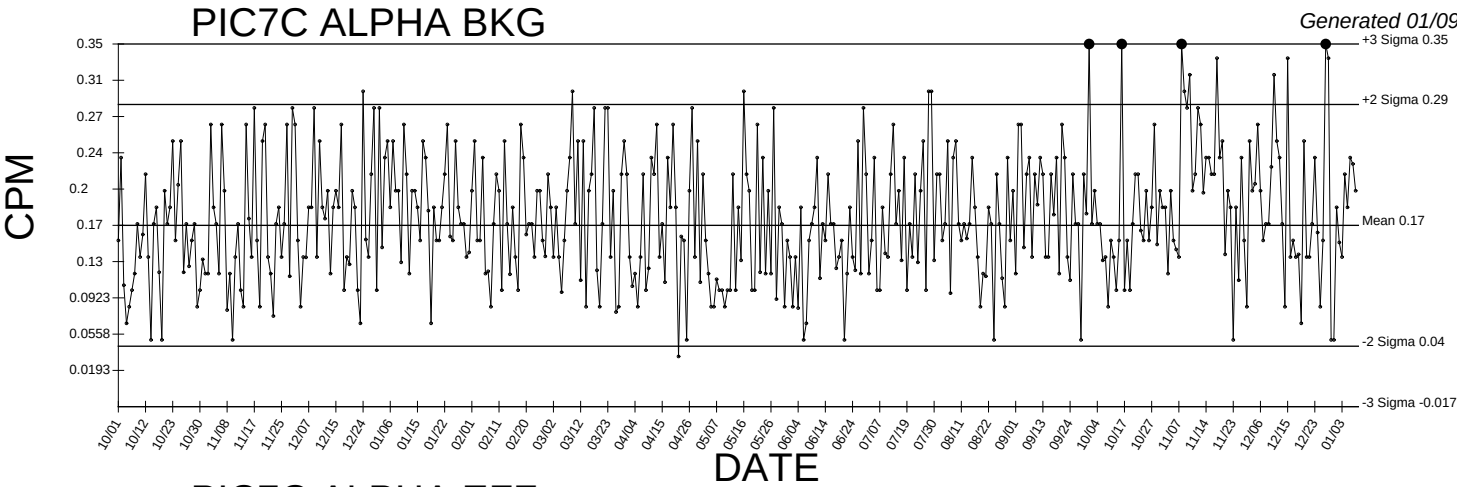
PIC5D BETA EFF

Generated 01/10/2017
+3 Sigma 26620



PIC5D BETA EFF Cross Talk

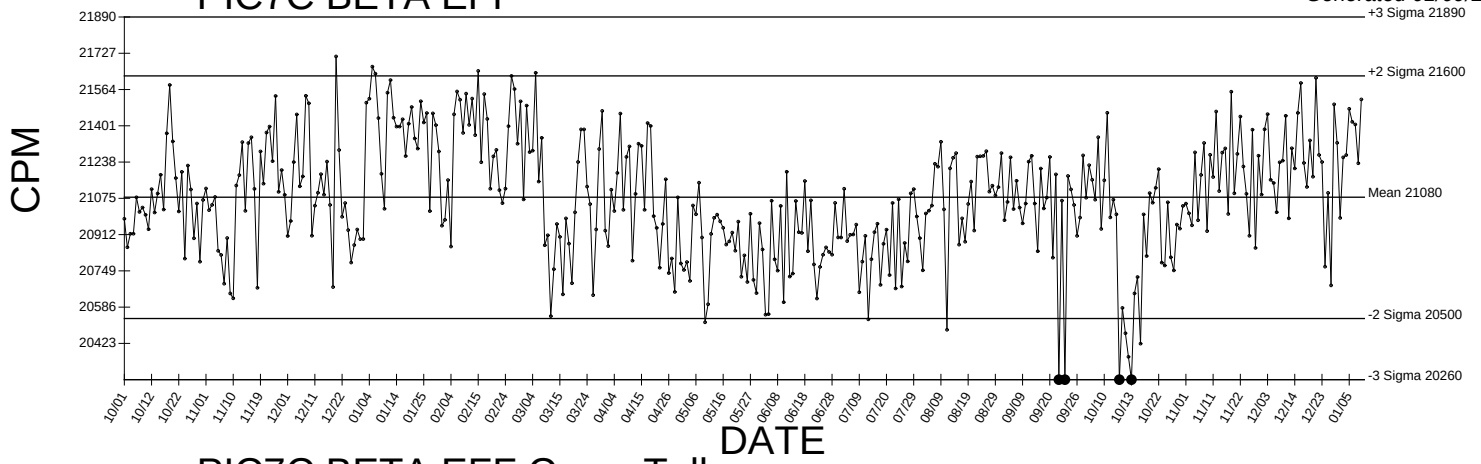




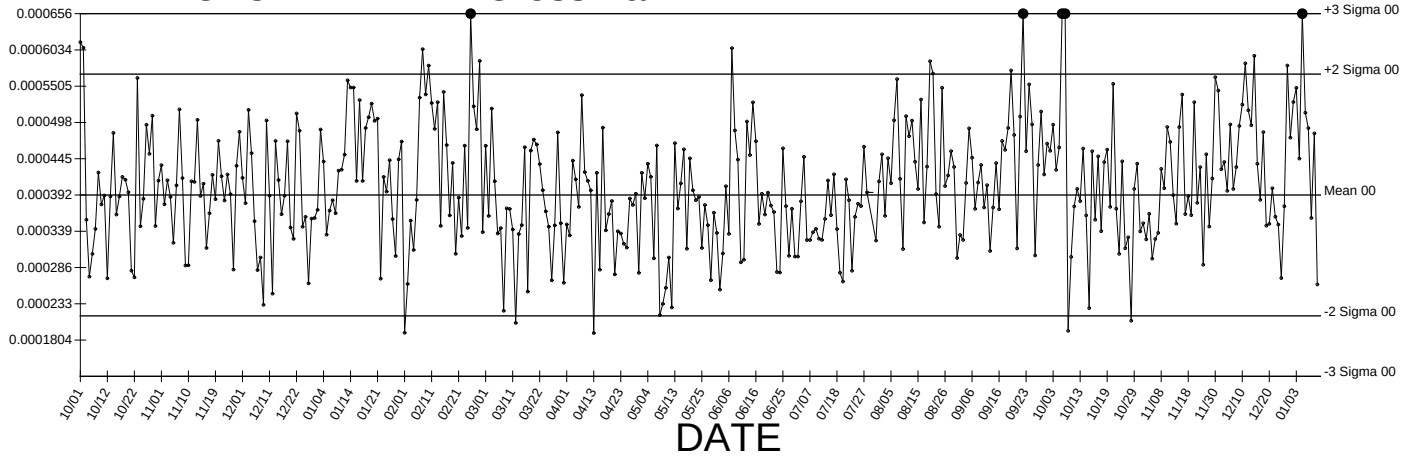
● Denotes Outlier

PIC7C BETA EFF

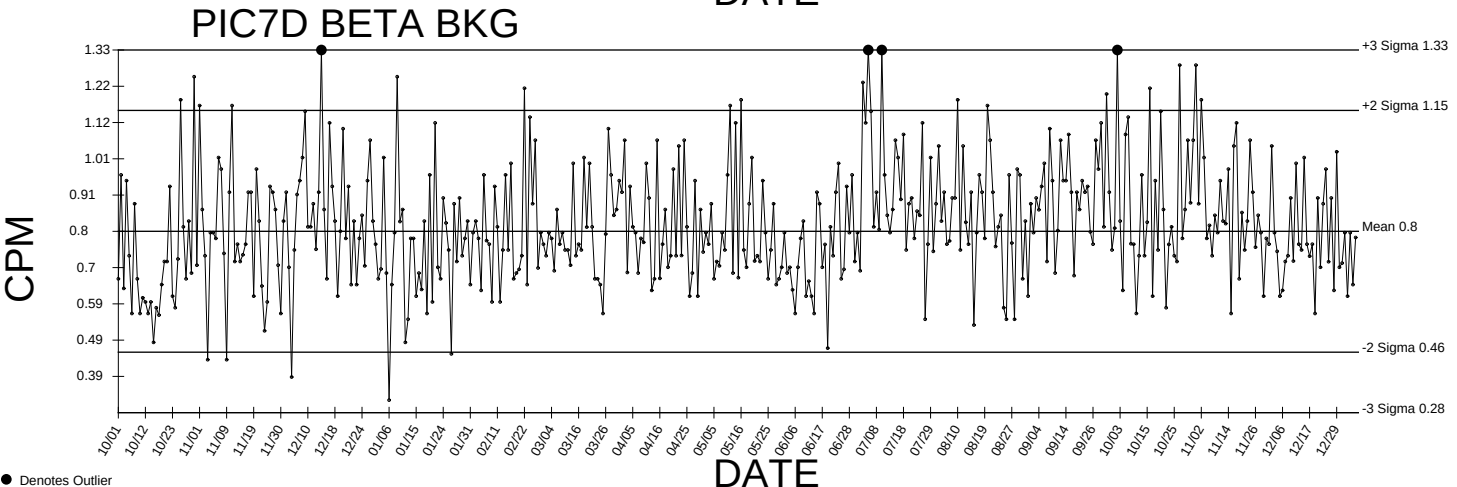
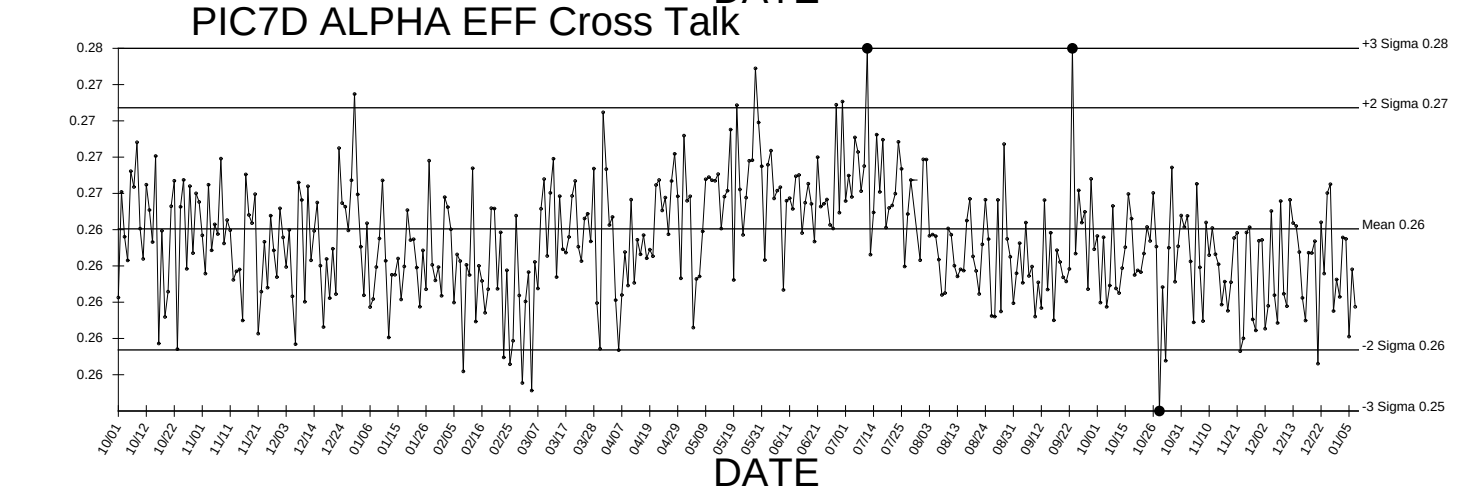
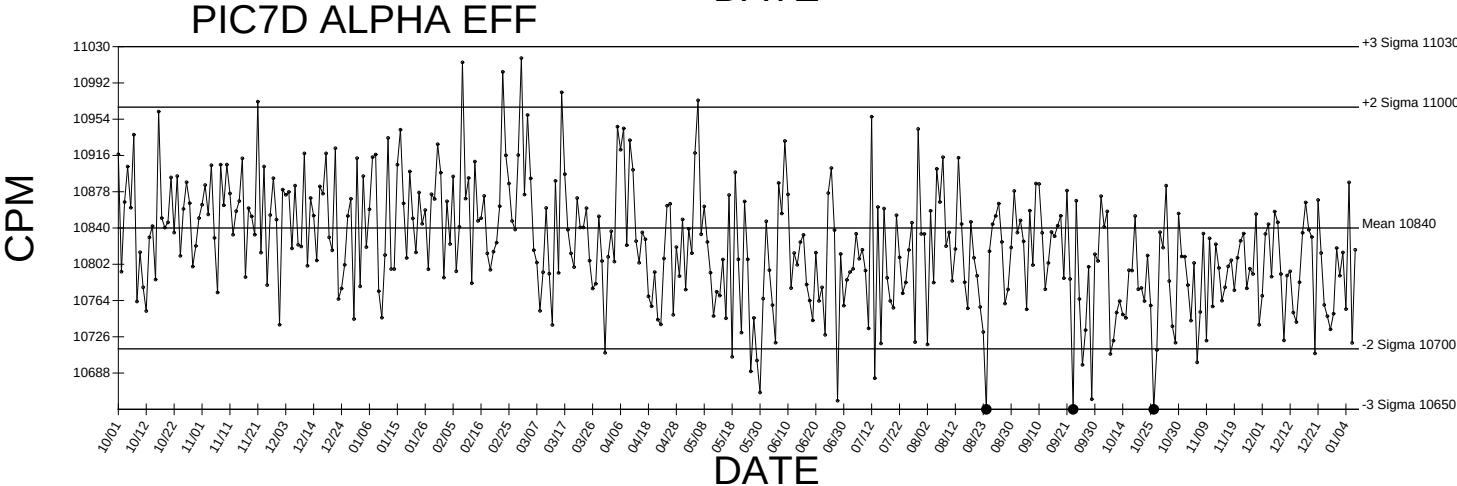
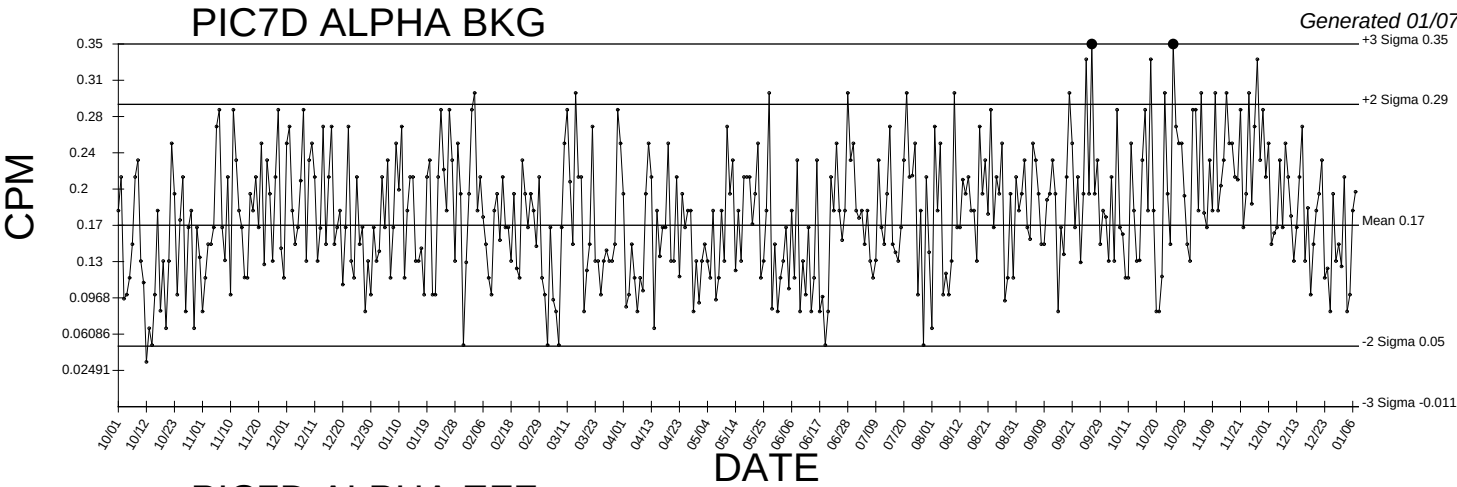
Generated 01/09/2017



PIC7C BETA EFF Cross Talk



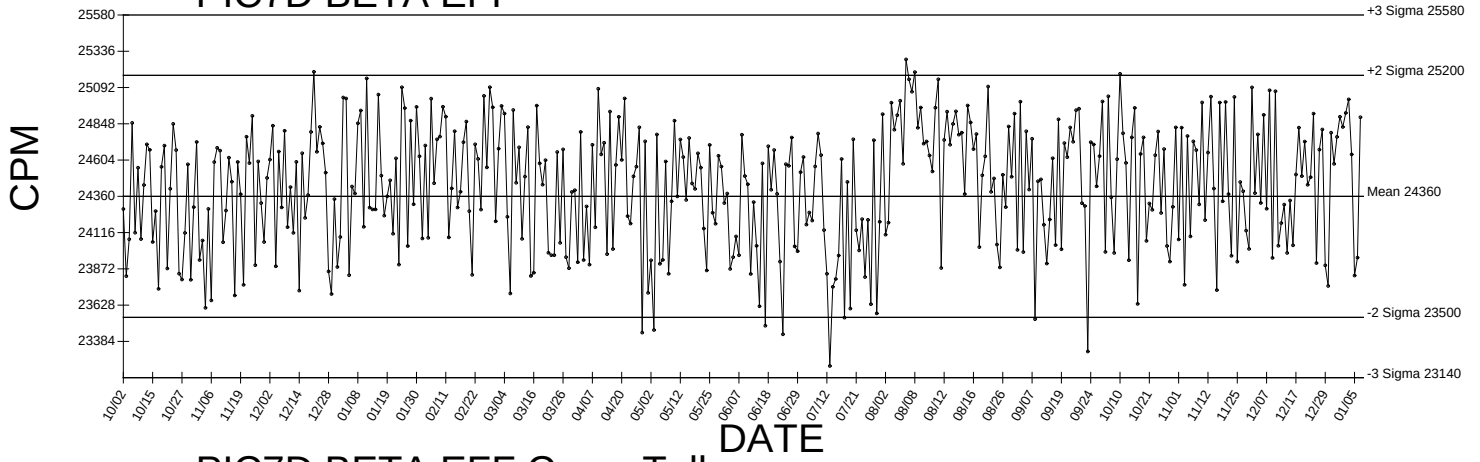
● Denotes Outlier



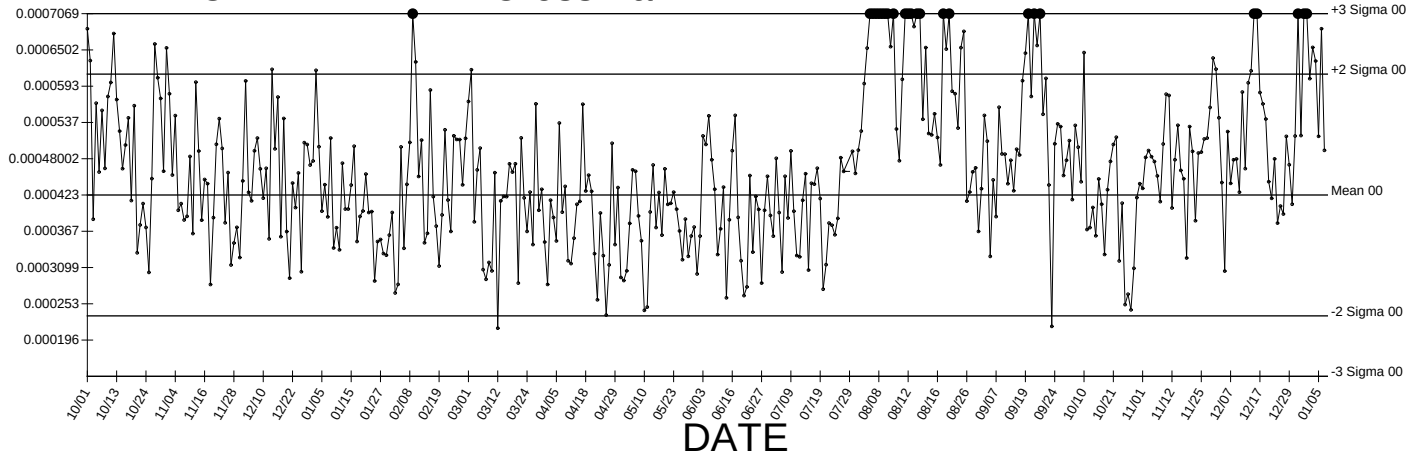
● Denotes Outlier

PIC7D BETA EFF

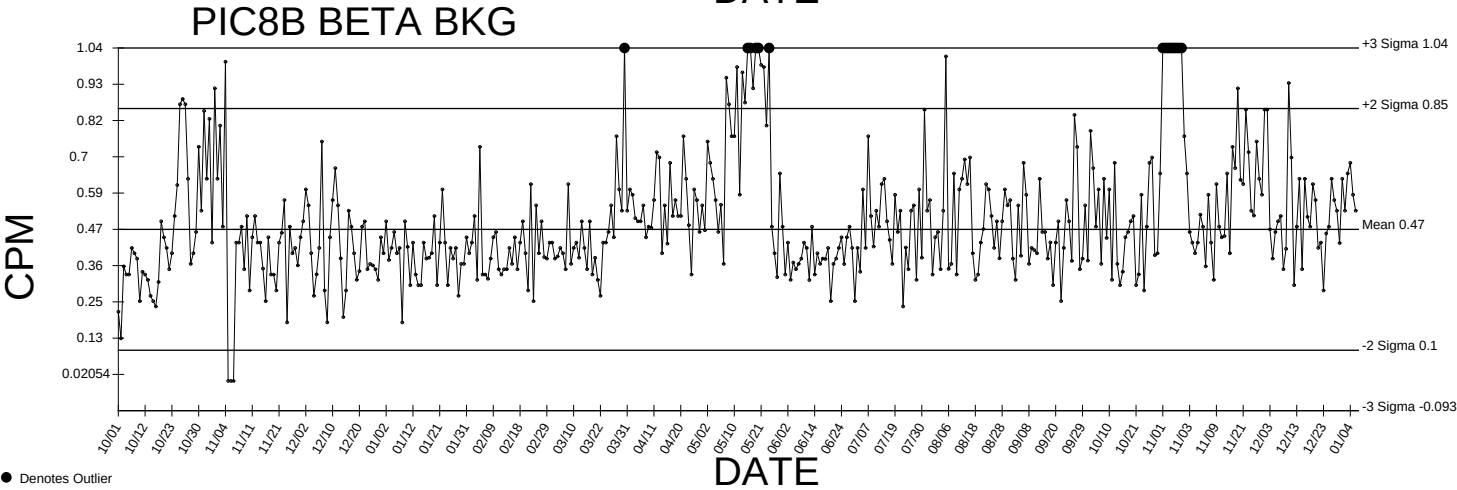
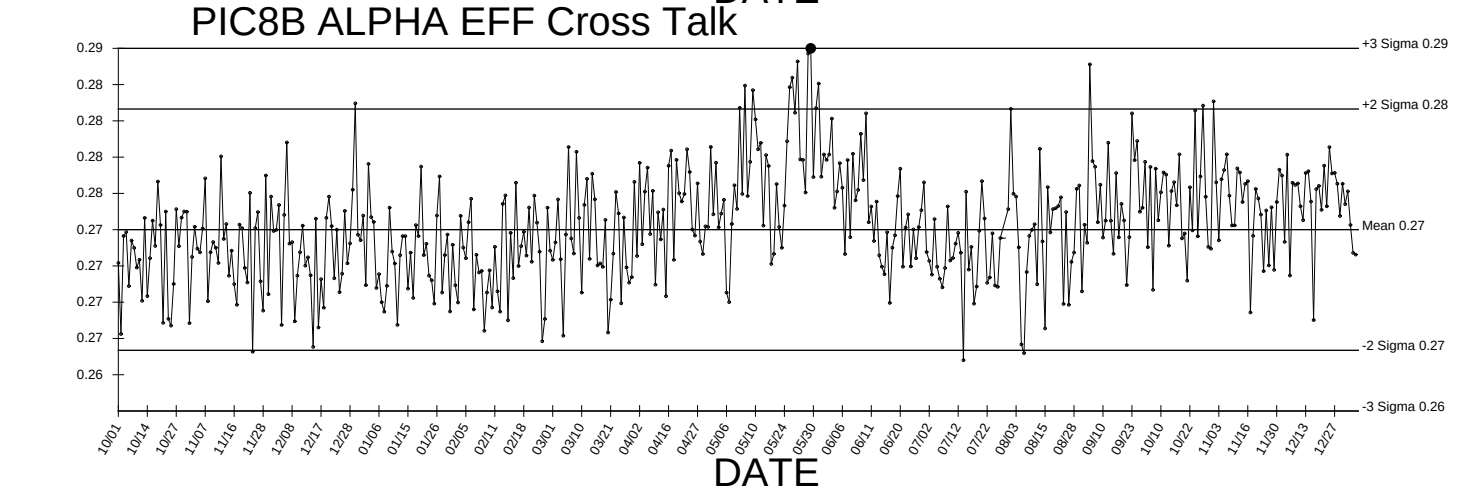
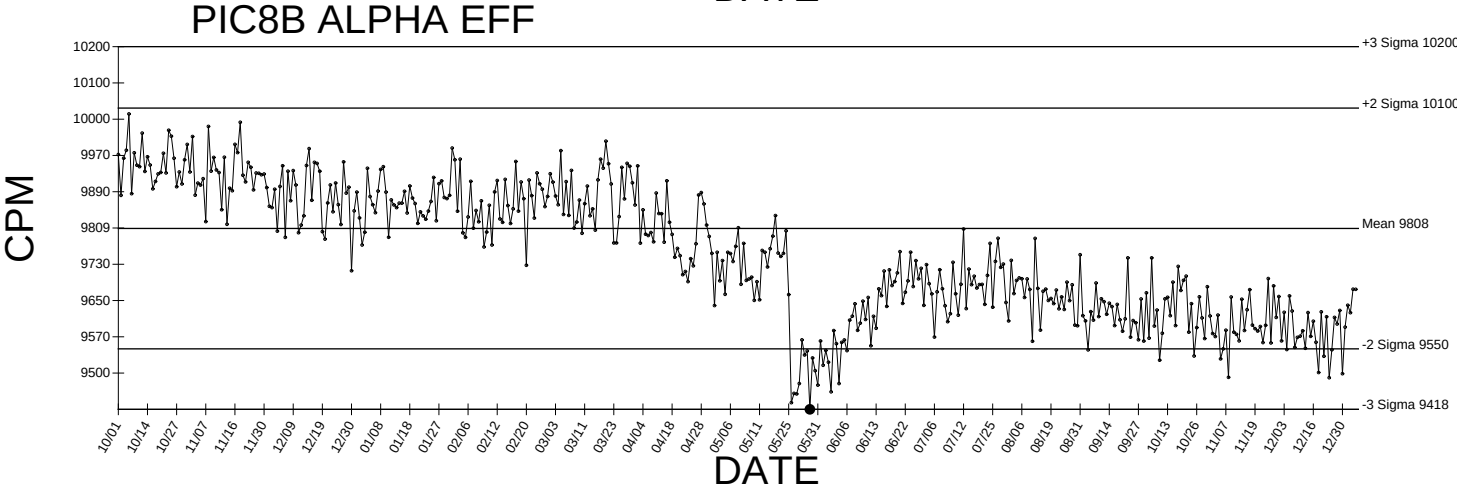
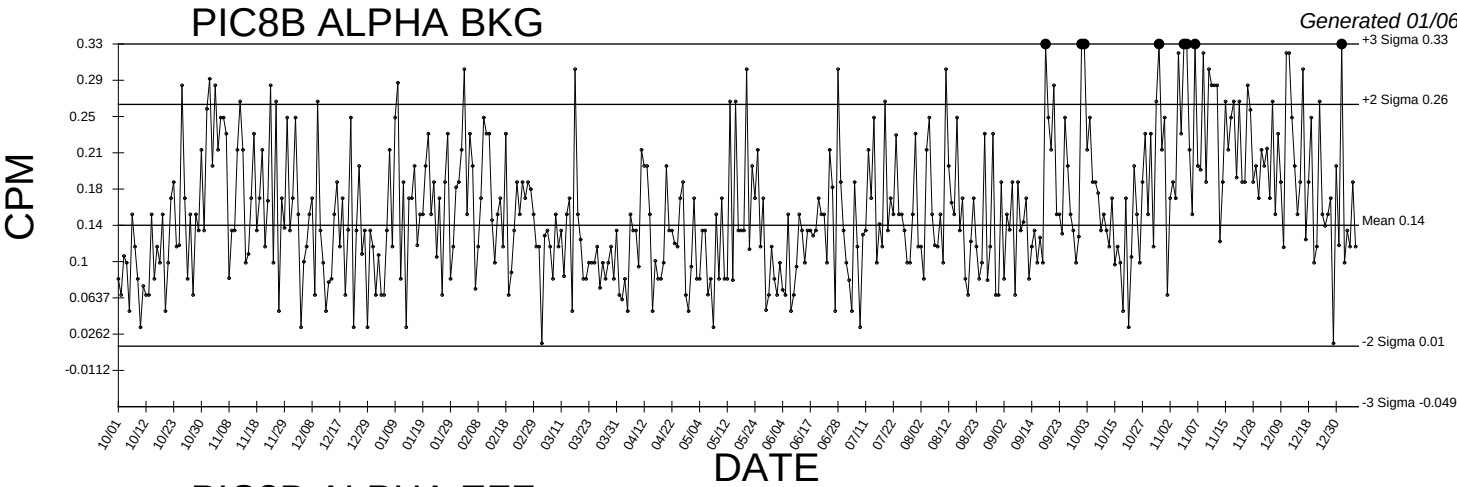
Generated 01/07/2017
+3 Sigma 25580



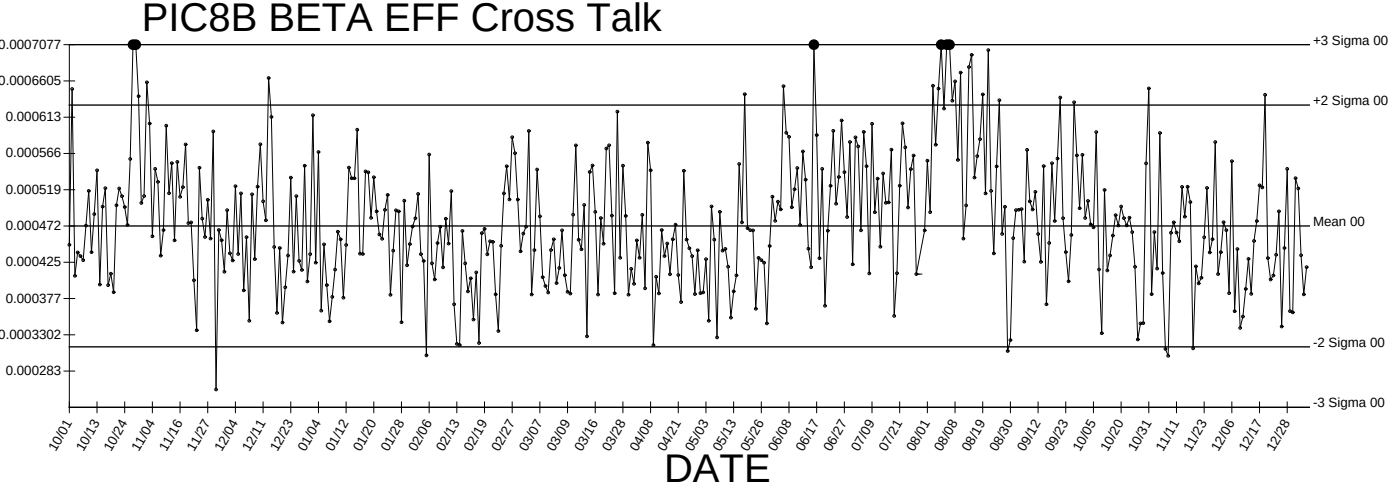
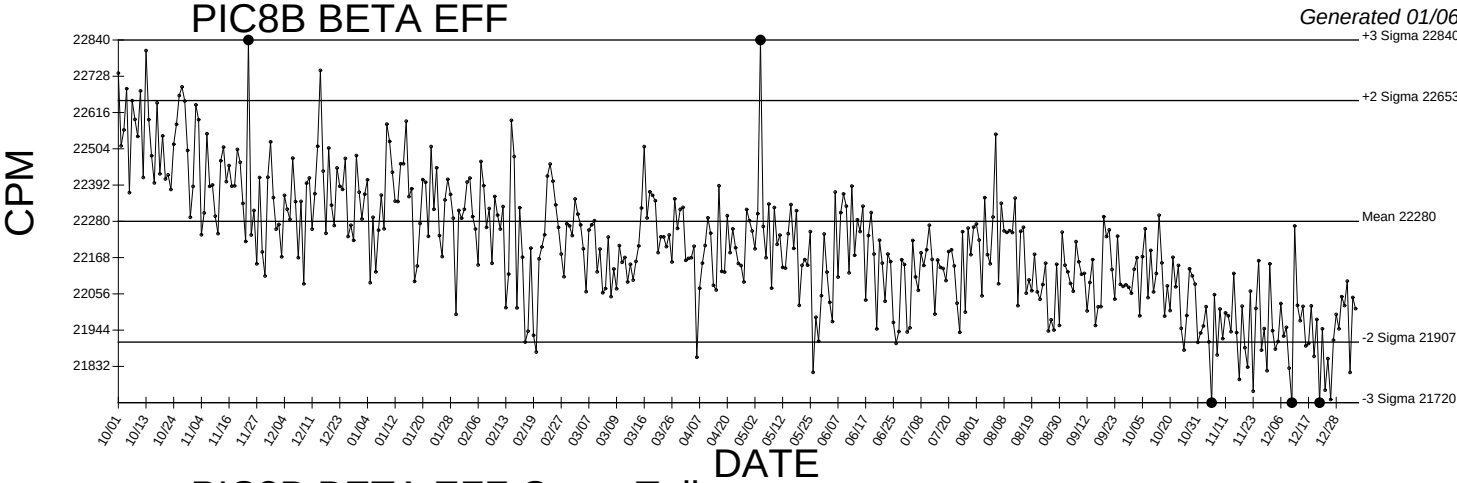
PIC7D BETA EFF Cross Talk



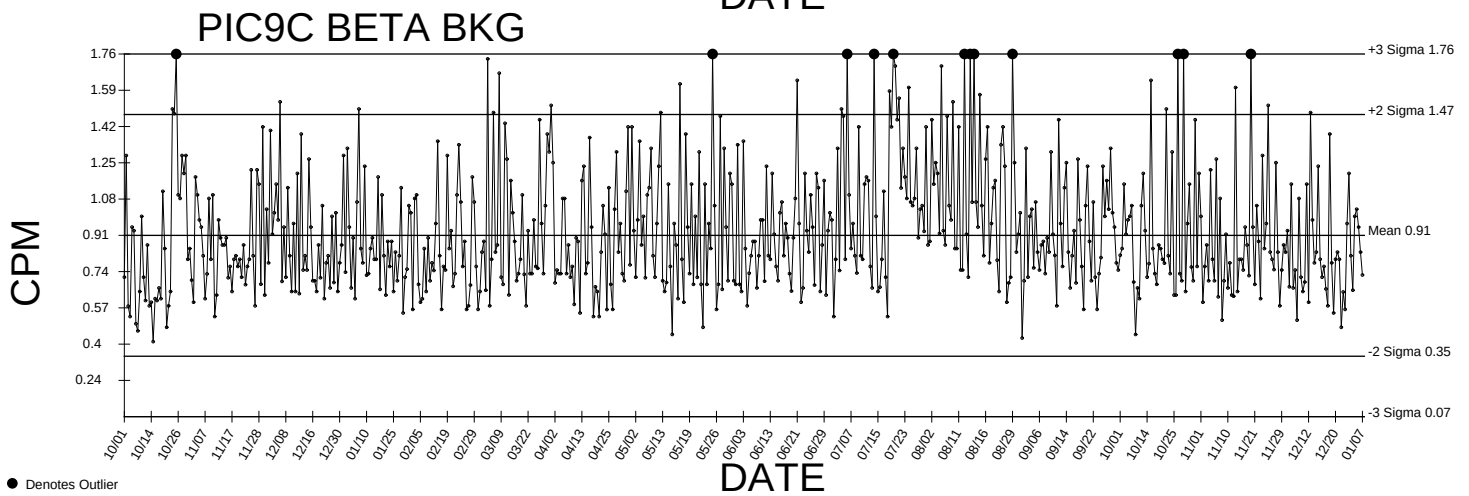
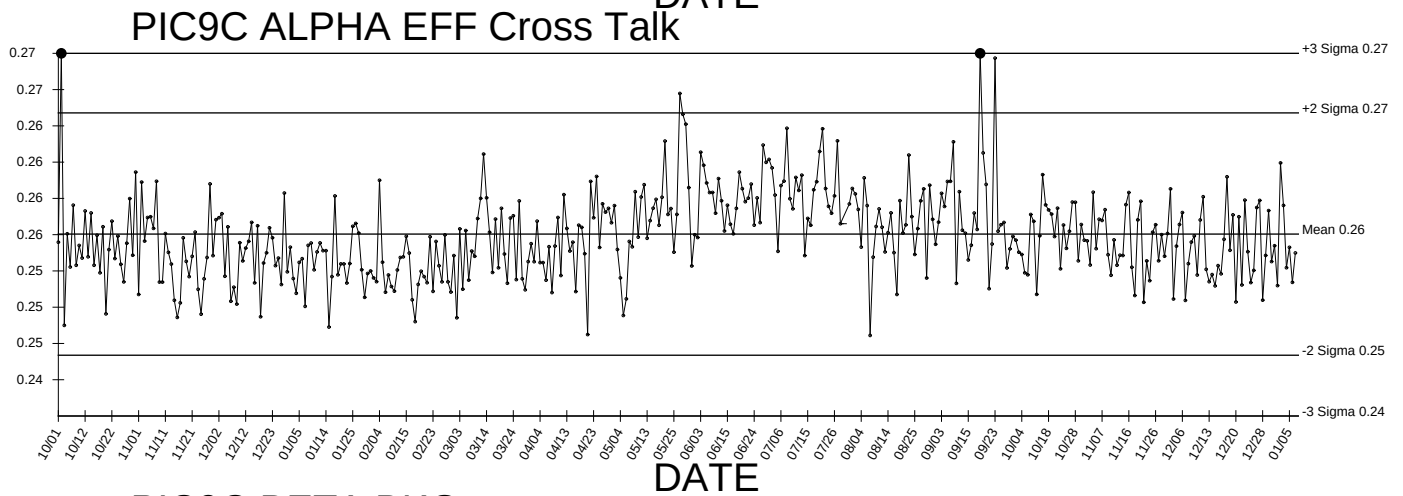
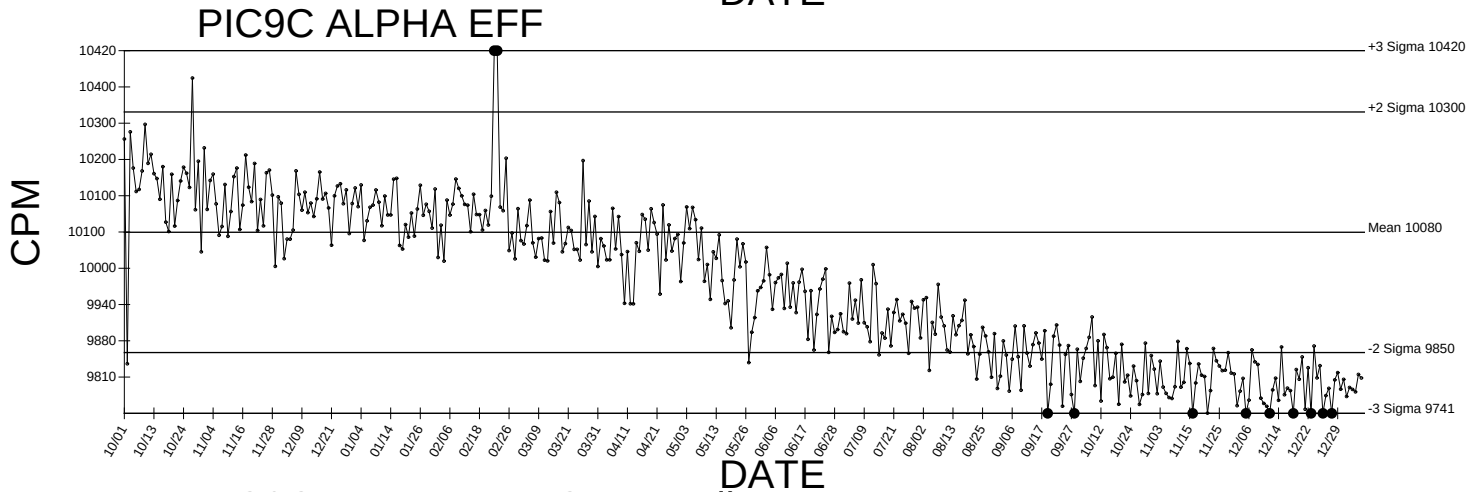
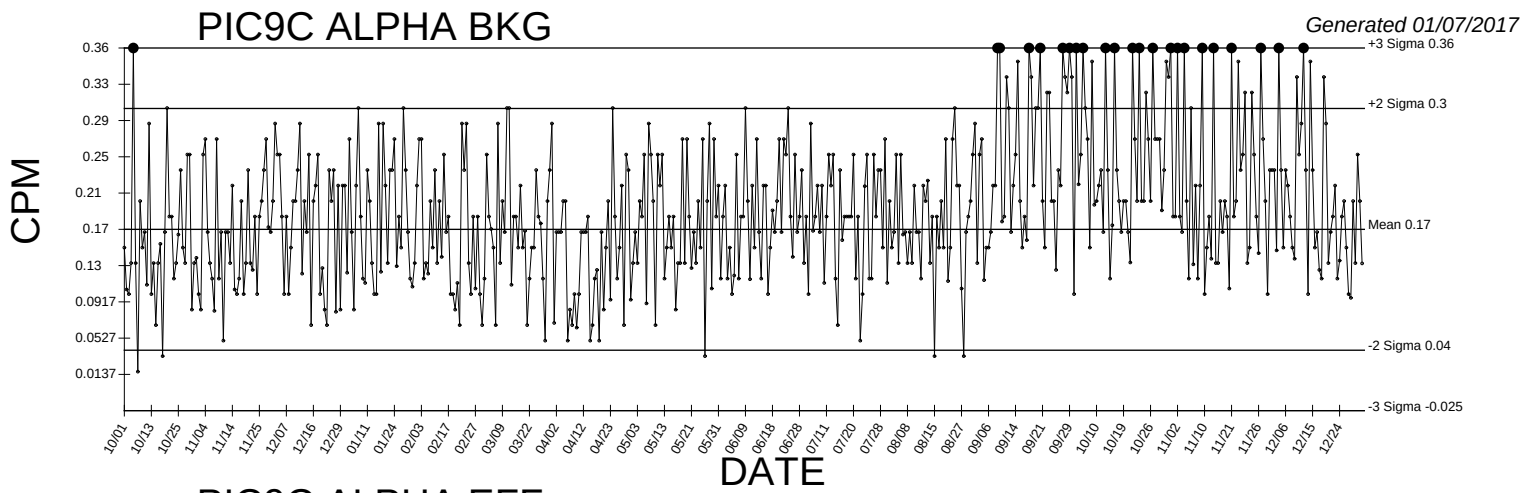
● Denotes Outlier



