

April 9, 2024

Mr. Mark Hanna
President
Environmental Advantage, Inc.
3636 N. Buffalo Road
Orchard Park, New York 14127

Dear Mr. Hanna:

MJW Corporation (MJW) is pleased to present the enclosed TENORM investigation report for slag-like materials analyzed from an excavation completed at MOD-PAC Corp. (MPC), located at 1801 Elmwood Avenue in Buffalo, NY. The MPC property is a completed Brownfield Cleanup Program (BCP) Site, which is subject to a Site Management Plan (SMP); BCP Site 915314. Environmental Advantage, Inc. (EA) staff discovered the slag-like material on November 6, 2023 while providing excavation oversight during a subsurface investigation into the cause of a sinkhole. The apparent slag-like material was immediately segregated upon discovery, along with the surrounding subsurface layers, and stockpiled and covered in a separate area at the MPC Site. MJW Radiological Control Supervisor Alex Bartels was notified immediately upon the discovery of the material, and retained to provide oversight; however due to being out of the area at another project site, MJW was not able to immediately respond to the MPC Site. Due to the emergency nature of the sink hole excavation work, excavation and segregation continued on November 10, 2023, when a broken pipe was located and repaired.

MJW Radiological Control Supervisor Alex Bartels investigated the stockpiled materials on November 13, 2023. A series of five (5) stockpiles were investigated; four (4) were deemed to be soil/crushed rock/concrete with no elevated readings detected above background on the Ludlum 2241-2/44-10 meter, and one (1) consisted of slag-like materials that exhibited 2x background readings. Samples were collected from this pile by MJW Radiological Control Supervisor Alex Bartels, and submitted to GEL Labs for sent for Gamma and Alpha Spectroscopy.

Sink hole excavation work was continued on November 20-21, 2023, as it was determined after the initial repair that an additional break was probable. Due to the discovery of the potential TENORM materials, Environmental Advantage requested a Radiological Control Technician (RCT) to provide oversight for this additional work. MJW provided an RCT as further excavation was completed in an adjacent area to locate and repair the broken underground pipes. MJW encountered roughly one (1) cubic yard of additional slag-like material, which was added to the existing slag stockpile. The material is currently staged and covered in the back of the MPC Site and will be transported to an approved facility once reviewed by the NYSDEC representative.

Enclosed is the report from the investigation, with the lab report from the samples sent to GEL Labs for analysis located in **Attachment D**. In accordance with DMM-5, the material is classified as TENORM (background-comparable). MJW used materials from the nearby athletic fields as background data. The data from that material is identified as unimpacted areas. Please review all the contents and reach out to MJW if you have any questions.

Sincerely,

Alexander Bartels

Alexander Bartels
MJW Radiological Safety Officer

MJW Doc. 24.2006.1

November 15, 2023

Ms. Mary Szustak
Project Manager
Environmental Advantage, Inc.
3636 N. Buffalo Road
Orchard Park, New York 14127

Dear Ms. Szustak:

MJW Corporation (MJW) is pleased to present the TENORM investigation report from materials analyzed from work performed at MOD-PAC Corp. BCP #915314, located at 1801 Elmwood Avenue in Buffalo, NY. The material was discovered during a sinkhole investigation after subcontractors discovered slag-like material. The material was segregated and covered in the back lot of MOD-PAC until MJW Radiological Control Supervisor Alex Bartels could investigate on November 13, 2023.

MJW used a Bicron MicroRem Survey Meter and Ludlum 2241-2 meter with a 44-10 (2" x 2") Sodium Iodine Detector to determine in-field radiological conditions.

A series of five (5) piles were investigated; four (4) were deemed to be soil/crushed rock/concrete with no elevated readings detected above background on the Ludlum 2241-2/44-10 in the proposed project areas, and one (1) consisted of slag like materials that were reading ~ 2x background reading. Sample material from this pile was sent for Gamma and Alpha Spectroscopy to GEL Labs.

The four piles showing no radiological footprint via instrumentation were released for disposal.

The pile showing elevated readings has been covered with poly while MJW awaits analytical results.

MJW is awaiting results from samples collected from GEL Labs. MJW will provide a sample analysis report as well as all Electronic Data Deliverables for review once received.

Alexander Bartels
Alexander Bartels
MJW Radiation Safety Officer

Attachment A: Pictures from MODPAC Investigation

1) Piles surveyed and corresponding identification numbers



2) Slag Pile #5



3) Slag Pile #5 (Different Angle)



4) Slag Pile #5 Covered with poly while awaiting lab results



Attachment B: MJW Survey Form from MODPAC Investigation

Radiological Survey Report Form

Activity: MODPAC Slag Investigation				Survey Number: 20231113-001				Page: 1 of 1					
Survey Date: 11/13/2023		Time: 1300		Surveyed By: A. Bartels									
Instrument/Detector Model #		Inst./Detector Serial #		BGK/units/type		% Eff.		Nuclide		Cal. Due Date			
Ludlum 2241-2 / 43-90		219137/PR277930		1		CPM α		18.2%		Pu-239			
Ludlum 3 / 44-9		222619/PR112415		50		CPM β		21.1%		Tc-99			
Thermo MicroRem		19264		5		μRem/hr γ		N/A		N/A			
Ludlum 2241-2/44-10		196664/PR413155		5,000		CPM γ		13.6%		Cs-137			
Area/Material Surveyed	Total (gross cpm)	Total (net cpm)	LAWs (net cpm)		Smear #	Smears (gross cpm)			Smears (dpm/100cm ²)			Dose Rate * (μRem/hr)	
	2x2 Readings	2x2 Readings	alpha	beta		alpha	beta	H-3	alpha	beta	H-3	30 cm	1 cm
Pile 1	4000	0										4	5
Pile 2	5000	0										5	5
Pile 3	5000	0										5	5
Pile 4	4500	0										4	4
Pile 5 (Slag)	10000	5000										10	15
Pile 5 NW Corner	11000	6000										10	15
Pile 5 NE Corner	9000	4000										10	15
Pile 5 SE Corner	12000	7000										10	15
Pile 5 SW Corner	8000	3000										10	15

* = Dose rates include background

Reviewed By (print/signature): Alexander Bartels Alexander Bartels Date: 11/14/2023

Attachment C: Instrument Calibration Paperwork



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CERT # 4084.01

Customer **MJW TECHNICAL SERVICES**

ORDER NO. 20436966/534083

Mfg. **Ludlum Measurements, Inc.** Model **3** Serial No. **222619**

Mfg. **Ludlum Measurements, Inc.** Model **44-9** Serial No. **PR112415**

Cal. Date **5-Jan-23** Cal Due Date **5-Jan-24** Cal. Interval **1 Year** Meterface **202-002**

Check mark ☒ Applies to applicable instr. and/or detector IAW mfg. spec. T **77** °F RH **23** % Alt **712.5** mm Hg

☐ New Instrument ☐ Instrument Received ☐ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☒ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☒ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☒ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation ☒ Geotropism

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck.

☒ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set **900** V Input Sens. **29** mV Det. Oper. **900** V at **29** mV Threshold Dial Ratio **=** mV

☐ HV Readout (2 points) Ref./Inst. **/** V Ref./Inst. **/** V

COMMENTS:

Tc99: #5296, 33 kdpm *Net reading $\approx$ 7000 cpm. Bkg: 50, 4 F Efficiency: $\approx$ 21.06%

SrY90: #5296, 53170dpm *Net reading $\approx$ 19 kcpm. Bkg: 50, 4 F Efficiency: $\approx$ 35.64%

Calibrated with 5ft cable.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.
Multimeter uncertainty within 1.3% of reading. Gamma uncertainty within 5.0% of reading. Neutron uncertainty within 1.5% of reading. Count rate uncertainty within 5.4% of reading.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
X100	400 K cpm	N/A	4K cpm
X100	100 K cpm		1K
x10	40 K cpm		4K
x10	10 K cpm		1K
X1	4 K cpm		4K
X1	1 K cpm		1K
X0.1	400 cpm		4K
X0.1	100 cpm		1K

ALL Range(s) Calibrated Electronically

Digital	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
Readout							

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the NIST and/or other international standards, or to the calibration facilities of other international standards organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors. Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2. The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323AB-2013.

ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1983

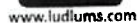
Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☒ G112 ☒ 2*38CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☐ Other

☒ m 500 S/N **315137** ☐ Oscilloscope S/N ☒ Multimeter S/N **92780460**

Calibrator **Josie Ruiz** Title **Technician** Date **5 Jan 23**

QC'd By **Josie Ruiz** Title **Final QC** Date **9 Jan 23**



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ACCREDITED
CERT # 4084.01

Customer **MJW TECHNICAL SERVICES**

ORDER NO. **20454790/546286**

Mfg. **Bicron** Model **MICRO REM** Serial No. **19264**

Mfg. _____ Model _____ Serial No. _____

Cal. Date **28-Sep-23** Cal Due Date **28-Sep-24** Cal. Interval **1 Year** Meterface _____

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. **73** °F RH **31** % Alt **698.0** mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☐ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation ☐ Geotropism

☒ Audio ck. ☐ Alarm Setting ck. ☐ Batt. ck.

☐ Calibrated in accordance with LMI SOP 14.8 ☒ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set _____ V Input Sens. _____ mV Det. Oper. _____ V at _____ mV Threshold Dial Ratio _____ = _____ mV

☐ HV Readout (2 points) Ref./Inst. _____ / _____ V Ref./Inst. _____ / _____ V

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

Multimeter uncertainty within 1.3% of reading. Gamma uncertainty within 5.0% of reading. Radiation uncertainty within 1.0% of reading. Count rate uncertainty within 5.4% of reading.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
x 1000	150 mrem/hr	150 mrem/hr	150 mrem/hr
x 1000	50 mrem/hr	50	50
x 100	15 mrem/hr	150	150
x 100	5 mrem/hr	48	48
x 10	1500 μ rem/hr	160	150
x 10	500 μ rem/hr	55	52
x 1	150 μ rem/hr	150	150
x 1	100 μ rem/hr	100	100
x0.1	15 μ rem/hr	150	150
x0.1			

Range(s) Calibrated Electronically

Digital Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors.

Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2.

The calibration system conforms to the requirements of ANSI/NCSL Z540-1:1994 and ANSI N322AB 2013.

ISO/IEC 17025:2017(E)

State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2' 68CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☒ E551 ☒ S105 ☒ CSV280

☐ Alpha S/N _____ ☐ Beta S/N _____ ☒ Other **Cs-137:** _____

☐ m 500 S/N _____ ☐ Oscilloscope S/N _____ ☐ Multimeter S/N _____

Calibrator **Duaine Jackson** Title **Calibrator** Date **28 Sep 23**

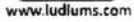
QC'd By **Randy** Title **Final QC** Date **28 Sep 23**

This certificate shall not be reproduced except in full, without the written approval of Ludlum Measurements, Inc.

FORM C22A 01/07/2020

Page **1** of **1**

AC Inst. ☐ Passed Dielectric (Hi-Pot) and Continuity Test
Only ☐ Failed: _____



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CERT # 4084.01

Customer MJW TECHNICAL SERVICES

ORDER NO. 20452324/544626

Mfg. Ludlum Measurements, Inc. Model 2241-2

Serial No. **219137**

Mfg. Ludlum Measurements, Inc. Model 43-90

Serial No. PR 277930

Cal. Date 23-Aug-23 Cal Due Date 23-Aug-24 Cal. Interval 1 Year Meterface cpm

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec.

T. 74 °F RH 36 % Alt 707.6 mm Hg

☐ New Instrument Instrument Received ☒ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☐ Meter Zeroed ☐ Background Subtract ☐ Input Sens. Linearity

☒ F/S Resp. ck ☒ Reset ck. ☐ Window Operation

☒ Audio ck. ☒ Alarm Setting ck.

☒ Batt ck.☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set Comments V Input Sens. mV Det. Oper. V at mV Threshold Dial Ratio = mV

COMMENTS:

COMMENTS:	Det.1	Det.2	Source: Pu239	<i>Radio 3m</i>	Firmware: P-06-10
	Detector: 43-90		SN: 0158	E121495	Det.2 left at customer settings.
	Deadtime: 0 µSec	0 µSec	Size: 160814 dpm	19797 dpm	Overload checked but not set.
Calibration Constant:	100 e-2	100 e-2	Background: ≈ 0 cpm	≈ 0 cpm	
Rate-meter Alarm:	500 cpm	300 kcpm	Reading: ≈ 32740 cpm	≈ 3647 cpm	
Rate-meter Alert:	400 cpm	200 kcpm	4 Pi Efficiency: ≈ 20.36 %	≈ 18.42 %	
	High Voltage: 900 V	1200 V			
	Input Sensitivity: 10 mV	10 mV			

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source

Multimeter uncertainty within 1.3% of reading, Gamma uncertainty within 5.0% of reading, Neutron uncertainty within 7.0% of reading, Count rate uncertainty within 5.4% of reading

[illegible]

Range(s) Calibrated Electronically

REFERENCE	INSTRUMENT	INSTRUMENT	REFERENCE	INSTRUMENT	INSTRUMENT
CAL. POINT	RECEIVED	METER READING	CAL. POINT	RECEIVED	METER READING
800K cpm	799 kcpm	799 kcpm	800K cpm	79980(0)	79980(0)
200K cpm	199	199	200K cpm	19984	19984
80K cpm	79.9	79.9	80K cpm	7997	7997
20K cpm	20.0	20.0	20K cpm	1999	1999
8K cpm	7.99	7.99	8K cpm	799	799
2K cpm	2.00	2.00	2K cpm	200	200
800 cpm	799 cpm	799 cpm	800 cpm	80	80
200 cpm	200	200	200 cpm	20	20
80 cpm	80.3	80.3	80 cpm	8	8
20 cpm	19.6	19.6	20 cpm	2	2

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. All pass/fail determinations are based on the manufacturer's specifications without considering uncertainty factors. Measurement results represent expanded uncertainties expressed at approximately the 95% level of confidence, using a coverage factor of k=2. The calibration system conforms to the requirements of ANSI/NCCL Z540-1-1994 and ANSI N323AB-2013.

ISO/IEC 17025:2017(E)
State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 ☐ Neutron Am-241 Be ☐ T-304 ☐ Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☒ Alpha S/N Pu239#0158 ☐ Beta S/N _____ ☐ Other _____

☒ m 500 S/N 251106 ☐ Oscilloscope S/N _____ ☒ Multimeter S/N 15060230

Calibrator James McBeth *James McBeth*

Title: Calibrator Date: 23 AUG 23

QC'd By Rachel H.

Title **Final QC** Date **24 Aug 23**



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CERT # 4084.01

Customer **MJW CORPORATION**

ORDER NO. 20438547/535171

Mfg. Ludlum Measurements, Inc. Model 224 Serial No. 192664

Mfg. Ludlum Measurements, Inc. Model 44-10 Serial No. PR413155

Cal. Date 7-Feb-23 Cal Due Date 7-Feb-24 Cal. Interval 1 Year Meterface Digital

Check mark ☒ applies to applicable instr. and/or detector IAW mfg. spec. T. 76 °F RH 27 % Alt 705.0 mm Hg

☐ New Instrument ☐ Instrument Received ☒ Within Toler. $\pm 10\%$ ☐ 10-20% ☐ Out of Tol. ☐ Requiring Repair ☐ Other-See comments

☒ Mechanical ck. ☐ Meter Zeroed ☒ Background Subtract ☒ Input Sens. Linearity

☒ F/S Resp. ck. ☒ Reset ck. ☐ Window Operation

☒ Audio ck. ☐ Alarm Setting ck. ☒ Batt. ck.

☐ Calibrated in accordance with LMI SOP 14.8 ☐ Calibrated in accordance with LMI SOP 14.9

Instrument Volt Set 950 V Input Sens. 10 mV Det. Oper. 950 V at 10 mV Threshold = mV

COMMENTS:

Deadtime: 0 μ Sec
Cal Constant: 100e-2
Ratemeter Alarm: 0300 kcpm
Ratemeter Alert: 0200 kcpm

Det1
Firmware: P-0408
Calibrated using 6' C-cable.
Overload checked but not set.
Pulser calibration "RATMETER READOUT"
performed without deadtime.
*See attachment for efficiencies.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the end of probe faces source
Multimeter uncertainty within 1.3% of reading. Gamma uncertainty within 5.0% of reading. Count rate uncertainty within 5.4% of reading

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING
AUTO			
AUTO			

Range(s) Calibrated Electronically

	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING		REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING
Ratemeter Readout	800K cpm	796 kcpm	796 kcpm	Scaler Readout	800K cpm	79642(0)	79642(0)
	200K cpm	199	199		200K cpm	19898(0)	19898(0)
	80K cpm	79.6	79.6		80K cpm	7964(0)	7964(0)
	20K cpm	19.9	19.9		20K cpm	1990(0)	1990(0)
	8K cpm	7.96	7.96		8K cpm	796(0)	796(0)
	2K cpm	1.99	1.99		2K cpm	199(0)	199(0)
	800 cpm	800 cpm	800 cpm		800 cpm	80(0)	80(0)
	200 cpm	200 cpm	200 cpm		200 cpm	20(0)	20(0)

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.

ISO/IEC 17025:2017(E)

State of Texas Calibration License No. LO- 963

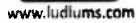
Reference instruments and/or Sources: Cs-137 S/N: ☐ 059 ☐ 2171CP ☐ 2261CP ☐ 720 ☐ 734 ☐ 781 ☐ 1131 ☐ 1616 ☐ 1696 ☐ 1909 ☐ 1916CP ☐ 2324/2521
☐ 5717CO ☐ 5719CO ☐ 60646 ☐ 70897 ☐ 73410 ☐ E552 ☐ G112 ☐ 2168CP ☐ S-394 ☐ S-1054 ☐ T10081 ☐ T10082 Neutron Am-241 Be ☐ T-304 Ra-226 ☐ Y982
☐ E551 ☐ 5105 ☐ CSV280

☐ Alpha S/N ☐ Beta S/N ☐ Other ☐ Multimeter S/N 17500076

☒ m 500 S/N 247891 ☐ Oscilloscope S/N ☒ Title Calibrator Date 7 FEB 23

Calibrator Scot VanAllen Title Final QC Date 7 Feb 23

QC'd By Scot VanAllen



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LUDLUM MEASUREMENTS, INC.

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Bench Test Data For Detector

Detector 44-10 Serial No. PR 413155

Customer MJW CORPORATION ORDER NO. 20438547/535171

Counter 2241 Serial No. 196664 Counter Input Sensitivity 10 mV

Count Time 6 SECOND Distance Source to Detector SURFACE

Other _____

High Voltage Background Isotope Am-241 Isotope _____ Isotope _____ Isotope _____
Size ~0.79 uCi Size _____ Size _____ Size _____

[illegible]

Signature Scot VanAllen

Date 7 FEB 23

Attachment 20438547/535171

Model 2241-2 s/n: 196664

Efficiencies for 44-10 (PR413155)

Am241 s/n: 1895

Activity: 23,840dpm

Source Count: 7,467cpm

Background: 5,040cpm

4pi Eff for Am241: 10.18%

Cs137 s/n: 0754

Activity: 133,949dpm

Source Count: 23,236cpm

Background: 5,040cpm

4pi Eff for Cs137: 13.58%



Scot VanAllen

Date: 7 February 2023

Attachment D: Sample Analysis Results

Attachment D. Sample Analysis Results

After reviewing results from SDG 645981 (Target Samples) and SDG 661916 (Background Samples), MJW compiled Table 1.0 below. It lists pertinent information regarding TENORM analysis; additional information is present in the Electronic Data Deliverable (EDD). An estimated 6 CY of material is in the pile represented in the report and analysis. Table 1.1 provides the analytical data for the samples analyzed.

Table 1.0 Analysis for Ra-226 in Samples

Per Sample (Backgrounds Excluded from Calculation)		
Sample No.	[Ra-226]	Sample Type
20231113-EA-03 Comp	1.85±0.171	TARGET
20231113-EA-MP-01	1.91±0.162	TARGET
20231113-EA-MP-01 Dup	1.9±0.192	FIELD DUPLICATE
20231113-EA-MP-01(645981001DUP)	1.79±0.179	LAB DUPLICATE
20231113-EA-MP-02	2.06±0.254	TARGET
01122024-SB1	1.22±.15	Background
01122024-TWT1	1.06±.137	Background
01122024-TWT1(651915001DUP)	0.993±.137	LAB DUPLICATE
Averages	1.90	
Averages (Background Subtracted)	0.81	
Standard Deviation	0.10	

MJW saw an average Ra-226 concentration in materials located in the segregated material from the sinkhole construction work at 1.90±0.10 pCi/g. The highest Ra-226 sample concentration was 2.06±.254 pCi/g for sample EA-MP-02. Nearby offsite background samples from areas identified by Alex Bartels of MJW as unimpacted were taken with an average Ra-226 value of 1.09 pCi/g; these samples were analyzed with a full 21-day ingrowth. The background results from these off-site samples reflect the typical background values for Western New York; Ra-226 is 1.1 pCi/g [DOE 1993a] and 0.9 pCi/g [ORNL 1992]. These results provide for net values well below 1.0 pCi/g. These low net values would bring into question the rationale for the offsite disposal of material.

In compliance with DMM-5 guidance, the material is classified as TENORM (background-comparable). A NYSDEC variance or approval from an assigned NYSDEC Environmental Radiation Specialist would be required to return the material to its original location.

The alternative of applying for a variance or returning the material to its original location is not an option at this Site, as the sinkhole was an emergency repair. For safety reasons, the excavation could not be left open and backfill was required immediately. Due to the low average Ra-226 concentration in materials, as well as the low volume of material, Environmental Advantage is looking for guidance in optional disposal at WM Chaffee Landfill or the Republic landfill in Niagara Falls.

Based on MJW's review of the information contained in the GEL sample analysis report, summarized in Attachment B, it is MJW's position that none of the test pit data would warrant offsite disposal.

Moreover, the net result (gross minus background) is about 0.8 pCi/g for Ra-226. MJW would recommend that, with these net low soil concentrations of Ra-226, offsite disposal is not warranted. However, the material needs to be removed from the site as the original excavation has already been backfilled and repaired with new asphalt. MJW recommends the material go to Waste Management's Chaffee, NY landfill and be "direct landfilled" (slag cannot be used as cover or a BUD/ADC).

If DEC is opposed to the Chaffee Landfill, MJW would propose Republic Landfill in Niagara Falls as a secondary location, where the "background levels" are higher than those observed at the MPC facility as Niagara County has significantly higher background levels than Erie County and the City of Buffalo.

Disposal options within Erie County provide for background Ra-226 values ≈ 0.9 pCi/g, as averaged across sampling reports (ORNL/TM-7343 1981, USACE 2020). Niagara County minimum Ra-226 concentrations begin at the Erie County average (0.9 pCi/g) as noted in DOE 2010; LMS/NFS/S06246. Previous sampling events in Niagara County by MJW representatives (GEL SDG:512240) have indicated even higher background concentrations above 1.8 pCi/g. Utilizing these values as backgrounds in disposal options, Erie County would provide for net Ra-226 concentrations of near 1.0 pCi/g and Niagara County at $<.5$ pCi/g.

December 13, 2023

Alex Bartels
MJW Technical Services
15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Re: Environmental Advantage
Work Order: 645981

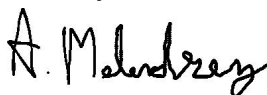
Dear Alex Bartels:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 20, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

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. 4422.

Sincerely,



Adrian Melendrez for
Jacob Crook
Project Manager

Purchase Order: GELP22-1492
Enclosures

**MJW Technical Services
Environmental Advantage
SDG: 645981**

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Case Narrative

**Case Narrative
for
MJW Technical Services
SDG: 645981**

December 13, 2023

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 November 20, 2023 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>
645981001	20231113-EA-MP-01
645981002	20231113-EA-MP-01 Dup
645981003	20231113-EA-MP-02
645981004	20231113-EA-03 Comp

Case Narrative

Sample analyses were conducted using methodology as outlined in GEL Laboratories, LLC (GEL) 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.

Data Package

The enclosed data package contains the following sections: General Narrative, Chain of Custody and Supporting Documentation, and data from the following fractions: Radiochemistry.



Adrian Melendrez for
Jacob Crook
Project Manager

List of current GEL Certifications as of 13 December 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-00651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
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	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	KY90129
Kentucky Wastewater	KY90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2023019
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122024-05
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2023-152
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-23-21
Utah NELAP	SC000122023-38
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Chain of Custody and Supporting Documentation

Client Name: <i>MTW (mmsani)</i>	Phone # <i>716 631-8791</i>
Sample Analysis Requested ⁽⁵⁾ (Fill in the number of containers for each test)	

Project #	Project Name	Project Manager	Project Status	Project Start Date	Project End Date	Project Budget	Project Actual Cost	Project Variance	Project Risk	Project Notes
1	Project A	John Doe	Completed	2023-01-01	2023-03-31	\$100,000	\$95,000	\$5,000	Low	Project A completed successfully.
2	Project B	Jane Smith	In Progress	2023-04-01	2023-06-30	\$200,000	\$180,000	\$20,000	Medium	Project B is on track.
3	Project C	Mike Johnson	On Hold	2023-07-01	2023-09-30	\$150,000	\$0	\$150,000	High	Project C is on hold due to budget constraints.
4	Project D	Sarah Lee	Not Started	2023-10-01	2023-12-31	\$300,000	\$0	\$300,000	Low	Project D is not yet started.

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	considered:	not considered
Address: 18 Hazelwood Suite 112 Amherst, NY 14228	c	c
Auditor: 6	c	c
		TM

Collected By:	A Barth
Sent Results To:	abart@umw.edu
(If Only)	ds
of course	cc
Comments	
Note: enter comments	

[illegible]

Sample ID	Sample ID	*Date Collected	Time Collected	Activity in 100mL H ₂ O	Concentration required for sample
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3	3			nm	nm
4	4			nm	nm
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70	81	EA-28-02	11-13-23	N	SD	X			F--33	2
71	3113-			N	SD					2

[illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible][illegible]

Renombrado por (signed)	Date	Received by (signed)	Date	Fax Results: ☐ Yes ☐ No

[illegible][illegible]

3		<i>Eor Lah Raravina Ise Out? Custody Seal Intact?</i> [] Yes [] No	Cooler Temp.: 0°C

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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[illegible]

1. Client or Custody Number = Client Determined

2.) QC Codes: **N** = Normal Sample, **TB** = Trip Blank, **FD** = Field Duplicate, **EB** = Equipment Blank, **MS** = Matrix Spike Sample, **MSD** = Matrix Spike Duplicate Sample, **G** = Grab, **C** = Composite

3.) Field Filtered. For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.

4.) Matrix Codes **DW**=Drinking Water, **GW**=Groundwater, **SW**=Surface Water, **WW**=Waste Water, **W**=Water, **ML**=Misc Liquid, **SO**=Soil, **SD**=Sediment, **SI**=Sludge, **SS**=Solid Waste, **O**=Oil, **F**=Filter, **P**=Wipe, **U**=Urine, **F**=Fecal, **N**=Nasal

5) Sample Analysis Requested Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. 8260B - 3, 6010B/7470A - 1).

3) Preservative Type: **HA** = Hydrochloric Acid **NI** = Nitric Acid **SH** = Sodium Hydroxide **SA** = Sulfuric Acid **AA** = Acetic Acid **HV** = Heavens **ST** = Sodium Thiosulfate. If a preservative is added, a one field blank.

[illegible]

FL = Flammable/ignitable	OT = Other / Unknown
LW = Listed Waste	
UNKN = Not Determined	

RCRA Metals	CO = Corrosive (F,K,P and U-listed wastes.) (i.e.: High/low pH, asbestos, beryllium, irritants, other concerns (i.e.: Origin of sample(s), type

As = Arsenic
Hg = Mercury
RE = Reactive
Waste code(s):
misc. health hazards, etc.)
of site collected from, odd matrices, etc.)

	Description:
Se = Selenium	
Ba = Barium	
C = Carbon	
S = Sulfur	
O = Oxygen	
H = Hydrogen	
N = Nitrogen	
P = Phosphorus	
K = Potassium	
Mg = Magnesium	
Fe = Iron	
Zn = Zinc	
Al = Aluminum	
Si = Silicon	
Ca = Calcium	
Na = Sodium	
I = Iodine	
Br = Bromine	
F = Fluorine	
Cl = Chlorine	
J = Joule	
m = meter	
s = second	
kg = kilogram	
A = Ampere	
V = Volt	
W = Watt	
Hz = Hertz	
Pa = Pascal	
N = Newton	
J = Joule	
C = Coulomb	
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G = Gauss	
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H = Henry	
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A = Ampere	
Ω = Ohm	
S = Siemens	
F = Farad	
H = Henry	
G = Gauss	
T = Tesla	
B = Weber	
Wb =	

Cd = Cadmium
 Cr = Chromium
 MR = Misc.
 PCP = Polychlorinated
 Ag = Silver
 ISCA Regulated
 RCRA metals

Pb = Lead
biphenv/s

[illegible][illegible]

SAMPLE RECEIPT & REVIEW FORM

Client: WJWC		SDG/AR/COC/Work Order: 645981		JC
Received By: Thyasia Tatum		Date Received: 11-20-23		
Carrier and Tracking Number		Circle Applicable: FedEx Express ☒ FedEx Ground ☒ UPS Field Services Courier Other		
		7741 1553 4049		
Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.	
A) Shipped as a DOT Hazardous?		☒	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___	
B) Did the client designate the samples are to be received as radioactive?		☒	COC notation on radioactive stickers on containers equal client designation	
C) Did the RSO classify the samples as radioactive?		☒	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/hr Classified as: Rad 1 Rad 2 Rad 3	
D) Did the client designate samples are hazardous?		☒	COC notation on hazard labels on containers equal client designation	
E) Did the RSO identify possible hazards?		☒	If D or E is yes, select Hazards below: PCBs Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____	
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 Chain of custody documents included with shipment?	☒	☒		Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	☒	☒		Preservation Method: Wet Ice Ice Packs Dry Ice ☒ None Other: _____ *all temperatures are recorded in Celsius TEMP: 10°C
4 Daily check performed and passed on IR temperature gun?	☒	☒		Temperature Device Serial #: IR2-23 Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	☒	☒		Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?		☒		Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?		☒		If Yes, are Encoros or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
				Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
				Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8 Samples received within holding time?	☒	☒		Sample ID's and containers affected: _____
9 Sample ID's on COC match ID's on bottles?	☒	☒		ID's and tests affected: _____
10 Date & time on COC match date & time on bottles?	☒	☒		Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	☒	☒		Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	☒	☒		
13 COC form is properly signed in relinquished/received sections?	☒	☒		Circle Applicable: Not relinquished Other (describe)
Comments (Use Continuation Form if needed):				

PM (or PMA) review: Initials 00 Date 11/24/23 Page 1 of 1

Data Review Qualifier Definitions

Data Review Qualifier Definitions

Qualifier Explanation

*	A quality control analyte recovery is outside of specified acceptance criteria
**	Analyte is a surrogate compound
<	Result is less than value reported
>	Result is greater than value reported
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL
A	The TIC is a suspected aldol-condensation product
B	Target analyte was detected in the associated blank
B	Metals-Either presence of analyte detected in the associated blank, or MDL/IDL < sample value < PQL
BD	Results are either below the MDC or tracer recovery is low
C	Analyte has been confirmed by GC/MS analysis
D	Results are reported from a diluted aliquot of the sample
d	5-day BOD-The 2:1 depletion requirement was not met for this sample
E	Organics-Concentration of the target analyte exceeds the instrument calibration range
E	Metals-%difference of sample and SD is >10%. Sample concentration must meet flagging criteria
H	Analytical holding time was exceeded
h	Preparation or preservation holding time was exceeded
J	Value is estimated
N	Metals-The Matrix spike sample recovery is not within specified control limits
N	Organics-Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
N/A	Spike recovery limits do not apply. Sample concentration exceeds spike concentration by 4X or more
ND	Analyte concentration is not detected above the reporting limit
UI	Gamma Spectroscopy-Uncertain identification
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
Z	Paint Filter Test-Particulates passed through the filter, however no free liquids were observed.

- P Organics-The concentrations between the primary and confirmation columns/detectors is >40% difference.
For HPLC, the difference is >70%.
- U Analyte was analyzed for, but not detected above the MDL, MDA, or LOD.

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
MJW Technical Services
SDG #: 645981**

Product: Alphaspec U, Solid

Analytical Method: DOE EML HASL-300, U-02-RC Modified

Analytical Procedure: GL-RAD-A-011 REV# 28

Analytical Batch: 2534022

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2528726

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
645981002	20231113-EA-MP-01 Dup
1205590008	Method Blank (MB)
1205590009	645402001(NonSDG) Sample Duplicate (DUP)
1205590010	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205590009 (Non SDG 645402001DUP)	Uranium-238	RPD 25.6* (0.00%-20.00%) RER 1.07 (0-3)

Product: Alphaspec Th, Solid

Analytical Method: DOE EML HASL-300, Th-01-RC Modified

Analytical Procedure: GL-RAD-A-038 REV# 18

Analytical Batch: 2534026

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2528726

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
645981002	20231113-EA-MP-01 Dup
1205590029	Method Blank (MB)
1205590030	645402001(NonSDG) Sample Duplicate (DUP)
1205590031	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

Sample 645981002 (20231113-EA-MP-01 Dup) was recounted due to high MDC. The recount is reported.

Product: Dry Weight

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2528726

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
645981001	20231113-EA-MP-01
645981002	20231113-EA-MP-01 Dup
645981003	20231113-EA-MP-02
645981004	20231113-EA-03 Comp

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: Gammaspec, Gamma, Solid (Standard List)

Analytical Method: DOE HASL 300, 4.5.2.3/Ga-01-R

Analytical Procedure: GL-RAD-A-013 REV# 28

Analytical Batch: 2529194

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2528726

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

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
645981001	20231113-EA-MP-01
645981002	20231113-EA-MP-01 Dup
645981003	20231113-EA-MP-02
645981004	20231113-EA-03 Comp
1205581249	Method Blank (MB)
1205581250	645981001(20231113-EA-MP-01) Sample Duplicate (DUP)
1205581251	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" 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

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205581250 (20231113-EA-MP-01DUP)	Lead-210	RPD 165* (0.0%-100.0%) RER 0.218 (0-3)
	Potassium-40	RPD 24.9* (0.00%-20.00%) RER 1.22 (0-3)

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Results are considered a false positive due to high counting uncertainty.	Uranium-235	645981003	20231113-EA-MP-02
		Uranium-235	645981004	20231113-EA-03 Comp

		Uranium-235	1205581250	20231113-EA-MP-01(645981001DUP)
UI	Results are considered a false positive due to interference.	Europium-155	645981001	20231113-EA-MP-01
		Europium-155	645981004	20231113-EA-03 Comp
UI	Results are considered a false positive due to low abundance.	Cesium-134	645981001	20231113-EA-MP-01
UI	Results are considered a false positive due to no valid peak.	Thorium-234	645981002	20231113-EA-MP-01 Dup
		Thorium-234	645981004	20231113-EA-03 Comp
		Uranium-238	645981002	20231113-EA-MP-01 Dup
		Uranium-238	645981004	20231113-EA-03 Comp

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.

Moisture LogBook

Batch: 2528726

Analyst: GG

Date/Time: 20-NOV-2023

Procedure Code:__PREPD

Procedure Description:Dry Soil Prep GL-RAD-A-021

Lab Sop: GL-RAD-A-021

Sample St Sample Id Rpd(%)

Sample Id	Sample Type	Original Hsn	Balance	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
645981001	SAMPLE		SP-C234673837	14:12	12.1	394.15	380.3	382.05	368.2	3.625
645981002	SAMPLE		SP-C234673837	14:12	12.09	412.68	396.4	400.59	384.31	4.064
645981003	SAMPLE		SP-C234673837	14:12	12.03	412.41	394.22	400.38	382.19	4.543
645981004	SAMPLE		SP-C234673837	14:12	11.94	535.73	508.53	523.79	496.59	5.192

Comments:

A) Result = (Net Initial - Net Final) /Net Initial * 100

Note: Aliquot is used for the determination of the effective MDL and PQL in LIMS

Evaporative Loss LogBook

GEL Laboratories LLC

GEL LABORATORIES LLC

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Qualifier Definition Report for

MJWC001 MJW Technical Services

Client SDG: 645981 GEL Work Order: 645981

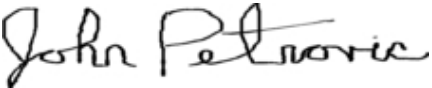
The Qualifiers in this report are defined as follows:

- * 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: John Petrovic

Date: 18 DEC 2023

Title: Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228
Contact: Alex Bartels
Project: Environmental Advantage

Report Date: December 18, 2023

Client Sample ID: 20231113-EA-MP-01
Sample ID: 645981001
Matrix: Solid
Collect Date: 13-NOV-23
Receive Date: 20-NOV-23
Collector: Client
Moisture: 3.63%

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammasepec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Actinium-228		1.01	+/-0.245	0.185	+/-0.268		pCi/g			RXF2	12/12/23	1928	2529194	1
Americium-241	U	-0.0101	+/-0.0234	0.0396	+/-0.0239		pCi/g							
Antimony-124	U	-0.0145	+/-0.0667	0.135	+/-0.0670		pCi/g							
Antimony-125	U	-0.0105	+/-0.0575	0.109	+/-0.0577		pCi/g							
Barium-133	U	-0.0240	+/-0.0302	0.0445	+/-0.0321		pCi/g							
Barium-140	U	-0.109	+/-0.365	0.675	+/-0.369		pCi/g							
Beryllium-7	U	-0.0305	+/-0.257	0.485	+/-0.257		pCi/g							
Bismuth-212		1.59	+/-0.680	0.580	+/-0.711		pCi/g							
Bismuth-214		1.60	+/-0.170	0.0827	+/-0.262		pCi/g							
Cerium-139	U	0.00793	+/-0.0149	0.0290	+/-0.0154		pCi/g							
Cerium-141	U	-0.00614	+/-0.0403	0.0709	+/-0.0404		pCi/g							
Cerium-144	U	0.0336	+/-0.0882	0.163	+/-0.0896		pCi/g							
Cesium-134	UI	0.000	+/-0.0568	0.0648	+/-0.0669		pCi/g							
Cesium-136	U	-0.0343	+/-0.165	0.311	+/-0.166		pCi/g							
Cesium-137	U	0.0110	+/-0.0242	0.0442	+/-0.0248	0.100	pCi/g							
Chromium-51	U	0.125	+/-0.296	0.551	+/-0.302		pCi/g							
Cobalt-56	U	-0.0136	+/-0.0348	0.0602	+/-0.0354		pCi/g							
Cobalt-57	U	0.00291	+/-0.0109	0.0214	+/-0.0110		pCi/g							
Cobalt-58	U	0.0171	+/-0.0315	0.0579	+/-0.0325		pCi/g							
Cobalt-60	U	0.0106	+/-0.0284	0.0585	+/-0.0288		pCi/g							
Europium-152	U	-0.0376	+/-0.0608	0.102	+/-0.0632		pCi/g							
Europium-154	U	0.00401	+/-0.0760	0.135	+/-0.0761		pCi/g							
Europium-155	UI	0.000	+/-0.0863	0.0698	+/-0.0872		pCi/g							
Iridium-192	U	0.0106	+/-0.0216	0.0406	+/-0.0221		pCi/g							
Iron-59	U	0.0447	+/-0.0811	0.167	+/-0.0837		pCi/g							
Lead-210		1.07	+/-0.338	0.281	+/-0.353		pCi/g							
Lead-212		1.13	+/-0.0817	0.0537	+/-0.147		pCi/g							
Lead-214		1.91	+/-0.162	0.0792	+/-0.224		pCi/g							
Manganese-54	U	-0.00431	+/-0.0293	0.0524	+/-0.0294		pCi/g							
Mercury-203	U	-0.00947	+/-0.0297	0.0478	+/-0.0300		pCi/g							
Neodymium-147	U	0.0469	+/-0.754	1.47	+/-0.754		pCi/g							
Neptunium-239	U	-0.0339	+/-0.100	0.193	+/-0.102		pCi/g							
Niobium-94	U	-0.000187	+/-0.0266	0.0487	+/-0.0266		pCi/g							
Niobium-95	U	0.0208	+/-0.0421	0.0732	+/-0.0432		pCi/g							
Potassium-40		3.20	+/-0.835	0.573	+/-0.882		pCi/g							
Promethium-144	U	-0.00368	+/-0.0231	0.0423	+/-0.0232		pCi/g							
Promethium-146	U	0.0268	+/-0.0249	0.0510	+/-0.0278		pCi/g							
Radium-226		1.91	+/-0.162	0.0792	+/-0.224		pCi/g							

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-01
Sample ID: 645981001

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammasespec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Radium-228		1.01	+/-0.245	0.185	+/-0.268		pCi/g							
Ruthenium-106	U	0.0531	+/-0.215	0.416	+/-0.217		pCi/g							
Silver-110m	U	-0.0117	+/-0.0317	0.0555	+/-0.0321		pCi/g							
Sodium-22	U	0.00251	+/-0.0272	0.0486	+/-0.0273		pCi/g							
Thallium-208		0.318	+/-0.0558	0.0446	+/-0.0675		pCi/g							
Thorium-234		1.42	+/-0.711	0.430	+/-0.780		pCi/g							
Tin-113	U	0.0140	+/-0.0306	0.0527	+/-0.0313		pCi/g							
Uranium-235	U	0.0684	+/-0.176	0.168	+/-0.176		pCi/g							
Uranium-238		1.42	+/-0.711	0.430	+/-0.780		pCi/g							
Yttrium-88	U	0.00583	+/-0.0294	0.0651	+/-0.0295		pCi/g							
Zinc-65	U	0.00571	+/-0.0584	0.103	+/-0.0584		pCi/g							
Zirconium-95	U	-0.000917	+/-0.0561	0.104	+/-0.0561		pCi/g							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	11/20/23	1412	2528726

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R

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 : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-01 Dup
Sample ID: 645981002
Matrix: Solid
Collect Date: 13-NOV-23
Receive Date: 20-NOV-23
Collector: Client
Moisture: 4.06%

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec Analysis														
<i>Alphaspec Th, Solid "Dry Weight Corrected"</i>														
Thorium-228	U	0.393	+/-0.480	0.754	+/-0.483	1.00	pCi/g			CM4	12/09/23	1523	2534026	1
Thorium-230		2.02	+/-0.722	0.613	+/-0.768	1.00	pCi/g							
Thorium-232		1.03	+/-0.557	0.610	+/-0.572	1.00	pCi/g							
<i>Alphaspec U, Solid "Dry Weight Corrected"</i>														
Uranium-233/234		1.32	+/-0.964	1.19	+/-0.997	1.00	pCi/g			CM4	12/08/23	0948	2534022	2
Uranium-235/236	U	0.153	+/-0.431	0.460	+/-0.432	1.00	pCi/g							
Uranium-238		1.55	+/-0.915	0.687	+/-0.959	1.00	pCi/g							
Rad Gamma Spec Analysis														
<i>Gammasespec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Actinium-228		1.42	+/-0.267	0.177	+/-0.298		pCi/g			RXF2	12/12/23	1929	2529194	3
Americium-241	U	-0.0411	+/-0.111	0.219	+/-0.113		pCi/g							
Antimony-124	U	-0.0313	+/-0.0755	0.138	+/-0.0769		pCi/g							
Antimony-125	U	0.0277	+/-0.0674	0.131	+/-0.0685		pCi/g							
Barium-133	U	-0.0167	+/-0.0313	0.0505	+/-0.0322		pCi/g							
Barium-140	U	0.0208	+/-0.383	0.717	+/-0.383		pCi/g							
Beryllium-7	U	0.00323	+/-0.290	0.538	+/-0.290		pCi/g							
Bismuth-212		1.98	+/-0.791	0.607	+/-0.812		pCi/g							
Bismuth-214		1.56	+/-0.178	0.101	+/-0.226		pCi/g							
Cerium-139	U	0.0148	+/-0.0220	0.0419	+/-0.0232		pCi/g							
Cerium-141	U	-0.0183	+/-0.0655	0.107	+/-0.0661		pCi/g							
Cerium-144	U	0.0343	+/-0.138	0.244	+/-0.139		pCi/g							
Cesium-134	U	0.0406	+/-0.0294	0.0642	+/-0.0348		pCi/g							
Cesium-136	U	0.0123	+/-0.173	0.305	+/-0.173		pCi/g							
Cesium-137	U	0.00827	+/-0.0267	0.0503	+/-0.0270	0.100	pCi/g							
Chromium-51	U	0.150	+/-0.348	0.690	+/-0.355		pCi/g							
Cobalt-56	U	-0.00121	+/-0.0355	0.0670	+/-0.0355		pCi/g							
Cobalt-57	U	-1.20E-05	+/-0.0168	0.0318	+/-0.0168		pCi/g							
Cobalt-58	U	-0.00210	+/-0.0319	0.0608	+/-0.0319		pCi/g							
Cobalt-60	U	-0.0116	+/-0.0336	0.0622	+/-0.0340		pCi/g							
Europium-152	U	0.0217	+/-0.0676	0.132	+/-0.0683		pCi/g							
Europium-154	U	0.00957	+/-0.0690	0.139	+/-0.0692		pCi/g							
Europium-155	U	0.116	+/-0.141	0.125	+/-0.141		pCi/g							
Iridium-192	U	0.00796	+/-0.0279	0.0545	+/-0.0281		pCi/g							
Iron-59	U	-0.0334	+/-0.0749	0.132	+/-0.0765		pCi/g							
Lead-210	U	3.99	+/-4.28	7.95	+/-4.66		pCi/g							
Lead-212		1.15	+/-0.103	0.0771	+/-0.147		pCi/g							
Lead-214		1.90	+/-0.192	0.0965	+/-0.244		pCi/g							
Manganese-54	U	-0.00244	+/-0.0276	0.0520	+/-0.0276		pCi/g							

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-01 Dup
Sample ID: 645981002

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Mercury-203	U	0.00630	+/-0.0393	0.0640	+/-0.0394		pCi/g							
Neodymium-147	U	-0.490	+/-1.05	1.85	+/-1.08		pCi/g							
Neptunium-239	U	-0.0731	+/-0.169	0.312	+/-0.172		pCi/g							
Niobium-94	U	0.00766	+/-0.0235	0.0467	+/-0.0237		pCi/g							
Niobium-95	U	0.0283	+/-0.0358	0.0679	+/-0.0381		pCi/g							
Potassium-40		3.65	+/-0.660	0.423	+/-0.735		pCi/g							
Promethium-144	U	0.00476	+/-0.0230	0.0456	+/-0.0231		pCi/g							
Promethium-146	U	-0.0109	+/-0.0295	0.0534	+/-0.0300		pCi/g							
Radium-226		1.90	+/-0.192	0.0965	+/-0.244		pCi/g							
Radium-228		1.42	+/-0.267	0.177	+/-0.298		pCi/g							
Ruthenium-106	U	-0.132	+/-0.236	0.402	+/-0.244		pCi/g							
Silver-110m	U	0.00200	+/-0.0367	0.0706	+/-0.0367		pCi/g							
Sodium-22	U	0.00288	+/-0.0244	0.0492	+/-0.0245		pCi/g							
Thallium-208		0.349	+/-0.0724	0.0496	+/-0.0787		pCi/g							
Thorium-234	UI	0.000	+/-1.84	1.83	+/-1.98		pCi/g							
Tin-113	U	0.00105	+/-0.0358	0.0676	+/-0.0358		pCi/g							
Uranium-235	U	0.130	+/-0.220	0.252	+/-0.220		pCi/g							
Uranium-238	UI	0.000	+/-1.84	1.83	+/-1.98		pCi/g							
Yttrium-88	U	0.0140	+/-0.0298	0.0660	+/-0.0305		pCi/g							
Zinc-65	U	0.0595	+/-0.0750	0.139	+/-0.0798		pCi/g							
Zirconium-95	U	0.000549	+/-0.0620	0.118	+/-0.0620		pCi/g							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	11/20/23	1412	2528726

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL-300, Th-01-RC Modified
2	DOE EML HASL-300, U-02-RC Modified
3	DOE HASL 300, 4.5.2.3/Ga-01-R

Surrogate/Tracer Recovery	Test	Batch ID	Recovery%	Acceptable Limits
Thorium-229 Tracer	Alphaspec Th, Solid "Dry Weight Corrected"	2534026	20.4	(15%-125%)
Uranium-232 Tracer	Alphaspec U, Solid "Dry Weight Corrected"	2534022	49.9	(15%-125%)

GEL LABORATORIES LLC

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-01 Dup
Sample ID: 645981002

Project: MJWC01023
Client ID: MJWC001

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 : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-02
Sample ID: 645981003
Matrix: Solid
Collect Date: 13-NOV-23
Receive Date: 20-NOV-23
Collector: Client
Moisture: 4.54%

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Actinium-228		0.901	+/-0.279	0.268	+/-0.290		pCi/g			RXF2	12/12/23	1930	2529194	1
Americium-241	U	0.0598	+/-0.0661	0.119	+/-0.0716		pCi/g							
Antimony-124	U	-0.0291	+/-0.0860	0.159	+/-0.0870		pCi/g							
Antimony-125	U	0.0408	+/-0.0862	0.170	+/-0.0882		pCi/g							
Barium-133	U	0.0194	+/-0.0426	0.0764	+/-0.0435		pCi/g							
Barium-140	U	-0.0910	+/-0.599	1.10	+/-0.600		pCi/g							
Beryllium-7	U	0.304	+/-0.378	0.763	+/-0.403		pCi/g							
Bismuth-212		1.55	+/-1.16	0.992	+/-1.17		pCi/g							
Bismuth-214		1.94	+/-0.232	0.119	+/-0.311		pCi/g							
Cerium-139	U	-0.00924	+/-0.0304	0.0530	+/-0.0307		pCi/g							
Cerium-141	U	0.0115	+/-0.0869	0.142	+/-0.0871		pCi/g							
Cerium-144	U	-0.0844	+/-0.184	0.323	+/-0.188		pCi/g							
Cesium-134	U	0.0718	+/-0.0418	0.0921	+/-0.0533		pCi/g							
Cesium-136	U	0.0588	+/-0.177	0.369	+/-0.179		pCi/g							
Cesium-137	U	-0.00934	+/-0.0382	0.0606	+/-0.0385	0.100	pCi/g							
Chromium-51	U	0.0585	+/-0.466	0.901	+/-0.466		pCi/g							
Cobalt-56	U	-0.00390	+/-0.0443	0.0763	+/-0.0443		pCi/g							
Cobalt-57	U	-0.00376	+/-0.0232	0.0417	+/-0.0233		pCi/g							
Cobalt-58	U	-0.0189	+/-0.0522	0.0788	+/-0.0529		pCi/g							
Cobalt-60	U	0.0161	+/-0.0326	0.0702	+/-0.0334		pCi/g							
Europium-152	U	0.0181	+/-0.0917	0.170	+/-0.0921		pCi/g							
Europium-154	U	-0.0233	+/-0.0994	0.187	+/-0.0999		pCi/g							
Europium-155	U	0.0419	+/-0.0838	0.158	+/-0.0860		pCi/g							
Iridium-192	U	-0.0203	+/-0.0344	0.0630	+/-0.0357		pCi/g							
Iron-59	U	-0.0503	+/-0.0999	0.180	+/-0.103		pCi/g							
Lead-210	U	0.924	+/-0.527	1.06	+/-0.679		pCi/g							
Lead-212		1.28	+/-0.129	0.0997	+/-0.163		pCi/g							
Lead-214		2.06	+/-0.254	0.135	+/-0.311		pCi/g							
Manganese-54	U	0.0143	+/-0.0341	0.0702	+/-0.0348		pCi/g							
Mercury-203	U	-0.0236	+/-0.0444	0.0821	+/-0.0457		pCi/g							
Neodymium-147	U	-1.04	+/-1.57	2.36	+/-1.64		pCi/g							
Neptunium-239	U	-0.187	+/-0.235	0.406	+/-0.250		pCi/g							
Niobium-94	U	0.00840	+/-0.0355	0.0665	+/-0.0357		pCi/g							
Niobium-95	U	-0.0101	+/-0.0529	0.0831	+/-0.0531		pCi/g							
Potassium-40		2.38	+/-0.676	0.559	+/-0.708		pCi/g							
Promethium-144	U	0.0104	+/-0.0318	0.0614	+/-0.0321		pCi/g							
Promethium-146	U	-0.00278	+/-0.0383	0.0719	+/-0.0383		pCi/g							
Radium-226		2.06	+/-0.254	0.135	+/-0.311		pCi/g							
Radium-228		0.901	+/-0.279	0.268	+/-0.290		pCi/g							

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-MP-02
Sample ID: 645981003

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Ruthenium-106	U	0.280	+/-0.311	0.638	+/-0.338		pCi/g							
Silver-110m	U	0.0276	+/-0.0459	0.0972	+/-0.0476		pCi/g							
Sodium-22	U	-0.00685	+/-0.0356	0.0674	+/-0.0357		pCi/g							
Thallium-208		0.263	+/-0.0838	0.0688	+/-0.0884		pCi/g							
Thorium-234		2.46	+/-1.56	1.13	+/-1.66		pCi/g							
Tin-113	U	-0.0156	+/-0.0492	0.0861	+/-0.0497		pCi/g							
Uranium-235	UI	0.000	+/-0.382	0.310	+/-0.383		pCi/g							
Uranium-238		2.46	+/-1.56	1.13	+/-1.66		pCi/g							
Yttrium-88	U	0.00311	+/-0.0337	0.0747	+/-0.0338		pCi/g							
Zinc-65	U	0.0262	+/-0.0932	0.166	+/-0.0939		pCi/g							
Zirconium-95	U	-0.0263	+/-0.0913	0.160	+/-0.0921		pCi/g							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	11/20/23	1412	2528726

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R

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

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-03 Comp
Sample ID: 645981004
Matrix: Solid
Collect Date: 13-NOV-23
Receive Date: 20-NOV-23
Collector: Client
Moisture: 5.19%

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammascpec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Actinium-228		0.852	+/-0.254	0.179	+/-0.268		pCi/g			RXF2	12/13/23	0501	2529194	1
Americium-241	U	0.0255	+/-0.119	0.221	+/-0.120		pCi/g							
Antimony-124	U	0.0491	+/-0.0691	0.163	+/-0.0726		pCi/g							
Antimony-125	U	-0.00592	+/-0.0678	0.127	+/-0.0679		pCi/g							
Barium-133	U	0.0176	+/-0.0292	0.0538	+/-0.0303		pCi/g							
Barium-140	U	0.226	+/-0.396	0.785	+/-0.409		pCi/g							
Beryllium-7	U	-0.0106	+/-0.278	0.519	+/-0.278		pCi/g							
Bismuth-212		0.762	+/-0.699	0.524	+/-0.703		pCi/g							
Bismuth-214		1.58	+/-0.155	0.0833	+/-0.208		pCi/g							
Cerium-139	U	-0.00122	+/-0.0213	0.0387	+/-0.0213		pCi/g							
Cerium-141	U	0.00361	+/-0.0582	0.0995	+/-0.0582		pCi/g							
Cerium-144	U	-0.0316	+/-0.129	0.236	+/-0.130		pCi/g							
Cesium-134	U	0.0209	+/-0.0283	0.0590	+/-0.0299		pCi/g							
Cesium-136	U	0.0276	+/-0.148	0.293	+/-0.149		pCi/g							
Cesium-137	U	-0.00920	+/-0.0248	0.0435	+/-0.0251	0.100	pCi/g							
Chromium-51	U	0.0899	+/-0.356	0.697	+/-0.358		pCi/g							
Cobalt-56	U	0.00438	+/-0.0229	0.0473	+/-0.0230		pCi/g							
Cobalt-57	U	-0.0131	+/-0.0171	0.0278	+/-0.0181		pCi/g							
Cobalt-58	U	0.00636	+/-0.0278	0.0561	+/-0.0279		pCi/g							
Cobalt-60	U	-0.0242	+/-0.0283	0.0456	+/-0.0304		pCi/g							
Europium-152	U	-0.00109	+/-0.0677	0.129	+/-0.0677		pCi/g							
Europium-154	U	-0.0962	+/-0.0705	0.0974	+/-0.0832		pCi/g							
Europium-155	UI	0.000	+/-0.128	0.115	+/-0.129		pCi/g							
Iridium-192	U	-0.00689	+/-0.0260	0.0491	+/-0.0262		pCi/g							
Iron-59	U	0.00237	+/-0.0656	0.128	+/-0.0656		pCi/g							
Lead-210	U	-0.800	+/-3.20	6.21	+/-3.22		pCi/g							
Lead-212		0.931	+/-0.0953	0.0708	+/-0.122		pCi/g							
Lead-214		1.85	+/-0.171	0.0983	+/-0.225		pCi/g							
Manganese-54	U	-0.00638	+/-0.0238	0.0450	+/-0.0240		pCi/g							
Mercury-203	U	0.0264	+/-0.0366	0.0674	+/-0.0385		pCi/g							
Neodymium-147	U	-1.04	+/-0.953	1.56	+/-1.07		pCi/g							
Neptunium-239	U	-0.0530	+/-0.171	0.290	+/-0.173		pCi/g							
Niobium-94	U	-0.00858	+/-0.0234	0.0407	+/-0.0237		pCi/g							
Niobium-95	U	0.00768	+/-0.0353	0.0595	+/-0.0355		pCi/g							
Potassium-40		2.85	+/-0.673	0.585	+/-0.725		pCi/g							
Promethium-144	U	-0.00294	+/-0.0244	0.0440	+/-0.0245		pCi/g							
Promethium-146	U	-0.0234	+/-0.0307	0.0536	+/-0.0326		pCi/g							
Radium-226		1.85	+/-0.171	0.0983	+/-0.225		pCi/g							
Radium-228		0.852	+/-0.254	0.179	+/-0.268		pCi/g							

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Certificate of Analysis

Company : MJW Technical Services
Address : 15 Hazelwood Drive
Suite 112
Amherst, New York 14228

Report Date: December 18, 2023

Contact: Alex Bartels
Project: Environmental Advantage

Client Sample ID: 20231113-EA-03 Comp
Sample ID: 645981004

Project: MJWC01023
Client ID: MJWC001

Parameter	Qualifier	Result	Uncertainty	MDC	TPU	RL	Units	PF	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gamma Spec Analysis														
<i>Gammaspec, Gamma, Solid (Standard List) "Dry Weight Corrected"</i>														
Ruthenium-106	U	-0.0724	+/-0.239	0.424	+/-0.241		pCi/g							
Silver-110m	U	0.00760	+/-0.0348	0.0694	+/-0.0350		pCi/g							
Sodium-22	U	-0.0290	+/-0.0252	0.0345	+/-0.0285		pCi/g							
Thallium-208		0.363	+/-0.0631	0.0364	+/-0.0706		pCi/g							
Thorium-234	UI	0.000	+/-2.31	1.68	+/-2.50		pCi/g							
Tin-113	U	0.00259	+/-0.0336	0.0642	+/-0.0336		pCi/g							
Uranium-235	UI	0.000	+/-0.229	0.238	+/-0.230		pCi/g							
Uranium-238	UI	0.000	+/-2.31	1.68	+/-2.50		pCi/g							
Yttrium-88	U	0.0125	+/-0.0278	0.0630	+/-0.0284		pCi/g							
Zinc-65	U	0.0197	+/-0.0597	0.108	+/-0.0604		pCi/g							
Zirconium-95	U	0.0539	+/-0.0645	0.128	+/-0.0691		pCi/g							

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	GG	11/20/23	1412	2528726

The following Analytical Methods were performed

Method	Description
1	DOE HASL 300, 4.5.2.3/Ga-01-R

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

Quality Control Data

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 18, 2023

Page 1 of 13

Client : MJW Technical Services
15 Hazelwood Drive
Suite 112
Amherst, New York

Contact: Alex Bartels

Workorder: 645981

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	2534022										
QC1205590009	645402001	DUP									
Uranium-233/234		4.73		4.40	pCi/g	7.32		(0%-20%)	CM4	12/08/23	09:48
		Uncert:		+/-1.36							
		TPU:		+/-1.58							
Uranium-235/236		U	0.0622	U	-0.0491	pCi/g	0		N/A		
		Uncert:		+/-0.346							
		TPU:		+/-0.346							
Uranium-238		4.93		3.82	pCi/g	25.6*		(0%-20%)			
		Uncert:		+/-1.37							
		TPU:		+/-1.60							
QC1205590010	LCS										
Uranium-233/234				19.3	pCi/g				CM4	12/09/23	10:56
		Uncert:		+/-1.89							
		TPU:		+/-3.17							
Uranium-235/236				1.17	pCi/g						
		Uncert:		+/-0.532							
		TPU:		+/-0.554							
Uranium-238	21.6			19.4	pCi/g		89.5	(75%-125%)			
		Uncert:		+/-1.89							
		TPU:		+/-3.17							
QC1205590008	MB										
Uranium-233/234			U	0.104	pCi/g				CM4	12/08/23	09:48
		Uncert:		+/-0.359							
		TPU:		+/-0.360							
Uranium-235/236			U	-0.0521	pCi/g						
		Uncert:		+/-0.230							
		TPU:		+/-0.231							
Uranium-238			U	-0.0843	pCi/g						
		Uncert:		+/-0.195							
		TPU:		+/-0.196							
Batch	2534026										
QC1205590030	645402001	DUP									
Thorium-228		U	0.600	U	0.287	pCi/g	0		N/A	CM4	12/07/23
		Uncert:		+/-0.610							
		TPU:		+/-0.618							
Thorium-230			2.88		3.55	pCi/g	20.6		(0% - 100%)		
		Uncert:		+/-1.13							
		TPU:		+/-1.23							
Thorium-232		U	0.356		1.43	pCi/g	81.1		(0% - 100%)		
		Uncert:		+/-0.466							
		TPU:		+/-0.470							
QC1205590031	LCS										

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QC Summary

Workorder: 645981

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Alpha Spec											
Batch	2534026										
Thorium-228				18.0	pCi/g				CM4	12/07/23	15:32
	Uncert:			+/-2.10							
	TPU:			+/-3.20							
Thorium-230				2.53	pCi/g			(75%-125%)			
	Uncert:			+/-0.815							
	TPU:			+/-0.889							
Thorium-232	16.3			17.0	pCi/g		104	(75%-125%)			
	Uncert:			+/-2.03							
	TPU:			+/-3.05							
QC1205590029	MB										
Thorium-228			U	0.0783	pCi/g				CM4	12/07/23	15:32
	Uncert:			+/-0.233							
	TPU:			+/-0.233							
Thorium-230			U	-0.0231	pCi/g						
	Uncert:			+/-0.198							
	TPU:			+/-0.198							
Thorium-232			U	0.143	pCi/g						
	Uncert:			+/-0.226							
	TPU:			+/-0.227							
Rad Gamma Spec											
Batch	2529194										
QC1205581250	645981001	DUP									
Actinium-228				1.01	pCi/g	2.15		(0%-20%)	RXF2	12/13/23	05:03
	Uncert:			+/-0.245							
	TPU:			+/-0.268							
Americium-241	U	-0.0101	U	-0.0696	pCi/g	0			N/A		
	Uncert:			+/-0.0234							
	TPU:			+/-0.0239							
Antimony-124	U	-0.0145	U	-0.0221	pCi/g	0			N/A		
	Uncert:			+/-0.0667							
	TPU:			+/-0.0670							
Antimony-125	U	-0.0105	U	-0.00865	pCi/g	0			N/A		
	Uncert:			+/-0.0575							
	TPU:			+/-0.0577							
Barium-133	U	-0.0240	U	-0.00413	pCi/g	0			N/A		
	Uncert:			+/-0.0302							
	TPU:			+/-0.0321							
Barium-140	U	-0.109	U	-0.0272	pCi/g	0			N/A		
	Uncert:			+/-0.365							
	TPU:			+/-0.369							
Beryllium-7	U	-0.0305	U	0.0939	pCi/g	0			N/A		
	Uncert:			+/-0.257							
	TPU:			+/-0.257							
Bismuth-212				1.59	pCi/g	18.6		(0% - 100%)			
	Uncert:			+/-0.680							
	TPU:			+/-0.711							

GEL LABORATORIES LLC

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QC Summary

Workorder: 645981

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Bismuth-214		1.60		1.62	pCi/g	.683		(0%-20%)			
	Uncert:	+/-0.170		+/-0.162							
	TPU:	+/-0.262		+/-0.237							
Cerium-139	U	0.00793	U	0.000379	pCi/g	0			N/A		
	Uncert:	+/-0.0149		+/-0.0266							
	TPU:	+/-0.0154		+/-0.0266							
Cerium-141	U	-0.00614	U	0.0463	pCi/g	0			N/A		
	Uncert:	+/-0.0403		+/-0.142							
	TPU:	+/-0.0404		+/-0.143							
Cerium-144	U	0.0336	U	-0.00874	pCi/g	0			N/A		
	Uncert:	+/-0.0882		+/-0.182							
	TPU:	+/-0.0896		+/-0.182							
Cesium-134	UI	0.000	U	0.0457	pCi/g	0			N/A		
	Uncert:	+/-0.0568		+/-0.0495							
	TPU:	+/-0.0669		+/-0.0538							
Cesium-136	U	-0.0343	U	-0.0418	pCi/g	0			N/A		
	Uncert:	+/-0.165		+/-0.169							
	TPU:	+/-0.166		+/-0.170							
Cesium-137	U	0.0110	U	-0.0152	pCi/g	0			N/A		
	Uncert:	+/-0.0242		+/-0.0305							
	TPU:	+/-0.0248		+/-0.0314							
Chromium-51	U	0.125	U	-0.267	pCi/g	0			N/A		
	Uncert:	+/-0.296		+/-0.437							
	TPU:	+/-0.302		+/-0.453							
Cobalt-56	U	-0.0136	U	0.0133	pCi/g	0			N/A		
	Uncert:	+/-0.0348		+/-0.0355							
	TPU:	+/-0.0354		+/-0.0360							
Cobalt-57	U	0.00291	U	-0.0195	pCi/g	0			N/A		
	Uncert:	+/-0.0109		+/-0.0243							
	TPU:	+/-0.0110		+/-0.0259							
Cobalt-58	U	0.0171	U	0.000405	pCi/g	0			N/A		
	Uncert:	+/-0.0315		+/-0.0302							
	TPU:	+/-0.0325		+/-0.0302							
Cobalt-60	U	0.0106	U	0.00611	pCi/g	0			N/A		
	Uncert:	+/-0.0284		+/-0.0287							
	TPU:	+/-0.0288		+/-0.0288							
Europium-152	U	-0.0376	U	-0.0984	pCi/g	0			N/A		
	Uncert:	+/-0.0608		+/-0.0815							
	TPU:	+/-0.0632		+/-0.0932							
Europium-154	U	0.00401	U	-0.00473	pCi/g	0			N/A		
	Uncert:	+/-0.0760		+/-0.0818							
	TPU:	+/-0.0761		+/-0.0818							
Europium-155	UI	0.000	U	0.0420	pCi/g	0			N/A		
	Uncert:	+/-0.0863		+/-0.0972							
	TPU:	+/-0.0872		+/-0.0991							
Iridium-192	U	0.0106	U	-0.0240	pCi/g	0			N/A		

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Iron-59	Uncert:	+/-0.0216		+/-0.0327							
	TPU:	+/-0.0221		+/-0.0345							
	U	0.0447	U	0.000967	pCi/g	0			N/A		
Lead-210	Uncert:	+/-0.0811		+/-0.0758							
	TPU:	+/-0.0837		+/-0.0758							
		1.07	U	1.72	pCi/g	165*		(0% - 100%)			
Lead-212	Uncert:	+/-0.338		+/-5.81							
	TPU:	+/-0.353		+/-5.86							
		1.13		1.11	pCi/g	1.79		(0%-20%)			
Lead-214	Uncert:	+/-0.0817		+/-0.113							
	TPU:	+/-0.147		+/-0.143							
		1.91		1.79	pCi/g	6.56		(0%-20%)			
Manganese-54	Uncert:	+/-0.162		+/-0.179							
	TPU:	+/-0.224		+/-0.232							
	U	-0.00431	U	-0.0265	pCi/g	0			N/A		
Mercury-203	Uncert:	+/-0.0293		+/-0.0336							
	TPU:	+/-0.0294		+/-0.0357							
	U	-0.00947	U	-0.0324	pCi/g	0			N/A		
Neodymium-147	Uncert:	+/-0.0297		+/-0.0463							
	TPU:	+/-0.0300		+/-0.0486							
	U	0.0469	U	-0.333	pCi/g	0			N/A		
Neptunium-239	Uncert:	+/-0.754		+/-1.01							
	TPU:	+/-0.754		+/-1.02							
	U	-0.0339	U	-0.206	pCi/g	0			N/A		
Niobium-94	Uncert:	+/-0.100		+/-0.252							
	TPU:	+/-0.102		+/-0.269							
	U	-0.000187	U	-0.00138	pCi/g	0			N/A		
Niobium-95	Uncert:	+/-0.0266		+/-0.0249							
	TPU:	+/-0.0266		+/-0.0249							
	U	0.0208	U	-0.0103	pCi/g	0			N/A		
Potassium-40	Uncert:	+/-0.0421		+/-0.0414							
	TPU:	+/-0.0432		+/-0.0416							
		3.20		2.49	pCi/g	24.9*		(0%-20%)			
Promethium-144	Uncert:	+/-0.835		+/-0.686							
	TPU:	+/-0.882		+/-0.717							
	U	-0.00368	U	-0.0178	pCi/g	0			N/A		
Promethium-146	Uncert:	+/-0.0231		+/-0.0243							
	TPU:	+/-0.0232		+/-0.0257							
	U	0.0268	U	-0.00736	pCi/g	0			N/A		
Radium-226	Uncert:	+/-0.0249		+/-0.0334							
	TPU:	+/-0.0278		+/-0.0336							
		1.91		1.79	pCi/g	6.56		(0%-20%)			
Radium-228	Uncert:	+/-0.162		+/-0.179							
	TPU:	+/-0.224		+/-0.232							
		1.01		0.992	pCi/g	2.15		(0%-20%)			
	Uncert:	+/-0.245		+/-0.225							

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Ruthenium-106	TPU:	+/-0.268		+/-0.240							
	U	0.0531	U	0.117	pCi/g	0	N/A				
	Uncert:	+/-0.215		+/-0.199							
Silver-110m	TPU:	+/-0.217		+/-0.207							
	U	-0.0117	U	-0.00389	pCi/g	0	N/A				
	Uncert:	+/-0.0317		+/-0.0372							
Sodium-22	TPU:	+/-0.0321		+/-0.0373							
	U	0.00251	U	-0.00312	pCi/g	0	N/A				
	Uncert:	+/-0.0272		+/-0.0289							
Thallium-208	TPU:	+/-0.0273		+/-0.0289							
		0.318		0.316	pCi/g	.82	(0%-20%)				
	Uncert:	+/-0.0558		+/-0.0762							
Thorium-234	TPU:	+/-0.0675		+/-0.0831							
		1.42	U	0.379	pCi/g	74.7	(0% - 100%)				
	Uncert:	+/-0.711		+/-1.70							
Tin-113	TPU:	+/-0.780		+/-1.71							
	U	0.0140	U	-0.000215	pCi/g	0	N/A				
	Uncert:	+/-0.0306		+/-0.0382							
Uranium-235	TPU:	+/-0.0313		+/-0.0382							
	U	0.0684	UI	0.000	pCi/g	0	N/A				
	Uncert:	+/-0.176		+/-0.324							
Uranium-238	TPU:	+/-0.176		+/-0.325							
		1.42	U	0.379	pCi/g	74.7	(0% - 100%)				
	Uncert:	+/-0.711		+/-1.70							
Yttrium-88	TPU:	+/-0.780		+/-1.71							
	U	0.00583	U	0.000616	pCi/g	0	N/A				
	Uncert:	+/-0.0294		+/-0.0296							
Zinc-65	TPU:	+/-0.0295		+/-0.0296							
	U	0.00571	U	0.0207	pCi/g	0	N/A				
	Uncert:	+/-0.0584		+/-0.0615							
Zirconium-95	TPU:	+/-0.0584		+/-0.0622							
	U	-0.000917	U	-0.0208	pCi/g	0	N/A				
	Uncert:	+/-0.0561		+/-0.0621							
QC1205581251	LCS	TPU:		+/-0.0561		+/-0.0628					
Actinium-228			U	-0.251	pCi/g				RXF2	12/13/2306:01	
Americium-241	Uncert:			+/-2.31							
	TPU:			+/-2.31							
	484			515	pCi/g		106	(75%-125%)			
Antimony-124	Uncert:			+/-4.09							
	TPU:			+/-42.1							
			U	0.289	pCi/g						
Antimony-125	Uncert:			+/-0.642							
	TPU:			+/-0.655							
			U	-0.518	pCi/g						
			</								

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Barium-133	TPU:			+/-1.25							
			U	-0.0284	pCi/g						
	Uncert:			+/-0.476							
Barium-140	TPU:			+/-0.477							
			U	3.95	pCi/g						
	Uncert:			+/-4.44							
Beryllium-7	TPU:			+/-4.81							
			U	4.81	pCi/g						
	Uncert:			+/-5.37							
Bismuth-212	TPU:			+/-5.81							
			U	5.25	pCi/g						
	Uncert:			+/-5.40							
Bismuth-214	TPU:			+/-5.93							
			U	-0.179	pCi/g						
	Uncert:			+/-0.728							
Cerium-139	TPU:			+/-0.732							
			U	0.0770	pCi/g						
	Uncert:			+/-0.211							
Cerium-141	TPU:			+/-0.215							
			U	-0.0230	pCi/g						
	Uncert:			+/-0.455							
Cerium-144	TPU:			+/-0.455							
			U	-0.00280	pCi/g						
	Uncert:			+/-1.22							
Cesium-134	TPU:			+/-1.22							
			U	-0.0217	pCi/g						
	Uncert:			+/-0.461							
Cesium-136	TPU:			+/-0.461							
			U	0.485	pCi/g						
	Uncert:			+/-2.18							
Cesium-137	TPU:			+/-2.19							
	152			161	pCi/g			106 (75%-125%)			
	Uncert:			+/-3.11							
Chromium-51	TPU:			+/-21.6							
			U	-1.90	pCi/g						
	Uncert:			+/-4.69							
Cobalt-56	TPU:			+/-4.77							
			U	0.162	pCi/g						
	Uncert:			+/-0.576							
Cobalt-57	TPU:			+/-0.581							
			U	-0.0225	pCi/g						
	Uncert:			+/-0.156							
Cobalt-58	TPU:			+/-0.156							
			U	-0.275	pCi/g						
	Uncert:			+/-0.545							
	TPU:			+/-0.560							

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Cobalt-60	62.8			63.8	pCi/g		102	(75%-125%)			
	Uncert:			+/-2.51							
	TPU:			+/-5.79							
Europium-152			U	0.379	pCi/g						
	Uncert:			+/-1.10							
	TPU:			+/-1.12							
Europium-154			U	0.0297	pCi/g						
	Uncert:			+/-0.817							
	TPU:			+/-0.817							
Europium-155			U	-0.206	pCi/g						
	Uncert:			+/-0.578							
	TPU:			+/-0.586							
Iridium-192			U	-0.267	pCi/g						
	Uncert:			+/-0.393							
	TPU:			+/-0.412							
Iron-59			U	-0.769	pCi/g						
	Uncert:			+/-1.57							
	TPU:			+/-1.61							
Lead-210				4360	pCi/g						
	Uncert:			+/-36.3							
	TPU:			+/-411							
Lead-212			U	-0.243	pCi/g						
	Uncert:			+/-0.502							
	TPU:			+/-0.514							
Lead-214			U	-0.549	pCi/g						
	Uncert:			+/-0.804							
	TPU:			+/-0.843							
Manganese-54			U	-0.222	pCi/g						
	Uncert:			+/-0.502							
	TPU:			+/-0.512							
Mercury-203			U	0.0283	pCi/g						
	Uncert:			+/-0.397							
	TPU:			+/-0.398							
Neodymium-147			U	3.94	pCi/g						
	Uncert:			+/-10.6							
	TPU:			+/-10.8							
Neptunium-239			U	-1.19	pCi/g						
	Uncert:			+/-1.52							
	TPU:			+/-1.63							
Niobium-94			U	-0.237	pCi/g						
	Uncert:			+/-0.331							
	TPU:			+/-0.349							
Niobium-95			U	-0.276	pCi/g						
	Uncert:			+/-0.492							
	TPU:			+/-0.508							
Potassium-40			U	-1.32	pCi/g						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Promethium-144	Uncert:			+/-2.06							
	TPU:			+/-2.15							
			U	-0.00290	pCi/g						
Promethium-146	Uncert:			+/-0.350							
	TPU:			+/-0.350							
			U	-0.196	pCi/g						
Radium-226	Uncert:			+/-0.645							
	TPU:			+/-0.651							
			U	-0.549	pCi/g						
Radium-228	Uncert:			+/-0.804							
	TPU:			+/-0.843							
			U	-0.251	pCi/g						
Ruthenium-106	Uncert:			+/-2.31							
	TPU:			+/-2.31							
			U	1.87	pCi/g						
Silver-110m	Uncert:			+/-3.46							
	TPU:			+/-3.57							
			U	0.293	pCi/g						
Sodium-22	Uncert:			+/-0.857							
	TPU:			+/-0.868							
			U	0.00550	pCi/g						
Thallium-208	Uncert:			+/-0.289							
	TPU:			+/-0.289							
			U	-0.0455	pCi/g						
Thorium-234	Uncert:			+/-0.393							
	TPU:			+/-0.393							
			U	3.42	pCi/g						
Tin-113	Uncert:			+/-3.89							
	TPU:			+/-4.26							
			U	0.0109	pCi/g						
Uranium-235	Uncert:			+/-0.589							
	TPU:			+/-0.589							
			U	0.106	pCi/g						
Uranium-238	Uncert:			+/-1.27							
	TPU:			+/-1.27							
			U	3.42	pCi/g						
Yttrium-88	Uncert:			+/-3.89							
	TPU:			+/-4.26							
			U	0.0235	pCi/g						
Zinc-65	Uncert:			+/-0.226							
	TPU:			+/-0.227							
			U	0.179	pCi/g						
Zirconium-95	Uncert:			+/-1.15							
	TPU:			+/-1.15							
			U	0.310	pCi/g						
	Uncert:			+/-0.892							

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Parmname		NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec												
Batch	2529194											
									</			

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Chromium-51	TPU:			+/-0.0239							
			U	0.0215	pCi/g						
	Uncert:			+/-0.146							
Cobalt-56	TPU:			+/-0.146							
			U	-0.00937	pCi/g						
	Uncert:			+/-0.0156							
Cobalt-57	TPU:			+/-0.0161							
			U	0.00364	pCi/g						
	Uncert:			+/-0.00833							
Cobalt-58	TPU:			+/-0.00850							
			U	-0.00463	pCi/g						
	Uncert:			+/-0.0171							
Cobalt-60	TPU:			+/-0.0173							
			U	0.0154	pCi/g						
	Uncert:			+/-0.0139							
Europium-152	TPU:			+/-0.0156							
			U	0.00679	pCi/g						
	Uncert:			+/-0.0368							
Europium-154	TPU:			+/-0.0369							
			U	0.000266	pCi/g						
	Uncert:			+/-0.0430							
Europium-155	TPU:			+/-0.0430							
			U	-0.0476	pCi/g						
	Uncert:			+/-0.0392							
Iridium-192	TPU:			+/-0.0450							
			U	0.000366	pCi/g						
	Uncert:			+/-0.0127							
Iron-59	TPU:			+/-0.0127							
			U	0.0129	pCi/g						
	Uncert:			+/-0.0328							
Lead-210	TPU:			+/-0.0333							
			U	-0.751	pCi/g						
	Uncert:			+/-1.16							
Lead-212	TPU:			+/-1.21							
			U	0.00196	pCi/g						
	Uncert:			+/-0.0496							
Lead-214	TPU:			+/-0.0496							
			U	-0.0180	pCi/g						
	Uncert:			+/-0.0360							
Manganese-54	TPU:			+/-0.0369							
			U	-0.00634	pCi/g						
	Uncert:			+/-0.0124							
Mercury-203	TPU:			+/-0.0128							
			U	-0.00567	pCi/g						
	Uncert:			+/-0.0146							
	TPU:			+/-0.0148							

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Parmname	NOM	Sample	Qual	QC	Units	RPD %	REC %	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Neodymium-147			U	0.135	pCi/g						
	Uncert:			+/-0.346							
	TPU:			+/-0.352							
Neptunium-239			U	0.0197	pCi/g						
	Uncert:			+/-0.0866							
	TPU:			+/-0.0870							
Niobium-94			U	-0.0150	pCi/g						
	Uncert:			+/-0.0160							
	TPU:			+/-0.0175							
Niobium-95			U	0.00663	pCi/g						
	Uncert:			+/-0.0170							
	TPU:			+/-0.0173							
Potassium-40			U	0.105	pCi/g						
	Uncert:			+/-0.284							
	TPU:			+/-0.284							
Promethium-144			U	0.000250	pCi/g						
	Uncert:			+/-0.0155							
	TPU:			+/-0.0155							
Promethium-146			U	0.00729	pCi/g						
	Uncert:			+/-0.0146							
	TPU:			+/-0.0150							
Radium-226			U	-0.0180	pCi/g						
	Uncert:			+/-0.0360							
	TPU:			+/-0.0369							
Radium-228			U	-0.0168	pCi/g						
	Uncert:			+/-0.0738							
	TPU:			+/-0.0742							
Ruthenium-106			U	-0.00265	pCi/g						
	Uncert:			+/-0.128							
	TPU:			+/-0.128							
Silver-110m			U	-0.00480	pCi/g						
	Uncert:			+/-0.0182							
	TPU:			+/-0.0183							
Sodium-22			U	0.000477	pCi/g						
	Uncert:			+/-0.0153							
	TPU:			+/-0.0153							
Thallium-208			U	0.000449	pCi/g						
	Uncert:			+/-0.0197							
	TPU:			+/-0.0197							
Thorium-234			U	-0.145	pCi/g						
	Uncert:			+/-0.421							
	TPU:			+/-0.427							
Tin-113			U	-0.00197	pCi/g						
	Uncert:			+/-0.0173							
	TPU:			+/-0.0173							
Uranium-235			U	0.0465	pCi/g						

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2529194										
Uranium-238	Uncert:			+/-0.124							
	TPU:			+/-0.124							
			U	-0.145	pCi/g						
Yttrium-88	Uncert:			+/-0.421							
	TPU:			+/-0.427							
			U	-0.0229	pCi/g						
Zinc-65	Uncert:			+/-0.0177							
	TPU:			+/-0.0205							
			U	0.00150	pCi/g						
Zirconium-95	Uncert:			+/-0.0299							
	TPU:			+/-0.0299							
			U	0.0159	pCi/g						
	Uncert:			+/-0.0258							
	TPU:			+/-0.0268							

Notes:

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

The Qualifiers in this report are defined as follows:

U	Analyte was analyzed for, but not detected above the Lc.
J	Value is estimated
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
H	Analytical holding time was exceeded
<	Result is less than value reported
>	Result is greater than value reported
UI	Gamma Spectroscopy--Uncertain identification
BD	Results are either below the MDC or tracer recovery is low
h	Preparation or preservation holding time was exceeded
R	Sample results are rejected
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
N/A	RPD or %Recovery limits do not apply.
ND	Analyte concentration is not detected above the detection limit
M	M if above MDC and less than LLD
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
FA	Failed analysis.
M	REMP Result > MDC/CL and < RDL
UJ	Gamma Spectroscopy--Uncertain identification
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
N1	See case narrative
Y	Other specific qualifiers were required to properly define the results. Consult case narrative.
**	Analyte is a Tracer compound

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

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

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.

Alpha Spectroscopy Raw Data

Batch 2534022 Check-list

This check-list was completed on 11-DEC-23 by Melanie Aycok

This batch was reviewed by Melanie Aycok on 11-DEC-23 and Scott Moreland on 11-DEC-23.

Batch ID:
2534022

Product:
ASP__UUS

Description: Alpha Spec Uranium
GL-RAD-A-011

#	Criteria	Yes	No	Comments
Preparation Information				
1	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
2	Are instrument source checks within limits?	Yes		
3	Have samples been blank corrected?		No	
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were all tracer/carrier recoveries within the required acceptance limits?	Yes		
10	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Were manual integrations performed on any sample or QC data files in this batch?		No	
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Uranium

Batch ID: 2534022

Analyst: Chandler Metts (CM4)

Method: DOE EML HASL-300, U-02-RC
Modified

Lab SOP: GL-RAD-A-011 REV# 28

Instrument: BAL-18550299

Due Dates for Lab: 12-DEC-2023

Package: 13-DEC-2023

SDG: 14-DEC-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205590010	Uranium-238 AS SPIKE	1600-P	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/g)	Dry or Wet	Unadjusted Aliquot (g)	Aliquot (g)
1	645402001	04-DEC-2023	1	Dry to Dry	0.119	0.119
2	645402002	04-DEC-2023	1	Dry to Dry	0.12	0.12
3	645863002	04-DEC-2023	1	Dry to Dry	0.117	0.117
4	645981002	04-DEC-2023	1	Dry to Dry	0.116	0.116
5	646261002	04-DEC-2023	1	Dry to Dry	0.12	0.12
6	646494004	04-DEC-2023	1	Dry to Dry	0.112	0.112
7	646494005	04-DEC-2023	1	Dry to Dry	0.123	0.123
8	646494014	04-DEC-2023	1	Dry to Dry	0.124	0.124
9	646494030	04-DEC-2023	1	Dry to Dry	0.12	0.12
10	1205590008 MB	04-DEC-2023	1	Dry to Wet		0.124
11	1205590009 DUP (645402001)	04-DEC-2023	1	Dry to Dry	0.116	0.116
12	1205590010 LCS	04-DEC-2023	1	Dry to Wet		0.124

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1564-II	Uranium-232 AS TRACER	.1 ml	Pipet Id: RAD-ASP-184002Z Pu-236 Tracer Used: No Analyzed With: N/A Data Entry Date2: 04-DEC-2023 00:00
REGNT 3976130.3	Acetone	1 mL	
REGNT 3976909.2	Hydrogen Peroxide 30% ACS Reagent	.1 mL	
REGNT 4068848	0.1M HCl	15 mL	
REGNT 4068304	6M Hydrochloric Acid/0.52M Hydrofluoric Acid	15 mL	
REGNT 4068306	RASP-6M Hydrochloric Acid	5 mL	
REGNT 4044382.1	Anion Exchange Resin 1x8 100-200 Mesh Resin	3 mL	
REGNT 4056462	RASP- Ethyl Alcohol (80%)	5 mL	
REGNT 3972570	Iron Carrier	2 mL	
REGNT 4067119	Neodymium 500 MG/L in 4% HNO3	.1 mL	
REGNT 4068852	RASP-Neodymium Substrate	5 mL	
REGNT 3473590.1	RASP-Titanium Chloride	.5 mL	
REGNT 4059813	5% Saturated Boric Acid	1 mL	
REGNT 4068820	9M Hydrochloric Acid	30 mL	
REGNT 4064439.3	RASP-Ammonium Hydroxide	10 mL	
REGNT 4059521.1	RASP-Hydrochloric Acid	20 mL	
REGNT 4058522.8	RASP-Hydrofluoric Acid	30 mL	
REGNT 4066223.8	Nitric Acid	20 mL	

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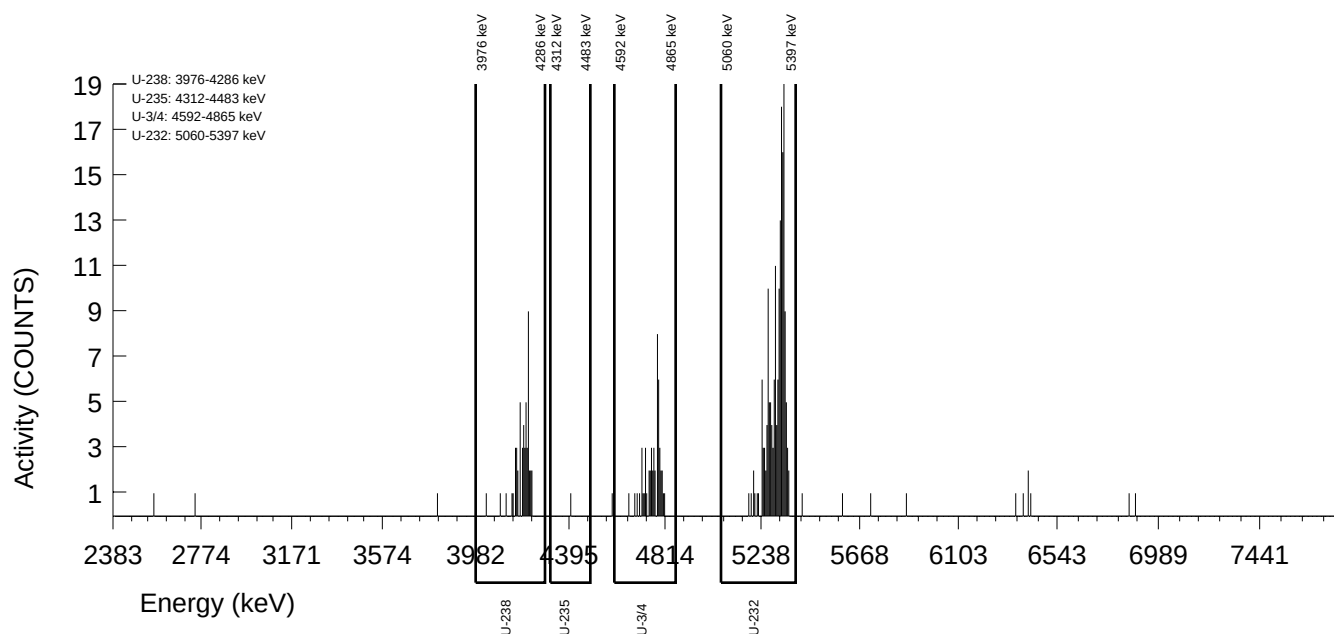
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-011

BATCH NUMBER : 2534022 SAMPLE ID : S0645402001_UU SAMPLE QTY : 0.119 G +/-0.840 % SAMPLE DATE : 09-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 41.7 +/-8.278 %	CHAMBER : 158 DETECTOR S/N : 155813 AVERAGE %EFFICIENCY : 39.0874 AVERAGE %EFF ERROR : 0.7524 COUNT DATE : 08-Dec-2023 08:41:46 ELAPSED LIVE TIME(SEC) : 14400.00	LIB FILE : UU BKG FILE : B158.CNF;1833 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 60000.00 EFF FILE : W158.CNF;20 CAL DATE : 14-Nov-2023
TRACER ID : 1564-II NUCLIDE : U-232 NOMINAL : 4.4204E+00 dpm RESULTS : 1.8435E+00 dpm		

NUCLIDE ACTIVITY SUMMARY													
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	1.96-sigma TPU pCi/G	MDA pCi/G	Lc pCi/G	1.96-sigma cnt Unc pCi/G
U-232	5302.10	5307.16	68.198	174.000	172.800	1.200	1.0954	100.000	1.67E+01	3.76E+00	6.79E-01	1.94E-01	2.51E+00
U-3/4	4763.02	4760.98	10.529	50.000	48.934	0.480	0.6928	100.000	4.73E+00	1.58E+00	6.36E-01	1.73E-01	1.36E+00
U-235	4391.00	4400.15	4.860	1.000	0.520	0.480	0.6928	80.900	6.22E-02	3.46E-01	6.62E-01	1.52E-01	3.46E-01
U-238	4184.73	4186.79	37.628	51.000	51.000	0.000	1.0000	100.000	4.93E+00	1.60E+00	2.90E-01	1.77E-01	1.37E+00

NOTES:

* Correction made to the following net area
due to tracer impurity:
U-3/4 (0.586 +/-0.018)



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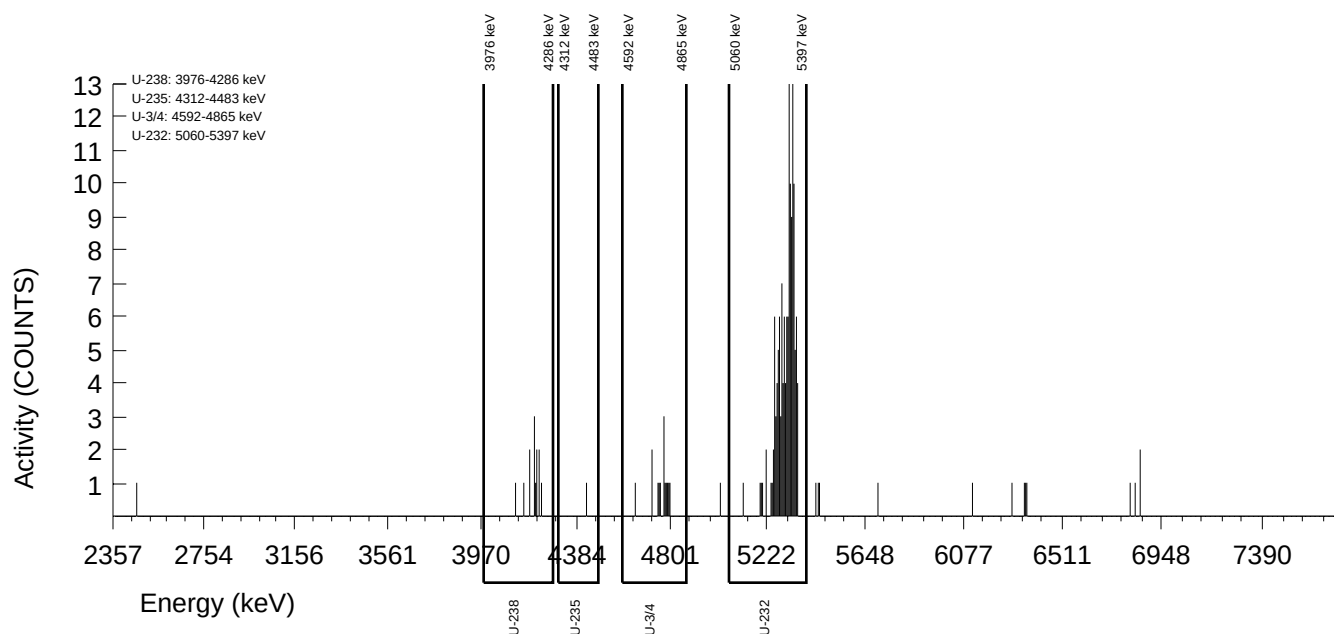
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-011

BATCH NUMBER : 2534022 SAMPLE ID : S0645981002_UU SAMPLE QTY : 0.116 G +/-0.862 % SAMPLE DATE : 13-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 49.9 +/-9.154 %	CHAMBER : 117 DETECTOR S/N : 80003 AVERAGE %EFFICIENCY : 26.1702 AVERAGE %EFF ERROR : 0.5086 COUNT DATE : 08-Dec-2023 09:48:15 ELAPSED LIVE TIME(SEC) : 14400.00	LIB FILE : UU BKG FILE : B117.CNF;1927 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 60000.00 EFF FILE : W117.CNF;501 CAL DATE : 13-Nov-2023
TRACER ID : 1564-II NUCLIDE : U-232 NOMINAL : 4.4199E+00 dpm RESULTS : 2.2038E+00 dpm		

NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	1.96-sigma TPU pCi/G	MDA pCi/G	Lc pCi/G	1.96-sigma cnt Unc pCi/G
U-232	5302.10	5303.47	53.482	140.000	138.320	1.680	1.2961	100.000	1.72E+01	4.29E+00	9.61E-01	2.95E-01	2.89E+00
U-3/4	4763.02	4754.28	54.347	14.000	10.651	2.880	1.6971	100.000	1.32E+00	9.97E-01	1.19E+00	4.10E-01	9.64E-01
U-235	4391.00	4430.43	4.941	1.000	1.000	0.000	1.0000	80.900	1.53E-01	4.32E-01	4.60E-01	2.81E-01	4.31E-01
U-238	4184.73	4196.77	41.995	13.000	12.520	0.480	0.6928	100.000	1.55E+00	9.59E-01	6.87E-01	1.57E-01	9.15E-01

NOTES:

* Correction made to the following net area due to tracer impurity:
U-3/4 (0.469 +/-0.014)



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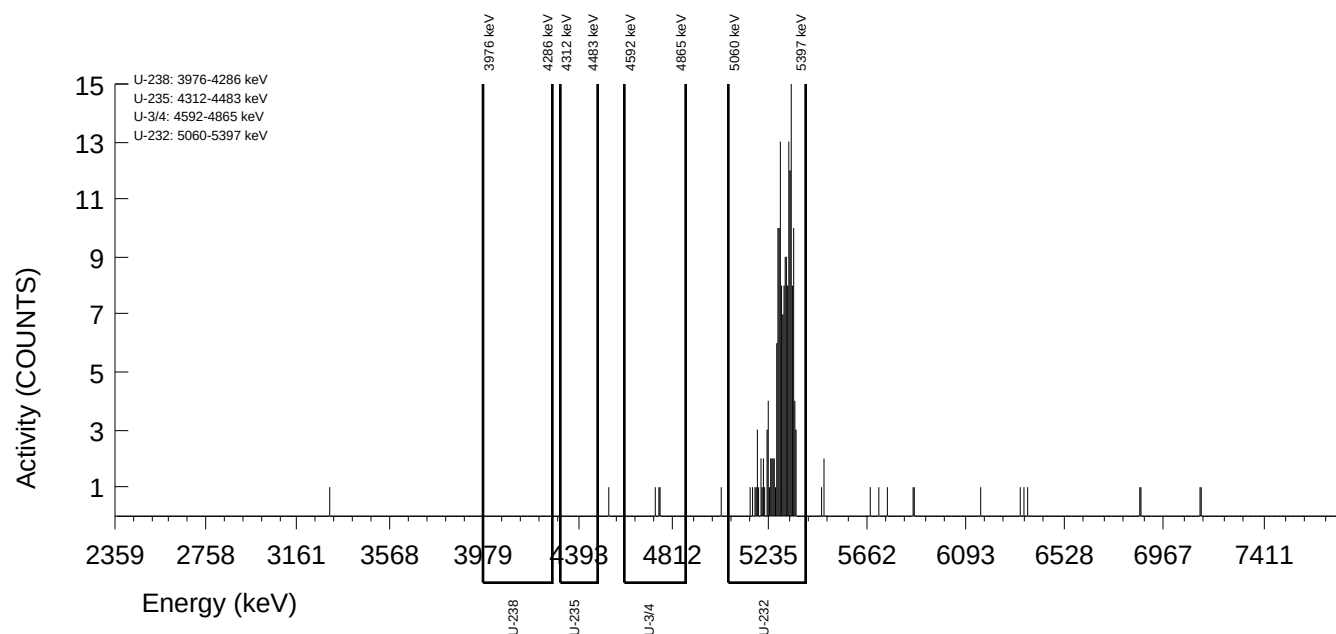
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-011

BATCH NUMBER : 2534022 SAMPLE ID : S1205590008_UU SAMPLE QTY : 0.124 G +/-0.806 % SAMPLE DATE : 04-Dec-2023 00:00:00 ANALYST : CM4 % YIELD : 64.7 +/-8.083 %	CHAMBER : 131 DETECTOR S/N : 126132 AVERAGE %EFFICIENCY : 26.6481 AVERAGE %EFF ERROR : 0.5176 COUNT DATE : 08-Dec-2023 09:48:32 ELAPSED LIVE TIME(SEC) : 14400.00	LIB FILE : UU BKG FILE : B131.CNF;1929 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 60000.00 EFF FILE : W131.CNF;509 CAL DATE : 13-Nov-2023
TRACER ID : 1564-II NUCLIDE : U-232 NOMINAL : 4.4173E+00 dpm RESULTS : 2.8586E+00 dpm		

NUCLIDE ACTIVITY SUMMARY											1.96-sigma		1.96-sigma	
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G		TPU pCi/G	MDA pCi/G	Lc pCi/G	cnt Unc pCi/G
U-232	5302.10	5292.95	69.643	184.000	182.800	1.200	1.0954	100.000	1.60E+01		3.52E+00	6.16E-01	1.76E-01	2.34E+00
U-3/4	4763.02	4745.84	24.799	3.000	1.180	1.200	1.0954	100.000	1.04E-01		3.60E-01	6.83E-01	2.10E-01	3.59E-01
U-235	4391.00	4397.19	0.000	0.000	-0.480	0.480	0.6928	80.900	-5.21E-02		2.31E-01	6.01E-01	1.38E-01	2.30E-01
U-238	4184.73	4130.83	0.000	0.000	-0.960	0.960	0.9798	100.000	-8.43E-02		1.96E-01	5.78E-01	1.58E-01	1.95E-01

NOTES:

* Correction made to the following net area due to tracer impurity:
U-3/4 (0.620 +/-0.019)



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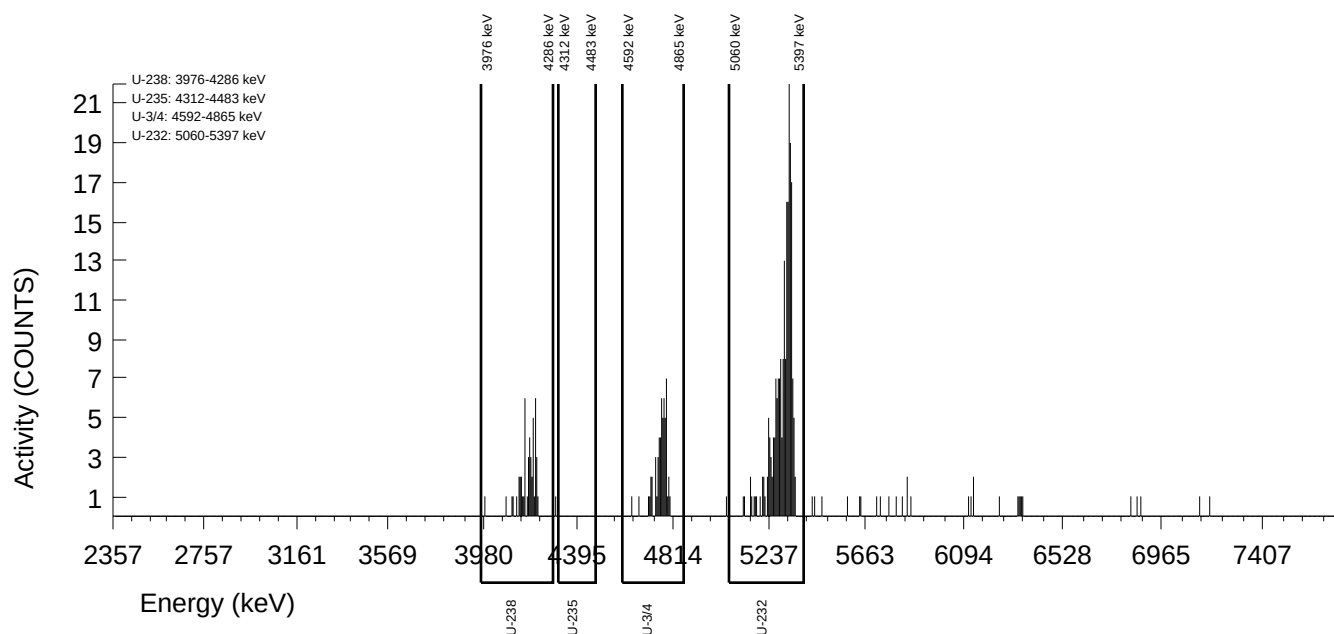
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-011

BATCH NUMBER : 2534022 SAMPLE ID : S1205590009_UU SAMPLE QTY : 0.116 G +/-0.862 % SAMPLE DATE : 09-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 76.3 +/-7.696 %	CHAMBER : 133 DETECTOR S/N : 101520 AVERAGE %EFFICIENCY : 25.5917 AVERAGE %EFF ERROR : 0.4978 COUNT DATE : 08-Dec-2023 09:48:33 ELAPSED LIVE TIME(SEC) : 14400.00	LIB FILE : UU BKG FILE : B133.CNF;1929 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 60000.00 EFF FILE : W133.CNF;107 CAL DATE : 13-Nov-2023
TRACER ID : 1564-II NUCLIDE : U-232 NOMINAL : 4.4204E+00 dpm RESULTS : 3.3749E+00 dpm		

NUCLIDE ACTIVITY SUMMARY											1.96-sigma		1.96-sigma	
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	TPU pCi/G	MDA pCi/G	Lc pCi/G	cnt	Unc pCi/G
U-232	5302.10	5298.46	34.843	210.000	207.120	2.880	1.6971	100.000	1.72E+01	3.58E+00	7.64E-01	2.58E-01	2.36E+00	
U-3/4	4763.02	4761.81	35.258	56.000	53.137	2.160	1.4697	100.000	4.40E+00	1.42E+00	7.49E-01	2.50E-01	1.23E+00	
U-235	4391.00	4397.19	0.000	0.000	-0.480	0.480	0.6928	80.900	-4.91E-02	2.18E-01	5.67E-01	1.30E-01	2.17E-01	
U-238	4184.73	4175.97	52.763	48.000	46.080	1.920	1.3856	100.000	3.82E+00	1.29E+00	6.69E-01	2.10E-01	1.14E+00	

NOTES:

* Correction made to the following net area due to tracer impurity:
U-3/4 (0.703 +/-0.021)



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ALPHA SPECTROSCOPY REPORT

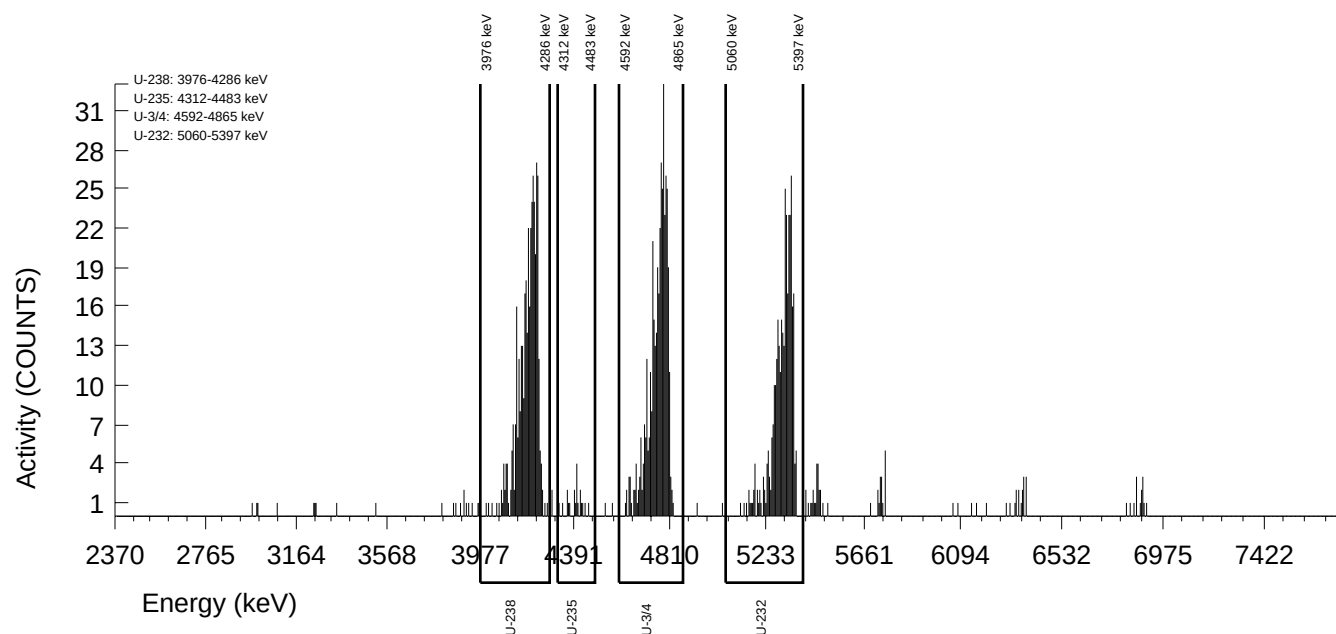
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-011

BATCH NUMBER : 2534022 SAMPLE ID : S1205590010_UU SAMPLE QTY : 0.124 G +/-0.806 % SAMPLE DATE : 04-Dec-2023 00:00:00 ANALYST : CM4 % YIELD : 94.3 +/-6.383 %	CHAMBER : 014 DETECTOR S/N : 83289 AVERAGE %EFFICIENCY : 33.5746 AVERAGE %EFF ERROR : 0.6483 COUNT DATE : 09-Dec-2023 10:56:07 ELAPSED LIVE TIME(SEC) : 14400.00	LIB FILE : UU BKG FILE : B014.CNF;2587 BKG DATE : 08-Dec-2023 BKG LIVE TIME(SEC) : 59999.99 EFF FILE : W014.CNF;713 CAL DATE : 01-Dec-2023
TRACER ID : 1564-II NUCLIDE : U-232 NOMINAL : 4.4173E+00 dpm RESULTS : 4.1660E+00 dpm	LCS ID 1600-P NUCLIDE U-238 NOMINAL (pCi/G) 2.1631E+01 % RECOVERY 89.500	

NUCLIDE ACTIVITY SUMMARY										1.96-sigma			1.96-sigma
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	TPU pCi/G	MDA pCi/G	Lc pCi/G	cnt Unc pCi/G
U-232	5302.10	5305.20	68.513	345.000	335.640	9.360	3.0594	100.000	1.60E+01	2.74E+00	6.79E-01	2.68E-01	1.75E+00
U-3/4	4763.02	4757.63	66.965	407.000	403.461	2.400	1.5492	100.000	1.93E+01	3.17E+00	4.62E-01	1.60E-01	1.89E+00
U-235	4391.00	4394.29	6.537	20.000	19.760	0.240	0.4899	80.900	1.17E+00	5.54E-01	2.83E-01	5.30E-02	5.32E-01
U-238	4184.73	4184.22	93.989	405.000	405.000	0.000	1.0000	100.000	1.94E+01	3.17E+00	1.43E-01	8.76E-02	1.89E+00

NOTES:

* Correction made to the following net area due to tracer impurity:
U-3/4 (1.139 +/-0.034)



Batch 2534026 Check-list

This check-list was completed on 11-DEC-23 by Melanie Aycok

This batch was reviewed by Melanie Aycok on 11-DEC-23 and Scott Moreland on 11-DEC-23.

Batch ID:
2534026

Product:
ASP__THS

Description: Alpha Spec Thorium
GL-RAD-A-038

#	Criteria	Yes	No	Comments
Preparation Information				
1	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
2	Are instrument source checks within limits?	Yes		
3	Have samples been blank corrected?		No	
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were all tracer/carrier recoveries within the required acceptance limits?	Yes		
10	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Were manual integrations performed on any sample or QC data files in this batch?		No	
14	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Thorium

Batch ID: 2534026

Analyst: Chandler Metts (CM4)

Method: DOE EML HASL-300, Th-01-RC
Modified

Lab SOP: GL-RAD-A-038 REV# 18

Instrument: BAL-18550299

Due Dates for Lab: 12-DEC-2023

Package: 13-DEC-2023

SDG: 14-DEC-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205590031	Thorium-232 AS SPIKE	1513-J	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/g)	Dry or Wet	Unadjusted Aliquot (g)	Aliquot (g)
1	645402001	04-DEC-2023	1	Dry to Dry	0.116	0.116
2	645402002	04-DEC-2023	1	Dry to Dry	0.115	0.115
3	645863002	04-DEC-2023	1	Dry to Dry	0.122	0.122
4	645981002	04-DEC-2023	1	Dry to Dry	0.11	0.11
5	646261002	04-DEC-2023	1	Dry to Dry	0.119	0.119
6	646494004	04-DEC-2023	1	Dry to Dry	0.115	0.115
7	646494005	04-DEC-2023	1	Dry to Dry	0.117	0.117
8	646494014	04-DEC-2023	1	Dry to Dry	0.118	0.118
9	646494030	04-DEC-2023	1	Dry to Dry	0.117	0.117
10	1205590029 MB	04-DEC-2023	1	Dry to Wet		0.122
11	1205590030 DUP (645402001)	04-DEC-2023	1	Dry to Dry	0.112	0.112
12	1205590031 LCS	04-DEC-2023	1	Dry to Wet		0.122

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1845-I	Thorium-229 AS TRACER, RASP	.1 mL	Pipet ID: RAD-ASP-184002Z Data Entry Date2: 04-DEC-2023 00:00
REGNT 3976130.3	Acetone	1 mL	
REGNT 3976909.2	Hydrogen Peroxide 30% ACS Reagent	3 mL	
REGNT 4061107	RASP-2M Hydrochloric Acid	4 mL	
REGNT 4044382.1	Anion Exchange Resin 1x8 100-200 Mesh Resin	3 mL	
REGNT 4056462	RASP- Ethyl Alcohol (80%)	5 mL	
REGNT 3972570	Iron Carrier	2 mL	
REGNT 4067119	Neodymium 500 MG/L in 4% HNO3	.1 mL	
REGNT 4068852	RASP-Neodymium Substrate	5 mL	
REGNT 4059813	5% Saturated Boric Acid	1 mL	
REGNT 4068850	8M Nitric Acid	30 mL	
REGNT 4068820	9M Hydrochloric Acid	20 mL	
REGNT 4059521.1	RASP-Hydrochloric Acid	20 mL	
REGNT 4058522.8	RASP-Hydrofluoric Acid	30 mL	
REGNT 4066223.8	Nitric Acid	20 mL	

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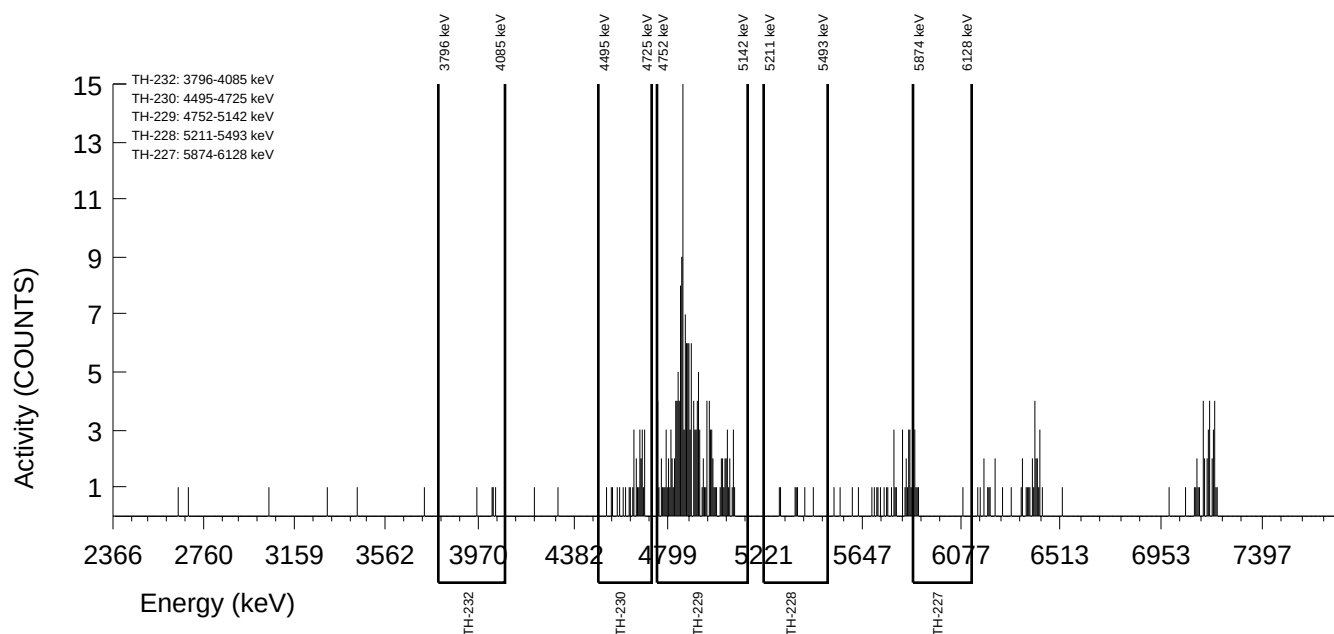
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-038

BATCH NUMBER : 2534026 SAMPLE ID : S0645402001_TH SAMPLE QTY : 0.116 G +/-0.862 % SAMPLE DATE : 09-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 64.1 +/-7.968 %	CHAMBER : 025 DETECTOR S/N : 149007 AVERAGE %EFFICIENCY : 32.0326 AVERAGE %EFF ERROR : 0.6192 COUNT DATE : 07-Dec-2023 15:32:11 ELAPSED LIVE TIME(SEC) : 10799.99	LIB FILE : TH BKG FILE : B025.CNF;2610 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 59999.99 EFF FILE : W025.CNF;756 CAL DATE : 02-Dec-2023
TRACER ID : 1845-I NUCLIDE : TH-229 NOMINAL : 4.8066E+00 dpm RESULTS : 3.0832E+00 dpm		

NUCLIDE ACTIVITY SUMMARY													
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	1.96-sigma TPU pCi/G	MDA pCi/G	Lc pCi/G	1.96-sigma cnt Unc pCi/G
TH-227	5994.04	5938.98	6.119	8.000	6.560	1.440	1.2000	57.440	3.48E+00	3.22E+00	3.86E+00	1.14E+00	3.17E+00
TH-228	5363.00	5354.05	141.955	7.000	5.553	1.440	1.2000	99.940	6.00E-01	6.18E-01	7.89E-01	2.32E-01	6.10E-01
TH-229	4900.00	4899.06	13.461	178.000	176.920	1.080	1.0392	99.520	1.87E+01	4.09E+00	7.08E-01	1.96E-01	2.77E+00
TH-230	4671.39	4644.55	50.174	29.000	27.395	0.540	0.7348	99.700	2.88E+00	1.23E+00	7.68E-01	2.26E-01	1.13E+00
TH-232	3972.00	4014.71	83.215	4.000	3.389	0.540	0.7348	100.000	3.56E-01	4.70E-01	6.06E-01	1.45E-01	4.66E-01

NOTES:

* Corrections made to the following net areas due to tracer impurity:
TH-228 (0.007 +/-0.000)
TH-230 (1.065 +/-0.017)
TH-232 (0.071 +/-0.001)



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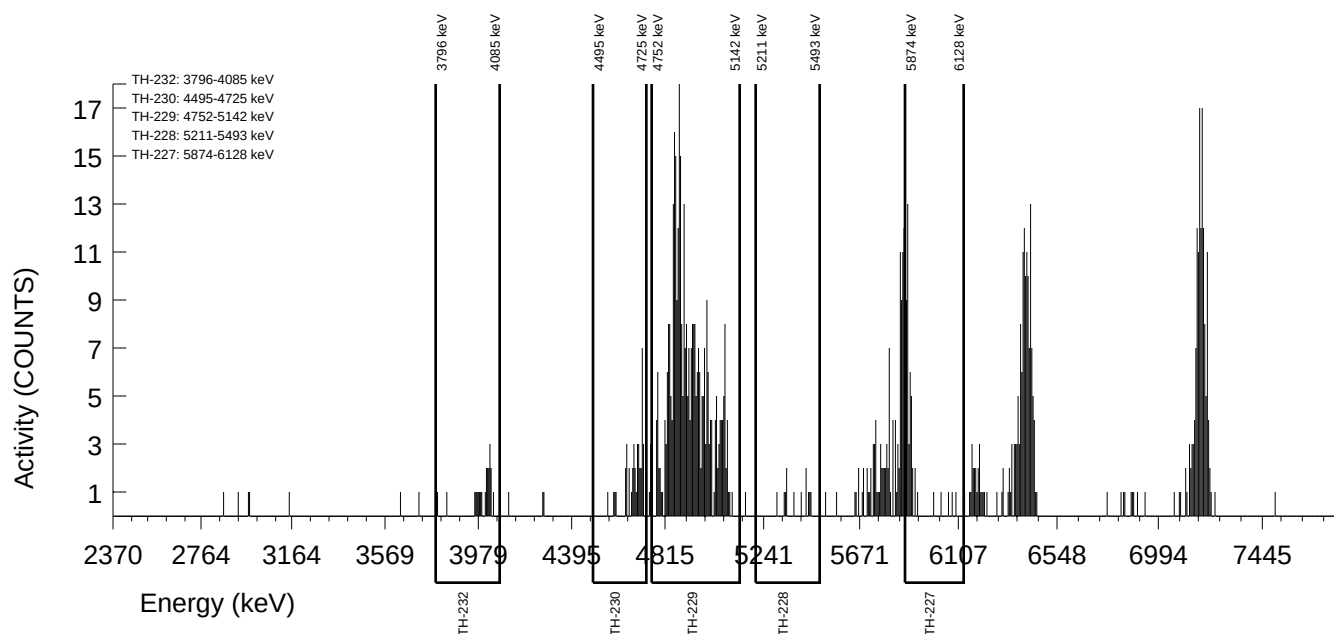
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-038

BATCH NUMBER : 2534026 SAMPLE ID : S0645981002_TH SAMPLE QTY : 0.110 G +/-0.909 % SAMPLE DATE : 13-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 20.4 +/-5.896 %	CHAMBER : 038 DETECTOR S/N : 72532 AVERAGE %EFFICIENCY : 36.6806 AVERAGE %EFF ERROR : 0.7070 COUNT DATE : 09-Dec-2023 15:23:01 ELAPSED LIVE TIME(SEC) : 59999.99	LIB FILE : TH BKG FILE : B038.CNF;2594 BKG DATE : 08-Dec-2023 BKG LIVE TIME(SEC) : 60000.00 EFF FILE : W038.CNF;688 CAL DATE : 02-Dec-2023
TRACER ID : 1845-I NUCLIDE : TH-229 NOMINAL : 4.8066E+00 dpm RESULTS : 9.8071E-01 dpm		

NUCLIDE ACTIVITY SUMMARY													
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	1.96-sigma TPU pCi/G	MDA pCi/G	Lc pCi/G	1.96-sigma cnt Unc pCi/G
TH-227	5994.04	5899.03	0.000	60.000	14.000	46.000	6.7823	57.440	3.63E+00	5.30E+00	8.95E+00	4.09E+00	5.28E+00
TH-228	5363.00	5390.71	85.791	12.000	6.987	5.000	2.2361	99.940	3.93E-01	4.83E-01	7.54E-01	2.93E-01	4.80E-01
TH-229	4900.00	4917.97	49.568	361.000	358.000	3.000	1.7321	99.520	1.97E+01	3.18E+00	6.08E-01	2.22E-01	2.06E+00
TH-230	4671.39	4674.70	7.721	41.000	36.846	2.000	1.4142	99.700	2.02E+00	7.68E-01	6.13E-01	2.24E-01	7.22E-01
TH-232	3972.00	3997.98	23.286	22.000	18.856	3.000	1.7321	100.000	1.03E+00	5.72E-01	6.10E-01	2.23E-01	5.57E-01

NOTES:

* Corrections made to the following net areas due to tracer impurity:
TH-228 (0.013 +/-0.000)
TH-230 (2.154 +/-0.033)
TH-232 (0.144 +/-0.002)



GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

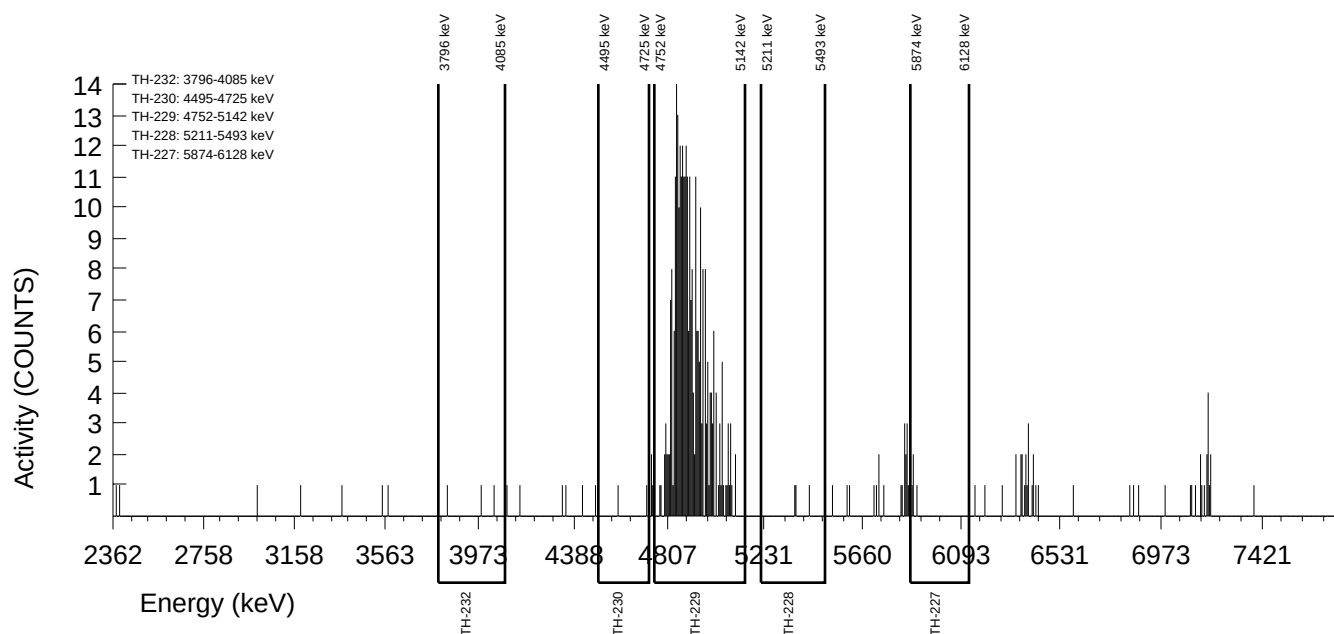
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-038

BATCH NUMBER : 2534026 SAMPLE ID : S1205590029_TH SAMPLE QTY : 0.122 G +/-0.820 % SAMPLE DATE : 04-Dec-2023 00:00:00 ANALYST : CM4 % YIELD : 102 +/-6.222 %	CHAMBER : 034 DETECTOR S/N : 88994 AVERAGE %EFFICIENCY : 35.1374 AVERAGE %EFF ERROR : 0.6778 COUNT DATE : 07-Dec-2023 15:32:12 ELAPSED LIVE TIME(SEC) : 10800.00	LIB FILE : TH BKG FILE : B034.CNF;2602 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 59999.99 EFF FILE : W034.CNF;689 CAL DATE : 02-Dec-2023
TRACER ID : 1845-I NUCLIDE : TH-229 NOMINAL : 4.8066E+00 dpm RESULTS : 4.9238E+00 dpm		

NUCLIDE ACTIVITY SUMMARY											1.96-sigma		1.96-sigma	
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	TPU pCi/G	MDA pCi/G	Lc pCi/G	cnt	Unc pCi/G
TH-227	5994.04	5889.17	7.379	4.000	0.040	3.960	1.9900	57.440	4.55E-03	5.35E-01	1.15E+00	4.05E-01	5.35E-01	5.35E-01
TH-228	5363.00	5387.63	63.947	3.000	1.368	1.620	1.2728	99.940	7.83E-02	2.33E-01	4.33E-01	1.31E-01	2.33E-01	2.33E-01
TH-229	4900.00	4906.51	143.636	311.000	309.920	1.080	1.0392	99.520	1.77E+01	3.02E+00	3.84E-01	1.06E-01	1.98E+00	1.98E+00
TH-230	4671.39	4649.36	122.976	2.000	-0.405	0.540	0.7348	99.700	-2.31E-02	1.98E-01	4.69E-01	1.49E-01	1.98E-01	1.98E-01
TH-232	3972.00	3952.70	201.680	3.000	2.515	0.360	0.6000	100.000	1.43E-01	2.27E-01	3.10E-01	6.95E-02	2.26E-01	2.26E-01

NOTES:

* Corrections made to the following net areas due to tracer impurity:
TH-228 (0.012 +/-0.000)
TH-230 (1.865 +/-0.029)
TH-232 (0.125 +/-0.002)



GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

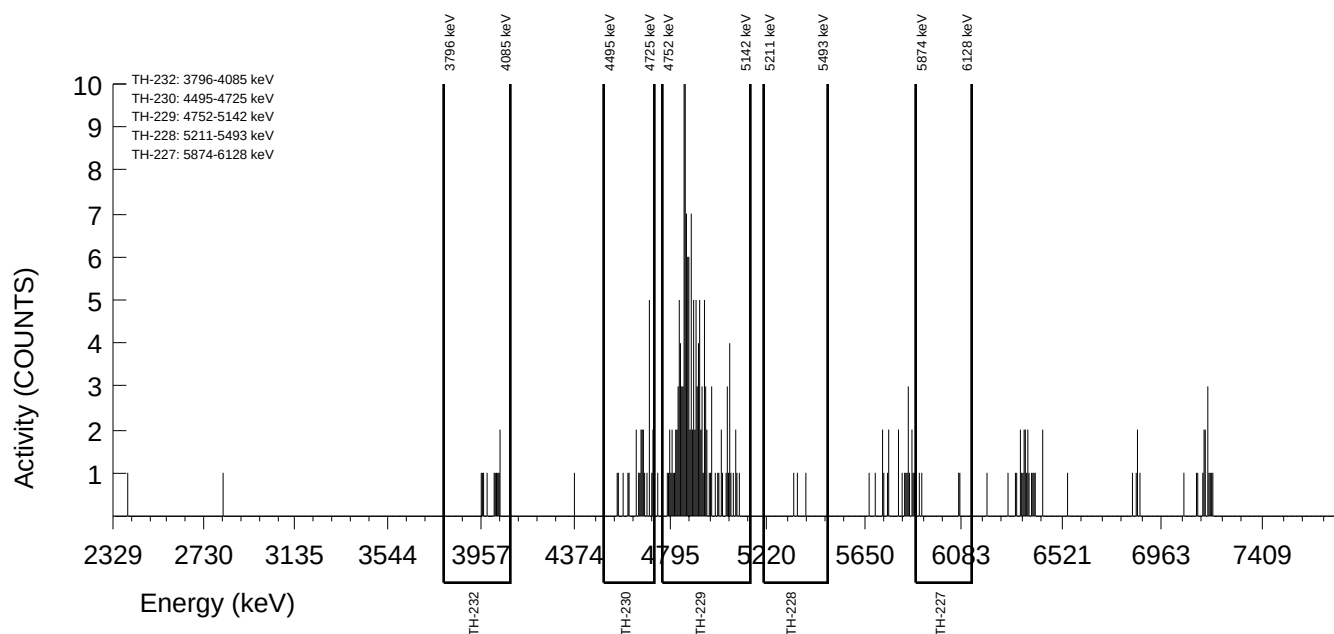
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-038

BATCH NUMBER : 2534026 SAMPLE ID : S1205590030_TH SAMPLE QTY : 0.112 G +/-0.893 % SAMPLE DATE : 09-Nov-2023 00:00:00 ANALYST : CM4 % YIELD : 57.5 +/-8.785 %	CHAMBER : 035 DETECTOR S/N : 79182 AVERAGE %EFFICIENCY : 29.1995 AVERAGE %EFF ERROR : 0.5658 COUNT DATE : 07-Dec-2023 15:32:12 ELAPSED LIVE TIME(SEC) : 10800.00	LIB FILE : TH BKG FILE : B035.CNF;2590 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 59999.99 EFF FILE : W035.CNF;741 CAL DATE : 02-Dec-2023
TRACER ID : 1845-I NUCLIDE : TH-229 NOMINAL : 4.8066E+00 dpm RESULTS : 2.7656E+00 dpm		

NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	1.96-sigma TPU pCi/G	MDA pCi/G	Lc pCi/G	1.96-sigma cnt Unc pCi/G
TH-227	5994.04	5947.41	0.000	6.000	1.140	4.860	2.2045	57.440	7.65E-01	3.70E+00	7.30E+00	2.64E+00	3.70E+00
TH-228	5363.00	5361.27	54.806	3.000	2.095	0.900	0.9487	99.940	2.87E-01	5.52E-01	8.76E-01	2.33E-01	5.50E-01
TH-229	4900.00	4901.89	35.446	147.000	144.660	2.340	1.5297	99.520	1.93E+01	4.68E+00	1.13E+00	3.65E-01	3.19E+00
TH-230	4671.39	4667.68	23.251	28.000	26.590	0.540	0.7348	99.700	3.55E+00	1.55E+00	9.39E-01	2.69E-01	1.41E+00
TH-232	3972.00	4006.26	7.474	11.000	10.762	0.180	0.4243	100.000	1.43E+00	9.41E-01	6.27E-01	1.14E-01	9.05E-01

NOTES:

* Corrections made to the following net areas due to tracer impurity:
TH-228 (0.005 +/-0.000)
TH-230 (0.870 +/-0.013)
TH-232 (0.058 +/-0.001)



GEL Laboratories LLC
ALPHA SPECTROSCOPY REPORT

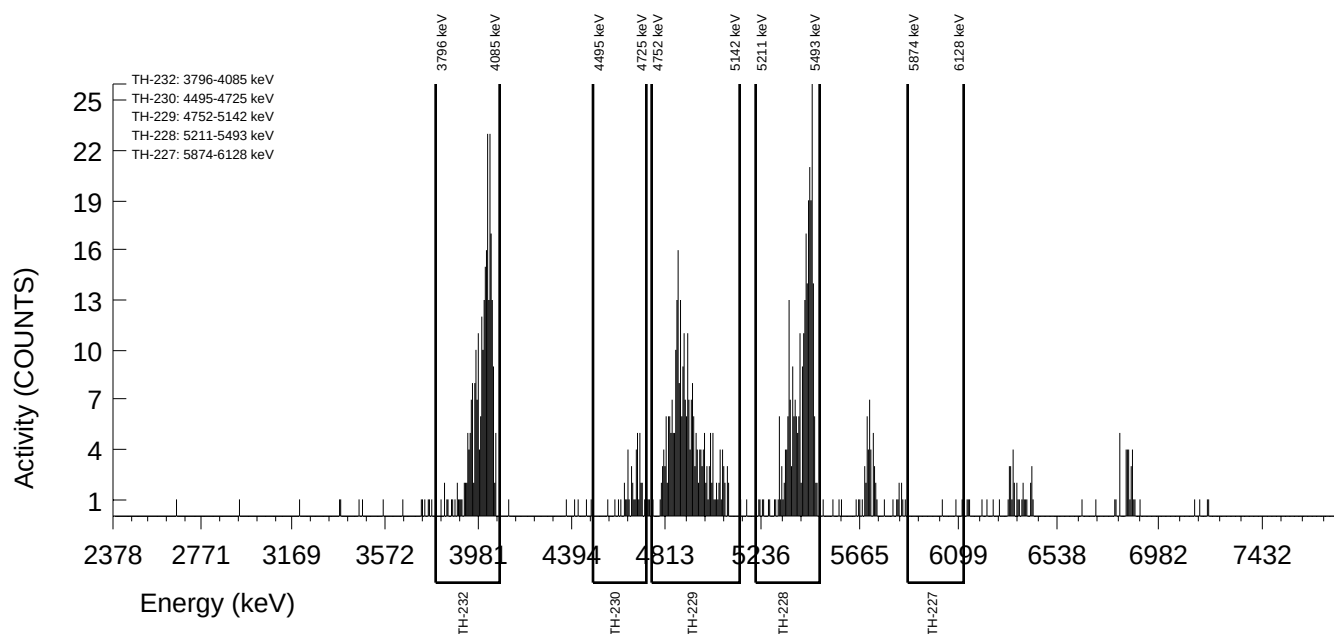
Instrument SOP: GL-RAD-I-009
Analytical SOP: GL-RAD-A-038

BATCH NUMBER : 2534026 SAMPLE ID : S1205590031_TH SAMPLE QTY : 0.122 G +/-0.820 % SAMPLE DATE : 04-Dec-2023 00:00:00 ANALYST : CM4 % YIELD : 92.6 +/-6.506 %	CHAMBER : 036 DETECTOR S/N : 101511 AVERAGE %EFFICIENCY : 35.0530 AVERAGE %EFF ERROR : 0.6762 COUNT DATE : 07-Dec-2023 15:32:12 ELAPSED LIVE TIME(SEC) : 10800.00	LIB FILE : TH BKG FILE : B036.CNF;2598 BKG DATE : 01-Dec-2023 BKG LIVE TIME(SEC) : 59999.99 EFF FILE : W036.CNF;697 CAL DATE : 06-Dec-2023
TRACER ID : 1845-I NUCLIDE : TH-229 NOMINAL : 4.8066E+00 dpm RESULTS : 4.4521E+00 dpm	LCS ID 1513-J NUCLIDE TH-232 NOMINAL (pCi/G) 1.6287E+01 % RECOVERY 104.230	