● Denotes Outlier

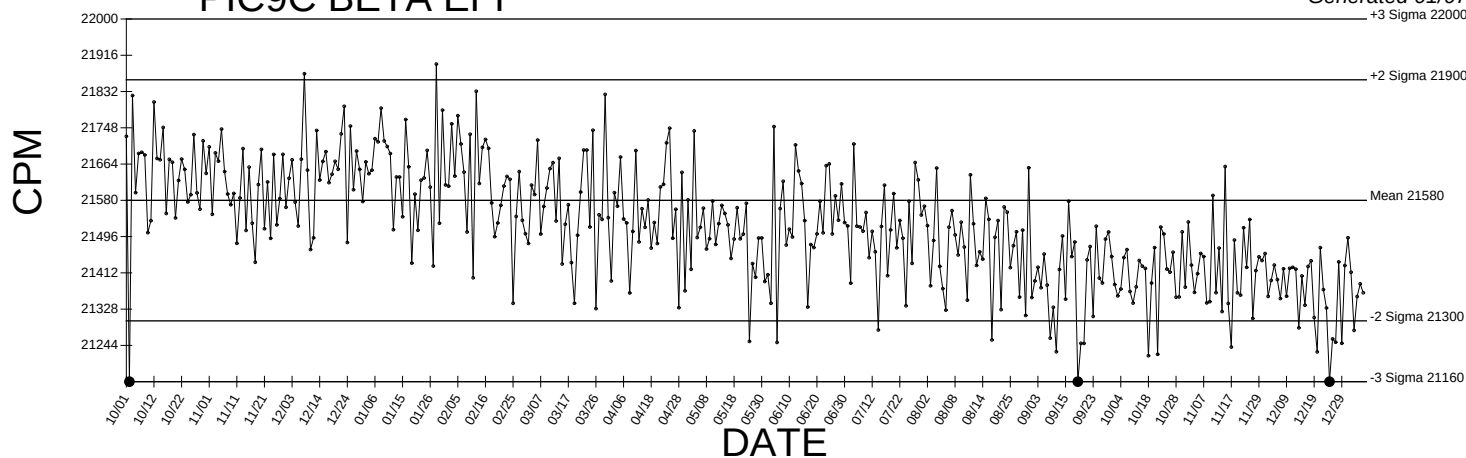


● Denotes Outlier

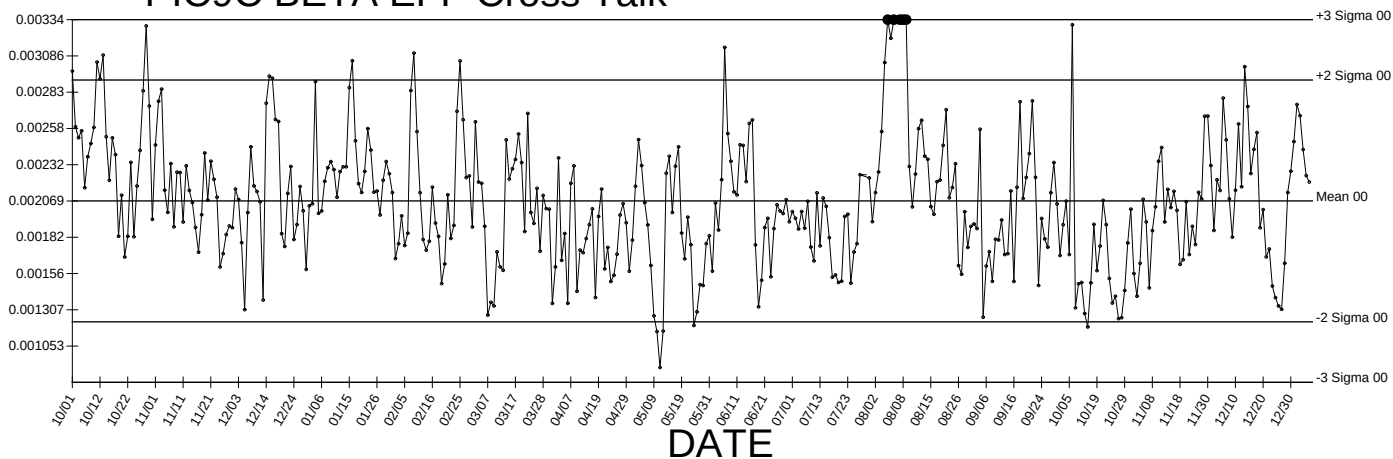


PIC9C BETA EFF

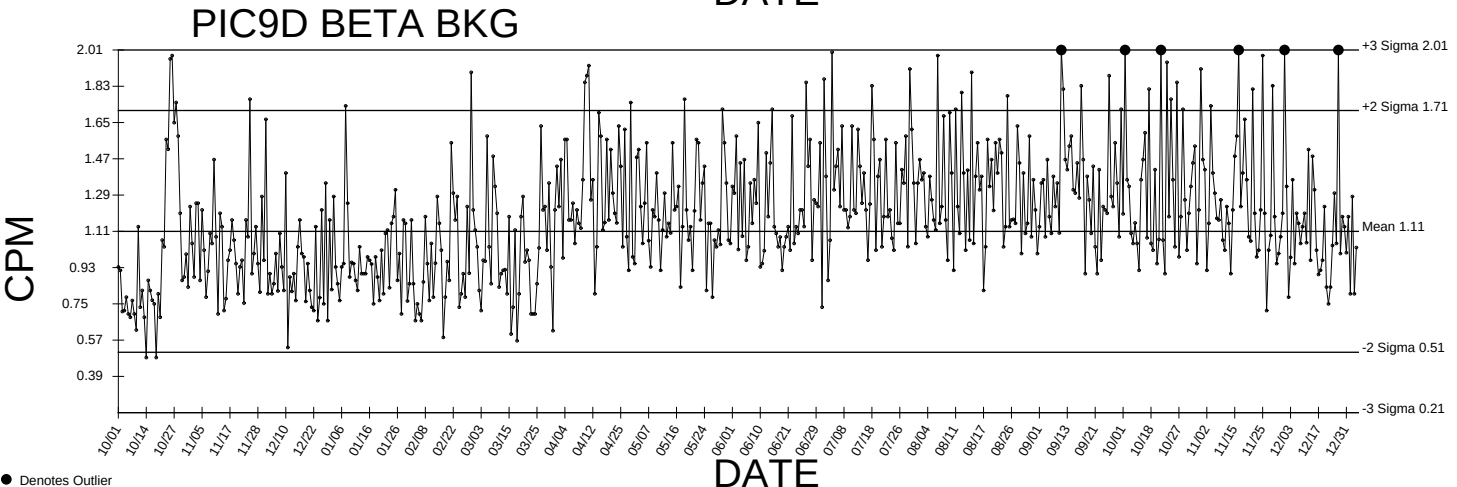
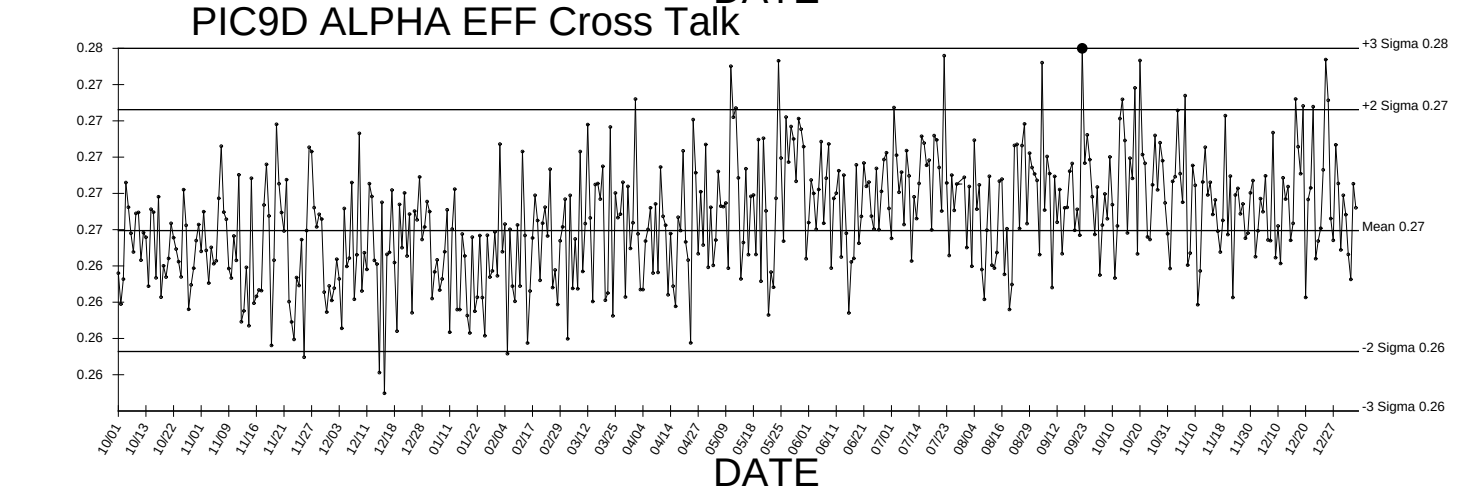
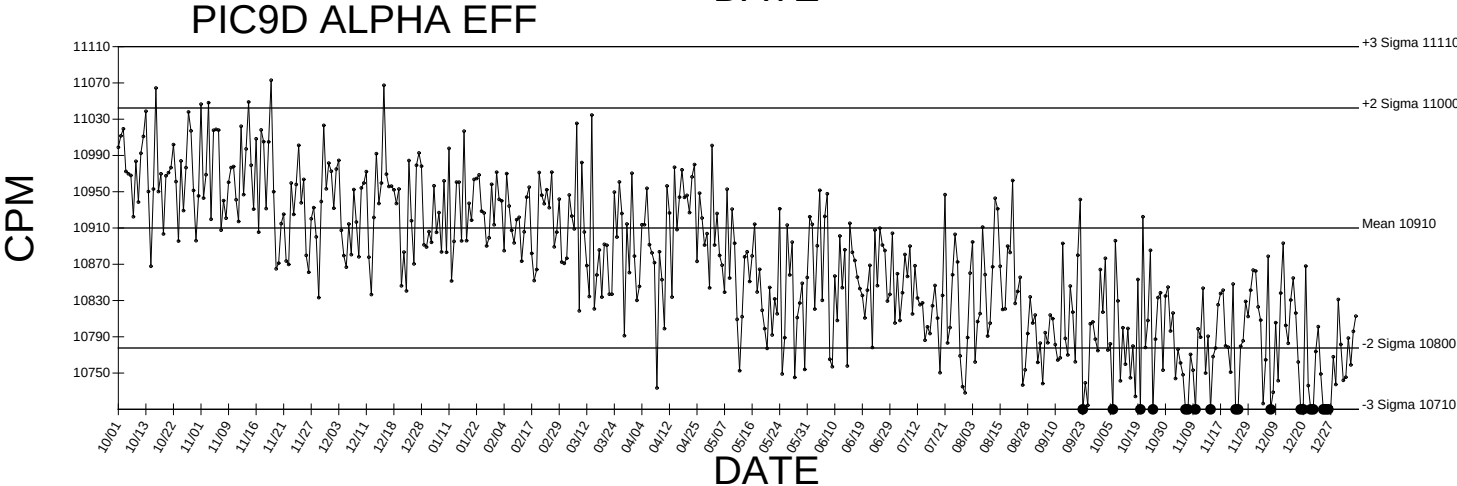
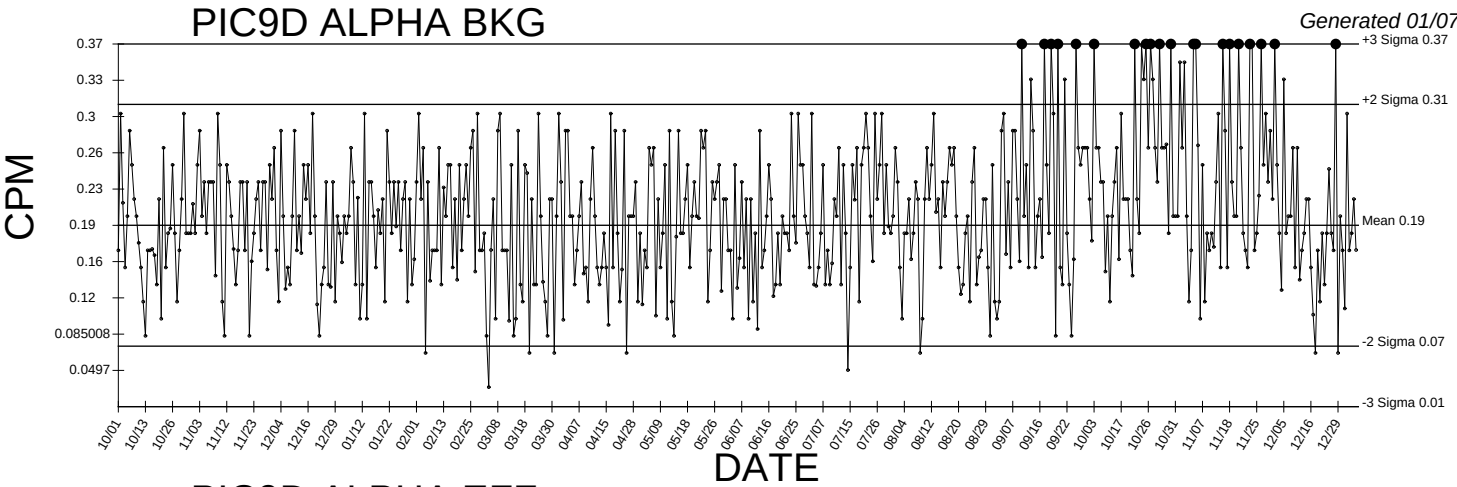
Generated 01/07/2017
+3 Sigma 22000



PIC9C BETA EFF Cross Talk



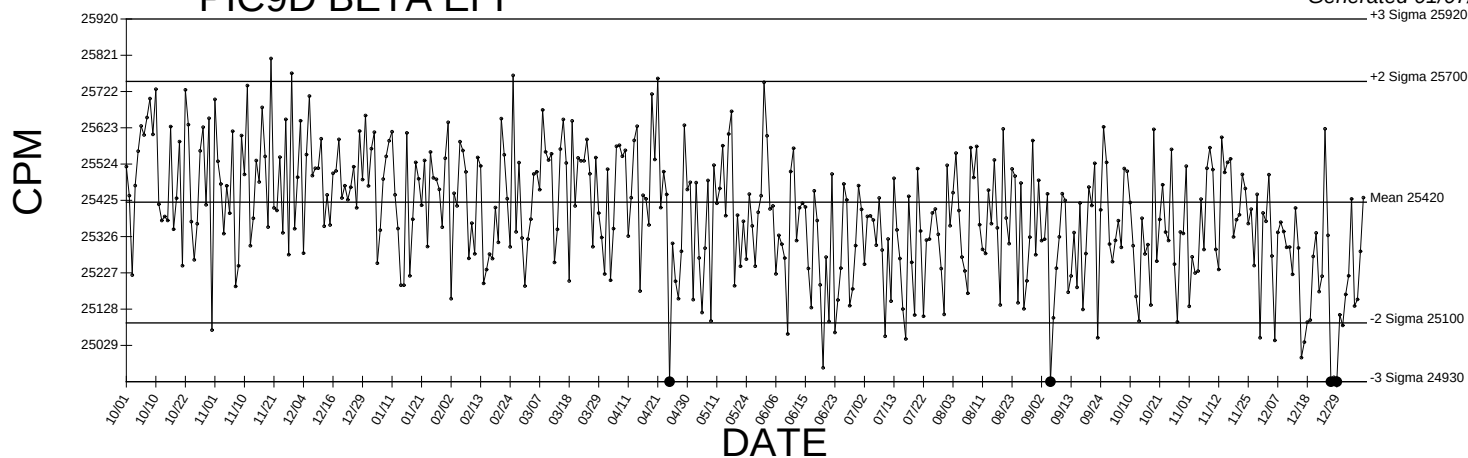
● Denotes Outlier



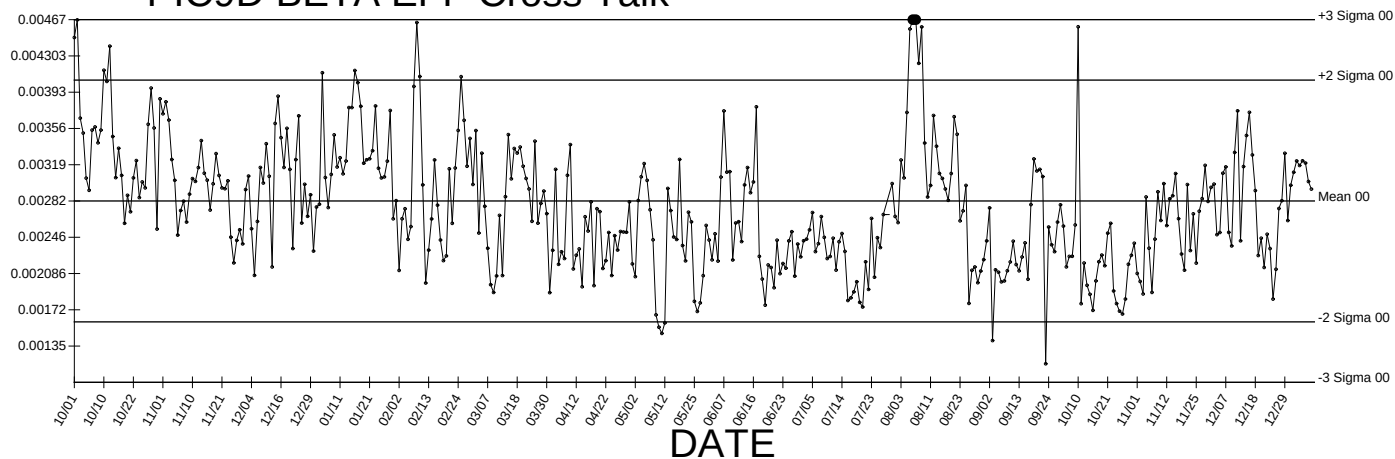
● Denotes Outlier

PIC9D BETA EFF

Generated 01/07/2017



PIC9D BETA EFF Cross Talk



● Denotes Outlier

RAD Standards Traceability

Standardization of Strontium Carrier 2473254

v1.2.1

Analyst	TC1

Standard Information	
Isotope	Strontium
Serial Number	2473254
Amount of Std. (mL)	2.0
Standard Prepared	11/2/2016

Parent Information	
Parent Serial #	2420326
Parent Exp. Date	6/17/2018

Standardization Rule

A satisfactory standardization is obtained when results give a standard deviation of less than 1.0% of the mean value.

Std #	Weight of carrier added (g)	Weight of crucible or filter (g)	Weight of crucible or filter + ppt. (g)	Weight of ppt. (g)	mg Strontium/mL	mg Strontium/g
1	2.0302	17.4737	17.5049	0.0312	15.60	15.37
2	2.0268	20.1770	20.2077	0.0307	15.35	15.15
3	2.0272	19.7480	19.7789	0.0309	15.45	15.24
4	2.0272	18.1086	18.1398	0.0312	15.60	15.39

Mean Value (mg/mL) = 15.50
 Stdev (mg/mL) = ± 0.12
 1.0% of Mean Value = 0.155000

Pass

Expiration Date 11/2/2017

Mean Value (mg/2.0mL) = 31.00

Mean Value (mg/0.5mL) = 7.75

TPC



Eckert & Ziegler

Analytics

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

1243

78352-278

Sr-90 10 mL Liquid in Flame Sealed Vial

Customer: General Engineering Labs/Charleston, SC

P.O. No.: 7312 RD, Item 3

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting.

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. The nuclear decay rate and assay date for this source are given below.

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

Isotope:	Sr-90
Activity (Bq):	3.856 E5
Half-Life:	28.79 years
Calibration Date:	October 1, 2008 12:00 EST
Relative Expanded Uncertainty (k=2):	1.7%

Comments:

Impurities: γ -impurities <0.1%

10.41484 grams 0.1M HCl solution with 30 $\mu\text{g/g}$ Sr carrier.

NOTE: This source also contains Y-90 in secular equilibrium with Sr-90. The Y-90 activity is equal to the Sr-90 activity. Since Sr-90 and Y-90 both decay 100% by beta emission, the total beta emission rate for the source is twice the certified Sr-90 activity. The half-life for Y-90 is 64.08 hours.

Source Prepared By: W. Mao
W. Mao, Radiochemist

QA Approved:

D. M. Montgomery
D. M. Montgomery, QA Manager

Date:

10/3/08

RECEIVED



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1243
Prepared By:	Daniel Roy
Carrier Conc:	0.1M HCL
Reference Date:	10/01/2008
Ampoule Mass (g):	10.41484 g
Uncertainty:	+/- .85 %
LogBook No:	RC-S-048-124

A Solution Material Info			
Isotope:	Strontium-90		
Prepared By:	Daniel Roy		
Prep Date:	12/19/2008		
Verification Date:	09/27/2016		
Expiration Date:	09/27/2017		
Primary Code:	1243-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	10.2164 g		
Density(g/mL):	0.9991	Balance ID:	38080204

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(10.2164 \text{ g}) * (385600 \text{ Bq}) * (60 \text{ dpm/Bq}) / (10.41484 \text{ g} * 100 \text{ mL}) = 226951.7634 \text{ dpm/mL}$
$(10.2164 \text{ g}) * (385600 \text{ Bq}) * (60 \text{ dpm/Bq}) / (0.9991 \text{ g/mL}) / (10.41484 \text{ g} * 100 \text{ mL}) = 227146.2010 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
01/21/2010	Bethany Fiem	2.2467	1000	1243-B	510.329369 dpm/mL	01/21/2010	01/21/2011
08/03/2010	Bethany Fiem	2.5604	1000	1243-C	581.5851 dpm/mL	08/03/2010	08/03/2011
01/12/2011	Bethany Fiem	2.4946	1000	1243-D	566.6389 dpm/mL	01/12/2011	01/12/2012
08/12/2011	Tim Chandler	3.3115	100	1243-G	18.7877 dpm/mL	03/26/2014	03/25/2015
08/17/2011	Tim Chandler	2.5541	100	1243-H	14.49064 dpm/mL	03/26/2014	03/25/2015
06/21/2011	Tim Chandler	.0235	100	1243-E	53.37936 dpm/mL	03/19/2014	06/20/2014
07/05/2011	Bethany Fiem	2.6072	1000	1243-F	592.2156 dpm/mL	07/05/2011	07/05/2012
01/31/2012	Gregory Ramsay	2.6792	1000	1243-I	608.5701 dpm/ml	01/31/2012	01/31/2013

08/29/2012	Bethany Fiem	2.6799	1000	1243-J	608.729104 dpm/mL	09/14/2012	09/11/2013
02/12/2013	Gregory Ramsay	2.6526	1000	1243-K	602.528 dpm/ml	01/15/2014	01/15/2015
12/04/2013	Gregory Ramsay	2.5347	1000	1243-L	575.747476 dpm/ml	12/04/2013	12/04/2014
08/11/2014	Gregory Ramsay	2.7006	1000	1243-M	613.431 dpm/mL	08/12/2014	08/12/2015
05/06/2015	Gregory Ramsay	2.5102	1000	1243-N	570.1824 dpm/mL	05/06/2015	05/06/2016
12/18/2015	Gregory Ramsay	2.5762	1000	1243-O	585.174 dpm/mL	12/18/2015	12/18/2016
08/30/2016	Christina Kimball	.068	250	1243-P	61.7838 dpm/mL	09/07/2016	09/07/2017
09/27/2016	Bethany Fiem	2.6337	1000	1243-Q	598.235 dpm/mL	09/27/2016	09/27/2017

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Sr-90 Standard 1243-Q

v1.0.2

Instrument	RED
Analyst	BXF1
Verification Prep Date	9/27/2016

Standard Information	
Isotope	Sr-90
Serial Number	1243-Q
Isotope Half-life	28.9000 Y
Reference Date	10/1/2008
Ref. Act. (DPM/mL)	598.235
Amount of Std. (mL)	0.5
Standard Prep Date	9/27/2016

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	9/27/2016	87.70	568.40	47.40
2	9/27/2016	87.20	550.60	47.40
3	9/27/2016	87.50	575.60	47.40

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	521.00	2.039634	510.88	255.44
2	503.20	2.039634	493.42	246.71
3	528.20	2.039634	517.94	258.97

dpm/mL
507.41
12.61901528

Mean Value =
Stdev =

Certificate Value* = 493.9
Two sigma = 25.238
10 % of Mean = 50.741
Rule A (Pass/Fail) Pass
% Recovery 102.73%
Rule B (Pass/Fail) Pass
Expiration Date 9/27/2017

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

* Certificate Value is decay corrected to Count Date.

The analyst prepared three standard verification sources for Sr-90 source 1243-Q by transferring 0.5 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecosint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecosint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSQRD for Sr-90 source standard verification. The Sr-90 efficiency calibration which was used for verification calculations was performed on 9/27/2016 using Sr-90 source 1244-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

A = Ver. source cpm,
B = BKG cpm,
C = System efficiency (cpm/dpm), and
D = volume used for standard verification.

RAD-M-001

9/27/16 11/10/16
9-28-16
[Signature]

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 1625914

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1203694692	MB	BXF1	PIC3D	JAN-05-17 16:26:08	DONE	Tuffryn Filter	01-MAR-16 00:00
1203694693	DUP	BXF1	PIC4A	JAN-05-17 16:26:13	DONE	Tuffryn Filter	01-MAR-16 00:00
1203694694	LCS	BXF1	PIC3B	JAN-05-17 16:26:15	DONE	Tuffryn Filter	01-MAR-16 00:00
412372003	SAMPLE	BXF1	PIC3C	JAN-05-17 16:26:21	DONE	Tuffryn Filter	01-MAR-16 00:00

Instrument Run Log

Instrument Type: GFPC

Batch ID: 1625919

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
412372001	SAMPLE	BXF1	PIC2B	JAN-06-17 08:42:13	DONE	Tuffryn Filter	01-APR-16 00:00
412372004	SAMPLE	BXF1	PIC8B	JAN-06-17 08:46:35	DONE	Tuffryn Filter	01-APR-16 00:00
412372006	SAMPLE	BXF1	LB4100H3	JAN-06-17 09:14:40	DONE	Tuffryn Filter	01-APR-16 00:00
412372012	SAMPLE	BXF1	PIC2B	JAN-06-17 11:04:38	DONE	Tuffryn Filter	01-APR-16 00:00
412372013	SAMPLE	BXF1	PIC8B	JAN-06-17 11:07:36	DONE	Tuffryn Filter	01-APR-16 00:00
412372014	SAMPLE	BXF1	PIC14A	JAN-06-17 11:11:06	DONE	Tuffryn Filter	01-APR-16 00:00
1203694706	MB	BXF1	PIC14B	JAN-06-17 11:11:07	DONE	Tuffryn Filter	01-APR-16 00:00
1203694708	LCS	BXF1	LB4100C3	JAN-06-17 11:27:49	DONE	Tuffryn Filter	01-APR-16 00:00
412372002	SAMPLE	BXF1	PIC7D	JAN-07-17 14:06:13	DONE	Tuffryn Filter	01-APR-16 00:00
412372005	SAMPLE	BXF1	PIC9C	JAN-07-17 14:06:15	DONE	Tuffryn Filter	01-APR-16 00:00
412372007	SAMPLE	BXF1	PIC9D	JAN-07-17 14:06:17	DONE	Tuffryn Filter	01-APR-16 00:00
412372008	SAMPLE	BXF1	PIC12A	JAN-07-17 14:09:24	DONE	Tuffryn Filter	01-APR-16 00:00
412372009	SAMPLE	BXF1	PIC13D	JAN-07-17 14:09:29	DONE	Tuffryn Filter	01-APR-16 00:00
412372011	SAMPLE	BXF1	PIC2B	JAN-09-17 12:30:24	DONE	Tuffryn Filter	01-APR-16 00:00
1203694707	DUP	BXF1	PIC7C	JAN-09-17 18:06:29	DONE	Tuffryn Filter	01-APR-16 00:00
412372010	SAMPLE	BXF1	PIC5D	JAN-10-17 12:04:54	DONE	Tuffryn Filter	01-APR-16 00:00

Liquid Scintillation Raw Data

30-Dec-2016

Batch# 162559S Product: H3 Date: 12/30/16

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required). Blank correction reported included (if required).			NA
If activity less than 10x MDA/ MDC, error is less than or equal to 150% of sample activity. If greater than 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5* MDA/ MDC, then RPD is 100% or less, If greater 5* MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).			NA
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stasured.	✓		
M5, LC5, and Duplicate RPD/ RER values uploaded to LIMS and values verified	✓		
Hit notification complete (if necessary)			NA
Batch entered into Case Narrative.	✓		
Batch Data Exception Reports (DER) completed, if applicable.			NA
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.			NA
Aliquot Correction completed If required.			NA
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

Primary Review Performed By: _____

Secondary Review Performed By: _____

[Signature] 12/30/16

SUFF
HAAL
WVNS
1/5

SUFF WUNS
HAAL 1/5/17

60 P/O 175

Prep Logbook

The Determination of Tritium in Drinking Water Samples

Batch ID: 1625595

Analyst: Kimber Amweg

Method: EPA 906.0

Lab SOP: GL-RAD-A-050 REV# 10

Instrument: No instrument-manual method

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203693752	Tritium SPIKE	1753-B	.2	mL
MS	1203693750	Tritium SPIKE	1753-B	.1	mL
MSD	1203693751	Tritium SPIKE	1753-B	.1	mL

Sample ID	Prep Date	Matrix	Initial Sample Aliquot (mL)	Final Volume (mL)	Aliquot in vial (mL)	Rig #
411910001	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	1
411910002	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	2
412372003	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	3
412854002	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	4
412854004	27-DEC-2016 11:09:27	Drinking Water 50 (Potable)	50	50	10	5
1203693748 MB	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	9
1203693749 DUP (412854004)	27-DEC-2016 11:09:27	Drinking Water 50 (Potable)	50	50	10	6
1203693750 MS (412854004)	27-DEC-2016 11:09:27	Drinking Water 50 (Potable)	50	50	10	7
1203693751 MSD (412854004)	27-DEC-2016 11:09:27	Drinking Water 50 (Potable)	50	50	10	8
1203693752 LCS	27-DEC-2016 11:09:27	Drinking Water 100 (Potable)	100	100	10	10

Reagent/Solvent Lot ID	Description	Amount	Comments:
2418926	Quenching Agent	20 uL	Spike Pipet ID: RAD-LSC-2970968
2474026	RL-Potassium Permanganate	2 mL	Vial Pipet ID: 8036236
2481159.15	Ecosciint Ultra Scintillation Solution	13 mL	Bkg Prepared with dead water: Yes
2486094	Sodium Hydroxide Pellets 98.5%	1 g	

Tritium Liquid

Filename : H3DST.XLS
File type : Excel
Version # : 1.2.13

Batch : 1625595
Analyst : KIM02056
Prep Date : 12/27/2016
Method Uncertainty : 0.0903

Procedure Code : LSCDSH3D
Parmaname : Tritium
Required MDA : 200 pCi/L
H-3 Abundance : 1.00
Half-life of Tritium : 12.32 years

Geometry: 10mL DW/13mL Ecoscint Ultra

Sample Characteristics		Total Sample Volume (L)	Sample Aliquot L	Sample Aliquot StdDev. L	Distilled Sample Counted L	Sample Counted StdDev. L	Rig number	Sample Date/Time
Pos.	Sample ID							
1	411910001.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	1	11/17/2016 19:15
2	411910002.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	2	11/28/2016 10:10
3	412372003.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	3	12/7/2016 7:59
4	412854002.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	4	12/13/2016 13:00
5	412854004.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	5	12/13/2016 13:10
6	1203693748.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	9	12/27/2016 0:00
7	1203693749.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	6	12/13/2016 13:10
8	1203693750.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	7	12/13/2016 13:10
9	1203693751.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	8	12/13/2016 13:10
10	1203693752.1	0.1000	0.1000	1.1370E-05	0.0100	1.0000E-05	10	12/27/2016 0:00

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1.0 ml Stdev : +/- 0.002000 ml
 Pipet, 5.0 ml Stdev : +/- 0.010000 ml

Analytical SOP: GL-RAD-A-050
 Instrument SOP: GL-RAD-I-017

Count raw Data										Calibration Data				Detector Efficiency Error (cpm/dpm)	Detector Efficiency (cpm/dpm)	Calibration Due Date	Background Rack Position #	Background Count Start Date/Time
Pos.	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	Sample Decay	Counted on	Calibration Date	Calibration Due Date					
1	5	30.0297	657.24	1.49	1.46	60	655.62	1.4642	12/28/2016 18:04	0.994	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2108	6/30/2017	4	12/28/2016 17:02
2	6	30.0297	657.43	1.6	1.46	60	655.62	1.4646	12/28/2016 18:37	0.995	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2112	6/30/2017	4	12/28/2016 17:02
3	7	15.0297	652.77	1.02	1.46	60	655.62	1.4519	12/28/2016 19:09	0.997	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2019	6/30/2017	4	12/28/2016 17:02
4	8	60.0296	656.95	1.26	1.46	60	655.62	1.4635	12/28/2016 19:27	0.998	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2102	6/30/2017	4	12/28/2016 17:02
5	9	60.0296	661.23	1.21	1.46	60	655.62	1.4730	12/28/2016 20:29	0.998	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2188	6/30/2017	4	12/28/2016 17:02
6	10	60.0297	657.98	1.19	1.46	60	655.62	1.4660	12/28/2016 21:32	1.000	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2123	6/30/2017	4	12/28/2016 17:02
7	11	60.0297	658.74	1.41	1.46	60	655.62	1.4677	12/28/2016 22:35	0.998	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2138	6/30/2017	4	12/28/2016 17:02
8	5	15.0296	656.03	10.01	1.49	15	653.89	1.4959	12/29/2016 7:39	0.998	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.2084	6/30/2017	4	12/29/2016 7:22
9	6	15.0297	650.13	10.55	1.49	15	653.89	1.4783	12/29/2016 7:57	0.998	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.1967	6/30/2017	4	12/29/2016 7:22
10	5	15.0296	650.94	10.93	0.95	15	653.53	0.9420	12/29/2016 11:28	1.000	LSCORANGE	6/15/2016	6/30/2017	0.00792	0.1983	6/30/2017	4	12/29/2016 11:11

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1753-B
 Spike Exp Date : 11/1/2017
 Spike Activity (dpm/ml): 2511.83
 Spike Volume Added: 0.10

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1753-B
 LCS Exp Date : 11/1/2017
 LCS Activity (dpm/ml): 2511.83
 LCS Volume Added: 0.20

Results		2 SIGMA				2 SIGMA				2 SIGMA				2 SIGMA			
Pos.	Decision Level	Critical Level	Required MDA	MDA	Sample Act. Conc.	Sample Act. Error	Net Count Rate	Net Count Rate Error	Net Count Rate Error	Counting Uncertainty	Total Prop. Uncertainty	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	135.5303	95.6855	300	212.8567	5.5540	1053.45%	0.0258	0.2720	0.2720	114.6765	114.6836		SAMPLE				
2	135.0867	95.3723	300	212.1566	29.0111	205.91%	0.1354	0.2787	0.2787	117.0828	117.1962		SAMPLE				
3	181.2719	127.9795	700	300.6418	-96.6740	70.26%	-0.4319	0.3034	0.3034	133.1187	133.1450		SAMPLE				
4	110.5188	78.0272	200	166.7898	-43.7042	104.69%	-0.2035	0.2130	0.2130	89.6792	89.6815		SAMPLE				
5	106.5019	75.1912	200	160.6941	-54.2626	80.39%	-0.2630	0.2114	0.2114	85.4973	85.4995		SAMPLE				
6	109.3118	77.1751	200	164.9590	-58.5840	76.22%	-0.2760	0.2103	0.2103	87.5188	87.5210		MB				
7	108.8211	76.8286	200	164.2122	-12.1946	379.21%	-0.0577	0.2189	0.2189	90.6357	90.6379	412854004.1	DUP	* 0.0%	0.6617	2267.6061	81.4%
8	225.2974	159.0619	200	361.3833	1845.2041	10.31%	8.5141	0.8750	0.8750	371.6631	495.6150	412854004.1	MS			2267.8081	91.8%
9	237.2083	167.4711	200	380.7593	2082.3079	9.89%	9.0717	0.8946	0.8946	402.4746	548.7071	412854004.1	MSD	12.1%	0.6298	2262.9124	100.3%
10	187.4809	132.3490	200	310.0571	2269.7008	8.93%	9.9880	0.8888	0.8888	395.8533	565.1122		LCS				

REGISTRY

WED 28 DEC 2016 17:00

*** DIRECTORY PATH :M:\LSC\O\DA\625595A0 ***

PARAMETER GROUP: 8
ID: H-3 (1)

00A PROGRAM MODE 6 ->

ORDER	POS	ID	CTIME	COUNTS	CUCNTS	MCW	REP	STD	STMS	STIME
1	4	BKG	60:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
2	5	411910001	30:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
3	6	411910002	30:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
4	7	412372003	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
5	8	412854002	60:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
6	9	412854004	60:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
7	10	1203693748	60:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
8	11	1203693749	60:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
9	12	1203693750	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
10	13	1203693751	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
11	14	1203693752	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00

NUMBER OF CYCLES 1
COINCIDENCE BIAS (L/H) L

MCA INPUT TRIGG. INHIBIT
1 LRSUM DCOS G
2 GSUM G

MEMORY SPLIT
L*R
L*R

WINDOW	CHANNELS	MCA	HALF
1	50- 175	1	2
2	5- 320	1	2
3	1- 1024	1	2
4	50- 320	1	1
5	50- 270	1	1
6	60- 220	1	1
7	1- 1024	2	1
8	1- 1024	2	2

SELECTED PRINTOUT FOR TERMINAL 1 (A)

SELECTED PRINTOUT FOR TERMINAL 2 (B)

1.	2.	3.	4.	5.	6.	7.
POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
SEND SPECTRA	12					
RESOLUTION OF SPECTRA	1024					
LISTING	Y					
INSTRUMENT NUMBER	1					

POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
Q010401N.001	28 DEC 2016	18:03				
4	BKG	60:01.780	655.62	1.46	2.86	6.32
Q020501N.001	28 DEC 2016	18:35				
5	411910001	30:01.780	657.24	1.49	2.72	5.99