NUCLIDE ACTIVITY SUMMARY										1.96-sigma		1.96-sigma	
NUCLIDE	LIBRARY ENERGY	PEAK ENERGY	PEAK FWHM	GROSS AREA	NET AREA	BKG AREA	BKG StDev	%ABUN	ACTIVITY pCi/G	TPU pCi/G	MDA pCi/G	Lc pCi/G	cnt Unc pCi/G
TH-227	5994.04	6088.23	87.836	4.000	-0.140	4.140	2.0347	57.440	-1.77E-02	5.95E-01	1.30E+00	4.59E-01	5.95E-01
TH-228	5363.00	5408.65	34.768	284.000	283.270	0.720	0.8485	99.940	1.80E+01	3.20E+00	3.84E-01	9.68E-02	2.10E+00
TH-229	4900.00	4909.33	54.409	281.000	279.560	1.440	1.2000	99.520	1.77E+01	3.17E+00	4.63E-01	1.36E-01	2.09E+00
TH-230	4671.39	4669.06	55.304	42.000	39.958	0.360	0.6000	99.700	2.53E+00	8.89E-01	4.93E-01	1.51E-01	8.15E-01
TH-232	3972.00	4001.02	46.154	269.000	268.708	0.180	0.4243	100.000	1.70E+01	3.05E+00	3.08E-01	5.92E-02	2.03E+00

NOTES:

* Corrections made to the following net areas due to tracer impurity:
 TH-228 (0.010 +/-0.000)
 TH-230 (1.682 +/-0.026)
 TH-232 (0.112 +/-0.002)



Continuing Calibration Data

Review of Alpha Spectrometer QA results (Daily checks) 7-DEC-2023 13:49:36.41

Bank 1 through bank 29 (detectors 1 through 256)

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

	Detector	Parameter	Flag
	-----	-----	-----
7-DEC-2023	23	PSFWHM-5000	Above
7-DEC-2023	23	PSCTSS-5000	Below
7-DEC-2023	73	PSENERGY-5000	Below
7-DEC-2023	73	PSCTSS-5000	Below
7-DEC-2023	94	PSFWHM-5000	Below
7-DEC-2023	94	PSCTSS-5000	Below
28-AUG-2023	115	PSCTSS-5000	Below
28-AUG-2023	116	PSCTSS-5000	Below
7-DEC-2023	124	PSENERGY-5000	Below
7-DEC-2023	171	PSFWHM-5000	Below
7-DEC-2023	171	PSCTSS-5000	Below
7-DEC-2023	175	PSFWHM-5000	Below
7-DEC-2023	175	PSCTSS-5000	Below
28-NOV-2020	198	PSFWHM-5000	Below
28-NOV-2020	198	PSCTSS-5000	Below
8-SEP-2023	221	PSFWHM-5000	Above
8-SEP-2023	221	PSCTSS-5000	Below
8-SEP-2023	222	PSENERGY-5000	Above
8-SEP-2023	222	PSCTSS-5000	Below
7-DEC-2023	227	PSFWHM-5000	Below
7-DEC-2023	227	PSCTSS-5000	Below

The following detectors that may not have properly transferred to the QA file

115 may not have run since 7-DEC-2023
116 may not have run since 7-DEC-2023
119 may not have run since 7-DEC-2023
120 may not have run since 7-DEC-2023
183 may not have run since 7-DEC-2023
184 may not have run since 7-DEC-2023
198 may not have run since 7-DEC-2023
209 may not have run since 7-DEC-2023
210 may not have run since 7-DEC-2023
211 may not have run since 7-DEC-2023
212 may not have run since 7-DEC-2023
221 may not have run since 7-DEC-2023

222 may not have run since 7-DEC-2023
223 may not have run since 7-DEC-2023
224 may not have run since 7-DEC-2023
237 may not have run since 7-DEC-2023
238 may not have run since 7-DEC-2023
241 may not have run since 7-DEC-2023
242 may not have run since 7-DEC-2023
247 may not have run since 7-DEC-2023
248 may not have run since 7-DEC-2023

APPROVAL DATE: 12/7/23

APPROVAL TIME: 1353

APPROVED BY:



PROCEDURE # GL-RAD-I-009

Report completed at 7-DEC-2023 13:52:41.97

Review of Alpha Spectrometer QA results (Daily checks) 8-DEC-2023 12:32:35.56

Bank 1 through bank 29 (detectors 1 through 256)

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

	Detector	Parameter	Flag
	-----	-----	-----
8-DEC-2023	23	PSFWHM-5000	Below
8-DEC-2023	23	PSCTSS-5000	Below
8-DEC-2023	73	PSENERGY-5000	Below
8-DEC-2023	73	PSCTSS-5000	Below
8-DEC-2023	94	PSFWHM-5000	Below
8-DEC-2023	94	PSCTSS-5000	Below
8-DEC-2023	114	PSENERGY-5000	Below
28-AUG-2023	115	PSCTSS-5000	Below
28-AUG-2023	116	PSCTSS-5000	Below
8-DEC-2023	124	PSENERGY-5000	Below
8-DEC-2023	175	PSFWHM-5000	Below
8-DEC-2023	175	PSCTSS-5000	Below
8-DEC-2023	187	PSCTSS-5000	Below
8-DEC-2023	188	PSCTSS-5000	Below
28-NOV-2020	198	PSFWHM-5000	Below
28-NOV-2020	198	PSCTSS-5000	Below
8-SEP-2023	221	PSFWHM-5000	Above
8-SEP-2023	221	PSCTSS-5000	Below
8-SEP-2023	222	PSENERGY-5000	Above
8-SEP-2023	222	PSCTSS-5000	Below
8-DEC-2023	227	PSFWHM-5000	Below
8-DEC-2023	227	PSCTSS-5000	Below

The following detectors that may not have properly transferred to the QA file

115 may not have run since 8-DEC-2023
116 may not have run since 8-DEC-2023
119 may not have run since 8-DEC-2023
120 may not have run since 8-DEC-2023
183 may not have run since 8-DEC-2023
184 may not have run since 8-DEC-2023
198 may not have run since 8-DEC-2023
209 may not have run since 8-DEC-2023
210 may not have run since 8-DEC-2023

211 may not have run since 8-DEC-2023
212 may not have run since 8-DEC-2023
221 may not have run since 8-DEC-2023
222 may not have run since 8-DEC-2023
223 may not have run since 8-DEC-2023
224 may not have run since 8-DEC-2023
237 may not have run since 8-DEC-2023
238 may not have run since 8-DEC-2023
241 may not have run since 8-DEC-2023
242 may not have run since 8-DEC-2023
247 may not have run since 8-DEC-2023
248 may not have run since 8-DEC-2023

APPROVAL DATE: 12/8/23

APPROVAL TIME: 1242

APPROVED BY: 

PROCEDURE # GL-RAD-I-009

Report completed at 8-DEC-2023 12:35:54.47

Review of Alpha Spectrometer QA results (Daily checks) 9-DEC-2023 23:00:00.81

Bank 1 through bank 29 (detectors 1 through 256)

DETECTORS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

	Detector	Parameter	Flag
	-----	-----	-----
9-DEC-2023	23	PSFWHM-5000	Below
9-DEC-2023	23	PSCTSS-5000	Below
9-DEC-2023	73	PSENERGY-5000	Below
9-DEC-2023	73	PSCTSS-5000	Below
9-DEC-2023	94	PSFWHM-5000	Below
9-DEC-2023	94	PSCTSS-5000	Below
28-AUG-2023	115	PSCTSS-5000	Below
28-AUG-2023	116	PSCTSS-5000	Below
9-DEC-2023	124	PSENERGY-5000	Below
9-DEC-2023	173	PSCTSS-5000	Below
9-DEC-2023	175	PSCTSS-5000	Below
9-DEC-2023	193	PSCTSS-5000	Below
28-NOV-2020	198	PSFWHM-5000	Below
28-NOV-2020	198	PSCTSS-5000	Below
9-DEC-2023	216	PSENERGY-5000	Above
8-SEP-2023	221	PSFWHM-5000	Above
8-SEP-2023	221	PSCTSS-5000	Below
8-SEP-2023	222	PSENERGY-5000	Above
8-SEP-2023	222	PSCTSS-5000	Below
9-DEC-2023	227	PSFWHM-5000	Below
9-DEC-2023	227	PSCTSS-5000	Below

The following detectors that may not have properly transferred to the QA file

115 may not have run since 9-DEC-2023
116 may not have run since 9-DEC-2023
119 may not have run since 9-DEC-2023
120 may not have run since 9-DEC-2023
121 may not have run since 9-DEC-2023
122 may not have run since 9-DEC-2023
183 may not have run since 9-DEC-2023
184 may not have run since 9-DEC-2023
198 may not have run since 9-DEC-2023
211 may not have run since 9-DEC-2023

212 may not have run since 9-DEC-2023
221 may not have run since 9-DEC-2023
222 may not have run since 9-DEC-2023
223 may not have run since 9-DEC-2023
224 may not have run since 9-DEC-2023
241 may not have run since 9-DEC-2023
242 may not have run since 9-DEC-2023
247 may not have run since 9-DEC-2023
248 may not have run since 9-DEC-2023

APPROVAL DATE:

12/9/23

APPROVAL TIME:

23:10

APPROVED BY:

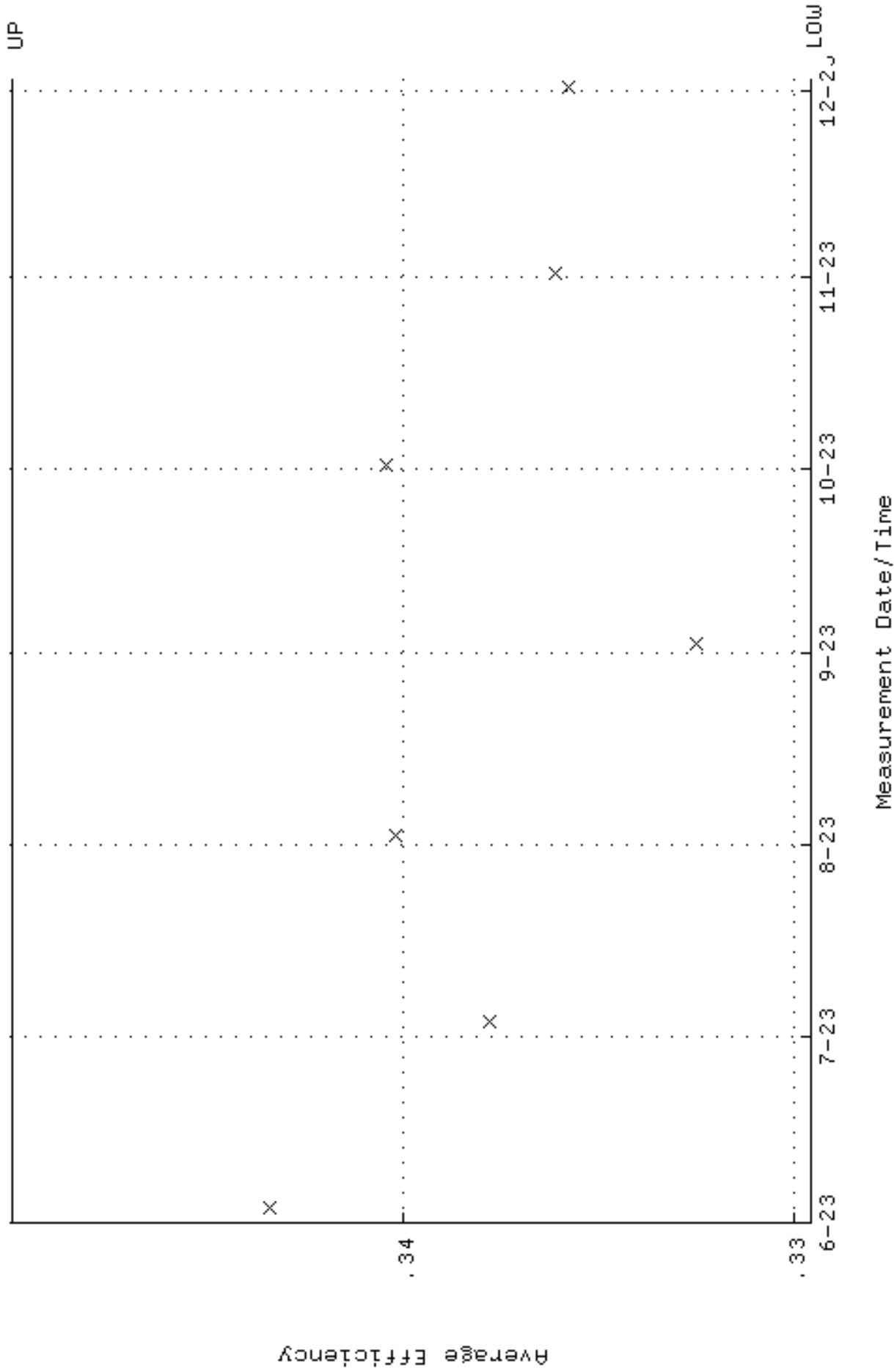


PROCEDURE # GL-RAD-I-009

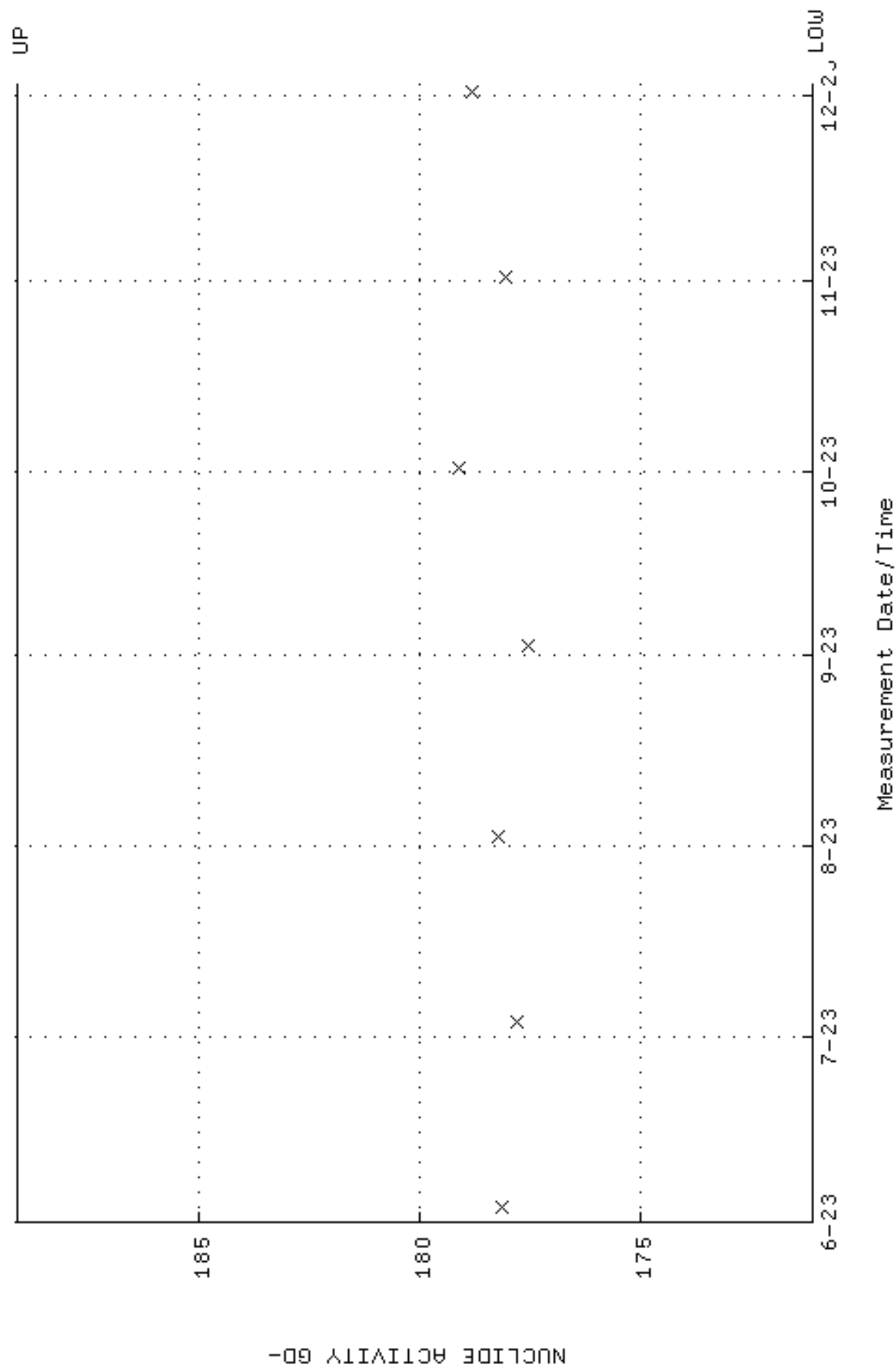
Report completed at 9-DEC-2023 23:02:39.26

Background and Efficiency Data

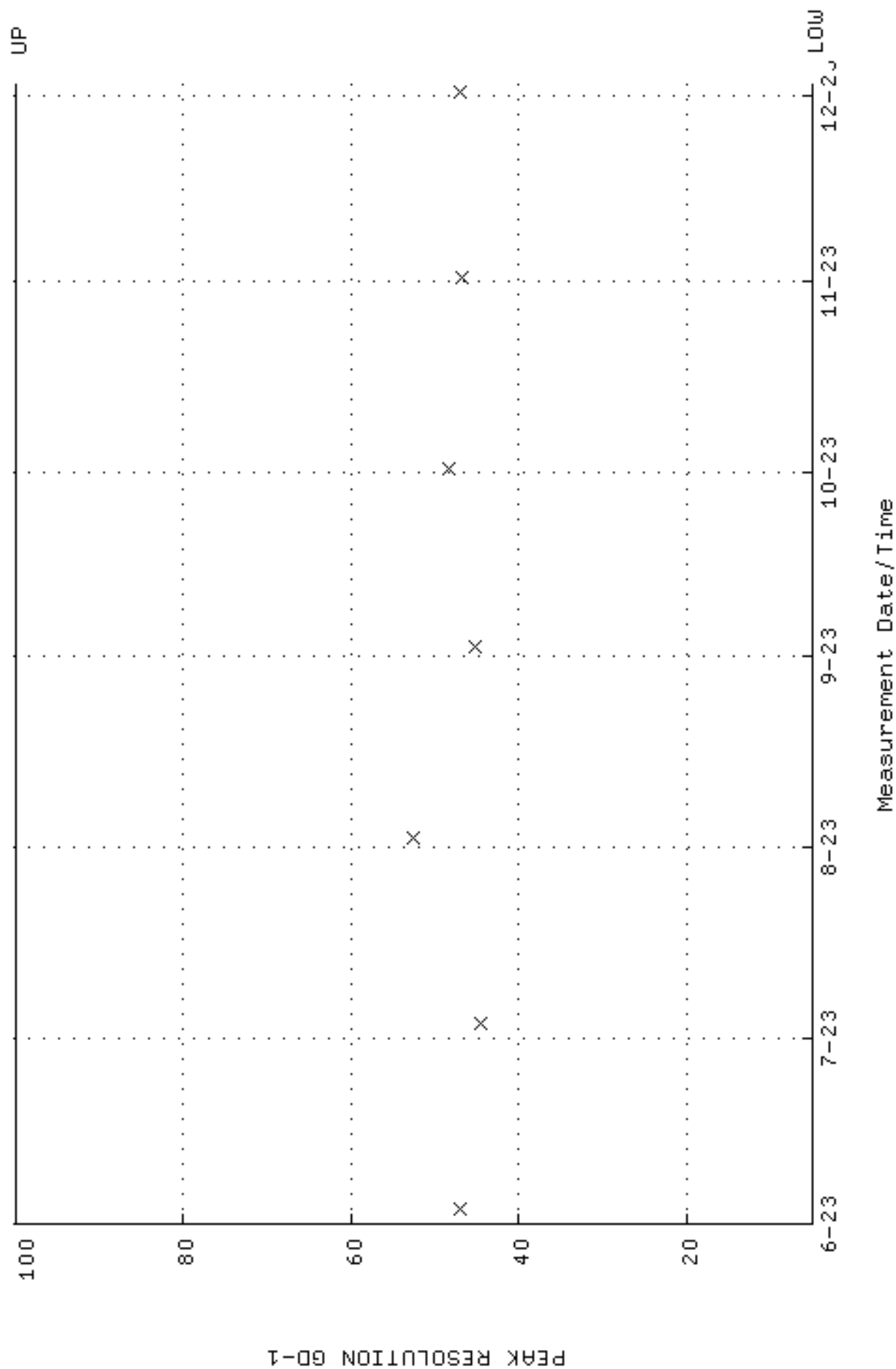
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Lower/Upper Lmts: 0.329580 through 0.349960



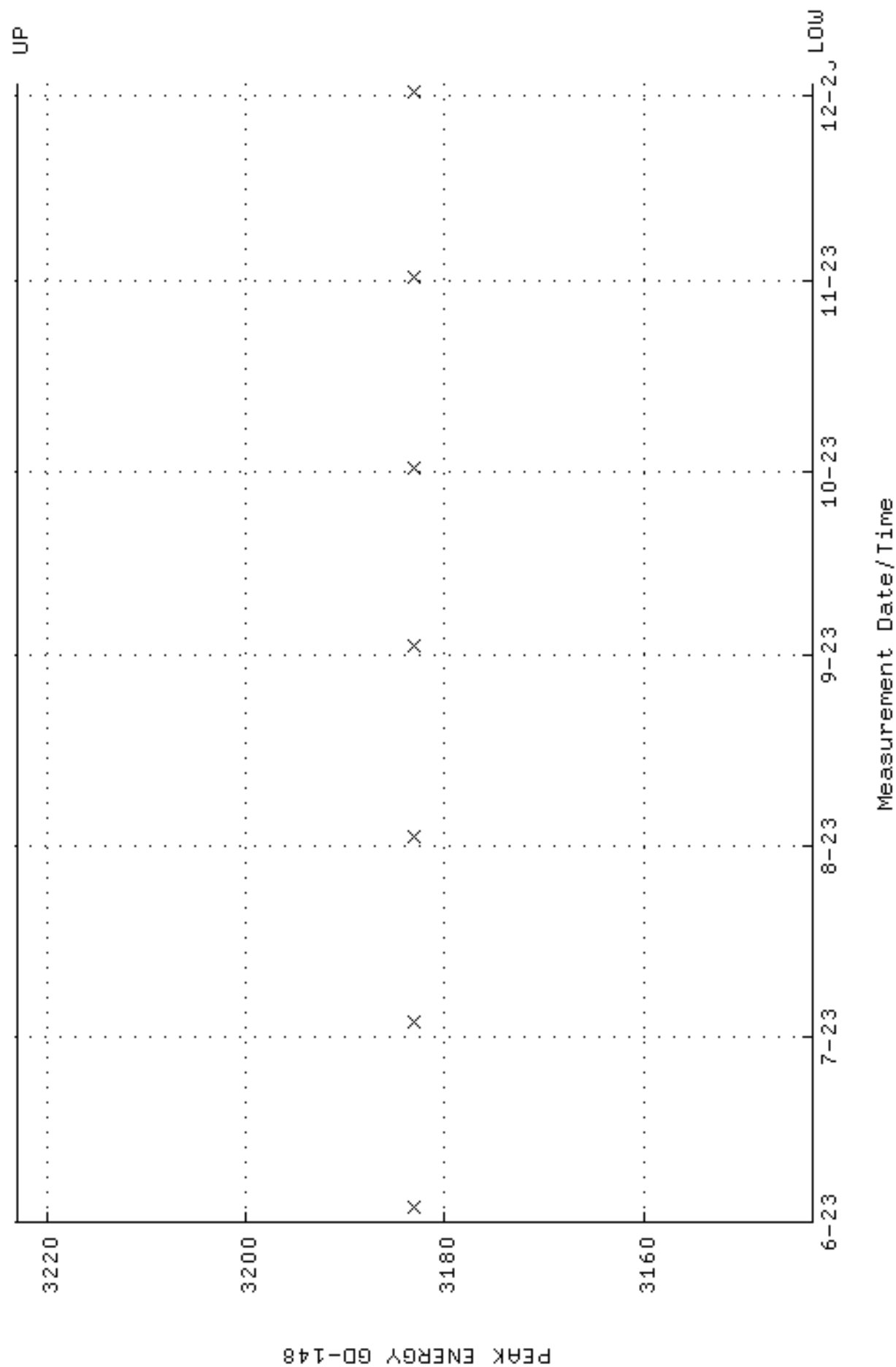
QA filename : DKA100:[ENV_ALPHA.QA.W]W014.QAF;8
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 3-JUN-2023 11:26:25 through 2-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



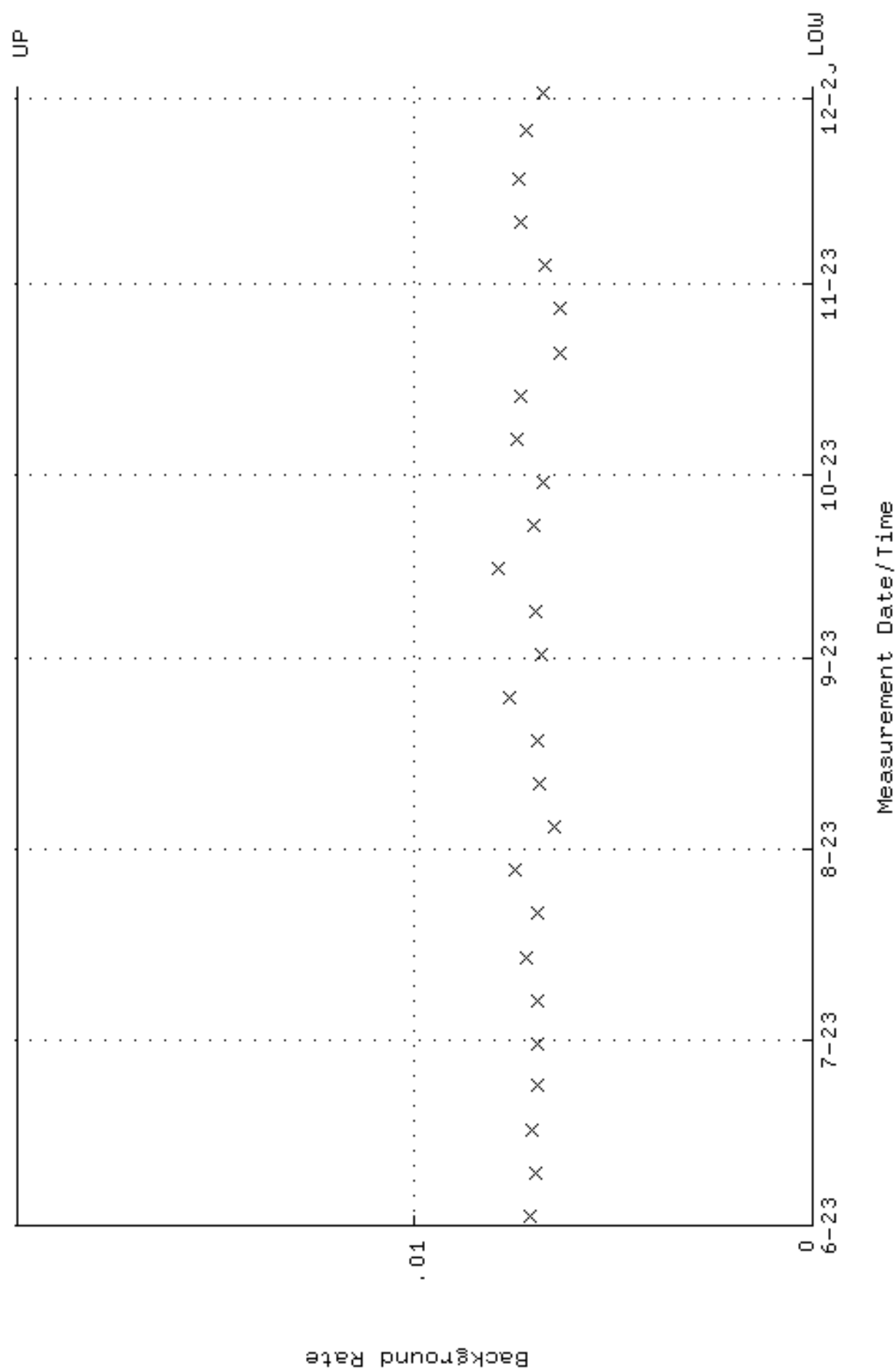
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Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
Start/End Dates : 3-JUN-2023 11:26:25 through 2-DEC-2023 12:00:00
Lower/Upper Lmts: 5.00000 through 100.000



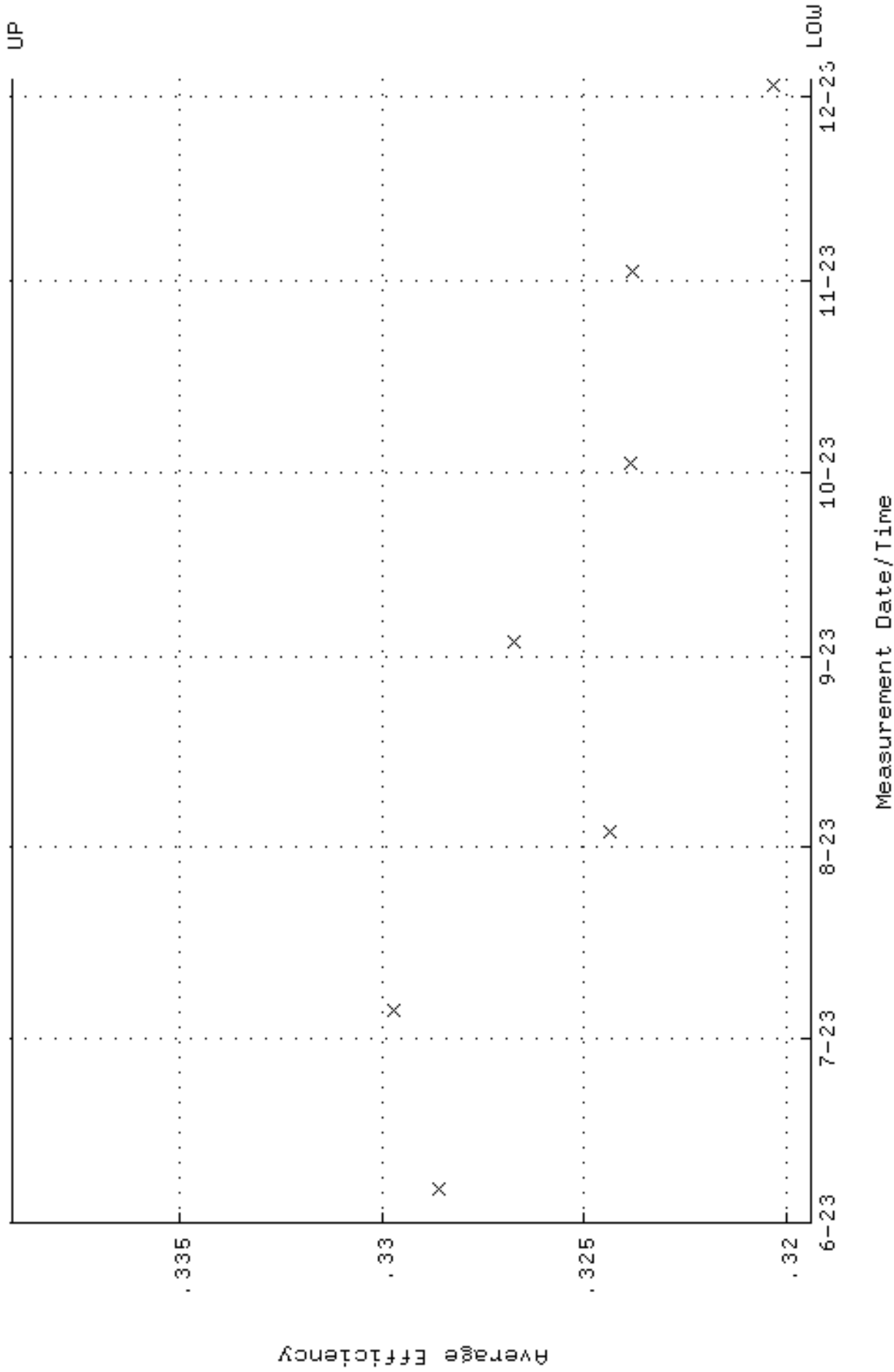
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 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 3-JUN-2023 11:26:25 through 2-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



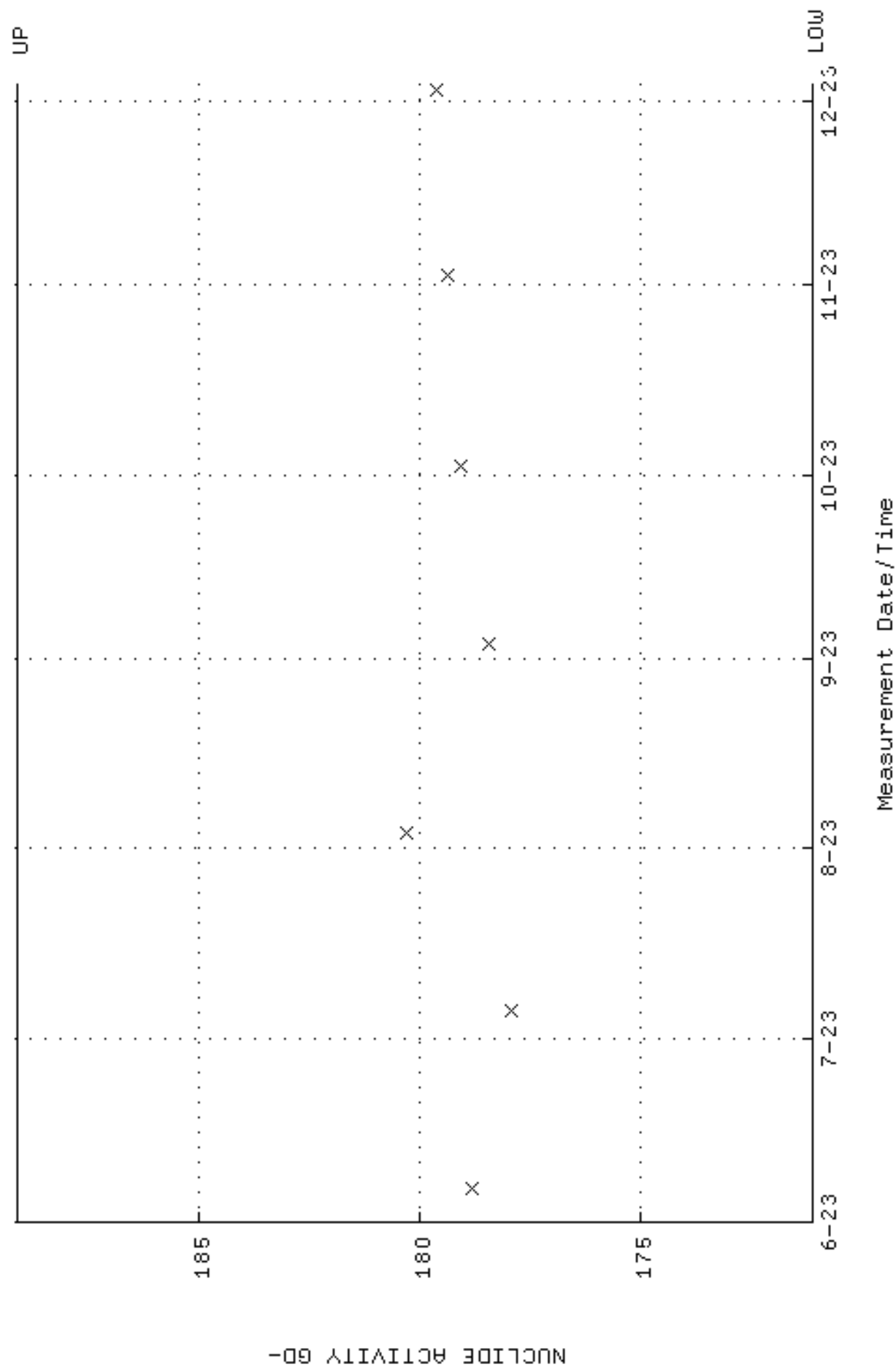
QQA filename : DKA100:[ENV_ALPHA.QA.B]B014.QAF;5
Parameter Name : BACKRATE (Background Rate)
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Lower/Upper Lmts: 0.000000E+00 through 2.000000E+02



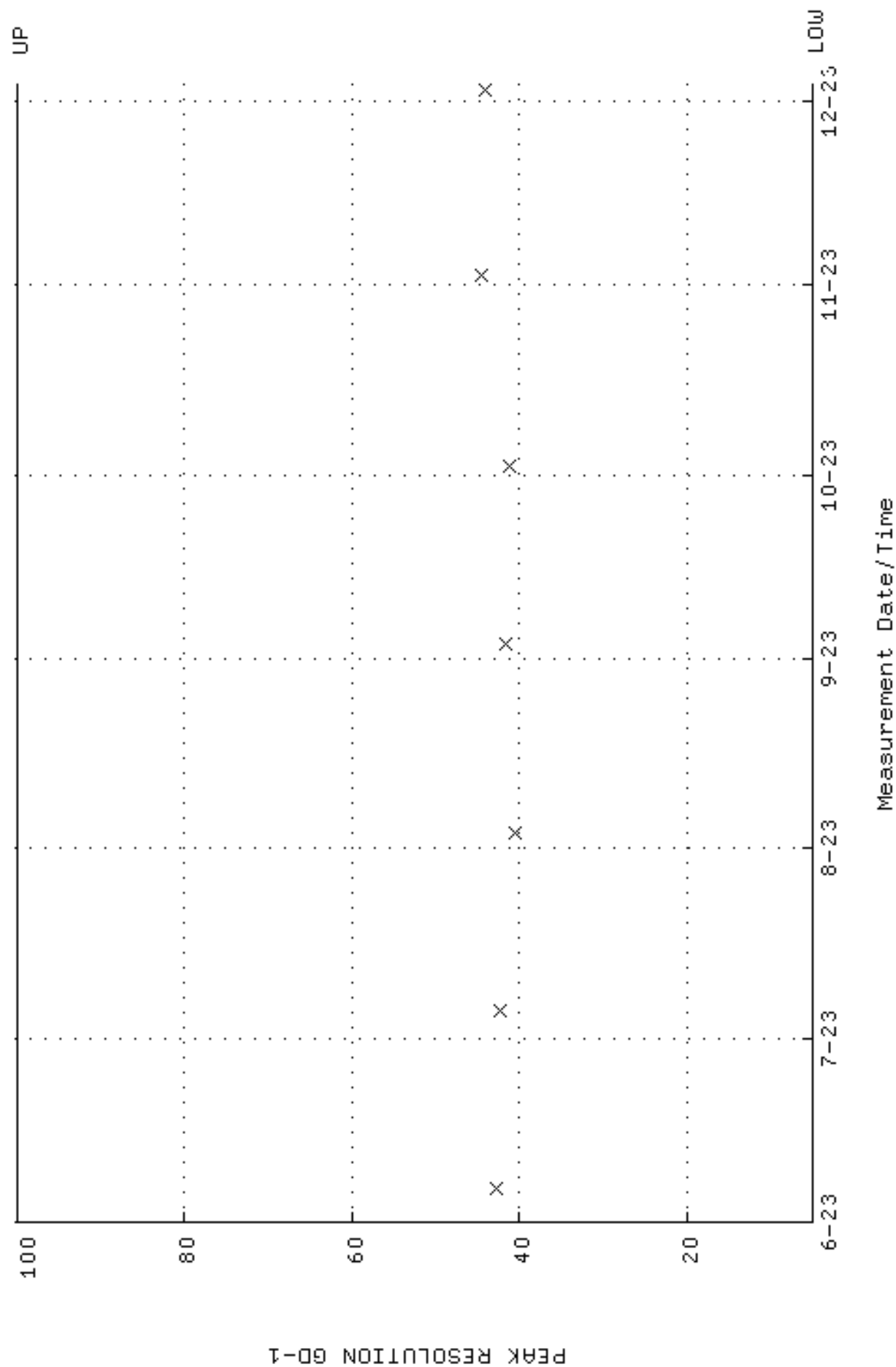
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Parameter Name : AVRGEFF (Average Efficiency)
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Lower/Upper Lmts: 0.319390 through 0.339140



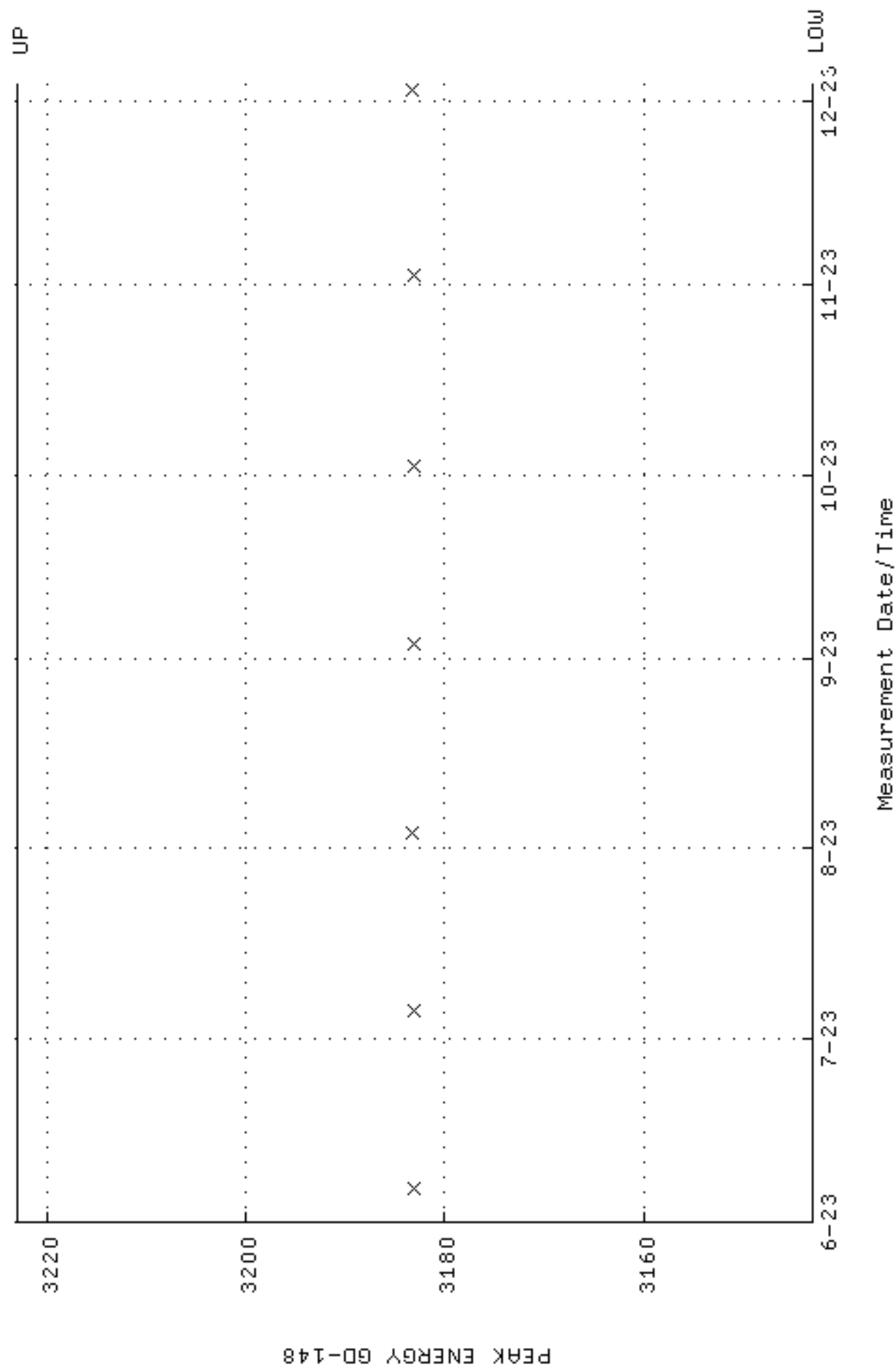
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 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-JUN-2023 08:34:19 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



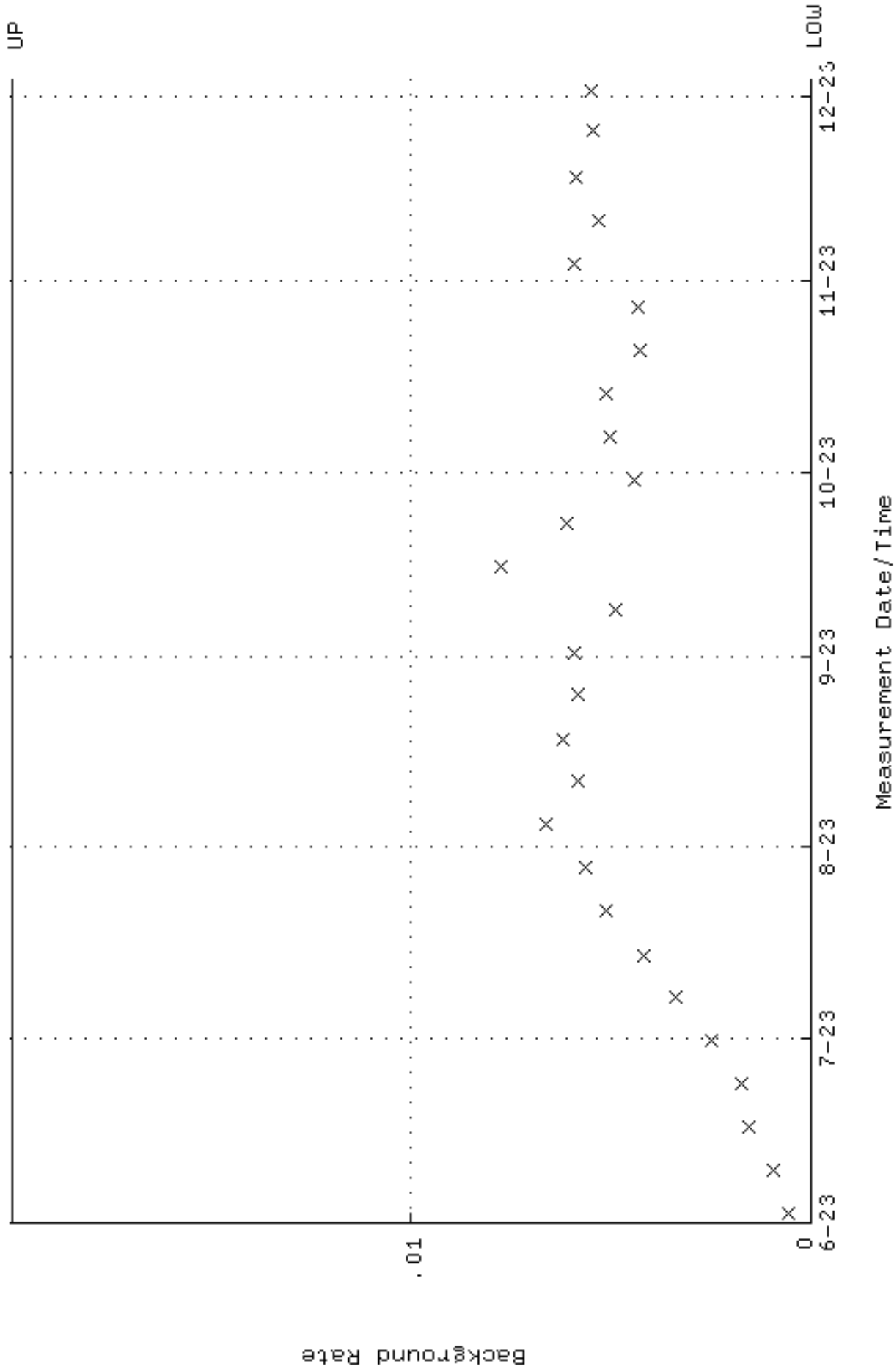
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Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
Start/End Dates : 6-JUN-2023 08:34:19 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 5.00000 through 100.000



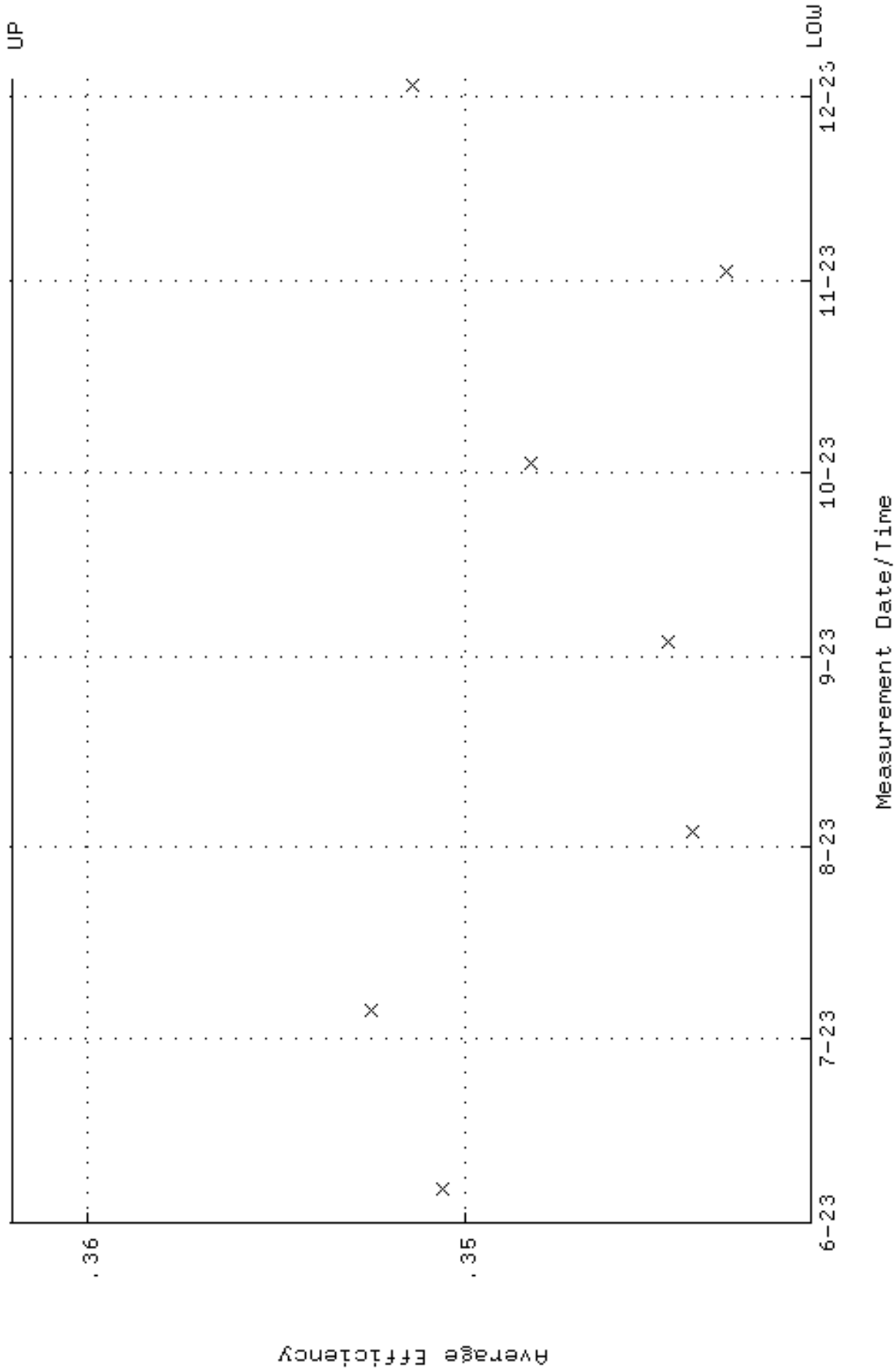
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 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 6-JUN-2023 08:34:19 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



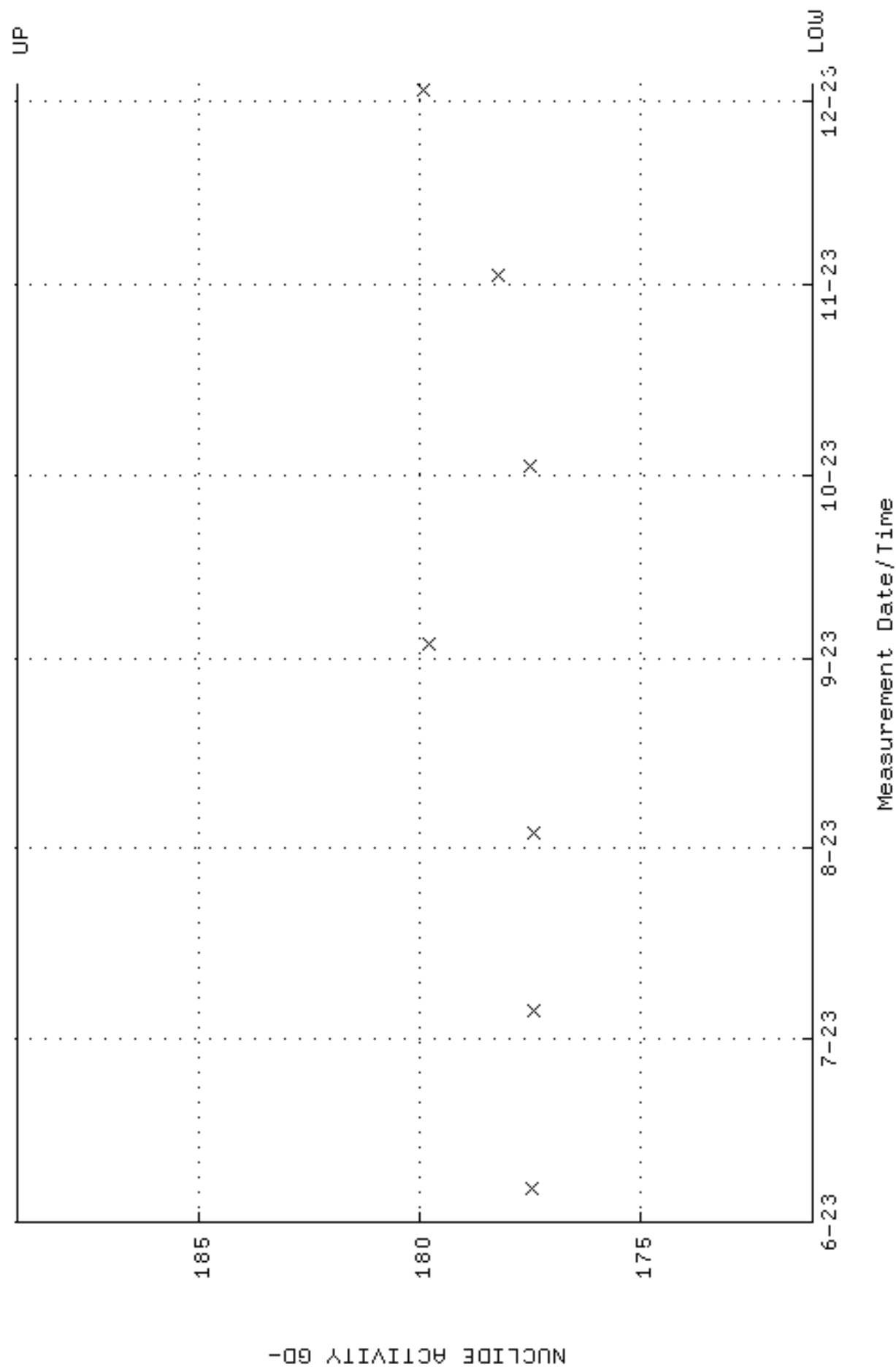
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Parameter Name : BACKRATE (Background Rate)
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Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



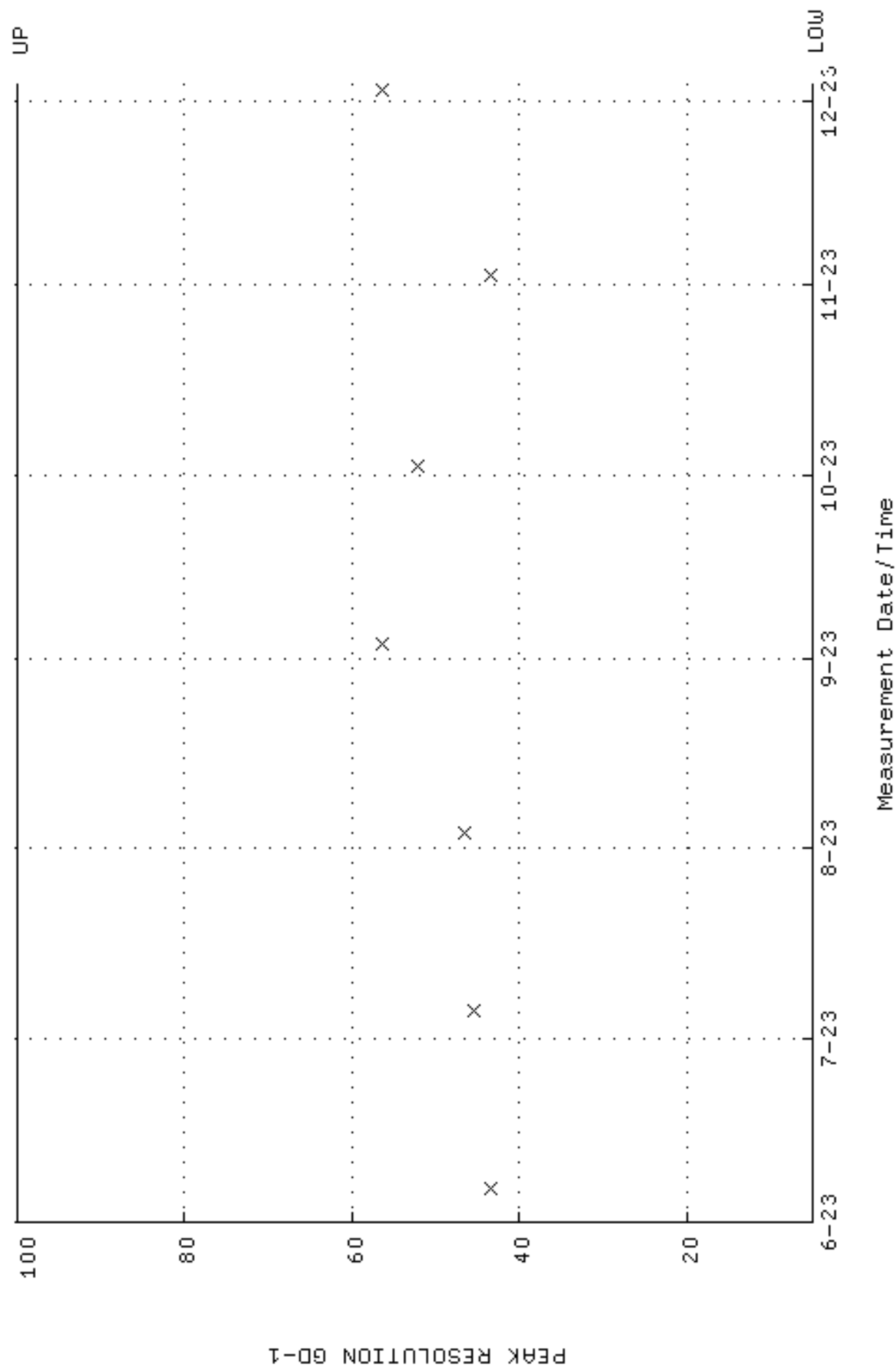
QA filename : DKA100:[ENV_ALPHA.QA.W]W034.QAF;7
Parameter Name : AVRGEFF (Average Efficiency)
Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 0.340880 through 0.361960



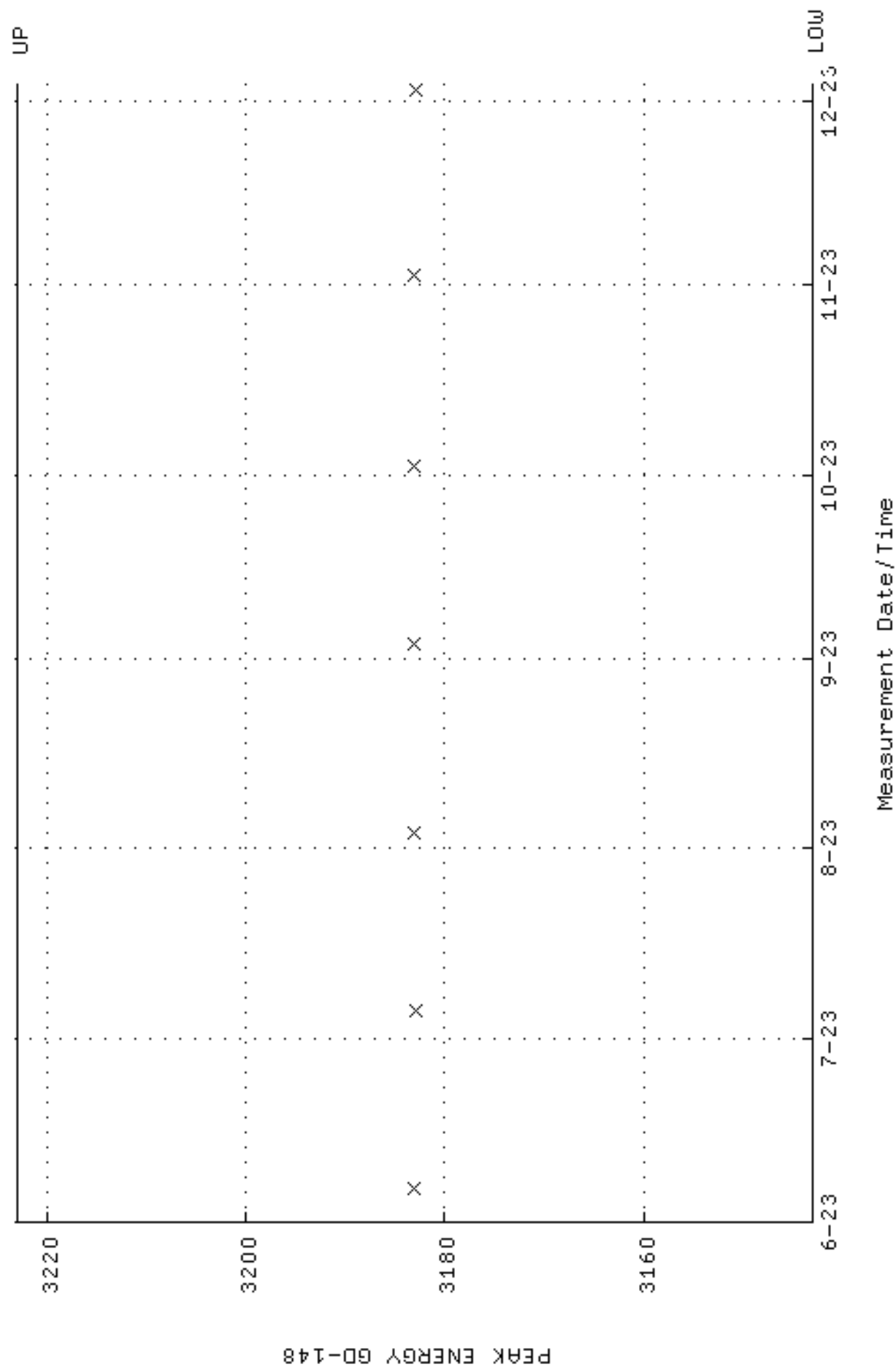
QA filename : DKA100:[ENV_ALPHA.QA.W]W034.QAF;7
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



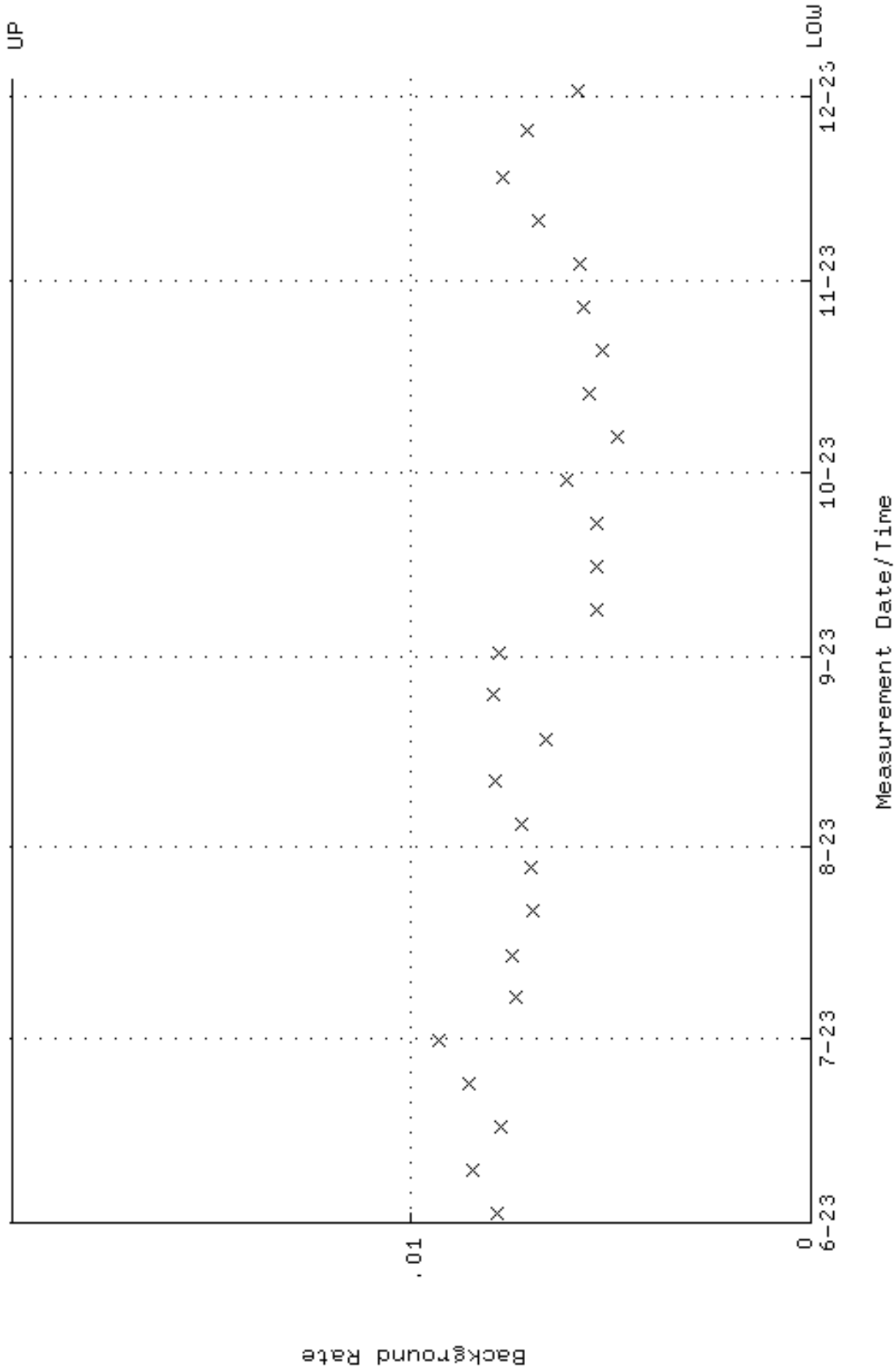
QA filename : DKA100:[ENV_ALPHA.QA.W]W034.QAF;7
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