Page 1

REGISTRY

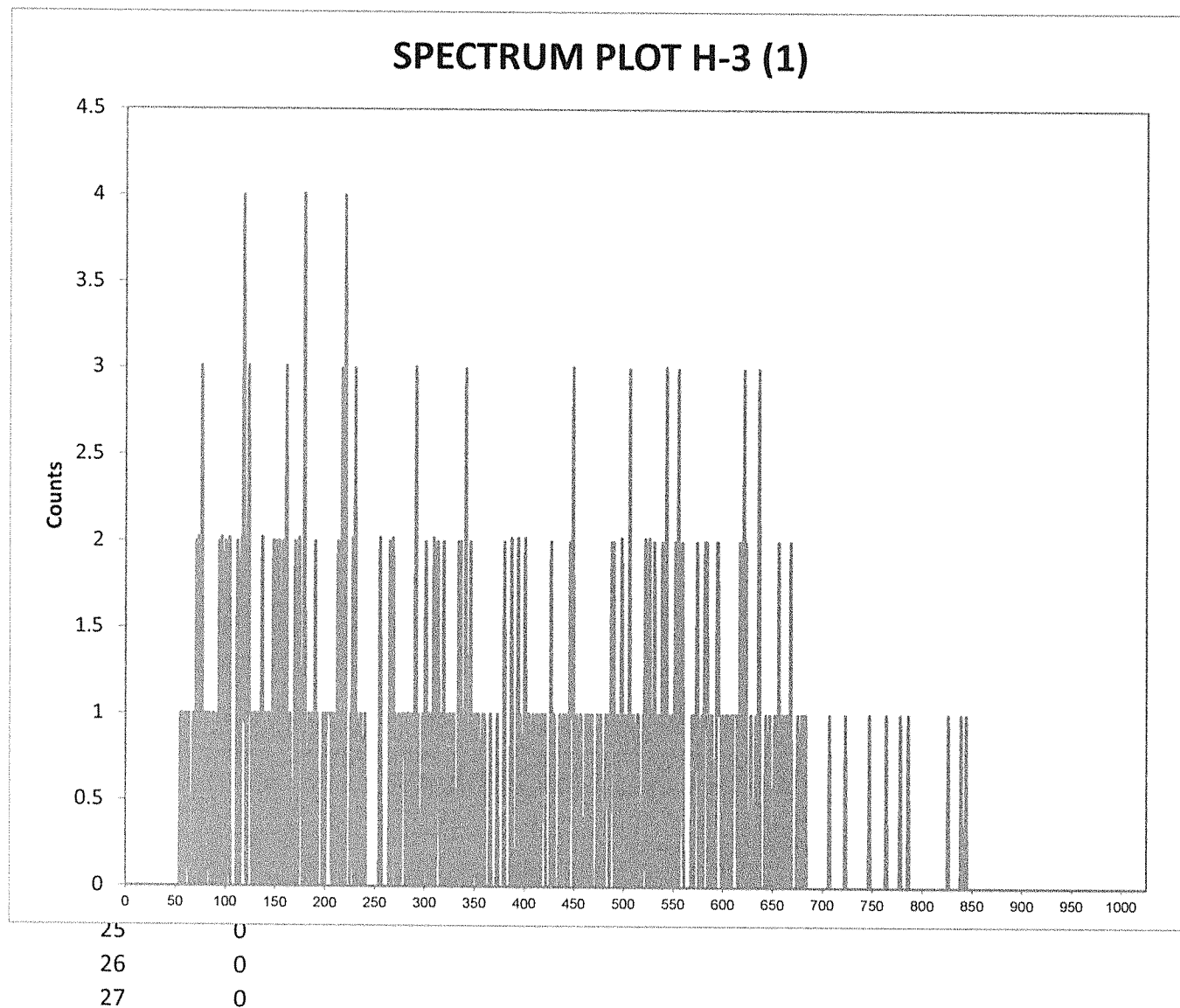
Q030601N.001	28 DEC 2016	19:08					
6	411910002	30:01.780	657.43	1.60	3.20	6.51	
Q040701N.001	28 DEC 2016	19:25					
7	412372003	15:01.780	652.77	1.02	2.58	6.33	
Q050801N.001	28 DEC 2016	20:28					
8	412854002	60:01.773	656.95	1.26	2.72	5.62	
Q060901N.001	28 DEC 2016	21:30					
9	412854004	60:01.773	661.23	1.21	2.57	5.14	
Q071001N.001	28 DEC 2016	22:33					
10	1203693748	60:01.780	657.98	1.19	2.50	5.40	
Q081101N.001	28 DEC 2016	23:36					
11	1203693749	60:01.779	658.74	1.41	2.45	5.62	
~~Q091201N.001~~	~~28 DEC 2016~~	~~23:53~~					
12	1203693750	15:01.773	656.30	15.39	19.61	23.15	
Q101301N.001	29 DEC 2016	0:11					
13	1203693751	15:01.779	654.38	9.26	10.69	12.59	
Q111401N.001	29 DEC 2016	0:28					
~~14~~	~~1203693752~~	~~15:01.779~~	~~653.30~~	~~9.53~~	~~11.16~~	~~14.23~~	

JP 12/30/16

Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ010401N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

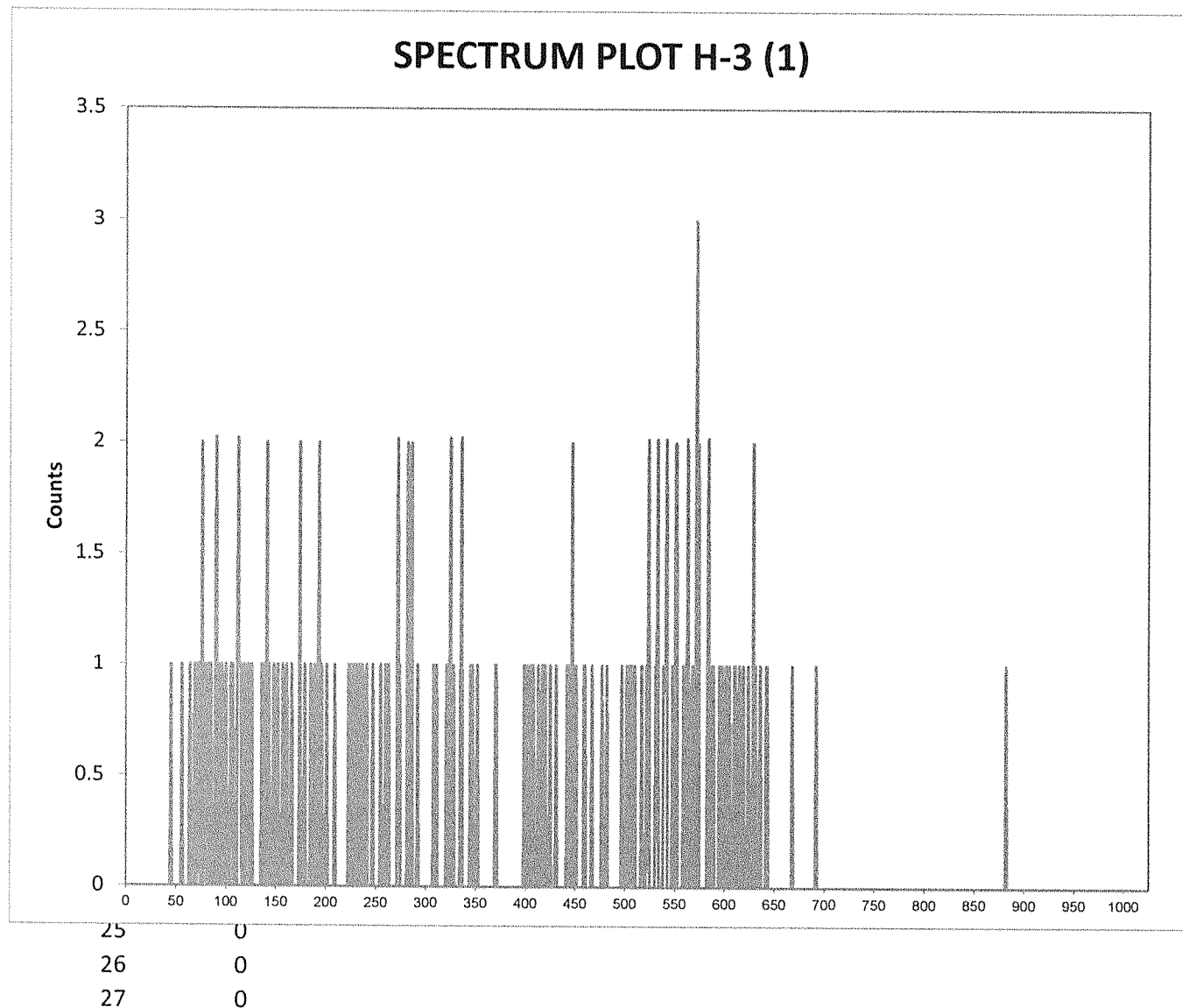
Sample, Rack-Pos, Time: 1, BKG, 60.02967:
Quench: 655.62
Start, End, X-Axis 50-175



Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ020501N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

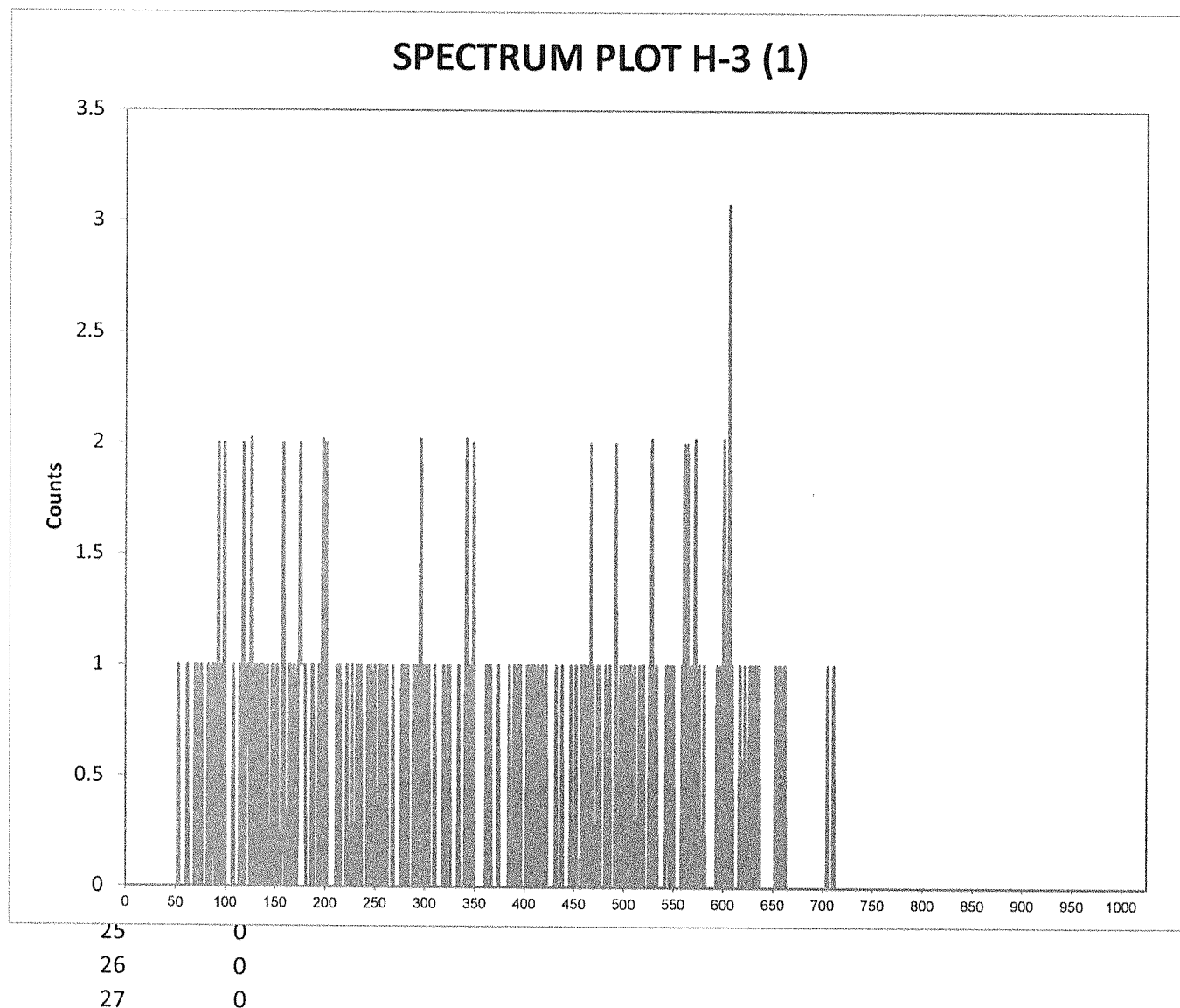
Sample, Rack-Pos, Time: 2, 411910001, 30.02967:
Quench: 657.24
Start, End, X-Axis 50-175



Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ030601N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

Sample, Rack-Pos, Time: 3, 411910002, 30.02967:
Quench: 657.43
Start, End, X-Axis 50-175



Instrument Type:Quantulus

Data Capture Date:WED 28 DEC 2016 17:00

FileName:M:\LSC\FILES\orange\625595A0\SQ040701N.001.xls

File Info:M:\LSC\FILES\orange\625595A0\U625595A0.xls

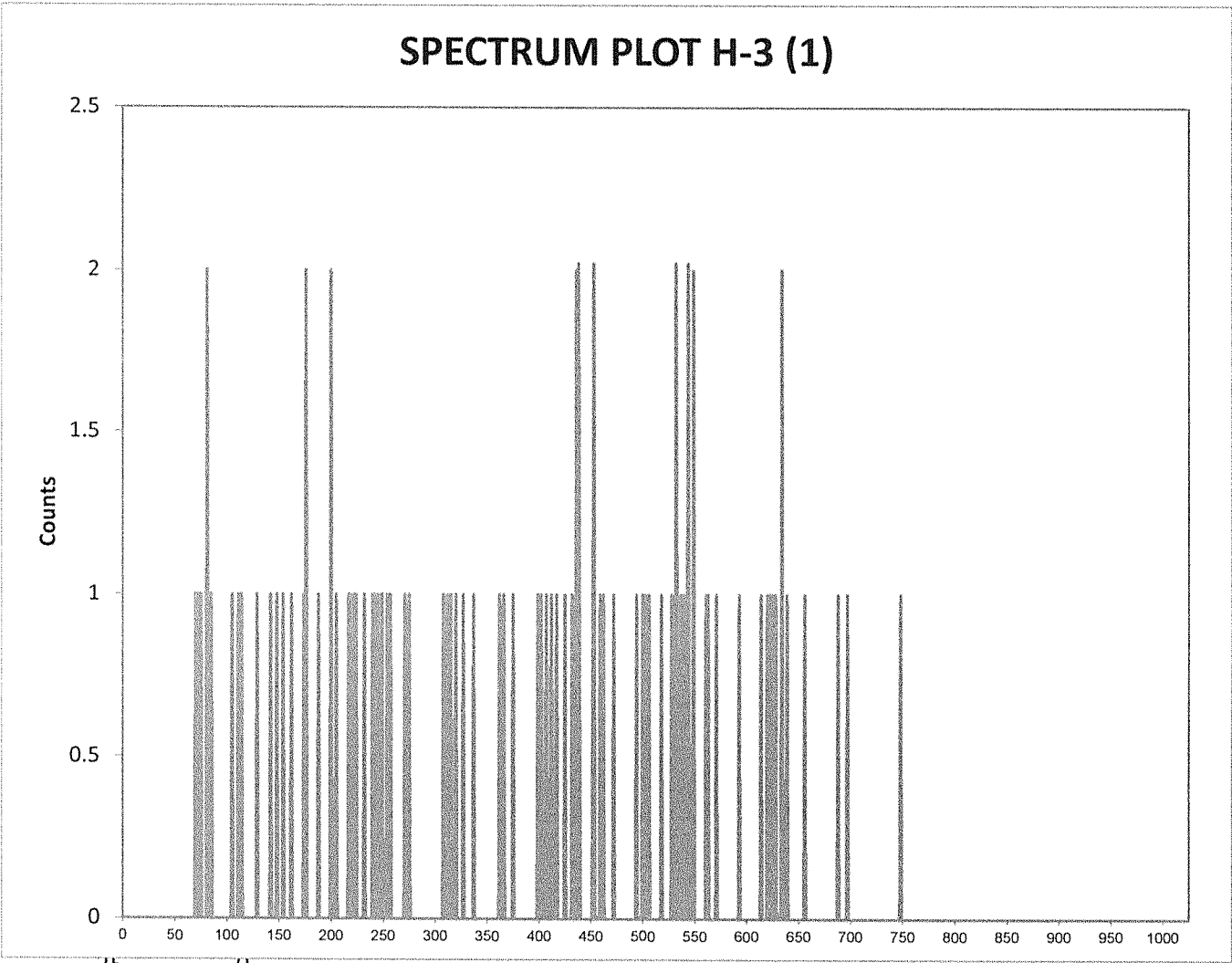
ID:H-3 (1)

Comments:ORANGE

Sample, Rack-Pos, Time:4, 412372003, 15.02967:

Quench:652.77

Start, End, X-Axis50-175



250

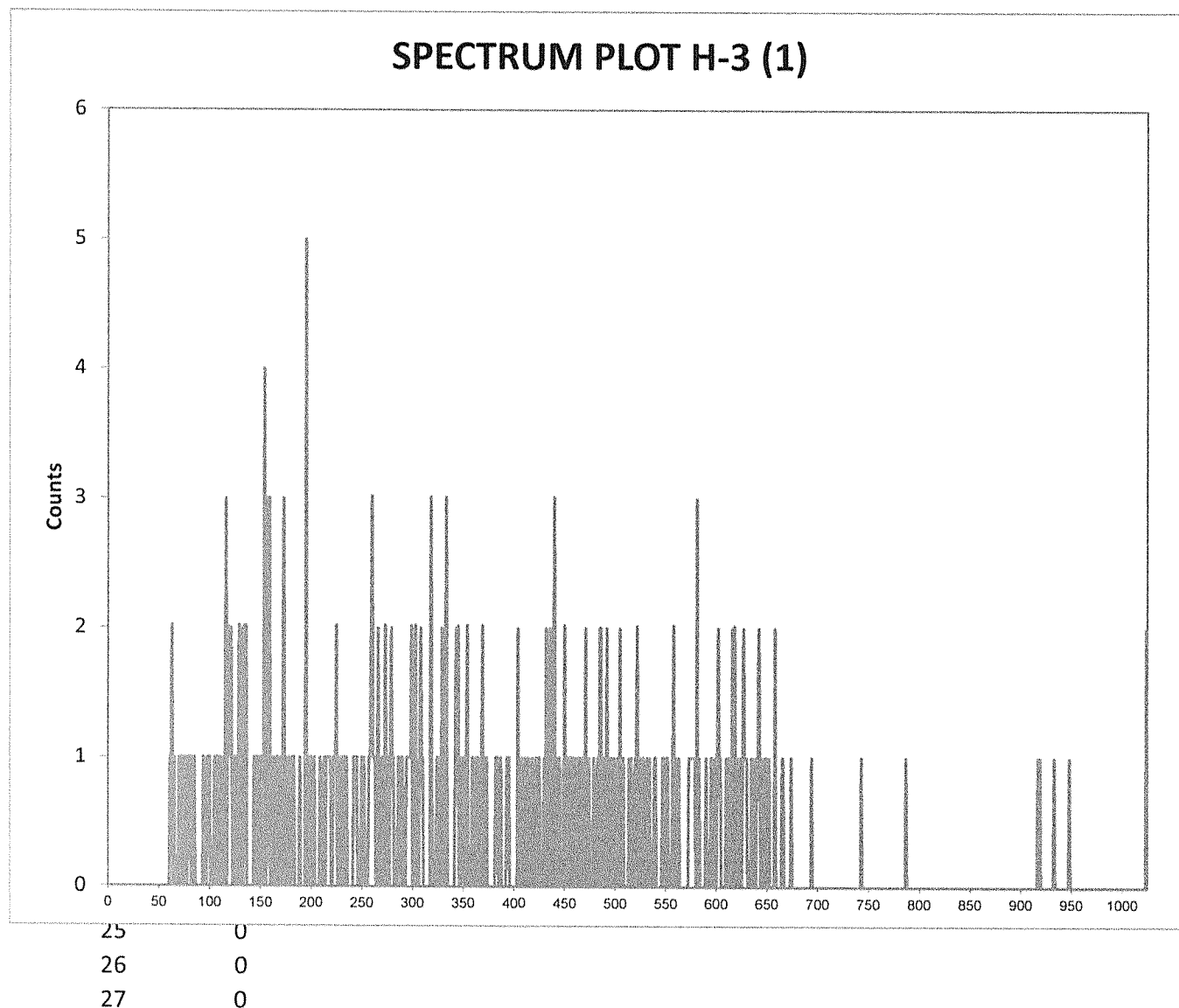
260

270

Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ050801N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

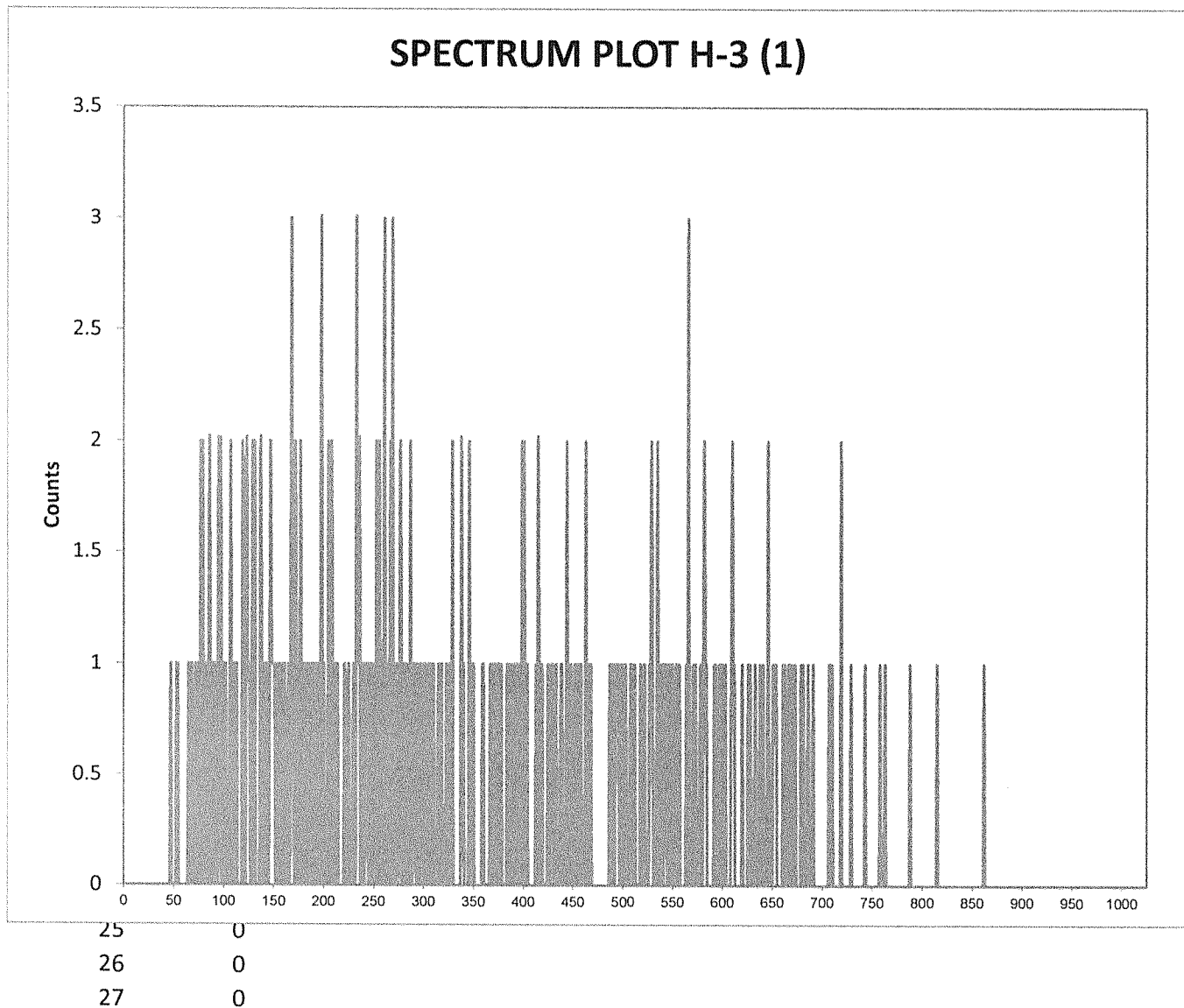
Sample, Rack-Pos, Time: 5, 412854002, 60.02955:
Quench: 656.95
Start, End, X-Axis 50-175



Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ060901N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

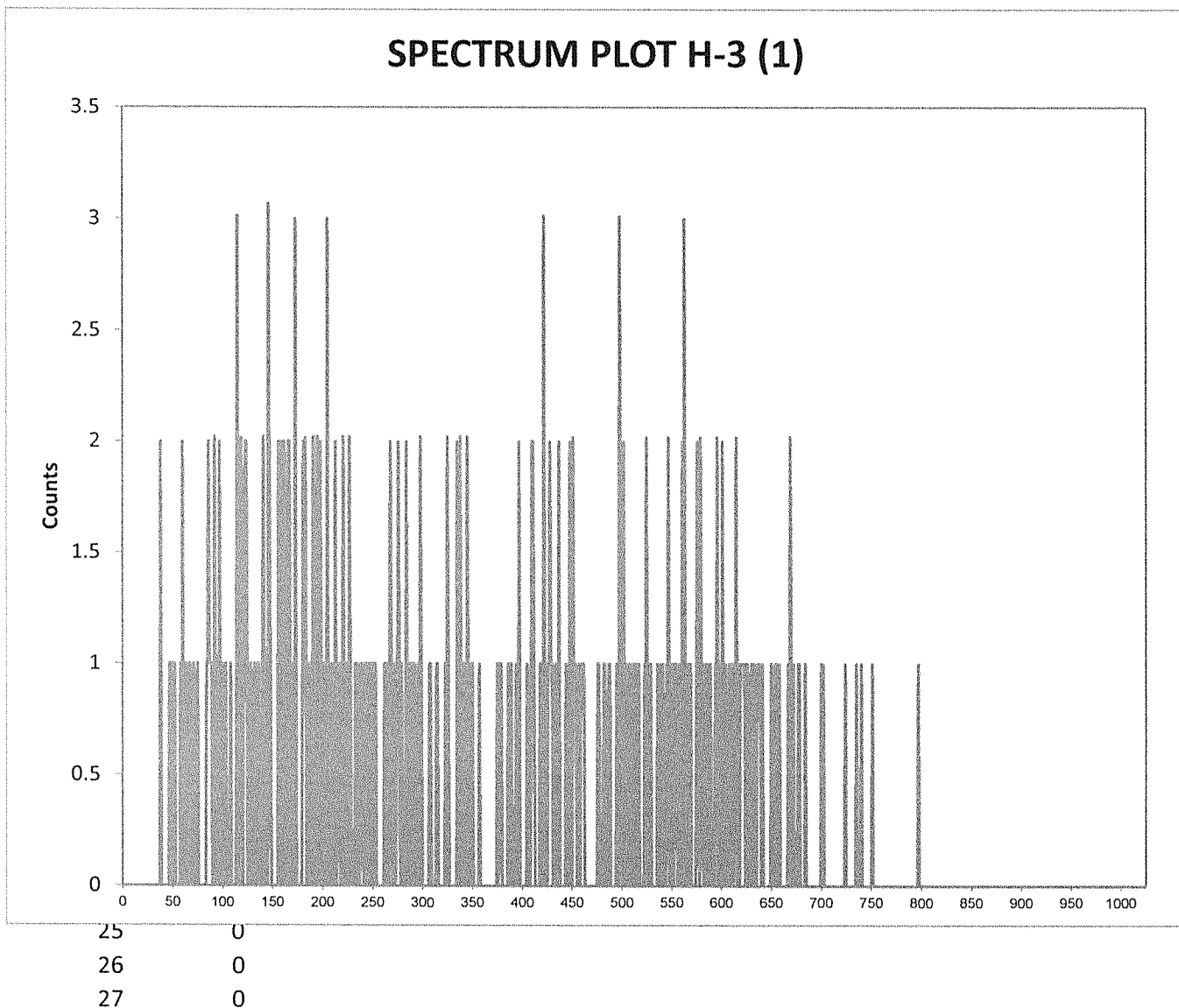
Sample, Rack-Pos, Time: 6, 412854004, 60.02955:
Quench: 661.23
Start, End, X-Axis 50-175



Instrument Type: Quantulus
Data Capture Date: WED 28 DEC 2016 17:00
FileName: M:\LSC\FILES\orange\625595A0\SQ071001N.001.xls
File Info: M:\LSC\FILES\orange\625595A0\U625595A0.xls

ID: H-3 (1)
Comments: ORANGE

Sample, Rack-Pos, Time: 7, 1203693748, 60.02967:
Quench: 657.98
Start, End, X-Axis 50-175



Instrument Type:Quantulus

Data Capture Date:WED 28 DEC 2016 17:00

FileName:M:\LSC\FILES\orange\625595A0\SQ081101N.001.xls

File Info:M:\LSC\FILES\orange\625595A0\U625595A0.xls

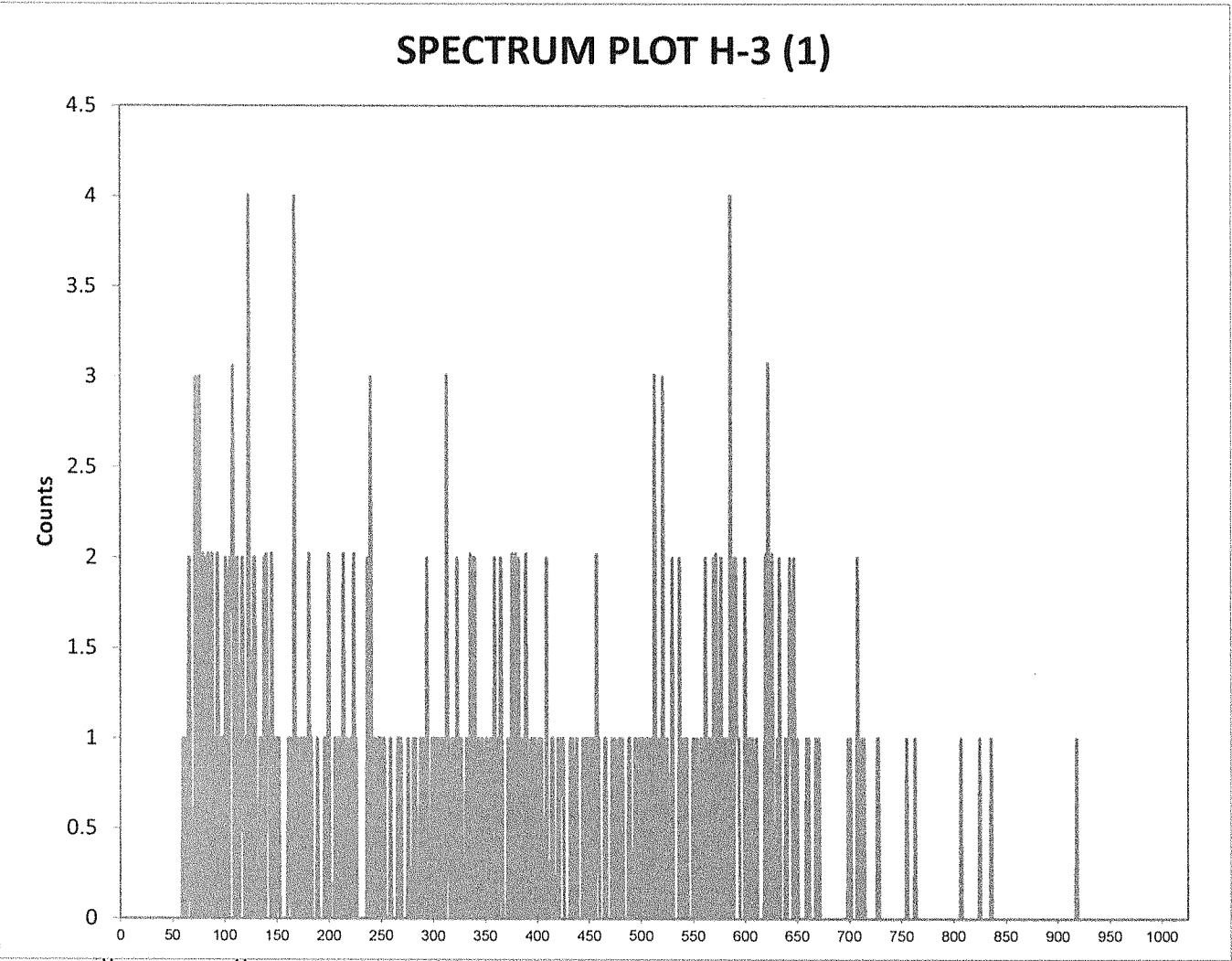
ID:H-3 (1)

Comments:ORANGE

Sample, Rack-Pos, Time:8, 1203693749, 60.02965:

Quench:658.74

Start, End, X-Axis50-175



250

260

270

REGISTRY

THU 29 DEC 2016 7:20

*** DIRECTORY PATH :M:\LSC\O\DA\625595A1 ***

PARAMETER GROUP: 8
ID: H-3 (1)

00A PROGRAM MODE 6 ->

ORDER	POS	ID	CTIME	COUNTS	CUCNTS	MCW	REP	STD	STMS	STIME
1	4	BKG	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
2	5	1203693750	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
3	6	1203693751	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
~~4~~	~~7~~	~~1203693752~~	~~15:00~~	~~1.0E04~~	~~NO LIM~~	~~1~~	~~1~~	~~Y~~	~~1/10~~	~~1:00~~
NUMBER OF CYCLES			1							
COINCIDENCE BIAS (L/H)			L							

JP 12/30/16

MCA INPUT	TRIGG.	INHIBIT	MEMORY SPLIT
1 LRSUM	DCOS	G	L*R
2 GSUM	G		L*R

WINDOW	CHANNELS	MCA	HALF
1	50- 175	1	2
2	5- 320	1	2
3	1- 1024	1	2
4	50- 320	1	1
5	50- 270	1	1
6	60- 220	1	1
7	1- 1024	2	1
8	1- 1024	2	2

SELECTED PRINTOUT FOR TERMINAL 1 (A)

SELECTED PRINTOUT FOR TERMINAL 2 (B)

1.	2.	3.	4.	5.	6.	7.
POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
SEND SPECTRA	12					
RESOLUTION OF SPECTRA	1024					
LISTING	Y					
INSTRUMENT NUMBER	1					

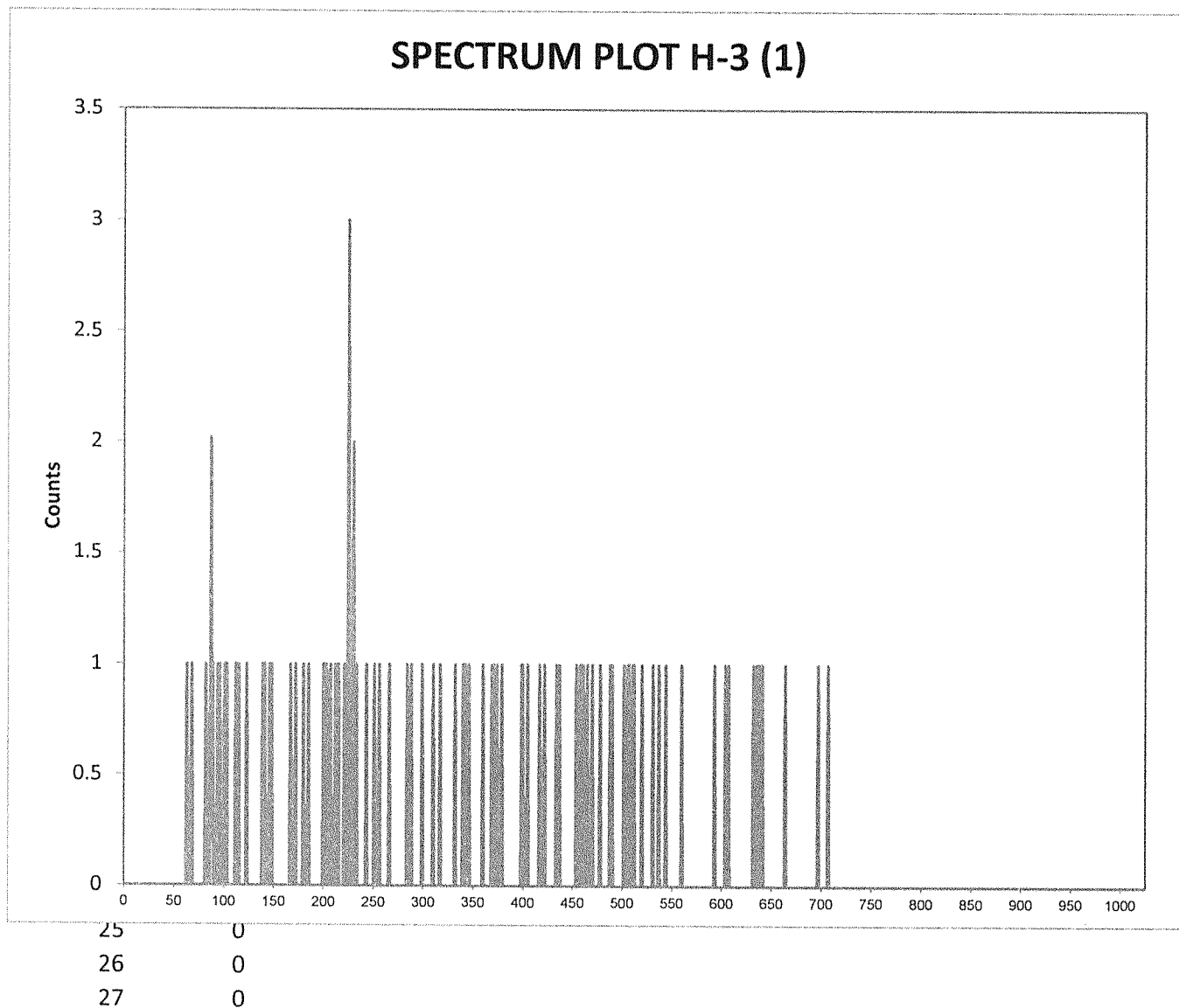
POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
Q010401N.001	29 DEC 2016	7:38				
4	BKG	15:01.780	653.89	1.49	3.20	6.46
Q020501N.001	29 DEC 2016	7:55				
5	1203693750	15:01.774	656.03	10.01	12.05	16.20
Q030601N.001	29 DEC 2016	8:13				
6	1203693751	15:01.780	650.13	10.55	12.25	16.20
~~Q040701N.001~~	~~29 DEC 2016~~	~~8:30~~				
~~7~~	~~1203693752~~	~~15:01.773~~	~~656.01~~	~~10.62~~	~~11.84~~	~~15.05~~

JP 12/30/16

Instrument Type: Quantulus
Data Capture Date: THU 29 DEC 2016 7:20
FileName: M:\LSC\FILES\orange\625595A1\SQ010401N.001.xls
File Info: M:\LSC\FILES\orange\625595A1\U625595A1.xls

ID: H-3 (1)
Comments: ORANGE

Sample, Rack-Pos, Time: 1, BKG, 15.02967:
Quench: 653.89
Start, End, X-Axis 50-175



Instrument Type:

Data Capture Date:

FileName:

File Info:

Quantulus

THU 29 DEC 2016 7:20

M:\LSC\FILES\orange\625595A1\SQ020501N.001.xls

M:\LSC\FILES\orange\625595A1\U625595A1.xls

ID:

Comments:

H-3 (1)

ORANGE

Sample, Rack-Pos, Time:

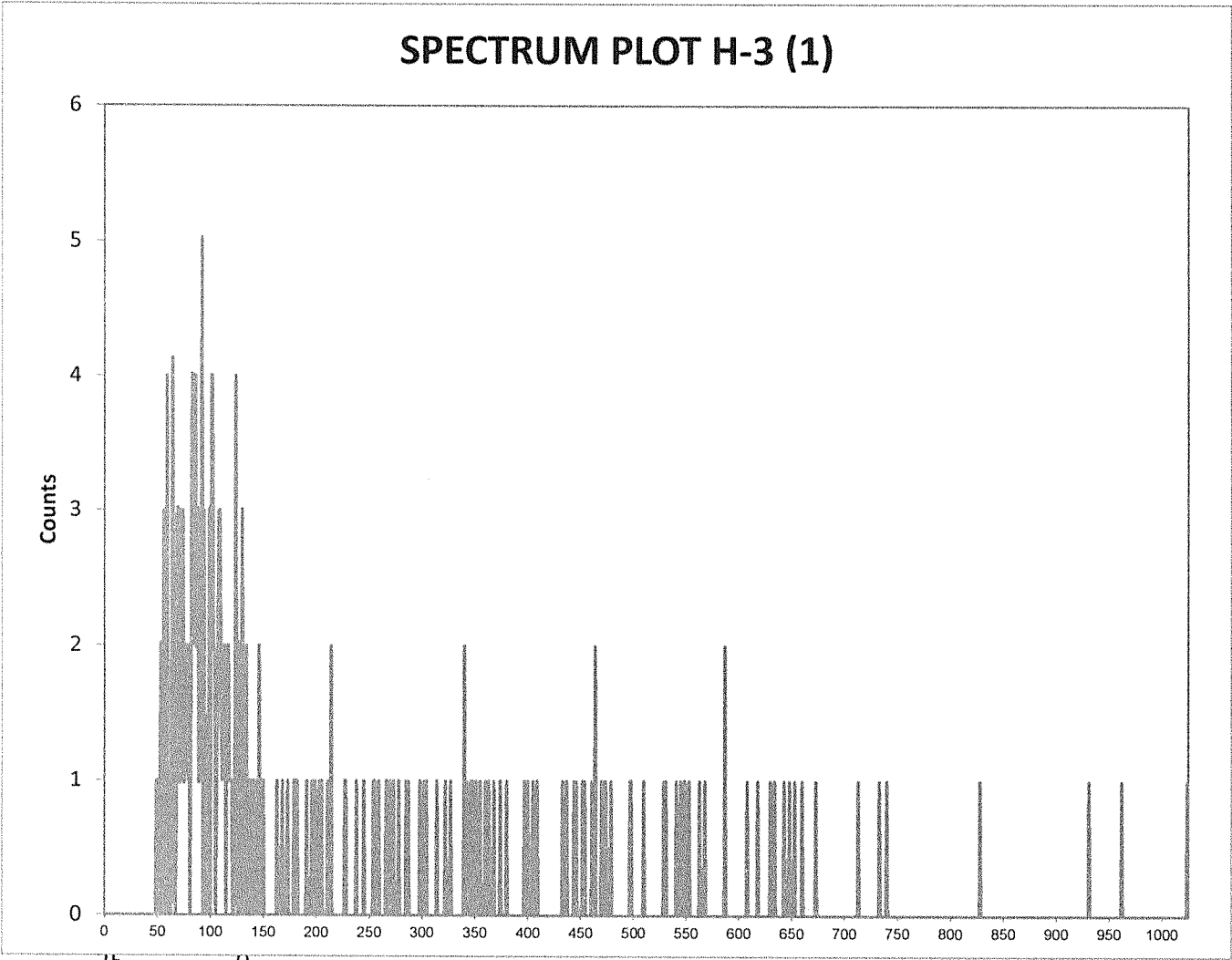
Quench:

Start, End, X-Axis

2, 1203693750, 15.02957:

656.03

50-175



250

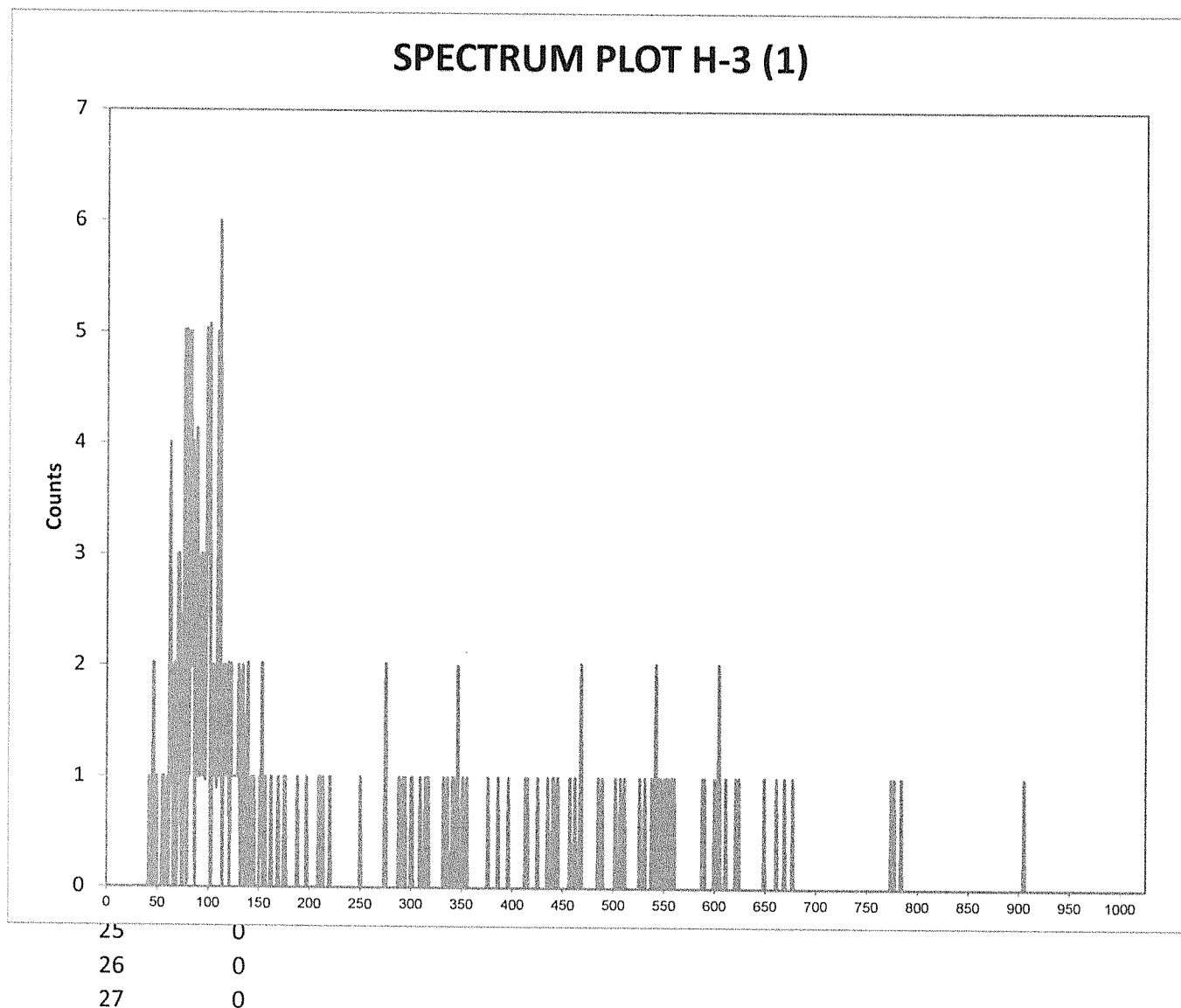
260

270

Instrument Type: Quantulus
Data Capture Date: THU 29 DEC 2016 7:20
FileName: M:\LSC\FILES\orange\625595A1\SQ030601N.001.xls
File Info: M:\LSC\FILES\orange\625595A1\U625595A1.xls

ID: H-3 (1)
Comments: ORANGE

Sample, Rack-Pos, Time: 3, 1203693751, 15.02967:
Quench: 650.13
Start, End, X-Axis 50-175



REGISTRY

THU 29 DEC 2016 11:09

*** DIRECTORY PATH :M:\LSC\O\DA\625595A2 ***

PARAMETER GROUP: 8
ID: H-3 (1)

00A PROGRAM MODE 6 ->

ORDER	POS	ID	CTIME	COUNTS	CUCNTS	MCW	REP	STD	STMS	STIME
1	4	BKG	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00
2	5	1203693752	15:00	1.0E04	NO LIM	1	1	Y	1/10	1:00

NUMBER OF CYCLES 1
COINCIDENCE BIAS (L/H) L

MCA INPUT	TRIGG.	INHIBIT	MEMORY SPLIT
1 LRSUM	DCOS	G	L*R
2 GSUM	G		L*R

WINDOW	CHANNELS	MCA	HALF
1	50- 175	1	2
2	5- 320	1	2
3	1- 1024	1	2
4	50- 320	1	1
5	50- 270	1	1
6	60- 220	1	1
7	1- 1024	2	1
8	1- 1024	2	2

SELECTED PRINTOUT FOR TERMINAL 1 (A)

SELECTED PRINTOUT FOR TERMINAL 2 (B)

1.	2.	3.	4.	5.	6.	7.
POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
SEND SPECTRA	12					
RESOLUTION OF SPECTRA	1024					
LISTING	Y					
INSTRUMENT NUMBER	1					

POS	ID	CTIME	SQP	CPM1	CPM2	CPM3
Q010401N.001	29 DEC 2016	11:27				
4	BKG	15:01.780	653.53	.95	2.38	5.65
Q020501N.001	29 DEC 2016	11:44				
5	1203693752	15:01.774	650.94	10.93	11.64	15.93

Instrument Type:Quantulus

Data Capture Date:THU 29 DEC 2016 11:09

FileName:M:\LSC\FILES\orange\625595A2\SQ010401N.001.xls

File Info:M:\LSC\FILES\orange\625595A2\U625595A2.xls

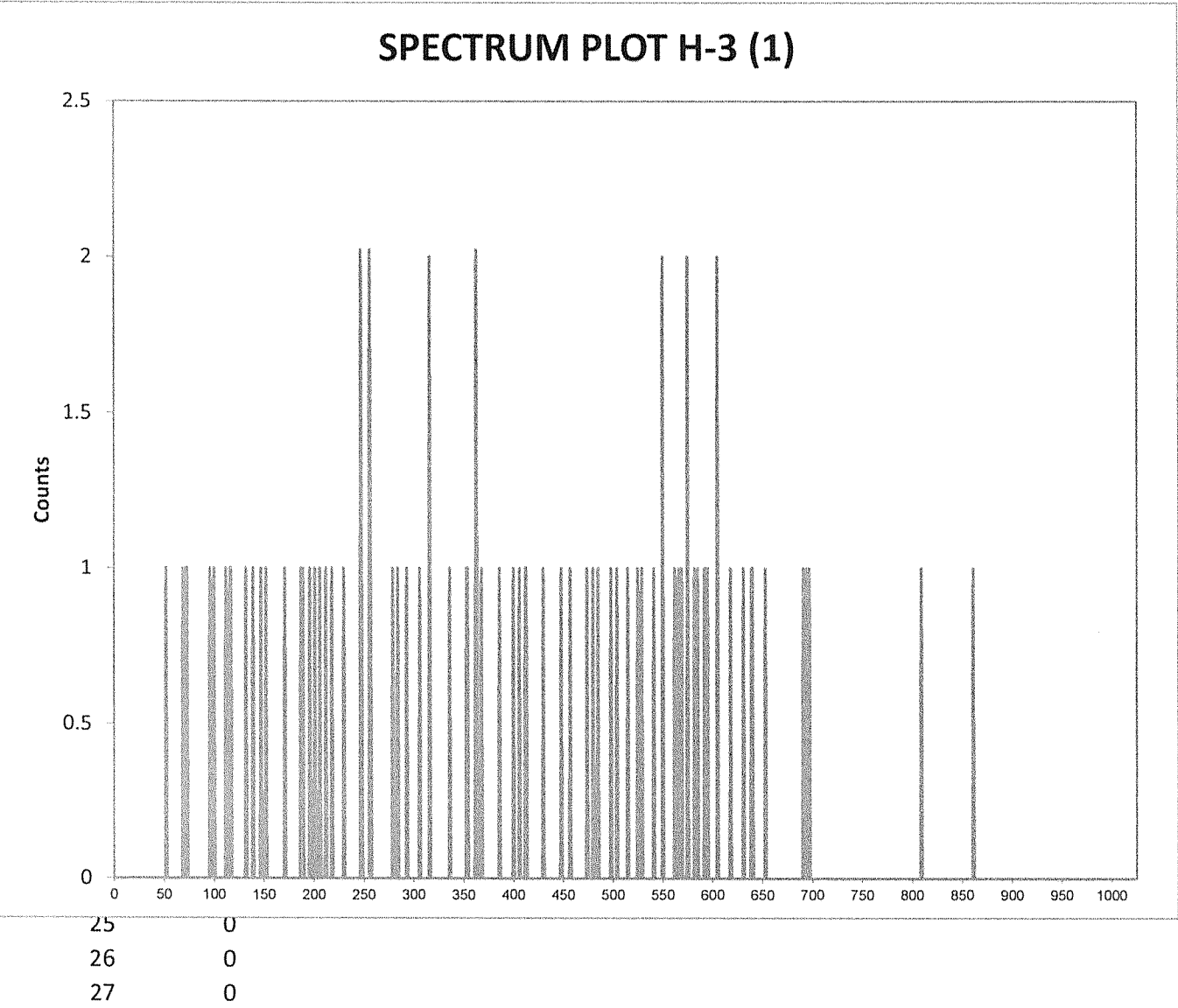
ID:H-3 (1)

Comments:ORANGE

Sample, Rack-Pos, Time:1, BKG, 15.02967:

Quench:653.53

Start, End, X-Axis50-175



Instrument Type:Quantulus

Data Capture Date:THU 29 DEC 2016 11:09

FileName:M:\LSC\FILES\orange\625595A2\SQ020501N.001.xls

File Info:M:\LSC\FILES\orange\625595A2\U625595A2.xls

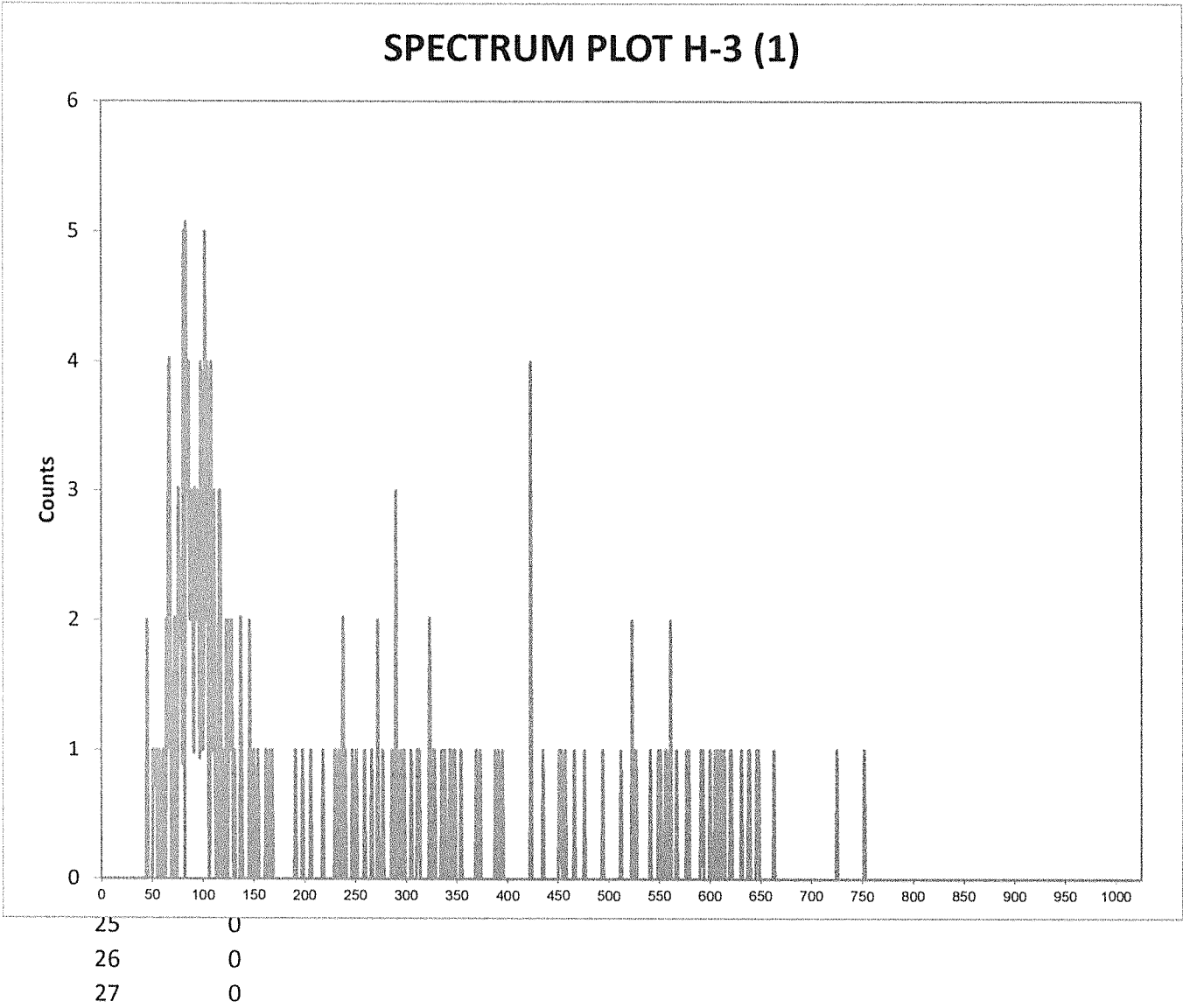
ID:H-3 (1)

Comments:ORANGE

Sample, Rack-Pos, Time:2, 1203693752, 15.02957:

Quench:650.94

Start, End, X-Axis50-175



05-Jan-2017

Batch# 1625629 Product: HB Date: 1/5/17 ca 1/5/17

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required). Blank correction reported Included (if required).			NA
If activity less than 10x MDA/ MDC, error is less than or equal to 150% of sample activity. If greater than 10* MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5* MDA/ MDC, then RPD is 100% or less, If greater 5* MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).			NA
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved If required.	✓		
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are Included and properly statused.	✓		
MS, LCS, and Duplicate RPD/RER values uploaded to LIMS and values verified	✓		
Hit notification complete (if necessary)	✓		NA
Batch entered into Case Narrative.			NA
Batch Data Exception Reports (DER) completed, if applicable.			NA
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.			NA
Aliquot Correction completed If required.			NA
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

Primary Review Performed By: [Signature]

HAAL

Secondary Review Performed By: [Signature]

1/10

Prep Logbook

The Determination of Tritium

Batch ID: 1625629

Analyst: Terry Phillips

Method: EPA 906.0 Modified

Lab SOP: GL-RAD-A-002 REV# 21

Instrument: No instrument-manual method

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203693866	Tritium SPIKE	1753-B	.1	mL
MS	1203693865	Tritium SPIKE	1753-B	.1	mL

Sample ID	Prep Date	Matrix	Initial Sample Aliquot (mL)	Final Volume (mL)	Aliquot in vial (mL)	Rig #
412372001	30-DEC-2016 13:03:33	Ground Water	50	50	10	51
412372002	30-DEC-2016 13:03:33	Ground Water	50	50	10	52
412372004	30-DEC-2016 13:03:33	Ground Water	50	50	10	56
412372005	30-DEC-2016 13:03:33	Ground Water	50	50	10	57
412372006	30-DEC-2016 13:03:33	Ground Water	50	50	10	59
412372007	30-DEC-2016 13:03:33	Ground Water	50	50	10	60
412372008	30-DEC-2016 13:03:33	Ground Water	50	50	10	62
412372009	30-DEC-2016 13:03:33	Ground Water	50	50	10	64
412372010	30-DEC-2016 13:03:33	Ground Water	50	50	10	65
412372011	30-DEC-2016 13:03:33	Ground Water	50	50	10	66
412372012	30-DEC-2016 13:03:33	Ground Water	50	50	10	67
412372013	30-DEC-2016 13:03:33	Ground Water	50	50	10	69
412372014	30-DEC-2016 13:03:33	Ground Water	50	50	10	70
1203693863 MB	30-DEC-2016 13:03:33	Ground Water	50	50	10	80
1203693864 DUP (412372002)	30-DEC-2016 13:03:33	Ground Water	50	50	10	82
1203693865 MS (412372002)	30-DEC-2016 13:03:33	Ground Water	50	50	10	84
1203693866 LCS	30-DEC-2016 13:03:33	Ground Water	50	50	10	90

Comments:

Spike Pipet ID: RAD-LSC-2970968

Vial Pipet ID: RAD-LSC-8036326

Bkg Prepared with dead water. Yes

Reagent/Solvent Lot ID	Description	Amount
2418926	Quenching Agent	20 uL
2474026	RL-Potassium Permanganate	2 mL
2481145.8	Ecosent Ultra Scintillation Solution	13 mL
2486094	Sodium Hydroxide Pellets 98.5%	1 g

Tritium Liquid

Filename : H3DST.XLS
File type : Excel
Version # : 1.2.13

Batch : 1625629
Analyst : TXP3
Prep Date : 12/30/2016
Method Uncertainty : 0.0983

Procedure Code : LSCDSH3L
Paramname : Tritium
Required MDA : 700 pCi/L
H-3 Abundance : 1.00
Half-life of Tritium : 12.32 years

Geometry: 10mL DW/13mL Ecoscint Ultra

Pos.	Sample ID	Total Sample Volume (L)	Sample Aliquot L	Sample Aliquot SDev. L	Distilled Sample Counted L	Sample Counted SDev. L	Rig number	Sample Date/Time
1	412372001.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	51	12/6/2016 16:21
2	412372002.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	52	12/6/2016 16:46
3	412372004.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	56	12/7/2016 15:17
4	412372005.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	57	12/7/2016 10:01
5	412372006.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	59	12/7/2016 10:00
6	412372007.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	60	12/7/2016 11:33
7	412372008.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	62	12/7/2016 11:30
8	412372009.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	64	12/7/2016 11:30
9	412372010.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	65	12/8/2016 8:16
10	412372011.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	66	12/8/2016 8:09
11	412372012.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	67	12/8/2016 10:16
12	412372013.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	69	12/8/2016 10:11
13	412372014.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	70	12/7/2016 15:09
14	1203693863.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	80	12/30/2016 0:00
15	1203693864.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	82	12/6/2016 16:46
16	1203693865.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	84	12/6/2016 16:46
17	1203693866.1	0.0500	0.0500	7.8337E-06	0.0100	1.0000E-05	90	12/30/2016 0:00

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1.0 ml Stdev : +/- 0.002000 ml
 Pipet, 5.0 ml Stdev : +/- 0.010000 ml

Analytical SOP: GL-RAD-A-002
 Instrument SOP: GL-RAD-I-004

Count raw Data				Bkg				Calibration Data				Background					
Pos.	Rack Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Quench#	Corrected Bkg cpm	Count Start Date/Time	Sample Decay	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Background Rack Position #	Background Count Start Date/Time
1	23-2	15	154.9	3.33	5.07	15	159.8	5.0319	1/2/2017 13:17	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2096	0.00792	23-1	1/2/2017 13:01
2	23-3	15	154.4	3.53	5.07	15	159.8	5.0276	1/2/2017 13:33	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2106	0.00792	23-1	1/2/2017 13:01
3	23-4	15	160	3.07	5.07	15	159.8	5.0714	1/2/2017 13:50	0.996	LSCSILVER	7/1/2016	6/30/2017	0.1998	0.00792	23-1	1/2/2017 13:01
4	23-5	15	158.6	3.73	5.07	15	159.8	5.0614	1/2/2017 14:06	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2025	0.00792	23-1	1/2/2017 13:01
5	23-6	15	159.9	3.73	5.07	15	159.8	5.0707	1/2/2017 14:22	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2000	0.00792	23-1	1/2/2017 13:01
6	23-7	15	160	4.2	5.07	15	159.8	5.0714	1/2/2017 14:39	0.996	LSCSILVER	7/1/2016	6/30/2017	0.1998	0.00792	23-1	1/2/2017 13:01
7	23-8	15	160.1	4.27	5.07	15	159.8	5.0721	1/2/2017 14:55	0.996	LSCSILVER	7/1/2016	6/30/2017	0.1996	0.00792	23-1	1/2/2017 13:01
8	23-9	15	150.9	4.07	5.07	15	159.8	4.9951	1/2/2017 15:11	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2175	0.00792	23-1	1/2/2017 13:01
9	23-10	15	160.1	3	5.07	15	159.8	5.0721	1/2/2017 15:28	0.996	LSCSILVER	7/1/2016	6/30/2017	0.1996	0.00792	23-1	1/2/2017 13:01
10	23-11	15	160.1	4.6	5.07	15	159.8	5.0721	1/2/2017 16:00	0.996	LSCSILVER	7/1/2016	6/30/2017	0.1996	0.00792	23-1	1/2/2017 13:01
11	23-12	15	159.4	3.4	5.07	15	159.8	5.0672	1/2/2017 16:00	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2009	0.00792	23-1	1/2/2017 13:01
12	6-1	15	146.2	4.33	5.07	15	159.8	4.9450	1/2/2017 16:17	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2270	0.00792	23-1	1/2/2017 13:01
13	6-2	15	157.9	4.13	5.07	15	159.8	5.0561	1/2/2017 16:33	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2038	0.00792	23-1	1/2/2017 13:01
14	6-3	15	156.4	3.4	5.07	15	159.8	5.0444	1/2/2017 16:49	0.999	LSCSILVER	7/1/2016	6/30/2017	0.2067	0.00792	23-1	1/2/2017 13:01
15	**4	15	155.7	3.47	4.20	15	157.5	4.1856	1/3/2017 14:30	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2081	0.00792	**3	1/3/2017 14:13
16	2-1	15	153.1	14.67	3.80	15	155.5	3.7790	1/4/2017 7:08	0.996	LSCSILVER	7/1/2016	6/30/2017	0.2132	0.00792	2-2	1/4/2017 7:25
17	**1	15	151.4	12.73	4.20	15	157.5	4.1469	1/3/2017 13:40	0.999	LSCSILVER	7/1/2016	6/30/2017	0.2165	0.00792	**3	1/3/2017 14:13

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1753-B
 Spike Exp Date : 11/1/2017
 Spike Activity (dpm/ml): 2510.67
 Spike Volume Added: 0.10

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1753-B
 LCS Exp Date : 11/1/2017
 LCS Activity (dpm/ml): 2510.67
 LCS Volume Added: 0.10

Results																		
Pos.	Decision		Critical Level	Required MDA	MDA	Sample Act. Conc.	Sample Act. Error	Net Count		Net Count Rate Error	2 SIGMA		Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
	pCi/L	%						Rate CPM	Counting Uncertainty pCi/L		Total Prop. Uncertainty pCi/L							
1	411.8172	290.7465	700	624.6491	-367.2421	43.88%	-1.7019	0.7486	315.7735	315.7858	SAMPLE							
2	409.7294	289.2725	700	621.5007	-321.6547	50.44%	-1.4976	0.7553	317.9638	317.9759	SAMPLE							
3	433.7031	306.1981	700	657.6688	-453.0398	36.82%	-2.0014	0.7367	326.8612	326.8742	SAMPLE							
4	427.5721	301.8695	700	648.4157	-297.4054	57.51%	-1.3314	0.7656	335.1882	335.2005	SAMPLE							
5	433.2771	305.8974	700	857.0258	-303.2061	57.14%	-1.3407	0.7660	339.5280	339.5405	SAMPLE							
6	433.7157	306.2070	700	657.6878	-197.2565	90.23%	-0.8714	0.7882	348.8182	348.8304	SAMPLE							
7	434.1593	306.5202	700	658.3573	-181.7409	98.39%	-0.8021	0.7892	350.4797	350.4919	SAMPLE							
8	395.3781	279.1404	700	599.8665	-192.3590	84.04%	-0.9251	0.7774	316.8193	318.8306	SAMPLE							
9	434.1030	306.4804	700	658.2719	-469.4424	35.41%	-2.0721	0.7336	325.7448	325.7579	SAMPLE							
10	434.1041	306.4812	700	858.2735	-106.9543	170.10%	-0.4721	0.8030	356.5708	356.5827	SAMPLE							
11	431.0109	304.2974	700	653.6048	-375.1981	45.07%	-1.6672	0.7513	331.4055	331.4182	SAMPLE							
12	376.9091	266.1011	700	572.0457	-122.5184	127.86%	-0.6150	0.7863	307.0405	307.0512	SAMPLE							
13	424.5288	299.7196	700	643.8205	-205.5147	84.50%	-0.9261	0.7826	340.3670	340.3790	SAMPLE							
14	416.6571	294.1635	700	631.9364	-358.5526	45.64%	-1.6444	0.7503	320.6593	320.6718	MB							
15	378.4660	267.2003	700	577.8889	-155.5925	99.84%	-0.7156	0.7144	304.4549	304.4678	412372002.1	DUP	0.0%	0.7393	2270.0000	101.8%		
16	351.0649	247.8548	700	538.1620	2311.7432	10.21%	10.8910	1.1090	461.3916	642.3330	412372002.1	MS			2261.8870	79.0%		
17	360.7045	254.6605	700	550.9592	1786.9167	12.38%	8.5831	1.0607	432.8322	553.7760		LCS						

1625628

PAGE: 1

ID: TRITIUM

2 JAN 2017 13:49

USER: 4

COMMENT: SILVER

PRESET TIME : 15.00

DATA CALC : CPM H# : YES SAMPLE REPEATS: 1 PRINTER : STD

COUNT BLANK : NO IC# : NO REPLICATES : 1 RS232 : EDIT

TWO PHASE : NO AOC : NO CYCLE REPEATS : 1 DISK : OFF

SCINTILLATOR: LIQUID LUMEX: YES LOW SAMPLE REJ: 0

LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

CHAN: 50.0 - 255.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

CHAN: 0.0 - 1000.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		
1	23-1	15.00	159.8	5.07	23.98	41.47	8.06	1.39	15.82
2	23-2	15.00	154.9	3.33	28.84	39.07	8.28	0.46	32.11
3	23-3	15.00	154.4	3.53	27.47	40.60	8.10	0.36	48.41
4	23-4	15.00	160.0	3.07	31.35	39.47	8.26	1.25	64.73
5	23-5	15.00	158.6	3.73	28.35	41.87	8.03	1.28	81.05
6	23-6	15.00	159.9	3.73	28.35	40.00	8.21	1.34	97.39
7	23-7	15.00	160.0	4.20	26.56	41.07	8.10	1.37	113.72
8	23-8	15.00	160.1	4.27	26.33	40.20	8.19	1.38	130.04
9	23-9	15.00	150.9	4.07	26.02	42.13	7.97	0.63	146.35
10	23-10	15.00	160.1	3.00	32.05	40.33	8.18	1.29	162.67
11	23-11	15.00	160.1	4.60	24.93	40.47	8.16	1.33	179.01
12	23-12	15.00	159.4	3.40	29.61	37.40	8.49	1.25	195.32
13	6-1	15.00	146.2	4.33	25.19	42.07	7.97	0.45	211.73
14	6-2	15.00	157.9	4.13	26.80	42.00	8.01	1.41	228.06
15	6-3	15.00	156.4	3.40	30.12	44.67	7.77	1.36	244.39
16	6-4	15.00	155.9	2.40	36.43	39.20	8.30	1.44	260.72
17	6-5	15.00	157.9	33.93	8.95	74.00	6.03	1.06	277.05
18	6-6	15.00	155.8	10.40	16.37	46.20	7.64	1.32	293.40

QFQP

Sample Count Start Time:

2 Jan 2017 13:01:10

Data Capture Date

02 Jan 2017 13:16:35

User Filename

S04010223-1A.XLS

U04010223-1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

123-115.00

H#, Total Counts:

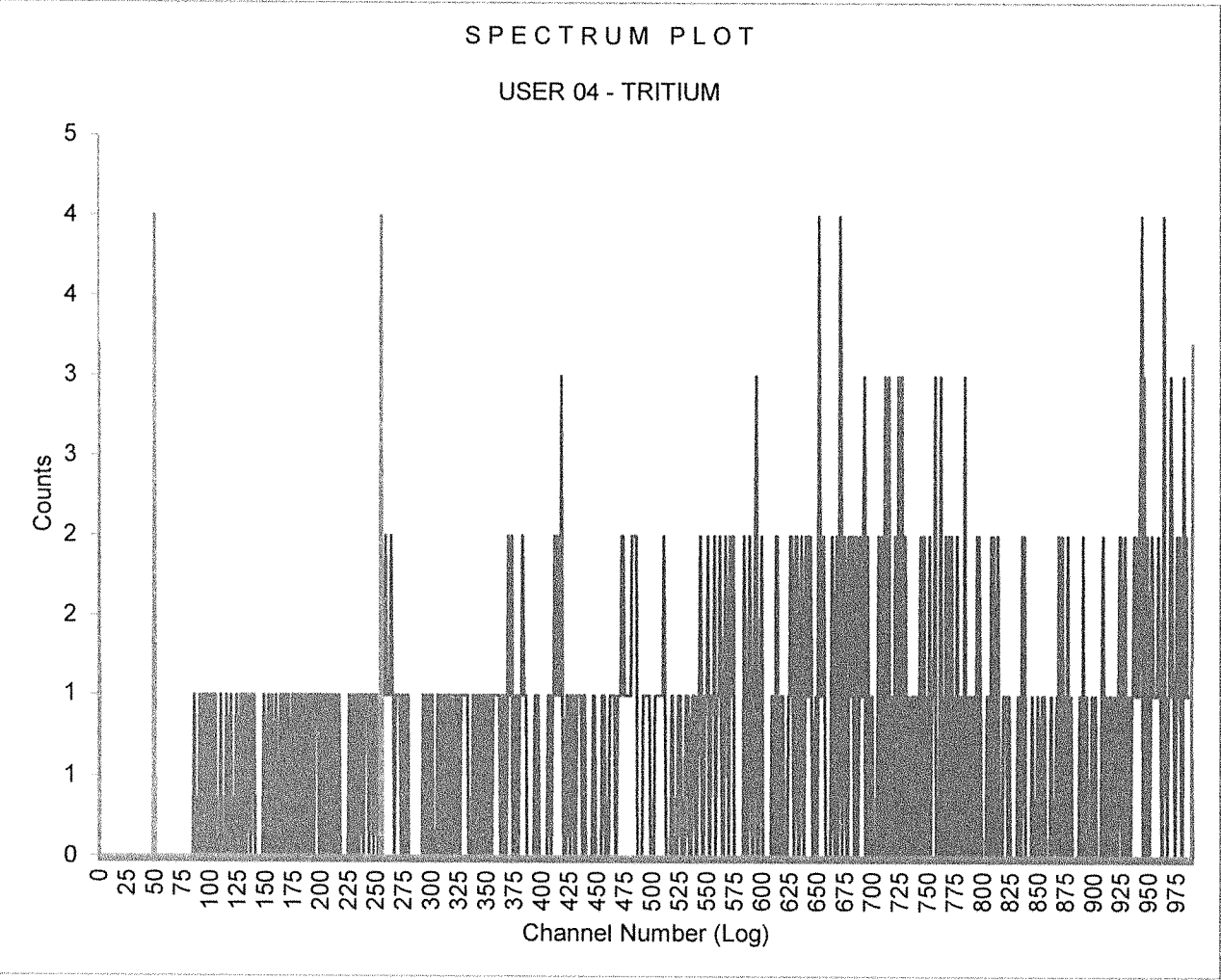
159.8622

Win1: Tritium - Start, End:

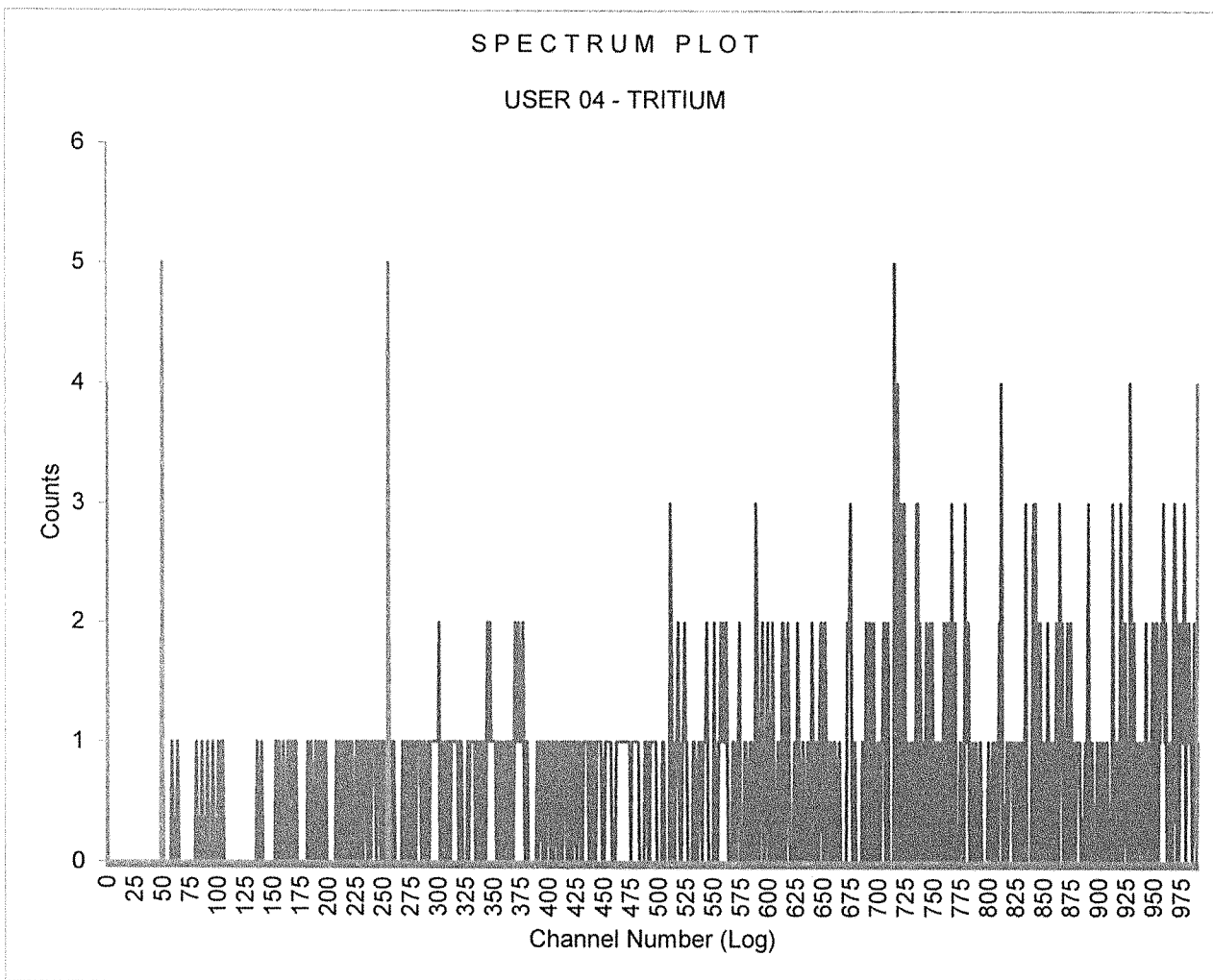
50255

Win2: - Start, End:

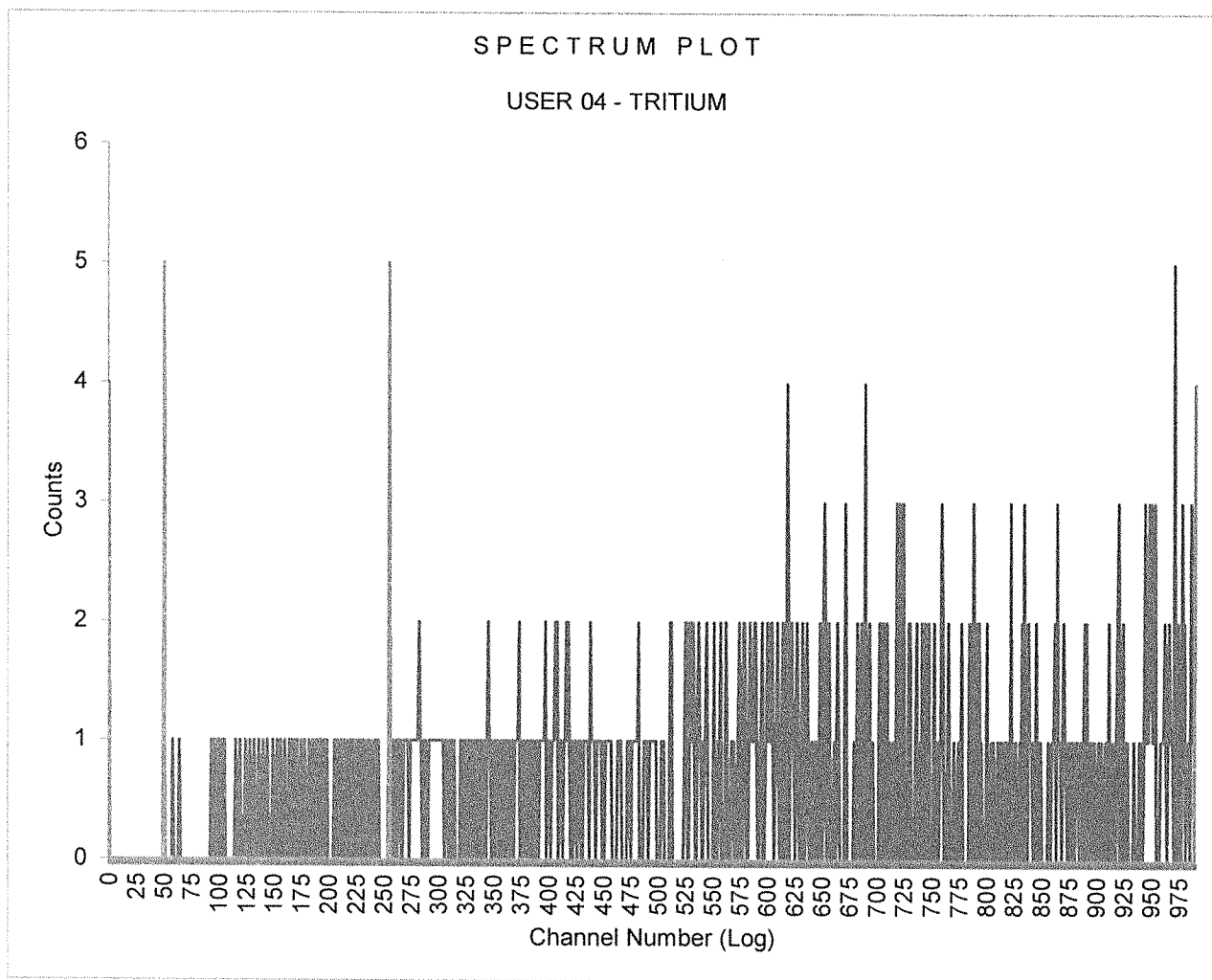
0990



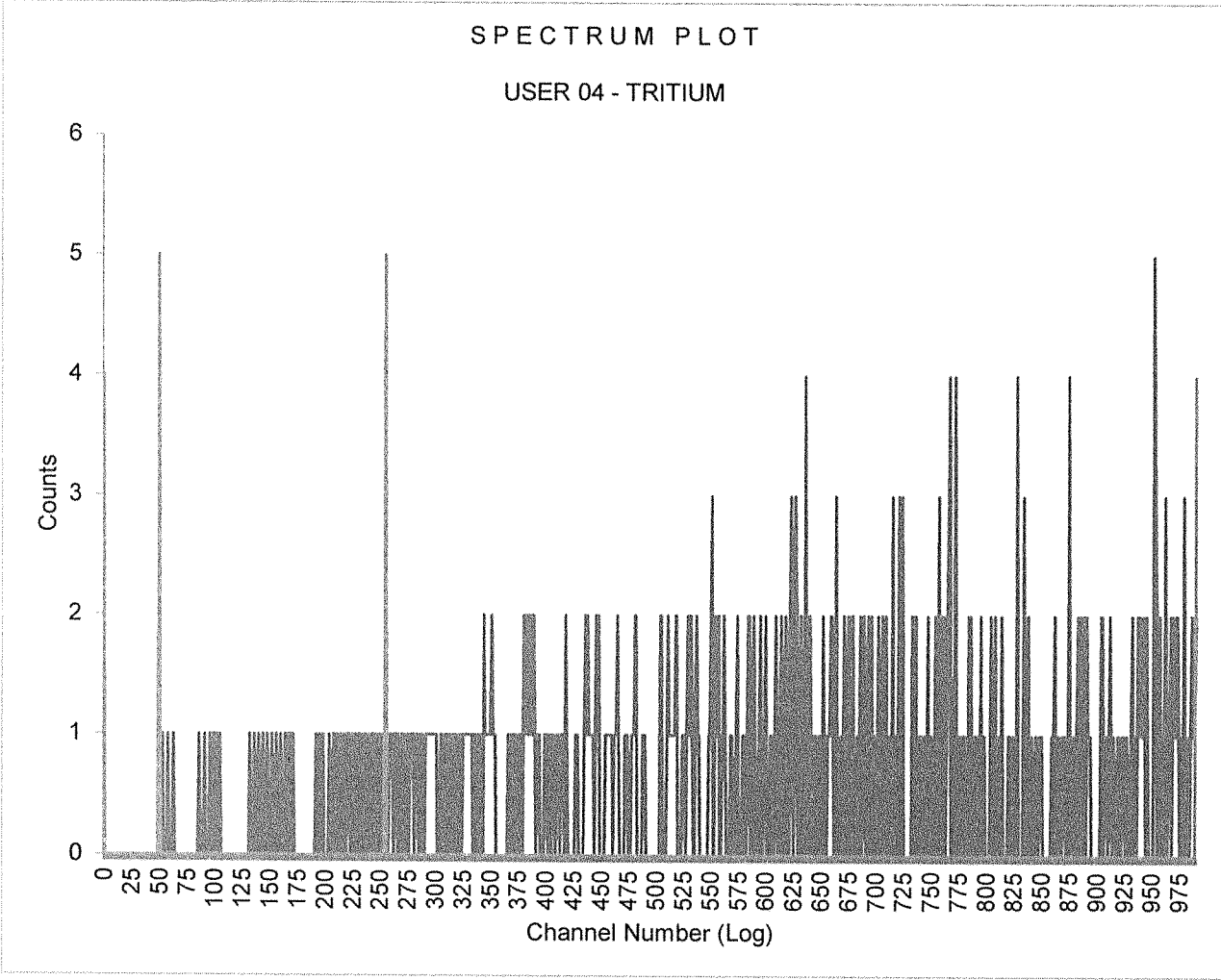
Sample Count Start Time:	2 Jan 2017 13:17:28		
Data Capture Date	02 Jan 2017 13:32:53		
User Filename	S04010223-2A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	2	23-2	15.00
H#, Total Counts:	154.9	586	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



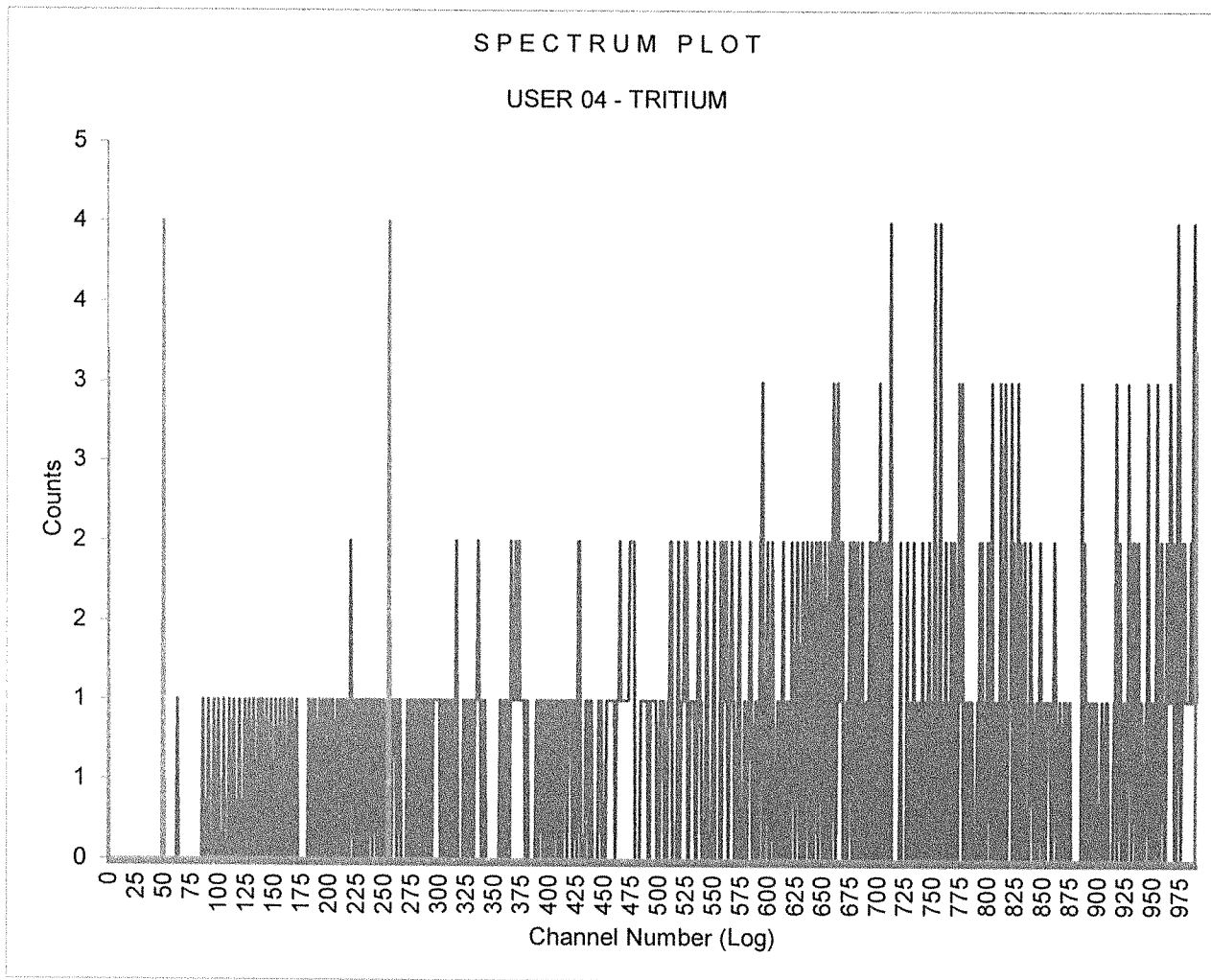
Sample Count Start Time:	2 Jan 2017 13:33:46		
Data Capture Date	02 Jan 2017 13:49:11		
User Filename	S04010223-3A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	3	23-3	15.00
H#, Total Counts:	154.4	609	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



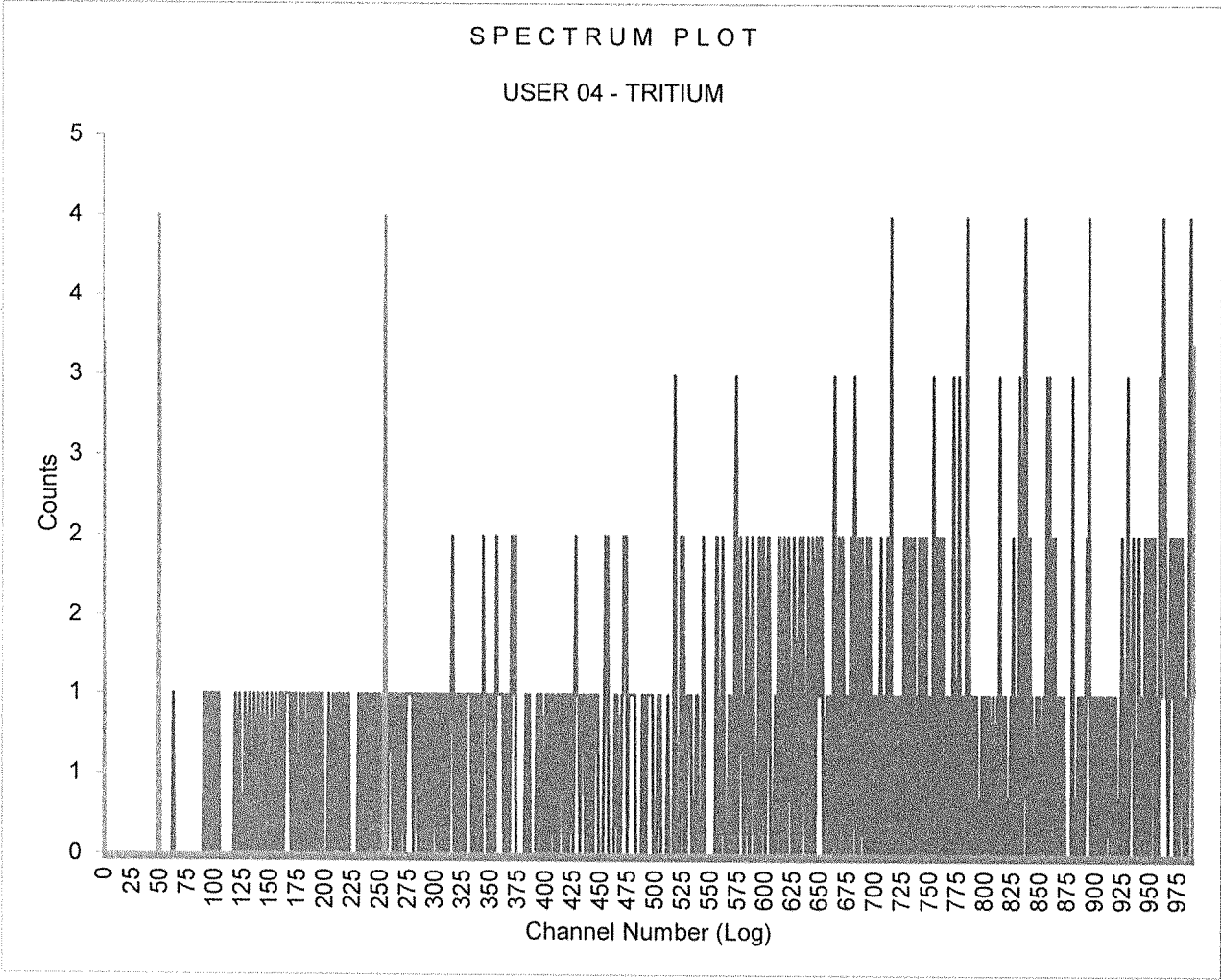
Sample Count Start Time:	2 Jan 2017 13:50:05		
Data Capture Date	02 Jan 2017 14:05:30		
User Filename	S04010223-4A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	4	23-4	15.00
H#, Total Counts:	160.0	592	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



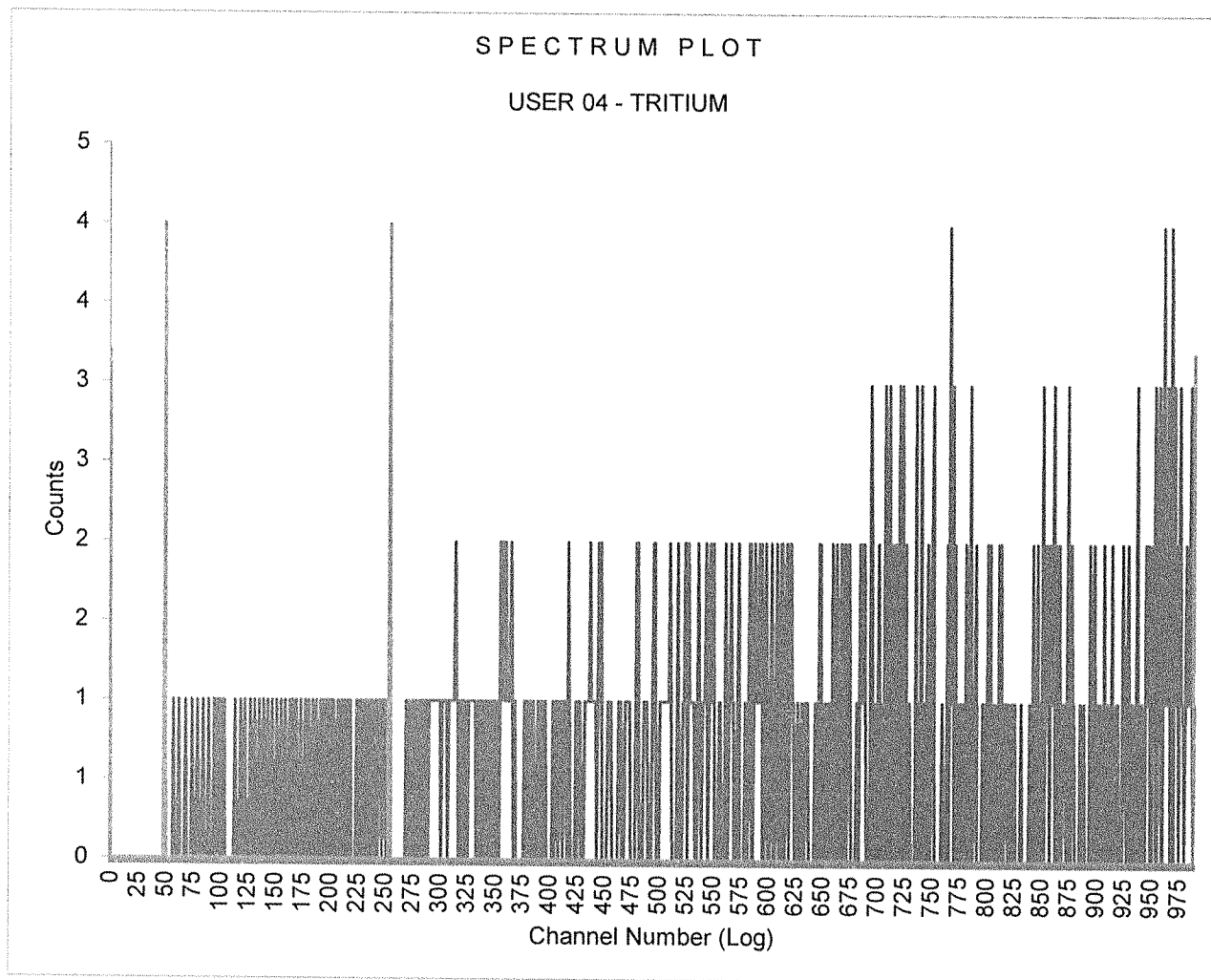
Sample Count Start Time:	2 Jan 2017 14:06:24		
Data Capture Date	02 Jan 2017 14:21:50		
User Filename	S04010223-5A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	5	23-5	15.00
H#, Total Counts:	158.6	628	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	2 Jan 2017 14:22:44		
Data Capture Date	02 Jan 2017 14:38:09		
User Filename	S04010223-6A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	6	23-6	15.00
H#, Total Counts:	159.9	600	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	2 Jan 2017 14:39:04		
Data Capture Date	02 Jan 2017 14:54:29		
User Filename	S04010223-7A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	7	23-7	15.00
H#, Total Counts:	160.0	616	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:

2 Jan 2017 14:55:23

Data Capture Date

02 Jan 2017 15:10:49

User Filename

S04010223-8A.XLS

U04010223-1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

8

23-8

15.00

H#, Total Counts:

160.1

603

Win1: Tritium - Start, End:

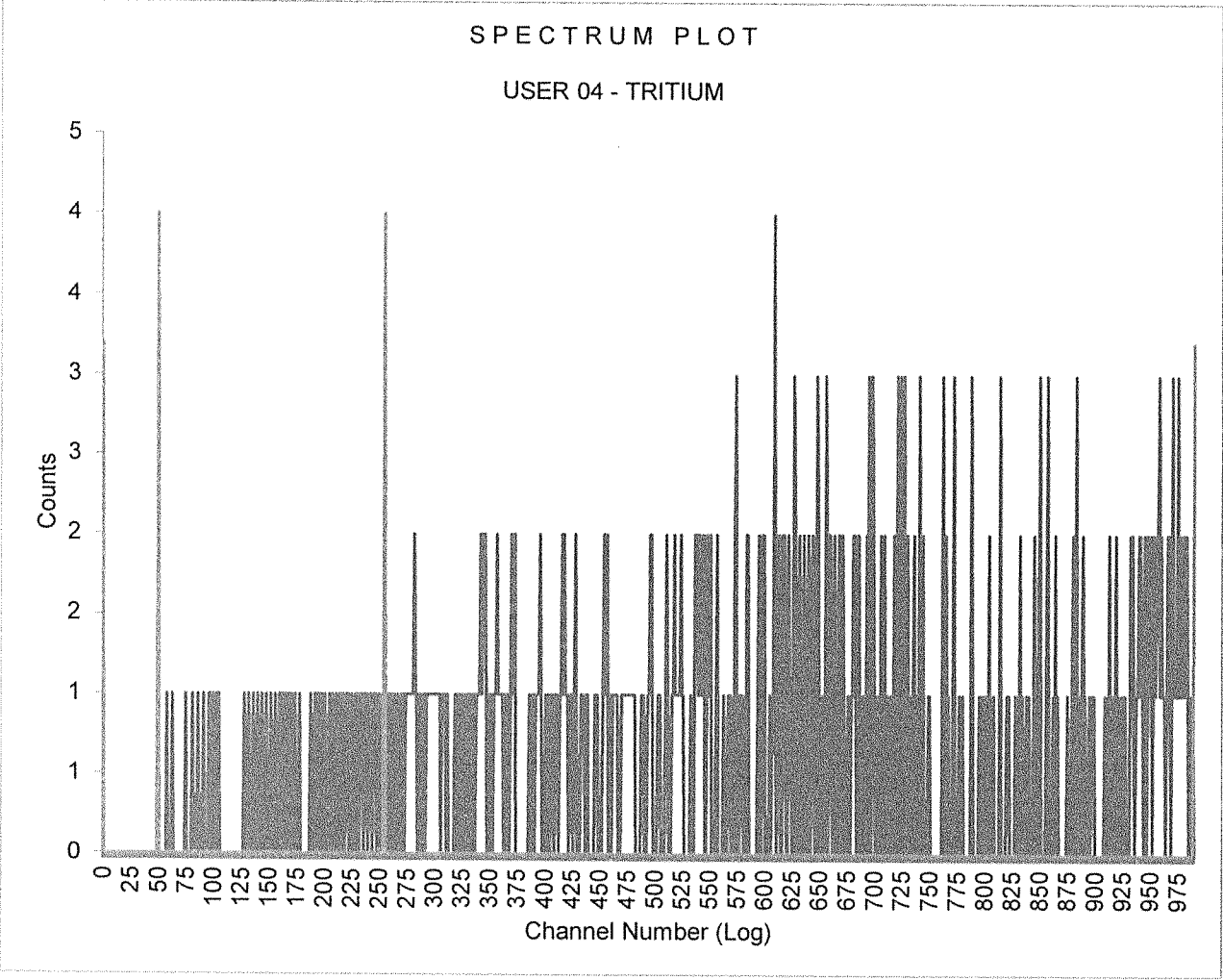
50

255

Win2: - Start, End:

0

990



Sample Count Start Time:

2 Jan 2017 15:11:42

Data Capture Date

02 Jan 2017 15:27:07

User Filename

S04010223-9A.XLS

U04010223-1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

923-915.00

H#, Total Counts:

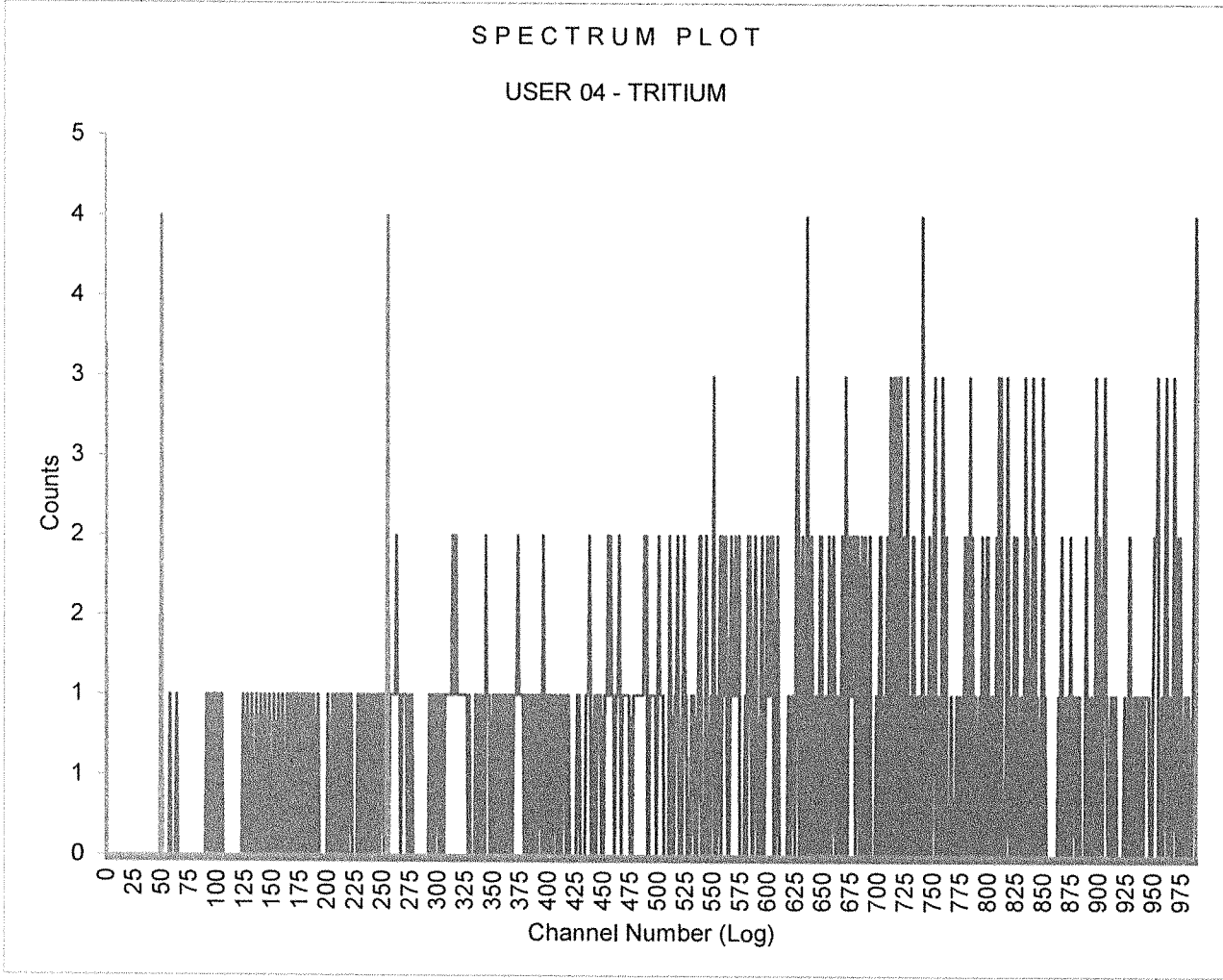
150.9632

Win1: Tritium - Start, End:

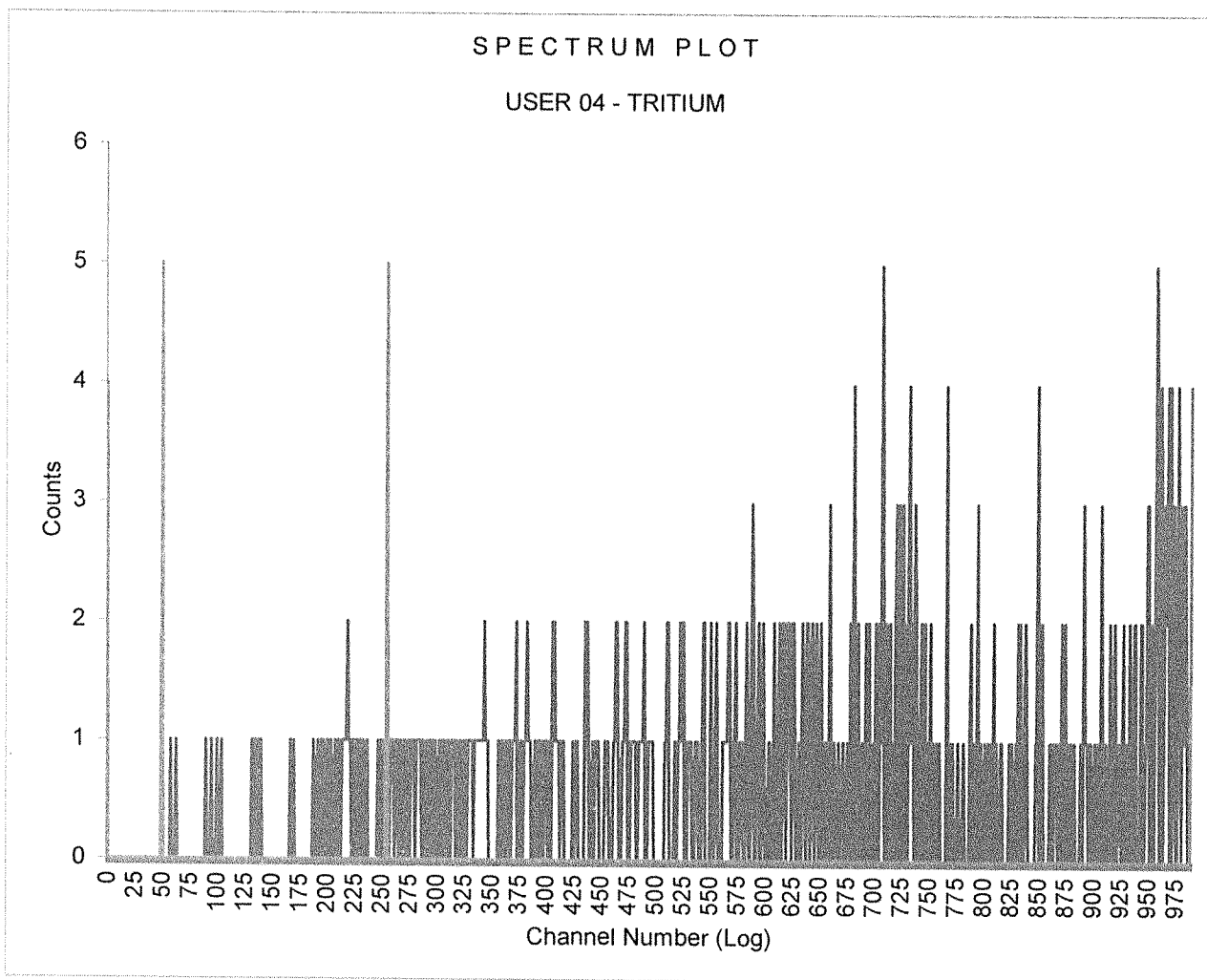
50255

Win2: - Start, End:

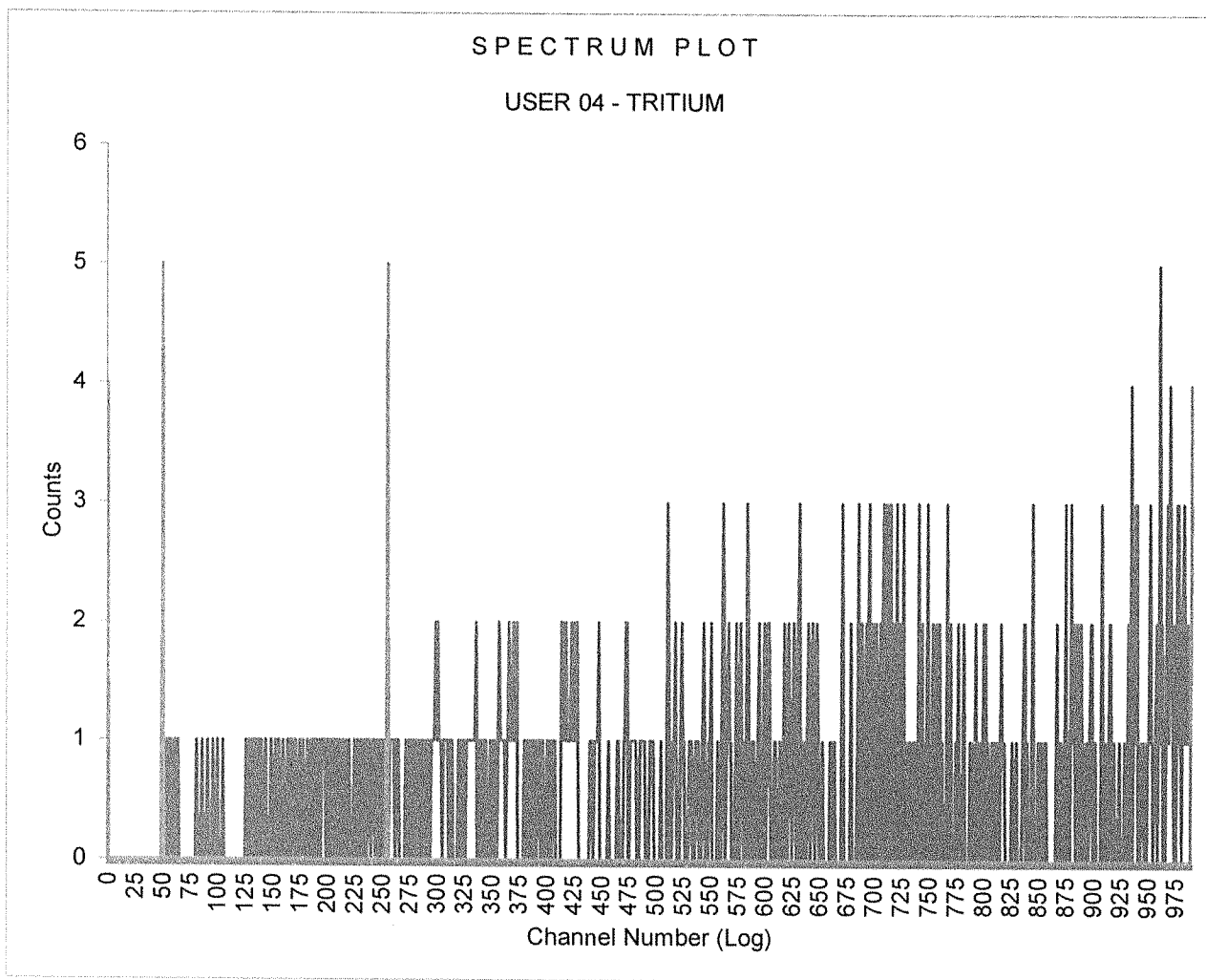
0990



Sample Count Start Time:	2 Jan 2017 15:28:01		
Data Capture Date	02 Jan 2017 15:43:27		
User Filename	S04010223-10A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	10	23-10	15.00
H#, Total Counts:	160.1	605	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	2 Jan 2017 15:44:22		
Data Capture Date	02 Jan 2017 15:59:46		
User Filename	S04010223-11A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	11	23-11	15.00
H#, Total Counts:	160.1	607	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:

2 Jan 2017 16:00:40

Data Capture Date

02 Jan 2017 16:16:06

User Filename

S04010223-12A.XLS

U04010223-1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

1223-1215.00

H#, Total Counts:

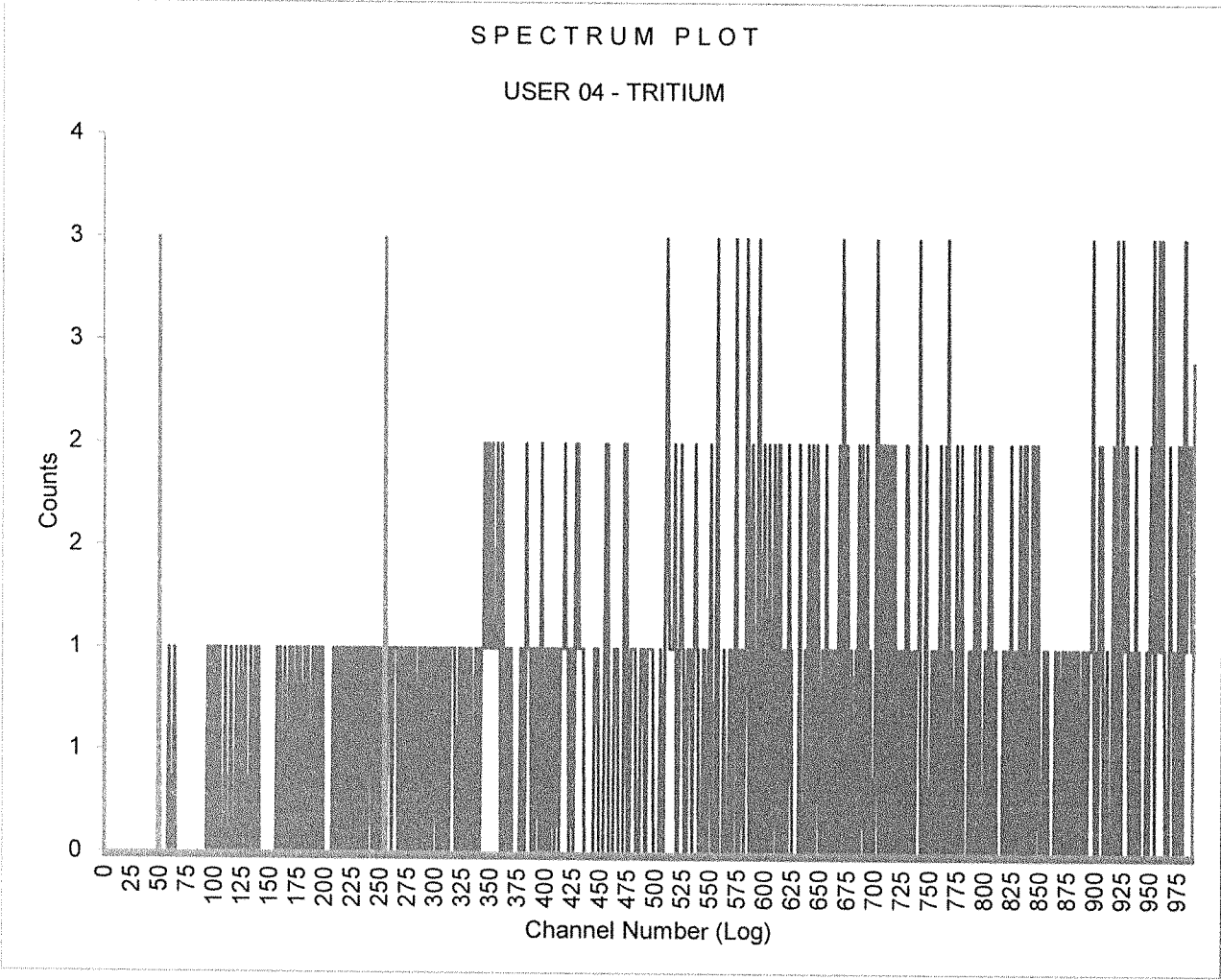
159.4561

Win1: Tritium - Start, End:

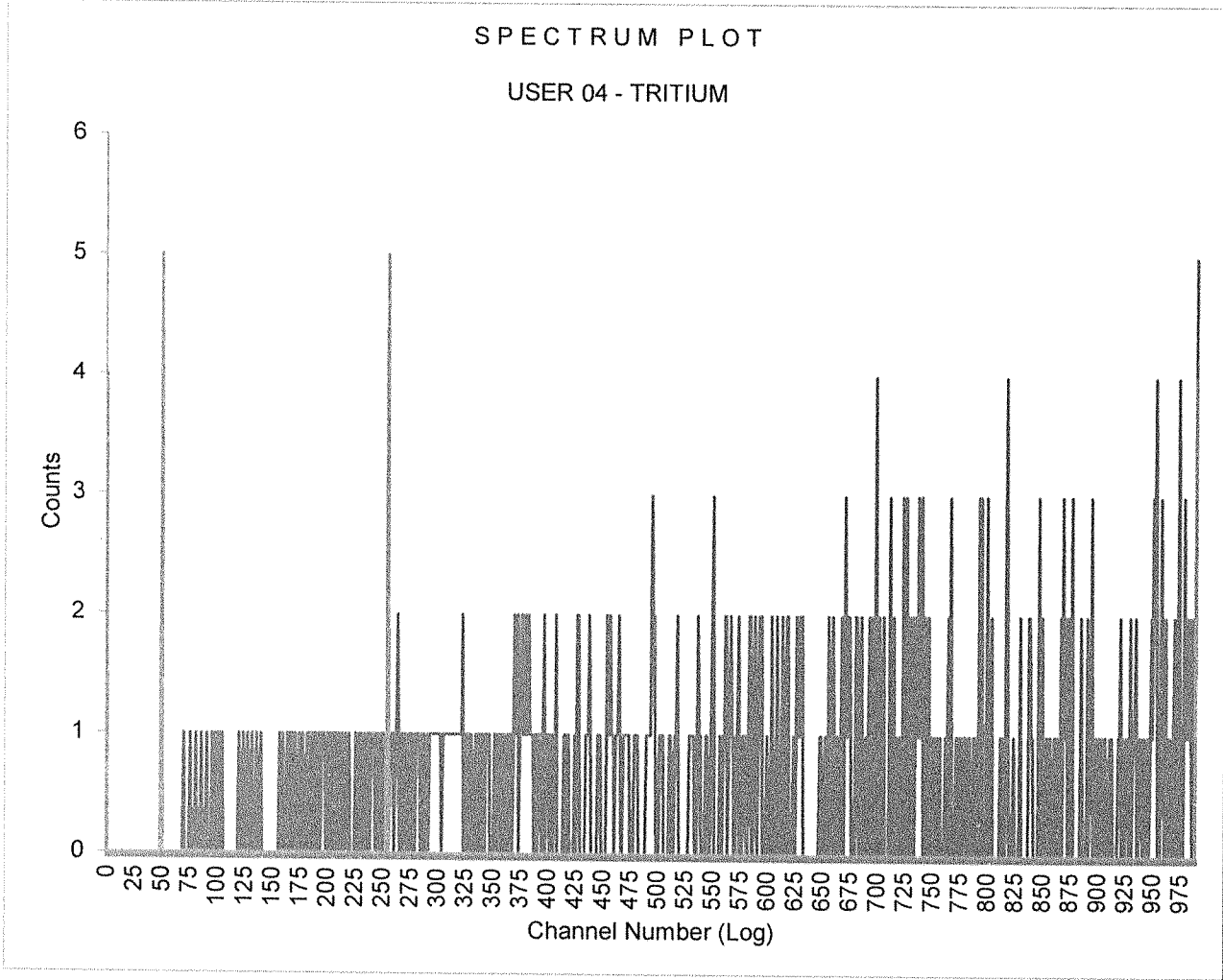
50255

Win2: - Start, End:

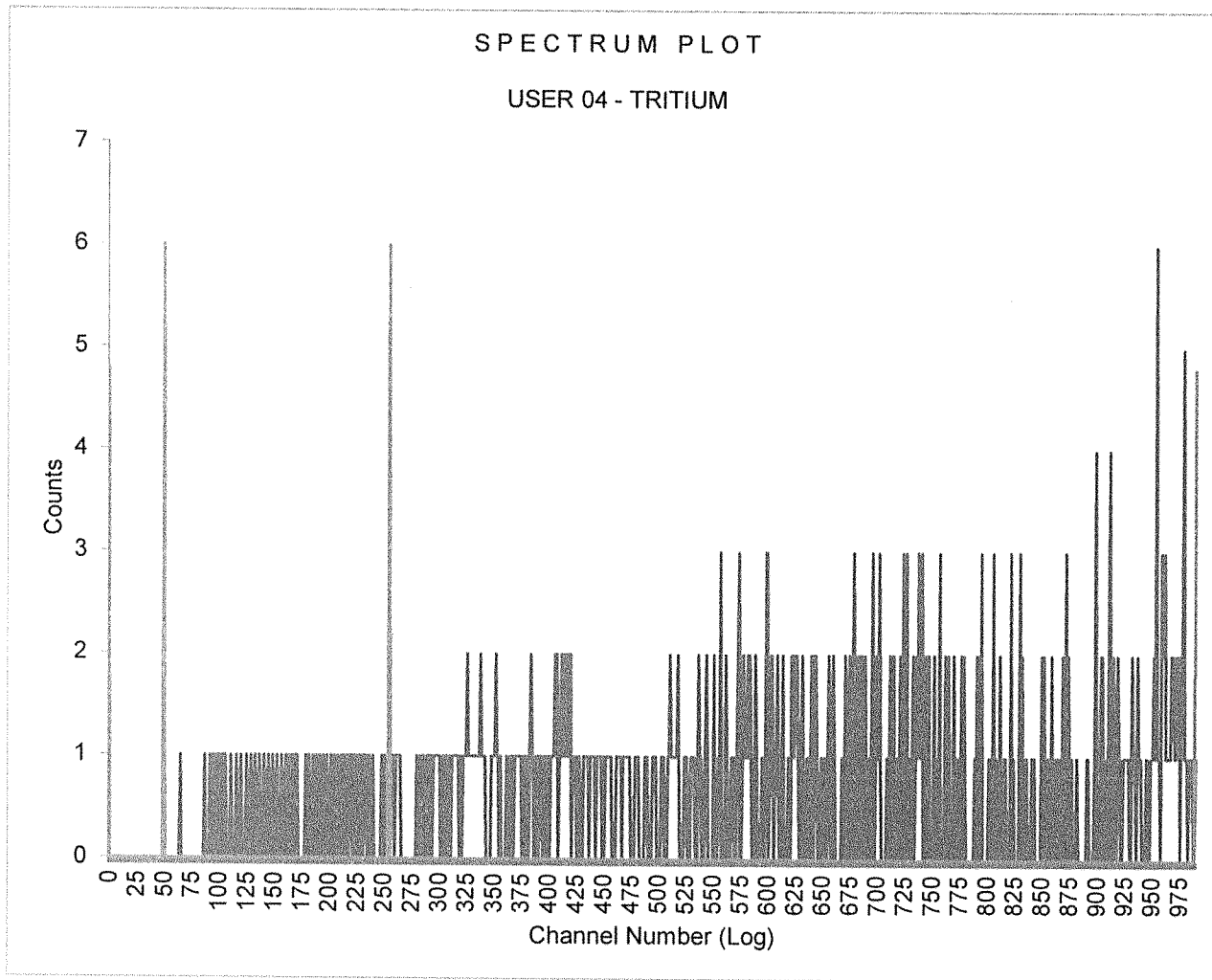
0990



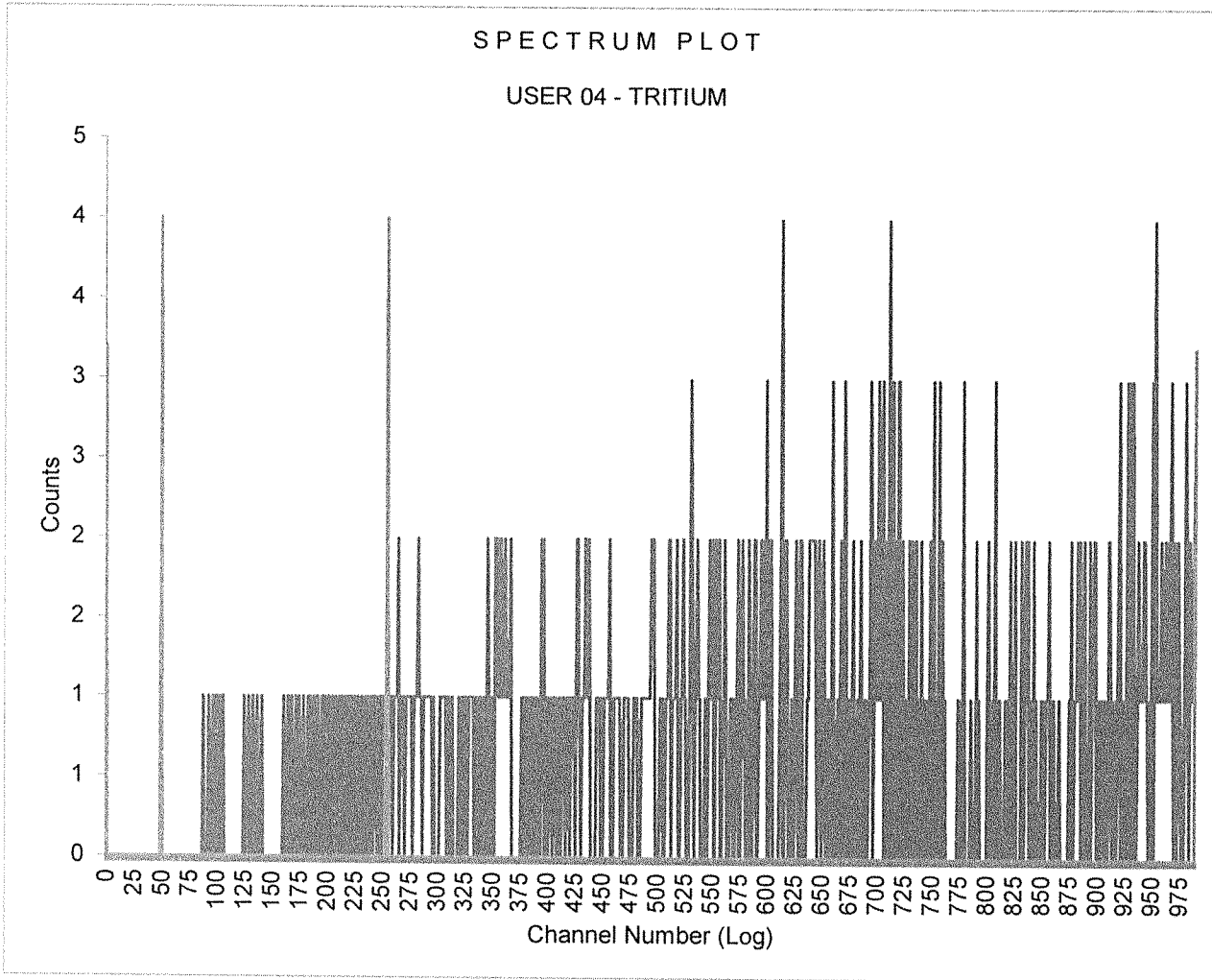
Sample Count Start Time:	2 Jan 2017 16:17:05		
Data Capture Date	02 Jan 2017 16:32:30		
User Filename	S04010206-1A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	13	6-1	15.00
H#, Total Counts:	146.2	631	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	2 Jan 2017 16:33:25		
Data Capture Date	02 Jan 2017 16:48:50		
User Filename	S04010206-2A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	14	6-2	15.00
H#, Total Counts:	157.9	630	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	2 Jan 2017 16:49:44		
Data Capture Date	02 Jan 2017 17:05:09		
User Filename	S04010206-3A.XLS		
	U04010223-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	15	6-3	15.00
H#, Total Counts:	156.4	670	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



1625628

PAGE: 1

ID: TRITIUM

3 JAN 2017 14:28

USER: 4

COMMENT: SILVER

PRESET TIME : 15.00

DATA CALC : CPM H# : YES SAMPLE REPEATS: 1 PRINTER : STD

COUNT BLANK : NO IC# : NO REPLICATES : 1 R5232 : EDIT

TWO PHASE : NO AQC : NO CYCLE REPEATS : 1 DISK : OFF

SCINTILLATOR: LIQUID LUMEX: YES LOW SAMPLE REJ: 0

LOW LEVEL : NO HALF LIFE CORRECTION DATE: none

CHAN: 50.0 - 255.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

CHAN: 0.0 - 1000.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		

17	1	** -1	15.00	151.4	12.73	14.96	50.07	7.36	2.05	15.85
16	2	** -2	15.00	154.0	11.53	15.72	50.60	7.32	1.86	32.20
BK	3	** -3	15.00	157.5	4.20	27.68	43.87	7.87	2.28	48.57
15	4	** -4	15.00	155.7	3.47	30.77	40.13	8.23	2.23	64.93

SK 1/5/17

QPOP

Sample Count Start Time:

3 Jan 2017 13:40:56

Data Capture Date

03 Jan 2017 13:56:20

User Filename

S040103---1A.XLS

U040103---1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

1**-115.00

H#, Total Counts:

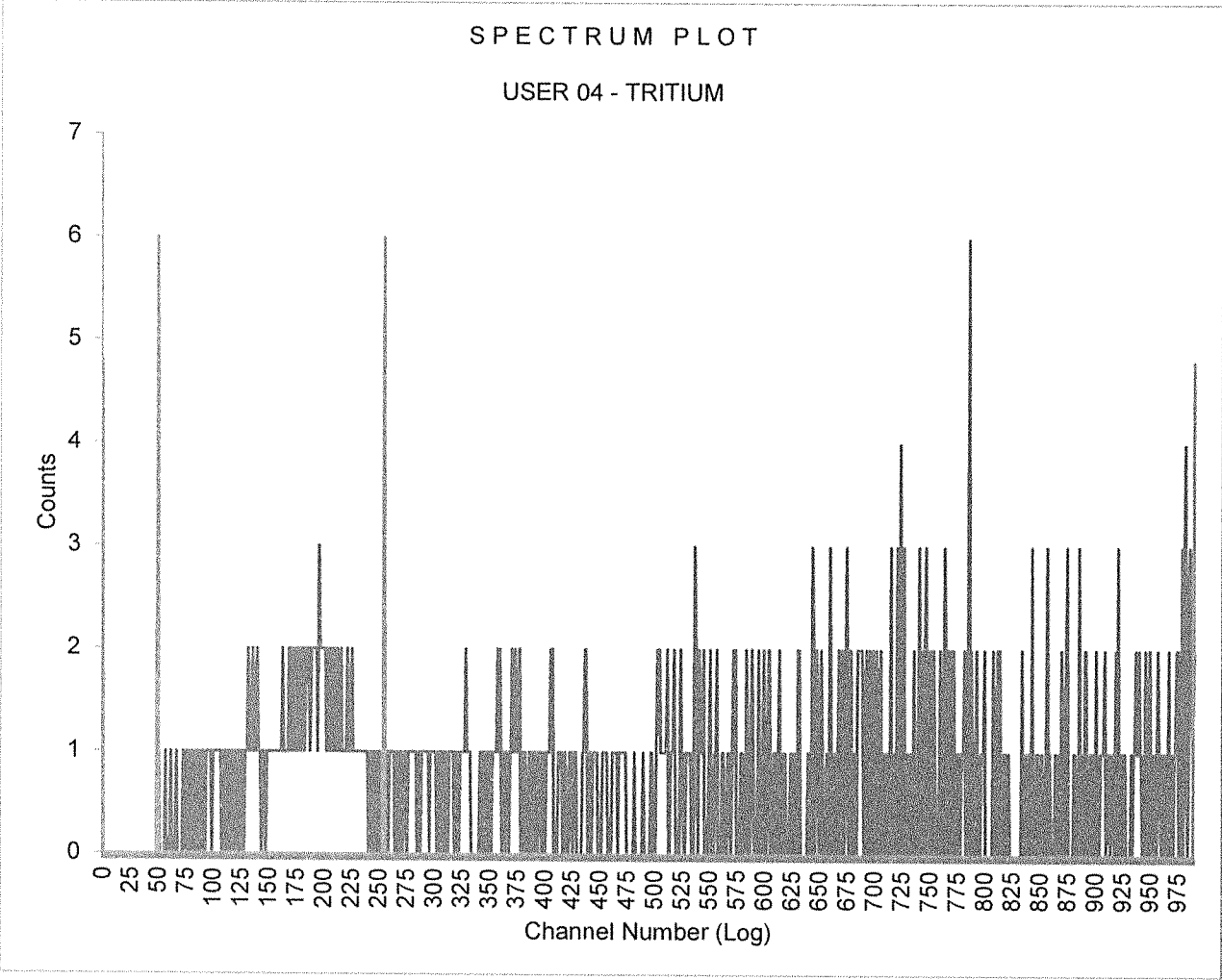
151.4751

Win1: Tritium - Start, End:

50255

Win2: - Start, End:

0990



Sample Count Start Time:

3 Jan 2017 14:13:39

Data Capture Date

03 Jan 2017 14:29:03

User Filename

S040103---3A.XLS

U040103---1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

3

** -3

15.00

H#, Total Counts:

157.5

658

Win1: Tritium - Start, End:

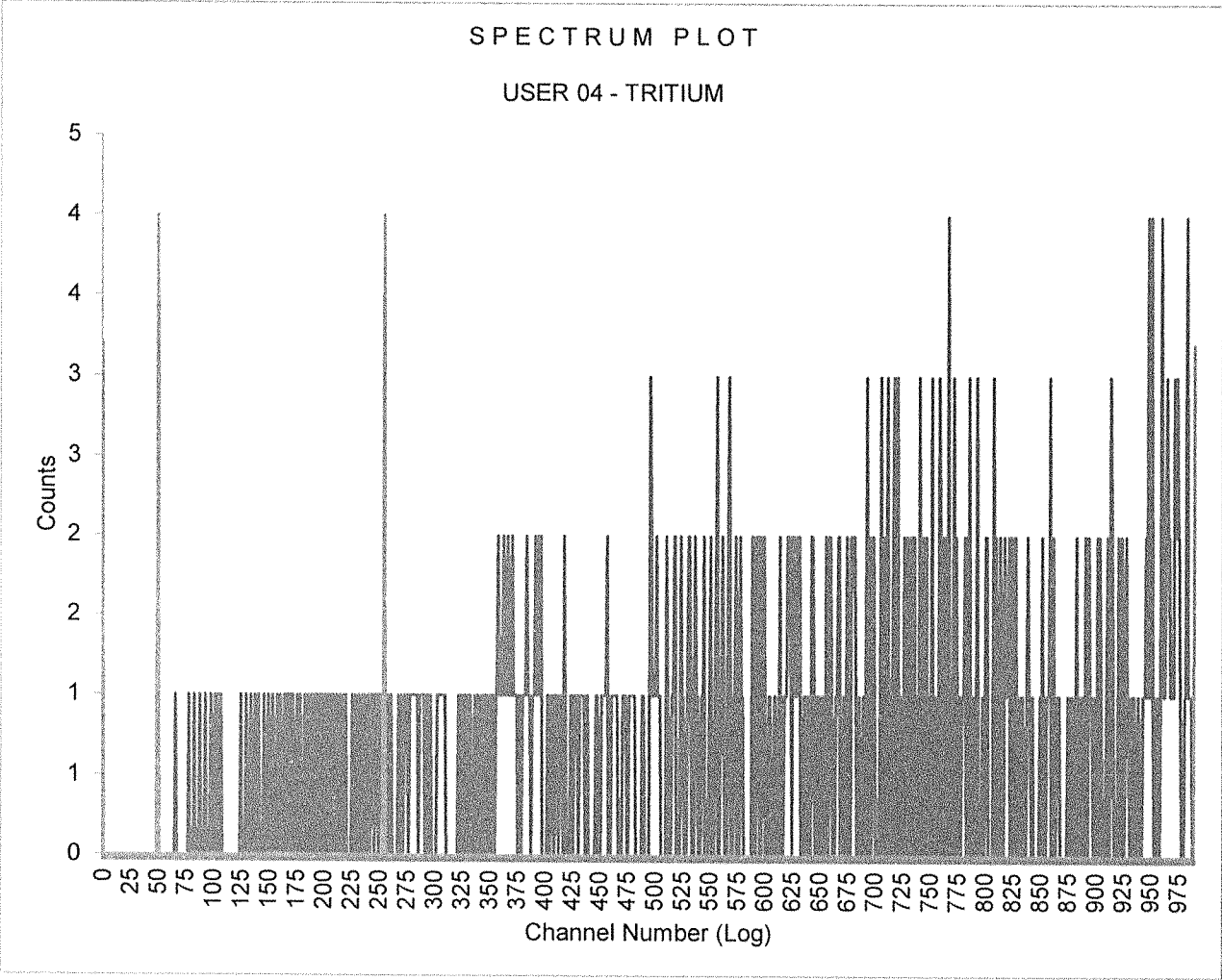
50

255

Win2: - Start, End:

0

990



Sample Count Start Time:

3 Jan 2017 14:30:01

Data Capture Date

03 Jan 2017 14:45:24

User Filename

S040103---4A.XLS

U040103---1A.XLS

Spectrum Type

Log Counts

User Number

04

User Id

TRITIUM

User Comment

SILVER

Scintillator

LIQUID

Sample, Rack-Pos, Time:

4

** -4

15.00

H#, Total Counts:

155.7

602

Win1: Tritium - Start, End:

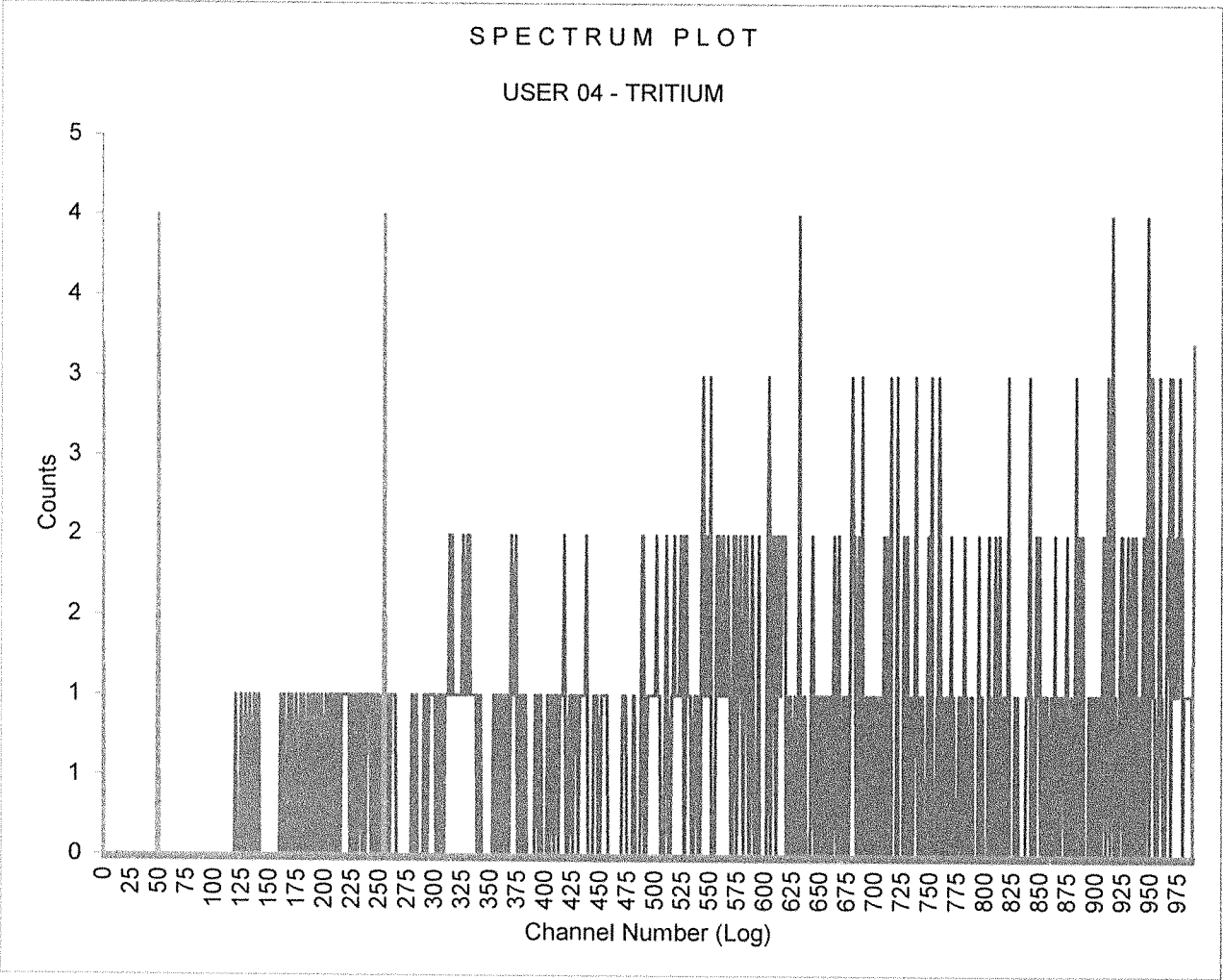
50

255

Win2: - Start, End:

0

990



1625629

Filename: 4:10 AMab

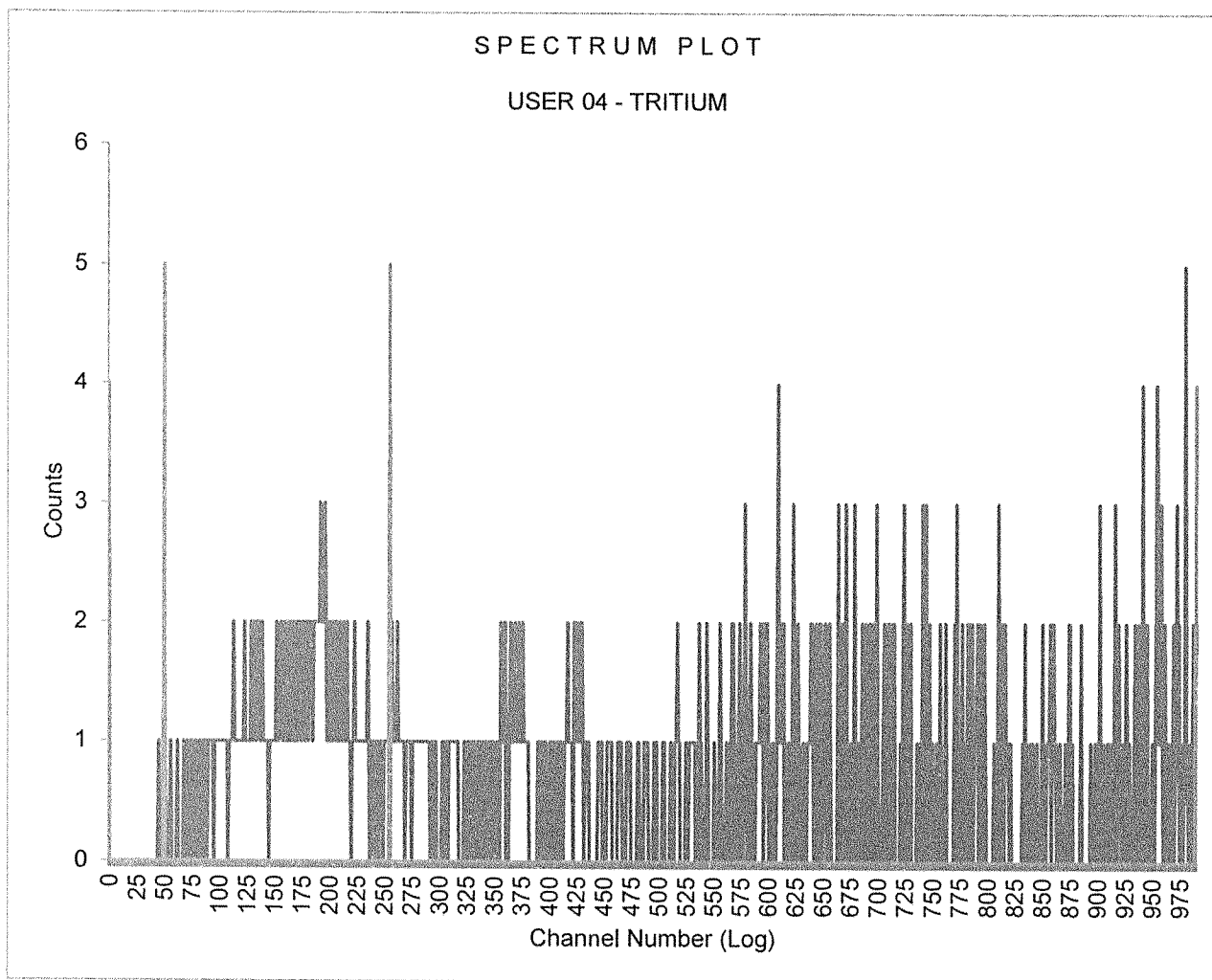
Instrument Type LS 6000
Data Capture Date 04 Jan 2017 07:07:56
User Filename C:\LSCCAPTURE\SILVER\USER04\UN010401.BSF

User Number 4
User Id TRITIUM
User Comments SILVER

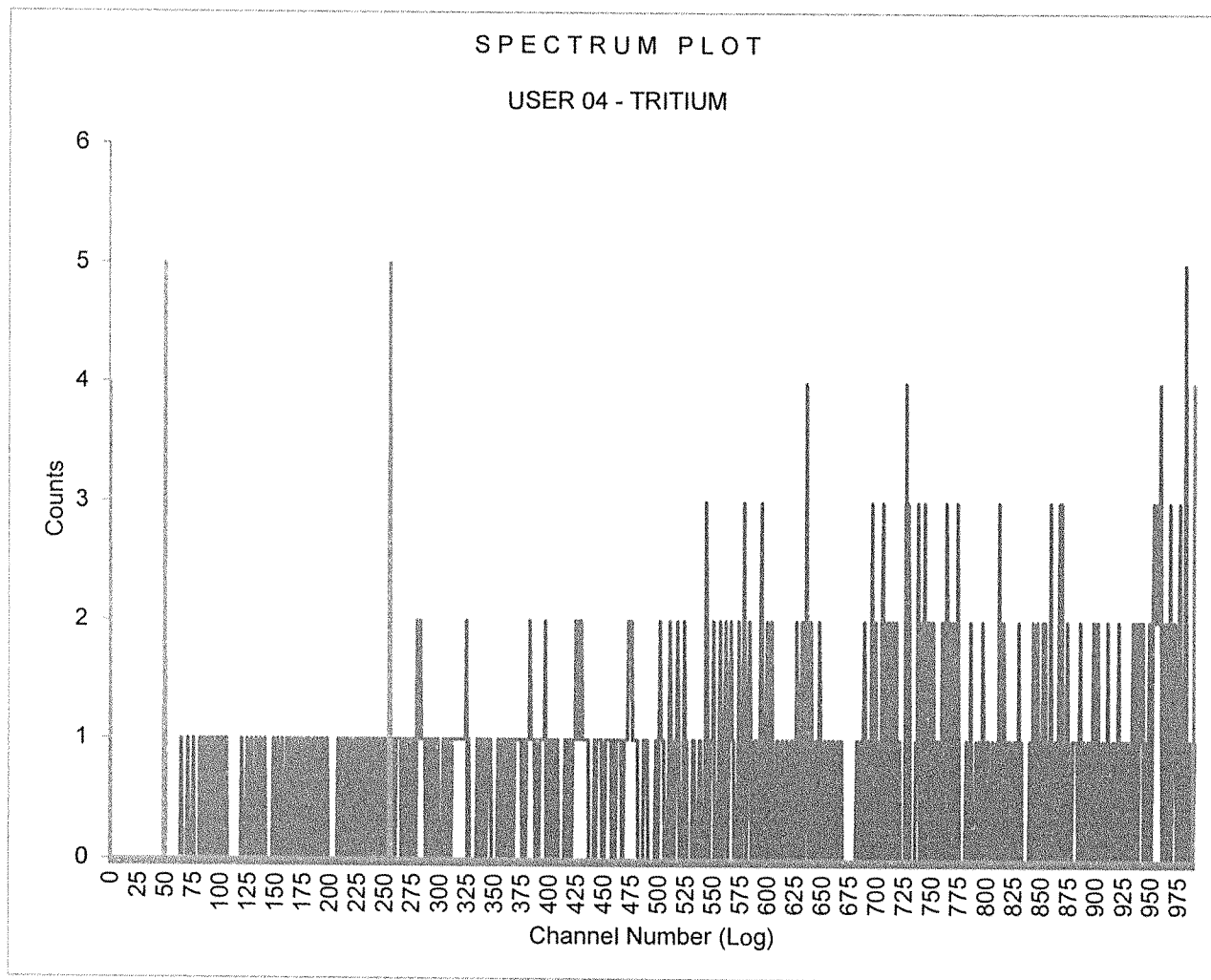
Scintillator Choice: LIQUID

Sam	Rack	Time	H#	Raw	Raw CPM2	CPM Iso1	%Err1	CPM Iso2	%Err2	LumEx	ElTime	
16 BR 1	1	2-1	15.00	153.1	15.33	51.93	14.67	13.79	51.27	7.26	1.60	15.83
BR 2	2	2-2	15.00	155.5	4.40	40.53	3.80	28.51	39.93	8.23	1.68	32.17

Sample Count Start Time:	4 Jan 2017 07:08:46		
Data Capture Date	04 Jan 2017 07:24:11		
User Filename	S04010402-1A.XLS		
	U04010402-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	1	2-1	15.00
H#, Total Counts:	153.1	769	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



Sample Count Start Time:	4 Jan 2017 07:25:06		
Data Capture Date	04 Jan 2017 07:40:32		
User Filename	S04010402-2B.XLS		
	U04010402-1A.XLS		
Spectrum Type	Log Counts		
User Number	04		
User Id	TRITIUM		
User Comment	SILVER		
Scintillator	LIQUID		
Sample, Rack-Pos, Time:	2	2-2	15.00
H#, Total Counts:	155.5	599	
Win1: Tritium - Start, End:	50	255	
Win2: - Start, End:	0	990	



23-Dec-2016

Batch# 1625619 Product: N¹⁶ Date: 12/23/16

Criteria:	Yes	No	Comments
Sample Solids are less than or equal to 100 mg for GAB.			NA
Samples have been blank corrected (if required). Blank correction reported included (if required).			NA
If activity less than 10x MDA/MDC, error is less than or equal to 150% of sample activity. If greater than 10x MDA/ MDC, error is 40% or less. If below the MDA/ MDC, error is okay.	✓		
Instrument source check is within limits.	✓		
Instrument bkg check is within limits.	✓		
Method RDL/ LLD has been met.	✓		
If duplicate activities are: Less than 5x MDA/ MDC, then RPD is 100% or less, If greater 5x MDA/ MDC, then RPD 20% or less, If below the MDA/ MDC, the RPD is 0%, Or meets the client's required RER acceptance criteria.	✓		
Tracer yield is 15-125% . Carrier yield 25-125%. (Or meets the client's contract acceptance criteria).	✓		
Method blank is less than the RDL/ LLD. (If rad samples, < 5% of lowest activity)	✓		
Sample was run within hold time.	✓		
Sample was correctly preserved if required.	✓		
Smears Taken for Radioactive batches.			NA
Method Spike and LCS are within 75-125% (or meets the client's contract acceptance criteria).	✓		
No blank spaces on data forms. All line outs initialed and dated. No transcription errors are apparent.	✓		
Aux data is correct.			NA
Client Special requirements page has been checked.	✓		
Raw Data and/ or spectrum are included and properly stated.	✓		
MS, LCS, and Duplicate RPD/RER values uploaded to LIMS and values verified	✓		
Hit notification complete (if necessary)			NA
Batch entered into Case Narrative.	✓		
Batch Data Exception Reports (DER) completed, if applicable.			NA
Batch Data Exception Reports (DER) second reviewed. Disposition verified to be completed.			NA
Allquot Correction completed if required.			NA
Review sample historical results if available (If REMP, results above MDC have been verified by historical results, recount or re-analysis.)	✓		

Primary Review Performed By: _____

Secondary Review Performed By: [Signature] 12/23/16

HAAL
1/10

Prep Logbook

The Determination of Ni-59 and Ni-63

Batch ID: 1625619

Analyst: Miranda Myers

Method: DOE RESL Ni-1, Modified

Lab SOP: GL-RAD-A-022 REV# 18

Instrument: LSC-33010896

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1203693831	Nickel-63 SPIKE	0398-H	.1	mL

Sample ID	Prep Date	Aliquot (mL)	Initial Weight (g)	Final Weight (g)	Net Weight (mg)
412372001	21-DEC-2016 09:46	125	13.4876	13.5086	21
412372002	21-DEC-2016 09:46	125	13.3842	13.4051	20.9
412372003	21-DEC-2016 09:46	125	13.5323	13.5529	20.6
412372004	21-DEC-2016 09:46	125	13.3803	13.4006	20.3
412372005	21-DEC-2016 09:46	125	13.4746	13.4947	20.1
412372006	21-DEC-2016 09:46	125	13.3604	13.3805	20.1
412372007	21-DEC-2016 09:46	125	13.3535	13.3755	22
412372008	21-DEC-2016 09:46	125	13.3718	13.3937	21.9
412372009	21-DEC-2016 09:46	125	13.4658	13.4877	21.9
412372010	21-DEC-2016 09:46	125	13.481	13.5017	20.7
412372011	21-DEC-2016 09:46	125	13.5004	13.5213	20.9
412372012	21-DEC-2016 09:46	125	13.2911	13.3123	21.2
412372013	21-DEC-2016 09:46	125	13.5085	13.5295	21
412372014	21-DEC-2016 09:46	125	13.325	13.3467	21.7
1203693829 MB	21-DEC-2016 09:46	125	13.2639	13.2853	21.4
1203693830 DUP (412372002)	21-DEC-2016 09:46	125	13.3553	13.3759	20.6
1203693831 LCS	21-DEC-2016 09:46	125	13.4007	13.4214	20.7

Reagent/Solvent Lot ID	Description	Amount	Comments:
2418926	Quenching Agent	20 uL	
2422244	Nickel Carrier-2mL=24.58mg, 0.5mL=22.18mg	2 mL	
2466078	RL-8M Nitric Acid	20 mL	
2475217	RL-0.7M Hydrochloric Acid	5 mL	
2479861.1	14m Ammonium Hydroxide Poly Coated Bottle	10 mL	
2481159.15	Ecoscint Ultra Scintillation Solution	15 mL	
2481479	RL-10mg/mL Ferrie Nitrite	1 mL	
2488607	Dimethylglyoxime in Methanol	5 mL	
2488609	RL-1M Ammonium Citrate	5 mL	
2490393.22	16M Nitric Acid Poly Coated Bottle	5 mL	

Analytical Logbook version 1 11-04-2002

GEL Laboratories LLC

Carrier S/N :	2422244
Carrier Exp Date :	6/23/2017
Carrier Volume Added:	2.00
Carrier Weight (mg/ml):	12.29
Carrier Weight StDev.:	0.09

Procedure Code :	LSC63NIL
Parname :	Nickel-63
Required MDA :	50
ii-63 Abundance :	1.00
Halfife of Ni-63 :	100.100

Geometry: 2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint
Ultra

Page 1

Pipet, 0.1 ml Stdev : +/- 0.00200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-022
 Instrument SOP: GL-RAD-I-014

Count raw Data				Calibration Data										Detector				Background				
Pos.	Rack	Position #	Counting Time (min.)	Quench#	Gross cpm	Bkg cpm	Bkg Count Time (min.)	Bkg Quench#	Corrected Bkg cpm	Count Start Date/Time	Ni-63 Normalization Factor	Sample Decay	Calculated Sample Recovery %	Sample Recovery Error %	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Error (cpm/dpm)	Background Rack	Position #	Background Count Start Date/Time
1	57-2	15	652.16	11.3	12.70	15	654.94	12.6312	12.6312	12/23/2016 3:31	1.00000	1.000	85.4%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4505	0.00792	57-1		12/23/2016 3:15
2	57-3	15	650.11	12.9	12.70	15	654.94	12.5802	12.5802	12/23/2016 3:47	1.00000	1.000	85.0%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4449	0.00792	57-1		12/23/2016 3:15
3	57-4	15	650.73	14.3	12.70	15	654.94	12.5956	12.5956	12/23/2016 4:03	1.00000	1.000	83.8%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4466	0.00792	57-1		12/23/2016 3:15
4	57-5	15	651.3	12.4	12.70	15	654.94	12.6098	12.6098	12/23/2016 4:19	1.00000	1.000	82.6%	0.99%	LSCTEAL	5/1/2016	4/30/2017	0.4481	0.00792	57-1		12/23/2016 3:15
5	57-6	15	651.19	13.8	12.70	15	654.94	12.6071	12.6071	12/23/2016 4:35	1.00000	1.000	81.8%	0.99%	LSCTEAL	5/1/2016	4/30/2017	0.4478	0.00792	57-1		12/23/2016 3:15
6	57-7	15	650.51	12.7	12.70	15	654.94	12.5902	12.5902	12/23/2016 4:51	1.00000	1.000	81.8%	0.99%	LSCTEAL	5/1/2016	4/30/2017	0.4460	0.00792	57-1		12/23/2016 3:15
7	57-8	15	650.56	12.9	12.70	15	654.94	12.5914	12.5914	12/23/2016 5:07	1.00000	1.000	89.5%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4461	0.00792	57-1		12/23/2016 3:15
8	57-9	15	652.58	12.4	12.70	15	654.94	12.8863	12.8863	12/23/2016 5:24	1.00000	1.000	89.1%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4788	0.00792	57-1		12/23/2016 3:15
9	57-10	15	658.46	12.9	12.70	15	654.94	12.7864	12.7864	12/23/2016 5:40	1.00000	1.000	89.1%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4676	0.00792	57-1		12/23/2016 3:15
10	57-11	15	651.79	12.9	12.70	15	654.94	12.8672	12.8672	12/23/2016 5:56	1.00000	1.000	84.2%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4766	0.00792	57-1		12/23/2016 3:15
11	57-12	15	651.53	13.8	12.70	15	654.94	12.6156	12.6156	12/23/2016 6:12	1.00000	1.000	85.0%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4488	0.00792	57-1		12/23/2016 3:15
12	0-1	15	650.22	13.6	12.70	15	654.94	12.5829	12.5829	12/23/2016 6:28	1.00000	1.000	86.2%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4452	0.00792	57-1		12/23/2016 3:15
13	0-2	15	651.08	13.7	12.70	15	654.94	12.6044	12.6044	12/23/2016 8:44	1.00000	1.000	85.4%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4475	0.00792	57-1		12/23/2016 3:15
14	0-3	15	652.84	13.9	12.70	15	654.94	12.6481	12.6481	12/23/2016 7:00	1.00000	1.000	88.3%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4523	0.00792	57-1		12/23/2016 3:15
15	0-4	15	652.16	11.2	12.70	15	654.94	12.6312	12.6312	12/23/2016 7:17	1.00000	1.000	87.1%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4505	0.00792	57-1		12/23/2016 3:15
16	0-5	15	650.91	11.4	12.70	15	654.94	12.6001	12.6001	12/23/2016 7:33	1.00000	1.000	83.8%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4471	0.00792	57-1		12/23/2016 3:15
17	0-6	15	651.02	118.1	12.70	15	654.94	12.6029	12.6029	12/23/2016 7:49	1.00000	1.000	84.2%	0.98%	LSCTEAL	5/1/2016	4/30/2017	0.4474	0.00792	57-1		12/23/2016 3:15

Notes:

- 1 - Results are decay corrected to Sample Date/Time
 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike SN : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS SN : 0398-H
 LCS Exp Date : 9/13/2017
 LCS Activity (dpm/ml): 2988.23
 LCS Volume Added: 0.10

Results		2 SIGMA										2 SIGMA				Total Prop.			
Pos.	Decision Level	Critical Level	Required MDA	MDA	Sample Act. Conc.	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty	pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery			
1	28.3218	19.9954	50	41.8641	-12.4687	94.89%	-1.3312	1.2631	23.1881	23.1883	SAMPLE	SAMPLE							
2	28.7549	20.3012	50	42.5082	3.0476	407.52%	0.3198	1.3033	24.3419	24.3464	SAMPLE	SAMPLE							
3	29.0813	20.5316	50	42.9895	16.4150	78.58%	1.7044	1.3390	25.2772	25.4019	SAMPLE	SAMPLE							
4	29.4256	20.7747	50	43.4973	-2.0437	615.37%	-0.2098	1.2912	24.6496	24.6498	SAMPLE	SAMPLE							
5	29.7351	20.9932	50	43.9551	11.7420	111.23%	1.1929	1.3268	25.5981	25.6611	SAMPLE	SAMPLE							
6	29.8380	21.0659	50	44.1086	1.0857	1182.08%	0.1098	1.2985	25.1545	25.1551	SAMPLE	SAMPLE							
7	27.2542	19.2417	50	40.2888	2.7859	422.43%	0.3086	1.3036	23.0663	23.0702	SAMPLE	SAMPLE							
8	25.8094	18.2217	50	38.1334	-4.1096	266.99%	-0.4863	1.2984	21.5051	21.5053	SAMPLE	SAMPLE							
9	26.3243	18.5852	50	38.9009	0.9833	1151.50%	0.1136	1.3086	22.1932	22.1937	SAMPLE	SAMPLE							
10	27.4078	19.3501	50	40.4984	0.2942	4001.16%	0.0328	1.3107	23.0701	23.0703	SAMPLE	SAMPLE							
11	28.5472	20.1546	50	42.1985	11.1892	112.05%	1.1844	1.3270	24.5711	24.6308	SAMPLE	SAMPLE							
12	28.3312	20.0021	50	41.8816	9.5478	129.91%	1.0171	1.3212	24.3091	24.3530	SAMPLE	SAMPLE							
13	28.4761	20.1044	50	42.0942	10.3291	120.87%	1.0956	1.3242	24.4692	24.5202	SAMPLE	SAMPLE							
14	27.3142	19.2840	50	40.3735	11.3012	106.27%	1.2519	1.3304	23.5384	23.6019	SAMPLE	SAMPLE							
15	27.7850	19.6164	50	41.0706	-13.1512	86.08%	-1.4312	1.2605	22.7010	22.7012	MB	MB							
16	29.0551	20.5131	50	42.9504	-11.5461	105.41%	-1.2001	1.2649	23.8521	23.8523	DUP	DUP	0.0%	0.8392	1076.8403	93.7%			
17	28.8907	20.3971	50	42.7073	1009.1122	3.07%	105.4971	2.9519	55.3416	164.1383	LCS	LCS							

1625619

Ni-63 TEAL

PROTOCOL : 23 Ni-63 15 min
DATE : 2016/12/23
TIME : 03:14
ID : P23AS516

Ni-63

Wallac 1414 WinSpectral v3.0 S/N4140421

Counting mode : CPM
Isotope(s) : Ni63
Ni63 = 5- 530,100.00 y
Protocol name : Ni-63 15 min
Counting time : 900
Repeats : 1
Cycles : 1
Replicates : 1
2 sigma % : 0.01
Minimum cpm : 0.00 Checking time: 10
Advanced modes : Chemilum
Output to Display :
POS,RACK,RACKPOS,CTIME,DATE,TIME,SQPE,CPM1,CPMw1,CPMw2,CPM
Additions to Display : Spectrum,Header,Listing
Header : Ni-63
Spectrum : Rnd.Cos,Beta
Window 1 : 5- 300 /Beta
Window 2 : 5- 300 /Rnd.Cos
Window 3 : 1-1024 /Beta
Window 4 : 1-1024 /Beta
Window 5 : 1-1024 /Beta
Window 6 : 1-1024 /Beta
FNCT1 = FNCT1 : CTIME/60
FNCT2 = FNCT2 : CPMW1-CPMW2
FNCT3 = FNCT3 :
FNCT4 = FNCT4 :