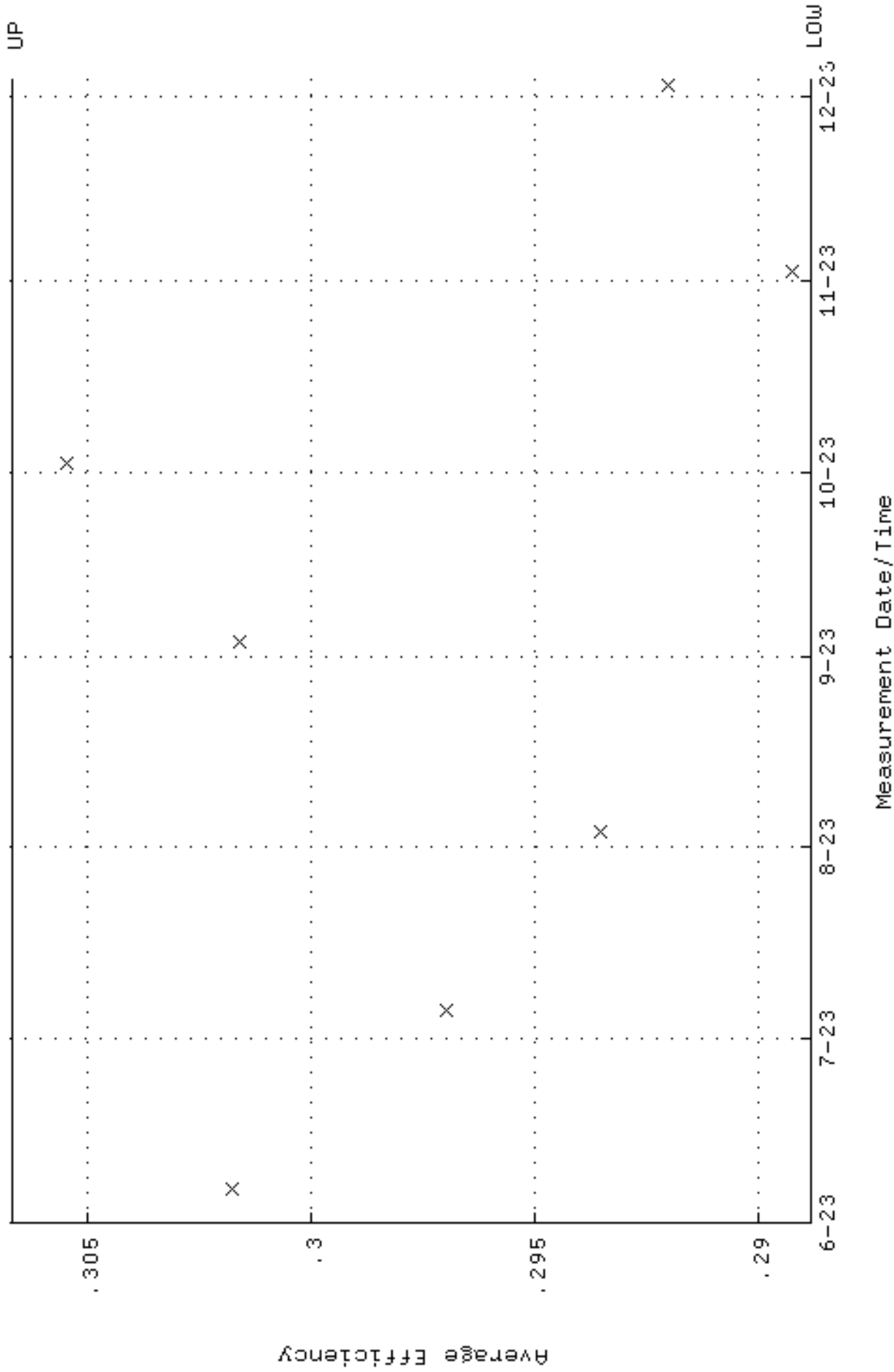
QA filename : DKA100:[ENV_ALPHA.QA.W]W034.QAF;7
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



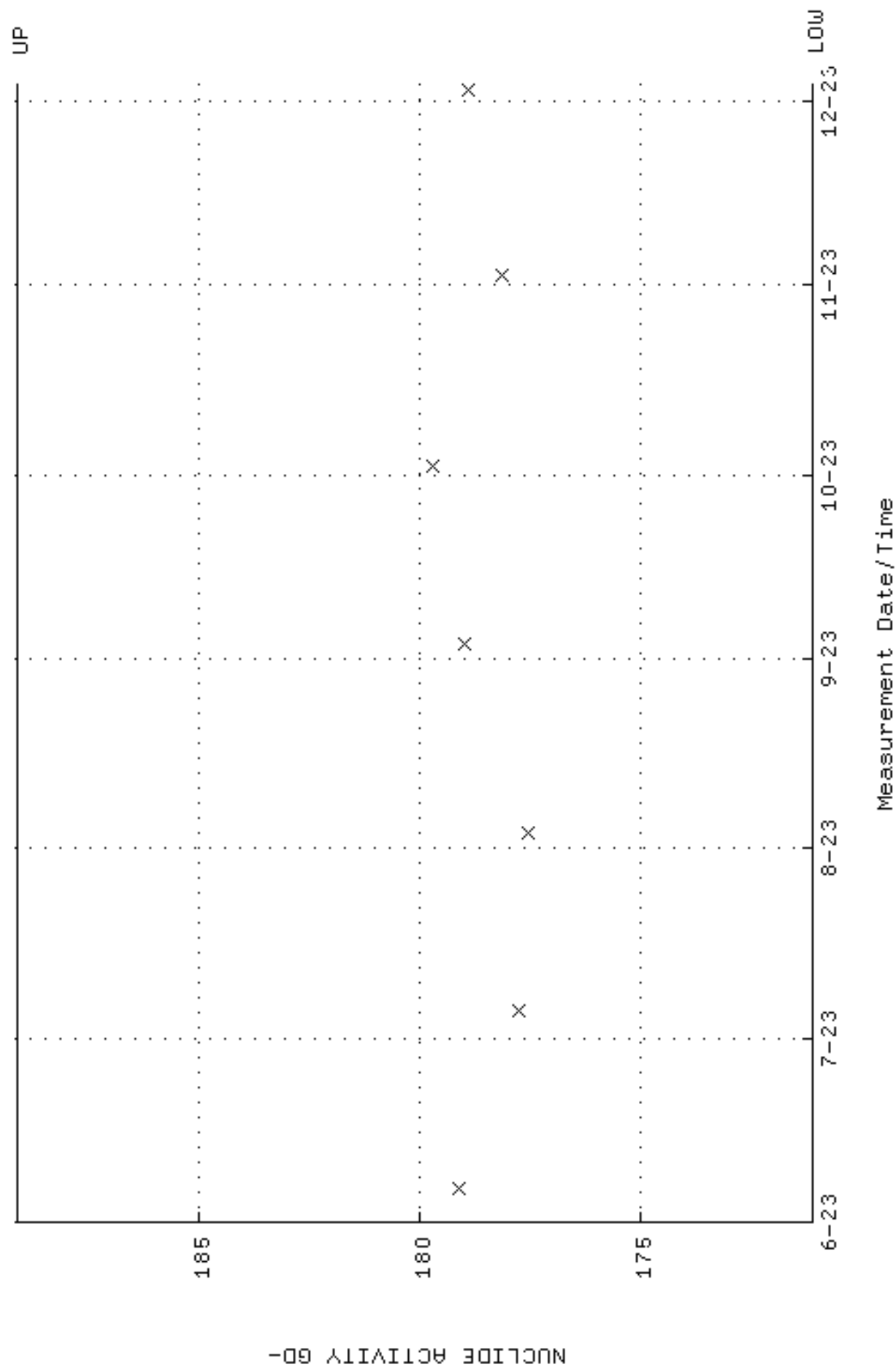
QA filename : DKA100:[ENV_ALPHA.QA.B]B034.QAF;4
Parameter Name : BACKRATE (Background Rate)
Start/End Dates : 2-JUN-2023 10:56:42 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



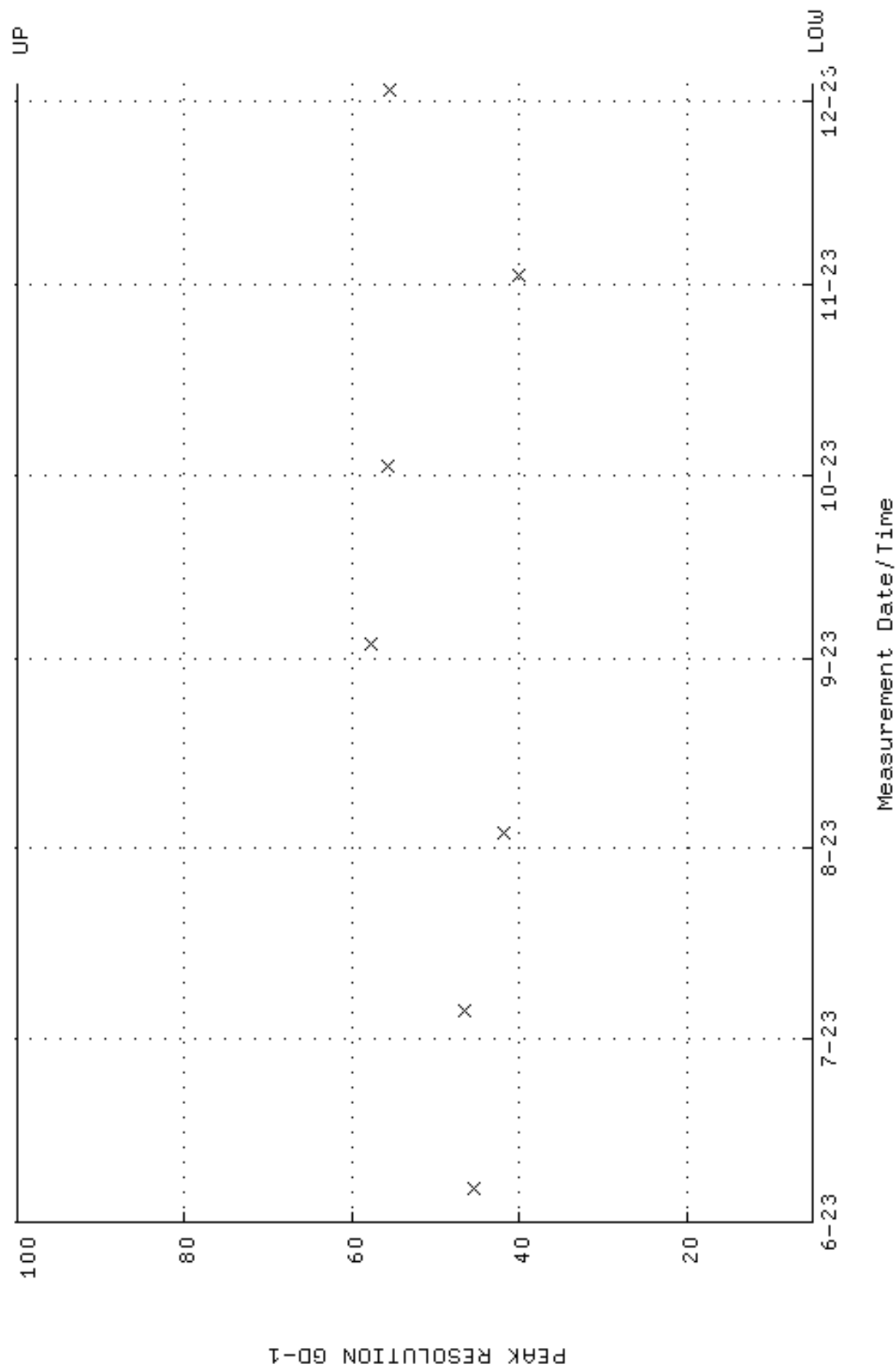
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;7
Parameter Name : AVRGEFF (Average Efficiency)
Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 0.288810 through 0.306670



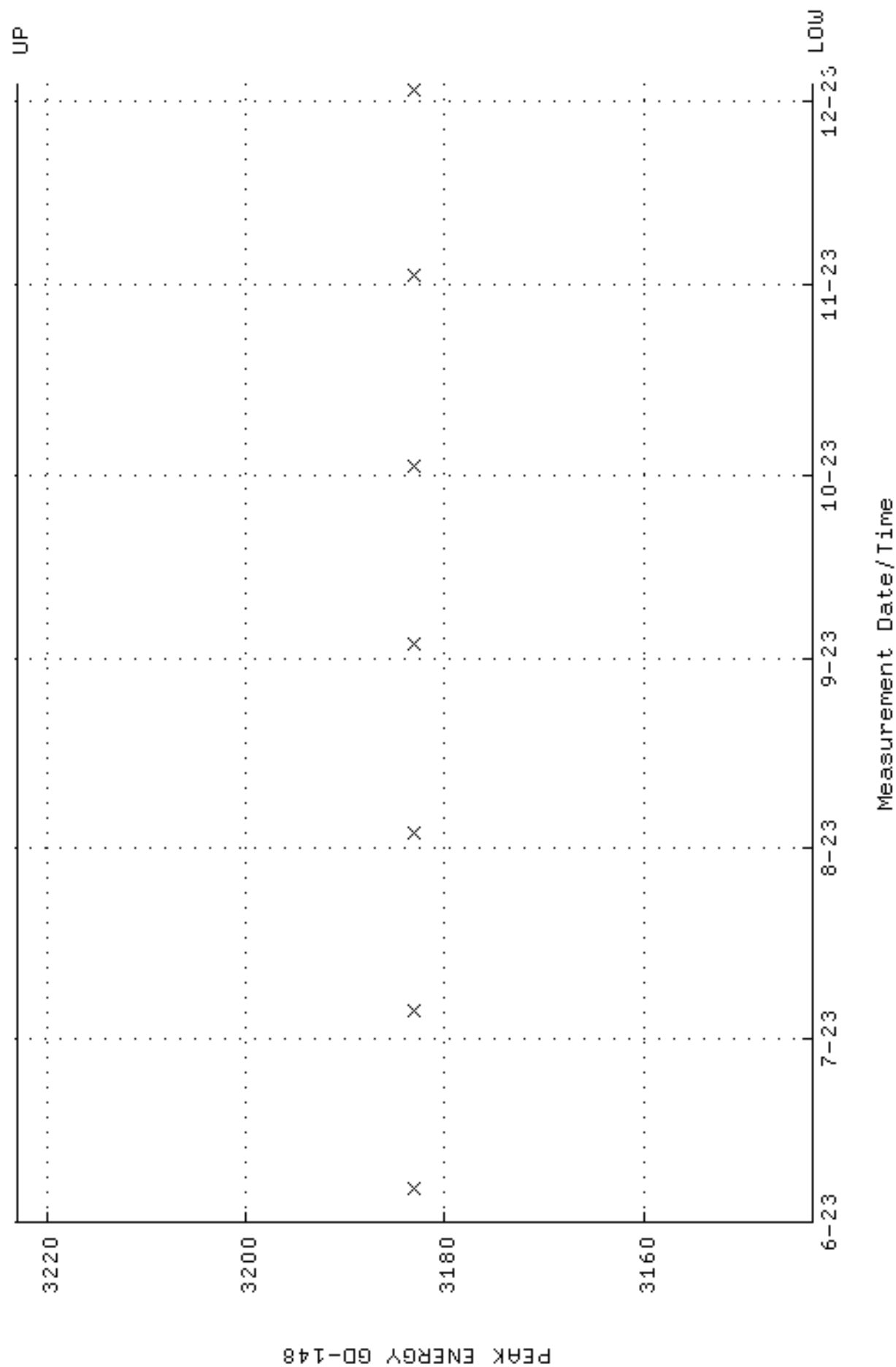
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;7
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



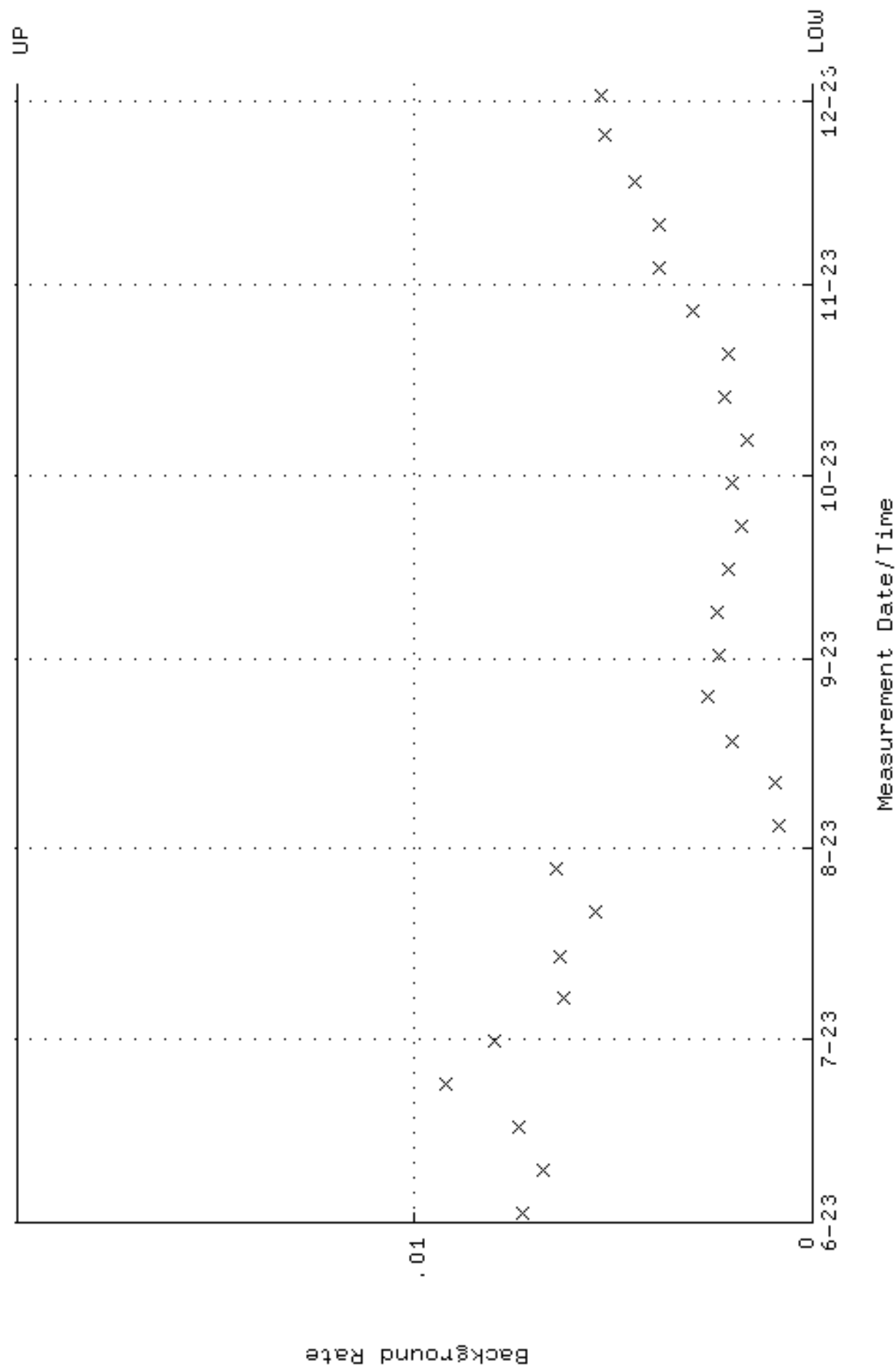
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;7
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



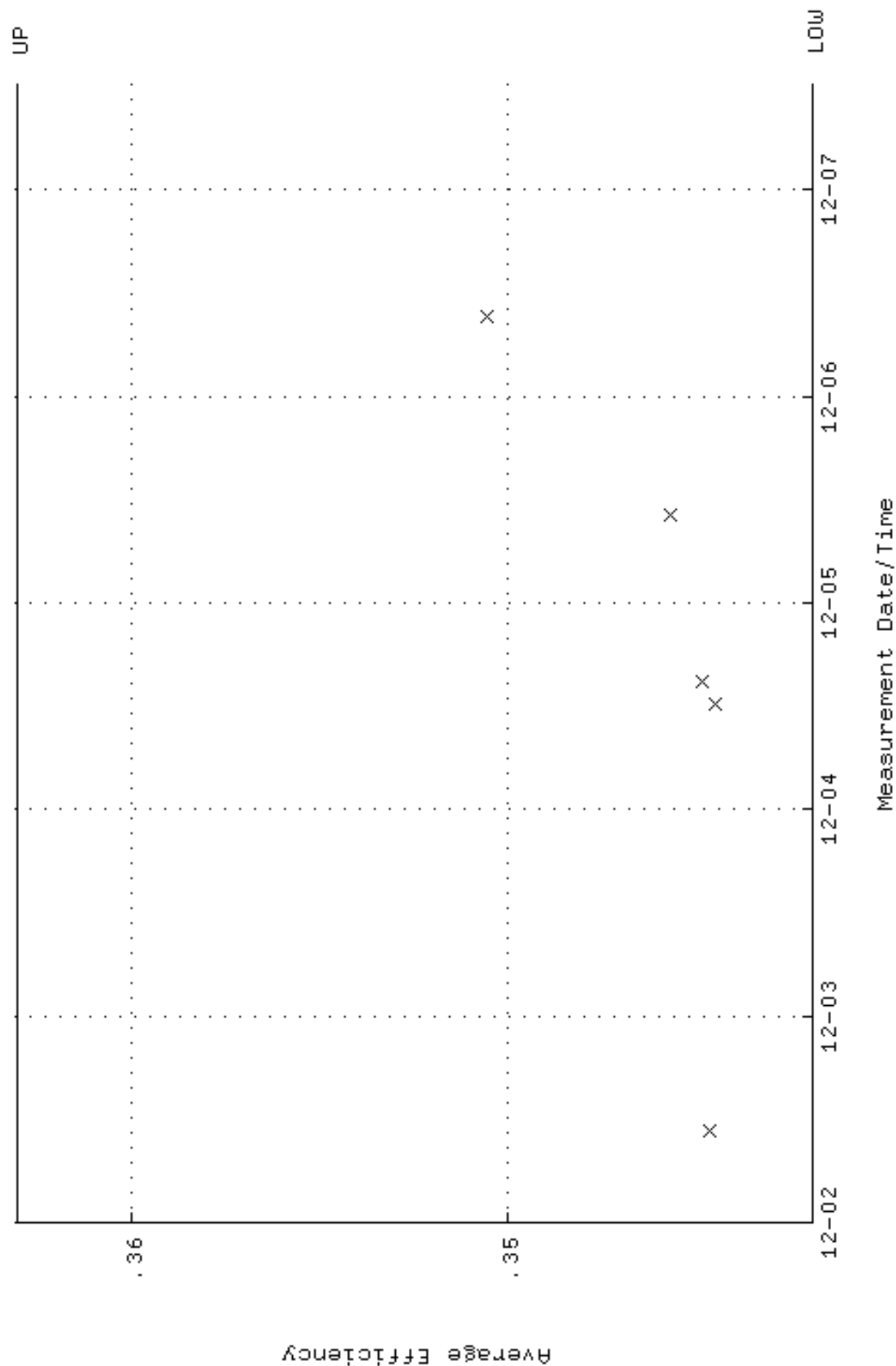
QA filename : DKA100:[ENV_ALPHA.QA.W]W035.QAF;7
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 6-JUN-2023 09:16:58 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



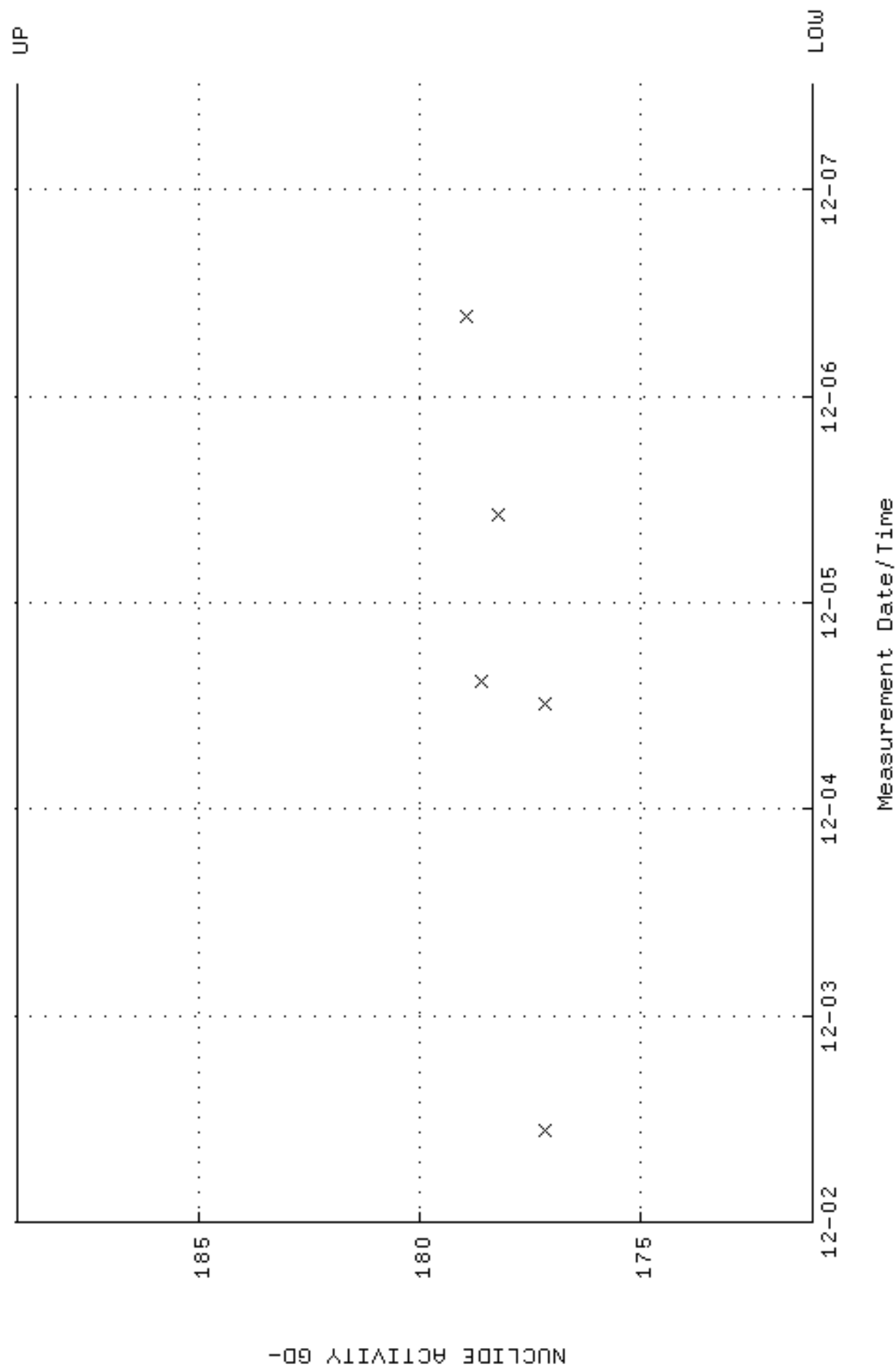
QA filename : DKA100:[ENV_ALPHA.QA.B]B035.QAF;4
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 2-JUN-2023 10:56:42 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



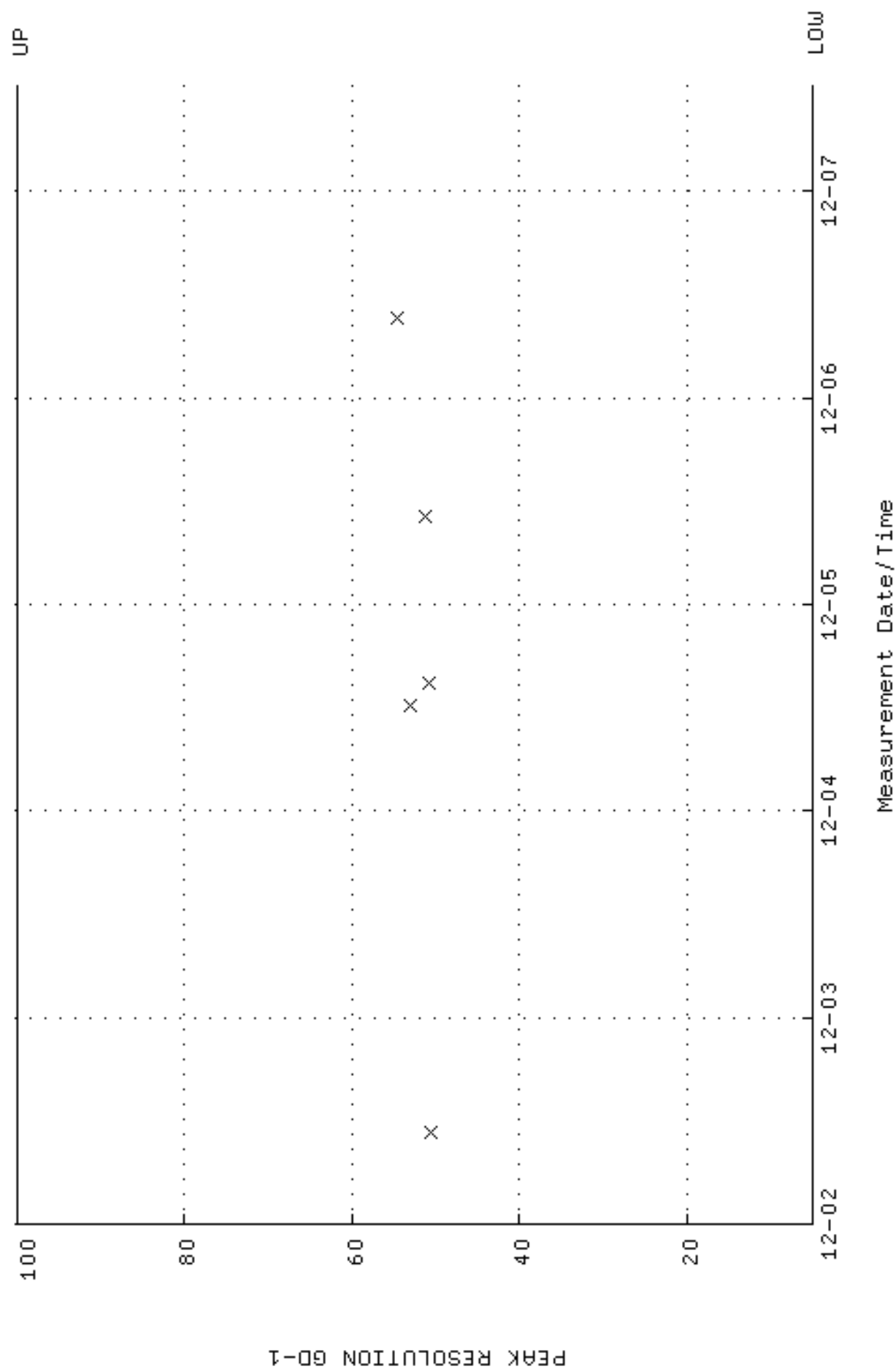
QA filename : DKA100:[ENV_ALPHA.QA.W]W036.QAF;7
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 2-DEC-2023 10:33:13 through 7-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.341887 through 0.363035



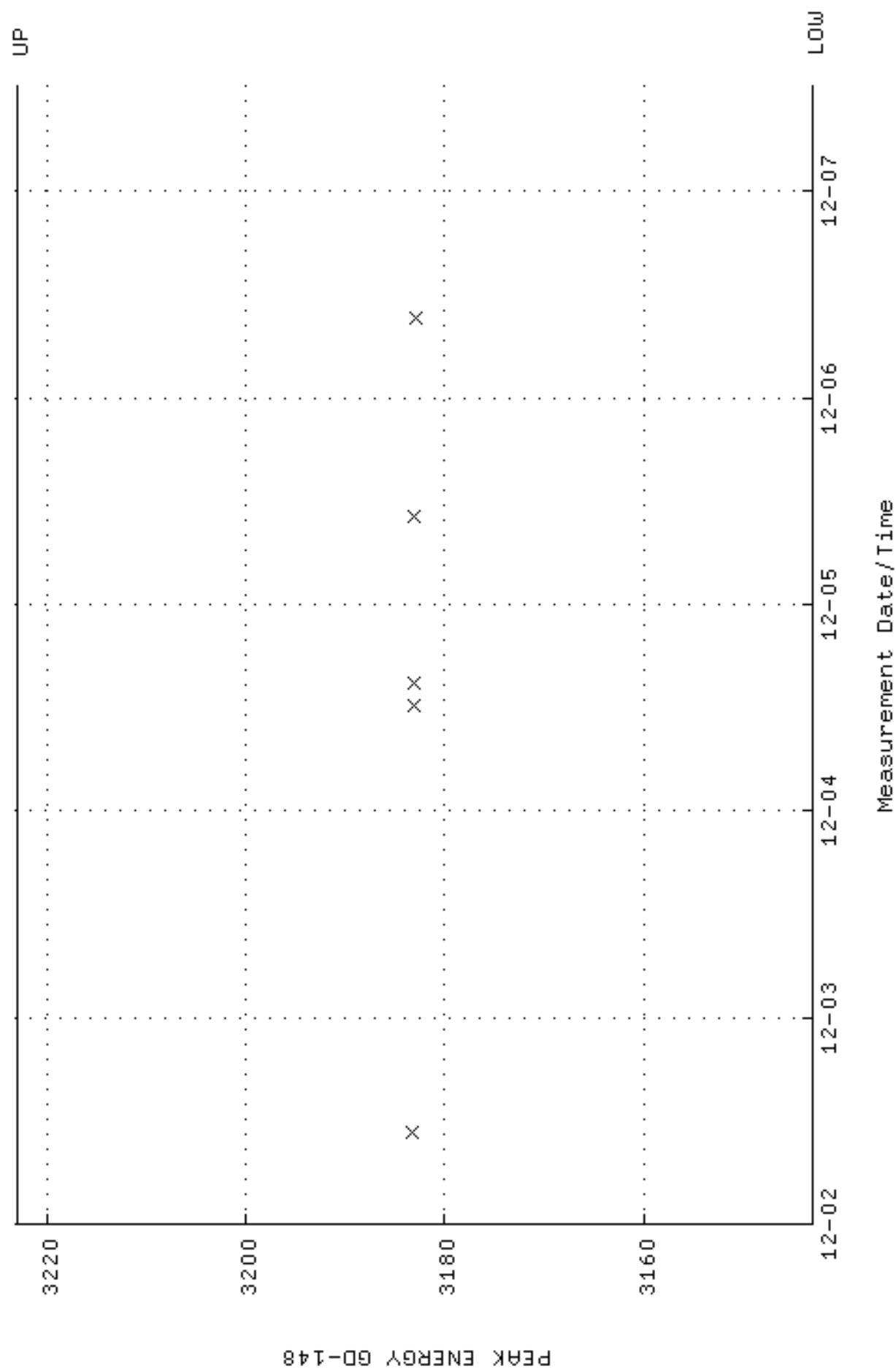
QA filename : DKA100:[ENV_ALPHA.QA.W]W036.QAF;7
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 2-DEC-2023 10:33:13 through 7-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



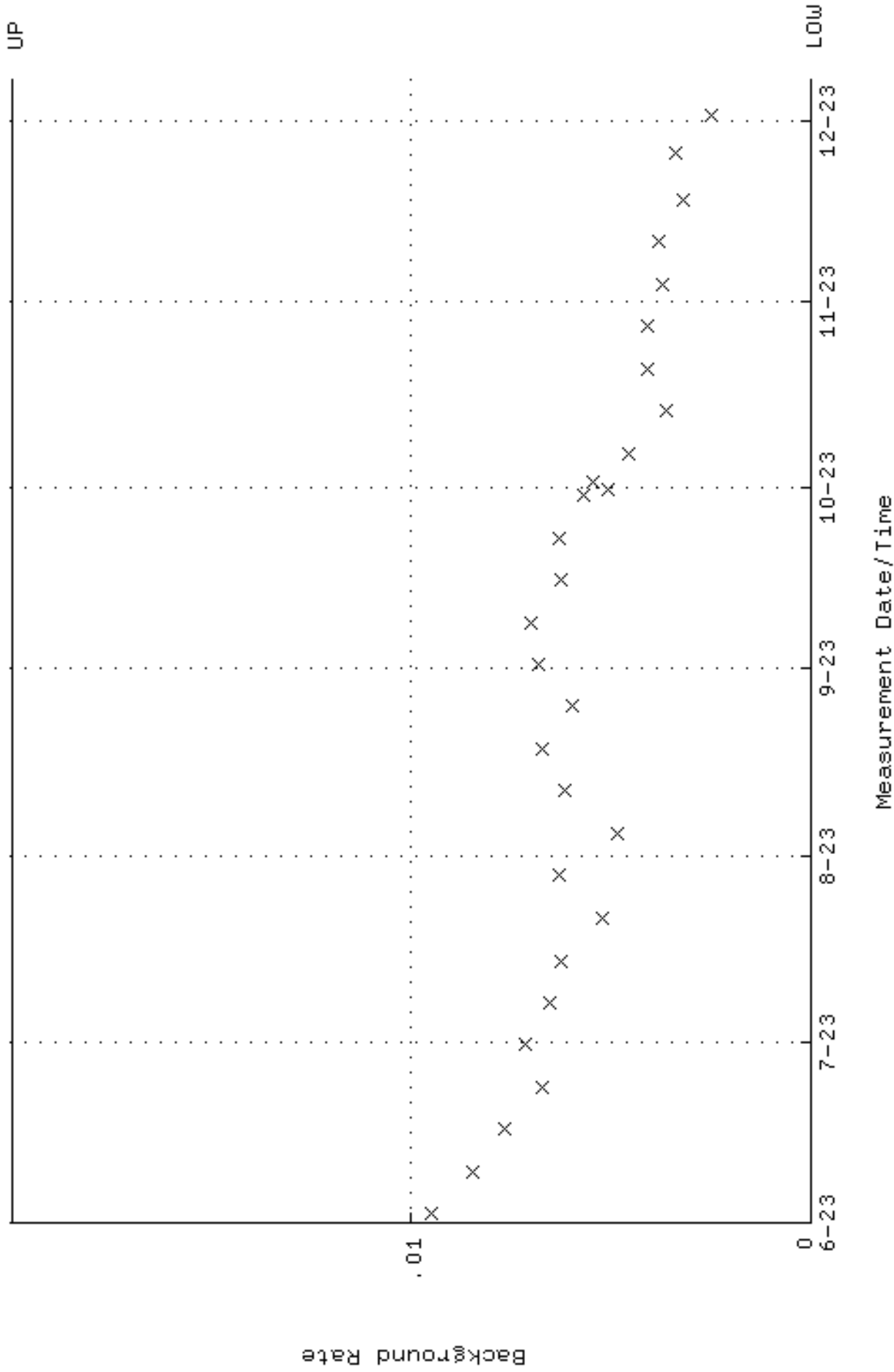
QA filename : DKA100:[ENV_ALPHA.QA.W]W036.QAF;7
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 2-DEC-2023 10:33:13 through 7-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



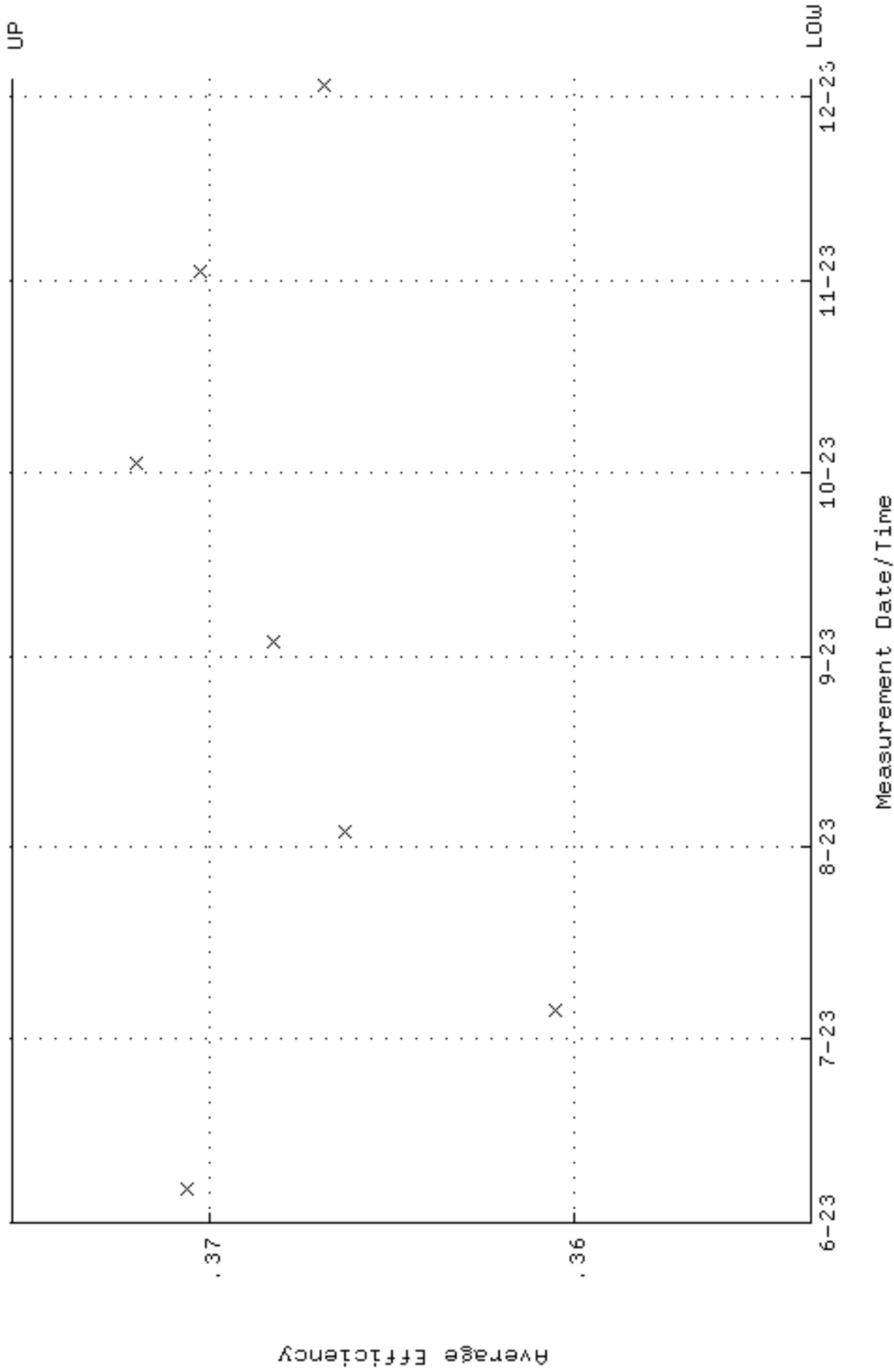
QA filename : DKA100:[ENV_ALPHA.QA.W]W036.QAF;7
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 2-DEC-2023 10:33:13 through 7-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



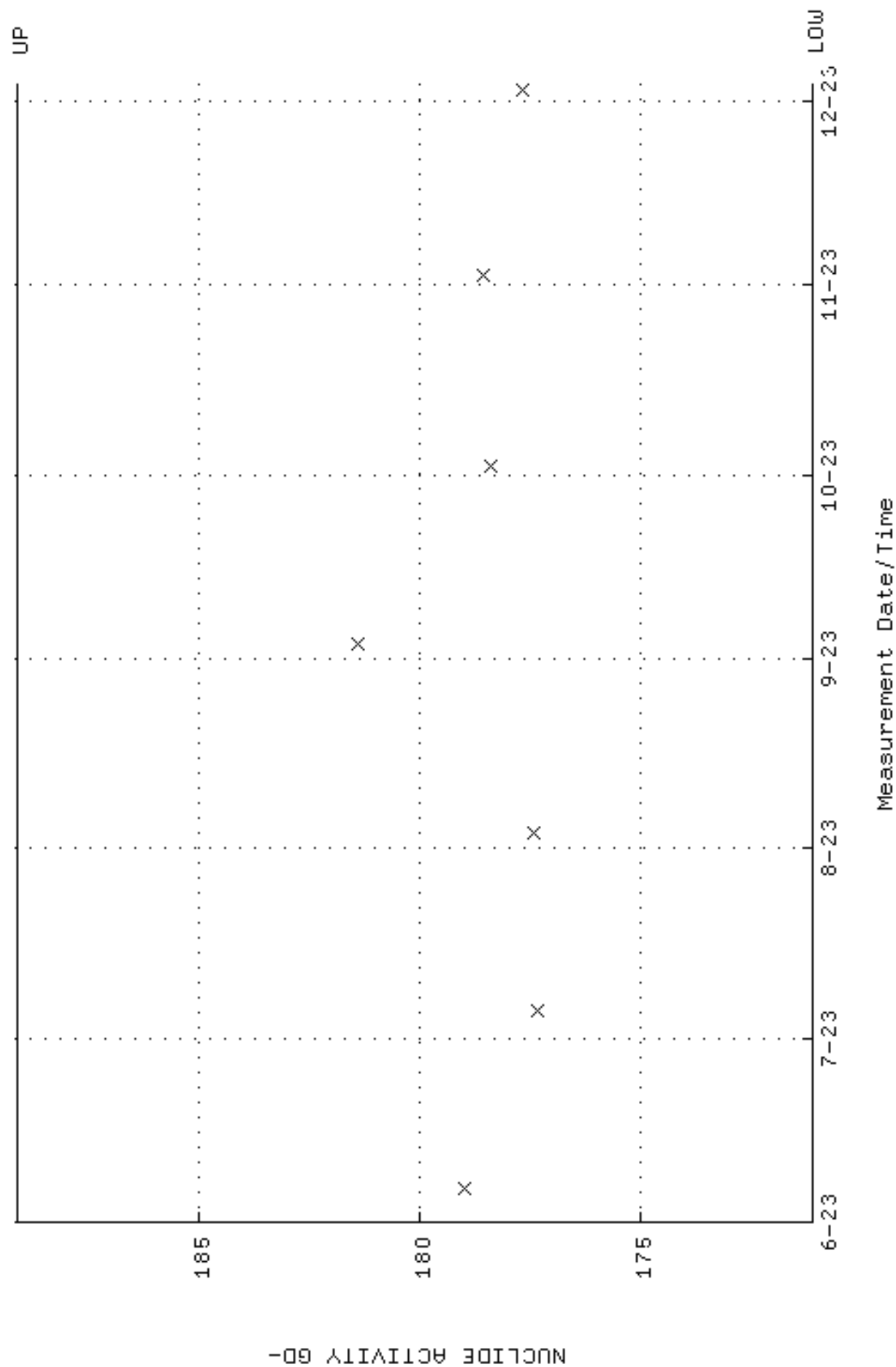
QA filename : DKA100:[ENV_ALPHA.QA.B]B036.QAF;4
Parameter Name : BACKRATE (Background Rate)
Start/End Dates : 2-JUN-2023 10:56:42 through 7-DEC-2023 12:00:00
Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



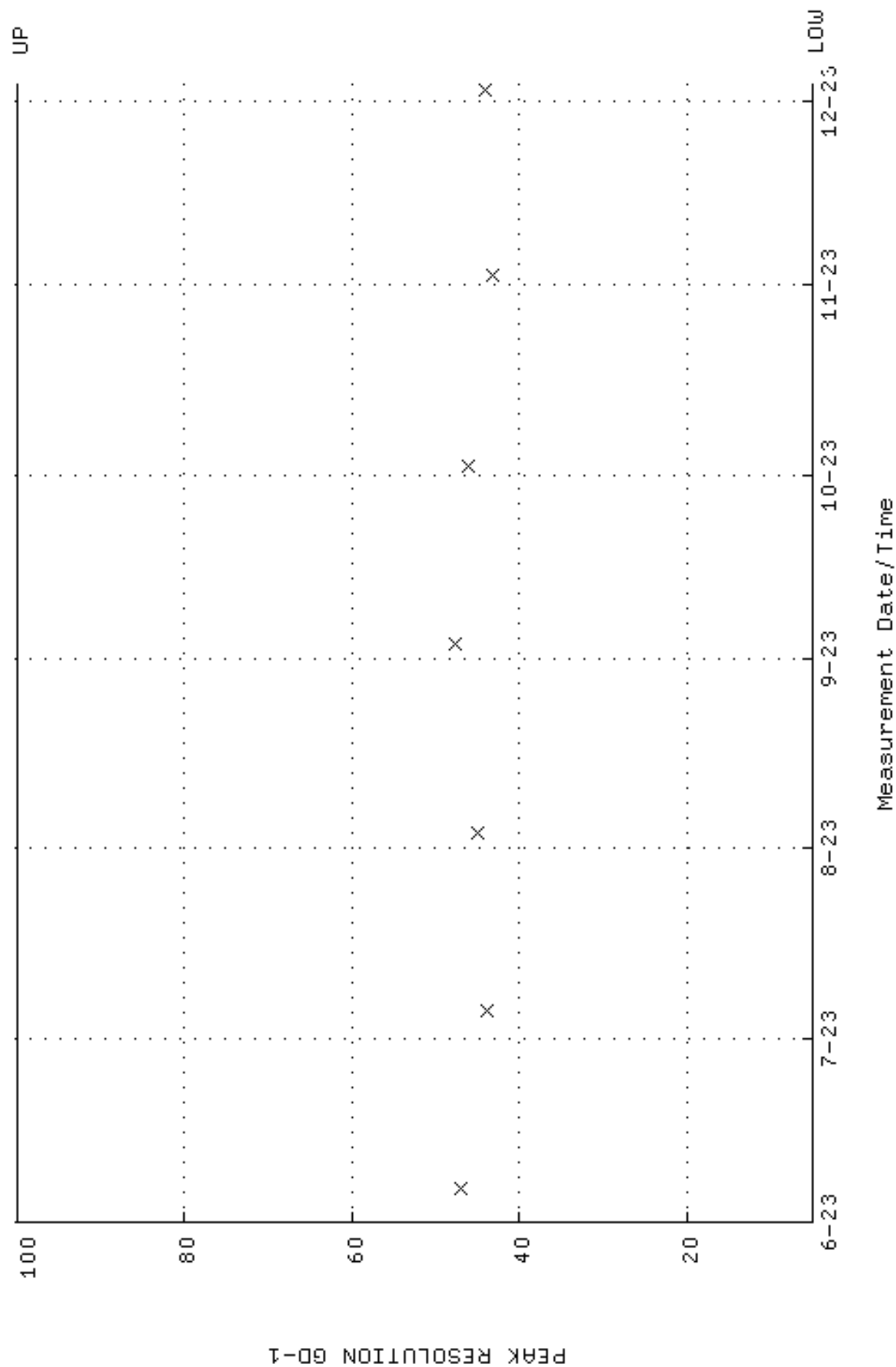
QA filename : DKA100:[ENV_ALPHA.QA.W]W038.QAF;6
Parameter Name : AVRGEFF (Average Efficiency)
Start/End Dates : 6-JUN-2023 09:17:01 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 0.353540 through 0.375400



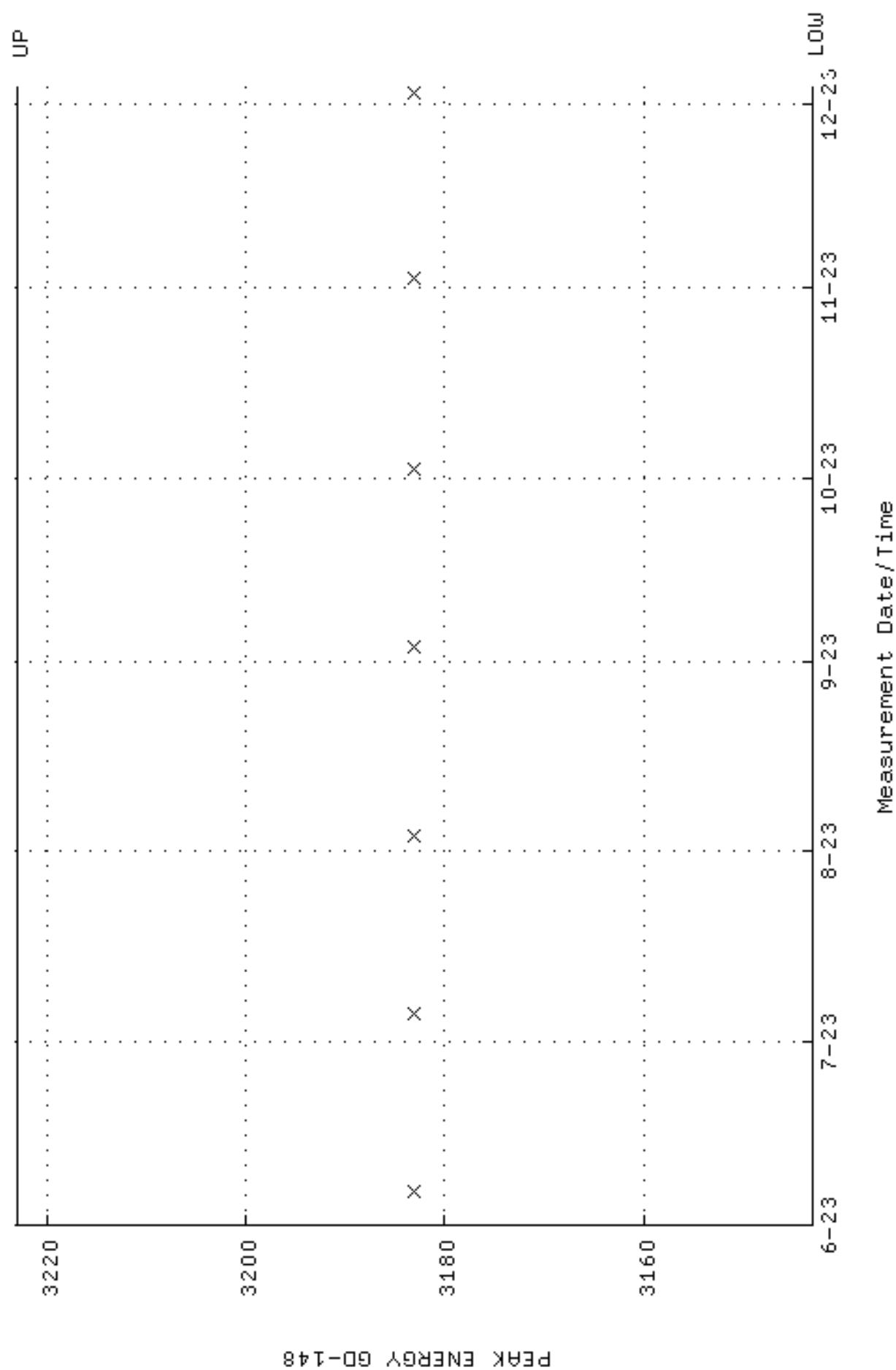
QA filename : DKA100:[ENV_ALPHA.QA.W]W038.QAF;6
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 6-JUN-2023 09:17:01 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



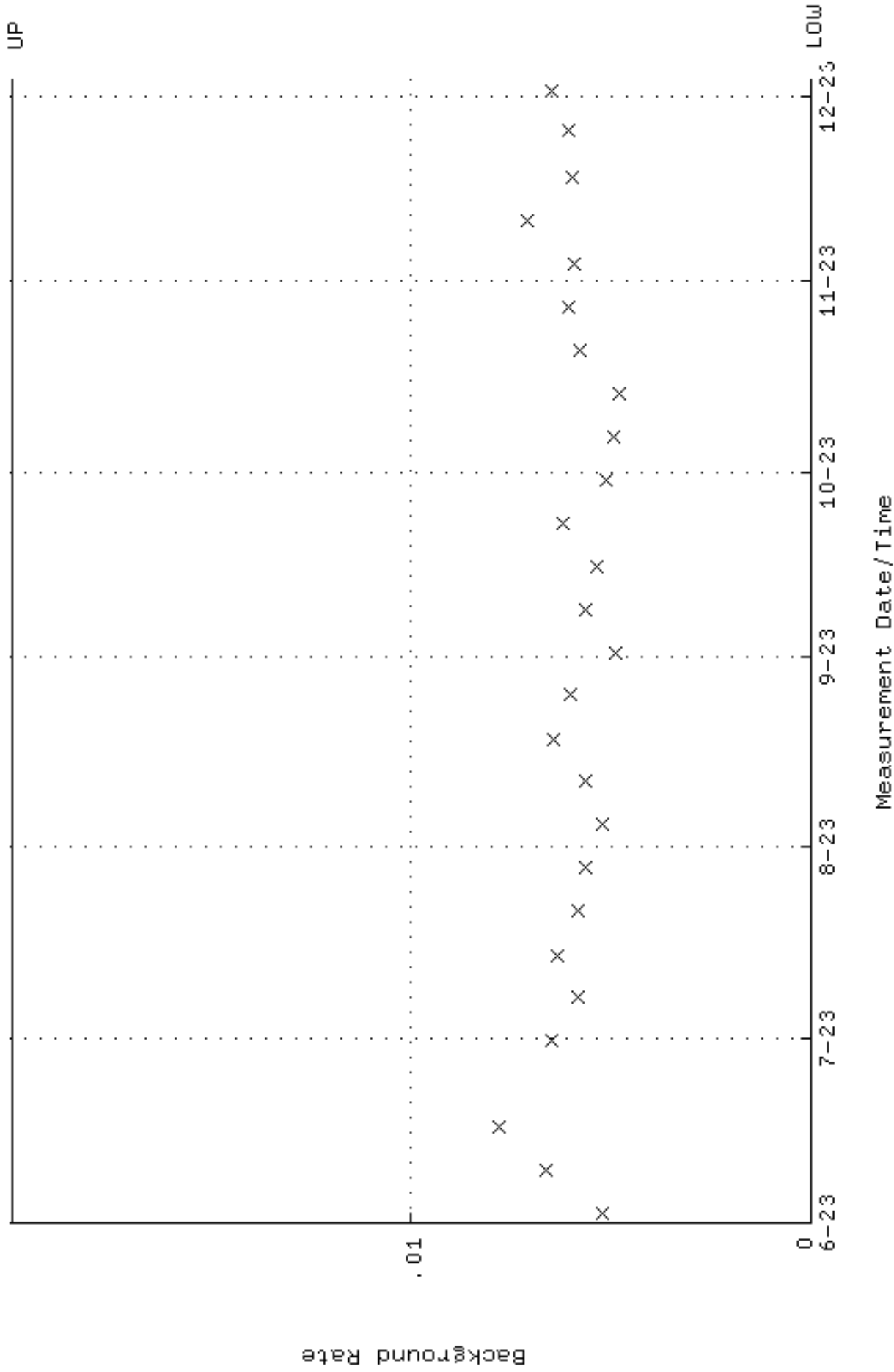
QA filename : DKA100:[ENV_ALPHA.QA.W]W038.QAF;6
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 6-JUN-2023 09:17:01 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



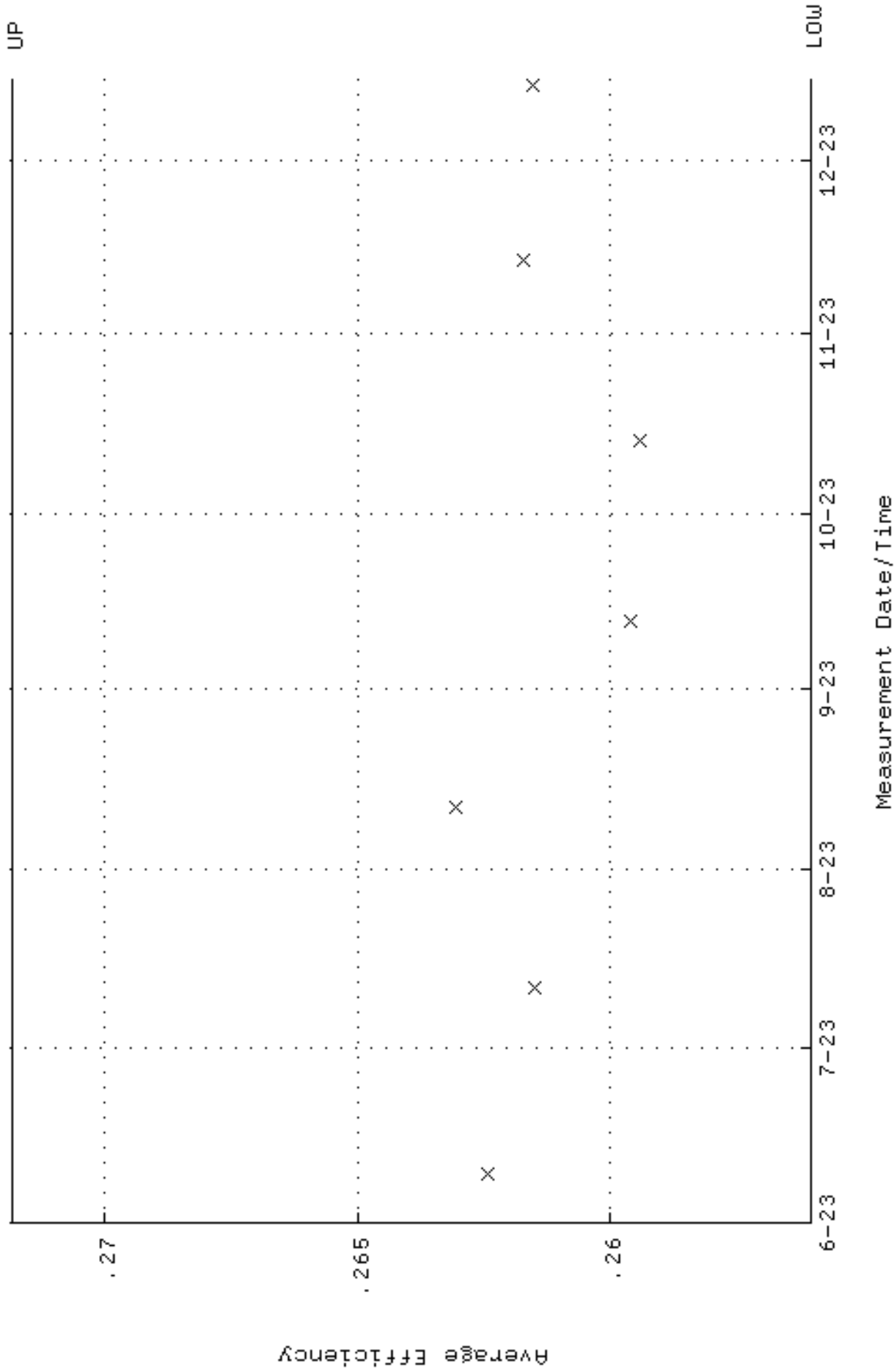
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 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 6-JUN-2023 09:17:01 through 3-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



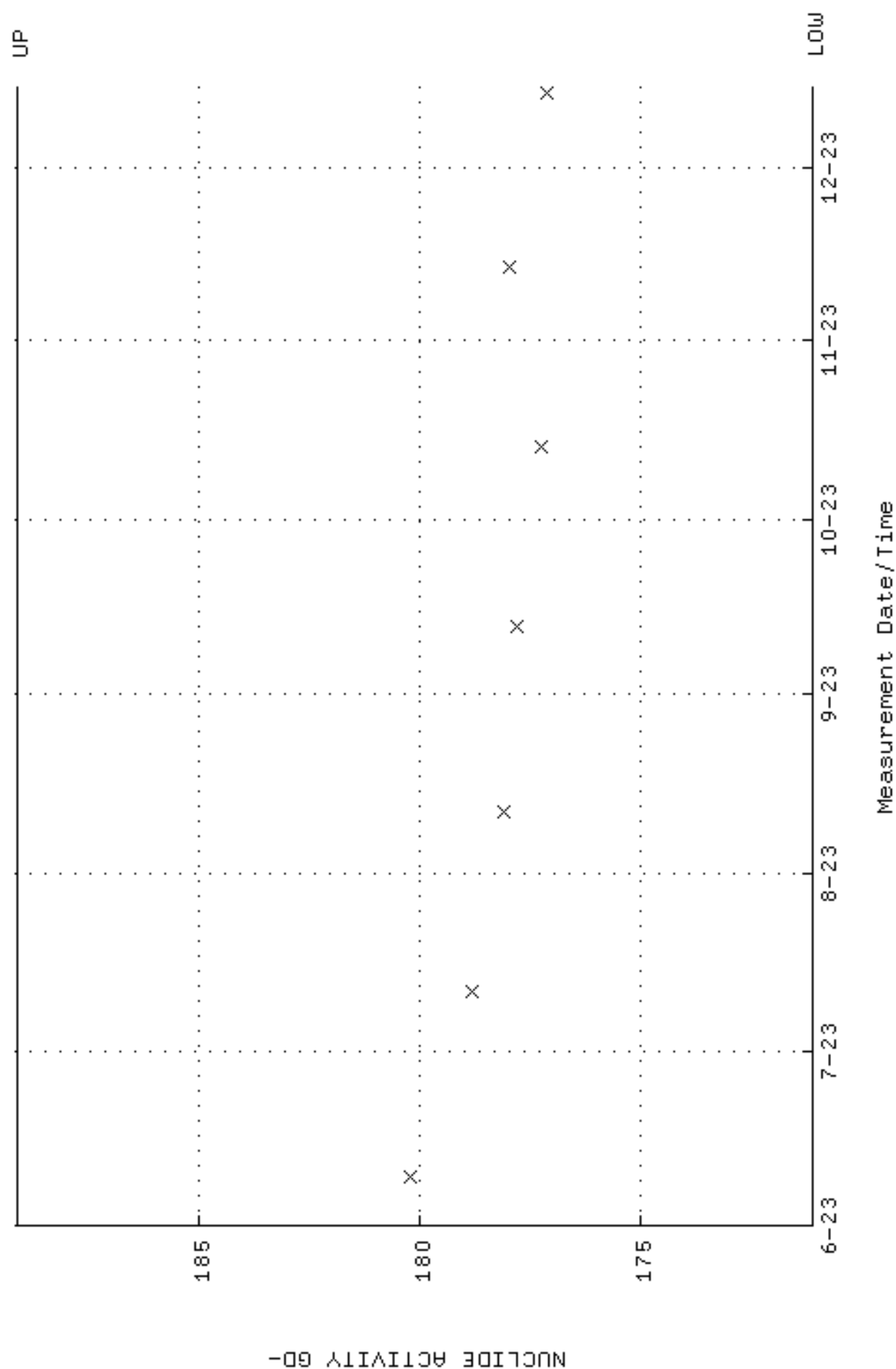
QA filename : DKA100:[ENV_ALPHA.QA.B]B038.QAF;4
Parameter Name : BACKRATE (Background Rate)
Start/End Dates : 2-JUN-2023 12:35:56 through 3-DEC-2023 12:00:00
Lower/Upper Lmts: 0.000000E+00 through 2.000000E-02



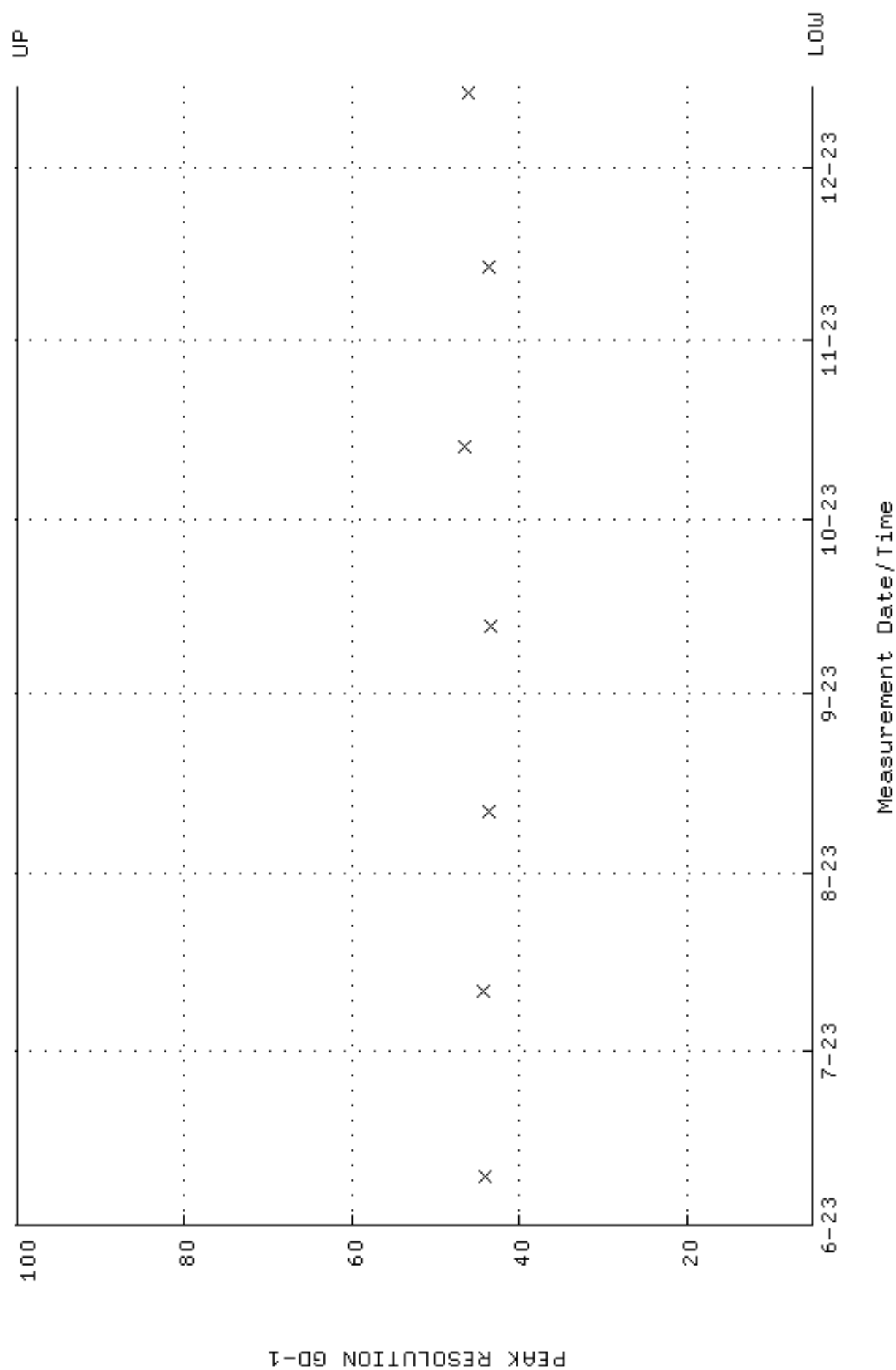
QA filename : DKA100:[ENV_ALPHA.QA.W]W117.QAF;6
Parameter Name : AVRGEFF (Average Efficiency)
Start/End Dates : 9-JUN-2023 11:04:35 through 14-DEC-2023 12:00:00
Lower/Upper Lmts: 0.256000 through 0.271840



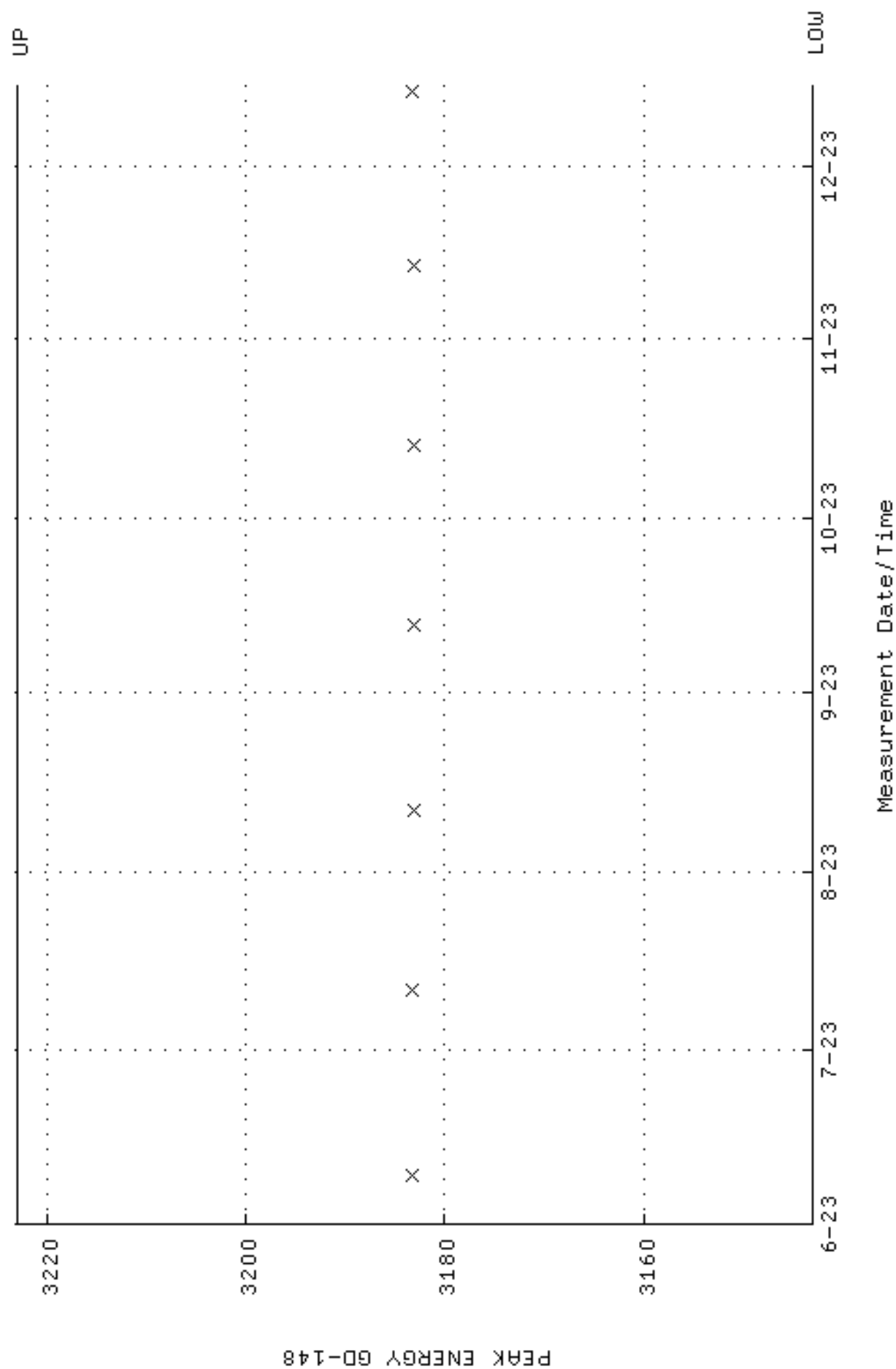
QA filename : DKA100:[ENV_ALPHA.QA.W]W117.QAF;6
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 9-JUN-2023 11:04:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



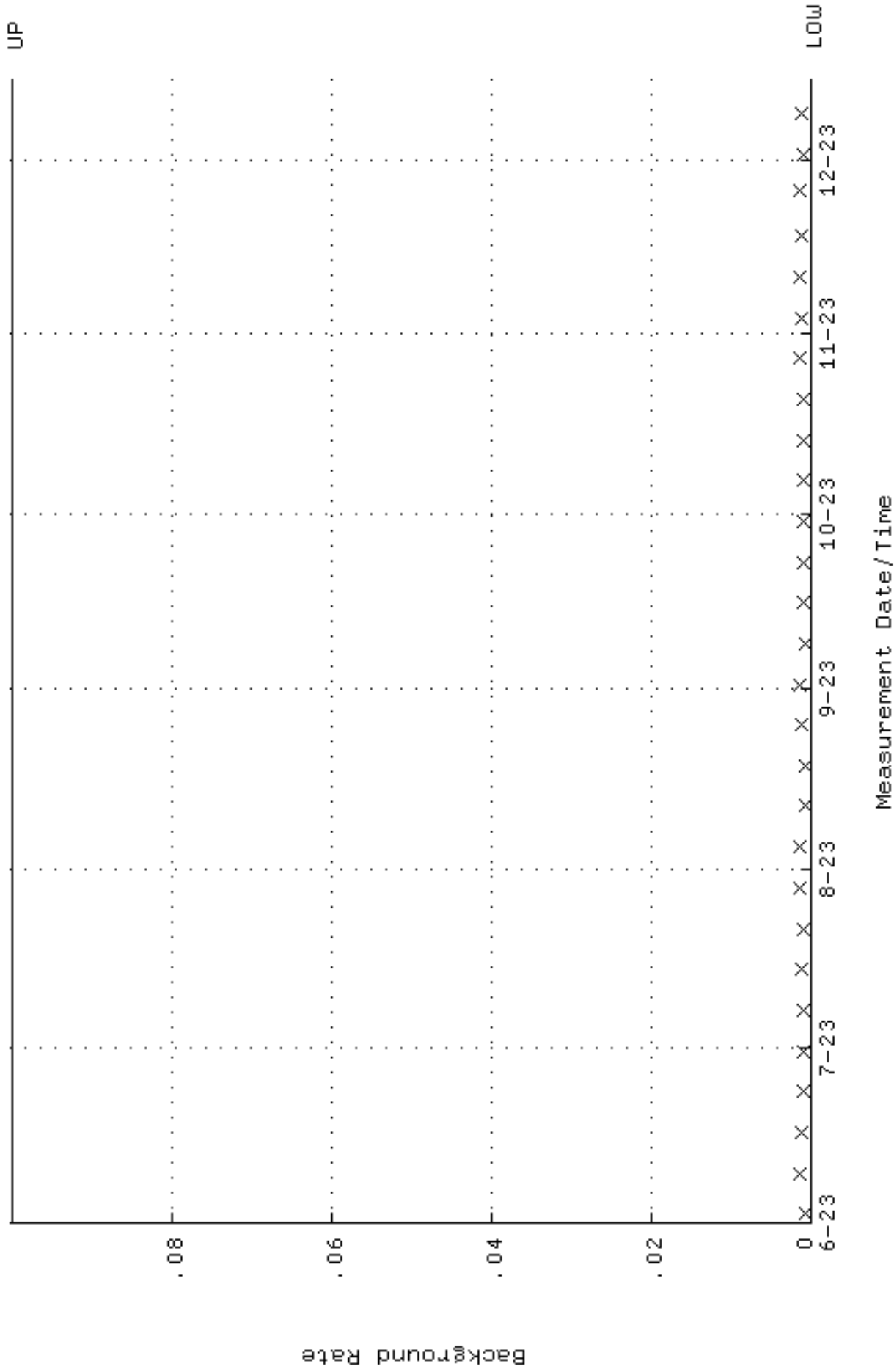
QA filename : DKA100:[ENV_ALPHA.QA.W]W117.QAF;6
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 9-JUN-2023 11:04:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



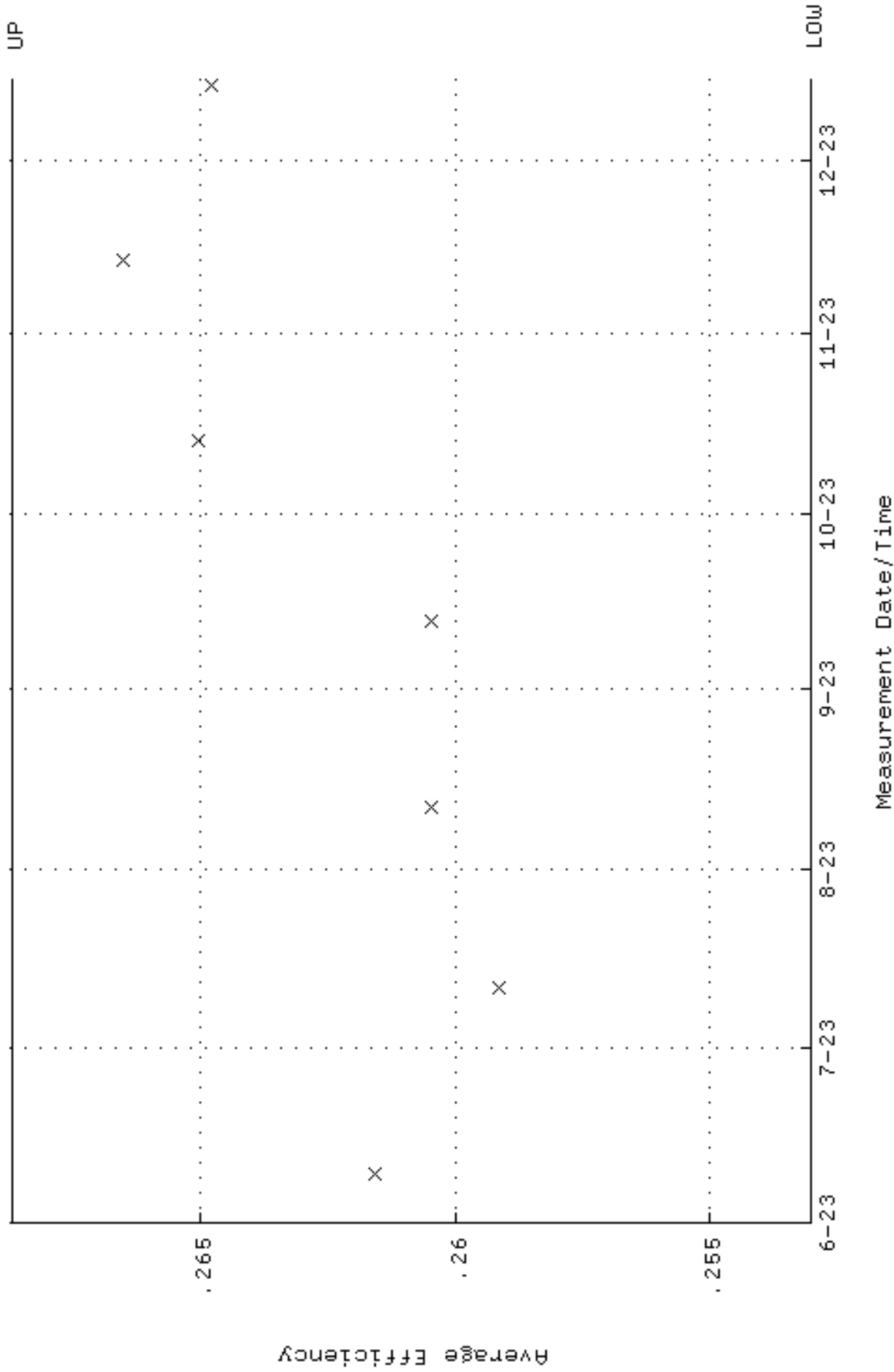
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 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 9-JUN-2023 11:04:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



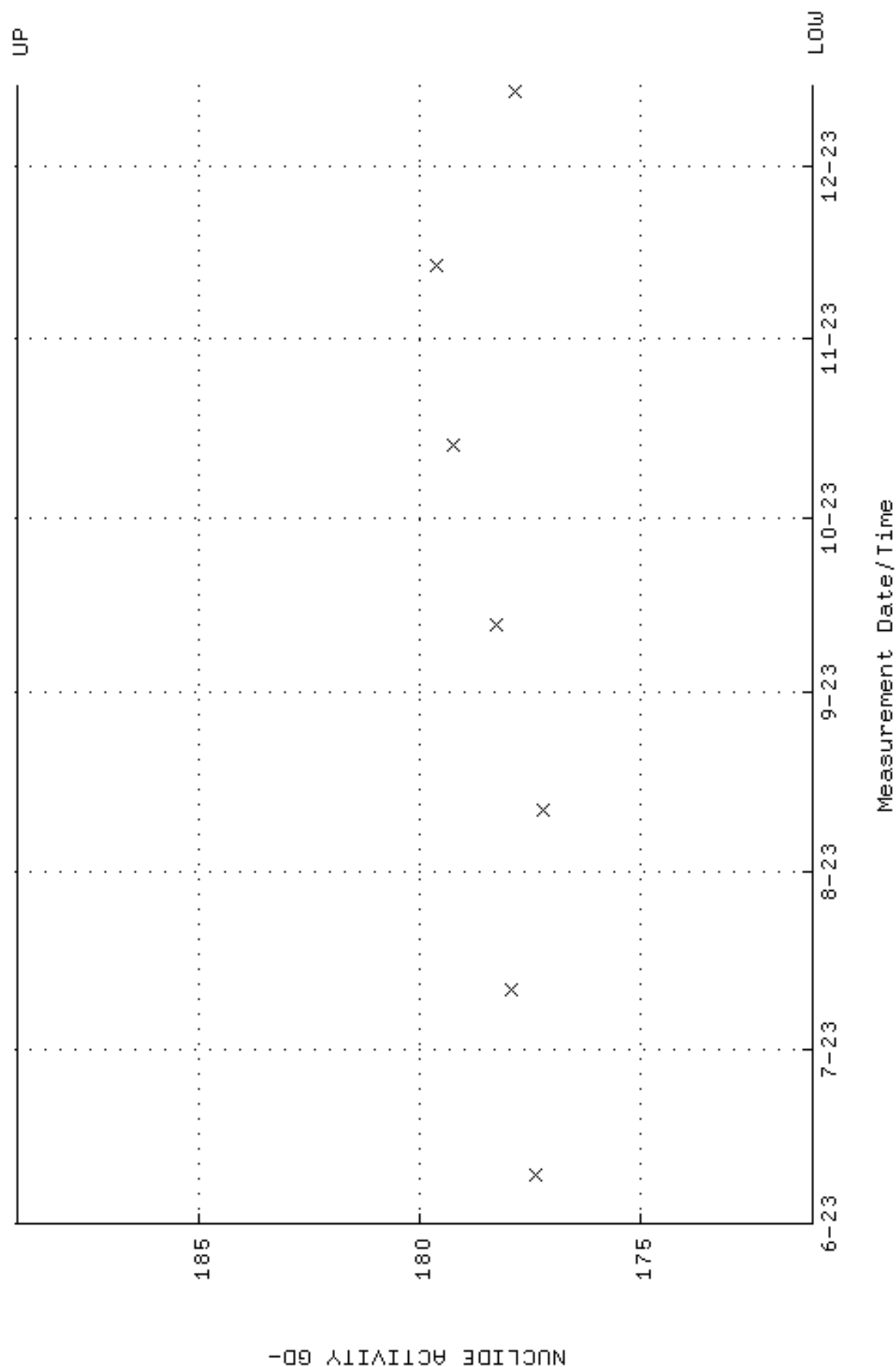
QA filename : DKA100:[ENV_ALPHA.QA.B]B117.QAF;4
Parameter Name : BACKRATE (Background Rate)
Start/End Dates : 2-JUN-2023 11:46:16 through 14-DEC-2023 12:00:00
Lower/Upper Lmts: 0.000000E+00 through 0.100000



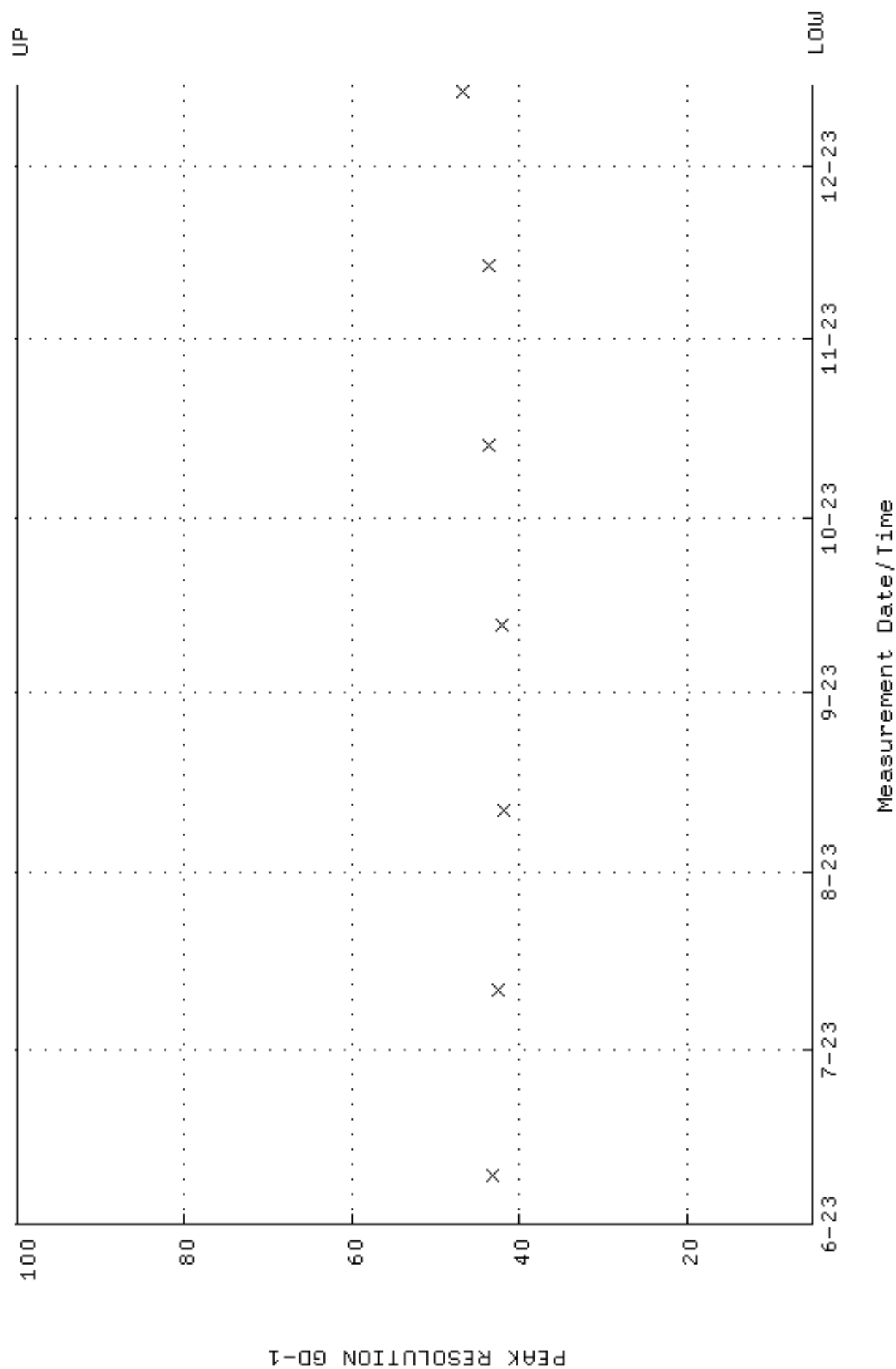
QA filename : DKA100:[ENV_ALPHA.QA.W]W131.QAF;7
Parameter Name : AVRGEFF (Average Efficiency)
Start/End Dates : 9-JUN-2023 09:47:42 through 14-DEC-2023 12:00:00
Lower/Upper Lmts: 0.253020 through 0.268680



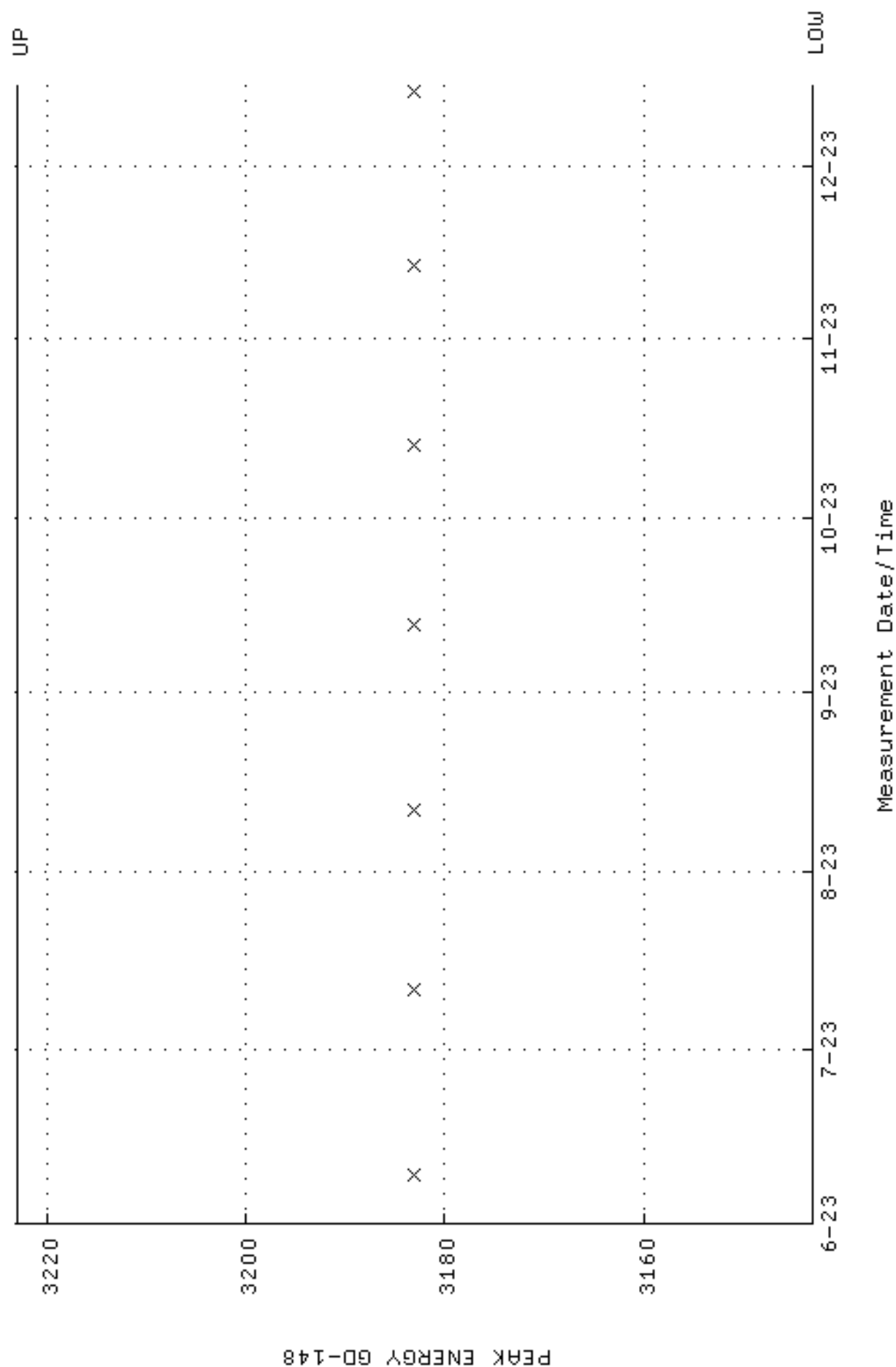
QA filename : DKA100:[ENV_ALPHA.QA.W]W131.QAF;7
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 9-JUN-2023 09:47:42 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



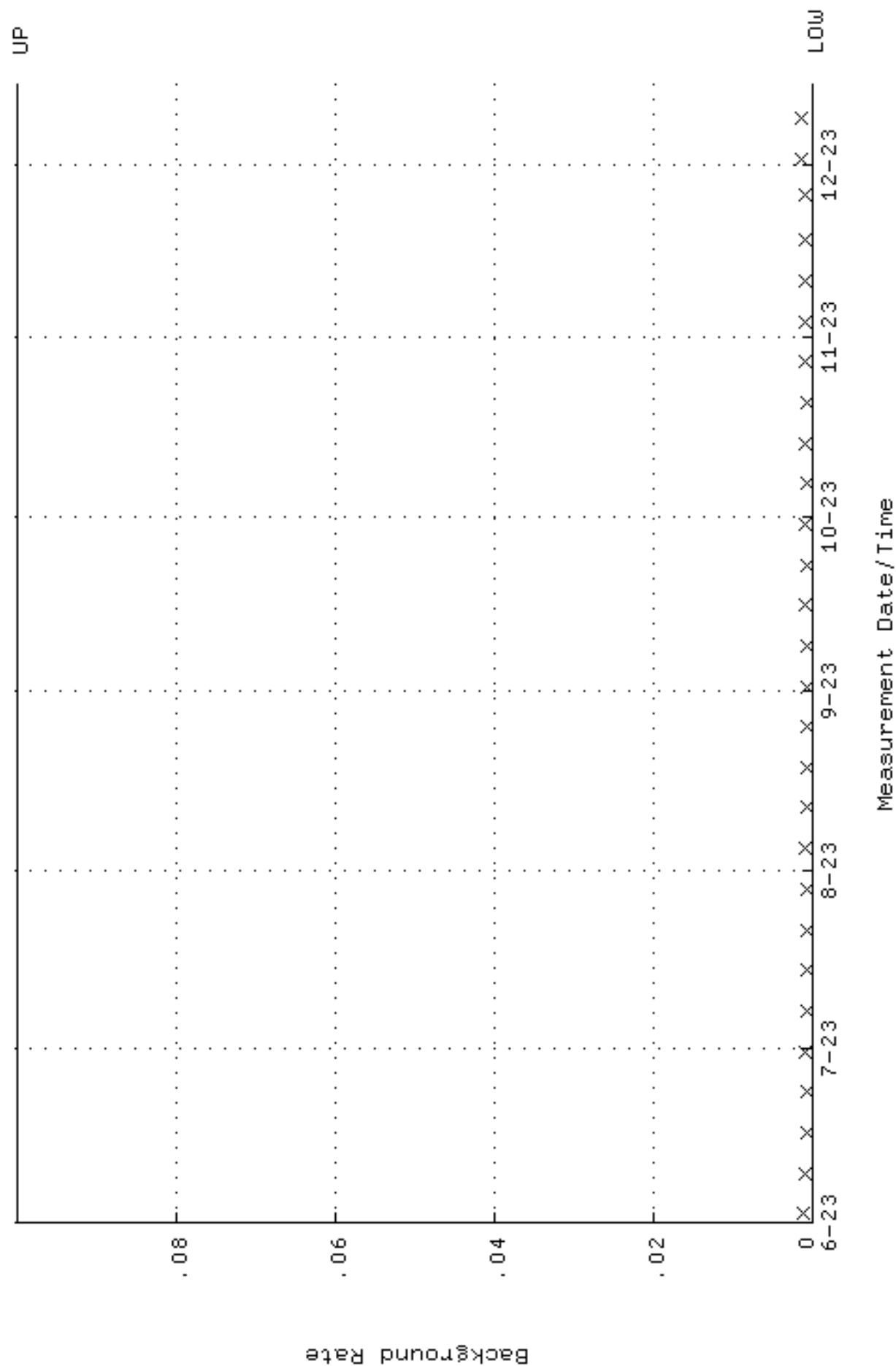
QA filename : DKA100:[ENV_ALPHA.QA.W]W131.QAF;7
 Parameter Name : PSFVHM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 9-JUN-2023 09:47:42 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



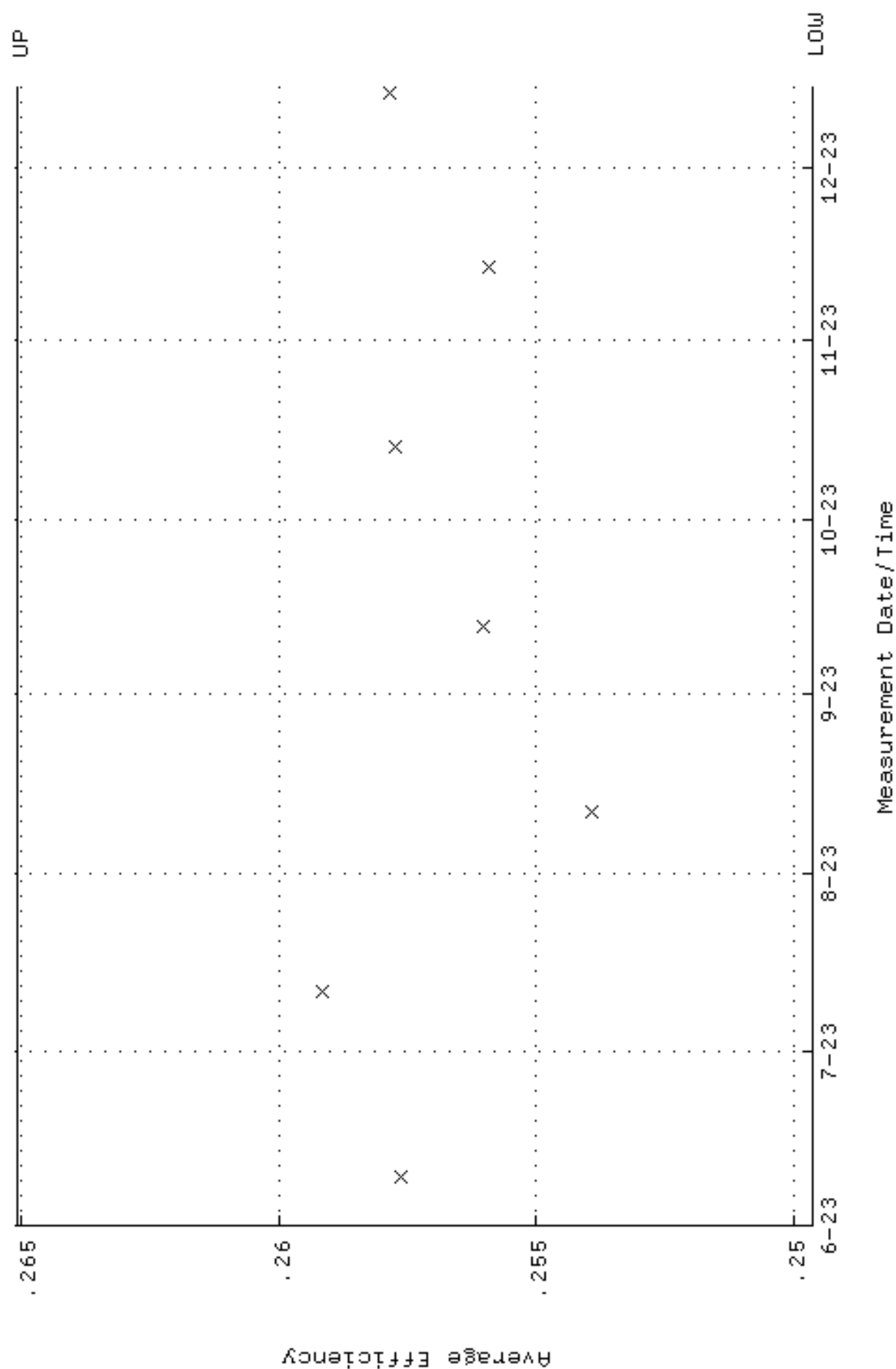
QA filename : DKA100:[ENV_ALPHA.QA.W]W131.QAF;7
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 9-JUN-2023 09:47:42 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



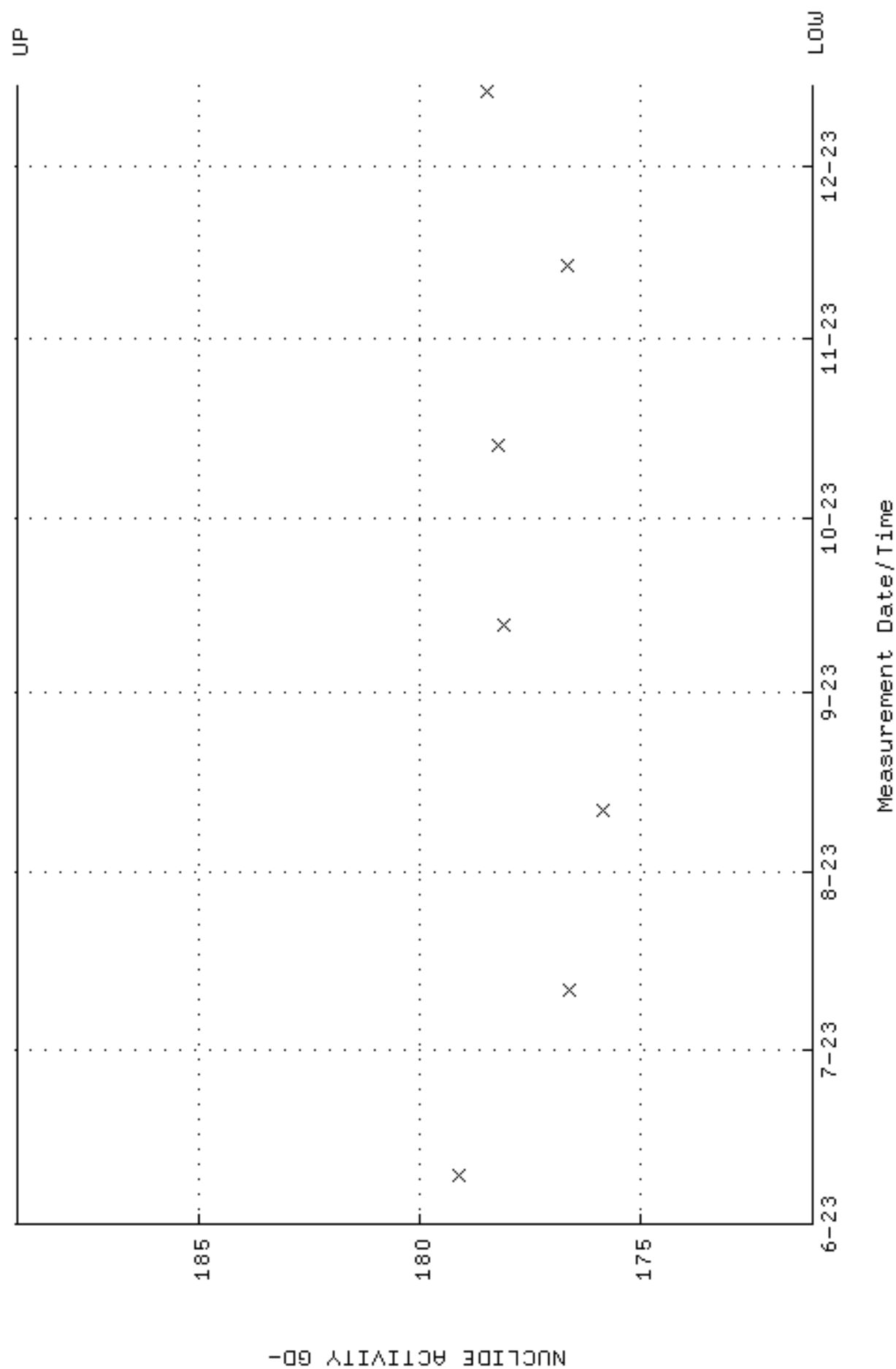
QA filename : DKA100:[ENV_ALPHA.QA.B]B131.QAF;4
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 2-JUN-2023 12:53:25 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



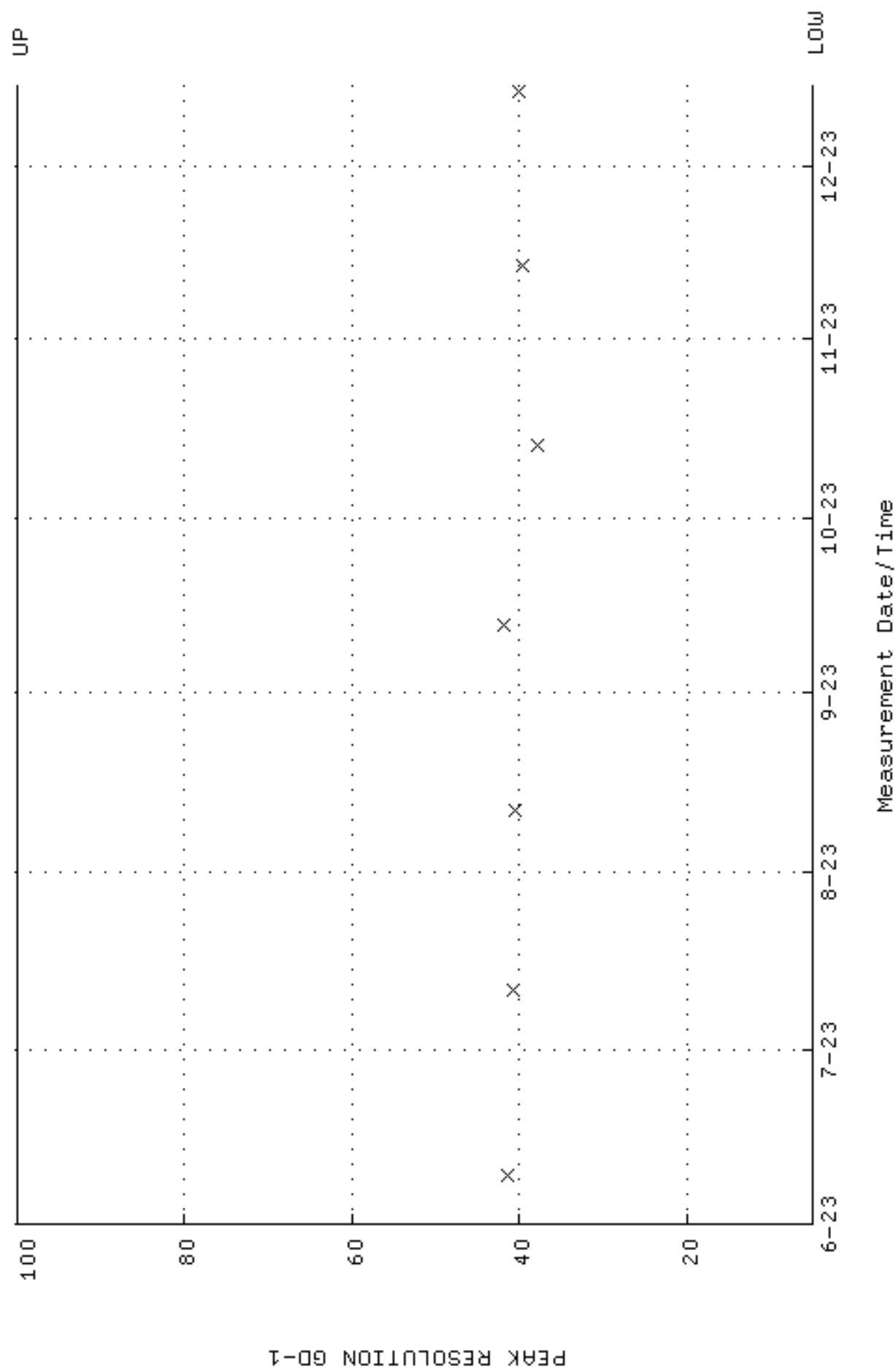
QA filename : DKA100:[ENV_ALPHA.QA.W]W133.QAF;6
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 9-JUN-2023 09:02:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.249630 through 0.265070



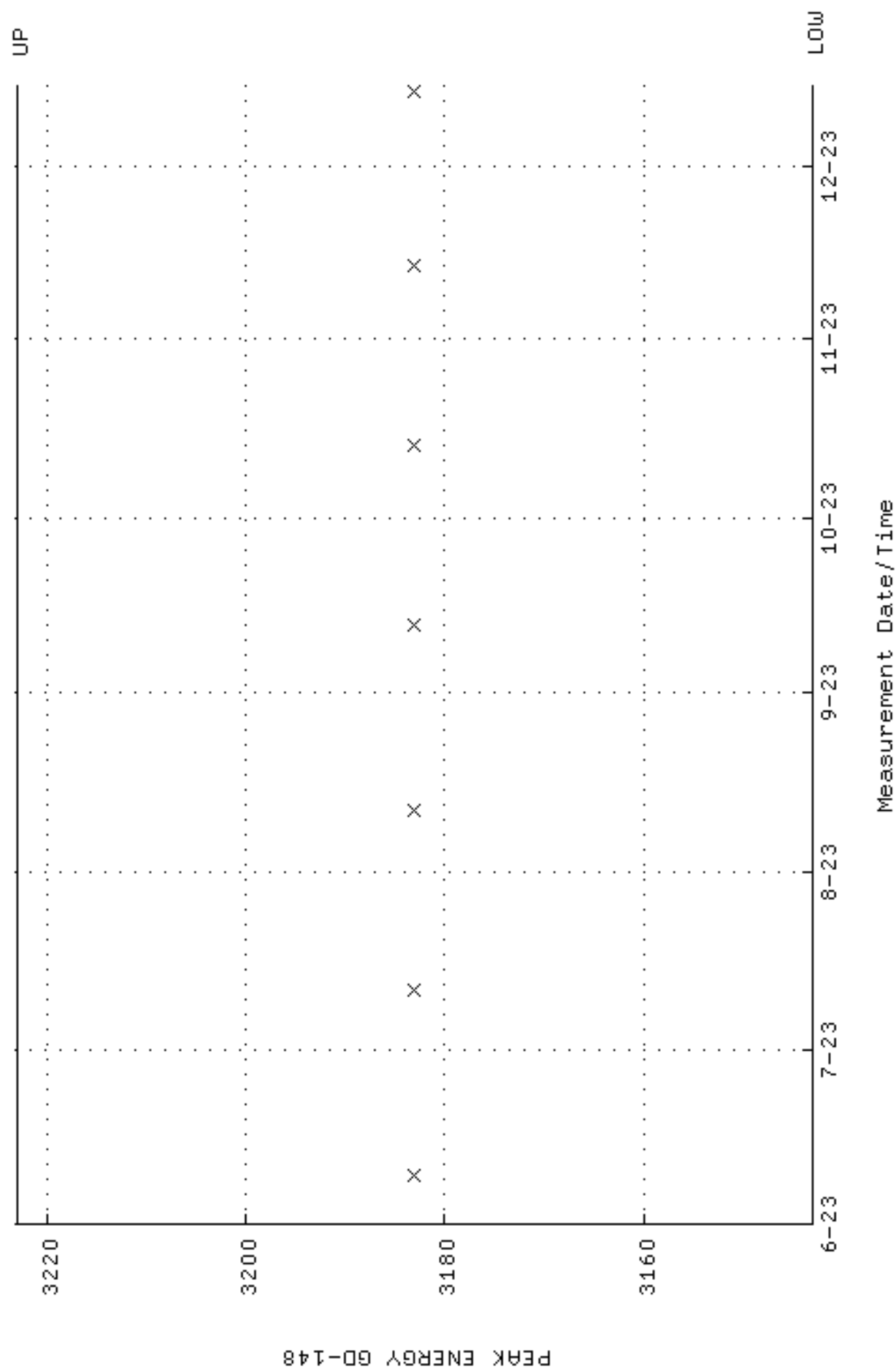
QA filename : DKA100:[ENV_ALPHA.QA.W]W133.QAF;6
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 9-JUN-2023 09:02:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



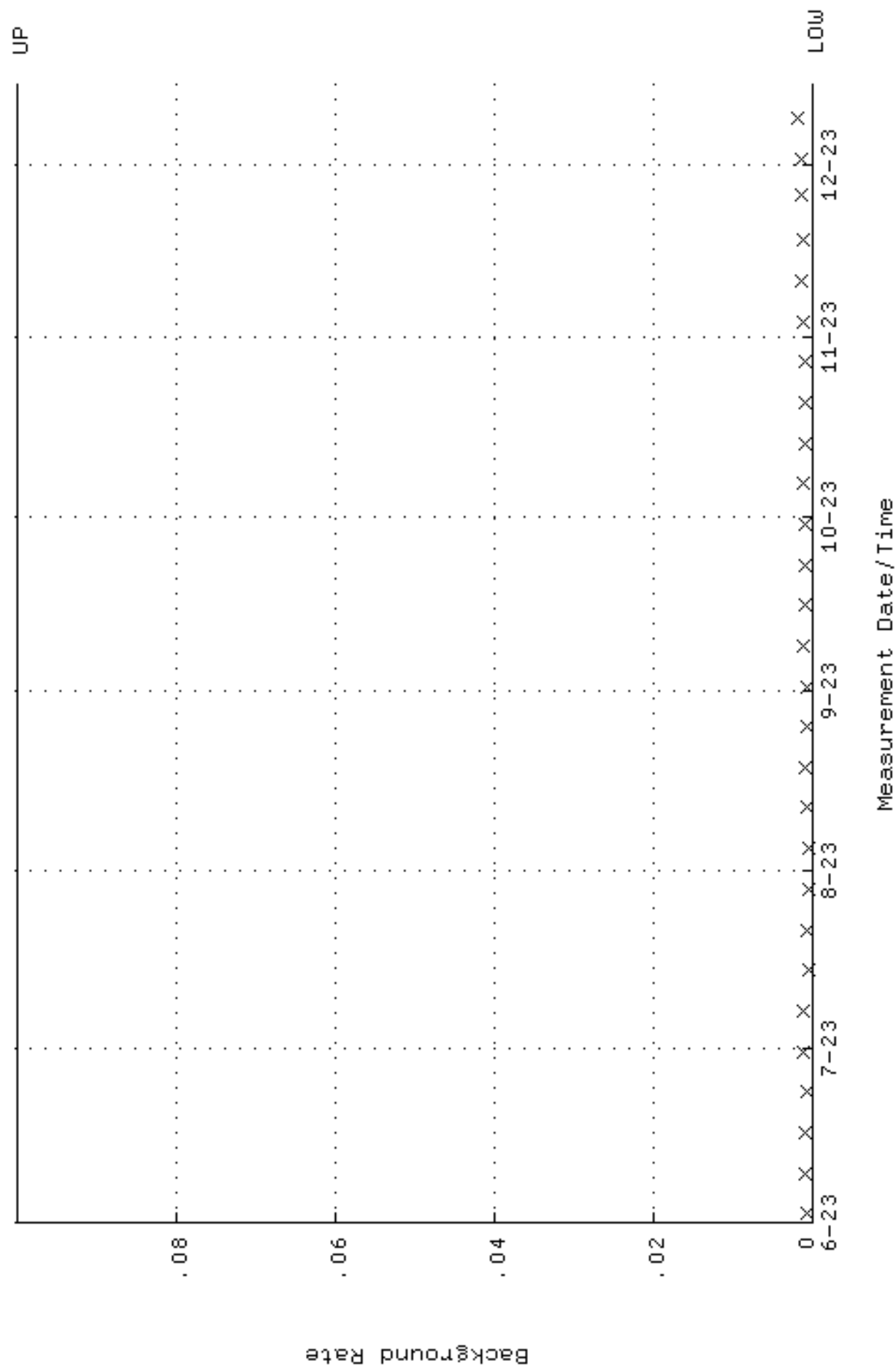
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 Parameter Name : PSFVHM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 9-JUN-2023 09:02:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



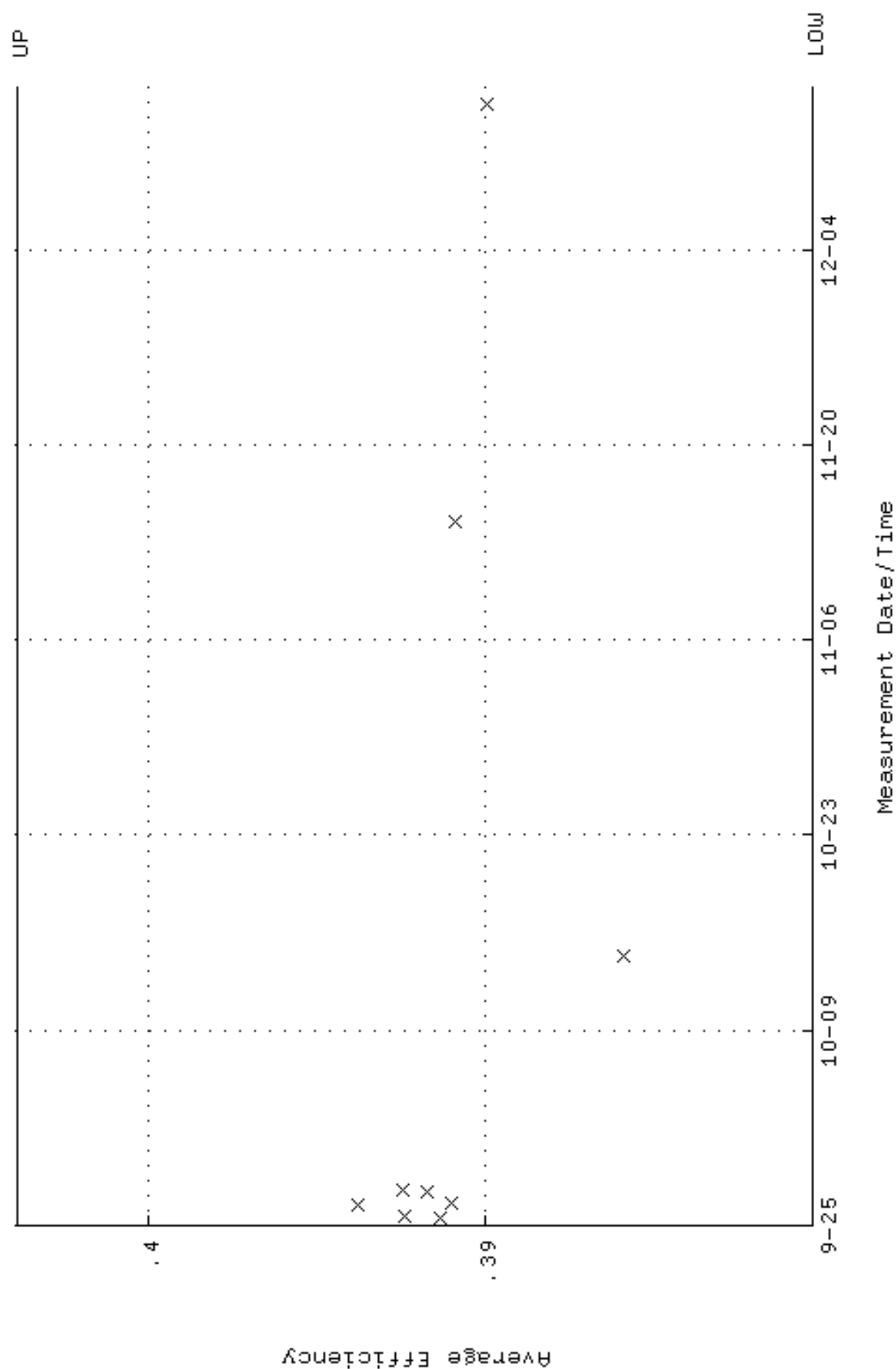
QA filename : DKA100:[ENV_ALPHA.QA.W]W133.QAF;6
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 9-JUN-2023 09:02:35 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



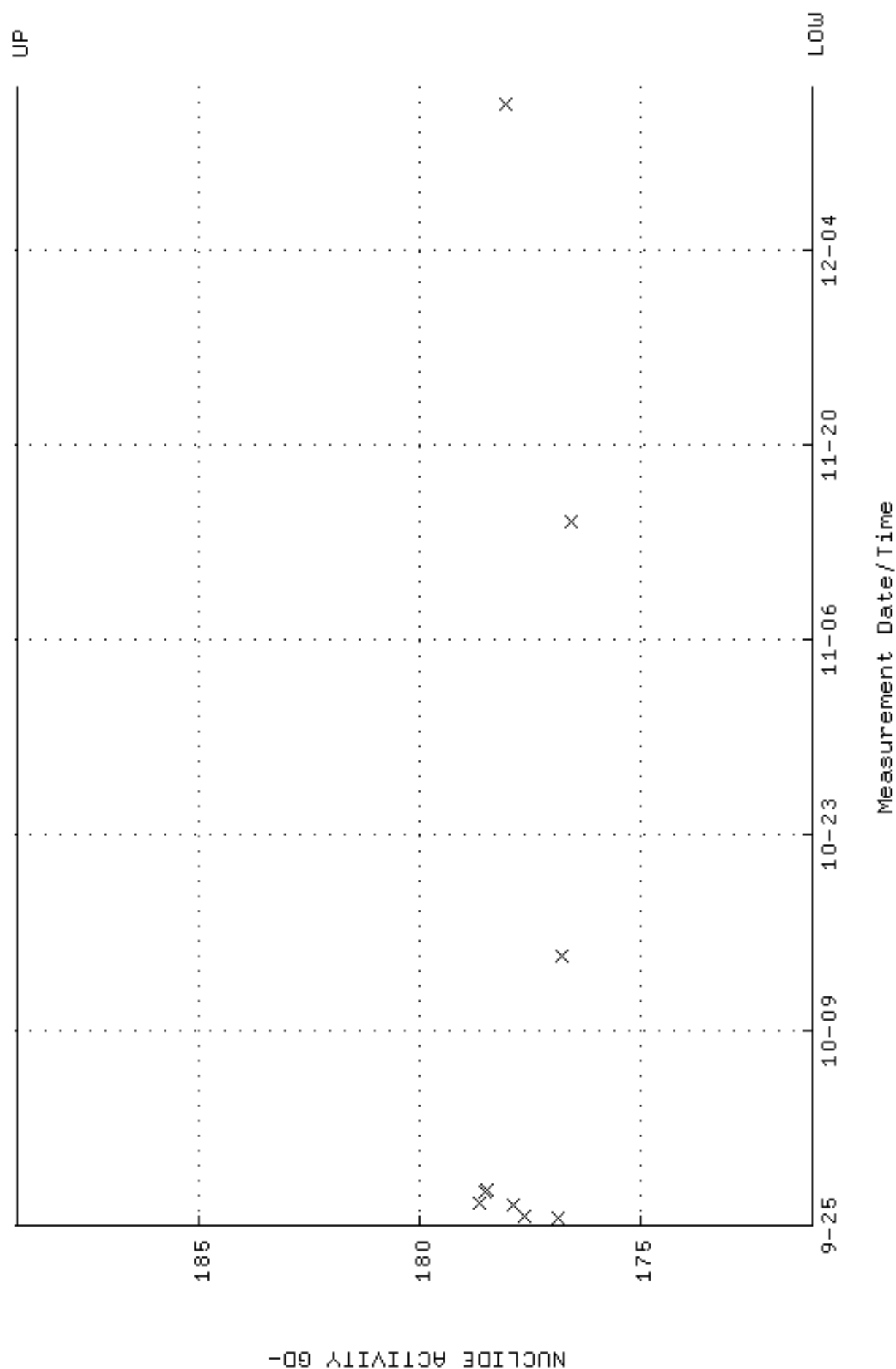
QA filename : DKA100:[ENV_ALPHA.QA.B]B133.QAF;12
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 2-JUN-2023 12:53:37 through 14-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



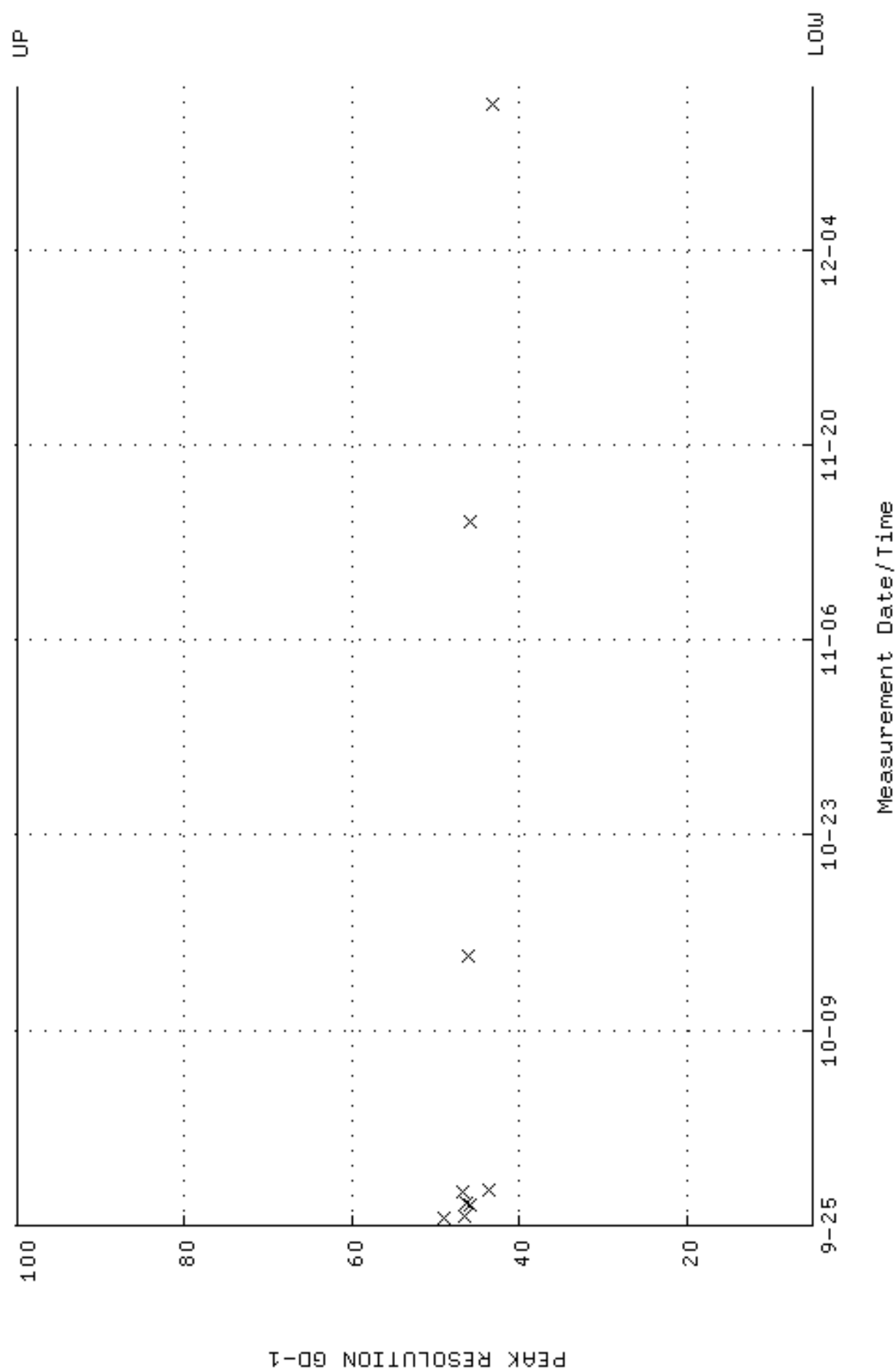
QA filename : DKA100:[ENV_ALPHA.QA.W]W158.QAF;4
 Parameter Name : AVRGEFF (Average Efficiency)
 Start/End Dates : 25-SEP-2023 12:23:55 through 15-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.380330 through 0.403860



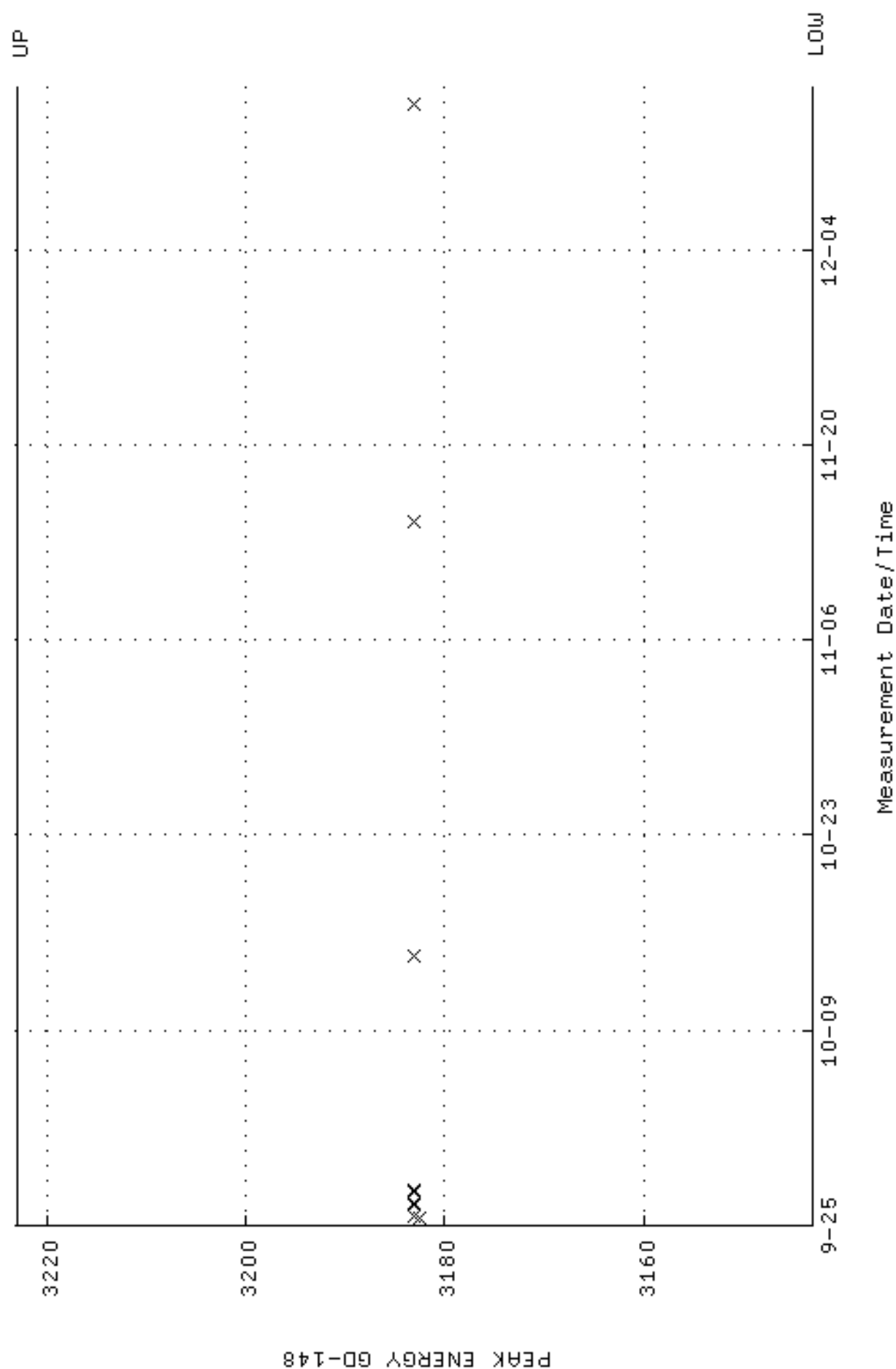
QA filename : DKA100:[ENV_ALPHA.QA.W]W158.QAF;4
 Parameter Name : NLAIVITY-GD148 (NUCLIDE ACTIVITY GD-148)
 Start/End Dates : 25-SEP-2023 12:23:55 through 15-DEC-2023 12:00:00
 Lower/Upper Lmts: 171.090 through 189.100



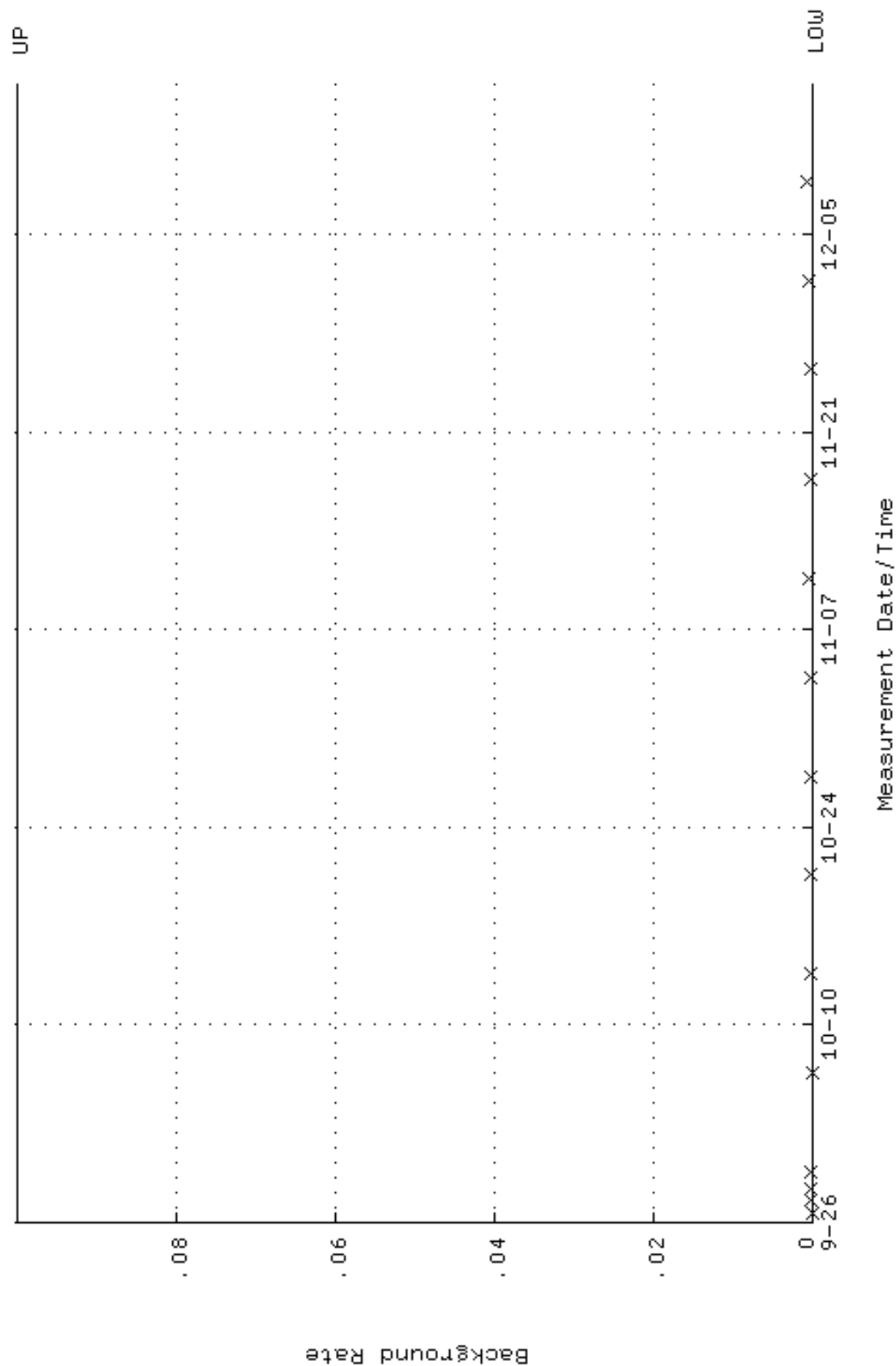
QA filename : DKA100:[ENV_ALPHA.QA.W]W158.QAF;4
 Parameter Name : PSFWM-GD148 (PEAK RESOLUTION GD-148)
 Start/End Dates : 25-SEP-2023 12:23:55 through 15-DEC-2023 12:00:00
 Lower/Upper Lmts: 5.00000 through 100.000



QA filename : DKA100:[ENV_ALPHA.QA.W]W158.QAF;4
 Parameter Name : PSENERGY-GD148 (PEAK ENERGY GD-148)
 Start/End Dates : 25-SEP-2023 12:23:55 through 15-DEC-2023 12:00:00
 Lower/Upper Lmts: 3143.00 through 3223.00



QA filename : DKA100:[ENV_ALPHA.QA.B]B158.QAF;4
 Parameter Name : BACKRATE (Background Rate)
 Start/End Dates : 26-SEP-2023 16:38:56 through 15-DEC-2023 12:00:00
 Lower/Upper Lmts: 0.000000E+00 through 0.100000



RAD Standards Traceability



Eckert & Ziegler

Analytics

1845

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.ezag.com

CERTIFICATE OF CALIBRATION

Standard Reference Source

Received: 12-1-17 12:00

SRS Number: 108018

Source Description: 5 mL Liquid in Flame Sealed Ampoule

Product Code: 8229

Customer: GEL Laboratories LLC

P.O. Number: GEL1718798, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution calibrated by Eckert & Ziegler Analytics (EZA). 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. EZA maintains traceability to the National Institute of Standards and Technology (NIST) 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."