Total count rate:

Ni63 463.6 CPM

Ni-63 TEAL

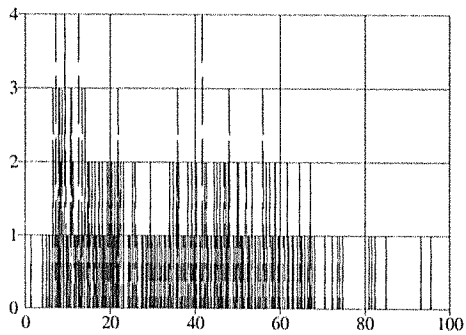
Rack_Position	Count_Time	Quench_number	Run_Date	TIME
RACK RACKPOS	CTIME	SQPE	DATE	

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 3:15 AM

Big

Rack_Position	Count_Time	Quench_number
57	900	654.94

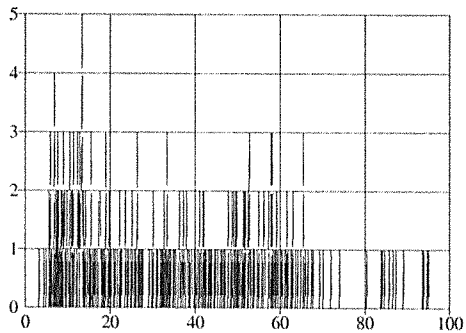


Gross_Beta_CPM
12.70

Lumex_CPM
0.30

Rack_Position	Count_Time	Quench_number
57	900	652.16

Run_Date
12/23/2016 3:31 AM



Gross_Beta_CPM
11.30

Lumex_CPM
0.80

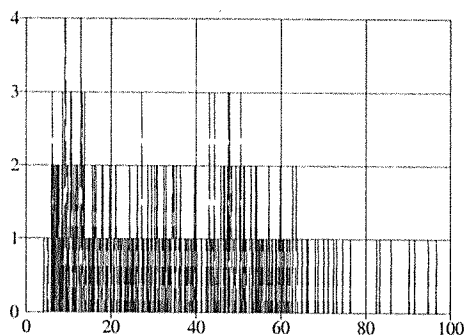
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date
RACK RACKPOS	CTIME	SQPE	DATE TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 3:47 AM

2 Rack_Position 57 Count_Time 900 Quench_number 650.11

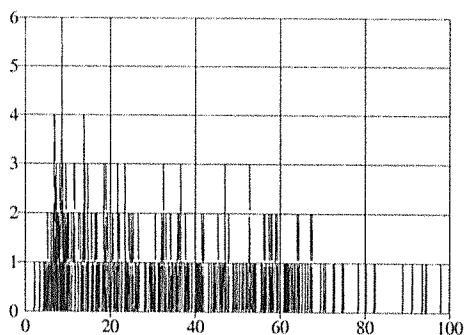


Gross_Beta_CPM
12.90

Lumex_CPM
1.40

3 Rack_Position 57 Count_Time 900 Quench_number 650.73

Run_Date
12/23/2016 4:03 AM



Gross_Beta_CPM
14.30

Lumex_CPM
1.70

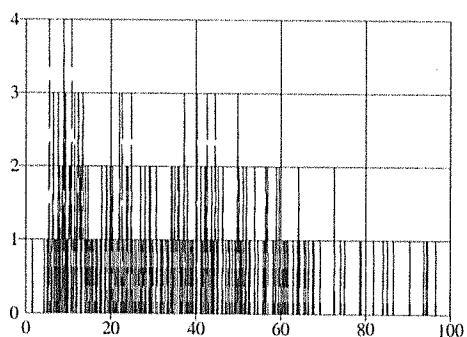
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date	TIME
RACK RACKPOS	CTIME	SQPE	DATE	

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 4:19 AM

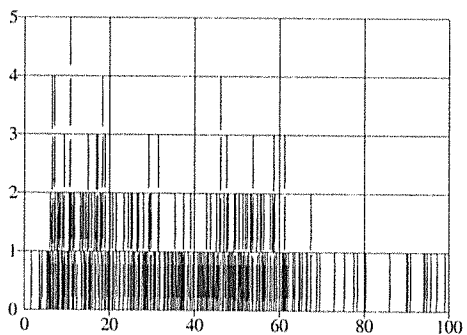
4
Rack_Position 57 Count_Time 900 Quench_number 651.30



Gross_Beta_CPM
12.40

Lumex_CPM
0.90

S
Rack_Position 57 Count_Time 900 Quench_number 651.19



Run_Date
12/23/2016 4:35 AM

Gross_Beta_CPM
13.80

Lumex_CPM
1.10

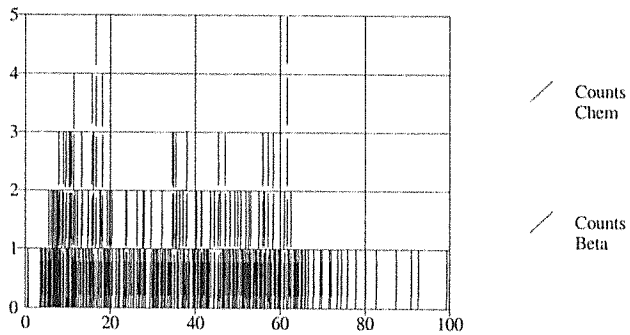
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date	
RACK RACKPOS	CTIME	SQPE	DATE	TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 4:51 AM

6 Rack_Position 57 Count_Time 900 Quench_number 650.51

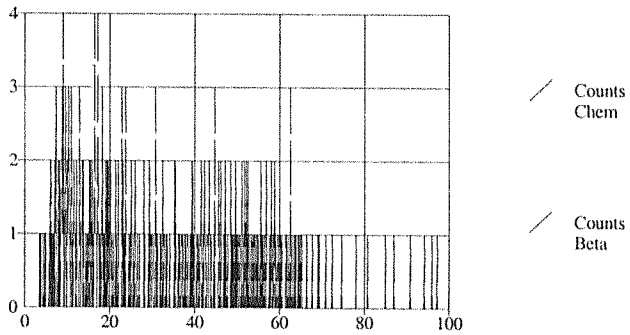


Gross_Beta_CPM
12.70

Lumex_CPM
1.40

7 Rack_Position 57 Count_Time 900 Quench_number 650.56

Run_Date
12/23/2016 5:07 AM



Gross_Beta_CPM
12.90

Lumex_CPM
1.00

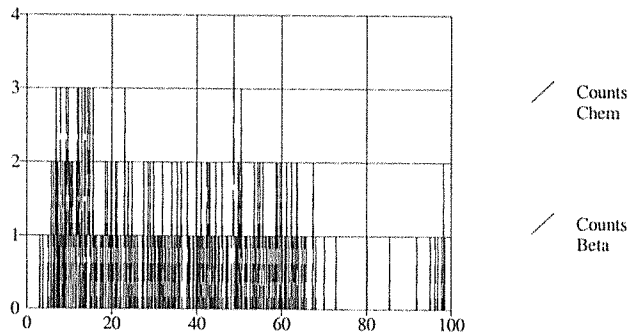
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date	
RACK RACKPOS	CTIME	SQPE	DATE	TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 5:24 AM

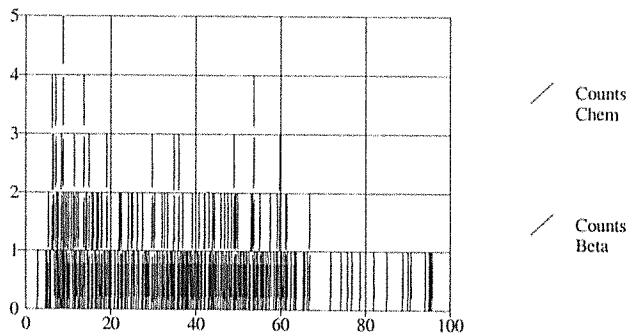
8
Rack_Position 57 Count_Time 9 Quench_number 662.58



Gross_Beta_CPM
12.40

Lumex_CPM
0.80

9
Rack_Position 57 Count_Time 10 Quench_number 658.46



Run_Date
12/23/2016 5:40 AM

Gross_Beta_CPM
12.90

Lumex_CPM
1.20

Ni-63 TEAL

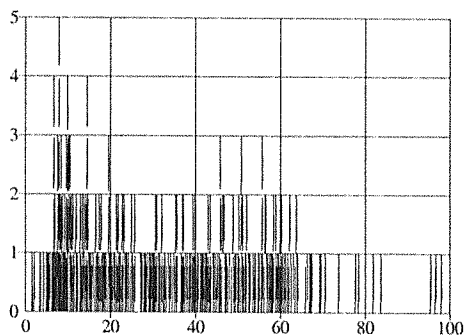
Rack_Position	Count_Time	Quench_number	Run_Date
RACK RACKPOS	CTIME	SQPE	DATE TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 5:56 AM

Rack_Position	Count_Time	Quench_number
57 11	900	661.79

10

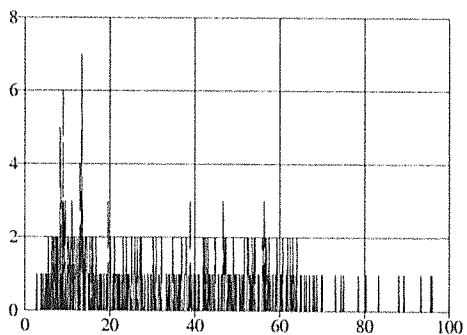


Gross_Beta_CPM
12.90

Lumex_CPM
1.40

Rack_Position	Count_Time	Quench_number
57 12	900	651.53

11



Run_Date
12/23/2016 6:12 AM

Gross_Beta_CPM
13.80

Lumex_CPM
1.50

Ni-63 TEAL

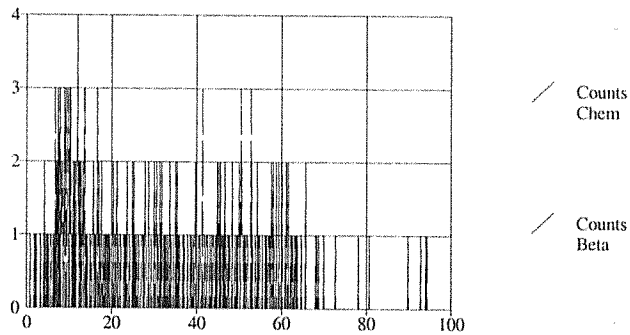
Rack_Position	Count_Time	Quench_number	Run_Date	
RACK RACKPOS	CTIME	SQPE	DATE	TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 6:28 AM

12

Rack_Position	Count_Time	Quench_number
0	900	650.22

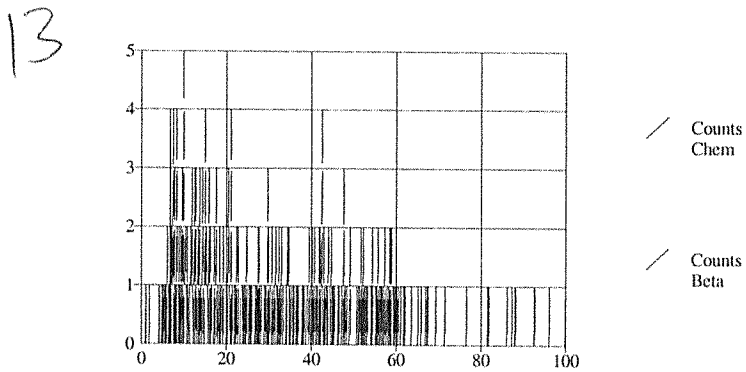


Gross_Beta_CPM
13.60

Lumex_CPM
1.50

Rack_Position	Count_Time	Quench_number
0	900	651.08

Run_Date
12/23/2016 6:44 AM



Gross_Beta_CPM
13.70

Lumex_CPM
0.90

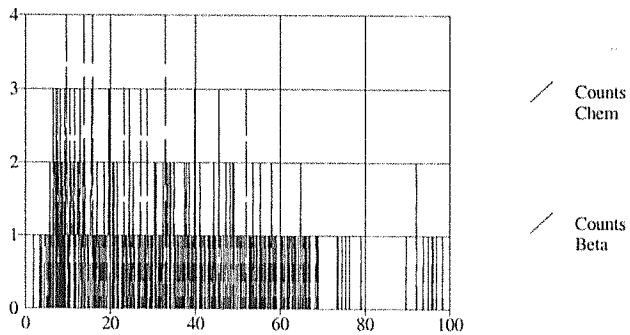
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date	
RACK RACKPOS	CTIME	SQPE	DATE	TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 7:00 AM

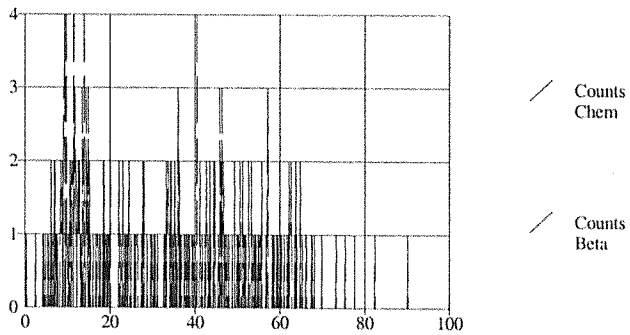
14
Rack_Position Count_Time Quench_number
0 3 652.84



Gross_Beta_CPM
13.90

Lumex_CPM
1.20

15
Rack_Position Count_Time Quench_number
0 4 652.16



Run_Date
12/23/2016 7:17 AM

Gross_Beta_CPM
11.20

Lumex_CPM
0.40

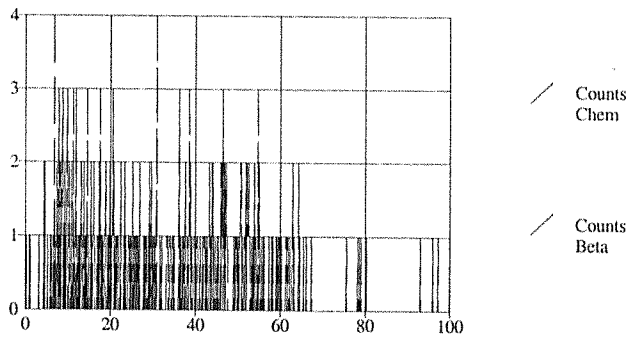
Ni-63 TEAL

Rack_Position	Count_Time	Quench_number	Run_Date	
RACK RACKPOS	CTIME	SQPE	DATE	TIME

Gross_Beta_CPM
CPMW1

Lumex_CPM
CPMW2
Run_Date
12/23/2016 7:33 AM

16 Rack_Position 0 Count_Time 5 Quench_number 650.91

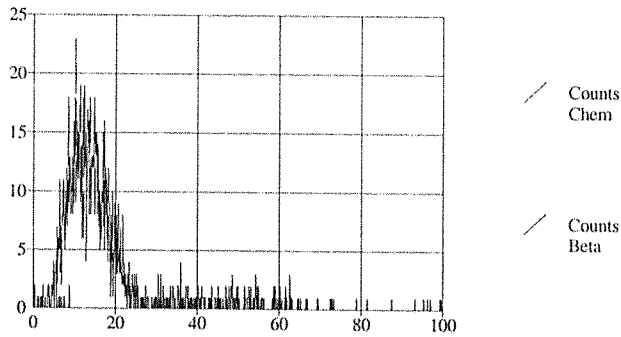


Gross_Beta_CPM
11.40

Lumex_CPM
0.80

17 Rack_Position 0 Count_Time 6 Quench_number 651.02

Run_Date
12/23/2016 7:49 AM



Gross_Beta_CPM
118.10

Lumex_CPM
0.60

Continuing Calibration Data



Liquid Scintillation Counter Checks for 23-DEC-2016

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	02:00	1.4		115099	1.08		
	Carbon-14	02:02	1.4		115035	0.85		
	Tritium	02:04	1.35		160859	-0.69		
	Tritium	02:06	1.35		161176	-0.05		
	BKG	02:08	30		26	0.59		
	BKG	02:38	30		25	0.06		
LSCBROWN	Carbon-14	00:44	1.4		114908	-0.66		
	Carbon-14	00:46	1.4		114925	-0.6		
	Tritium	00:48	1.3		166936	-0.67		
	Tritium	00:50	1.3		166722	-1.21		
	BKG	00:52	30		26	0.11		
	BKG	01:22	30		26	0.05		
LSCGOLD	Carbon-14	01:46	1.3		125688	-0.94		
	Carbon-14	01:48	1.3		125082	-2.76		
	Tritium	01:49	1.4		150523	-1.27		
	Tritium	01:51	1.4		150312	-1.74		
	BKG	01:53	30		22	-0.68		
	BKG	02:24	30		23	1.24		
LSCGREEN	Carbon-14	00:29	1.4		115038	-0.21		
	Carbon-14	00:31	1.4		115316	0.72		
	Tritium	00:33	1.25		172269	-0.3		
	Tritium	00:35	1.25		172009	-0.9		
	BKG	00:37	30		27	0.53		
	BKG	01:07	30		25	-1.15		
LSCMOCHA	Carbon-14	02:13	1.35		121040	-1.32		
	Carbon-14	02:15	1.35		120505	-2.57		
	Tritium	02:17	1.3		164824	0.32		
	Tritium	02:19	1.3		164997	0.56		
	BKG	02:21	30		26	-0.47		
	BKG	02:51	30		25	-1.09		

LSCORANGE	Carbon-14	05:42	1.012433	107541	-0.5
	Tritium	05:45	1.012433	180021	1.02
	BKG	06:18	30.01243	11	-0.33
	Carbon-14	06:19	1.012433	107238	-1.45
	Tritium	06:20	1.012333	179349	-0.3
	BKG	06:51	30.01243	11	-0.73
LSCPINK	Carbon-14	08:33	1.012433	118790	-0.55
	Tritium	08:36	1.01235	137458	-0.93
	BKG	09:09	30.01243	8.67	-0.44
	Carbon-14	09:10	1.012433	119115	0.3
	Tritium	09:11	1.012433	137705	-0.41
	BKG	09:42	30.01243	7.96	-1.7
LSCRED	Carbon-14	01:45	1.4	114976	0.25
	Carbon-14	01:47	1.4	115274	1.24
	Tritium	01:49	1.3	164948	-0.1
	Tritium	01:50	1.3	165272	0.54
	BKG	01:53	30	25	-0.75
	BKG	02:23	30	24	-1.75
LSCSILVER	Carbon-14	02:01	1.35	121055	-0.46
	Carbon-14	02:03	1.35	121321	0.39
	Tritium	02:05	1.25	170368	1.24
	Tritium	02:07	1.25	170764	2.1
	BKG	02:09	30	24	-1.73
	BKG	02:39	30	26	0.03
LSCTEAL	Carbon-14	02:03	1.583	106238	1.01
	Carbon-14	02:06	1.583	106048	0.2
	Tritium	02:08	1.25	142646	-1.58
	Tritium	02:10	1.25	142721	-1.48
	BKG	02:12	30	15	-0.72
	BKG	02:43	30	15	-0.85
LSCYELLOW	Carbon-14	03:22	1.483	114260	-0.46
	Carbon-14	03:25	1.483	114405	0.02
	Tritium	03:27	1.517	149271	-0.53
	Tritium	03:30	1.5	149729	0.53

BKG	03:32	30	15	-0.47
BKG	04:03	30	14	-1.91

Reviewed by: 
Lyndsey Pace

Date: 23-DEC-16

GEL Laboratories LLC



Liquid Scintillation Counter Checks for 28-DEC-2016

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	01:34	1.4		114814	0.05		
	Carbon-14	01:36	1.45		114304	-1.79		
	Tritium	01:38	1.35		162521	2.68		
	Tritium	01:40	1.35		161796	1.21		
	BKG	01:42	30		25	-0.51		
	BKG	02:13	30		25	-0.04		
LSCBROWN	Carbon-14	03:22	1.4		115559	1.58		
	Carbon-14	03:24	1.4		115217	0.4		
	Tritium	03:26	1.3		166469	-1.85		
	Tritium	03:27	1.3		166747	-1.15		
	BKG	03:30	30		26	-0.23		
	BKG	04:00	30		26	-0.61		
LSCGOLD	Carbon-14	00:30	1.3		125397	-1.81		
	Carbon-14	00:31	1.3		125452	-1.65		
	Tritium	00:33	1.4		151363	0.58		
	Tritium	00:35	1.4		151038	-0.14		
	BKG	00:37	30		22	-0.35		
	BKG	01:07	30		22	-0.46		
LSCGREEN	Carbon-14	00:54	1.4		115196	0.32		
	Carbon-14	00:56	1.4		115546	1.49		
	Tritium	00:58	1.25		172574	0.4		
	Tritium	01:00	1.25		172660	0.6		
	BKG	01:02	30		28	1.99		
	BKG	01:32	30		25	-1.27		
LSCMOCHA	Carbon-14	03:25	1.35		121468	-0.31		
	Carbon-14	03:27	1.35		120996	-1.42		
	Tritium	03:29	1.3		164766	0.24		
	Tritium	03:30	1.3		165942	1.9		
	BKG	03:32	30		27	-0.17		
	BKG	04:03	30		27	-0.09		

LSCORANGE	Carbon-14	05:30	1.012433	107553	-0.46
	Tritium	05:33	1.012433	179705	0.4
	BKG	06:06	30.01243	12	0.81
	Carbon-14	06:07	1.012433	107523	-0.56
	Tritium	06:09	1.012333	179684	0.36
	BKG	06:39	30.01243	9.82	-1.72
LSCPINK	Carbon-14	04:17	1.012433	119575	1.5
	Tritium	04:20	1.012433	137594	-0.64
	BKG	04:53	30.01243	8.5	-0.75
	Carbon-14	04:54	1.012433	119482	1.26
	Tritium	04:56	1.01235	137253	-1.36
	BKG	05:26	30.01243	9.28	0.64
LSCRED	Carbon-14	02:19	1.45	114333	-1.87
	Carbon-14	02:21	1.4	114514	-1.27
	Tritium	02:23	1.3	164960	-0.08
	Tritium	02:25	1.3	165394	0.78
	BKG	02:27	30	26	-0.6
	BKG	02:57	30	27	0.37
LSCSILVER	Carbon-14	01:14	1.35	121285	0.27
	Carbon-14	01:15	1.35	121307	0.34
	Tritium	01:17	1.3	169248	-1.2
	Tritium	01:19	1.25	169462	-0.74
	BKG	01:21	30	26	0.36
	BKG	01:51	30	24	-1.3
LSCTEAL	Carbon-14	03:06	1.583	106064	0.27
	Carbon-14	03:08	1.583	105647	-1.5
	Tritium	03:11	1.25	142470	-1.82
	Tritium	03:13	1.25	142608	-1.63
	BKG	03:15	30	14	-0.98
	BKG	03:46	30	14	-1.91
LSCYELLOW	Carbon-14	03:24	1.483	114385	-0.05
	Carbon-14	03:27	1.483	113980	-1.38
	Tritium	03:29	1.517	149319	-0.42
	Tritium	03:32	1.517	148473	-2.39

BKG	03:34	30	14	-1.55
BKG	04:05	30	15	-0.83

Reviewed by: 
Lyndsey Pace

Date: 28-DEC-16

GEL Laboratories LLC



Liquid Scintillation Counter Checks for 29-DEC-2016

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	06:16	1.4		114956	0.56		
	Carbon-14	06:18	1.4		114811	0.04		
	Tritium	06:20	1.35		161906	1.43		
	Tritium	06:22	1.35		161700	1.01		
	BKG	06:24	30		26	0.43		
	BKG	06:54	30		25	-0.47		
LSCBROWN	Carbon-14	02:13	1.4		115052	-0.17		
	Carbon-14	02:15	1.4		114939	-0.55		
	Tritium	02:17	1.3		167265	0.17		
	Tritium	02:19	1.3		166460	-1.88		
	BKG	02:21	30		27	0.29		
	BKG	02:51	30		26	0.11		
LSCGOLD	Carbon-14	00:28	1.3		125126	-2.63		
	Carbon-14	00:29	1.3		125581	-1.26		
	Tritium	00:31	1.4		150795	-0.67		
	Tritium	00:33	1.4		150062	-2.29		
	BKG	00:35	30		21	-0.86		
	BKG	01:06	30		24	1.86		
LSCGREEN	Carbon-14	03:15	1.4		115322	0.74		
	Carbon-14	03:17	1.4		114867	-0.78		
	Tritium	03:19	1.25		172749	0.8		
	Tritium	03:20	1.25		172029	-0.85		
	BKG	03:22	30		26	-0.85		
	BKG	03:53	30		27	0.21		
LSCMOCHA	Carbon-14	03:18	1.35		120760	-1.97		
	Carbon-14	03:20	1.35		121024	-1.35		
	Tritium	03:22	1.3		164985	0.55		
	Tritium	03:23	1.3		165573	1.38		
	BKG	03:25	30		27	0.18		
	BKG	03:56	30		27	-0.2		

LSCORANGE	Carbon-14	03:51	1.012433	107591	-0.34
	Tritium	03:54	1.012433	179336	-0.32
	BKG	04:27	30.01243	12	1.66
	Carbon-14	04:28	1.012433	107578	-0.38
	Tritium	04:29	1.012333	180507	1.98
	BKG	05:00	30.01243	10	-0.79
LSCPINK	Carbon-14	04:10	1.012433	118910	-0.23
	Tritium	04:13	1.012433	138199	0.63
	BKG	04:46	30.01243	8.09	-1.47
	Carbon-14	04:47	1.012433	119929	2.42
	Tritium	04:48	1.01235	138176	0.58
	BKG	05:19	30.01243	7.99	-1.65
LSCRED	Carbon-14	03:30	1.4	115061	0.53
	Carbon-14	03:32	1.4	114754	-0.48
	Tritium	03:34	1.35	164730	-0.53
	Tritium	03:35	1.3	164841	-0.31
	BKG	03:38	30	26	-0.28
	BKG	04:08	30	26	-0.53
LSCSILVER	Carbon-14	00:24	1.35	121531	1.05
	Carbon-14	00:26	1.35	120856	-1.09
	Tritium	00:28	1.25	169992	0.42
	Tritium	00:29	1.25	170497	1.52
	BKG	00:31	30	26	0.83
	BKG	01:02	30	25	-1.15
LSCTEAL	Carbon-14	00:48	1.6	105343	-2.79
	Carbon-14	00:50	1.583	105780	-0.94
	Tritium	00:53	1.25	143187	-0.84
	Tritium	00:55	1.25	142016	-2.45
	BKG	00:57	30	14	-1.12
	BKG	01:28	30	14	-1.12
LSCYELLOW	Carbon-14	00:48	1.483	114164	-0.77
	Carbon-14	00:50	1.467	114543	0.47
	Tritium	00:53	1.517	148524	-2.27
	Tritium	00:55	1.517	149180	-0.74

BKG	00:57	30	15	0.25
BKG	01:28	30	14	-1.55

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Lyndsey Pace

Date: 29-DEC-16

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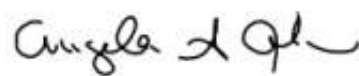
Liquid Scintillation Counter Checks for 02-JAN-2017

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	07:42	1.4		114817	0.06		
	Carbon-14	07:44	1.4		114520	-1.01		
	Tritium	07:46	1.35		161798	1.21		
	Tritium	07:48	1.35		161388	0.38		
	BKG	07:50	30		26	1.03		
	BKG	08:20	30		26	0.43		
	Carbon-14	18:58	1.4		114591	-0.75		
	Carbon-14	19:00	1.4		114963	0.59		
	Tritium	19:02	1.35		161348	0.3		
	Tritium	19:03	1.35		161672	0.96		
	BKG	19:06	30		26	0.39		
	BKG	19:36	30		24	-1.14		
LSCBROWN	Carbon-14	07:23	1.4		115099	-00		
	Carbon-14	07:25	1.4		115044	-0.19		
	Tritium	07:27	1.3		166069	-2.86		
	Tritium	07:28	1.3		166361	-2.13		
	BKG	07:30	30		27	0.93		
	BKG	08:01	30		26	0.11		
LSCGOLD	Carbon-14	07:10	1.3		125786	-0.64		
	Carbon-14	07:11	1.3		125787	-0.64		
	Tritium	07:13	1.4		150269	-1.83		
	Tritium	07:15	1.4		150613	-1.08		
	BKG	07:17	30		21	-1.05		
	BKG	07:48	30		22	-0.17		
LSCGREEN	Carbon-14	07:23	1.4		114963	-0.46		
	Carbon-14	07:25	1.4		115498	1.33		
	Tritium	07:27	1.25		173164	1.76		
	Tritium	07:28	1.25		172702	0.7		
	BKG	07:30	30		28	1.1		
	BKG	08:01	30		27	0.5		

LSCMOCHA	Carbon-14	07:25	1.35	121287	-0.74
	Carbon-14	07:27	1.35	121184	-0.98
	Tritium	07:29	1.3	164532	-0.1
	Tritium	07:30	1.3	164704	0.15
	BKG	07:32	30	26	-0.55
	BKG	08:03	30	25	-1.24
LSCORANGE	Carbon-14	08:00	1.01245	107312	-1.22
	Tritium	08:03	1.01245	179217	-0.55
	BKG	08:36	30.01243	10	-0.93
	Carbon-14	08:37	1.012433	107742	0.13
	Tritium	08:39	1.01235	179483	-0.03
	BKG	09:09	30.01243	11	0.61
LSCPURPLE	Carbon-14	06:17	.5	105823	-2.17
	Carbon-14	06:17	.5	106919	0.04
	Tritium	06:19	.3	180916	-1.05
	Tritium	06:19	.3	181605	-0.31
	BKG	06:20	30	31	-0.82
	BKG	06:51	30	32	0.15
LSCRED	Carbon-14	07:46	1.4	115055	0.51
	Carbon-14	07:48	1.4	114515	-1.27
	Tritium	07:50	1.3	165006	0.01
	Tritium	07:51	1.3	164863	-0.27
	BKG	07:54	30	25	-0.79
	BKG	08:24	30	25	-0.88
LSCSILVER	Carbon-14	07:13	1.35	121465	0.84
	Carbon-14	07:15	1.35	121334	0.43
	Tritium	07:17	1.3	169024	-1.69
	Tritium	07:18	1.25	169666	-0.29
	BKG	07:21	30	24	-1.37
	BKG	07:51	30	26	0.32
LSCTEAL	Carbon-14	08:13	1.583	105900	-0.42
	Carbon-14	08:16	1.583	105747	-1.08
	Tritium	08:18	1.25	143206	-0.81
	Tritium	08:20	1.25	143225	-0.79

	BKG	08:23	30	16	0.88
	BKG	08:54	30	15	-0.32
LSCYELLOW	Carbon-14	07:28	1.517	114455	0.18
	Carbon-14	07:30	1.483	114245	-0.51
	Tritium	07:33	1.517	148765	-1.71
	Tritium	07:35	1.517	148960	-1.26
	BKG	07:38	30	17	2.06
	BKG	08:08	30	15	-0.11

Reviewed by:



Angela Johnson

Date: 03-JAN-17

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Liquid Scintillation Counter Checks for 03-JAN-2017

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	02:23	1.4		114684	-0.42		
	Carbon-14	02:24	1.45		114084	-2.58		
	Tritium	02:27	1.35		161997	1.61		
	Tritium	02:28	1.35		161708	1.03		
	BKG	02:30	30		24	-0.67		
	BKG	03:01	30		26	0.43		
LSCBROWN	Carbon-14	02:06	1.4		114846	-0.87		
	Carbon-14	02:08	1.4		115226	0.43		
	Tritium	02:10	1.3		166238	-2.44		
	Tritium	02:12	1.3		166700	-1.27		
	BKG	02:14	30		27	0.39		
	BKG	02:44	30		27	0.39		
LSCGOLD	Carbon-14	01:51	1.3		125752	-0.75		
	Carbon-14	01:53	1.3		125568	-1.3		
	Tritium	01:55	1.4		149928	-2.59		
	Tritium	01:57	1.4		150219	-1.95		
	BKG	01:59	30		23	0.74		
	BKG	02:29	30		21	-0.97		
LSCGREEN	Carbon-14	03:48	1.4		115326	0.75		
	Carbon-14	03:50	1.4		114688	-1.38		
	Tritium	03:52	1.25		172966	1.3		
	Tritium	03:54	1.25		172815	0.95		
	BKG	03:56	30		27	0.56		
	BKG	04:26	30		28	1.55		
LSCMOCHA	Carbon-14	02:08	1.35		121734	0.31		
	Carbon-14	02:10	1.35		120882	-1.69		
	Tritium	02:12	1.3		164963	0.51		
	Tritium	02:13	1.3		164779	0.25		
	BKG	02:16	30		25	-1.02		
	BKG	02:46	30		27	0.36		

LSCORANGE	Carbon-14	01:53	1.01245	107979	0.88
	Tritium	01:56	1.01245	179245	-0.5
	BKG	02:29	30.01243	10	-1.12
	Carbon-14	02:30	1.012433	107431	-0.85
	Tritium	02:32	1.01235	178454	-2.05
	BKG	03:02	30.01243	9.58	-2.07
LSCPINK	Carbon-14	03:01	1.012433	118891	-0.28
	Tritium	03:04	1.012433	137152	-1.57
	BKG	03:37	30.01243	9.01	0.16
	Carbon-14	03:38	1.012433	118687	-0.82
	Tritium	03:39	1.012333	137584	-0.66
	BKG	04:10	30.01243	9.11	0.33
LSCPURPLE	Carbon-14	07:28	.5	106845	-0.11
	Carbon-14	07:29	.5	106549	-0.71
	Tritium	07:30	.3	182786	0.94
	Tritium	07:31	.3	182100	0.21
	BKG	07:32	30	29	-1.99
	BKG	08:02	30	31	-0.46
LSCRED	Carbon-14	02:22	1.4	114389	-1.69
	Carbon-14	02:24	1.4	115336	1.44
	Tritium	02:26	1.3	165558	1.1
	Tritium	02:27	1.3	165155	0.31
	BKG	02:29	30	26	-0.32
	BKG	03:00	30	27	1.15
LSCSILVER	Carbon-14	01:52	1.35	121156	-0.14
	Carbon-14	01:54	1.35	121106	-0.3
	Tritium	01:55	1.25	170358	1.21
	Tritium	01:57	1.25	170076	0.6
	BKG	01:59	30	25	-1
	BKG	02:30	30	25	-1
LSCTEAL	Carbon-14	02:54	1.583	105765	-1
	Carbon-14	02:56	1.583	105988	-0.05
	Tritium	02:59	1.25	142673	-1.54
	Tritium	03:01	1.25	143248	-0.76

	BKG	03:03	30	15	0.21
	BKG	03:34	30	16	0.61
LSCYELLOW	Carbon-14	02:09	1.483	114161	-0.78
	Carbon-14	02:11	1.483	114264	-0.45
	Tritium	02:14	1.517	149302	-0.46
	Tritium	02:16	1.517	148899	-1.4
	BKG	02:18	30	16	0.85
	BKG	02:49	30	15	-0.59

Reviewed by:



Angela Johnson

Date: 03-JAN-17

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Liquid Scintillation Counter Checks for 04-JAN-2017

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LSCBLUE	Carbon-14	02:13	1.4		115075	0.99		
	Carbon-14	02:14	1.4		114801	00		
	Tritium	02:16	1.35		161841	1.3		
	Tritium	02:18	1.35		161379	0.36		
	BKG	02:20	30		27	1.58		
	BKG	02:51	30		26	1.28		
LSCBROWN	Carbon-14	00:20	1.4		114580	-1.79		
	Carbon-14	00:22	1.4		115216	0.4		
	Tritium	00:24	1.3		166143	-2.68		
	Tritium	00:26	1.3		166171	-2.61		
	BKG	00:28	30		28	1.8		
	BKG	00:58	30		28	1.21		
LSCGOLD	Carbon-14	06:45	1.3		125933	-0.2		
	Carbon-14	06:47	1.3		125808	-0.58		
	Tritium	06:49	1.4		150330	-1.7		
	Tritium	06:50	1.4		150536	-1.24		
	BKG	06:53	30		22	-0.07		
	BKG	07:23	30		22	-0.02		
LSCGREEN	Carbon-14	02:14	1.4		114910	-0.63		
	Carbon-14	02:16	1.4		115228	0.43		
	Tritium	02:18	1.25		171946	-1.04		
	Tritium	02:20	1.25		172876	1.1		
	BKG	02:22	30		27	0.46		
	BKG	02:52	30		28	1.16		
LSCMOCHA	Carbon-14	02:16	1.35		120731	-2.04		
	Carbon-14	02:18	1.35		120861	-1.74		
	Tritium	02:20	1.3		164401	-0.28		
	Tritium	02:21	1.3		165385	1.11		
	BKG	02:23	30		27	0.33		
	BKG	02:54	30		27	-0.02		

LSCORANGE	Carbon-14	08:46	1.01245	107818	0.37
	Tritium	08:50	1.01245	179698	0.39
	BKG	09:22	30.01243	11	-0.48
	Carbon-14	09:24	1.012433	107228	-1.48
	Tritium	09:25	1.01235	179257	-0.48
	BKG	09:55	30.01243	10	-1.18
LSCPINK	Carbon-14	03:07	1.012433	118714	-0.75
	Tritium	03:10	1.012433	137533	-0.77
	BKG	03:43	30.01243	8.6	-0.57
	Carbon-14	03:44	1.012433	118679	-0.84
	Tritium	03:46	1.012333	136943	-2
	BKG	04:16	30.01243	9.41	0.87
LSCPURPLE	Carbon-14	07:41	.5	107121	0.45
	Carbon-14	07:41	.5	106747	-0.31
	Tritium	07:42	.3	182055	0.16
	Tritium	07:43	.3	181138	-0.81
	BKG	07:44	30	32	0.26
	BKG	08:15	30	32	0.04
LSCRED	Carbon-14	00:52	1.4	114793	-0.35
	Carbon-14	00:54	1.45	114270	-2.08
	Tritium	00:56	1.3	165247	0.49
	Tritium	00:58	1.3	165241	0.48
	BKG	01:00	30	27	0.94
	BKG	01:30	30	26	-0.07
LSCSILVER	Carbon-14	01:31	1.35	121274	0.24
	Carbon-14	01:33	1.35	121137	-0.2
	Tritium	01:35	1.25	170034	0.51
	Tritium	01:36	1.25	170628	1.8
	BKG	01:38	30	27	1.94
	BKG	02:09	30	26	0.62
LSCTEAL	Carbon-14	03:02	1.583	105888	-0.48
	Carbon-14	03:05	1.583	106296	1.26
	Tritium	03:07	1.25	143448	-0.48
	Tritium	03:09	1.25	143272	-0.72

	BKG	03:11	30	15	0.35
	BKG	03:42	30	17	1.81
LSCYELLOW	Carbon-14	01:20	1.483	114089	-1.02
	Carbon-14	01:23	1.467	114715	1.03
	Tritium	01:25	1.5	149630	0.3
	Tritium	01:28	1.5	149677	0.41
	BKG	01:30	30	14	-1.43
	BKG	02:01	30	15	-0.83