Reference Date: 29-November-2017 12:00 PM EST

Isotope	Half-Life, d	Activity, Bq	Uncertainty			Calibration Method**
			u_A , %	u_B , %	U , %*	
Th-229	2.897E+06	1.999E+04	0.5	1.5	3.1	4π LS

Uncertainty:** U - Relative expanded uncertainty, $k = 2$. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results." *Calibration Methods:** 4π LS - 4π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber.

(Certificate continued on reverse side)

SRS Number: 108018

Comments:

5.21561 g of 0.5 M HNO₃ solution, carrier free.

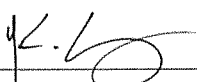
Impurities:

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

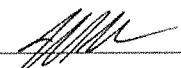
α-impurities: Th-228 6.6E+00 Bq, Th-230 1.2E+02 Bq, Th-232 8.0E+00 Bq

This source was wipe tested in its inactive areas with leak test results < 185 Bq (5 nCi) of removable activity per ISO 9978:1992.

Source Prepared by:


K. Hardley, Radiochemist

QC Approved by:


J. Lahr, Spectroscopist

Date: 27-Nov-17

Standard Logbook

Serial ID: 1845 **Open/Reference Date:** 29-NOV-17 **Aliquot :** 5.21561 g
Name: Thorium-229 **Received:** 01-DEC-17 **Density :** Hand Calculated
Type: Source Material **Expires:** 01-DEC-18 **Logbook Num :** GL-CED-297-138
Employee: Tim Chandler **Lot Number :** 108018
Supplier: Eckert & Ziegler **Solvent :** 0.5M HNO₃
 Uncertainty : 1.55 percent

Description: 1 ampoule
Comments: None

Analyte	Concentration	Analyte	Concentration
Thorium-229	19990 Bq		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1845
Prepared By:	Tim Chandler
Carrier Conc:	0.5M HNO3
Reference Date:	11/29/2017
Ampoule Mass (g):	5.21561 g
Uncertainty:	+/- 1.55 %
LogBook No:	GL-CED-297-138
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Thorium-229		
Prepared By:	Tim Chandler		
Prep Date:	06/08/2018		
Verification Date:	06/27/2023		
Expiration Date:	06/27/2024		
Primary Code:	1845-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	5.1906 g		
Density(g/mL):	1.0291	Balance ID:	B733529066

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(5.1906 \text{ g}) * (19990 \text{ Bq}) * (60 \text{ dpm/Bq}) / (5.21561 \text{ g} * 100 \text{ mL}) = 11936.4861 \text{ dpm/mL}$
$(5.1906 \text{ g}) * (19990 \text{ Bq}) * (60 \text{ dpm/Bq}) / (1.0291 \text{ g/mL}) / (5.21561 \text{ g} * 100 \text{ mL}) = 11598.7987 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
06/08/2018	Tim Chandler	2.0385	1000	1845-B	23.6442 dpm/mL	06/01/2020	06/01/2021
07/10/2019	Tim Chandler	4.0198	1000	1845-C	46.62485 dpm/mL	07/07/2020	07/07/2021
10/26/2020	Tim Chandler	4.0184	1000	1845-D	46.6086 dpm/mL	10/27/2020	10/27/2021
04/23/2021	Tim Chandler	4.2911	1000	1845-E	49.7716 dpm/mL	04/26/2021	04/26/2022
11/10/2021	Matelon DeFreese	4.211	1000	1845-F	48.8425 dpm/mL	11/10/2021	11/10/2022
05/11/2022	Matelon DeFreese	4.1951	1000	1845-G	48.6581 dpm/mL	05/12/2022	05/11/2023
01/11/2023	Matelon DeFreese	4.1664	1000	1845-H	48.3252 dpm/mL	01/11/2023	01/11/2024
06/27/2023	Matelon DeFreese	4.1464	1000	1845-I	48.093259 dpm/mL	06/27/2023	06/27/2024

01/11/2023	Tim Chandler	4.1664	1000	2073-A	48.3252 dpm/mL	01/11/2023	01/11/2024
01/11/2023	Tim Chandler	4.1664	1000	2074-A	48.3252 dpm/mL	01/11/2023	01/11/2024

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Th-229 Standard 1845-I

v1.2

Analyst	MXS2
Verification Prep Date	6/27/2023

Tracer Information	
Isotope	Th-232
Serial Number	1513-J
Amount of Std. (mL)	0.2
Expiration Date	4/25/2024

Standard Information	
Isotope	Th-229
Serial Number	1845-I
Isotope Half-life	7.3400E+03 Y
Reference Date	11/29/2017
Ref. Act. (dpm/mL)	48.093259
Amount of Std. (mL)	0.2
Standard Prep Date	6/27/2023

Std #	Count Date	Activity pCi	Standard dpm/mL
1	6/28/2023	4.260	47.29
2	6/27/2023	4.470	49.62
3	6/27/2023	4.490	49.84

Mean Value = 4.407 48.914
Stdev = 0.127410099 1.414252099

Certificate Value* = 4.3304 pCi
Two sigma = 0.2548
10 % of Mean = 0.4407
Rule A (Pass/Fail) Pass
% Recovery 101.76%
Rule B (Pass/Fail) Pass
Expiration Date 6/27/2024

dpm/mL
48.0679
2.8285
4.8914
Pass
101.76%
Pass

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 Verification Prep Date.

The analyst prepared three standard verification sources for Th-229 standard 1845-I using 0.2 mL for each source. Each standard was combined with 0.2 mL of Th-232 standard 1513-J and was diluted in a centrifuge tube containing 4 mL 2M HCl, diluted to 40 mL with DI water. 0.1 mL of neodymium carrier and 5 mL of 48% HF was added to precipitate neodymium (and Thorium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for Th-229 were calculated by comparison to Th-232 certified values.

6/30/23

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide:	Th-232	Customer:	GEL LABORATORIES, LLC
Half-life:	(1.405 ± 0.006)E+10 years	P.O. No.:	7347RD
Catalog No.:	7232	Reference Date:	1-Nov-10 12:00 PST
Source No.:	1451-62	Contained Radioactivity:	50.26 nCi 1860 Bq
		(Th-232 only)	

Physical Description:

A. Mass of solution:	5.73256 g in 5 mL flame-sealed ampoule
B. Chemical form:	Th(NO ₃) ₄ in H ₂ O
C. Carrier content:	None
D. Density:	1.15 g/mL @ 20°C

Radioimpurities:

Not determined

Radionuclide Concentration: 8.767 nCi/g, 324.4 Bq/g

Method of Calibration:

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement:

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

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from NCRP Report No. 58, 1985.
- This solution has a working life of 5 years.


Quality Control

15-OCT-10
Date

EZIP Ref. No.: 1451-62

RC-S-060-058

ISO 9001 CERTIFIED

Standard Logbook

Serial ID: 1513 **Open/Reference Date:** 01-NOV-10 **Aliquot :** 5.73256 g
Name: Thorium-232 **Received:** 21-OCT-10 **Density :** Hand Calculated g/mL
Type: Source Material **Expires:** 30-NOV-11 **Logbook Num :** RC-S-060-058
Employee: Gregory Ramsay **Verified:** 28-APR-11 **Lot Number :** 1451-62
Supplier: Eckert & Ziegler **Solvent :** DI water
Uncertainty : 1.172 PERCENT

Description: in water
Comments: None

Analyte	Concentration	Analyte	Concentration
Thorium-232	324.4 Bq/g		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1513
Prepared By:	Gregory Ramsay
Carrier Conc:	DI water
Reference Date:	11/01/2010
Ampoule Mass (g):	5.73256 g
Uncertainty:	+/- 1.172 %
LogBook No:	RC-S-060-058
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Thorium-232		
Prepared By:	Christina Kimball		
Prep Date:	04/19/2011		
Verification Date:	04/25/2023		
Expiration Date:	04/25/2024		
Primary Code:	1513-A		
Dilution(mL):	250 mL		
Mass of Parent(g):	5.672 g		
Density(g/mL):	1.0020	Balance ID:	60108592

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq/g)}) * (\text{conversion dpm to Bq}) / (\text{Dilution Vol}) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq/g)}) * (\text{conversion dpm to Bq}) / \text{Density (g/mL)} / (\text{Dilution Vol}) = \text{Parent Activity (dpm/g)}$
$(5.672 \text{ g}) * (324.4 \text{ Bq/g}) * (60 \text{ dpm/Bq}) / (250 \text{ mL}) = 441.5992 \text{ dpm/mL}$
$(5.672 \text{ g}) * (324.4 \text{ Bq/g}) * (60 \text{ dpm/Bq}) / (1.0020 \text{ g/mL}) / (250 \text{ mL}) = 440.7354 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
04/19/2011	Christina Kimball	5.0665	100	1513-B	22.3299 dpm/mL	04/11/2013	04/11/2014
02/26/2014	Matelon DeFreese	100.0316	1000	1513-C	44.08747 dpm/mL	12/14/2022	12/14/2023
04/18/2014	Christina Kimball	5.0477	100	1513-D	22.247 dpm/mL	07/14/2023	07/14/2024
01/04/2016	Christina Kimball	.2487	100	1513-E	1.096117 dpm/mL	02/11/2020	02/11/2021
08/01/2016	Christina Kimball	2.053	250	1513-F	3.61932 dpm/mL	07/21/2023	07/21/2024
02/21/2020	Christina Kimball	.248	100	1513-G	1.093 dpm/mL	02/16/2023	02/16/2024
11/11/2022	Christina Kimball	.3	100	1513-H	1.3222 dpm/mL	11/14/2022	11/14/2023
12/13/2022	Christina Kimball	.23	100	1513-I	1.0137 dpm/mL	12/27/2022	12/27/2023

04/25/2023	Matelon DeFreese	25.022	250	1513-J	44.1123247 dpm/mL	04/25/2023	04/25/2024
06/16/2023	Christina Kimball	5.02	100	1513-K	22.1249 dpm/mL	06/21/2023	06/21/2024

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for Th-232 Standard 1513-J

v1.2

Analyst	MXS2
Verification Prep Date	4/25/2023

Tracer Information	
Isotope	Th-229
Serial Number	1845-H
Amount of Std. (mL)	0.1
Expiration Date	1/11/2024

Standard Information	
Isotope	Th-232
Serial Number	1513-J
Isotope Half-life	1.4050E+10 Y
Reference Date	1/11/2010
Ref. Act. (dpm/mL)	44.1123247
Amount of Std. (mL)	0.1
Standard Prep Date	4/25/2023

Std #	Count Date	Activity pCi	Standard dpm/mL
1	4/25/2023	2.010	44.62
2	4/25/2023	1.930	42.85
3	4/25/2023	1.950	43.29

Certificate Value* = 1.9870 pCi
 Two sigma = 0.0833
 10 % of Mean = 0.1963
 Rule A (Pass/Fail) Pass
 % Recovery 98.81%
 Rule B (Pass/Fail) Pass
 Expiration Date 4/25/2024

dpm/mL
 44.1123
 1.8485
 4.3586
 Pass
 98.81%
 Pass

Mean Value = 1.963 43.586
 Stdev = 0.04163332 0.924259704

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 Verification Prep Date.

The analyst prepared three standard verification sources for Th-232 standard 1513-J using 0.1 mL for each source. Each standard was combined with 0.1 mL of Th-229 standard 1845-H and was diluted in a centrifuge tube containing 4 mL 2M HCl, diluted to 40 mL with DI water. 0.1 mL of neodymium carrier and 5 mL of 48% HF was added to precipitate neodymium (and Thorium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for Th-232 were calculated by comparison to Th-229 certified values.

4/25/23



Eckert & Ziegler

Analytics

1564

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

85621-278

5 mL Liquid in Flame Sealed Vial

Customer: General Engineering Labs/Charleston, SC
P.O. No.: 936814RD, Item 1

This standard radionuclide source was prepared gravimetrically from a master solution, calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France. Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry. 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 1, February, 1979, 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.

Isotope	Half-Life, Days	Activity (Bq)	Uncertainty*, %			Reference Date (12:00 PM EST)
			u _A	u _B	U	
U-232	2.517E+04	3.393E+04	0.5	2.4	4.9	09/12/2011

***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 (other than decay products) < 0.1 %, U-233 < 1.20E2 Bq, Am-241 < 5.8E1 Bq. 5.06048 grams 2M HNO3 solution.

Source Prepared by: M. I. Taskaeva
M. I. Taskaeva, Radiochemist

QA Approved: J. D. McCorvey
J. D. McCorvey, QA Manager Alternate

Date: 9/12/11

RECEIVED
9/14/11
AM



Standard Logbook

Serial ID: 1564 **Open/Reference Date:** 12-SEP-11 **Aliquot :** 5.06048 g
Name: Uranium-232 **Received:** 14-SEP-11 **Density :** Hand Calculated
Type: Source Material **Expires:** 26-SEP-14 **Logbook Num :** RC-S-060-109
Employee: Ashley Drochter **Lot Number :** 85621-278
Supplier: Eckert & Ziegler **Solvent :** 2M HNO3
 Uncertainty : 2.45 percent

Description: Ampoule
Comments: None

Analyte	Concentration	Analyte	Concentration
Uranium-232	33930 Bq		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1564
Prepared By:	Ashley Drochter
Carrier Conc:	2M HNO3
Reference Date:	09/12/2011
Ampoule Mass (g):	5.06048 g
Uncertainty:	+/- 2.45 %
LogBook No:	RC-S-060-109
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Uranium-232		
Prepared By:	Ashley Drochter		
Prep Date:	11/15/2012		
Verification Date:	10/10/2023		
Expiration Date:	10/10/2024		
Primary Code:	1564-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	4.9067 g		
Density(g/mL):	1.0615	Balance ID:	38080204

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parent Activity (Bq)}) * (\text{conversion dpm to Bq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(4.9067 \text{ g}) * (33930 \text{ Bq}) * (60 \text{ dpm/Bq}) / (5.06048 \text{ g} * 100 \text{ mL}) = 19739.3525 \text{ dpm/mL}$
$(4.9067 \text{ g}) * (33930 \text{ Bq}) * (60 \text{ dpm/Bq}) / (1.0615 \text{ g/mL}) / (5.06048 \text{ g} * 100 \text{ mL}) = 18595.7160 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
11/16/2012	Ashley Drochter	2.6179	1000	1564-B	48.6817 dpm/mL	11/13/2013	11/13/2014
07/26/2021	Christina Kimball	.635	500	1564-BB	23.6166 dpm/mL	07/21/2022	07/21/2023
07/26/2021	Christina Kimball	.635	500	1564-BB Spike	23.6166 dpm/mL	07/21/2022	07/21/2023
01/15/2013	Christina Kimball	.265	250	1564-C	19.7115 dpm/mL	01/13/2014	01/13/2015
12/14/2021	Tim Chandler	2.6412	1000	1564-CC	49.115 dpm/mL	12/15/2021	12/15/2022
02/18/2013	Christina Kimball	.116	500	1564-D	4.31421 dpm/mL	02/16/2015	02/13/2016
04/13/2022	Matelon DeFreese	2.7103	1000	1564-DD	50.4 dpm/mL	04/13/2022	04/13/2023
01/02/2014	Gregory Ramsay	2.6936	1000	1564-E	50.08942 dpm/mL	12/10/2014	12/10/2015

09/21/2022	Tim Chandler	2.6897	1000	1564-EE	50.0169 dpm/mL	09/21/2022	09/21/2023
03/17/2014	Christina Kimball	.266	250	1564-F	19.78584 dpm/mL	03/25/2015	03/25/2016
12/27/2022	Christina Kimball	.61	500	1564-FF	22.6868 dpm/mL	12/01/2023	12/01/2024
12/27/2022	Christina Kimball	.61	500	1564-FF Spike	22.6868 dpm/mL	12/01/2023	12/01/2024
12/10/2014	Tim Chandler	2.6312	1000	1564-G	48.929 dpm/mL	12/10/2014	12/10/2015
01/19/2023	Matelon DeFreese	2.689	1000	1564-GG	50.0039 dpm/mL	01/20/2023	01/20/2024
07/20/2015	Christina Kimball	.266	250	1564-H	19.78584 dpm/mL	07/25/2016	07/25/2017
05/19/2023	Matelon DeFreese	2.685	1000	1564-HH	49.9294975 dpm/mL	05/19/2023	05/19/2024
11/23/2015	Tim Chandler	2.6117	1000	1564-I	48.5664 dpm/mL	11/23/2015	11/23/2016
10/09/2023	Matelon DeFreese	2.6864	1000	1564-II	49.9555315 dpm/mL	10/10/2023	10/10/2024
01/05/2016	Christina Kimball	.119	500	1564-J	4.4258 dpm/mL	12/27/2017	12/27/2018
01/05/2016	Christina Kimball	.119	500	1564-J Spike	4.4258 dpm/mL	12/27/2017	12/27/2018
09/20/2016	Tim Chandler	2.6389	1000	1564-K	49.0722 dpm/mL	09/18/2017	09/18/2018
12/20/2016	Christina Kimball	.276	250	1564-L	20.52974 dpm/mL	12/21/2017	12/21/2018
06/20/2017	Tim Chandler	2.6611	1000	1564-M	49.4851 dpm/mL	06/19/2018	06/19/2019
01/18/2018	Tim Chandler	2.6367	1000	1564-N	49.0313 dpm/mL	04/25/2018	04/25/2019
04/25/2018	Tim Chandler	2.6505	1000	1564-O	49.2879 dpm/mL	04/25/2018	04/25/2019
08/06/2018	Christina Kimball	.106	500	1564-P	3.9423 dpm/mL	12/19/2019	12/19/2020
08/06/2018	Christina Kimball	.106	500	1564-P Spike	3.9423 dpm/mL	12/19/2019	12/19/2020
12/13/2018	Tim Chandler	2.6502	1000	1564-Q	49.2824 dpm/mL	12/13/2018	12/13/2019
01/08/2019	Christina Kimball	.29	250	1564-R	21.571 dpm/mL	01/08/2019	01/08/2020
01/08/2019	Christina Kimball	.29	250	1564-R Spike	21.571 dpm/mL	01/08/2019	01/08/2020

10/01/2019	Tim Chandler	2.6957	1000	1564-S	50.1285 dpm/mL	10/01/2019	10/01/2020
12/18/2019	Christina Kimball	.307	250	1564-T	22.83554 dpm/mL	12/19/2019	12/19/2020
12/18/2019	Christina Kimball	.307	250	1564-T Spike	22.83554 dpm/mL	12/19/2019	12/19/2020
03/31/2020	Tim Chandler	2.6645	1000	1564-U	49.5483 dpm/mL	03/31/2020	03/31/2021
08/14/2020	Christina Kimball	.111	500	1564-V	4.1282 dpm/mL	08/14/2020	08/14/2021
08/14/2020	Christina Kimball	.111	500	1564-V Spike	4.1282 dpm/mL	08/14/2020	08/14/2021
10/13/2020	Tim Chandler	2.6983	1000	1564-W	50.1768 dpm/mL	10/13/2020	10/13/2021
11/04/2020	Christina Kimball	.315	250	1564-X	23.4306 dpm/mL	11/04/2020	11/04/2021
11/04/2020	Christina Kimball	.315	250	1564-X Spike	23.4306 dpm/mL	11/04/2020	11/04/2021
03/19/2021	Matelon DeFreese	2.7599	1000	1564-Y	51.32232 dpm/mL	03/19/2021	03/19/2022
03/19/2021	Matelon DeFreese	2.7599	1000	1564-Z	51.32232 dpm/mL	03/20/2021	03/20/2022

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for U-232 Standard 1564-II

v1.2

Analyst	MXS2
Verification Prep Date	10/10/2023

Tracer Information	
Isotope	U-238
Serial Number	1600-P
Amount of Std. (mL)	0.2
Expiration Date	5/8/2024

Standard Information	
Isotope	U-232
Serial Number	1564-II
Isotope Half-life	68.9000 Y
Reference Date	9/12/2011
Ref. Act. (dpm/mL)	49.9555315
Amount of Std. (mL)	0.2
Standard Prep Date	10/9/2023

Std #	Count Date	Activity pCi	Standard dpm/mL
1	10/10/2023	3.760	41.74
2	10/10/2023	3.970	44.07
3	10/10/2023	3.790	42.07

Mean Value = 3.840 42.624
 Stdev = 0.113578167 1.260717653

Certificate Value* = 3.9856 pCi
 Two sigma = 0.2272 dpm/mL
 10 % of Mean = 0.3840 2.5214
 Rule A (Pass/Fail) 4.2624
 % Recovery Pass
 Rule B (Pass/Fail) 96.35%
 Expiration Date Pass
 10/10/2024

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 Verification Prep Date.

The analyst prepared three standard verification sources for U-232 standard 1564-II using 0.2 mL for each source. Each standard was combined with 0.2 mL of U-238 standard 1600-P and was diluted in a centrifuge tube containing 15 mL of 0.1M HCL diluted to 40 mL with DI water. 0.1 mL of neodymium carrier, 0.5 mL of titanium (III) chloride, and 5 mL of 48% HF was added to precipitate neodymium (and Uranium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for U-232 were calculated by comparison to U-238 certified values.

4.617

15 Apr 3/24/12
1600

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOLUTION

Radionuclide:	U-238 (Nat)	Customer:	GENERAL ENGINEERING LABS.	
Half-life:	(4.468 ± 0.005)E+09 years	P.O. No.:	936823 RD	
Catalog No.:	7338	Reference Date:	15-Apr-12 12:00 PST	
Source No.:	1577-71-2	Contained Radioactivity:	1.023 µCi 37.85 kBq	
		(Total Uranium)		

Physical Description:

A. Mass of solution:	7.05210 g in 10 mL flame-sealed ampoule
B. Chemical form:	UO ₂ (NO ₃) ₂ in dilute HNO ₃
C. Carrier content:	None
D. Density:	Approximately 1.41 g/mL @ 20°C

Radioimpurities:

See Technical Data Sheet

Radionuclide Concentration: 0.1451 µCi/g, 5.369 kBq/g

Method of Calibration:

Activity calculations are based upon known specific activity and mass.

Uncertainty of Measurement:

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

Notes:

- See reverse side for leak test(s) performed on this source.
- EZIP participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (as in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This solution has a working life of 5 years.


Quality Control

21-Mar-12
Date

EZIP Ref. No.: 1577-71

RC-S-065-030a

ISO 9001 CERTIFIED

Medical Imaging Laboratory

24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory

1800 North Keystone Street Burbank, California 91504

U-238 Natural Technical Data

The U-238 Natural used to prepare your order was taken from Eckert & Ziegler Isotope Products Lot #4550102. It had the following composition as of 9 Feb 10:

<u>Nuclide</u>	<u>Atom %</u>	<u>Activity %</u>
U-234	0.0055	49.086
U-235	0.7200	2.241
U-238	99.274	48.673

Isotopic composition provided by New Brunswick Laboratory.

If you have any question, please contact Eckert & Ziegler Isotope Products Technical Service: (661) 309-1010

Standard Logbook

Serial ID: 1600 **Open/Reference Date:** 15-APR-12 **Aliquot :** 7.0521 g
Name: Uranium-238 **Received:** 24-MAR-12 **Density :** Hand Calculated g/mL
Type: Source Material **Expires:** 26-MAR-15 **Logbook Num :** RC-S-065-030
Employee: Ashley Drochter **Lot Number :** 4550102
Supplier: Eckert & Ziegler **Solvent :** UO₂(NO₃)₂ in dilute HNO₃
 Uncertainty : 1.17 percent
Description: Ampoule
Comments: None

Analyte	Concentration	Analyte	Concentration
Uranium-238	18.42 kbq		



Standard Traceability Log Rad

Source Material Info	
Parent Code:	1600
Prepared By:	Ashley Drochter
Carrier Conc:	UO ₂ (NO ₃) ₂ in dilute HNO ₃
Reference Date:	04/15/2012
Ampoule Mass (g):	7.0521 g
Uncertainty:	+/- 1.17 %
LogBook No:	RC-S-065-030
Supplier:	Eckert & Ziegler

A Solution Material Info			
Isotope:	Uranium-238		
Prepared By:	Ashley Drochter		
Prep Date:	09/04/2012		
Verification Date:	05/08/2023		
Expiration Date:	05/08/2024		
Primary Code:	1600-A		
Dilution(mL):	100 mL		
Mass of Parent(g):	6.8204 g		
Density(g/mL):	1.0789	Balance ID:	38080204

Calculations Converting parent activity to dpm/mL|dpm/g

$(\text{Mass of parent(g)}) * (\text{Parm Activity (kbq)}) * (\text{conversion dpm to kbq}) / (\text{Ampoule Mass(g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/mL)}$
$(\text{Mass of parent(g)}) * (\text{Parm Activity (kbq)}) * (\text{conversion dpm to kbq}) / \text{Density} / (\text{Ampoule Mass (g)} * (\text{Dilution Vol})) = \text{Parent Activity (dpm/g)}$
$(6.8204 \text{ g}) * (18.42 \text{ kbq}) * (60000 \text{ dpm/kbq}) / (7.0521 \text{ g} * 100 \text{ mL}) = 10688.8814 \text{ dpm/mL}$
$(6.8204 \text{ g}) * (18.42 \text{ kbq}) * (60000 \text{ dpm/kbq}) / (1.0789 \text{ g/mL}) / (7.0521 \text{ g} * 100 \text{ mL}) = 9907.0626 \text{ dpm/g}$

Secondary Standards

Prep Date	Preparer	Mass Primary	Dilution (mL)	Code	Conc dpm/mL	Verification Date	Expiration Date
09/04/2012	Ashley Drochter	1.4579	500	1600-B	28.8913 dpm/mL	09/04/2012	09/04/2013
09/11/2012	Ashley Drochter	3.0288	500	1600-C	60.0219 dpm/mL	09/04/2013	09/04/2014
03/27/2014	Tim Chandler	3.0445	500	1600-D	60.3241 dpm/mL	03/18/2015	03/18/2016
07/24/2015	Tim Chandler	3.0177	500	1600-E	59.7931 dpm/mL	07/10/2017	07/10/2018
02/16/2017	Tim Chandler	3.0261	500	1600-F	59.9595 dpm/mL	02/06/2018	02/06/2019
10/10/2017	Christina Kimball	.539	250	1600-G	21.3596 dpm/mL	12/28/2022	12/28/2023

04/02/2018	Tim Chandler	3.0544	500	1600-H	60.5203 dpm/mL	03/29/2019	03/29/2020
06/21/2019	Tim Chandler	3.0536	500	1600-I	60.5044 dpm/mL	06/21/2019	06/21/2020
01/30/2020	Tim Chandler	3.0563	500	1600-J	60.5579 dpm/mL	01/26/2021	01/26/2022
03/13/2020	Christina Kimball	.01222	500	1600-K	.24207 dpm/mL	03/15/2022	03/15/2023
04/23/2021	Tim Chandler	3.0507	500	1600-L	60.4469 dpm/mL	04/26/2021	04/26/2022
01/21/2022	Matelon DeFreese	3.1075	500	1600-M	61.5723941 dpm/mL	01/21/2022	01/21/2023
05/19/2022	Christina Kimball	.01275	500	1600-N	.2527 dpm/mL	05/17/2023	05/17/2024
09/06/2022	Matelon DeFreese	3.1499	500	1600-O	62.412513 dpm/mL	09/06/2022	09/06/2023
05/08/2023	Matelon DeFreese	6.0105	1000	1600-P	59.5463998 dpm/mL	05/08/2023	05/08/2024

GEL Laboratories LLC
Version 1.0 9/18/2000

Verification for U-238 Standard 1600-P

v1.2

Analyst	MXS2
Verification Prep Date	5/8/2023

Tracer Information	
Isotope	U-232
Serial Number	1564-GG
Amount of Std. (mL)	0.2
Expiration Date	1/20/2024

Standard Information	
Isotope	U-238
Serial Number	1600-P
Isotope Half-life	4.4680E+09 Y
Reference Date	4/15/2012
Ref. Act. (dpm/mL)	59.5463998
Amount of Std. (mL)	0.2
Standard Prep Date	5/8/2023

Std #	Count Date	Activity pCi	Standard dpm/mL
1	5/10/2023	5.730	63.60
2	5/9/2023	5.280	58.61
3	5/10/2023	5.350	59.39

Mean Value = 5.453 60.532
 Stdev = 0.242143208 2.687789612

Certificate Value* = 5.3645 pCi
 Two sigma = 0.4843
 10 % of Mean = 0.5453
 Rule A (Pass/Fail) Pass
 % Recovery 101.66%
 Rule B (Pass/Fail) Pass
 Expiration Date 5/8/2024

dpm/mL
 59.5464
 5.3756
 6.0532
 Pass
 101.66%
 Pass

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 Verification Prep Date.

The analyst prepared three standard verification sources for U-238 standard 1600-P using 0.2 mL for each source. Each standard was combined with 0.2 mL of U-232 standard 1564-GG and was diluted in a centrifuge tube containing 15 mL 0.1M HCl and 25 mL of DI water 0.1 mL of neodymium carrier, 0.5 mL of titanium (III) chloride, and 5 mL of 48% HF was added to precipitate neodymium (and Uranium) fluoride. After 30 minutes, each sample was filtered following routine procedures for alpha spectroscopy source preparation. Each source was counted using routine alpha spec procedures. DPM values for U-238 were calculated by comparison to U-232 certified values.

5/11/24

Runlogs

Instrument Run Log

Instrument Type: ALPHA SPECTROMETER

Batch ID: 2534022

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
645402001	SAMPLE	CM4	1158	DEC-08-23 08:41:46	DONE		14-NOV-23 10:47
645402002	SAMPLE	CM4	1159	DEC-08-23 08:41:49	DONE		14-NOV-23 10:24
645863002	SAMPLE	CM4	1160	DEC-08-23 08:41:52	DONE		14-NOV-23 10:24
645981002	SAMPLE	CM4	1117	DEC-08-23 09:48:15	DONE		13-NOV-23 12:13
646261002	SAMPLE	CM4	1121	DEC-08-23 09:48:17	DONE		13-NOV-23 12:13
646494004	SAMPLE	CM4	1125	DEC-08-23 09:48:20	DONE		13-NOV-23 12:14
646494005	SAMPLE	CM4	1126	DEC-08-23 09:48:22	DONE		13-NOV-23 12:14
646494014	SAMPLE	CM4	1129	DEC-08-23 09:48:27	DONE		13-NOV-23 12:15
646494030	SAMPLE	CM4	1130	DEC-08-23 09:48:29	DONE		13-NOV-23 12:15
1205590008	MB	CM4	1131	DEC-08-23 09:48:32	DONE		13-NOV-23 12:15
1205590009	DUP	CM4	1133	DEC-08-23 09:48:33	DONE		13-NOV-23 12:20
1205590010	LCS	CM4	1014	DEC-09-23 10:56:07	DONE		01-DEC-23 12:42

Instrument Run Log

Instrument Type: ALPHA SPECTROMETER

Batch ID: 2534026

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
645402001	SAMPLE	CM4	1025	DEC-07-23 15:32:11	DONE		02-DEC-23 12:40
645402002	SAMPLE	CM4	1026	DEC-07-23 15:32:11	DONE		02-DEC-23 12:40
646261002	SAMPLE	CM4	1029	DEC-07-23 15:32:11	DONE		02-DEC-23 12:41
646494004	SAMPLE	CM4	1030	DEC-07-23 15:32:11	DONE		02-DEC-23 12:41
646494005	SAMPLE	CM4	1031	DEC-07-23 15:32:12	DONE		02-DEC-23 12:41
646494030	SAMPLE	CM4	1033	DEC-07-23 15:32:12	DONE		02-DEC-23 12:41
1205590029	MB	CM4	1034	DEC-07-23 15:32:12	DONE		02-DEC-23 12:42
1205590030	DUP	CM4	1035	DEC-07-23 15:32:12	DONE		02-DEC-23 12:42
1205590031	LCS	CM4	1036	DEC-07-23 15:32:12	DONE		06-DEC-23 11:20
645863002	SAMPLE	CM4	1037	DEC-09-23 15:23:01	DONE		02-DEC-23 12:46
645981002	SAMPLE	CM4	1038	DEC-09-23 15:23:01	DONE		02-DEC-23 12:47
646494014	SAMPLE	CM4	1039	DEC-09-23 15:23:01	DONE		02-DEC-23 12:47

Gamma Spectroscopy Raw Data

Batch 2529194 Check-list

This check-list was completed on 13-DEC-23 by Tim Winters

This batch was reviewed by Spencer Collins on 13-DEC-23 and Tim Winters on 13-DEC-23.

Batch ID: 2529194

Product: GSCGAMMS

Description: Gamma Spec Solid RAD A-013

#	Criteria	Yes	No	Comments
Preparation Information				
1	Did any sample(s) require dilution?		No	
2	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
3	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
4	Are instrument source checks within limits?	Yes		
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were any additional radionuclides added that were not requested by the client?		No	
7	Were all the samples prepared/analyzed within the required holding time period?	Yes		
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Gamma Spectroscopy

Batch ID: 2529194
Analyst: Rebekah Futch (RXF2)
Method: DOE HASL 300, 4.5.2.3/Ga-01-R
Lab SOP: GL-RAD-A-013 REV# 28
Instrument: No instrument-manual method

Due Dates for Lab: 17-DEC-2023			Hold: 25-NOV-2023	Package: 18-DEC-2023	SDG: 19-DE
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205581251	84680-278	1556	1	mL

#	Sample ID	Prep Date	Min RDL (pCi/g)	Dry or Wet	Unadjusted Aliquot (g)	Aliquot (g)	Adjusted Aliquot (g)
1	645981001	21-NOV-2023	.1	Dry to Dry	133.16	133.16	133.16
2	645981002	21-NOV-2023	.1	Dry to Dry	136.39	136.39	136.39
3	645981003	21-NOV-2023	.1	Dry to Dry	137.89	137.89	137.89
4	645981004	21-NOV-2023	.1	Dry to Dry	136.59	136.59	136.59
5	1205581249 MB	21-NOV-2023	.1	Dry to Wet	137.89	137.89	137.89
6	1205581250 DUP (645981001)	21-NOV-2023	.1	Dry to Dry	133.16	133.16	133.16
7	1205581251 LCS	21-NOV-2023	.1	Dry to Wet	115	115	115

Reagent/Solvent Lot ID	Description	Amount	Comments:

VAX/VMS Nuclide Identification Report Generated 12-DEC-2023 21:29:12.17

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981001.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM21.CNF;808
Background date  : 11-DEC-2023 05:17:22
Sample date      : 13-NOV-2023 12:00:00 Acquisition date : 12-DEC-2023 19:28:47
Sample ID        : G645981001 Sample quantity : 1.33160E+02 GRAM
Detector name     : GAM21 Detector geometry: CAN
Elapsed live time : 0 02:00:00.00 Elapsed real time: 0 02:00:01.03 0.0%
Energy tolerance  : 1.50000 keV Analyst Initials : RXF2
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 2529194 Detector SN# :
Matrix Spike ID   : LCS ID :
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	39.96	36	166	1.19	79.35	77	6	4.97E-03	59.4	
2	0	46.39	151	180	0.94	92.21	89	6	2.10E-02	16.2	
3	1	52.35	28	75	0.68	104.12	103	8	3.94E-03	40.2	9.23E+00
4	1	54.22	30	139	0.69	107.87	103	8	4.14E-03	62.1	
5	0	57.29	57	396	0.96	114.01	111	9	7.98E-03	63.5	
6	0	62.94	186	599	0.94	125.31	121	10	2.59E-02	25.6	
7	4	72.87	26	249	1.00	145.16	143	14	3.65E-03	86.3	2.53E+00
8	4	74.81	724	306	0.89	149.05	143	14	1.01E-01	5.1	
9	4	77.05*	1146	294	0.79	153.54	143	14	1.59E-01	3.7	
10	5	83.88	167	330	1.15	167.18	164	18	2.32E-02	19.7	1.26E+00
11	5	87.11	393	331	1.16	173.66	164	18	5.46E-02	9.2	
12	5	89.75	237	285	0.96	178.93	164	18	3.29E-02	12.9	
13	8	92.70*	441	213	1.17	184.83	182	10	6.12E-02	6.9	3.24E+00
14	8	94.11	89	295	1.59	187.65	182	10	1.23E-02	42.8	
15	0	104.85	70	269	1.59	209.13	206	8	9.77E-03	42.0	
16	2	127.96	44	61	0.98	255.34	254	12	6.05E-03	24.0	2.89E+00
17	2	129.28	67	187	1.00	257.98	254	12	9.27E-03	36.1	
18	0	143.74	21	256	1.07	286.92	284	7	2.85E-03	130.9	
19	0	170.72	41	236	2.12	340.87	337	8	5.76E-03	66.0	
20	0	186.09*	301	412	1.17	371.61	367	12	4.18E-02	14.8	
21	0	208.99	91	223	1.13	417.42	414	9	1.27E-02	31.4	
22	8	238.55*	933	105	0.89	476.55	471	19	1.30E-01	3.7	2.64E+00
23	8	241.66*	422	189	1.76	482.77	471	19	5.86E-02	9.8	
24	0	270.01	123	165	2.24	539.47	533	12	1.71E-02	22.7	
25	0	277.34	35	151	0.72	554.13	550	9	4.86E-03	65.4	
26	2	295.10	577	79	1.03	589.65	583	21	8.01E-02	4.8	1.67E+00
27	2	299.91	74	111	1.35	599.28	583	21	1.03E-02	26.2	
28	4	325.95	15	29	0.94	651.36	650	14	2.15E-03	61.3	5.04E-01
29	4	327.72	59	78	1.54	654.90	650	14	8.15E-03	31.4	
30	0	338.14	147	107	1.10	675.73	672	9	2.04E-02	15.1	
31	0	351.73*	915	149	1.19	702.93	697	13	1.27E-01	4.3	
32	0	389.75	49	85	1.75	778.98	773	11	6.79E-03	39.3	
33	0	458.13	25	27	1.15	915.75	913	8	3.47E-03	40.9	
34	0	462.82*	70	55	0.96	925.14	920	11	9.78E-03	24.0	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	511.12*	45	93	2.01	1021.75	1015	15	6.30E-03	55.9	
36	0	562.87	24	48	1.89	1125.29	1119	10	3.40E-03	56.4	
37	0	583.00	225	44	1.46	1165.55	1161	12	3.12E-02	8.9	
38	0	609.05*	581	78	1.41	1217.67	1212	14	8.07E-02	5.4	
39	0	666.48	70	32	2.28	1332.56	1325	18	9.70E-03	22.3	
40	0	726.79	71	43	1.12	1453.22	1448	12	9.84E-03	21.9	
41	0	735.66	14	10	0.92	1470.95	1468	6	1.90E-03	46.0	
42	0	767.97	69	36	2.19	1535.60	1529	13	9.64E-03	21.4	
43	0	785.75	38	41	1.33	1571.18	1564	14	5.22E-03	40.0	
44	0	794.59	39	36	0.71	1588.85	1582	16	5.36E-03	38.3	
45	0	806.14	25	27	0.71	1611.98	1607	10	3.42E-03	46.9	
46	0	819.05	16	21	0.82	1637.80	1629	12	2.22E-03	62.5	
47	0	876.85	12	15	1.72	1753.45	1749	7	1.68E-03	60.9	
48	0	910.71	140	34	1.33	1821.20	1814	15	1.95E-02	12.3	
49	0	932.52	37	21	4.83	1864.83	1858	12	5.14E-03	29.7	
50	3	961.19	15	4	1.95	1922.19	1920	13	2.03E-03	28.1	1.11E+00
51	3	964.54	36	13	1.63	1928.90	1920	13	5.05E-03	23.5	
52	0	968.64	100	16	1.55	1937.11	1933	12	1.39E-02	13.1	
53	0	975.16	5	14	1.28	1950.16	1944	9	6.98E-04	146.8	
54	0	999.31	19	15	3.56	1998.47	1993	10	2.61E-03	44.9	
55	0	1015.60	40	34	7.40	2031.07	2021	26	5.49E-03	42.7	
56	0	1119.65	112	27	2.02	2239.29	2233	17	1.55E-02	14.1	
57	0	1237.88	30	21	1.96	2475.87	2470	11	4.12E-03	35.6	
58	0	1264.24	22	8	2.05	2528.63	2521	15	2.99E-03	35.2	
59	1	1276.92	24	3	2.02	2554.00	2550	15	3.30E-03	20.6	2.80E+00
60	1	1279.42	29	2	2.02	2559.00	2550	15	4.05E-03	23.0	
61	0	1313.51	11	6	3.48	2627.23	2620	12	1.53E-03	53.8	
62	0	1369.65	9	20	3.80	2739.58	2727	16	1.23E-03	118.0	
63	0	1377.34	36	24	1.41	2754.97	2747	16	5.00E-03	34.7	
64	0	1401.96	15	9	2.60	2804.24	2798	11	2.06E-03	49.7	
65	0	1407.74	35	5	2.27	2815.81	2809	17	4.87E-03	21.7	
66	0	1459.76*	118	23	2.14	2919.92	2912	16	1.63E-02	13.3	
67	0	1508.45	19	6	2.33	3017.38	3012	11	2.69E-03	32.7	
68	0	1558.81	9	3	0.53	3118.16	3114	8	1.20E-03	51.6	
69	0	1728.61	33	7	2.18	3458.05	3450	14	4.58E-03	24.3	
70	0	1763.55*	88	0	3.29	3527.97	3520	15	1.22E-02	11.3	
71	0	1846.44	18	4	2.82	3693.90	3686	14	2.56E-03	31.8	

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

VMS Nuclide Identification Report V3.1 Generated 12-DEC-2023 21:29:13

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981001.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 13-NOV-2023 12:00:00	Acquisition date	: 12-DEC-2023 19:28:47
Sample ID	: G645981001	Sample quantity	: 133.16 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA21	Detector geometry	: CAN
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:01.03 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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	112	10.66*	9.283E-01	3.200E+00	3.200E+00	26.62
AS-73	53.44	36	10.30*	1.184E+01	8.282E-02	1.067E-01	124.14
CD-109	88.03	458	3.70*	1.124E+01	3.104E+00	3.244E+00	18.34
I-126	388.63	51	35.60	3.637E+00	1.120E-01	5.404E-01	78.57
	666.33	71	32.90*	2.081E+00	2.913E-01	1.405E+00	44.69
	753.82	-----	4.15	1.828E+00	-----	Line Not Found	-----
SN-126	64.28	221	9.60	1.192E+01	5.454E-01	5.454E-01	51.27
	86.94	458	8.90	1.124E+01	1.291E+00	1.291E+00	18.34
	87.57	458	37.00*	1.124E+01	3.104E-01	3.104E-01	18.34
EU-155	86.55	458	30.70	1.124E+01	3.741E-01	3.786E-01	18.34
	105.31	81	21.10*	1.044E+01	1.036E-01	1.049E-01	83.93
TM-171	51.35	34	0.27	1.178E+01	3.026E+00	3.115E+00	80.38
	52.39	34	0.47*	1.178E+01	1.739E+00	1.790E+00	80.38
	66.73	-----	0.14	1.188E+01	-----	Line Not Found	-----
TL-208	277.37	38	6.60	5.078E+00	3.177E-01	3.177E-01	130.87
	583.19	230	85.00*	2.396E+00	3.182E-01	3.182E-01	17.89
	860.56	-----	12.50	1.591E+00	-----	Line Not Found	-----
BI-210	46.54	184	4.25*	1.144E+01	1.064E+00	1.066E+00	32.39
PB-210	46.54	184	4.25*	1.144E+01	1.064E+00	1.066E+00	32.39
BI-211	72.87	31	1.23	1.175E+01	6.044E-01	6.044E-01	172.64
	351.06	970	12.92*	4.032E+00	5.250E+00	5.250E+00	8.67
BI-212	727.33	71	6.67*	1.900E+00	1.586E+00	1.586E+00	43.73
	1620.50	-----	1.47	8.380E-01	-----	Line Not Found	-----
PB-212	74.82	851	10.28	1.169E+01	1.997E+00	1.997E+00	10.27
	77.11	1345	17.10	1.162E+01	1.908E+00	1.908E+00	7.48
	238.63	1017	43.60*	5.831E+00	1.128E+00	1.128E+00	7.39
	300.09	80	3.30	4.713E+00	1.447E+00	1.447E+00	52.37
BI-214	609.32	592	45.49*	2.288E+00	1.604E+00	1.604E+00	10.82
	1120.29	109	14.92	1.212E+00	1.696E+00	1.696E+00	28.17
	1764.49	82	15.30	7.724E-01	1.965E+00	1.965E+00	22.62
PB-214	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.365E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
RN-222	609.32	592	45.49*	2.288E+00	1.604E+00	1.604E+00	10.82
	1120.29	109	14.92	1.212E+00	1.696E+00	1.696E+00	28.17
	1764.49	82	15.30	7.724E-01	1.965E+00	1.965E+00	22.62
RA-224	240.99	459	4.10*	5.764E+00	5.477E+00	5.477E+00	19.54
RA-226	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.365E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
AC-228	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93
	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
RA-228	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93
	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----
TH-228	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
	74.82	851	10.28	1.169E+01	1.997E+00	1.997E+00	10.27
	77.11	1345	17.10	1.162E+01	1.908E+00	1.908E+00	7.48
	238.63	1017	43.60*	5.831E+00	1.128E+00	1.128E+00	7.39
TH-230	300.09	80	3.30	4.713E+00	1.447E+00	1.447E+00	52.37
	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.364E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
PA-231	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
	283.69	-----	1.70	4.970E+00	-----	Line Not Found	-----
	301.36	80	5.35*	4.713E+00	8.926E-01	8.926E-01	52.37
	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93
TH-232	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----
	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
	63.29	221	3.70*	1.192E+01	1.415E+00	1.415E+00	51.27
U-234	92.59	511	4.23	1.099E+01	3.101E+00	3.101E+00	13.73
	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.364E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
U-235	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
	89.96	275	3.47	1.112E+01	2.010E+00	2.010E+00	25.73
	93.35	511	5.60	1.099E+01	2.342E+00	2.342E+00	13.73
	143.76	23	10.96*	8.709E+00	6.844E-02	6.844E-02	261.89
U-238	163.33	-----	5.08	7.960E+00	-----	Line Not Found	-----
	185.72	334	57.20	7.200E+00	2.286E-01	2.286E-01	29.62
	205.31	-----	5.01	6.643E+00	-----	Line Not Found	-----
	63.29	221	3.70*	1.192E+01	1.415E+00	1.415E+00	51.27
	92.59	511	4.23	1.099E+01	3.101E+00	3.101E+00	13.73
AM-243	43.53	-----	5.90	1.119E+01	-----	Line Not Found	-----
ANH-511	74.66	851	67.20*	1.169E+01	3.054E-01	3.054E-01	10.27
	511.00	47	100.00*	2.750E+00	4.805E-02	4.805E-02	111.77

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]G645981001.CNF;1  *
* Acquisition date   : 12-DEC-2023 19:28:47 Sensitivity      : 3.000          *
* Detector ID        : GAM21 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:01.03 Half life ratio  : *****          *
* Sample date        : 13-NOV-2023 12:00:00 Analyst initials: RXF2          *
* Sample ID          : G645981001 Sample Quantity : 1.3316E+02 GRAM          *
* Batch Number       : 2529194 Wet Weight : 0.00000          *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : SOLID.NLB;17
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 3-JUL-2023 09:20:00 Eff. Geometry   : CAN          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25          *
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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/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	3.200E+00	8.351E-01	5.729E-01
AS-73	1.067E-01	1.298E-01	1.565E-01
CD-109	3.244E+00	5.832E-01	4.242E-01
I-126	1.405E+00	6.155E-01	5.191E-01
SN-126	3.104E-01	5.580E-02	4.049E-02
EU-155	1.049E-01	8.625E-02	6.981E-02
TM-171	1.790E+00	1.410E+00	2.742E+00
TL-208	3.182E-01	5.578E-02	4.460E-02
BI-210	1.066E+00	3.384E-01	2.814E-01
PB-210	1.066E+00	3.384E-01	2.814E-01
BI-211	5.250E+00	4.461E-01	2.176E-01
BI-212	1.586E+00	6.798E-01	5.796E-01
PB-212	1.128E+00	8.173E-02	5.373E-02
BI-214	1.604E+00	1.701E-01	8.273E-02
PB-214	1.906E+00	1.619E-01	7.919E-02
RN-222	1.604E+00	1.701E-01	8.273E-02
RA-224	5.477E+00	1.049E+00	5.773E-01
RA-226	1.906E+00	1.619E-01	7.919E-02
AC-228	1.013E+00	2.449E-01	1.852E-01
RA-228	1.013E+00	2.449E-01	1.852E-01
TH-228	1.128E+00	8.173E-02	5.373E-02
TH-230	1.906E+00	1.619E-01	7.919E-02
PA-231	8.926E-01	4.581E-01	5.003E-01
TH-232	1.013E+00	2.449E-01	1.852E-01
TH-234	1.415E+00	7.111E-01	4.301E-01
U-234	1.906E+00	1.619E-01	7.919E-02
U-235	6.844E-02	1.756E-01	1.683E-01
U-238	1.415E+00	7.111E-01	4.301E-01
AM-243	3.054E-01	3.073E-02	2.456E-02
ANH-511	4.805E-02	5.264E-02	3.476E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)

BE-7	-3.047E-02	2.570E-01	4.853E-01	NOT IDENT.
NA-22	2.511E-03	2.724E-02	4.863E-02	NOT IDENT.
NA-24	0.000E+00	7.685E+12	0.000E+00	SHORT HLIF
AL-26	-2.379E-02	2.901E-02	4.883E-02	NOT IDENT.
SC-46	-1.462E-02	2.651E-02	4.476E-02	FAIL ABUN
V-48	-2.566E-02	8.139E-02	1.540E-01	FAIL ABUN
CR-51	1.254E-01	2.960E-01	5.513E-01	NOT IDENT.
MN-52	-4.477E-01	1.198E+00	2.143E+00	NOT IDENT.
MN-54	-4.308E-03	2.934E-02	5.240E-02	NOT IDENT.
CO-56	-1.359E-02	3.482E-02	6.023E-02	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	2.908E-03	1.087E-02	2.138E-02	NOT IDENT.
CO-58	1.711E-02	3.151E-02	5.787E-02	NOT IDENT.
FE-59	4.473E-02	8.111E-02	1.668E-01	NOT IDENT.
CO-60	1.062E-02	2.842E-02	5.847E-02	NOT IDENT.
ZN-65	5.709E-03	5.836E-02	1.034E-01	NOT IDENT.
GE-68	-1.837E-02	8.821E-01	1.713E+00	NOT IDENT.
AS-74	3.385E-02	9.675E-02	1.910E-01	NOT IDENT.
SE-75	6.949E-03	2.715E-02	4.690E-02	NOT IDENT.
BR-77	0.000E+00	8.057E+02	0.000E+00	SHORT HLIF
SR-82	4.465E-02	3.537E-01	6.630E-01	NOT IDENT.
RB-83	-3.838E-02	4.584E-02	8.011E-02	NOT IDENT.
RB-84	-1.923E-02	6.298E-02	1.109E-01	NOT IDENT.
KR-85	3.438E+00	4.516E+00	8.469E+00	NOT IDENT.
SR-85	2.107E-02	2.779E-02	5.210E-02	NOT IDENT.
RB-86	1.257E-01	8.856E-01	1.764E+00	NOT IDENT.
Y-88	5.830E-03	2.938E-02	6.508E-02	NOT IDENT.
Y-91	-2.259E+01	1.775E+01	2.757E+01	NOT IDENT.
NB-94	-1.870E-04	2.661E-02	4.873E-02	NOT IDENT.
NB-95	2.079E-02	4.212E-02	7.318E-02	NOT IDENT.
NB-95M	3.220E-02	8.040E-02	1.402E-01	NOT IDENT.
ZR-95	-9.167E-04	5.607E-02	1.041E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	1.373E+12	0.000E+00	SHORT HLIF
MO-99	0.000E+00	3.117E+02	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	2.006E+33	0.000E+00	SHORT HLIF
RH-101	2.225E-02	1.047E-02	2.507E-02	FAIL ABUN
RH-102	7.304E-04	3.916E-02	7.334E-02	FAIL ABUN
RU-103	8.180E-03	2.940E-02	5.821E-02	FAIL ABUN
RH-106	5.305E-02	2.154E-01	4.157E-01	NOT IDENT.
RU-106	5.305E-02	2.154E-01	4.157E-01	NOT IDENT.
AG-108M	1.001E-02	1.780E-02	3.590E-02	NOT IDENT.
AG-110	1.529E-01	5.213E-01	1.004E+00	NOT IDENT.
AG-110M	-1.172E-02	3.168E-02	5.547E-02	NOT IDENT.
SN-113	1.404E-02	3.062E-02	5.274E-02	NOT IDENT.
CD-115	0.000E+00	5.586E+02	0.000E+00	SHORT HLIF
SN-117M	1.969E-03	5.407E-02	1.026E-01	NOT IDENT.
SB-122	0.000E+00	7.896E+01	0.000E+00	SHORT HLIF
TE-123M	1.103E-03	1.464E-02	2.785E-02	NOT IDENT.
SB-124	-1.445E-02	6.670E-02	1.353E-01	NOT IDENT.
SB-125	-1.047E-02	5.747E-02	1.091E-01	FAIL ABUN
TE-125M	4.239E-01	4.324E+00	8.513E+00	NOT IDENT.
SB-126	-2.000E-01	2.029E-01	3.281E-01	FAIL ABUN
SB-127	1.317E+00	1.081E+01	2.062E+01	NOT IDENT.
I-131	-9.039E-02	2.314E-01	3.940E-01	NOT IDENT.
I-132	0.000E+00	4.380E+40	0.000E+00	SHORT HLIF
TE-132	-8.364E-01	8.476E+00	1.544E+01	NOT IDENT.
BA-133	-2.398E-02	3.020E-02	4.451E-02	FAIL ABUN
I-133	0.000E+00	3.037E+08	0.000E+00	SHORT HLIF
CS-134	0.000E+00	5.680E-02	6.484E-02	FAIL ABUN
I-135	0.000E+00	1.207E+31	0.000E+00	SHORT HLIF
CS-136	-3.425E-02	1.654E-01	3.114E-01	FAIL ABUN
BA-137M	1.041E-02	2.294E-02	4.180E-02	NOT IDENT.
CS-137	1.100E-02	2.423E-02	4.416E-02	NOT IDENT.
LA-138	1.567E-02	4.095E-02	8.582E-02	NOT IDENT.
CE-139	7.933E-03	1.490E-02	2.901E-02	NOT IDENT.
BA-140	-1.094E-01	3.654E-01	6.749E-01	NOT IDENT.
LA-140	5.458E-02	1.398E-01	2.968E-01	FAIL ABUN
CE-141	-6.136E-03	4.027E-02	7.092E-02	NOT IDENT.
CE-143	0.000E+00	9.416E+04	0.000E+00	SHORT HLIF
CE-144	3.357E-02	8.818E-02	1.629E-01	NOT IDENT.
PM-144	-3.680E-03	2.314E-02	4.234E-02	NOT IDENT.
PR-144	6.620E-01	1.616E+00	3.189E+00	NOT IDENT.
PM-146	2.679E-02	2.489E-02	5.099E-02	FAIL ABUN
ND-147	4.687E-02	7.540E-01	1.467E+00	FAIL ABUN
PM-147	6.418E+01	3.014E+02	5.926E+02	NOT IDENT.
PM-149	0.000E+00	4.409E+03	0.000E+00	SHORT HLIF
EU-150	2.251E-03	1.748E-02	2.583E-02	FAIL ABUN

EU-152	-3.760E-02	6.080E-02	1.015E-01	FAIL ABUN
GD-153	1.386E-02	3.132E-02	5.407E-02	NOT IDENT.
EU-154	4.010E-03	7.603E-02	1.346E-01	NOT IDENT.
TB-160	-7.648E-02	1.120E-01	1.559E-01	FAIL ABUN
HO-166M	2.817E-03	4.190E-02	7.842E-02	NOT IDENT.
HF-172	1.839E-02	8.365E-02	1.534E-01	FAIL ABUN
LU-172	3.884E-02	4.594E-02	9.805E-02	FAIL ABUN
LU-176	-2.785E-04	1.569E-02	2.807E-02	FAIL ABUN
HF-181	-1.649E-02	3.354E-02	6.144E-02	FAIL ABUN
TA-182	7.584E-02	1.364E-01	2.804E-01	NOT IDENT.
RE-183	0.000E+00	7.894E-02	5.770E-02	FAIL ABUN
RE-184	8.200E-02	1.229E-01	2.443E-01	NOT IDENT.
W-188	-3.262E+00	5.222E+00	8.116E+00	FAIL ABUN
IR-192	1.058E-02	2.156E-02	4.055E-02	FAIL ABUN
HG-203	-9.469E-03	2.965E-02	4.784E-02	FAIL ABUN
TL-204	-2.082E-01	1.232E+00	2.075E+00	FAIL ABUN
BI-207	-7.905E-03	3.535E-02	6.676E-02	FAIL ABUN
PB-211	-1.221E-01	4.082E-01	7.731E-01	NOT IDENT.
BI-213	2.407E-02	6.212E-02	1.237E-01	NOT IDENT.
RN-219	3.682E-02	2.582E-01	4.589E-01	FAIL ABUN
RA-223	2.255E-01	3.559E-01	6.353E-01	FAIL ABUN
AC-225	-2.562E-01	8.153E-01	1.473E+00	NOT IDENT.
AC-227	-1.758E-04	1.288E-01	2.356E-01	FAIL ABUN
TH-227	-1.758E-04	1.288E-01	2.356E-01	FAIL ABUN
TH-229	-1.865E-02	2.749E-01	5.088E-01	FAIL ABUN
TH-231	2.255E-01	3.559E-01	6.353E-01	FAIL ABUN
PA-233	3.596E-02	3.517E-02	6.904E-02	FAIL ABUN
PA-234	8.230E-02	1.940E-01	4.026E-01	FAIL ABUN
PA-234M	1.363E+00	3.487E+00	6.396E+00	NOT IDENT.
NP-237	3.596E-02	3.517E-02	6.904E-02	FAIL ABUN
NP-238	0.000E+00	1.268E+03	0.000E+00	SHORT HLIF
NP-239	-3.390E-02	1.004E-01	1.928E-01	FAIL ABUN
PU-239	0.000E+00	2.572E+02	3.246E+02	FAIL ABUN
AM-241	-1.013E-02	2.342E-02	3.959E-02	NOT IDENT.
CM-243	0.000E+00	8.623E-02	6.785E-02	FAIL ABUN
BK-247	-4.937E-03	4.609E-02	7.671E-02	FAIL ABUN
CM-247	1.088E-02	2.145E-02	4.320E-02	FAIL ABUN
CF-249	9.874E-03	2.664E-02	4.827E-02	NOT IDENT.
CF-251	6.210E-02	6.575E-02	1.295E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	112	10.66*	9.283E-01	3.200E+00	3.200E+00	26.62
AS-73	53.44	36	10.30*	1.184E+01	8.282E-02	1.067E-01	124.14
CD-109	88.03	458	3.70*	1.124E+01	3.104E+00	3.244E+00	18.34
I-126	388.63	51	35.60	3.637E+00	1.120E-01	5.404E-01	78.57
	666.33	71	32.90*	2.081E+00	2.913E-01	1.405E+00	44.69
	753.82	-----	4.15	1.828E+00	-----	Line Not Found	-----
SN-126	64.28	221	9.60	1.192E+01	5.454E-01	5.454E-01	51.27
	86.94	458	8.90	1.124E+01	1.291E+00	1.291E+00	18.34
	87.57	458	37.00*	1.124E+01	3.104E-01	3.104E-01	18.34
EU-155	86.55	458	30.70	1.124E+01	3.741E-01	3.786E-01	18.34
	105.31	81	21.10*	1.044E+01	1.036E-01	1.049E-01	83.93
TM-171	51.35	34	0.27	1.178E+01	3.026E+00	3.115E+00	80.38
	52.39	34	0.47*	1.178E+01	1.739E+00	1.790E+00	80.38
	66.73	-----	0.14	1.188E+01	-----	Line Not Found	-----
TL-208	277.37	38	6.60	5.078E+00	3.177E-01	3.177E-01	130.87
	583.19	230	85.00*	2.396E+00	3.182E-01	3.182E-01	17.89
	860.56	-----	12.50	1.591E+00	-----	Line Not Found	-----
BI-210	46.54	184	4.25*	1.144E+01	1.064E+00	1.066E+00	32.39
PB-210	46.54	184	4.25*	1.144E+01	1.064E+00	1.066E+00	32.39
BI-211	72.87	31	1.23	1.175E+01	6.044E-01	6.044E-01	172.64
	351.06	970	12.92*	4.032E+00	5.250E+00	5.250E+00	8.67
BI-212	727.33	71	6.67*	1.900E+00	1.586E+00	1.586E+00	43.73
	1620.50	-----	1.47	8.380E-01	-----	Line Not Found	-----
PB-212	74.82	851	10.28	1.169E+01	1.997E+00	1.997E+00	10.27
	77.11	1345	17.10	1.162E+01	1.908E+00	1.908E+00	7.48
	238.63	1017	43.60*	5.831E+00	1.128E+00	1.128E+00	7.39
	300.09	80	3.30	4.713E+00	1.447E+00	1.447E+00	52.37
BI-214	609.32	592	45.49*	2.288E+00	1.604E+00	1.604E+00	10.82
	1120.29	109	14.92	1.212E+00	1.696E+00	1.696E+00	28.17
	1764.49	82	15.30	7.724E-01	1.965E+00	1.965E+00	22.62
PB-214	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.365E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
RN-222	609.32	592	45.49*	2.288E+00	1.604E+00	1.604E+00	10.82
	1120.29	109	14.92	1.212E+00	1.696E+00	1.696E+00	28.17
	1764.49	82	15.30	7.724E-01	1.965E+00	1.965E+00	22.62
RA-224	240.99	459	4.10*	5.764E+00	5.477E+00	5.477E+00	19.54
RA-226	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.365E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
AC-228	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----
	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
RA-228	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93
	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----
	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
TH-228	74.82	851	10.28	1.169E+01	1.997E+00	1.997E+00	10.27
	77.11	1345	17.10	1.162E+01	1.908E+00	1.908E+00	7.48
	238.63	1017	43.60*	5.831E+00	1.128E+00	1.128E+00	7.39
	300.09	80	3.30	4.713E+00	1.447E+00	1.447E+00	52.37
TH-230	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.364E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
PA-231	283.69	-----	1.70	4.970E+00	-----	Line Not Found	-----
	301.36	80	5.35*	4.713E+00	8.926E-01	8.926E-01	52.37
TH-232	105.21	81	1.10	1.044E+01	1.988E+00	1.988E+00	83.93
	338.32	156	11.27	4.193E+00	9.316E-01	9.316E-01	30.21
	835.71	-----	1.61	1.641E+00	-----	Line Not Found	-----
	911.20	139	25.80*	1.500E+00	1.013E+00	1.013E+00	24.68
	968.97	98	15.80	1.407E+00	1.247E+00	1.247E+00	26.13
TH-234	63.29	221	3.70*	1.192E+01	1.415E+00	1.415E+00	51.27
	92.59	511	4.23	1.099E+01	3.101E+00	3.101E+00	13.73
U-234	74.82	851	5.80	1.169E+01	3.539E+00	3.539E+00	10.27
	77.11	1345	9.70	1.162E+01	3.364E+00	3.364E+00	7.48
	87.09	458	3.41	1.124E+01	3.368E+00	3.368E+00	18.34
	242.00	459	7.25	5.764E+00	3.098E+00	3.098E+00	19.54
	295.22	620	18.42	4.787E+00	1.981E+00	1.981E+00	9.67
	351.93	970	35.60*	4.032E+00	1.906E+00	1.906E+00	8.67
U-235	89.96	275	3.47	1.112E+01	2.010E+00	2.010E+00	25.73
	93.35	511	5.60	1.099E+01	2.342E+00	2.342E+00	13.73
	143.76	23	10.96*	8.709E+00	6.844E-02	6.844E-02	261.89
	163.33	-----	5.08	7.960E+00	-----	Line Not Found	-----
	185.72	334	57.20	7.200E+00	2.286E-01	2.286E-01	29.62
	205.31	-----	5.01	6.643E+00	-----	Line Not Found	-----
U-238	63.29	221	3.70*	1.192E+01	1.415E+00	1.415E+00	51.27
	92.59	511	4.23	1.099E+01	3.101E+00	3.101E+00	13.73
AM-243	43.53	-----	5.90	1.119E+01	-----	Line Not Found	-----
	74.66	851	67.20*	1.169E+01	3.054E-01	3.054E-01	10.27
ANH-511	511.00	47	100.00*	2.750E+00	4.805E-02	4.805E-02	111.77

Flag: "*" = Keyline

Total number of lines in spectrum 71
Number of unidentified lines 20
Number of lines tentatively identified by NID 51 71.83%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	3.200E+00	3.200E+00	0.852E+00	26.62	
AS-73	80.30D	1.29	8.282E-02	1.067E-01	1.325E-01	124.14	
CD-109	461.40D	1.05	3.104E+00	3.244E+00	0.595E+00	18.34	
I-126	12.93D	4.82	2.913E-01	1.405E+00	0.628E+00	44.69	
SN-126	2.30E+05Y	1.00	3.104E-01	3.104E-01	0.569E-01	18.34	
EU-155	4.75Y	1.01	1.036E-01	1.049E-01	0.880E-01	83.93	
TM-171	1.92Y	1.03	1.739E+00	1.790E+00	1.439E+00	80.38	
TL-208	1.41E+10Y	1.00	3.182E-01	3.182E-01	0.569E-01	17.89	
BI-210	22.20Y	1.00	1.064E+00	1.066E+00	0.345E+00	32.39	
PB-210	22.20Y	1.00	1.064E+00	1.066E+00	0.345E+00	32.39	
BI-211	7.04E+08Y	1.00	5.250E+00	5.250E+00	0.455E+00	8.67	
BI-212	1.41E+10Y	1.00	1.586E+00	1.586E+00	0.694E+00	43.73	
PB-212	1.41E+10Y	1.00	1.128E+00	1.128E+00	0.083E+00	7.39	
BI-214	1600.00Y	1.00	1.604E+00	1.604E+00	0.174E+00	10.82	
PB-214	1600.00Y	1.00	1.906E+00	1.906E+00	0.165E+00	8.67	
RN-222	1600.00Y	1.00	1.604E+00	1.604E+00	0.174E+00	10.82	
RA-224	1.41E+10Y	1.00	5.477E+00	5.477E+00	1.070E+00	19.54	
RA-226	1600.00Y	1.00	1.906E+00	1.906E+00	0.165E+00	8.67	
AC-228	1.41E+10Y	1.00	1.013E+00	1.013E+00	0.250E+00	24.68	
RA-228	1.41E+10Y	1.00	1.013E+00	1.013E+00	0.250E+00	24.68	
TH-228	1.41E+10Y	1.00	1.128E+00	1.128E+00	0.083E+00	7.39	
TH-230	7.54E+04Y	1.00	1.906E+00	1.906E+00	0.165E+00	8.67	
PA-231	7.04E+08Y	1.00	8.926E-01	8.926E-01	4.675E-01	52.37	
TH-232	1.41E+10Y	1.00	1.013E+00	1.013E+00	0.250E+00	24.68	
TH-234	4.47E+09Y	1.00	1.415E+00	1.415E+00	0.726E+00	51.27	
U-234	2.45E+05Y	1.00	1.906E+00	1.906E+00	0.165E+00	8.67	
U-235	7.04E+08Y	1.00	6.844E-02	6.844E-02	17.92E-02	261.89	
U-238	4.47E+09Y	1.00	1.415E+00	1.415E+00	0.726E+00	51.27	
AM-243	7370.00Y	1.00	3.054E-01	3.054E-01	0.314E-01	10.27	
ANH-511	1.00E+09Y	1.00	4.805E-02	4.805E-02	5.371E-02	111.77	
Total Activity :			4.386E+01	4.520E+01			

Grand Total Activity : 4.386E+01 4.520E+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	39.96	44	203	1.19	79.35	77	6	4.97E-03	****	1.08E+01	
0	57.29	69	473	0.96	114.01	111	9	7.98E-03	****	1.19E+01	T
5	83.88	195	385	1.15	167.18	164	18	2.32E-02	39.4	1.14E+01	T
8	94.11	103	342	1.59	187.65	182	10	1.23E-02	85.6	1.09E+01	T
2	127.96	49	70	0.98	255.34	254	12	6.05E-03	48.0	9.38E+00	T
2	129.28	76	212	1.00	257.98	254	12	9.27E-03	72.2	9.32E+00	T
0	170.72	46	263	2.12	340.87	337	8	5.76E-03	****	7.70E+00	
0	208.99	100	245	1.13	417.42	414	9	1.27E-02	62.8	6.54E+00	
0	270.01	133	178	2.24	539.47	533	12	1.71E-02	45.4	5.21E+00	T
4	325.95	17	31	0.94	651.36	650	14	2.15E-03	****	4.35E+00	T
4	327.72	63	83	1.54	654.90	650	14	8.15E-03	62.8	4.32E+00	T
0	458.13	26	28	1.15	915.75	913	8	3.47E-03	81.7	3.08E+00	
0	462.82	73	58	0.96	925.14	920	11	9.78E-03	47.9	3.05E+00	T
0	562.87	25	49	1.89	1125.29	1119	10	3.40E-03	****	2.49E+00	T
0	735.66	14	10	0.92	1470.95	1468	6	1.90E-03	92.0	1.88E+00	T
0	767.97	70	36	2.19	1535.60	1529	13	9.64E-03	42.8	1.79E+00	T
0	785.75	38	41	1.33	1571.18	1564	14	5.22E-03	79.9	1.75E+00	
0	794.59	39	36	0.71	1588.85	1582	16	5.36E-03	76.7	1.73E+00	T
0	806.14	25	27	0.71	1611.98	1607	10	3.42E-03	93.8	1.70E+00	
0	819.05	16	21	0.82	1637.80	1629	12	2.22E-03	****	1.68E+00	T
0	876.85	12	15	1.72	1753.45	1749	7	1.68E-03	****	1.56E+00	
0	932.52	37	21	4.83	1864.83	1858	12	5.14E-03	59.5	1.46E+00	
3	961.19	14	4	1.95	1922.19	1920	13	2.03E-03	56.3	1.42E+00	T
3	964.54	36	13	1.63	1928.90	1920	13	5.05E-03	47.0	1.41E+00	T
0	975.16	5	14	1.28	1950.16	1944	9	6.98E-04	****	1.40E+00	
0	999.31	18	15	3.56	1998.47	1993	10	2.61E-03	89.8	1.36E+00	
0	1015.60	39	34	7.40	2031.07	2021	26	5.49E-03	85.4	1.34E+00	
0	1237.88	29	21	1.96	2475.87	2470	11	4.12E-03	71.3	1.09E+00	T
0	1264.24	21	7	2.05	2528.63	2521	15	2.99E-03	70.3	1.07E+00	
1	1276.92	23	3	2.02	2554.00	2550	15	3.30E-03	41.2	1.06E+00	
1	1279.42	28	2	2.02	2559.00	2550	15	4.05E-03	46.0	1.06E+00	
0	1313.51	11	6	3.48	2627.23	2620	12	1.53E-03	****	1.03E+00	T
0	1369.65	8	19	3.80	2739.58	2727	16	1.23E-03	****	9.89E-01	T
0	1377.34	35	23	1.41	2754.97	2747	16	5.00E-03	69.4	9.83E-01	
0	1401.96	14	9	2.60	2804.24	2798	11	2.06E-03	99.3	9.66E-01	
0	1407.74	34	5	2.27	2815.81	2809	17	4.87E-03	43.5	9.62E-01	T
0	1508.45	18	5	2.33	3017.38	3012	11	2.69E-03	65.3	8.99E-01	
0	1558.81	8	3	0.53	3118.16	3114	8	1.20E-03	****	8.70E-01	
0	1728.61	31	7	2.18	3458.05	3450	14	4.58E-03	48.7	7.87E-01	
0	1846.44	17	3	2.82	3693.90	3686	14	2.56E-03	63.5	7.39E-01	

Flags: "T" = Tentatively associated

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981001.CNF;1
Acquisition date : 12-DEC-2023 19:28:47 Sensitivity : 3.000
Detector ID : GAM21 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:01.03 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981001 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3316E+02 GRAM
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 3-JUL-2023 09:20:00 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25

Combined Critical Level Report

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

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	2.479E-01
AS-73	7.401E-02
CD-109	2.021E-01
I-126	2.324E-01
SN-126	1.929E-02
EU-155	3.308E-02
TM-171	1.297E+00
TL-208	2.040E-02
BI-210	1.324E-01
PB-210	1.324E-01
BI-211	1.013E-01
BI-212	2.593E-01
PB-212	2.532E-02
BI-214	3.765E-02
PB-214	3.688E-02
RN-222	3.765E-02
RA-224	2.721E-01
RA-226	3.688E-02
AC-228	8.268E-02
RA-228	8.268E-02
TH-228	2.532E-02
TH-230	3.688E-02
PA-231	2.346E-01
TH-232	8.268E-02
TH-234	2.060E-01
U-234	3.688E-02
U-235	8.001E-02
U-238	2.060E-01
AM-243	1.178E-02
ANH-511	1.597E-02

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

Nuclide	Lc (pCi/GRAM)
BE-7	2.242E-01 NOT IDENT.