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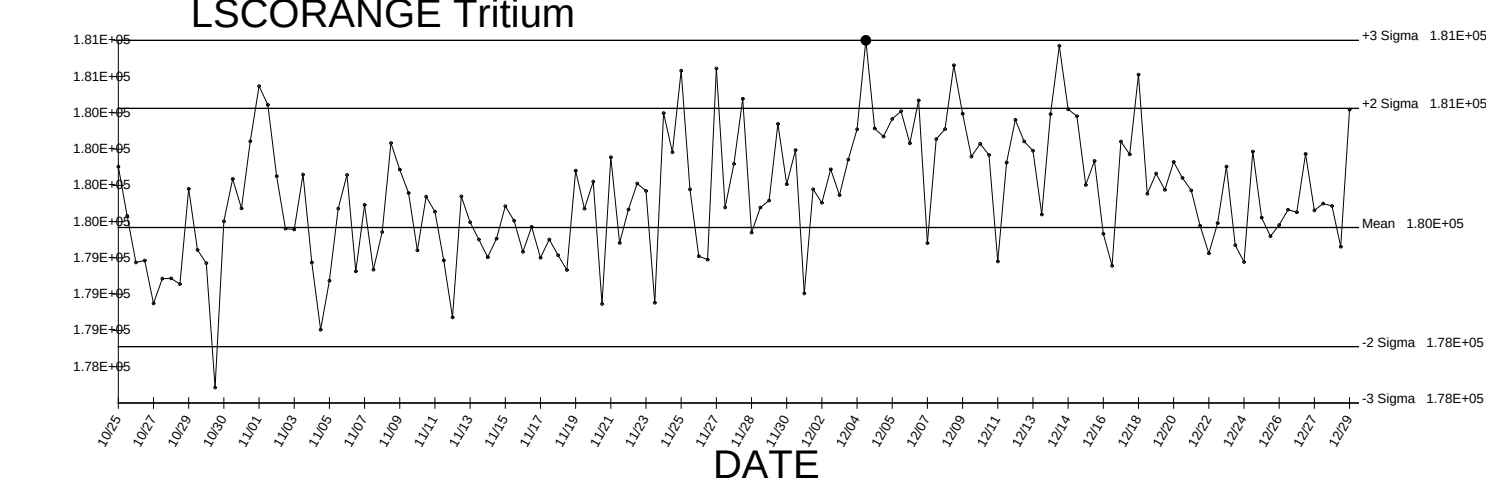
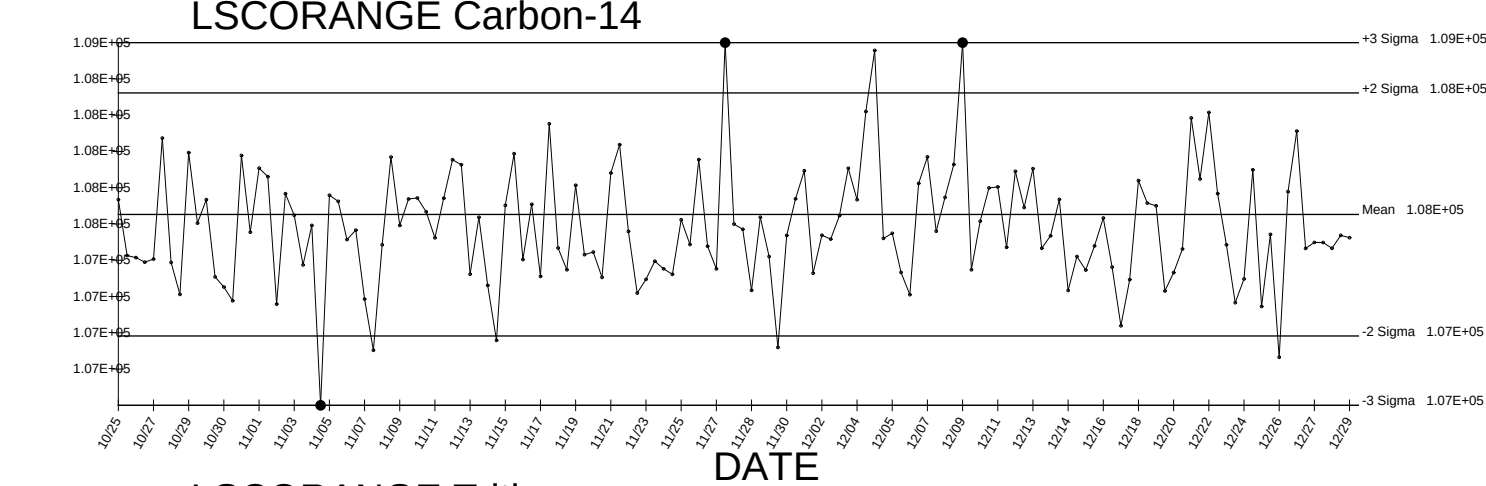
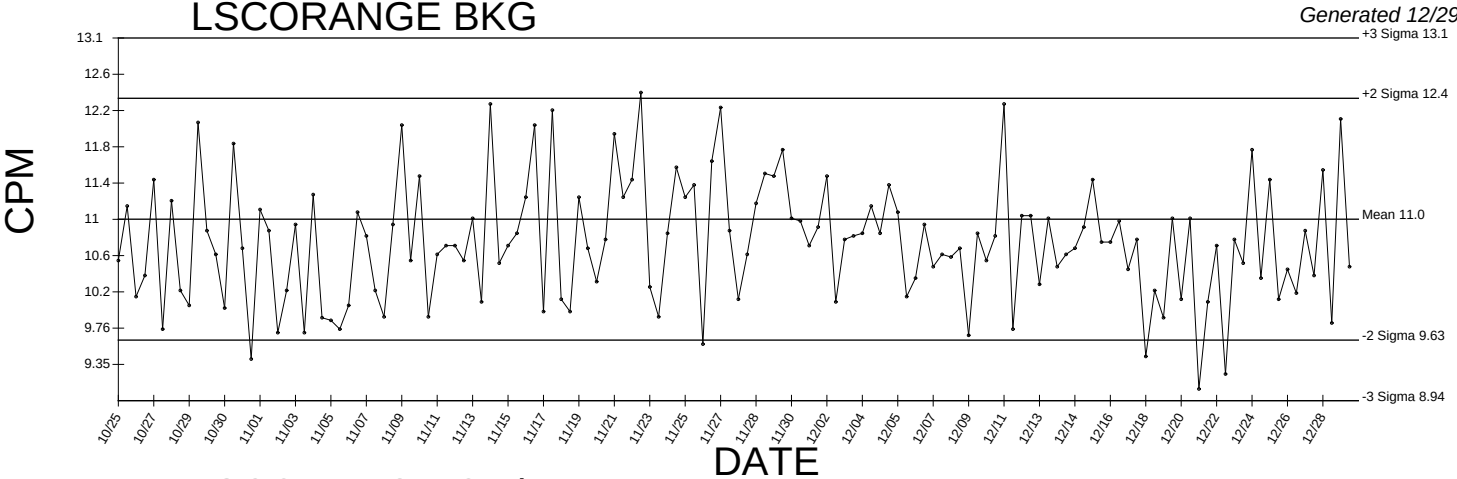


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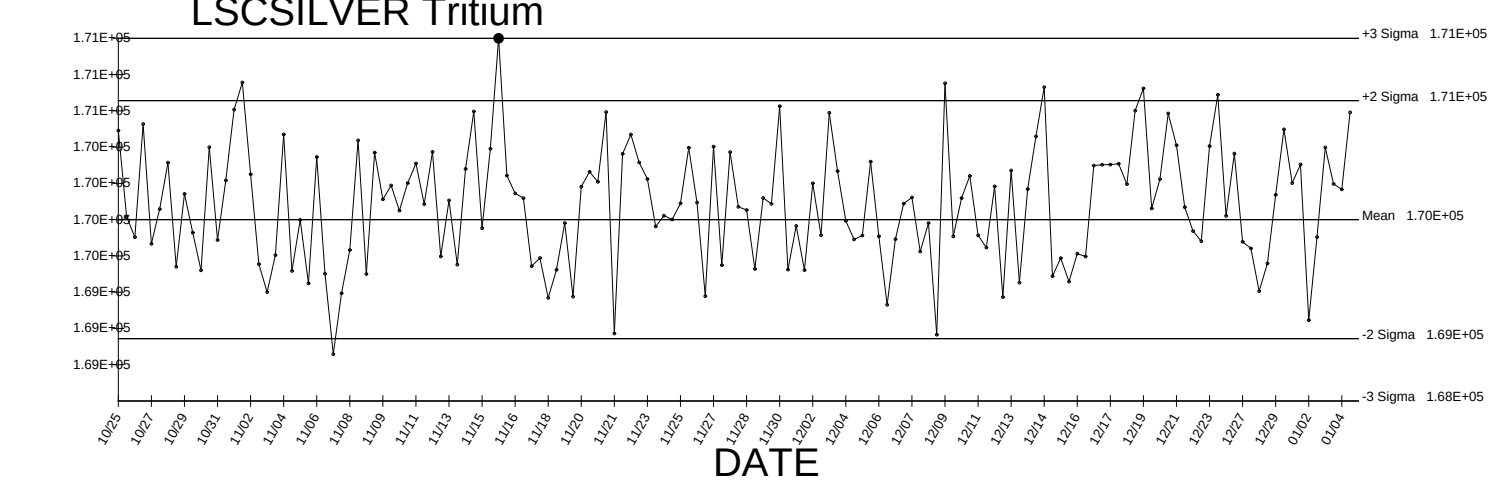
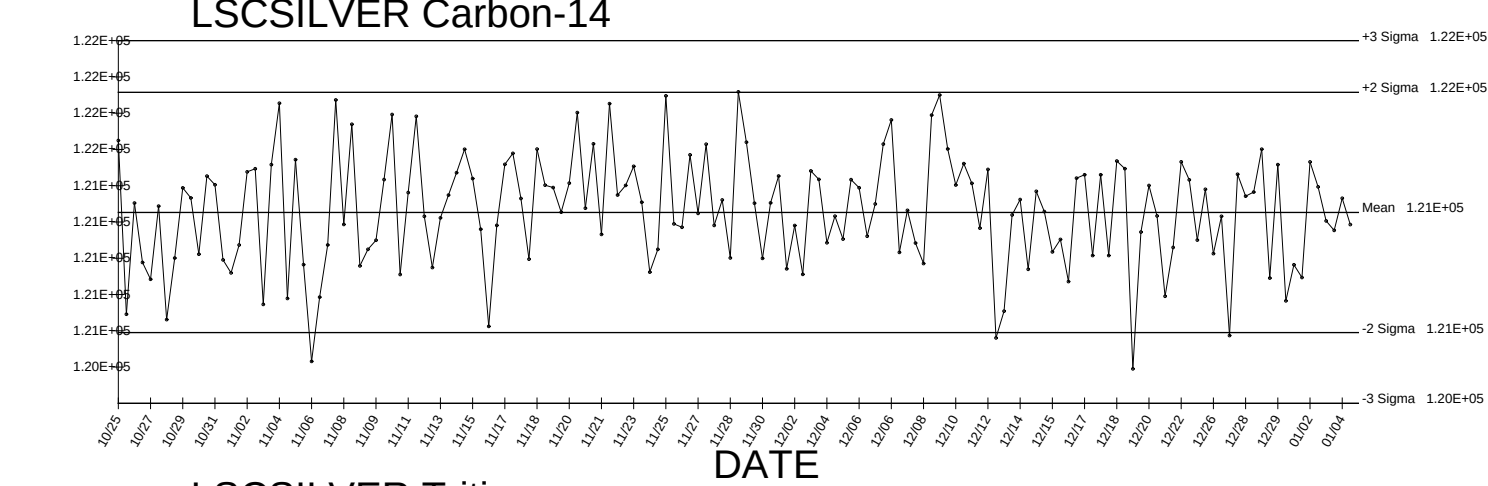
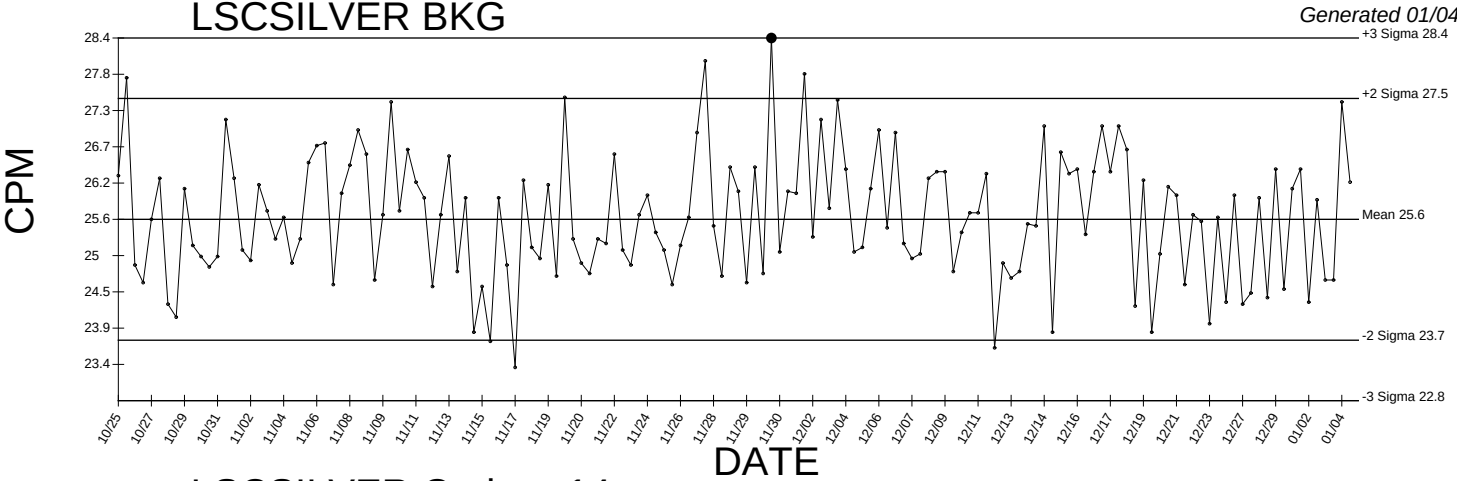
Date: 04-JAN-17

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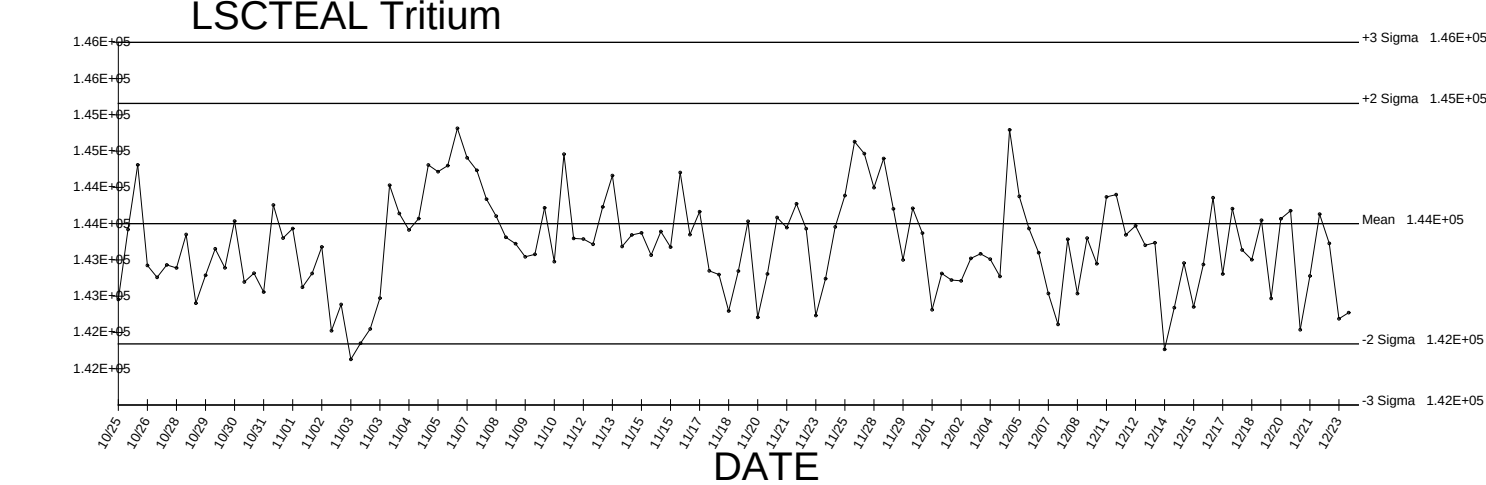
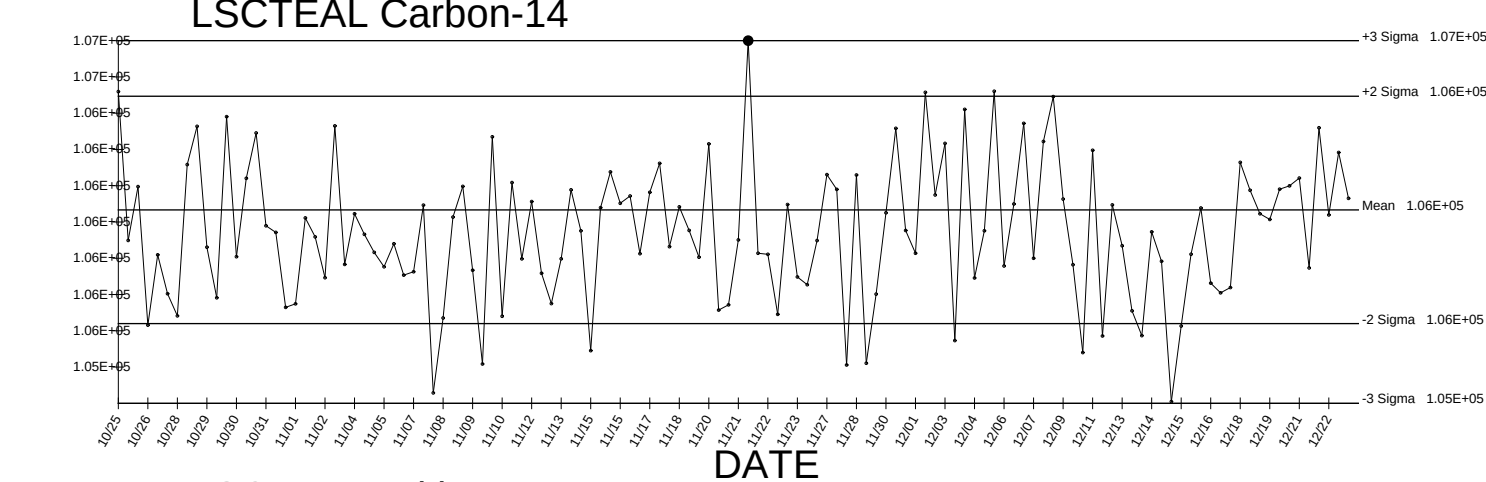
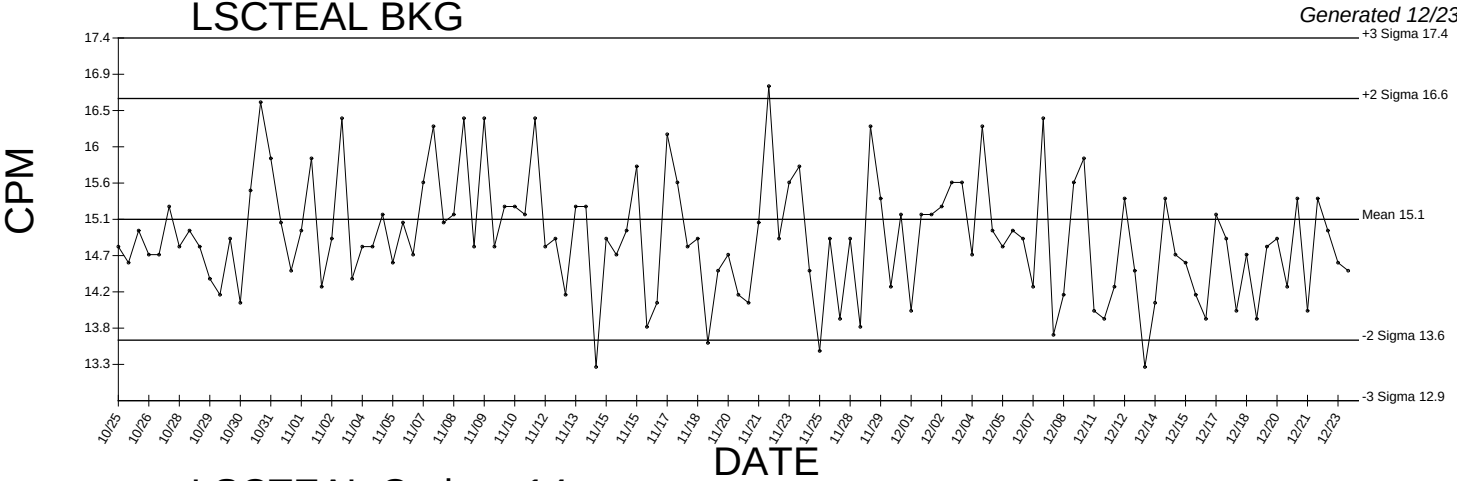
Background and Efficiency Data



● Denotes Outlier



● Denotes Outlier



● Denotes Outlier

RAD Standards Traceability



National Institute of Standards & Technology

Certificate

Standard Reference Material 4226C Nickel-63 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive nickel-63 chloride, non-radioactive nickel chloride, and hydrochloric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains nickel-63 with a total activity of approximately 260 kBq. Nickel-63 decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. During the decay process no photons are emitted. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. There is no detectable external radiation. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains hydrochloric acid (HCl) with a concentration of 0.9 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least August 2005. The long-term stability of these solutions is discussed in references [9] and [10].

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

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by R. Collé and B.E. Zimmerman of the Radioactivity Group.

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

Gaithersburg, Maryland 20899
December 1995 (Text only revised November 1997)

Thomas E. Gills, Chief
Standard Reference Materials Program

Recommended Procedure for Opening the SRM Ampoule

- 1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.
- 2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.
- 3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.
- 4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.
- 5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.
- 6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.
- 7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.
- 8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.
- 9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss. See also reference [4]*.

PROPERTIES OF SRM 4226C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4226C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter	(16.5 ± 0.5) mm	
	Wall Thickness	(0.60 ± 0.04) mm	
	Barium content	Less than 2.5%	
	Lead-oxide content	Less than 0.02%	
	Other heavy elements	Trace quantities	
Solution density	(1.014 ± 0.004) g·mL ⁻¹ at 22 °C [b]*		
Solution mass	(5.080 ± 0.002) g [b]		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L ⁻¹)	Mass Fraction (g·g ⁻¹)
	H ₂ O	54	0.96
	HCl	0.9	0.04
	NiCl ₂	0.0017	0.00022
	⁶³ NiCl ₂	4 × 10 ⁻⁷	5 × 10 ⁻⁸
Radiological Properties:			
Radionuclide	Nickel-63		
Reference time	1200 EST, 15 August 1995		
Massic activity of the solution [c]	50.53 kBq·g ⁻¹		
Relative expanded uncertainty (k=2)	0.92% [d] [e]		
Photon-emitting impurities	None detected [f]		
Half lives used in the decay corrections	Hydrogen-3: (12.33 ± 0.06) a [g] Nickel-63: (101.1 ± 1.4) a [h]		
Beta-particle maximum energies used in the EFFY4 computations	Hydrogen-3: (18.594 ± 0.008) keV [g] Nickel-63: (66.945 ± 0.004) keV [g]		
Calibration method	Two 4πβ liquid-scintillation counters. The Ni-63 detection efficiency was calculated using the CIEMAT/NIST method with H-3 as the detection-efficiency monitor. [s]		

RC-S-034-060c

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i , the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [i]	Relative Sensitivity Factor, $ \partial y/\partial x_i \cdot$ (x_i/y) [j]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [k]
Massic liquid-scintillation count rate of the Ni-63 solution, corrected for background and decay, divided by the computed detection efficiency [m]	Standard deviation of the mean (typical) for 10 repeated measurements on a single sample (A)	0.06	1.0	0.06
	Typical standard deviation for measurements on 4 differently quenched samples (A)	0.15	1.0	0.15
	Typical standard deviation for 18 computed detection efficiency curves (A)	0.18	1.0	0.18
Quench-indicating- parameter (QIP) measurements	Standard deviation of the mean (typical) for 10 repeated measurements on a single sample (A)	0.48	0.27	0.13
Live-time [n]	Estimated (B)	0.08	1.0	0.08
Gravimetric measurements	Estimated (B)	0.05	1.0	0.05
Photon-emitting impurities	Limit of detection (B) [p]	100.	0.00004	0.004
Half life of hydrogen-3 Half life of nickel-63	Standard uncertainty of the half life (A)	0.49 [q] 1.4 [q]	0.006 [r] 0.0007 [r]	0.003 0.001
Liquid-scintillation cocktail effects	Estimated (B)	0.08	1.0	0.08
Computed detection efficiency for Ni-63	Estimated (B) [s]	0.35	1.0	0.35
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.46
Coverage Factor, k				<u>x 2</u>
Relative Expanded Uncertainty of the Output Quantity, U/y , (%)				0.92

NOTES

- [a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.
 Distance from Ampoule (cm): 1 30 100
 Approximate Dose Rate ($\mu\text{Sv/h}$): <0.1 (Not detectable)

- [b] The stated uncertainty is two times the standard uncertainty.

- [c] **Massic activity** is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

- [d] The reported value, y , of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \dots, x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

 The value, x_i , used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y , $u_i(y) = |\partial y / \partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y .

 The **combined standard uncertainty** of y , $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

 The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U , the **expanded uncertainty** of y .

 Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

 For further information on the expression of uncertainties, see references [2] and [3].

- [e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the liquid-scintillation counting is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

- [f] Estimated limits of detection for photon-emitting impurities are:
 $5 \times 10^{-6} \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 12 and 88 keV,
 $2 \times 10^{-6} \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 96 and 507 keV,
 $8 \times 10^{-7} \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 515 and 1456 keV, and
 $3 \times 10^{-7} \gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 1465 and 1900 keV.

- [g] The stated uncertainty is the standard uncertainty. See reference [5].

- [h] The stated uncertainty is the standard uncertainty. The half life of nickel-63 was reevaluated as part of the calibration of this SRM. See reference [10].

- [i] Relative standard uncertainty of the input quantity x_i .
- [j] The relative change in the output quantity y divided by the relative change in the input quantity x_i . If $|\partial y / \partial x_i| \cdot (x_i / y) = 1.0$, then a 1% change in x_i results in a 1% change in y . If $|\partial y / \partial x_i| \cdot (x_i / y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y .
- [k] Relative component of combined standard uncertainty of output quantity y , rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \approx |\partial y / \partial x_i| \cdot u(x_i)/y = |\partial y / \partial x_i| \cdot (x_i / y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y / \partial x_i| \cdot (x_i / y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.
- [m] The Ni-63 massic activity of SRM 4226C is gravimetrically related to the massic activity of SRM 4226 (issued in 1969) and SRM 4226B (issued in 1984). The calibrations of SRM 4226 and SRM 4226B were based upon microcalorimetric measurements made in 1968. The calibration of SRM 4226C differs by less than 0.2 percent from the previous calibrations, after revision of the calorimetry data by a factor of 17.23/17.426 to account for a change in the assumed mean beta-particle energy of Ni-63 and after correction for decay using a half life of 101.1 years. See references [9], [10], and [11].
- [n] The live time is determined by counting the pulses from a gated crystal-controlled oscillator.
- [p] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y / \partial x_i| \cdot (x_i / y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of Ni-63})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of Ni-63})\}$. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.
- [q] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.
- [r] $|\partial y / \partial x_i| \cdot (x_i / y) = |\lambda \cdot t|$, multiplied by other sensitivity factors where appropriate.
- [s] The relationship between the detection efficiency for Ni-63 and the detection efficiency for H-3 was computed using the CIEMAT/NIST method as embodied in the computer program EFFY4. See references [6, 7, 8]. The program computes the detection efficiency for each radionuclide based upon an assumed model. No estimate is made of the uncertainty associated with this model.

REFERENCES

- [1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.
- [2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)
- [3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1993. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.
- [5] Evaluated Nuclear Structure Data File (ENSDF), August 1995, and M. Martin, Nuclear Data Project (Oak Ridge National Laboratory), private communication, August 1995.
- [6] E. Garcia-Toraño and A. Grau Malonda, EFFY, A New Program to Compute the Counting Efficiency of Beta Particles in Liquid Scintillators, *Computer Phys. Comm.* **36** (1985) 307.
- [7] A. Grau Malonda, E. Garcia-Toraño, and J.M. Los Arcos, Liquid-Scintillation Counting Efficiency as a Function of the Figure of Merit for Pure Beta-Particle Emitters, *Int. J. Appl. Radiat. Isot.* **36** (1985) 157.
- [8] B.M. Coursey, W.B. Mann, A. Grau Malonda, E. Garcia-Toraño, J.M. Los Arcos, J.A.B. Gibson, and D. Reher, Standardization of Carbon-14 by $4\pi\beta$ Liquid Scintillation Efficiency Tracing with Hydrogen-3, *Appl. Radiat. Isot.* **37** (1986) 403.
- [9] R. Collé and B.E. Zimmerman, ^{63}Ni Standardization: 1968-1995, to be published.
- [10] R. Collé and B.E. Zimmerman, ^{63}Ni Half Life: A New Experimental Determination and Critical Review, to be published.
- [11] B.E. Zimmerman and R. Collé, The Standardization of ^{63}Ni using $4\pi\beta$ Liquid Scintillation Spectrometry with ^3H -Standard Efficiency Tracing, to be published.
- [12] B.M. Coursey, L.L. Lucas, A. Grau Malonda, and E. Garcia-Toraño, The Standardization of Plutonium-241 and Nickel-63, *Nucl. Inst. Meth.* **A279** (1989) 603.
- [13] J.M. Los Arcos, L. Rodriguez Barquero, and E. Garcia-Toraño, *CIEMAT Contribution to the EUROMET Project 297 on the Standardization of ^{63}Ni* , CIEMAT document number DT-MRI-9502, Madrid, 1995.



Standard Traceability Log Rad

Source Material Info	
Parent Code:	0398
Prepared By:	Angela Johnson
Carrier Conc:	0.1 M HCL
Reference Date:	08/15/1995
Ampoule Mass (g):	5.08 g
Uncertainty:	+/- .92 %
LogBook No:	RC S 034 060

A Solution Material Info			
Isotope:	Nickel-63		
Prepared By:	Angela Johnson		
Prep Date:	01/29/2002		
Verification Date:	05/18/2015		
Expiration Date:	05/18/2016		
Primary Code:	0398-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.743 g		
Density(g/mL):	0.9984	Balance ID:	38080204

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kBq/g)}) * (\text{conversion dpm to kBq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(4.743 \text{ g}) * (50.53 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (100 \text{ mL}) = 143798.2740 \text{ dpm/mL}$
$(4.743 \text{ g}) * (50.53 \text{ kBq/g}) * (60000 \text{ dpm/kBq}) / (0.9984 \text{ g/mL}) / (100 \text{ mL}) = 144031.7490 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
01/29/2002	Angela Johnson	2.0859	100	0398-B-202	3004.358 dpm/mL	01/30/2004	01/30/2005
05/07/2003	Lonnie Morris	2.2473	100	0398-C	3236.8255 dpm/mL	05/07/2004	05/07/2005
02/04/2005	Amanda Fehr	2.4699	100	0398-D	3557.4402 dpm/mL	02/10/2005	02/10/2006
01/11/2006	Amanda Fehr	12.1551	500	0398-E	3501.44062 dpm/mL	12/15/2009	12/15/2010
07/29/2010	Gregory Ramsay	12.3265	500	0398-F	3550.8147 dpm/mL	06/25/2013	06/25/2014
08/13/2013	Christina Kimball	.2476	100	0398-G	356.6226 dpm/mL	09/15/2016	09/15/2017
09/16/2013	Gregory Ramsay	12.0265	500	0398-H	3464.39566 dpm/mL	09/13/2016	09/13/2017

Verification for Ni-63 Standard 0398-H

v1.0.2

Instrument	Green
Analyst	GXR1
Verification Prep Date	9/13/2016

Standard Information	
Isotope	Ni-63
Serial Number	0398-H
Isotope Half-life	100.1000 Y
Reference Date	8/15/1995
Ref. Act. (DPM/mL)	3464.39566
Amount of Std. (mL)	0.1
Standard Prep Date	9/16/2013

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	9/14/2016	75.90	281.00	43.20
2	9/14/2016	75.10	281.80	43.20
3	9/14/2016	74.40	283.00	43.20

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	237.80	0.774234	3071.42	307.14
2	238.60	0.774234	3081.75	308.18
3	239.80	0.774234	3097.25	309.73

Mean Value = 3083.48
 Stdev = 13.00180507
 Certificate Value* = 2993.8
 Two sigma = 26.004
 10 % of Mean = 308.348
 Rule A (Pass/Fail) Pass
 % Recovery 103.00%
 Rule B (Pass/Fail) Pass
 Expiration Date 9/13/2017

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
 Rule B = The determined mean value shall be within 5% of the certificate value.

* Certificate Value is decay corrected to Count Date.

The analyst prepared three standard verification sources for Ni-63 source 0398-H by transferring 0.1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSCGreen for Ni-63 source standard verification. The Ni-63 efficiency calibration which was used for verification calculations was performed on 9/13/2016 using Ni-63 source 1713-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

A = Ver. source cpm,
 B = BKG cpm,
 C = System efficiency (cpm/dpm), and
 D = volume used for standard verification.

RAD-M-001

09/14/16
 Asfa-dqel 9114114

Standardization of Nickel-63 Carrier 2422244

v1.2.1

Analyst	GXR1

Standard Information	
Isotope	Nickel-63
Serial Number	2422244
Amount of Std. (mL)	2.0
Standard Prepared	6/23/2016

Parent Information	
Parent Serial #	2296372
Parent Exp. Date	6/22/2018

Std #	Weight of carrier added (g)	Weight of crucible or filter (g)	Weight of crucible or filter + ppt. (g)	Weight of ppt. (g)	mg Nickel-63/mL	mg Nickel-63/g
1	2.0000	13.6476	13.6722	0.0246	12.30	12.30
2	2.0000	13.6792	13.7040	0.0248	12.40	12.40
3	2.0000	13.6403	13.6647	0.0244	12.20	12.20
4	2.0000	13.6532	13.6777	0.0245	12.25	12.25

Mean Value (mg/mL) = 12.29
 Stdev (mg/mL) = ± 0.09
 1.0% of Mean Value = 0.122875
 Pass
 Expiration Date 6/23/2017
 Mean Value (mg/2.0mL) = 24.58

Standardization Rule

A satisfactory standardization is obtained when results give a standard deviation of less than 1.0% of the mean value.

[Handwritten signature]
6/29/17

CERTIFICATE OF CALIBRATION
Standard Reference Source

1753

100124

H-3 5 mL Liquid in Flame Sealed Vial

Customer: GEL Laboratories, LLC
P.O. No.: GEL1511998, Item 3 **Product Code:** 8003-5FSA-185kBq



This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by Eckert & Ziegler Analytics. The master solution was calibrated by liquid scintillation counting. Radionuclide calibration and purity were checked by germanium gamma-ray spectrometry, liquid scintillation counting, and/or alpha spectrometry, as applicable. The nuclear decay rate and reference date for this source are given below. Eckert & Ziegler Analytics (EZA) maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 2, July 2007, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, %			Reference Date (12:00 PM EST)
			u _A	u _B	U	
H-3	4.500E+03	1.847E+05	0.1	1.5	3.0	09/01/2015

***Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

Impurities: γ -impurities < 0.1%.
5.00138 g of tritiated water.

Source Prepared by: _____

Z. Dimitrova, Radiochemist

QC Approved: _____

J. S. Laha, Spectroscopist

Date: 28 AUG 15



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1753
Prepared By:	Gregory Ramsay
Carrier Conc:	Water
Reference Date:	09/01/2015
Ampoule Mass (g):	5.00138 g
Uncertainty:	+/- 1.5 %
LogBook No:	GL-CED-297-046

A Solution Material Info			
Isotope:	Tritium		
Prepared By:	Gregory Ramsay		
Prep Date:	11/02/2015		
Verification Date:	11/02/2015		
Expiration Date:	11/02/2016		
Primary Code:	1753-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9357 g		
Density(g/mL):	0.9967	Balance ID:	C31514

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.9357 \text{ g}) * (184700 \text{ Bq}) * (60 \text{ dpm/Bq}) / (5.00138 \text{ g} * 100 \text{ mL}) = 109364.6702 \text{ dpm/mL}$
$(4.9357 \text{ g}) * (184700 \text{ Bq}) * (60 \text{ dpm/Bq}) / (0.9967 \text{ g/mL}) / (5.00138 \text{ g} * 100 \text{ mL}) = 109726.7685 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
11/02/2015	Gregory Ramsay	12.3299	500	1753-B	2705.8402 dpm/mL	11/01/2016	11/01/2017
12/27/2016	Gregory Ramsay	12.52	500	1753-C	2747.5583 dpm/mL	12/27/2016	12/27/2017

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for H-3 Standard 1753-B

v1.0.2

Instrument	RED
Analyst	GXR1
Verification Prep Date	11/1/2016

Standard Information	
Isotope	H-3
Serial Number	1753-B
Isotope Half-life	12.3200 Y
Reference Date	9/1/2015
Ref. Act. (DPM/mL)	2705.8402
Amount of Std. (mL)	0.1
Standard Prep Date	11/2/2015

Std #	Count Date	Quench Number	Gross cpm	Bkg cpm
1	11/2/2016	68.40	145.40	45.70
2	11/2/2016	68.70	149.10	45.70
3	11/2/2016	69.30	152.40	45.70

Std #	Net cpm	Calculated Avg. Eff.	Standard dpm/mL	Measured dpm
1	99.70	0.412322	2418.01	241.80
2	103.40	0.412322	2507.75	250.77
3	106.70	0.412322	2587.78	258.78

Mean Value = 2504.51
 Stdev = 84.93127172
 Certificate Value* = 2533.2
 Two sigma = 169.863
 10 % of Mean = 250.451
 Rule A (Pass/Fail) Pass
 % Recovery 98.87%
 Rule B (Pass/Fail) Pass
 Expiration Date 11/1/2017

Verification Rules

Rule A = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.

Rule B = The determined mean value shall be within 5% of the certificate value.

* Certificate Value is decay corrected to Count Date.

The analyst prepared three standard verification sources for H-3 source 1753-B by transferring 0.1 mL portions of the standard into glass liquid scintillation vials. 10 mL of Ecoscint Ultra liquid scintillation cocktail was added to each vial and the vials were shaken to mix. A Blank vial was prepared in a similar fashion using 10 mL of Ecoscint Ultra liquid scintillation cocktail. The standard verification vials and background source were dark adapted for at least two hours and counted on LSRED for H-3 source standard verification. The H-3 efficiency calibration which was used for verification calculations was performed on 11/1/2016 using H-3 source 1712-A.

Standard results for each verification source was calculated as follows:

$$\text{Source dpm/mL} = (A - B)/(C)(D)$$

where:

A = Ver. source cpm,

B = BKG cpm,

C = System efficiency (cpm/dpm), and

D = volume used for standard verification.

RAD-M-001

11/3/16
 Ogle 11/3/16

Runlogs

Instrument Run Log

Instrument Type: LSC

Batch ID: 1625595

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
411910001	SAMPLE	KXA1	LSCORANGE	DEC-28-16 18:04:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
411910002	SAMPLE	KXA1	LSCORANGE	DEC-28-16 18:37:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
412372003	SAMPLE	KXA1	LSCORANGE	DEC-28-16 19:09:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
412854002	SAMPLE	KXA1	LSCORANGE	DEC-28-16 19:27:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
412854004	SAMPLE	KXA1	LSCORANGE	DEC-28-16 20:29:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
1203693748 MB		KXA1	LSCORANGE	DEC-28-16 21:32:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
1203693749 DUP		KXA1	LSCORANGE	DEC-28-16 22:35:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
1203693750 MS		KXA1	LSCORANGE	DEC-29-16 07:39:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
1203693751 MSD		KXA1	LSCORANGE	DEC-29-16 07:57:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00
1203693752 LCS		KXA1	LSCORANGE	DEC-29-16 11:28:58	DONE	10mL DW/13mL Ecoscint Ultra	15-JUN-16 00:00

Instrument Run Log

Instrument Type: LSC

Batch ID: 1625619

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
412372001	SAMPLE	MYM1	LSCTEAL	DEC-23-16 03:31:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372002	SAMPLE	MYM1	LSCTEAL	DEC-23-16 03:47:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372003	SAMPLE	MYM1	LSCTEAL	DEC-23-16 04:03:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372004	SAMPLE	MYM1	LSCTEAL	DEC-23-16 04:19:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372005	SAMPLE	MYM1	LSCTEAL	DEC-23-16 04:35:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372006	SAMPLE	MYM1	LSCTEAL	DEC-23-16 04:51:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372007	SAMPLE	MYM1	LSCTEAL	DEC-23-16 05:07:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372008	SAMPLE	MYM1	LSCTEAL	DEC-23-16 05:24:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372009	SAMPLE	MYM1	LSCTEAL	DEC-23-16 05:40:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372010	SAMPLE	MYM1	LSCTEAL	DEC-23-16 05:56:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372011	SAMPLE	MYM1	LSCTEAL	DEC-23-16 06:12:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372012	SAMPLE	MYM1	LSCTEAL	DEC-23-16 06:28:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372013	SAMPLE	MYM1	LSCTEAL	DEC-23-16 06:44:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
412372014	SAMPLE	MYM1	LSCTEAL	DEC-23-16 07:00:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
1203693829	MB	MYM1	LSCTEAL	DEC-23-16 07:17:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
1203693830	DUP	MYM1	LSCTEAL	DEC-23-16 07:33:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00
1203693831	LCS	MYM1	LSCTEAL	DEC-23-16 07:49:00	DONE	2mL Ni Carrier/3mL 0.7M HCl/15mL Ecoscint Ultra	01-MAY-16 00:00

Instrument Run Log

Instrument Type: LSC

Batch ID: 1625629

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
412372001	SAMPLE	TXP3	LSCSILVER	JAN-02-17 13:17:28	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372002	SAMPLE	TXP3	LSCSILVER	JAN-02-17 13:33:46	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372004	SAMPLE	TXP3	LSCSILVER	JAN-02-17 13:50:05	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372005	SAMPLE	TXP3	LSCSILVER	JAN-02-17 14:06:24	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372006	SAMPLE	TXP3	LSCSILVER	JAN-02-17 14:22:44	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372007	SAMPLE	TXP3	LSCSILVER	JAN-02-17 14:39:04	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372008	SAMPLE	TXP3	LSCSILVER	JAN-02-17 14:55:23	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372009	SAMPLE	TXP3	LSCSILVER	JAN-02-17 15:11:42	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372010	SAMPLE	TXP3	LSCSILVER	JAN-02-17 15:28:01	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372011	SAMPLE	TXP3	LSCSILVER	JAN-02-17 15:44:22	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372012	SAMPLE	TXP3	LSCSILVER	JAN-02-17 16:00:40	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372013	SAMPLE	TXP3	LSCSILVER	JAN-02-17 16:17:05	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
412372014	SAMPLE	TXP3	LSCSILVER	JAN-02-17 16:33:25	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
1203693863 MB		TXP3	LSCSILVER	JAN-02-17 16:49:44	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
1203693866 LCS		TXP3	LSCSILVER	JAN-03-17 13:40:56	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
1203693864 DUP		TXP3	LSCSILVER	JAN-03-17 14:30:01	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00
1203693865 MS		TXP3	LSCSILVER	JAN-04-17 07:08:46	DONE	10mL DW/13mL Ecoscint Ultra	01-JUL-16 00:00