NA-22	2.064E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.936E-02	NOT IDENT.
SC-46	1.919E-02	FAIL ABUN
V-48	6.711E-02	FAIL ABUN
CR-51	2.571E-01	NOT IDENT.
MN-52	9.176E-01	NOT IDENT.
MN-54	2.370E-02	NOT IDENT.
CO-56	2.702E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	1.017E-02	NOT IDENT.
CO-58	2.589E-02	NOT IDENT.
FE-59	7.475E-02	NOT IDENT.
CO-60	2.544E-02	NOT IDENT.
ZN-65	4.494E-02	NOT IDENT.
GE-68	7.549E-01	NOT IDENT.
AS-74	8.669E-02	NOT IDENT.
SE-75	2.197E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	2.994E-01	NOT IDENT.
RB-83	3.601E-02	NOT IDENT.
RB-84	4.877E-02	NOT IDENT.
KR-85	3.907E+00	NOT IDENT.
SR-85	2.403E-02	NOT IDENT.
RB-86	7.771E-01	NOT IDENT.
Y-88	2.630E-02	NOT IDENT.
Y-91	1.193E+01	NOT IDENT.
NB-94	2.240E-02	NOT IDENT.
NB-95	3.365E-02	NOT IDENT.
NB-95M	6.645E-02	NOT IDENT.
ZR-95	4.669E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.191E-02	FAIL ABUN
RH-102	3.349E-02	FAIL ABUN
RU-103	2.658E-02	FAIL ABUN
RH-106	1.895E-01	NOT IDENT.
RU-106	1.895E-01	NOT IDENT.
AG-108M	1.663E-02	NOT IDENT.
AG-110	4.582E-01	NOT IDENT.
AG-110M	2.402E-02	NOT IDENT.
SN-113	2.440E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	4.880E-02	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	1.324E-02	NOT IDENT.
SB-124	5.369E-02	NOT IDENT.
SB-125	5.051E-02	FAIL ABUN
TE-125M	4.052E+00	NOT IDENT.
SB-126	1.446E-01	FAIL ABUN
SB-127	9.287E+00	NOT IDENT.
I-131	1.815E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	7.299E+00	NOT IDENT.
BA-133	2.067E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	2.974E-02	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	1.384E-01	FAIL ABUN
BA-137M	1.885E-02	NOT IDENT.
CS-137	1.991E-02	NOT IDENT.
LA-138	3.674E-02	NOT IDENT.
CE-139	1.378E-02	NOT IDENT.
BA-140	3.074E-01	NOT IDENT.
LA-140	1.252E-01	FAIL ABUN
CE-141	3.369E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	7.729E-02	NOT IDENT.
PM-144	1.911E-02	NOT IDENT.
PR-144	1.439E+00	NOT IDENT.
PM-146	2.356E-02	FAIL ABUN
ND-147	6.619E-01	FAIL ABUN
PM-147	2.817E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	1.196E-02	FAIL ABUN
EU-152	4.719E-02	FAIL ABUN

GD-153	2.566E-02	NOT IDENT.
EU-154	5.695E-02	NOT IDENT.
TB-160	6.708E-02	FAIL ABUN
HO-166M	3.554E-02	NOT IDENT.
HF-172	7.290E-02	FAIL ABUN
LU-172	4.399E-02	FAIL ABUN
LU-176	1.313E-02	FAIL ABUN
HF-181	2.806E-02	FAIL ABUN
TA-182	1.249E-01	NOT IDENT.
RE-183	2.754E-02	FAIL ABUN
RE-184	1.103E-01	NOT IDENT.
W-188	3.790E+00	FAIL ABUN
IR-192	1.889E-02	FAIL ABUN
HG-203	2.245E-02	FAIL ABUN
TL-204	9.939E-01	FAIL ABUN
BI-207	2.935E-02	FAIL ABUN
PB-211	3.572E-01	NOT IDENT.
BI-213	5.717E-02	NOT IDENT.
RN-219	2.128E-01	FAIL ABUN
RA-223	2.953E-01	FAIL ABUN
AC-225	6.946E-01	NOT IDENT.
AC-227	1.103E-01	FAIL ABUN
TH-227	1.103E-01	FAIL ABUN
TH-229	2.417E-01	FAIL ABUN
TH-231	2.953E-01	FAIL ABUN
PA-233	3.229E-02	FAIL ABUN
PA-234	1.791E-01	FAIL ABUN
PA-234M	2.862E+00	NOT IDENT.
NP-237	3.229E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
NP-239	9.136E-02	FAIL ABUN
PU-239	1.556E+02	FAIL ABUN
AM-241	1.886E-02	NOT IDENT.
CM-243	3.211E-02	FAIL ABUN
BK-247	3.589E-02	FAIL ABUN
CM-247	2.007E-02	FAIL ABUN
CF-249	2.252E-02	NOT IDENT.
CF-251	6.170E-02	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]G645981001.CNF;1  *
* Acquisition date   : 12-DEC-2023 19:28:47 Sensitivity      : 3.000          *
* Detector ID        : GAM21 Energy tolerance: 1.500          *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000          *
* Elapsed real time  : 0 02:00:01.03 Half life ratio  : *****          *
* Sample date        : 13-NOV-2023 12:00:00 Nuclide Library : SOLID          *
* Sample ID          : G645981001 Analyst initials:  RXF2          *
* Batch Number       : 2529194 Sample Quantity : 1.3316E+02 GRAM          *
*                                     Quantity Err(%) : 1.5020E-03 %          *
* Wet wt corr        : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 3-JUL-2023 09:20:00 Eff. Geometry   : CAN          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25          *
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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/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	3.200E+00	8.816E-01	8.816E-01
AS-73	1.067E-01	1.317E-01	1.317E-01
CD-109	3.244E+00	6.669E-01	6.669E-01
I-126	1.405E+00	6.460E-01	6.460E-01
SN-126	3.104E-01	6.166E-02	6.166E-02
EU-155	1.049E-01	8.716E-02	8.716E-02
TM-171	1.790E+00	1.420E+00	1.420E+00
TL-208	3.182E-01	6.746E-02	6.746E-02
BI-210	1.066E+00	3.529E-01	3.529E-01
PB-210	1.066E+00	3.529E-01	3.529E-01
BI-211	5.250E+00	6.220E-01	6.220E-01
BI-212	1.586E+00	7.111E-01	7.111E-01
PB-212	1.128E+00	1.471E-01	1.471E-01
BI-214	1.604E+00	2.615E-01	2.615E-01
PB-214	1.906E+00	2.236E-01	2.236E-01
RN-222	1.604E+00	2.615E-01	2.615E-01
RA-224	5.477E+00	1.201E+00	1.201E+00
RA-226	1.906E+00	2.236E-01	2.236E-01
AC-228	1.013E+00	2.675E-01	2.675E-01
RA-228	1.013E+00	2.675E-01	2.675E-01
TH-228	1.128E+00	1.471E-01	1.471E-01
TH-230	1.906E+00	2.236E-01	2.236E-01
PA-231	8.926E-01	4.992E-01	4.992E-01
TH-232	1.013E+00	2.675E-01	2.675E-01
TH-234	1.415E+00	7.797E-01	7.797E-01
U-234	1.906E+00	2.236E-01	2.236E-01
U-235	6.844E-02	1.759E-01	1.759E-01
U-238	1.415E+00	7.797E-01	7.797E-01
AM-243	3.054E-01	3.938E-02	3.938E-02
ANH-511	4.805E-02	5.288E-02	5.288E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)

BE-7	-3.047E-02	2.570E-01	2.574E-01	NOT IDENT.
NA-22	2.511E-03	2.724E-02	2.726E-02	NOT IDENT.
NA-24	3.322E+12	7.691E+12	7.835E+12	SHORT HLIF
AL-26	-2.379E-02	2.906E-02	3.098E-02	NOT IDENT.
SC-46	-1.462E-02	2.655E-02	2.736E-02	FAIL ABUN
V-48	-2.566E-02	8.142E-02	8.224E-02	FAIL ABUN
CR-51	1.254E-01	2.962E-01	3.015E-01	NOT IDENT.
MN-52	-4.477E-01	1.199E+00	1.216E+00	NOT IDENT.
MN-54	-4.308E-03	2.935E-02	2.941E-02	NOT IDENT.
CO-56	-1.359E-02	3.486E-02	3.539E-02	FAIL ABUN
MN-56	-1.000E+41	2.530E+41	0.000E+00	SHORT HLIF
CO-57	2.908E-03	1.087E-02	1.095E-02	NOT IDENT.
CO-58	1.711E-02	3.158E-02	3.251E-02	NOT IDENT.
FE-59	4.473E-02	8.125E-02	8.371E-02	NOT IDENT.
CO-60	1.062E-02	2.844E-02	2.884E-02	NOT IDENT.
ZN-65	5.709E-03	5.836E-02	5.842E-02	NOT IDENT.
GE-68	-1.837E-02	8.821E-01	8.821E-01	NOT IDENT.
AS-74	3.385E-02	9.686E-02	9.806E-02	NOT IDENT.
SE-75	6.949E-03	2.715E-02	2.733E-02	NOT IDENT.
BR-77	1.112E+04	9.527E+03	1.076E+04	SHORT HLIF
SR-82	4.465E-02	3.537E-01	3.543E-01	NOT IDENT.
RB-83	-3.838E-02	4.630E-02	4.943E-02	NOT IDENT.
RB-84	-1.923E-02	6.301E-02	6.361E-02	NOT IDENT.
KR-85	3.438E+00	4.531E+00	4.789E+00	NOT IDENT.
SR-85	2.107E-02	2.788E-02	2.945E-02	NOT IDENT.
RB-86	1.257E-01	8.857E-01	8.875E-01	NOT IDENT.
Y-88	5.830E-03	2.938E-02	2.950E-02	NOT IDENT.
Y-91	-2.259E+01	1.784E+01	2.054E+01	NOT IDENT.
NB-94	-1.870E-04	2.661E-02	2.661E-02	NOT IDENT.
NB-95	2.079E-02	4.220E-02	4.322E-02	NOT IDENT.
NB-95M	3.220E-02	8.050E-02	8.180E-02	NOT IDENT.
ZR-95	-9.167E-04	5.607E-02	5.607E-02	NOT IDENT.
NB-97	1.000E+41	6.770E+41	0.000E+00	SHORT HLIF
ZR-97	6.077E+11	1.375E+12	1.402E+12	SHORT HLIF
MO-99	-1.303E+02	3.122E+02	3.176E+02	SHORT HLIF
TC-99M	-6.968E+32	2.009E+33	0.000E+00	SHORT HLIF
RH-101	2.225E-02	1.158E-02	1.532E-02	FAIL ABUN
RH-102	7.304E-04	3.916E-02	3.916E-02	FAIL ABUN
RU-103	8.180E-03	2.942E-02	2.965E-02	FAIL ABUN
RH-106	5.305E-02	2.155E-01	2.168E-01	NOT IDENT.
RU-106	5.305E-02	2.155E-01	2.168E-01	NOT IDENT.
AG-108M	1.001E-02	1.783E-02	1.839E-02	NOT IDENT.
AG-110	1.529E-01	5.217E-01	5.263E-01	NOT IDENT.
AG-110M	-1.172E-02	3.170E-02	3.214E-02	NOT IDENT.
SN-113	1.404E-02	3.064E-02	3.128E-02	NOT IDENT.
CD-115	3.317E+01	5.586E+02	5.588E+02	SHORT HLIF
SN-117M	1.969E-03	5.407E-02	5.408E-02	NOT IDENT.
SB-122	7.140E+01	7.938E+01	8.566E+01	SHORT HLIF
TE-123M	1.103E-03	1.465E-02	1.465E-02	NOT IDENT.
SB-124	-1.445E-02	6.671E-02	6.703E-02	NOT IDENT.
SB-125	-1.047E-02	5.748E-02	5.768E-02	FAIL ABUN
TE-125M	4.239E-01	4.324E+00	4.328E+00	NOT IDENT.
SB-126	-2.000E-01	2.054E-01	2.243E-01	FAIL ABUN
SB-127	1.317E+00	1.081E+01	1.083E+01	NOT IDENT.
I-131	-9.039E-02	2.316E-01	2.351E-01	NOT IDENT.
I-132	1.000E+41	1.866E+41	0.000E+00	SHORT HLIF
TE-132	-8.364E-01	8.477E+00	8.485E+00	NOT IDENT.
BA-133	-2.398E-02	3.026E-02	3.214E-02	FAIL ABUN
I-133	-1.965E+08	3.066E+08	3.192E+08	SHORT HLIF
CS-134	7.561E-02	5.753E-02	6.687E-02	FAIL ABUN
I-135	-1.422E+30	1.211E+31	0.000E+00	SHORT HLIF
CS-136	-3.425E-02	1.654E-01	1.662E-01	FAIL ABUN
BA-137M	1.041E-02	2.298E-02	2.346E-02	NOT IDENT.
CS-137	1.100E-02	2.428E-02	2.478E-02	NOT IDENT.
LA-138	1.567E-02	4.097E-02	4.158E-02	NOT IDENT.
CE-139	7.933E-03	1.502E-02	1.544E-02	NOT IDENT.
BA-140	-1.094E-01	3.656E-01	3.689E-01	NOT IDENT.
LA-140	5.458E-02	1.398E-01	1.420E-01	FAIL ABUN
CE-141	-6.136E-03	4.028E-02	4.038E-02	NOT IDENT.
CE-143	1.175E+05	9.460E+04	1.084E+05	SHORT HLIF
CE-144	3.357E-02	8.831E-02	8.960E-02	NOT IDENT.
PM-144	-3.680E-03	2.315E-02	2.321E-02	NOT IDENT.
PR-144	6.620E-01	1.618E+00	1.645E+00	NOT IDENT.
PM-146	2.679E-02	2.508E-02	2.783E-02	FAIL ABUN
ND-147	4.687E-02	7.541E-01	7.544E-01	FAIL ABUN
PM-147	6.418E+01	3.016E+02	3.029E+02	NOT IDENT.
PM-149	1.363E+02	4.409E+03	4.409E+03	SHORT HLIF
EU-150	2.251E-03	1.748E-02	1.751E-02	FAIL ABUN

EU-152	-3.760E-02	6.089E-02	6.321E-02	FAIL ABUN
GD-153	1.386E-02	3.135E-02	3.197E-02	NOT IDENT.
EU-154	4.010E-03	7.603E-02	7.605E-02	NOT IDENT.
TB-160	-7.648E-02	1.123E-01	1.175E-01	FAIL ABUN
HO-166M	2.817E-03	4.190E-02	4.192E-02	NOT IDENT.
HF-172	1.839E-02	8.374E-02	8.415E-02	FAIL ABUN
LU-172	3.884E-02	4.621E-02	4.942E-02	FAIL ABUN
LU-176	-2.785E-04	1.569E-02	1.569E-02	FAIL ABUN
HF-181	-1.649E-02	3.358E-02	3.439E-02	FAIL ABUN
TA-182	7.584E-02	1.365E-01	1.407E-01	NOT IDENT.
RE-183	6.347E-02	7.925E-02	8.425E-02	FAIL ABUN
RE-184	8.200E-02	1.233E-01	1.287E-01	NOT IDENT.
W-188	-3.262E+00	5.238E+00	5.441E+00	FAIL ABUN
IR-192	1.058E-02	2.158E-02	2.210E-02	FAIL ABUN
HG-203	-9.469E-03	2.966E-02	2.996E-02	FAIL ABUN
TL-204	-2.082E-01	1.232E+00	1.235E+00	FAIL ABUN
BI-207	-7.905E-03	3.535E-02	3.553E-02	FAIL ABUN
PB-211	-1.221E-01	4.084E-01	4.120E-01	NOT IDENT.
BI-213	2.407E-02	6.216E-02	6.310E-02	NOT IDENT.
RN-219	3.682E-02	2.583E-01	2.588E-01	FAIL ABUN
RA-223	2.255E-01	3.565E-01	3.707E-01	FAIL ABUN
AC-225	-2.562E-01	8.160E-01	8.242E-01	NOT IDENT.
AC-227	-1.758E-04	1.288E-01	1.288E-01	FAIL ABUN
TH-227	-1.758E-04	1.288E-01	1.288E-01	FAIL ABUN
TH-229	-1.865E-02	2.750E-01	2.751E-01	FAIL ABUN
TH-231	2.255E-01	3.565E-01	3.707E-01	FAIL ABUN
PA-233	3.596E-02	3.529E-02	3.883E-02	FAIL ABUN
PA-234	8.230E-02	2.157E-01	2.189E-01	FAIL ABUN
PA-234M	1.363E+00	3.490E+00	3.543E+00	NOT IDENT.
NP-237	3.596E-02	3.529E-02	3.883E-02	FAIL ABUN
NP-238	-5.799E+02	1.269E+03	1.296E+03	SHORT HLIF
NP-239	-3.390E-02	1.005E-01	1.017E-01	FAIL ABUN
PU-239	3.634E+02	2.622E+02	3.092E+02	FAIL ABUN
AM-241	-1.013E-02	2.344E-02	2.388E-02	NOT IDENT.
CM-243	1.048E-01	8.735E-02	9.932E-02	FAIL ABUN
BK-247	-4.937E-03	4.610E-02	4.615E-02	FAIL ABUN
CM-247	1.088E-02	2.155E-02	2.210E-02	FAIL ABUN
CF-249	9.874E-03	2.666E-02	2.703E-02	NOT IDENT.
CF-251	6.210E-02	6.657E-02	7.222E-02	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	82.4398	85.43	133.6989	131.20	115.8456
45.60	84.6993	86.55	134.2509	133.02	103.0886
46.54	85.1824	86.79	134.3672	133.52	102.1093
49.72	80.6701	86.94	134.4424	136.00	113.0843
51.35	102.3841	87.09	134.5162	136.47	119.0888
51.87	91.5453	87.57	134.7504	140.51	0.0000
52.39	100.4911	88.03	134.9746	143.76	124.6534
52.97	100.8094	88.34	135.1264	144.24	124.7960
53.44	101.0658	88.47	135.1889	145.44	125.7261
54.07	101.4076	89.96	135.9098	152.43	146.3771
57.36	0.0000	1093.63	139.1660	153.25	134.4304
57.53	109.6259	91.11	139.3964	323.87	132.9722
57.98	109.8752	92.59	119.4681	156.02	141.4204
59.27	110.5871	93.35	119.7820	158.56	125.4374
59.32	110.6146	94.56	120.2789	159.00	122.0219
59.54	150.6507	94.65	120.3159	162.33	108.6618
60.96	137.4404	94.67	120.3246	162.66	117.6531
61.17	137.5804	94.87	120.4062	163.33	124.9652
62.93	171.4658	97.43	100.4540	165.86	105.0011
63.29	171.7576	98.43	109.8130	176.31	111.8824
63.58	171.9925	98.44	109.8163	176.60	119.2903
64.28	172.5557	99.53	123.7970	177.52	108.4788
66.73	193.1534	100.11	131.5939	181.07	0.0000
67.24	144.1972	102.03	102.4785	181.52	131.5844
125.81	129.7650	103.18	116.0920	184.41	124.2533
67.75	144.5251	103.37	113.1047	143.76	132.6656
68.89	174.8482	105.21	109.1478	193.51	121.3633
69.67	180.8456	105.31	109.1824	197.03	125.0193
70.82	180.3890	106.12	109.4576	198.01	113.7705
70.83	180.3991	106.47	115.2345	201.83	100.1200
72.81	177.8217	109.28	127.6420	203.43	113.9236
72.87	177.8673	111.00	136.9083	205.31	111.0763
74.66	179.1983	111.76	108.9904	210.85	95.2036
74.82	179.3173	114.06	125.5180	215.65	83.8262
74.97	179.4264	116.30	116.7986	218.12	101.0117
77.11	180.9955	116.74	118.5366	222.11	100.6887
78.74	180.7724	119.76	113.1339	227.09	85.4319
79.69	151.9113	121.12	116.7848	227.38	85.4721
80.03	184.5046	121.22	116.8169	228.16	101.6889
80.12	184.5726	121.78	126.6809	228.18	101.6935
80.19	184.6225	122.06	121.1266	116.74	101.6935
80.57	166.5461	122.92	117.3656	235.69	96.4636
81.00	155.5133	123.07	117.4131	235.96	96.5041
81.07	155.5569	265.00	128.1532	238.63	90.0826
81.75	150.2917	125.81	115.2970	238.98	0.0000
82.47	162.0816	127.23	117.9185	240.99	90.4116
83.79	132.8843	127.91	114.8507	242.00	90.5526
84.00	132.9893	129.30	115.2710	244.70	93.6826

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	66.8965	344.28	72.9325	563.25	31.4760
252.80	57.5227	345.93	56.5679	564.24	0.0000
254.15	0.0000	351.06	61.6326	569.33	28.7402
256.23	71.4785	351.93	61.6929	946.00	28.7439
260.90	0.0000	355.39	0.0000	569.70	27.7893
264.66	66.6770	356.01	77.8585	583.19	38.6979
264.80	66.6904	364.49	54.1214	584.27	38.7272
265.00	73.8063	366.42	0.0000	595.83	27.3278
269.46	62.1295	372.51	48.5181	427.87	37.2083
270.03	62.1790	375.05	54.7284	602.52	0.0000
271.23	62.2834	377.52	48.7732	604.72	55.9702
273.65	56.0276	356.01	54.0010	607.14	39.8326
276.40	72.4613	388.16	56.7026	609.32	34.4745
277.37	72.5574	388.63	56.7307	610.33	34.4973
277.60	72.5799	391.69	41.2354	614.28	29.6484
278.00	72.6208	264.66	44.9330	618.01	42.6011
279.20	86.8530	401.81	51.2312	620.36	28.7758
279.54	79.6511	402.40	47.5104	621.93	31.7865
279.70	79.6690	404.85	55.1437	630.19	0.0000
280.46	68.1496	410.95	61.3531	631.29	36.9789
283.69	75.3635	413.71	46.3481	633.25	29.0201
284.31	69.9609	414.70	55.6700	634.78	30.0513
285.41	73.3467	423.72	46.7878	635.95	38.0943
285.90	0.0000	427.09	49.4956	636.99	31.0971
287.50	80.1378	427.87	56.3629	657.50	31.5071
290.67	83.7791	433.94	42.9392	657.76	31.5121
293.27	0.0000	439.40	54.3726	657.90	0.0000
351.93	69.8599	440.45	43.1936	661.66	21.3990
295.96	69.9252	453.88	30.4252	664.57	0.0000
879.38	70.1617	463.37	30.4128	666.33	24.5273
299.98	70.2867	468.07	44.6096	666.50	24.5293
300.09	70.2963	473.00	51.5524	667.71	0.0000
300.13	70.3001	475.06	38.2864	677.62	27.7855
301.36	75.9978	476.78	49.0414	685.70	25.8545
302.85	65.6903	477.60	51.7518	692.65	0.0000
256.23	74.0546	482.18	45.6813	695.00	30.1588
304.85	72.9643	487.02	35.0732	696.49	31.2268
306.78	70.8904	492.35	0.0000	696.51	22.8997
308.46	63.1453	497.08	32.6426	697.00	28.1129
311.90	47.5602	505.52	54.7742	697.30	28.1173
316.51	51.2457	507.63	0.0000	697.49	32.2866
319.41	60.5680	511.00	43.0934	702.65	43.8782
320.08	54.8979	514.00	33.0864	706.68	37.6992
321.04	65.2661	514.00	33.0864	711.68	30.4573
323.87	44.4240	520.40	39.7176	720.70	32.7294
325.23	64.4424	520.69	0.0000	721.93	0.0000
328.76	42.7553	522.65	0.0000	722.78	20.6124
333.37	48.0200	527.90	0.0000	722.91	20.6140
333.97	48.8278	528.26	28.8077	723.31	14.2745
334.37	51.1771	529.59	36.2784	724.19	19.0422
338.28	60.7534	529.87	0.0000	727.33	24.3757
338.32	60.7566	531.02	27.9370	733.00	14.8858
311.90	79.6460	537.26	40.2338	735.93	18.1054
340.48	79.6460	546.56	0.0000	333.97	15.9894
340.55	79.6522	552.55	32.1780	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	31.0308	949.00	23.1174	1384.29	11.1608
747.24	25.7236	667.71	0.0000	1408.01	3.3732
748.06	27.8800	962.31	20.0348	1434.09	15.9393
752.31	26.8717	964.08	20.0505	1435.80	8.5054
753.82	27.9699	966.17	14.3350	1457.56	0.0000
756.73	25.8604	911.20	0.0000	1460.82	13.9268
756.80	25.8613	983.53	18.9582	1489.16	8.6426
884.68	22.7175	984.45	0.0000	1505.03	12.1563
765.81	34.1109	1274.44	15.9763	1584.12	25.5325
766.42	40.0803	1001.03	18.9192	1596.21	6.6830
766.84	40.0894	1002.74	14.5640	1620.50	8.9702
772.60	0.0000	1004.73	20.8231	1621.92	12.3387
776.52	27.2298	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	6.3981
778.90	22.2486	1028.54	0.0000	1750.46	0.0000
783.70	27.3356	1037.84	19.3991	1764.49	3.1047
788.74	9.8672	1038.76	0.0000	1063.66	1.3325
792.07	21.4170	631.29	19.4683	1771.35	4.1467
795.86	20.9096	1048.07	24.1179	1791.20	0.0000
810.06	13.3047	1049.04	24.1274	1808.65	11.2998
810.29	13.3062	1050.41	18.5706	1810.72	0.0000
344.28	13.3071	1063.66	20.5377	1836.06	4.7400
810.76	16.6364	1077.00	16.8937		
815.77	18.3477	1077.34	18.7732		
1048.07	21.1578	1085.87	17.8948		
832.01	23.5464	1093.63	15.1162		
834.85	32.5625	1099.45	17.9911		
835.71	29.2066	1112.07	19.0308		
836.80	0.0000	1112.84	16.3173		
846.75	0.0000	1115.54	13.7206		
846.77	31.6287	1120.29	17.1826		
856.80	36.3268	1120.55	17.1837		
860.56	25.0212	1221.41	17.1892		
871.09	21.7206	1129.67	15.3281		
873.19	13.7324	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	22.3818	1173.23	19.4763		
880.51	18.9485	1177.95	23.4111		
881.60	21.8311	1189.05	14.6915		
883.24	12.6489	1204.77	30.5364		
884.68	18.4115	1221.41	15.8545		
889.28	18.4518	1231.02	17.0445		
894.76	24.2813	1235.36	15.9326		
898.04	20.8447	1238.28	17.5441		
900.72	24.3496	1260.41	0.0000		
903.28	19.7351	1271.87	14.5213		
911.20	23.3040	1274.44	9.6896		
912.08	23.3130	1274.54	9.6896		
923.98	0.0000	1291.59	16.2432		
926.50	19.7142	1298.22	0.0000		
929.11	18.3276	1312.11	15.3333		
935.54	12.7257	1332.49	11.3196		
937.49	19.8133	1362.66	0.0000		
944.13	21.2922	1365.19	8.3203		
946.00	16.8703	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 12-DEC-2023 21:29:57.30

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981002.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM23.CNF;877
Background date    : 10-DEC-2023 11:03:50
Sample date       : 13-NOV-2023 12:00:00 Acquisition date : 12-DEC-2023 19:29:15
Sample ID        : G645981002 Sample quantity : 1.36390E+02 GRAM
Detector name    : GAM23 Detector geometry: CAN
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:02.57 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 2529194 Detector SN# :
Matrix Spike ID  : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.37*	77	192	1.46	126.74	124	6	1.07E-02	31.5	
2	3	74.76	260	256	1.05	149.50	144	14	3.61E-02	11.6	5.55E-01
3	3	77.15	411	254	0.93	154.28	144	14	5.70E-02	8.0	
4	0	83.98*	75	194	0.81	167.94	165	6	1.04E-02	32.8	
5	0	87.16	167	268	1.09	174.30	171	7	2.32E-02	17.9	
6	3	89.95	75	255	0.82	179.89	177	12	1.04E-02	33.4	2.57E+00
7	3	92.74*	139	306	1.01	185.45	177	12	1.93E-02	22.9	
8	0	105.55	44	233	1.94	211.07	207	8	6.11E-03	61.9	
9	0	129.63	90	188	0.81	259.23	256	8	1.25E-02	28.4	
10	4	141.47*	13	114	1.02	282.89	281	10	1.84E-03	125.6	1.05E+00
11	4	143.54*	27	191	0.97	287.03	281	10	3.71E-03	86.4	
12	0	185.74*	232	260	1.36	371.42	366	10	3.22E-02	14.9	
13	0	191.33	37	153	1.00	382.61	380	7	5.18E-03	57.7	
14	0	209.67	79	194	1.33	419.28	415	9	1.10E-02	33.8	
15	4	238.63*	724	151	1.03	477.20	473	17	1.01E-01	4.6	3.24E+00
16	4	241.99	342	153	1.73	483.91	473	17	4.74E-02	9.7	
17	0	254.77	20	74	0.64	509.46	507	5	2.78E-03	68.6	
18	0	269.61	116	200	1.76	539.13	532	14	1.61E-02	27.4	
19	0	277.21	46	141	1.62	554.33	551	9	6.33E-03	49.3	
20	0	288.13	34	97	0.85	576.16	572	8	4.68E-03	54.0	
21	0	295.22	453	103	1.22	590.35	587	8	6.28E-02	6.1	
22	0	304.86	34	74	1.72	609.63	607	7	4.71E-03	45.3	
23	0	328.14	91	87	1.41	656.17	651	11	1.26E-02	22.5	
24	0	338.20*	107	141	1.35	676.29	671	11	1.48E-02	24.0	
25	0	351.87*	749	161	1.33	703.63	696	14	1.04E-01	5.2	
26	0	410.50	14	75	1.40	820.88	816	9	1.99E-03	112.6	
27	0	463.20	51	87	1.46	926.27	919	12	7.08E-03	39.2	
28	0	488.01	38	55	1.87	975.87	969	11	5.29E-03	41.0	
29	0	494.33	17	47	0.65	988.51	983	9	2.41E-03	76.2	
30	0	510.53*	86	80	2.11	1020.90	1013	16	1.19E-02	30.2	
31	0	583.25*	230	76	1.54	1166.34	1159	14	3.20E-02	10.6	
32	0	609.37*	532	89	1.60	1218.56	1213	15	7.39E-02	5.8	
33	0	640.06	8	26	0.84	1279.94	1276	8	1.06E-03	121.5	
34	0	684.12	36	45	4.84	1368.06	1360	15	5.00E-03	43.9	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	727.20	86	44	1.74	1454.20	1447	17	1.20E-02	20.4	
36	0	768.53	50	53	1.64	1536.85	1531	14	6.88E-03	34.2	
37	0	819.38	28	16	1.25	1638.55	1633	13	3.85E-03	37.4	
38	0	864.48	50	72	10.16	1728.75	1715	26	6.95E-03	48.4	
39	0	900.01	19	38	3.53	1799.80	1786	19	2.67E-03	80.3	
40	0	911.14*	200	27	1.95	1822.07	1813	18	2.77E-02	9.5	
41	0	934.62	16	35	1.29	1869.02	1863	11	2.25E-03	75.3	
42	3	964.44	57	37	2.68	1928.67	1920	25	7.90E-03	26.4	4.23E+00
43	3	968.82	118	26	2.27	1937.41	1920	25	1.64E-02	13.2	
44	0	1058.25	21	36	6.98	2116.28	2103	18	2.94E-03	73.1	
45	0	1107.85	16	6	2.39	2215.47	2209	12	2.28E-03	38.5	
46	0	1120.58	102	34	2.18	2240.94	2234	14	1.42E-02	15.7	
47	3	1164.55	19	10	2.90	2328.87	2323	20	2.62E-03	37.4	4.72E-01
48	3	1169.50	18	5	2.19	2338.78	2323	20	2.52E-03	34.1	
49	0	1233.15	4	19	0.49	2466.07	2457	11	6.07E-04	199.4	
50	0	1237.95	54	19	1.69	2475.68	2469	16	7.45E-03	23.1	
51	0	1282.73	17	13	1.25	2565.24	2558	14	2.37E-03	52.0	
52	0	1294.85	8	11	1.42	2589.48	2582	10	1.05E-03	94.2	
53	0	1376.95	37	27	0.70	2753.68	2743	20	5.17E-03	39.3	
54	0	1460.34*	143	5	2.34	2920.48	2910	17	1.99E-02	9.2	
55	0	1467.82	3	8	1.26	2935.42	2928	9	4.17E-04	186.3	
56	0	1523.27	16	3	1.83	3046.34	3040	12	2.24E-03	32.8	
57	0	1588.99	38	21	1.12	3177.79	3169	20	5.29E-03	33.1	
58	0	1662.59	9	11	1.03	3325.00	3318	11	1.25E-03	78.8	
59	0	1764.40*	73	9	1.76	3528.65	3519	18	1.01E-02	15.7	
60	0	1907.83	13	0	1.00	3815.54	3806	16	1.81E-03	27.7	

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

VMS Nuclide Identification Report V3.1 Generated 12-DEC-2023 21:29:58

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981002.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 13-NOV-2023 12:00:00	Acquisition date	: 12-DEC-2023 19:29:15
Sample ID	: G645981002	Sample quantity	: 136.39 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA23	Detector geometry	: CAN
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:02.57 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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	137	10.66*	9.698E-01	3.651E+00	3.651E+00	18.44
CD-109	88.03	198	3.70*	4.950E+00	2.976E+00	3.110E+00	35.79
SN-126	64.28	93	9.60	2.333E+00	1.147E+00	1.147E+00	63.03
	86.94	198	8.90	4.950E+00	1.237E+00	1.237E+00	35.79
	87.57	198	37.00*	4.950E+00	2.976E-01	2.976E-01	35.79
EU-155	86.55	198	30.70	4.950E+00	3.587E-01	3.629E-01	35.79
	105.31	51	21.10*	5.849E+00	1.145E-01	1.158E-01	123.85
TL-208	277.37	50	6.60	3.920E+00	5.287E-01	5.287E-01	98.67
	583.19	237	85.00*	2.203E+00	3.485E-01	3.485E-01	21.19
	860.56	-----	12.50	1.568E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.550E+00	-----	Line Not Found	-----
	351.06	802	12.92*	3.273E+00	5.220E+00	5.220E+00	10.36
BI-212	727.33	87	6.67*	1.825E+00	1.975E+00	1.975E+00	40.84
	1620.50	-----	1.47	8.981E-01	-----	Line Not Found	-----
PB-212	74.82	311	10.28	3.770E+00	2.205E+00	2.205E+00	23.16
	77.11	490	17.10	4.036E+00	1.953E+00	1.953E+00	15.96
	238.63	798	43.60*	4.381E+00	1.150E+00	1.150E+00	9.10
	300.09	-----	3.30	3.693E+00	-----	Line Not Found	-----
BI-214	609.32	547	45.49*	2.124E+00	1.557E+00	1.557E+00	11.68
	1120.29	100	14.92	1.225E+00	1.504E+00	1.504E+00	31.48
	1764.49	69	15.30	8.530E-01	1.449E+00	1.449E+00	31.42
PB-214	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
RN-222	609.32	547	45.49*	2.124E+00	1.557E+00	1.557E+00	11.68
	1120.29	100	14.92	1.225E+00	1.504E+00	1.504E+00	31.48
	1764.49	69	15.30	8.530E-01	1.449E+00	1.449E+00	31.42
RA-224	240.99	376	4.10*	4.336E+00	5.823E+00	5.823E+00	19.37
RA-226	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
AC-228	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37
RA-228	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37
TH-228	74.82	311	10.28	3.770E+00	2.205E+00	2.205E+00	23.16
	77.11	490	17.10	4.036E+00	1.953E+00	1.953E+00	15.96

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	238.63	798	43.60*	4.381E+00	1.150E+00	1.150E+00	9.10
	300.09	-----	3.30	3.693E+00	-----	Line Not Found	-----
TH-229	85.43	89	14.70	4.695E+00	3.539E-01	3.539E-01	65.51
	88.47	198	24.00	4.950E+00	4.588E-01	4.588E-01	35.79
	193.51	-----	4.41*	5.067E+00	-----	Line Not Found	-----
TH-230	210.85	88	2.80	4.803E+00	1.800E+00	1.800E+00	67.59
	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
TH-232	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
TH-234	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37
	63.29	93	3.70*	2.333E+00	2.976E+00	2.976E+00	63.03
U-234	92.59	164	4.23	5.321E+00	2.005E+00	2.005E+00	45.79
	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
U-235	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
	89.96	88	3.47	5.148E+00	1.358E+00	1.358E+00	66.86
	93.35	164	5.60	5.321E+00	1.514E+00	1.514E+00	45.79
	143.76	31	10.96*	5.900E+00	1.300E-01	1.300E-01	172.77
	163.33	-----	5.08	5.592E+00	-----	Line Not Found	-----
	185.72	260	57.20	5.200E+00	2.409E-01	2.409E-01	29.90
U-238	205.31	-----	5.01	4.872E+00	-----	Line Not Found	-----
	63.29	93	3.70*	2.333E+00	2.976E+00	2.976E+00	63.03
	92.59	164	4.23	5.321E+00	2.005E+00	2.005E+00	45.79
AM-243	43.53	-----	5.90	2.737E-01	-----	Line Not Found	-----
	74.66	311	67.20*	3.770E+00	3.373E-01	3.373E-01	23.16
ANH-511	511.00	89	100.00*	2.454E+00	9.987E-02	9.987E-02	60.30

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]G645981002.CNF;1  *
* Acquisition date   : 12-DEC-2023 19:29:15 Sensitivity      : 3.000          *
* Detector ID        : GAM23 Energy tolerance: 1.500        *
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time  : 0 02:00:02.57 Half life ratio : *****      *
* Sample date        : 13-NOV-2023 12:00:00 Analyst initials: RXF2      *
* Sample ID          : G645981002 Sample Quantity : 1.3639E+02 GRAM    *
* Batch Number       : 2529194 Wet Weight : 0.00000        *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000         *
* Nuclide Library    : SOLID.NLB;17                                         *
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 6-SEP-2023 11:17:47 Eff. Geometry   : CAN          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM23_CAN.CNF;21          *
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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/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	3.651E+00	6.597E-01	4.231E-01
CD-109	3.110E+00	1.091E+00	1.046E+00
SN-126	2.976E-01	1.044E-01	8.468E-02
EU-155	1.158E-01	1.406E-01	1.248E-01
TL-208	3.485E-01	7.238E-02	4.961E-02
BI-211	5.220E+00	5.298E-01	2.652E-01
BI-212	1.975E+00	7.906E-01	6.067E-01
PB-212	1.150E+00	1.026E-01	7.705E-02
BI-214	1.557E+00	1.781E-01	1.013E-01
PB-214	1.895E+00	1.923E-01	9.645E-02
RN-222	1.557E+00	1.781E-01	1.013E-01
RA-224	5.823E+00	1.105E+00	8.265E-01
RA-226	1.895E+00	1.923E-01	9.645E-02
AC-228	1.424E+00	2.665E-01	1.765E-01
RA-228	1.424E+00	2.665E-01	1.765E-01
TH-228	1.150E+00	1.026E-01	7.705E-02
TH-229	1.732E-01	3.757E-01	6.521E-01
TH-230	1.895E+00	1.923E-01	9.645E-02
TH-232	1.424E+00	2.665E-01	1.765E-01
TH-234	2.976E+00	1.838E+00	1.833E+00
U-234	1.895E+00	1.923E-01	9.645E-02
U-235	1.300E-01	2.201E-01	2.515E-01
U-238	2.976E+00	1.838E+00	1.833E+00
AM-243	3.373E-01	7.656E-02	6.564E-02
ANH-511	9.987E-02	5.902E-02	3.709E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	3.231E-03	2.895E-01	5.383E-01	NOT IDENT.
NA-22	2.883E-03	2.443E-02	4.918E-02	NOT IDENT.
NA-24	0.000E+00	3.379E+12	0.000E+00	SHORT HLIF
AL-26	-7.706E-03	2.290E-02	4.286E-02	NOT IDENT.
SC-46	-4.575E-04	3.090E-02	5.729E-02	FAIL ABUN

V-48	-4.327E-03	7.886E-02	1.514E-01	NOT IDENT.
CR-51	1.495E-01	3.479E-01	6.900E-01	NOT IDENT.
MN-52	5.537E-01	1.165E+00	2.427E+00	FAIL ABUN
MN-54	-2.440E-03	2.755E-02	5.198E-02	NOT IDENT.
CO-56	-1.208E-03	3.546E-02	6.696E-02	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-1.198E-05	1.682E-02	3.175E-02	NOT IDENT.
CO-58	-2.101E-03	3.190E-02	6.083E-02	NOT IDENT.
FE-59	-3.336E-02	7.492E-02	1.320E-01	NOT IDENT.
CO-60	-1.158E-02	3.362E-02	6.218E-02	NOT IDENT.
ZN-65	5.947E-02	7.495E-02	1.389E-01	NOT IDENT.
GE-68	3.612E-01	8.936E-01	1.787E+00	NOT IDENT.
AS-73	-2.238E-02	1.018E+00	1.704E+00	NOT IDENT.
AS-74	3.496E-02	1.111E-01	2.116E-01	NOT IDENT.
SE-75	5.543E-03	3.819E-02	6.272E-02	NOT IDENT.
BR-77	0.000E+00	1.012E+03	0.000E+00	SHORT HLIF
SR-82	-3.627E-02	3.753E-01	7.103E-01	NOT IDENT.
RB-83	6.812E-03	6.022E-02	1.123E-01	NOT IDENT.
RB-84	-2.655E-03	6.773E-02	1.286E-01	NOT IDENT.
KR-85	6.302E-01	6.275E+00	1.036E+01	NOT IDENT.
SR-85	3.811E-03	3.862E-02	6.375E-02	NOT IDENT.
RB-86	-1.191E-01	9.437E-01	1.748E+00	NOT IDENT.
Y-88	1.399E-02	2.982E-02	6.604E-02	NOT IDENT.
Y-91	-2.606E+00	1.271E+01	2.267E+01	NOT IDENT.
NB-94	7.664E-03	2.347E-02	4.671E-02	NOT IDENT.
NB-95	2.825E-02	3.580E-02	6.789E-02	NOT IDENT.
NB-95M	1.652E-02	1.177E-01	1.932E-01	NOT IDENT.
ZR-95	5.485E-04	6.203E-02	1.180E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	1.460E+12	0.000E+00	SHORT HLIF
MO-99	0.000E+00	3.031E+02	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	3.290E+33	0.000E+00	SHORT HLIF
RH-101	5.349E-03	2.067E-02	3.683E-02	NOT IDENT.
RH-102	-2.070E-03	3.931E-02	7.138E-02	NOT IDENT.
RU-103	-8.539E-04	3.675E-02	6.141E-02	FAIL ABUN
RH-106	-1.323E-01	2.361E-01	4.015E-01	NOT IDENT.
RU-106	-1.323E-01	2.361E-01	4.015E-01	NOT IDENT.
AG-108M	-2.710E-03	1.869E-02	3.491E-02	NOT IDENT.
AG-110	-2.031E-01	5.749E-01	9.962E-01	NOT IDENT.
AG-110M	2.004E-03	3.668E-02	7.062E-02	NOT IDENT.
SN-113	1.054E-03	3.580E-02	6.758E-02	NOT IDENT.
CD-115	0.000E+00	6.785E+02	0.000E+00	SHORT HLIF
SN-117M	1.359E-02	7.869E-02	1.459E-01	NOT IDENT.
SB-122	0.000E+00	5.709E+01	0.000E+00	SHORT HLIF
TE-123M	1.178E-02	2.082E-02	3.958E-02	NOT IDENT.
SB-124	-3.130E-02	7.553E-02	1.379E-01	NOT IDENT.
SB-125	2.766E-02	6.736E-02	1.306E-01	FAIL ABUN
TE-125M	3.725E+00	7.178E+00	1.408E+01	NOT IDENT.
I-126	3.211E-01	3.425E-01	6.864E-01	NOT IDENT.
SB-126	-1.426E-01	2.535E-01	3.960E-01	NOT IDENT.
SB-127	4.341E+00	1.589E+01	2.625E+01	NOT IDENT.
I-131	1.711E-01	2.685E-01	5.373E-01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-2.746E+00	1.164E+01	2.032E+01	NOT IDENT.
BA-133	-1.668E-02	3.129E-02	5.051E-02	FAIL ABUN
I-133	0.000E+00	3.762E+08	0.000E+00	SHORT HLIF
CS-134	4.063E-02	2.940E-02	6.415E-02	NOT IDENT.
I-135	0.000E+00	1.709E+31	0.000E+00	SHORT HLIF
CS-136	1.228E-02	1.727E-01	3.051E-01	FAIL ABUN
BA-137M	7.830E-03	2.525E-02	4.759E-02	NOT IDENT.
CS-137	8.272E-03	2.668E-02	5.027E-02	NOT IDENT.
LA-138	-4.821E-05	4.704E-02	9.174E-02	NOT IDENT.
CE-139	1.475E-02	2.199E-02	4.188E-02	NOT IDENT.
BA-140	2.081E-02	3.831E-01	7.174E-01	FAIL ABUN
LA-140	-1.373E-01	1.937E-01	2.673E-01	FAIL ABUN
CE-141	-1.829E-02	6.554E-02	1.071E-01	NOT IDENT.
CE-143	0.000E+00	1.241E+05	0.000E+00	SHORT HLIF
CE-144	3.430E-02	1.378E-01	2.439E-01	NOT IDENT.
PM-144	4.755E-03	2.297E-02	4.563E-02	NOT IDENT.
PR-144	3.585E-01	1.732E+00	3.440E+00	NOT IDENT.
PM-146	-1.089E-02	2.952E-02	5.336E-02	NOT IDENT.
ND-147	-4.899E-01	1.053E+00	1.846E+00	FAIL ABUN
PM-147	2.781E+02	4.614E+02	9.043E+02	NOT IDENT.
PM-149	0.000E+00	6.080E+03	0.000E+00	SHORT HLIF
EU-150	1.338E-02	1.970E-02	3.623E-02	FAIL ABUN
EU-152	2.167E-02	6.756E-02	1.318E-01	FAIL ABUN
GD-153	-1.865E-02	5.283E-02	9.987E-02	NOT IDENT.
EU-154	9.567E-03	6.901E-02	1.393E-01	NOT IDENT.

TB-160	2.306E-02	1.077E-01	2.114E-01	FAIL ABUN
HO-166M	2.362E-02	4.610E-02	9.257E-02	FAIL ABUN
TM-171	-2.632E+01	2.053E+01	3.058E+01	NOT IDENT.
HF-172	-8.941E-03	1.221E-01	2.289E-01	FAIL ABUN
LU-172	1.044E-02	4.328E-02	8.485E-02	FAIL ABUN
LU-176	3.244E-04	2.036E-02	3.533E-02	FAIL ABUN
HF-181	7.572E-03	4.207E-02	7.206E-02	NOT IDENT.
TA-182	-2.655E-02	1.248E-01	2.263E-01	FAIL ABUN
RE-183	3.045E-02	1.666E-01	3.401E-01	NOT IDENT.
RE-184	1.123E-02	1.276E-01	1.894E-01	NOT IDENT.
W-188	-5.578E-01	6.244E+00	9.935E+00	FAIL ABUN
IR-192	7.958E-03	2.787E-02	5.448E-02	FAIL ABUN
HG-203	6.296E-03	3.930E-02	6.400E-02	NOT IDENT.
TL-204	-3.779E+00	3.705E+00	6.280E+00	NOT IDENT.
BI-207	1.146E-02	3.596E-02	6.714E-02	FAIL ABUN
BI-210	3.985E+00	4.280E+00	7.950E+00	NOT IDENT.
PB-210	3.985E+00	4.280E+00	7.950E+00	NOT IDENT.
PB-211	1.090E-02	5.037E-01	9.503E-01	NOT IDENT.
BI-213	4.253E-02	7.559E-02	1.483E-01	NOT IDENT.
RN-219	1.025E-01	3.022E-01	5.825E-01	NOT IDENT.
RA-223	1.961E-01	4.923E-01	8.798E-01	FAIL ABUN
AC-225	-3.407E-01	1.128E+00	1.971E+00	NOT IDENT.
AC-227	1.526E-01	2.053E-01	3.246E-01	FAIL ABUN
TH-227	1.526E-01	2.053E-01	3.246E-01	FAIL ABUN
PA-231	-1.943E-02	3.748E-01	6.453E-01	NOT IDENT.
TH-231	1.961E-01	4.923E-01	8.798E-01	FAIL ABUN
PA-233	1.246E-02	4.392E-02	8.612E-02	NOT IDENT.
PA-234	3.900E-02	2.262E-01	4.367E-01	NOT IDENT.
PA-234M	2.745E+00	3.422E+00	7.034E+00	NOT IDENT.
NP-237	1.246E-02	4.392E-02	8.612E-02	NOT IDENT.
NP-238	0.000E+00	1.300E+03	0.000E+00	SHORT HLIF
NP-239	-7.306E-02	1.691E-01	3.124E-01	FAIL ABUN
PU-239	0.000E+00	4.170E+02	4.597E+02	FAIL ABUN
AM-241	-4.106E-02	1.108E-01	2.187E-01	NOT IDENT.
CM-243	-4.181E-02	6.782E-02	1.156E-01	FAIL ABUN
BK-247	-3.287E-05	6.272E-02	1.015E-01	FAIL ABUN
CM-247	1.225E-03	2.787E-02	5.249E-02	FAIL ABUN
CF-249	-2.116E-02	3.080E-02	5.481E-02	NOT IDENT.
CF-251	2.457E-02	9.066E-02	1.676E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	137	10.66*	9.698E-01	3.651E+00	3.651E+00	18.44
CD-109	88.03	198	3.70*	4.950E+00	2.976E+00	3.110E+00	35.79
SN-126	64.28	93	9.60	2.333E+00	1.147E+00	1.147E+00	63.03
	86.94	198	8.90	4.950E+00	1.237E+00	1.237E+00	35.79
	87.57	198	37.00*	4.950E+00	2.976E-01	2.976E-01	35.79
EU-155	86.55	198	30.70	4.950E+00	3.587E-01	3.629E-01	35.79
	105.31	51	21.10*	5.849E+00	1.145E-01	1.158E-01	123.85
TL-208	277.37	50	6.60	3.920E+00	5.287E-01	5.287E-01	98.67
	583.19	237	85.00*	2.203E+00	3.485E-01	3.485E-01	21.19
	860.56	-----	12.50	1.568E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.550E+00	-----	Line Not Found	-----
	351.06	802	12.92*	3.273E+00	5.220E+00	5.220E+00	10.36
BI-212	727.33	87	6.67*	1.825E+00	1.975E+00	1.975E+00	40.84
	1620.50	-----	1.47	8.981E-01	-----	Line Not Found	-----
PB-212	74.82	311	10.28	3.770E+00	2.205E+00	2.205E+00	23.16
	77.11	490	17.10	4.036E+00	1.953E+00	1.953E+00	15.96
	238.63	798	43.60*	4.381E+00	1.150E+00	1.150E+00	9.10
	300.09	-----	3.30	3.693E+00	-----	Line Not Found	-----
BI-214	609.32	547	45.49*	2.124E+00	1.557E+00	1.557E+00	11.68
	1120.29	100	14.92	1.225E+00	1.504E+00	1.504E+00	31.48
	1764.49	69	15.30	8.530E-01	1.449E+00	1.449E+00	31.42
PB-214	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
RN-222	609.32	547	45.49*	2.124E+00	1.557E+00	1.557E+00	11.68
	1120.29	100	14.92	1.225E+00	1.504E+00	1.504E+00	31.48
	1764.49	69	15.30	8.530E-01	1.449E+00	1.449E+00	31.42
RA-224	240.99	376	4.10*	4.336E+00	5.823E+00	5.823E+00	19.37
RA-226	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
AC-228	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37
RA-228	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	74.82	311	10.28	3.770E+00	2.205E+00	2.205E+00	23.16
	77.11	490	17.10	4.036E+00	1.953E+00	1.953E+00	15.96
	238.63	798	43.60*	4.381E+00	1.150E+00	1.150E+00	9.10
	300.09	-----	3.30	3.693E+00	-----	Line Not Found	-----
TH-229	85.43	89	14.70	4.695E+00	3.539E-01	3.539E-01	65.51
	88.47	198	24.00	4.950E+00	4.588E-01	4.588E-01	35.79
	193.51	-----	4.41*	5.067E+00	-----	Line Not Found	-----
	210.85	88	2.80	4.803E+00	1.800E+00	1.800E+00	67.59
TH-230	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
TH-232	105.21	51	1.10	5.849E+00	2.196E+00	2.196E+00	123.85
	338.32	115	11.27	3.373E+00	8.311E-01	8.311E-01	48.00
	835.71	-----	1.61	1.611E+00	-----	Line Not Found	-----
	911.20	199	25.80*	1.487E+00	1.424E+00	1.424E+00	19.09
	968.97	117	15.80	1.404E+00	1.451E+00	1.451E+00	26.37
	63.29	93	3.70*	2.333E+00	2.976E+00	2.976E+00	63.03
U-234	92.59	164	4.23	5.321E+00	2.005E+00	2.005E+00	45.79
	74.82	311	5.80	3.770E+00	3.909E+00	3.909E+00	23.16
	77.11	490	9.70	4.036E+00	3.444E+00	3.444E+00	15.96
	87.09	198	3.41	4.950E+00	3.229E+00	3.229E+00	35.79
	242.00	376	7.25	4.336E+00	3.293E+00	3.293E+00	19.37
	295.22	491	18.42	3.738E+00	1.962E+00	1.962E+00	12.18
U-235	351.93	802	35.60*	3.273E+00	1.895E+00	1.895E+00	10.36
	89.96	88	3.47	5.148E+00	1.358E+00	1.358E+00	66.86
	93.35	164	5.60	5.321E+00	1.514E+00	1.514E+00	45.79
	143.76	31	10.96*	5.900E+00	1.300E-01	1.300E-01	172.77
	163.33	-----	5.08	5.592E+00	-----	Line Not Found	-----
	185.72	260	57.20	5.200E+00	2.409E-01	2.409E-01	29.90
U-238	205.31	-----	5.01	4.872E+00	-----	Line Not Found	-----
	63.29	93	3.70*	2.333E+00	2.976E+00	2.976E+00	63.03
	92.59	164	4.23	5.321E+00	2.005E+00	2.005E+00	45.79
AM-243	43.53	-----	5.90	2.737E-01	-----	Line Not Found	-----
ANH-511	74.66	311	67.20*	3.770E+00	3.373E-01	3.373E-01	23.16
	511.00	89	100.00*	2.454E+00	9.987E-02	9.987E-02	60.30

Flag: "*" = Keyline

Total number of lines in spectrum 60
Number of unidentified lines 19
Number of lines tentatively identified by NID 41 68.33%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	3.651E+00	3.651E+00	0.673E+00	18.44	
CD-109	461.40D	1.05	2.976E+00	3.110E+00	1.113E+00	35.79	
SN-126	2.30E+05Y	1.00	2.976E-01	2.976E-01	1.065E-01	35.79	
EU-155	4.75Y	1.01	1.145E-01	1.158E-01	1.435E-01	123.85	
TL-208	1.41E+10Y	1.00	3.485E-01	3.485E-01	0.739E-01	21.19	
BI-211	7.04E+08Y	1.00	5.220E+00	5.220E+00	0.541E+00	10.36	
BI-212	1.41E+10Y	1.00	1.975E+00	1.975E+00	0.807E+00	40.84	
PB-212	1.41E+10Y	1.00	1.150E+00	1.150E+00	0.105E+00	9.10	
BI-214	1600.00Y	1.00	1.557E+00	1.557E+00	0.182E+00	11.68	
PB-214	1600.00Y	1.00	1.895E+00	1.895E+00	0.196E+00	10.36	
RN-222	1600.00Y	1.00	1.557E+00	1.557E+00	0.182E+00	11.68	
RA-224	1.41E+10Y	1.00	5.823E+00	5.823E+00	1.128E+00	19.37	
RA-226	1600.00Y	1.00	1.895E+00	1.895E+00	0.196E+00	10.36	
AC-228	1.41E+10Y	1.00	1.424E+00	1.424E+00	0.272E+00	19.09	
RA-228	1.41E+10Y	1.00	1.424E+00	1.424E+00	0.272E+00	19.09	
TH-228	1.41E+10Y	1.00	1.150E+00	1.150E+00	0.105E+00	9.10	
TH-229	7340.00Y	1.00	4.588E-01	4.588E-01	1.642E-01	35.79	K
TH-230	7.54E+04Y	1.00	1.895E+00	1.895E+00	0.196E+00	10.36	
TH-232	1.41E+10Y	1.00	1.424E+00	1.424E+00	0.272E+00	19.09	
TH-234	4.47E+09Y	1.00	2.976E+00	2.976E+00	1.876E+00	63.03	
U-234	2.45E+05Y	1.00	1.895E+00	1.895E+00	0.196E+00	10.36	
U-235	7.04E+08Y	1.00	1.300E-01	1.300E-01	2.246E-01	172.77	
U-238	4.47E+09Y	1.00	2.976E+00	2.976E+00	1.876E+00	63.03	
AM-243	7370.00Y	1.00	3.373E-01	3.373E-01	0.781E-01	23.16	
ANH-511	1.00E+09Y	1.00	9.987E-02	9.987E-02	6.023E-02	60.30	
Total Activity :			4.465E+01	4.479E+01			

Grand Total Activity : 4.465E+01 4.479E+01

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

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

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	129.63	104	216	0.81	259.23	256	8	1.25E-02	56.8	6.04E+00	T
4	141.47	15	130	1.02	282.89	281	10	1.84E-03	****	5.93E+00	T
0	191.33	42	171	1.00	382.61	380	7	5.18E-03	****	5.10E+00	
0	254.77	22	81	0.64	509.46	507	5	2.78E-03	****	4.17E+00	T
0	269.61	127	218	1.76	539.13	532	14	1.61E-02	54.8	4.00E+00	T
0	288.13	37	106	0.85	576.16	572	8	4.68E-03	****	3.81E+00	T
0	304.86	37	80	1.72	609.63	607	7	4.71E-03	90.7	3.65E+00	T
0	328.14	98	94	1.41	656.17	651	11	1.26E-02	45.0	3.45E+00	T
0	410.50	15	79	1.40	820.88	816	9	1.99E-03	****	2.91E+00	T
0	463.20	53	91	1.46	926.27	919	12	7.08E-03	78.3	2.65E+00	T
0	488.01	40	57	1.87	975.87	969	11	5.29E-03	82.0	2.54E+00	T
0	494.33	18	49	0.65	988.51	983	9	2.41E-03	****	2.52E+00	
0	640.06	8	27	0.84	1279.94	1276	8	1.06E-03	****	2.04E+00	
0	684.12	37	46	4.84	1368.06	1360	15	5.00E-03	87.8	1.93E+00	
0	768.53	50	54	1.64	1536.85	1531	14	6.88E-03	68.4	1.74E+00	
0	819.38	28	16	1.25	1638.55	1633	13	3.85E-03	74.7	1.64E+00	T
0	864.48	50	72	10.16	1728.75	1715	26	6.95E-03	96.8	1.56E+00	
0	900.01	19	38	3.53	1799.80	1786	19	2.67E-03	****	1.50E+00	T
0	934.62	16	34	1.29	1869.02	1863	11	2.25E-03	****	1.45E+00	T
3	964.44	56	36	2.68	1928.67	1920	25	7.90E-03	52.8	1.41E+00	T
0	1058.25	21	35	6.98	2116.28	2103	18	2.94E-03	****	1.29E+00	
0	1107.85	16	5	2.39	2215.47	2209	12	2.28E-03	77.1	1.24E+00	
3	1164.55	18	9	2.90	2328.87	2323	20	2.62E-03	74.8	1.18E+00	
3	1169.50	18	5	2.19	2338.78	2323	20	2.52E-03	68.2	1.18E+00	
0	1233.15	4	18	0.49	2466.07	2457	11	6.07E-04	****	1.12E+00	
0	1237.95	52	19	1.69	2475.68	2469	16	7.45E-03	46.1	1.12E+00	T
0	1282.73	17	12	1.25	2565.24	2558	14	2.37E-03	****	1.08E+00	
0	1294.85	7	11	1.42	2589.48	2582	10	1.05E-03	****	1.07E+00	
0	1376.95	36	26	0.70	2753.68	2743	20	5.17E-03	78.6	1.02E+00	
0	1467.82	3	8	1.26	2935.42	2928	9	4.17E-04	****	9.66E-01	
0	1523.27	15	3	1.83	3046.34	3040	12	2.24E-03	65.6	9.39E-01	
0	1588.99	36	20	1.12	3177.79	3169	20	5.29E-03	66.2	9.10E-01	
0	1662.59	9	10	1.03	3325.00	3318	11	1.25E-03	****	8.83E-01	
0	1907.83	12	0	1.00	3815.54	3806	16	1.81E-03	55.5	8.23E-01	

Flags: "T" = Tentatively associated

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981002.CNF;1
Acquisition date : 12-DEC-2023 19:29:15 Sensitivity : 3.000
Detector ID : GAM23 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:02.57 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981002 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3639E+02 GRAM
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 6-SEP-2023 11:17:47 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM23_CAN.CNF;21

Combined Critical Level Report

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

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	1.755E-01
CD-109	5.009E-01
SN-126	4.023E-02
EU-155	5.921E-02
TL-208	2.278E-02
BI-211	1.236E-01
BI-212	2.724E-01
PB-212	3.652E-02
BI-214	4.672E-02
PB-214	4.495E-02
RN-222	4.672E-02
RA-224	3.918E-01
RA-226	4.495E-02
AC-228	7.848E-02
RA-228	7.848E-02
TH-228	3.652E-02
TH-229	3.089E-01
TH-230	4.495E-02
TH-232	7.848E-02
TH-234	8.710E-01
U-234	4.495E-02
U-235	1.198E-01
U-238	8.710E-01
AM-243	3.127E-02
ANH-511	1.700E-02

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

Nuclide	Lc (pCi/GRAM)	
BE-7	2.486E-01	NOT IDENT.
NA-22	2.108E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.701E-02	NOT IDENT.
SC-46	2.549E-02	FAIL ABUN
V-48	6.601E-02	NOT IDENT.

CR-51	3.222E-01	NOT IDENT.
MN-52	1.069E+00	FAIL ABUN
MN-54	2.350E-02	NOT IDENT.
CO-56	3.041E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	1.507E-02	NOT IDENT.
CO-58	2.737E-02	NOT IDENT.
FE-59	5.758E-02	NOT IDENT.
CO-60	2.749E-02	NOT IDENT.
ZN-65	6.292E-02	NOT IDENT.
GE-68	7.947E-01	NOT IDENT.
AS-73	8.069E-01	NOT IDENT.
AS-74	9.648E-02	NOT IDENT.
SE-75	2.946E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	3.228E-01	NOT IDENT.
RB-83	5.173E-02	NOT IDENT.
RB-84	5.771E-02	NOT IDENT.
KR-85	4.821E+00	NOT IDENT.
SR-85	2.966E-02	NOT IDENT.
RB-86	7.725E-01	NOT IDENT.
Y-88	2.761E-02	NOT IDENT.
Y-91	9.558E+00	NOT IDENT.
NB-94	2.135E-02	NOT IDENT.
NB-95	3.097E-02	NOT IDENT.
NB-95M	9.182E-02	NOT IDENT.
ZR-95	5.359E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.746E-02	NOT IDENT.
RH-102	3.237E-02	NOT IDENT.
RU-103	2.791E-02	FAIL ABUN
RH-106	1.815E-01	NOT IDENT.
RU-106	1.815E-01	NOT IDENT.
AG-108M	1.595E-02	NOT IDENT.
AG-110	4.524E-01	NOT IDENT.
AG-110M	3.164E-02	NOT IDENT.
SN-113	3.147E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	6.946E-02	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	1.883E-02	NOT IDENT.
SB-124	5.642E-02	NOT IDENT.
SB-125	6.067E-02	FAIL ABUN
TE-125M	6.695E+00	NOT IDENT.
I-126	3.151E-01	NOT IDENT.
SB-126	1.782E-01	NOT IDENT.
SB-127	1.207E+01	NOT IDENT.
I-131	2.502E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	9.604E+00	NOT IDENT.
BA-133	2.335E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	2.939E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	1.357E-01	FAIL ABUN
BA-137M	2.167E-02	NOT IDENT.
CS-137	2.289E-02	NOT IDENT.
LA-138	4.008E-02	NOT IDENT.
CE-139	1.993E-02	NOT IDENT.
BA-140	3.261E-01	FAIL ABUN
LA-140	1.124E-01	FAIL ABUN
CE-141	5.100E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.157E-01	NOT IDENT.
PM-144	2.070E-02	NOT IDENT.
PR-144	1.561E+00	NOT IDENT.
PM-146	2.448E-02	NOT IDENT.
ND-147	8.455E-01	FAIL ABUN
PM-147	4.292E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	1.695E-02	FAIL ABUN
EU-152	6.158E-02	FAIL ABUN
GD-153	4.731E-02	NOT IDENT.
EU-154	5.978E-02	NOT IDENT.
TB-160	9.494E-02	FAIL ABUN

HO-166M	4.254E-02	FAIL ABUN
TM-171	1.441E+01	NOT IDENT.
HF-172	1.086E-01	FAIL ABUN
LU-172	3.754E-02	FAIL ABUN
LU-176	1.654E-02	FAIL ABUN
HF-181	3.306E-02	NOT IDENT.
TA-182	9.852E-02	FAIL ABUN
RE-183	1.607E-01	NOT IDENT.
RE-184	8.301E-02	NOT IDENT.
W-188	4.631E+00	FAIL ABUN
IR-192	2.552E-02	FAIL ABUN
HG-203	3.014E-02	NOT IDENT.
TL-204	2.987E+00	NOT IDENT.
BI-207	2.966E-02	FAIL ABUN
BI-210	3.772E+00	NOT IDENT.
PB-210	3.772E+00	NOT IDENT.
PB-211	4.410E-01	NOT IDENT.
BI-213	6.886E-02	NOT IDENT.
RN-219	2.718E-01	NOT IDENT.
RA-223	4.125E-01	FAIL ABUN
AC-225	9.304E-01	NOT IDENT.
AC-227	1.526E-01	FAIL ABUN
TH-227	1.526E-01	FAIL ABUN
PA-231	3.033E-01	NOT IDENT.
TH-231	4.125E-01	FAIL ABUN
PA-233	4.030E-02	NOT IDENT.
PA-234	1.966E-01	NOT IDENT.
PA-234M	3.189E+00	NOT IDENT.
NP-237	4.030E-02	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
NP-239	1.481E-01	FAIL ABUN
PU-239	2.197E+02	FAIL ABUN
AM-241	1.034E-01	NOT IDENT.
CM-243	5.460E-02	FAIL ABUN
BK-247	4.761E-02	FAIL ABUN
CM-247	2.446E-02	FAIL ABUN
CF-249	2.551E-02	NOT IDENT.
CF-251	7.966E-02	NOT IDENT.

GEL Laboratories LLC
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Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981002.CNF;1
Acquisition date : 12-DEC-2023 19:29:15 Sensitivity : 3.000
Detector ID : GAM23 Energy tolerance : 1.500
Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time : 0 02:00:02.57 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981002 Analyst initials : RXF2
Batch Number : 2529194 Sample Quantity : 1.3639E+02 GRAM
Quantity Err(%) : 1.4664E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 6-SEP-2023 11:17:47 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM23_CAN.CNF;21

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	3.651E+00	7.349E-01	7.349E-01
CD-109	3.110E+00	1.169E+00	1.169E+00
SN-126	2.976E-01	1.107E-01	1.107E-01
EU-155	1.158E-01	1.411E-01	1.411E-01
TL-208	3.485E-01	7.874E-02	7.874E-02
BI-211	5.220E+00	6.767E-01	6.767E-01
BI-212	1.975E+00	8.117E-01	8.117E-01
PB-212	1.150E+00	1.474E-01	1.474E-01
BI-214	1.557E+00	2.257E-01	2.257E-01
PB-214	1.895E+00	2.436E-01	2.436E-01
RN-222	1.557E+00	2.257E-01	2.257E-01
RA-224	5.823E+00	1.226E+00	1.226E+00
RA-226	1.895E+00	2.436E-01	2.436E-01
AC-228	1.424E+00	2.975E-01	2.975E-01
RA-228	1.424E+00	2.975E-01	2.975E-01
TH-228	1.150E+00	1.474E-01	1.474E-01
TH-229	1.732E-01	3.761E-01	3.761E-01
TH-230	1.895E+00	2.436E-01	2.436E-01
TH-232	1.424E+00	2.975E-01	2.975E-01
TH-234	2.976E+00	1.976E+00	1.976E+00
U-234	1.895E+00	2.436E-01	2.436E-01
U-235	1.300E-01	2.204E-01	2.204E-01
U-238	2.976E+00	1.976E+00	1.976E+00
AM-243	3.373E-01	8.607E-02	8.607E-02
ANH-511	9.987E-02	5.966E-02	5.966E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	3.231E-03	2.895E-01	2.895E-01	NOT IDENT.
NA-22	2.883E-03	2.443E-02	2.446E-02	NOT IDENT.
NA-24	2.182E+12	3.386E+12	3.526E+12	SHORT HLIF
AL-26	-7.706E-03	2.290E-02	2.317E-02	NOT IDENT.
SC-46	-4.575E-04	3.090E-02	3.090E-02	FAIL ABUN

V-48	-4.327E-03	7.886E-02	7.888E-02	NOT IDENT.
CR-51	1.495E-01	3.481E-01	3.546E-01	NOT IDENT.
MN-52	5.537E-01	1.166E+00	1.192E+00	FAIL ABUN
MN-54	-2.440E-03	2.755E-02	2.758E-02	NOT IDENT.
CO-56	-1.208E-03	3.546E-02	3.547E-02	FAIL ABUN
MN-56	-1.000E+41	3.606E+42	0.000E+00	SHORT HLIF
CO-57	-1.198E-05	1.682E-02	1.682E-02	NOT IDENT.
CO-58	-2.101E-03	3.190E-02	3.191E-02	NOT IDENT.
FE-59	-3.336E-02	7.500E-02	7.649E-02	NOT IDENT.
CO-60	-1.158E-02	3.363E-02	3.403E-02	NOT IDENT.
ZN-65	5.947E-02	7.511E-02	7.975E-02	NOT IDENT.
GE-68	3.612E-01	8.941E-01	9.089E-01	NOT IDENT.
AS-73	-2.238E-02	1.018E+00	1.018E+00	NOT IDENT.
AS-74	3.496E-02	1.112E-01	1.123E-01	NOT IDENT.
SE-75	5.543E-03	3.820E-02	3.828E-02	NOT IDENT.
BR-77	1.134E+04	9.711E+03	1.097E+04	SHORT HLIF
SR-82	-3.627E-02	3.753E-01	3.757E-01	NOT IDENT.
RB-83	6.812E-03	6.023E-02	6.031E-02	NOT IDENT.
RB-84	-2.655E-03	6.773E-02	6.774E-02	NOT IDENT.
KR-85	6.302E-01	6.275E+00	6.282E+00	NOT IDENT.
SR-85	3.811E-03	3.862E-02	3.865E-02	NOT IDENT.
RB-86	-1.191E-01	9.437E-01	9.452E-01	NOT IDENT.
Y-88	1.399E-02	2.983E-02	3.049E-02	NOT IDENT.
Y-91	-2.606E+00	1.271E+01	1.276E+01	NOT IDENT.
NB-94	7.664E-03	2.348E-02	2.374E-02	NOT IDENT.
NB-95	2.825E-02	3.589E-02	3.809E-02	NOT IDENT.
NB-95M	1.652E-02	1.177E-01	1.180E-01	NOT IDENT.
ZR-95	5.485E-04	6.203E-02	6.203E-02	NOT IDENT.
NB-97	-1.000E+41	3.592E+41	0.000E+00	SHORT HLIF
ZR-97	2.720E+12	1.479E+12	1.921E+12	SHORT HLIF
MO-99	1.209E+02	3.033E+02	3.082E+02	SHORT HLIF
TC-99M	1.336E+33	3.294E+33	0.000E+00	SHORT HLIF
RH-101	5.349E-03	2.069E-02	2.083E-02	NOT IDENT.
RH-102	-2.070E-03	3.931E-02	3.932E-02	NOT IDENT.
RU-103	-8.539E-04	3.675E-02	3.675E-02	FAIL ABUN
RH-106	-1.323E-01	2.364E-01	2.438E-01	NOT IDENT.
RU-106	-1.323E-01	2.364E-01	2.438E-01	NOT IDENT.
AG-108M	-2.710E-03	1.869E-02	1.873E-02	NOT IDENT.
AG-110	-2.031E-01	5.752E-01	5.824E-01	NOT IDENT.
AG-110M	2.004E-03	3.668E-02	3.669E-02	NOT IDENT.
SN-113	1.054E-03	3.580E-02	3.580E-02	NOT IDENT.
CD-115	2.418E+02	6.790E+02	6.877E+02	SHORT HLIF
SN-117M	1.359E-02	7.870E-02	7.894E-02	NOT IDENT.
SB-122	-1.597E+01	5.711E+01	5.756E+01	SHORT HLIF
TE-123M	1.178E-02	2.085E-02	2.152E-02	NOT IDENT.
SB-124	-3.130E-02	7.557E-02	7.688E-02	NOT IDENT.
SB-125	2.766E-02	6.740E-02	6.854E-02	FAIL ABUN
TE-125M	3.725E+00	7.185E+00	7.379E+00	NOT IDENT.
I-126	3.211E-01	3.439E-01	3.732E-01	NOT IDENT.
SB-126	-1.426E-01	2.541E-01	2.621E-01	NOT IDENT.
SB-127	4.341E+00	1.590E+01	1.602E+01	NOT IDENT.
I-131	1.711E-01	2.689E-01	2.798E-01	NOT IDENT.
I-132	-1.000E+41	3.457E+41	0.000E+00	SHORT HLIF
TE-132	-2.746E+00	1.165E+01	1.172E+01	NOT IDENT.
BA-133	-1.668E-02	3.131E-02	3.220E-02	FAIL ABUN
I-133	-2.584E+08	3.799E+08	3.974E+08	SHORT HLIF
CS-134	4.063E-02	2.962E-02	3.483E-02	NOT IDENT.
I-135	5.578E+30	1.750E+31	0.000E+00	SHORT HLIF
CS-136	1.228E-02	1.727E-01	1.728E-01	FAIL ABUN
BA-137M	7.830E-03	2.526E-02	2.551E-02	NOT IDENT.
CS-137	8.272E-03	2.669E-02	2.695E-02	NOT IDENT.
LA-138	-4.821E-05	4.703E-02	4.703E-02	NOT IDENT.
CE-139	1.475E-02	2.224E-02	2.321E-02	NOT IDENT.
BA-140	2.081E-02	3.831E-01	3.832E-01	FAIL ABUN
LA-140	-1.373E-01	1.941E-01	2.037E-01	FAIL ABUN
CE-141	-1.829E-02	6.556E-02	6.607E-02	NOT IDENT.
CE-143	2.006E+05	1.250E+05	1.543E+05	SHORT HLIF
CE-144	3.430E-02	1.379E-01	1.387E-01	NOT IDENT.
PM-144	4.755E-03	2.298E-02	2.308E-02	NOT IDENT.
PR-144	3.585E-01	1.732E+00	1.740E+00	NOT IDENT.
PM-146	-1.089E-02	2.955E-02	2.995E-02	NOT IDENT.
ND-147	-4.899E-01	1.054E+00	1.077E+00	FAIL ABUN
PM-147	2.781E+02	4.618E+02	4.786E+02	NOT IDENT.
PM-149	-4.519E+03	6.116E+03	6.447E+03	SHORT HLIF
EU-150	1.338E-02	1.972E-02	2.063E-02	FAIL ABUN
EU-152	2.167E-02	6.758E-02	6.828E-02	FAIL ABUN
GD-153	-1.865E-02	5.287E-02	5.353E-02	NOT IDENT.
EU-154	9.567E-03	6.901E-02	6.915E-02	NOT IDENT.

TB-160	2.306E-02	1.077E-01	1.082E-01	FAIL ABUN
HO-166M	2.362E-02	4.616E-02	4.737E-02	FAIL ABUN
TM-171	-2.632E+01	2.085E+01	2.399E+01	NOT IDENT.
HF-172	-8.941E-03	1.222E-01	1.222E-01	FAIL ABUN
LU-172	1.044E-02	4.330E-02	4.356E-02	FAIL ABUN
LU-176	3.244E-04	2.036E-02	2.036E-02	FAIL ABUN
HF-181	7.572E-03	4.208E-02	4.222E-02	NOT IDENT.
TA-182	-2.655E-02	1.248E-01	1.254E-01	FAIL ABUN
RE-183	3.045E-02	1.667E-01	1.672E-01	NOT IDENT.
RE-184	1.123E-02	1.276E-01	1.277E-01	NOT IDENT.
W-188	-5.578E-01	6.245E+00	6.250E+00	FAIL ABUN
IR-192	7.958E-03	2.788E-02	2.811E-02	FAIL ABUN
HG-203	6.296E-03	3.930E-02	3.940E-02	NOT IDENT.
TL-204	-3.779E+00	3.738E+00	4.108E+00	NOT IDENT.
BI-207	1.146E-02	3.597E-02	3.634E-02	FAIL ABUN
BI-210	3.985E+00	4.304E+00	4.664E+00	NOT IDENT.
PB-210	3.985E+00	4.304E+00	4.664E+00	NOT IDENT.
PB-211	1.090E-02	5.037E-01	5.037E-01	NOT IDENT.
BI-213	4.253E-02	7.567E-02	7.806E-02	NOT IDENT.
RN-219	1.025E-01	3.026E-01	3.061E-01	NOT IDENT.
RA-223	1.961E-01	4.926E-01	5.005E-01	FAIL ABUN
AC-225	-3.407E-01	1.129E+00	1.139E+00	NOT IDENT.
AC-227	1.526E-01	2.065E-01	2.177E-01	FAIL ABUN
TH-227	1.526E-01	2.065E-01	2.177E-01	FAIL ABUN
PA-231	-1.943E-02	3.748E-01	3.749E-01	NOT IDENT.
TH-231	1.961E-01	4.926E-01	5.005E-01	FAIL ABUN
PA-233	1.246E-02	4.393E-02	4.429E-02	NOT IDENT.
PA-234	3.900E-02	2.306E-01	2.313E-01	NOT IDENT.
PA-234M	2.745E+00	3.431E+00	3.647E+00	NOT IDENT.
NP-237	1.246E-02	4.393E-02	4.429E-02	NOT IDENT.
NP-238	-1.435E+01	1.300E+03	1.300E+03	SHORT HLIF
NP-239	-7.306E-02	1.692E-01	1.724E-01	FAIL ABUN
PU-239	7.488E+02	4.211E+02	5.397E+02	FAIL ABUN
AM-241	-4.106E-02	1.109E-01	1.125E-01	NOT IDENT.
CM-243	-4.181E-02	6.801E-02	7.057E-02	FAIL ABUN
BK-247	-3.287E-05	6.272E-02	6.272E-02	FAIL ABUN
CM-247	1.225E-03	2.787E-02	2.788E-02	FAIL ABUN
CF-249	-2.116E-02	3.088E-02	3.232E-02	NOT IDENT.
CF-251	2.457E-02	9.073E-02	9.140E-02	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	97.6359	85.43	100.7245	131.20	107.3037
45.60	104.4470	86.55	119.6511	133.02	118.0435
46.54	86.5515	86.79	119.7486	133.52	106.6257
49.72	105.3741	86.94	119.8103	136.00	107.5821
51.35	91.7146	87.09	119.8721	136.47	108.6726
51.87	86.1206	87.57	120.0682	140.51	0.0000
52.39	115.6196	88.03	172.7600	143.76	133.2213
52.97	98.3444	88.34	172.9406	144.24	133.3665
53.44	91.2200	88.47	173.0168	145.44	130.7552
54.07	98.8852	89.96	175.0171	152.43	122.7260
57.36	0.0000	1093.63	175.4119	153.25	117.9034
57.53	92.2979	91.11	175.6829	323.87	129.2539
57.98	92.4926	92.59	176.5335	156.02	138.8772
59.27	109.6914	93.35	176.9690	158.56	124.3363
59.32	109.7169	94.56	136.1266	159.00	110.1687
59.54	109.0706	94.65	136.1650	162.33	109.9029
60.96	92.4978	94.67	136.1746	162.66	109.9764
61.17	98.6898	94.87	136.2610	163.33	124.5375
62.93	120.7427	97.43	117.8644	165.86	109.6586
63.29	120.9332	98.43	102.4669	176.31	101.3730
63.58	121.0868	98.44	102.4696	176.60	108.8246
64.28	118.6192	99.53	122.1468	177.52	113.2499
66.73	128.2038	100.11	117.9615	181.07	0.0000
67.24	136.3119	102.03	110.9748	181.52	118.0173
125.81	137.3463	103.18	113.7256	184.41	120.0818
67.75	137.3863	103.37	113.7900	143.76	120.3706
68.89	143.5552	105.21	114.4082	193.51	93.0065
69.67	126.6064	105.31	114.4424	197.03	105.2813
70.82	152.6323	106.12	114.7129	198.01	118.6441
70.83	152.6396	106.47	124.3982	201.83	132.6965
72.81	134.6133	109.28	109.4282	203.43	117.5355
72.87	134.6440	111.00	149.9454	205.31	102.3362
74.66	135.5836	111.76	110.1945	210.85	106.2775
74.82	135.6682	114.06	117.3125	215.65	126.7255
74.97	135.7463	116.30	120.7956	218.12	103.3734
77.11	136.8525	116.74	123.7091	222.11	109.7461
78.74	126.7570	119.76	115.4014	227.09	94.4734
79.69	141.4559	121.12	99.9362	227.38	92.2107
80.03	125.1606	121.22	99.0281	228.16	106.1700
80.12	131.7932	121.78	110.3990	228.18	106.1729
80.19	131.8274	122.06	116.0967	116.74	106.1729
80.57	138.6097	122.92	132.3080	235.69	116.7282
81.00	138.8251	123.07	132.3586	235.96	116.7755
81.07	138.8597	265.00	121.2849	238.63	110.2065
81.75	121.5232	125.81	117.2178	238.98	0.0000
82.47	139.5595	127.23	102.4579	240.99	110.5909
83.79	115.7294	127.91	106.4347	242.00	110.7544
84.00	115.8151	129.30	104.8958	244.70	70.9735

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	86.1119	344.28	60.7091	563.25	32.3425
252.80	81.3736	345.93	60.3699	564.24	0.0000
254.15	0.0000	351.06	62.9504	569.33	44.3883
256.23	92.9892	351.93	63.0088	946.00	42.2278
260.90	0.0000	355.39	0.0000	569.70	42.2341
264.66	76.2316	356.01	62.3768	583.19	42.6261
264.80	76.2469	364.49	48.3364	584.27	42.6578
265.00	76.2660	366.42	0.0000	595.83	30.8643
269.46	72.2357	372.51	66.2021	427.87	30.9622
270.03	72.2916	375.05	69.1376	602.52	0.0000
271.23	72.4068	377.52	57.2937	604.72	33.2629
273.65	86.1819	356.01	51.1451	607.14	39.9800
276.40	97.2026	388.16	75.6409	609.32	47.8221
277.37	84.1284	388.63	65.3986	610.33	47.8536
277.60	84.1533	391.69	60.9071	614.28	25.1038
278.00	84.1969	264.66	55.7602	618.01	38.0259
279.20	82.6741	401.81	57.7137	620.36	30.2421
279.54	82.7108	402.40	61.5326	621.93	39.2426
279.70	76.1108	404.85	55.0323	630.19	0.0000
280.46	84.4667	410.95	61.5474	631.29	32.7088
283.69	66.5234	413.71	47.3549	633.25	32.7501
284.31	91.5413	414.70	43.0893	634.78	27.1289
285.41	83.7541	423.72	63.7173	635.95	30.5431
285.90	0.0000	427.09	33.8920	636.99	33.9587
287.50	71.8591	427.87	49.4197	657.50	38.9763
290.67	65.4348	433.94	39.9440	657.76	35.5435
293.27	0.0000	439.40	46.9883	657.90	0.0000
351.93	72.5555	440.45	45.0716	661.66	29.8816
295.96	72.6220	453.88	48.5673	664.57	0.0000
879.38	78.7847	463.37	52.9526	666.33	26.5076
299.98	70.2643	468.07	34.9048	666.50	26.5105
300.09	66.1997	473.00	35.2478	667.71	0.0000
300.13	66.2029	475.06	42.3683	677.62	22.6262
301.36	82.8766	476.78	47.4781	685.70	38.4731
302.85	100.9102	477.60	48.5205	692.65	0.0000
256.23	60.1542	482.18	38.0470	695.00	38.6826
304.85	69.1430	487.02	37.6850	696.49	29.0361
306.78	71.8696	492.35	0.0000	696.51	29.0371
308.46	60.4396	497.08	33.8788	697.00	24.6444
311.90	64.5599	505.52	26.3513	697.30	23.7684
316.51	67.5057	507.63	0.0000	697.49	23.7708
319.41	71.2061	511.00	40.4711	702.65	32.6720
320.08	57.3552	514.00	57.7244	706.68	47.7938
321.04	70.4696	514.00	57.7244	711.68	34.6154
323.87	65.4602	520.40	43.8953	720.70	37.1109
325.23	57.6949	520.69	0.0000	721.93	0.0000
328.76	66.7010	522.65	0.0000	722.78	30.0091
333.37	47.6378	527.90	0.0000	722.91	30.0111
333.97	54.2905	528.26	38.8970	723.31	28.5889
334.37	62.2627	529.59	48.4071	724.19	22.8820
338.28	69.1847	529.87	0.0000	727.33	25.9671
338.32	69.1879	531.02	48.4576	733.00	24.4317
311.90	77.3534	537.26	32.8063	735.93	30.5884
340.48	77.3534	546.56	0.0000	333.97	30.6143
340.55	77.3587	552.55	31.0296	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	32.5360	949.00	28.9531	1384.29	18.7227
747.24	25.3468	667.71	0.0000	1408.01	14.1438
748.06	28.0748	962.31	15.0623	1434.09	13.3048
752.31	26.3237	964.08	15.0737	1435.80	16.1641
753.82	32.7052	966.17	15.0874	1457.56	0.0000
756.73	29.1162	911.20	15.1053	1460.82	7.9826
756.80	29.1172	983.53	16.2124	1489.16	8.6924
884.68	26.3057	984.45	0.0000	1505.03	27.1660
765.81	23.4063	1274.44	21.3929	1584.12	16.5308
766.42	32.1943	1001.03	20.4144	1596.21	18.2429
766.84	33.6645	1002.74	25.5363	1620.50	9.0141
772.60	0.0000	1004.73	27.6023	1621.92	10.0195
776.52	34.9408	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	10.2017
778.90	32.2218	1028.54	0.0000	1750.46	0.0000
783.70	32.3030	1037.84	24.8687	1764.49	8.3133
788.74	32.3874	1038.76	0.0000	1063.66	8.6719
792.07	41.7123	631.29	25.9964	1771.35	3.4697
795.86	19.5036	1048.07	20.8093	1791.20	0.0000
810.06	36.4828	1049.04	16.6533	1808.65	7.3527
810.29	35.5519	1050.41	23.3283	1810.72	0.0000
344.28	35.5543	1063.66	15.3542	1836.06	5.2864
810.76	28.0737	1077.00	21.0474		
815.77	30.0205	1077.34	16.8398		
1048.07	22.5461	1085.87	21.1194		
832.01	25.5350	1093.63	16.9463		
834.85	31.2527	1099.45	21.2305		
835.71	33.1607	1112.07	29.0112		
836.80	0.0000	1112.84	27.7393		
846.75	0.0000	1115.54	18.7967		
846.77	33.3401	1120.29	26.7471		
856.80	19.9094	1120.55	26.7502		
860.56	21.0963	1221.41	26.7578		
871.09	30.8389	1129.67	17.1787		
873.19	29.3257	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	23.2192	1173.23	19.1995		
880.51	22.2637	1177.95	14.2053		
881.60	26.1488	1189.05	15.3586		
883.24	22.2918	1204.77	8.8252		
884.68	24.2470	1221.41	17.7529		
889.28	22.2154	1231.02	14.2492		
894.76	23.3855	1235.36	26.7568		
898.04	21.4689	1238.28	17.8564		
900.72	20.3233	1260.41	0.0000		
903.28	15.6514	1271.87	9.0298		
911.20	21.5985	1274.44	11.0460		
912.08	21.6072	1274.54	11.0465		
923.98	0.0000	1291.59	12.1185		
926.50	30.6443	1298.22	0.0000		
929.11	23.7517	1312.11	10.0649		
935.54	14.2919	1332.49	23.9472		
937.49	15.8936	1362.66	0.0000		
944.13	15.9399	1365.19	12.0974		
946.00	24.9268	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 12-DEC-2023 21:30:42.58

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981003.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM31.CNF;737
Background date    : 10-DEC-2023 11:04:48
Sample date       : 13-NOV-2023 12:00:00 Acquisition date : 12-DEC-2023 19:30:01
Sample ID        : G645981003 Sample quantity : 1.37890E+02 GRAM
Detector name     : GAM31 Detector geometry: CAN
Elapsed live time : 0 02:00:00.00 Elapsed real time: 0 02:00:07.09 0.1%
Energy tolerance  : 1.50000 keV Analyst Initials : RXF2
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 2529194 Detector SN# :
Matrix Spike ID   : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	53.10*	47	482	0.62	106.67	104	7	6.49E-03	82.4	
2	0	63.56*	163	724	1.23	127.62	124	9	2.27E-02	32.3	
3	2	75.04*	393	396	1.00	150.61	145	15	5.46E-02	9.7	1.31E+00
4	2	77.30*	664	333	0.86	155.15	145	15	9.22E-02	5.8	
5	0	84.12*	118	382	1.31	168.80	165	8	1.63E-02	31.2	
6	0	87.31	201	386	1.09	175.18	172	7	2.79E-02	17.6	
7	8	92.93*	248	303	1.17	186.44	183	10	3.44E-02	14.3	2.90E+00
8	0	143.66*	52	248	2.65	288.00	284	10	7.26E-03	58.9	
9	4	186.09*	246	166	1.30	372.96	367	17	3.41E-02	11.8	1.25E+00
10	4	189.16	33	195	1.74	379.10	367	17	4.53E-03	88.3	
11	0	209.57	49	187	0.88	419.98	416	9	6.78E-03	52.7	
12	2	238.84*	591	104	1.14	478.58	475	26	8.21E-02	5.2	1.00E+00
13	2	242.09	233	132	1.51	485.09	475	26	3.23E-02	11.0	
14	0	270.57*	77	157	2.59	542.11	536	12	1.07E-02	35.6	
15	0	295.36*	364	151	1.33	591.74	584	14	5.06E-02	9.0	
16	0	300.43*	42	92	0.93	601.90	597	11	5.88E-03	48.4	
17	0	328.59	32	132	0.71	658.28	654	11	4.49E-03	71.6	
18	0	338.52	157	107	1.13	678.16	674	11	2.18E-02	15.0	
19	0	352.13*	588	182	1.19	705.42	700	12	8.17E-02	6.3	
20	0	396.55	24	61	1.57	794.35	790	9	3.39E-03	61.7	
21	0	446.36	33	57	3.71	894.07	888	12	4.52E-03	49.6	
22	0	463.86	66	65	1.20	929.11	923	13	9.17E-03	28.0	
23	0	511.16*	33	98	1.88	1023.81	1015	15	4.57E-03	80.3	
24	0	528.08	21	48	0.58	1057.68	1051	13	2.85E-03	73.4	
25	0	583.32*	121	65	1.46	1168.28	1163	11	1.68E-02	16.3	
26	0	609.49*	462	63	1.37	1220.67	1214	15	6.41E-02	6.1	
27	0	655.34	68	66	8.23	1312.48	1298	27	9.46E-03	35.7	
28	0	690.61	21	28	0.58	1383.08	1377	11	2.92E-03	56.2	
29	0	727.65*	47	56	1.71	1457.23	1448	15	6.54E-03	38.1	
30	0	769.25	26	34	0.95	1540.51	1535	8	3.55E-03	45.0	
31	0	807.31	17	30	2.01	1616.71	1607	12	2.36E-03	68.9	
32	0	852.16	31	26	2.71	1706.51	1697	18	4.25E-03	43.7	
33	0	870.77	14	101	5.75	1743.77	1718	34	1.98E-03	211.2	
34	8	911.17*	89	18	1.96	1824.64	1819	18	1.24E-02	15.8	1.25E+00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	8	915.29	13	5	2.35	1832.88	1819	18	1.80E-03	50.0	
36	0	935.13	15	49	0.73	1872.60	1863	14	2.08E-03	102.3	
37	4	964.70	27	19	1.94	1931.79	1928	19	3.69E-03	33.0	1.80E+00
38	4	968.90*	66	26	2.06	1940.21	1928	19	9.15E-03	21.0	
39	0	993.52	14	10	3.90	1989.49	1982	14	1.94E-03	55.9	
40	0	1000.12	30	13	2.27	2002.70	1996	13	4.18E-03	30.7	
41	0	1005.59	15	8	3.14	2013.66	2009	9	2.03E-03	45.1	
42	0	1089.28	21	3	1.43	2181.20	2174	14	2.87E-03	29.1	
43	0	1120.31	102	24	1.26	2243.30	2238	12	1.42E-02	13.8	
44	0	1153.75	9	14	1.29	2310.24	2307	8	1.25E-03	76.2	
45	0	1216.92	12	7	1.70	2436.71	2433	9	1.67E-03	48.7	
46	0	1238.36	71	20	1.80	2479.62	2472	15	9.86E-03	18.6	
47	0	1376.81	35	9	1.43	2756.76	2749	13	4.81E-03	25.1	
48	0	1402.05	11	13	2.94	2807.30	2797	13	1.50E-03	75.1	
49	0	1409.82	22	9	5.31	2822.84	2816	14	3.12E-03	36.6	
50	0	1460.37*	69	3	1.47	2924.02	2917	13	9.52E-03	14.5	
51	0	1729.65	14	7	1.58	3463.01	3458	10	1.88E-03	46.6	
52	0	1764.56*	58	9	1.54	3532.89	3527	12	8.10E-03	17.4	

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

VMS Nuclide Identification Report V3.1 Generated 12-DEC-2023 21:30:44

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981003.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 13-NOV-2023 12:00:00	Acquisition date	: 12-DEC-2023 19:30:01
Sample ID	: G645981003	Sample quantity	: 137.89 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA31	Detector geometry	: CAN
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:07.09 0.1%
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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	66	10.66*	7.028E-01	2.384E+00	2.384E+00	28.94
AS-73	53.44	58	10.30*	5.918E+00	2.574E-01	3.316E-01	164.87
CD-109	88.03	240	3.70*	5.636E+00	3.129E+00	3.270E+00	35.22
SN-126	64.28	199	9.60	5.955E+00	9.478E-01	9.478E-01	64.54
	86.94	240	8.90	5.636E+00	1.301E+00	1.301E+00	35.22
	87.57	240	37.00*	5.636E+00	3.129E-01	3.129E-01	35.22
TL-208	277.37	-----	6.60	2.854E+00	-----	Line Not Found	-----
	583.19	125	85.00*	1.527E+00	2.629E-01	2.629E-01	32.52
	860.56	-----	12.50	1.091E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	5.872E+00	-----	Line Not Found	-----
	351.06	632	12.92*	2.350E+00	5.669E+00	5.669E+00	12.60
BI-212	727.33	48	6.67*	1.261E+00	1.548E+00	1.548E+00	76.17
	1620.50	-----	1.47	6.468E-01	-----	Line Not Found	-----
PB-212	74.82	474	10.28	5.842E+00	2.147E+00	2.147E+00	19.40
	77.11	798	17.10	5.809E+00	2.186E+00	2.186E+00	11.64
	238.63	655	43.60*	3.205E+00	1.276E+00	1.276E+00	10.34
	300.09	46	3.30	2.677E+00	1.419E+00	1.419E+00	96.82
BI-214	609.32	476	45.49*	1.470E+00	1.937E+00	1.937E+00	12.24
	1120.29	100	14.92	8.733E-01	2.087E+00	2.087E+00	27.59
	1764.49	55	15.30	6.049E-01	1.615E+00	1.615E+00	34.78
PB-214	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
RN-222	609.32	476	45.49*	1.470E+00	1.937E+00	1.937E+00	12.24
	1120.29	100	14.92	8.733E-01	2.087E+00	2.087E+00	27.59
	1764.49	55	15.30	6.049E-01	1.615E+00	1.615E+00	34.78
RA-224	240.99	258	4.10*	3.172E+00	5.392E+00	5.392E+00	22.09
RA-226	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
AC-228	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
RA-228	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
TH-228	74.82	474	10.28	5.842E+00	2.147E+00	2.147E+00	19.40
	77.11	798	17.10	5.809E+00	2.186E+00	2.186E+00	11.64
	238.63	655	43.60*	3.205E+00	1.276E+00	1.276E+00	10.34

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-229	300.09	46	3.30	2.677E+00	1.419E+00	1.419E+00	96.82
	85.43	141	14.70	5.694E+00	4.571E-01	4.571E-01	62.38
	88.47	240	24.00	5.636E+00	4.824E-01	4.824E-01	35.22
	193.51	-----	4.41*	3.735E+00	-----	Line Not Found	-----
TH-230	210.85	55	2.80	3.530E+00	1.503E+00	1.503E+00	105.40
	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
PA-231	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
	283.69	-----	1.70	2.803E+00	-----	Line Not Found	-----
	301.36	46	5.35*	2.677E+00	8.754E-01	8.754E-01	96.82
TH-232	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
TH-234	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
	63.29	199	3.70*	5.955E+00	2.459E+00	2.459E+00	64.54
	92.59	294	4.23	5.526E+00	3.423E+00	3.423E+00	28.70
U-234	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
U-235	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
	89.96	-----	3.47	5.585E+00	-----	Line Not Found	-----
	93.35	294	5.60	5.526E+00	2.585E+00	2.585E+00	28.70
	143.76	60	10.96*	4.517E+00	3.307E-01	3.307E-01	117.76
	163.33	-----	5.08	4.180E+00	-----	Line Not Found	-----
U-238	185.72	277	57.20	3.837E+00	3.439E-01	3.439E-01	23.53
	205.31	-----	5.01	3.582E+00	-----	Line Not Found	-----
	63.29	199	3.70*	5.955E+00	2.459E+00	2.459E+00	64.54
	92.59	294	4.23	5.526E+00	3.423E+00	3.423E+00	28.70
AM-243	43.53	-----	5.90	5.667E+00	-----	Line Not Found	-----
ANH-511	74.66	474	67.20*	5.842E+00	3.285E-01	3.285E-01	19.40
	511.00	34	100.00*	1.711E+00	5.464E-02	5.464E-02	160.67

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981003.CNF;1
Acquisition date : 12-DEC-2023 19:30:01 Sensitivity : 3.000
Detector ID : GAM31 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:07.09 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Analyst initials: RXF2
Sample ID : G645981003 Sample Quantity : 1.3789E+02 GRAM
Batch Number : 2529194 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : SOLID.NLB;17

CALIBRATION INFORMATION

Eff. Cal. date : 5-JUN-2023 07:16:39 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM31_CAN.CNF;17

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	2.384E+00	6.760E-01	5.587E-01
AS-73	3.316E-01	5.359E-01	4.765E-01
CD-109	3.270E+00	1.129E+00	1.237E+00
SN-126	3.129E-01	1.080E-01	1.066E-01
TL-208	2.629E-01	8.377E-02	6.880E-02
BI-211	5.669E+00	6.998E-01	3.712E-01
BI-212	1.548E+00	1.156E+00	9.919E-01
PB-212	1.276E+00	1.292E-01	9.970E-02
BI-214	1.937E+00	2.323E-01	1.187E-01
PB-214	2.057E+00	2.540E-01	1.350E-01
RN-222	1.937E+00	2.323E-01	1.187E-01
RA-224	5.392E+00	1.167E+00	1.069E+00
RA-226	2.057E+00	2.540E-01	1.350E-01
AC-228	9.013E-01	2.793E-01	2.680E-01
RA-228	9.013E-01	2.793E-01	2.680E-01
TH-228	1.276E+00	1.292E-01	9.970E-02
TH-229	-3.162E-03	5.470E-01	8.872E-01
TH-230	2.057E+00	2.540E-01	1.350E-01
PA-231	8.754E-01	8.306E-01	7.123E-01
TH-232	9.013E-01	2.793E-01	2.680E-01
TH-234	2.459E+00	1.555E+00	1.126E+00
U-234	2.057E+00	2.540E-01	1.350E-01
U-235	3.307E-01	3.816E-01	3.100E-01
U-238	2.459E+00	1.555E+00	1.126E+00
AM-243	3.285E-01	6.246E-02	5.776E-02
ANH-511	5.464E-02	8.604E-02	5.079E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	3.036E-01	3.780E-01	7.633E-01	NOT IDENT.
NA-22	-6.852E-03	3.559E-02	6.740E-02	NOT IDENT.
NA-24	0.000E+00	4.706E+12	0.000E+00	SHORT HLIF
AL-26	7.016E-03	2.871E-02	6.498E-02	NOT IDENT.

SC-46	4.148E-03	3.980E-02	7.951E-02	FAIL ABUN
V-48	1.298E-01	1.117E-01	2.534E-01	NOT IDENT.
CR-51	5.847E-02	4.657E-01	9.010E-01	NOT IDENT.
MN-52	2.763E-01	1.242E+00	2.568E+00	FAIL ABUN
MN-54	1.431E-02	3.413E-02	7.022E-02	NOT IDENT.
CO-56	-3.897E-03	4.428E-02	7.625E-02	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-3.756E-03	2.321E-02	4.168E-02	NOT IDENT.
CO-58	-1.891E-02	5.217E-02	7.883E-02	NOT IDENT.
FE-59	-5.030E-02	9.994E-02	1.803E-01	NOT IDENT.
CO-60	1.612E-02	3.257E-02	7.017E-02	NOT IDENT.
ZN-65	2.618E-02	9.317E-02	1.663E-01	NOT IDENT.
GE-68	-2.008E-01	1.041E+00	2.000E+00	NOT IDENT.
AS-74	4.168E-02	1.724E-01	3.259E-01	NOT IDENT.
SE-75	-3.100E-03	4.444E-02	8.158E-02	NOT IDENT.
BR-77	0.000E+00	1.274E+03	0.000E+00	SHORT HLIF
SR-82	-3.423E-01	4.739E-01	7.792E-01	NOT IDENT.
RB-83	-4.126E-02	7.619E-02	1.344E-01	NOT IDENT.
RB-84	-8.159E-03	7.881E-02	1.545E-01	NOT IDENT.
KR-85	3.665E+00	7.601E+00	1.343E+01	NOT IDENT.
SR-85	2.227E-02	4.676E-02	8.256E-02	NOT IDENT.
RB-86	-3.523E-01	1.116E+00	2.092E+00	NOT IDENT.
Y-88	3.112E-03	3.373E-02	7.468E-02	NOT IDENT.
Y-91	-1.563E+01	1.887E+01	3.170E+01	NOT IDENT.
NB-94	8.397E-03	3.546E-02	6.648E-02	FAIL ABUN
NB-95	-1.012E-02	5.289E-02	8.311E-02	NOT IDENT.
NB-95M	6.124E-02	1.503E-01	2.491E-01	NOT IDENT.
ZR-95	-2.630E-02	9.125E-02	1.602E-01	NOT IDENT.
NB-97	0.000E+00	1.318E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	1.963E+12	0.000E+00	SHORT HLIF
MO-99	0.000E+00	4.560E+02	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	3.763E+33	0.000E+00	SHORT HLIF
RH-101	-4.336E-02	3.014E-02	4.838E-02	NOT IDENT.
RH-102	-2.046E-02	5.855E-02	1.036E-01	NOT IDENT.
RU-103	-6.511E-03	5.098E-02	9.427E-02	FAIL ABUN
RH-106	2.803E-01	3.114E-01	6.384E-01	NOT IDENT.
RU-106	2.803E-01	3.114E-01	6.384E-01	NOT IDENT.
AG-108M	-9.981E-03	2.666E-02	4.868E-02	NOT IDENT.
AG-110	5.302E-01	7.444E-01	1.491E+00	NOT IDENT.
AG-110M	2.762E-02	4.585E-02	9.718E-02	NOT IDENT.
SN-113	-1.557E-02	4.921E-02	8.610E-02	NOT IDENT.
CD-115	0.000E+00	1.698E+03	0.000E+00	SHORT HLIF
SN-117M	8.875E-03	1.127E-01	2.015E-01	NOT IDENT.
SB-122	0.000E+00	7.576E+01	0.000E+00	SHORT HLIF
TE-123M	4.946E-03	3.050E-02	5.483E-02	NOT IDENT.
SB-124	-2.910E-02	8.597E-02	1.594E-01	NOT IDENT.
SB-125	4.081E-02	8.616E-02	1.699E-01	FAIL ABUN
TE-125M	5.916E+00	9.823E+00	1.847E+01	NOT IDENT.
I-126	1.290E-01	4.837E-01	9.163E-01	NOT IDENT.
SB-126	2.378E-01	3.163E-01	5.924E-01	NOT IDENT.
SB-127	2.444E+00	1.835E+01	3.093E+01	NOT IDENT.
I-131	3.929E-01	3.766E-01	7.732E-01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-2.993E-01	1.541E+01	2.690E+01	NOT IDENT.
BA-133	1.936E-02	4.261E-02	7.642E-02	NOT IDENT.
I-133	0.000E+00	4.909E+08	0.000E+00	SHORT HLIF
CS-134	7.176E-02	4.180E-02	9.206E-02	NOT IDENT.
I-135	0.000E+00	1.846E+31	0.000E+00	SHORT HLIF
CS-136	5.879E-02	1.767E-01	3.686E-01	NOT IDENT.
BA-137M	-8.836E-03	3.617E-02	5.740E-02	NOT IDENT.
CS-137	-9.335E-03	3.821E-02	6.063E-02	NOT IDENT.
LA-138	8.744E-04	5.033E-02	1.000E-01	NOT IDENT.
CE-139	-9.235E-03	3.040E-02	5.300E-02	NOT IDENT.
BA-140	-9.099E-02	5.986E-01	1.096E+00	NOT IDENT.
LA-140	-2.225E-01	2.043E-01	3.016E-01	FAIL ABUN
CE-141	1.150E-02	8.692E-02	1.415E-01	NOT IDENT.
CE-143	0.000E+00	1.594E+05	0.000E+00	SHORT HLIF
CE-144	-8.440E-02	1.842E-01	3.227E-01	NOT IDENT.
PM-144	1.040E-02	3.175E-02	6.143E-02	NOT IDENT.
PR-144	8.039E-01	2.397E+00	4.641E+00	NOT IDENT.
PM-146	-2.778E-03	3.825E-02	7.187E-02	NOT IDENT.
ND-147	-1.038E+00	1.569E+00	2.363E+00	NOT IDENT.
PM-147	-4.457E+02	6.666E+02	1.160E+03	NOT IDENT.
PM-149	0.000E+00	6.931E+03	0.000E+00	SHORT HLIF
EU-150	1.394E-02	3.237E-02	4.756E-02	FAIL ABUN
EU-152	1.805E-02	9.172E-02	1.702E-01	FAIL ABUN
GD-153	2.198E-02	7.349E-02	1.227E-01	NOT IDENT.
EU-154	-2.327E-02	9.936E-02	1.869E-01	FAIL ABUN

EU-155	4.194E-02	8.380E-02	1.576E-01	FAIL ABUN
TB-160	-3.412E-02	1.341E-01	2.565E-01	FAIL ABUN
HO-166M	1.860E-03	5.796E-02	1.075E-01	NOT IDENT.
TM-171	5.807E+00	9.383E+00	8.971E+00	FAIL ABUN
HF-172	1.019E-01	1.721E-01	3.221E-01	FAIL ABUN
LU-172	-1.295E-02	5.554E-02	9.197E-02	FAIL ABUN
LU-176	-2.674E-03	2.466E-02	4.680E-02	FAIL ABUN
HF-181	2.561E-03	5.069E-02	9.621E-02	NOT IDENT.
TA-182	-6.449E-02	1.852E-01	2.912E-01	FAIL ABUN
RE-183	-5.844E-02	8.633E-02	1.571E-01	NOT IDENT.
RE-184	8.669E-02	1.761E-01	3.579E-01	NOT IDENT.
W-188	2.003E+00	7.636E+00	1.361E+01	FAIL ABUN
IR-192	-2.027E-02	3.443E-02	6.299E-02	FAIL ABUN
HG-203	-2.356E-02	4.444E-02	8.214E-02	NOT IDENT.
TL-204	2.307E+00	2.922E+00	5.203E+00	NOT IDENT.
BI-207	-6.365E-03	4.785E-02	9.143E-02	FAIL ABUN
BI-210	9.244E-01	5.269E-01	1.058E+00	NOT IDENT.
PB-210	9.244E-01	5.269E-01	1.058E+00	NOT IDENT.
PB-211	-2.839E-01	7.159E-01	1.251E+00	NOT IDENT.
BI-213	1.977E-02	9.729E-02	1.801E-01	NOT IDENT.
RN-219	1.559E-01	3.958E-01	7.710E-01	FAIL ABUN
RA-223	-7.455E-02	6.688E-01	1.133E+00	FAIL ABUN
AC-225	-7.973E-02	1.529E+00	2.671E+00	NOT IDENT.
AC-227	-7.597E-02	2.084E-01	3.937E-01	FAIL ABUN
TH-227	-7.597E-02	2.084E-01	3.937E-01	FAIL ABUN
TH-231	-7.455E-02	6.688E-01	1.133E+00	FAIL ABUN
PA-233	-4.402E-02	5.930E-02	1.071E-01	FAIL ABUN
PA-234	-1.900E-01	2.806E-01	5.002E-01	NOT IDENT.
PA-234M	1.003E+01	6.037E+00	1.012E+01	FAIL ABUN
NP-237	-4.402E-02	5.930E-02	1.071E-01	FAIL ABUN
NP-238	0.000E+00	1.942E+03	0.000E+00	SHORT HLIF
NP-239	-1.872E-01	2.346E-01	4.059E-01	NOT IDENT.
PU-239	4.325E+01	3.188E+02	5.657E+02	NOT IDENT.
AM-241	5.984E-02	6.609E-02	1.189E-01	NOT IDENT.
CM-243	-5.198E-02	8.429E-02	1.488E-01	NOT IDENT.
BK-247	-1.360E-02	7.738E-02	1.325E-01	FAIL ABUN
CM-247	1.604E-03	3.734E-02	7.054E-02	NOT IDENT.
CF-249	5.991E-03	3.899E-02	7.461E-02	NOT IDENT.
CF-251	5.926E-02	1.218E-01	2.233E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	66	10.66*	7.028E-01	2.384E+00	2.384E+00	28.94
AS-73	53.44	58	10.30*	5.918E+00	2.574E-01	3.316E-01	164.87
CD-109	88.03	240	3.70*	5.636E+00	3.129E+00	3.270E+00	35.22
SN-126	64.28	199	9.60	5.955E+00	9.478E-01	9.478E-01	64.54
	86.94	240	8.90	5.636E+00	1.301E+00	1.301E+00	35.22
	87.57	240	37.00*	5.636E+00	3.129E-01	3.129E-01	35.22
TL-208	277.37	-----	6.60	2.854E+00	-----	Line Not Found	-----
	583.19	125	85.00*	1.527E+00	2.629E-01	2.629E-01	32.52
	860.56	-----	12.50	1.091E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	5.872E+00	-----	Line Not Found	-----
	351.06	632	12.92*	2.350E+00	5.669E+00	5.669E+00	12.60
BI-212	727.33	48	6.67*	1.261E+00	1.548E+00	1.548E+00	76.17
	1620.50	-----	1.47	6.468E-01	-----	Line Not Found	-----
PB-212	74.82	474	10.28	5.842E+00	2.147E+00	2.147E+00	19.40
	77.11	798	17.10	5.809E+00	2.186E+00	2.186E+00	11.64
	238.63	655	43.60*	3.205E+00	1.276E+00	1.276E+00	10.34
	300.09	46	3.30	2.677E+00	1.419E+00	1.419E+00	96.82
BI-214	609.32	476	45.49*	1.470E+00	1.937E+00	1.937E+00	12.24
	1120.29	100	14.92	8.733E-01	2.087E+00	2.087E+00	27.59
	1764.49	55	15.30	6.049E-01	1.615E+00	1.615E+00	34.78
PB-214	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
RN-222	609.32	476	45.49*	1.470E+00	1.937E+00	1.937E+00	12.24
	1120.29	100	14.92	8.733E-01	2.087E+00	2.087E+00	27.59
	1764.49	55	15.30	6.049E-01	1.615E+00	1.615E+00	34.78
RA-224	240.99	258	4.10*	3.172E+00	5.392E+00	5.392E+00	22.09
RA-226	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
AC-228	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
RA-228	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
TH-228	74.82	474	10.28	5.842E+00	2.147E+00	2.147E+00	19.40

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-229	77.11	798	17.10	5.809E+00	2.186E+00	2.186E+00	11.64
	238.63	655	43.60*	3.205E+00	1.276E+00	1.276E+00	10.34
	300.09	46	3.30	2.677E+00	1.419E+00	1.419E+00	96.82
	85.43	141	14.70	5.694E+00	4.571E-01	4.571E-01	62.38
	88.47	240	24.00	5.636E+00	4.824E-01	4.824E-01	35.22
TH-230	193.51	-----	4.41*	3.735E+00	-----	Line Not Found	-----
	210.85	55	2.80	3.530E+00	1.503E+00	1.503E+00	105.40
	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
PA-231	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
	283.69	-----	1.70	2.803E+00	-----	Line Not Found	-----
	301.36	46	5.35*	2.677E+00	8.754E-01	8.754E-01	96.82
TH-232	105.21	-----	1.10	5.276E+00	-----	Line Not Found	-----
	338.32	169	11.27	2.428E+00	1.684E+00	1.684E+00	29.93
	835.71	-----	1.61	1.119E+00	-----	Line Not Found	-----
	911.20	89	25.80*	1.039E+00	9.013E-01	9.013E-01	31.62
	968.97	65	15.80	9.866E-01	1.141E+00	1.141E+00	42.00
TH-234	63.29	199	3.70*	5.955E+00	2.459E+00	2.459E+00	64.54
	92.59	294	4.23	5.526E+00	3.423E+00	3.423E+00	28.70
U-234	74.82	474	5.80	5.842E+00	3.806E+00	3.806E+00	19.40
	77.11	798	9.70	5.809E+00	3.854E+00	3.854E+00	11.64
	87.09	240	3.41	5.636E+00	3.395E+00	3.395E+00	35.22
	242.00	258	7.25	3.172E+00	3.049E+00	3.049E+00	22.09
	295.22	397	18.42	2.714E+00	2.163E+00	2.163E+00	17.93
U-235	351.93	632	35.60*	2.350E+00	2.057E+00	2.057E+00	12.60
	89.96	-----	3.47	5.585E+00	-----	Line Not Found	-----
	93.35	294	5.60	5.526E+00	2.585E+00	2.585E+00	28.70
	143.76	60	10.96*	4.517E+00	3.307E-01	3.307E-01	117.76
	163.33	-----	5.08	4.180E+00	-----	Line Not Found	-----
U-238	185.72	277	57.20	3.837E+00	3.439E-01	3.439E-01	23.53
	205.31	-----	5.01	3.582E+00	-----	Line Not Found	-----
	63.29	199	3.70*	5.955E+00	2.459E+00	2.459E+00	64.54
	92.59	294	4.23	5.526E+00	3.423E+00	3.423E+00	28.70
	43.53	-----	5.90	5.667E+00	-----	Line Not Found	-----
AM-243	74.66	474	67.20*	5.842E+00	3.285E-01	3.285E-01	19.40
ANH-511	511.00	34	100.00*	1.711E+00	5.464E-02	5.464E-02	160.67

Flag: "*" = Keyline

Total number of lines in spectrum 52
Number of unidentified lines 17
Number of lines tentatively identified by NID 35 67.31%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	2.384E+00	2.384E+00	0.690E+00	28.94	
AS-73	80.30D	1.29	2.574E-01	3.316E-01	5.468E-01	164.87	
CD-109	461.40D	1.05	3.129E+00	3.270E+00	1.152E+00	35.22	
SN-126	2.30E+05Y	1.00	3.129E-01	3.129E-01	1.102E-01	35.22	
TL-208	1.41E+10Y	1.00	2.629E-01	2.629E-01	0.855E-01	32.52	
BI-211	7.04E+08Y	1.00	5.669E+00	5.669E+00	0.714E+00	12.60	
BI-212	1.41E+10Y	1.00	1.548E+00	1.548E+00	1.179E+00	76.17	
PB-212	1.41E+10Y	1.00	1.276E+00	1.276E+00	0.132E+00	10.34	
BI-214	1600.00Y	1.00	1.937E+00	1.937E+00	0.237E+00	12.24	
PB-214	1600.00Y	1.00	2.057E+00	2.057E+00	0.259E+00	12.60	
RN-222	1600.00Y	1.00	1.937E+00	1.937E+00	0.237E+00	12.24	
RA-224	1.41E+10Y	1.00	5.392E+00	5.392E+00	1.191E+00	22.09	
RA-226	1600.00Y	1.00	2.057E+00	2.057E+00	0.259E+00	12.60	
AC-228	1.41E+10Y	1.00	9.013E-01	9.013E-01	2.850E-01	31.62	
RA-228	1.41E+10Y	1.00	9.013E-01	9.013E-01	2.850E-01	31.62	
TH-228	1.41E+10Y	1.00	1.276E+00	1.276E+00	0.132E+00	10.34	
TH-229	7340.00Y	1.00	4.824E-01	4.824E-01	1.699E-01	35.22	K
TH-230	7.54E+04Y	1.00	2.057E+00	2.057E+00	0.259E+00	12.60	
PA-231	7.04E+08Y	1.00	8.754E-01	8.754E-01	8.476E-01	96.82	
TH-232	1.41E+10Y	1.00	9.013E-01	9.013E-01	2.850E-01	31.62	
TH-234	4.47E+09Y	1.00	2.459E+00	2.459E+00	1.587E+00	64.54	
U-234	2.45E+05Y	1.00	2.057E+00	2.057E+00	0.259E+00	12.60	
U-235	7.04E+08Y	1.00	3.307E-01	3.307E-01	3.894E-01	117.76	
U-238	4.47E+09Y	1.00	2.459E+00	2.459E+00	1.587E+00	64.54	
AM-243	7370.00Y	1.00	3.285E-01	3.285E-01	0.637E-01	19.40	
ANH-511	1.00E+09Y	1.00	5.464E-02	5.464E-02	8.780E-02	160.67	

Total Activity : 4.330E+01 4.352E+01

Grand Total Activity : 4.330E+01 4.352E+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
4	189.16	37	220	1.74	379.10	367	17	4.53E-03	****	3.79E+00	
0	270.57	85	173	2.59	542.11	536	12	1.07E-02	71.2	2.91E+00	T
0	328.59	35	142	0.71	658.28	654	11	4.49E-03	****	2.49E+00	T
0	396.55	26	65	1.57	794.35	790	9	3.39E-03	****	2.13E+00	
0	446.36	34	61	3.71	894.07	888	12	4.52E-03	99.2	1.92E+00	
0	463.86	69	68	1.20	929.11	923	13	9.17E-03	56.1	1.86E+00	T
0	528.08	21	50	0.58	1057.68	1051	13	2.85E-03	****	1.66E+00	T
0	655.34	70	67	8.23	1312.48	1298	27	9.46E-03	71.3	1.38E+00	
0	690.61	21	29	0.58	1383.08	1377	11	2.92E-03	****	1.32E+00	
0	769.25	26	35	0.95	1540.51	1535	8	3.55E-03	90.0	1.20E+00	
0	807.31	17	30	2.01	1616.71	1607	12	2.36E-03	****	1.15E+00	
0	852.16	31	26	2.71	1706.51	1697	18	4.25E-03	87.4	1.10E+00	
0	870.77	14	101	5.75	1743.77	1718	34	1.98E-03	****	1.08E+00	T
8	915.29	13	5	2.35	1832.88	1819	18	1.80E-03	****	1.04E+00	
0	935.13	15	49	0.73	1872.60	1863	14	2.08E-03	****	1.02E+00	T
4	964.70	26	19	1.94	1931.79	1928	19	3.69E-03	66.0	9.90E-01	T
0	993.52	14	10	3.90	1989.49	1982	14	1.94E-03	****	9.66E-01	
0	1000.12	30	13	2.27	2002.70	1996	13	4.18E-03	61.4	9.61E-01	T
0	1005.59	14	8	3.14	2013.66	2009	9	2.03E-03	90.2	9.56E-01	T
0	1089.28	20	3	1.43	2181.20	2174	14	2.87E-03	58.2	8.94E-01	
0	1153.75	9	14	1.29	2310.24	2307	8	1.25E-03	****	8.52E-01	
0	1216.92	12	7	1.70	2436.71	2433	9	1.67E-03	97.5	8.15E-01	
0	1238.36	69	19	1.80	2479.62	2472	15	9.86E-03	37.3	8.04E-01	T
0	1376.81	33	9	1.43	2756.76	2749	13	4.81E-03	50.3	7.37E-01	
0	1402.05	10	13	2.94	2807.30	2797	13	1.50E-03	****	7.26E-01	
0	1409.82	22	8	5.31	2822.84	2816	14	3.12E-03	73.2	7.23E-01	
0	1729.65	13	7	1.58	3463.01	3458	10	1.88E-03	93.2	6.14E-01	

Flags: "T" = Tentatively associated

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981003.CNF;1
Acquisition date : 12-DEC-2023 19:30:01 Sensitivity : 3.000
Detector ID : GAM31 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:07.09 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981003 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3789E+02 GRAM
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 5-JUN-2023 07:16:39 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM31_CAN.CNF;17

Combined Critical Level Report

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

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	2.301E-01
AS-73	2.301E-01
CD-109	5.991E-01
SN-126	5.148E-02
TL-208	3.152E-02
BI-211	1.732E-01
BI-212	4.516E-01
PB-212	4.713E-02
BI-214	5.373E-02
PB-214	6.301E-02
RN-222	5.373E-02
RA-224	5.055E-01
RA-226	6.301E-02
AC-228	1.201E-01
RA-228	1.201E-01
TH-228	4.713E-02
TH-229	4.205E-01
TH-230	6.301E-02
PA-231	3.296E-01
TH-232	1.201E-01
TH-234	5.453E-01
U-234	6.301E-02
U-235	1.473E-01
U-238	5.453E-01
AM-243	2.790E-02
ANH-511	2.320E-02

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

Nuclide	Lc (pCi/GRAM)	
BE-7	3.526E-01	NOT IDENT.
NA-22	2.889E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.628E-02	NOT IDENT.
SC-46	3.528E-02	FAIL ABUN

V-48	1.131E-01	NOT IDENT.
CR-51	4.192E-01	NOT IDENT.
MN-52	1.087E+00	FAIL ABUN
MN-54	3.156E-02	NOT IDENT.
CO-56	3.374E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	1.986E-02	NOT IDENT.
CO-58	3.507E-02	NOT IDENT.
FE-59	7.847E-02	NOT IDENT.
CO-60	3.015E-02	NOT IDENT.
ZN-65	7.406E-02	NOT IDENT.
GE-68	8.622E-01	NOT IDENT.
AS-74	1.497E-01	NOT IDENT.
SE-75	3.821E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	3.433E-01	NOT IDENT.
RB-83	6.093E-02	NOT IDENT.
RB-84	6.784E-02	NOT IDENT.
KR-85	6.205E+00	NOT IDENT.
SR-85	3.814E-02	NOT IDENT.
RB-86	9.044E-01	NOT IDENT.
Y-88	2.970E-02	NOT IDENT.
Y-91	1.340E+01	NOT IDENT.
NB-94	3.036E-02	FAIL ABUN
NB-95	3.730E-02	NOT IDENT.
NB-95M	1.181E-01	NOT IDENT.
ZR-95	7.235E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.300E-02	NOT IDENT.
RH-102	4.706E-02	NOT IDENT.
RU-103	4.318E-02	FAIL ABUN
RH-106	2.917E-01	NOT IDENT.
RU-106	2.917E-01	NOT IDENT.
AG-108M	2.223E-02	NOT IDENT.
AG-110	6.800E-01	NOT IDENT.
AG-110M	4.339E-02	NOT IDENT.
SN-113	3.983E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	9.610E-02	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	2.615E-02	NOT IDENT.
SB-124	6.234E-02	NOT IDENT.
SB-125	7.847E-02	FAIL ABUN
TE-125M	8.846E+00	NOT IDENT.
I-126	4.179E-01	NOT IDENT.
SB-126	2.679E-01	NOT IDENT.
SB-127	1.396E+01	NOT IDENT.
I-131	3.611E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	1.270E+01	NOT IDENT.
BA-133	3.558E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	4.219E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	1.607E-01	NOT IDENT.
BA-137M	2.565E-02	NOT IDENT.
CS-137	2.710E-02	NOT IDENT.
LA-138	4.209E-02	NOT IDENT.
CE-139	2.516E-02	NOT IDENT.
BA-140	5.019E-01	NOT IDENT.
LA-140	1.217E-01	FAIL ABUN
CE-141	6.744E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.535E-01	NOT IDENT.
PM-144	2.768E-02	NOT IDENT.
PR-144	2.092E+00	NOT IDENT.
PM-146	3.285E-02	NOT IDENT.
ND-147	1.071E+00	NOT IDENT.
PM-147	5.521E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	2.217E-02	FAIL ABUN
EU-152	7.912E-02	FAIL ABUN
GD-153	5.870E-02	NOT IDENT.
EU-154	7.990E-02	FAIL ABUN
EU-155	7.532E-02	FAIL ABUN

TB-160	1.129E-01	FAIL ABUN
HO-166M	4.837E-02	NOT IDENT.
TM-171	4.342E+00	FAIL ABUN
HF-172	1.539E-01	FAIL ABUN
LU-172	3.918E-02	FAIL ABUN
LU-176	2.187E-02	FAIL ABUN
HF-181	4.391E-02	NOT IDENT.
TA-182	1.255E-01	FAIL ABUN
RE-183	7.604E-02	NOT IDENT.
RE-184	1.624E-01	NOT IDENT.
W-188	6.345E+00	FAIL ABUN
IR-192	2.914E-02	FAIL ABUN
HG-203	3.854E-02	NOT IDENT.
TL-204	2.517E+00	NOT IDENT.
BI-207	4.026E-02	FAIL ABUN
BI-210	5.130E-01	NOT IDENT.
PB-210	5.130E-01	NOT IDENT.
PB-211	5.780E-01	NOT IDENT.
BI-213	8.259E-02	NOT IDENT.
RN-219	3.584E-01	FAIL ABUN
RA-223	5.291E-01	FAIL ABUN
AC-225	1.261E+00	NOT IDENT.
AC-227	1.837E-01	FAIL ABUN
TH-227	1.837E-01	FAIL ABUN
TH-231	5.291E-01	FAIL ABUN
PA-233	4.976E-02	FAIL ABUN
PA-234	2.194E-01	NOT IDENT.
PA-234M	4.598E+00	FAIL ABUN
NP-237	4.976E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
NP-239	1.934E-01	NOT IDENT.
PU-239	2.701E+02	NOT IDENT.
AM-241	5.766E-02	NOT IDENT.
CM-243	7.093E-02	NOT IDENT.
BK-247	6.195E-02	FAIL ABUN
CM-247	3.278E-02	NOT IDENT.
CF-249	3.467E-02	NOT IDENT.
CF-251	1.061E-01	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981003.CNF;1
Acquisition date : 12-DEC-2023 19:30:01 Sensitivity : 3.000
Detector ID : GAM31 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:07.09 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981003 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3789E+02 GRAM
Quantity Err(%) : 1.4504E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 5-JUN-2023 07:16:39 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM31_CAN.CNF;17

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	2.384E+00	7.084E-01	7.084E-01
AS-73	3.316E-01	5.406E-01	5.406E-01
CD-109	3.270E+00	1.180E+00	1.180E+00
SN-126	3.129E-01	1.117E-01	1.117E-01
TL-208	2.629E-01	8.838E-02	8.838E-02
BI-211	5.669E+00	8.625E-01	8.625E-01
BI-212	1.548E+00	1.167E+00	1.167E+00
PB-212	1.276E+00	1.627E-01	1.627E-01
BI-214	1.937E+00	3.114E-01	3.114E-01
PB-214	2.057E+00	3.113E-01	3.113E-01
RN-222	1.937E+00	3.114E-01	3.114E-01
RA-224	5.392E+00	1.240E+00	1.240E+00
RA-226	2.057E+00	3.113E-01	3.113E-01
AC-228	9.013E-01	2.903E-01	2.903E-01
RA-228	9.013E-01	2.903E-01	2.903E-01
TH-228	1.276E+00	1.627E-01	1.627E-01
TH-229	-3.162E-03	5.470E-01	5.470E-01
TH-230	2.057E+00	3.112E-01	3.112E-01
PA-231	8.754E-01	8.530E-01	8.530E-01
TH-232	9.013E-01	2.903E-01	2.903E-01
TH-234	2.459E+00	1.656E+00	1.656E+00
U-234	2.057E+00	3.112E-01	3.112E-01
U-235	3.307E-01	3.830E-01	3.830E-01
U-238	2.459E+00	1.656E+00	1.656E+00
AM-243	3.285E-01	6.927E-02	6.927E-02
ANH-511	5.464E-02	8.623E-02	8.623E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	3.036E-01	3.793E-01	4.032E-01	NOT IDENT.
NA-22	-6.852E-03	3.560E-02	3.573E-02	NOT IDENT.
NA-24	4.952E+12	4.729E+12	5.229E+12	SHORT HLIF
AL-26	7.016E-03	2.872E-02	2.889E-02	NOT IDENT.

SC-46	4.148E-03	3.980E-02	3.985E-02	FAIL ABUN
V-48	1.298E-01	1.122E-01	1.265E-01	NOT IDENT.
CR-51	5.847E-02	4.657E-01	4.664E-01	NOT IDENT.
MN-52	2.763E-01	1.242E+00	1.248E+00	FAIL ABUN
MN-54	1.431E-02	3.415E-02	3.476E-02	NOT IDENT.
CO-56	-3.897E-03	4.428E-02	4.432E-02	FAIL ABUN
MN-56	-1.000E+41	1.099E+42	0.000E+00	SHORT HLIF
CO-57	-3.756E-03	2.321E-02	2.328E-02	NOT IDENT.
CO-58	-1.891E-02	5.220E-02	5.289E-02	NOT IDENT.
FE-59	-5.030E-02	1.001E-01	1.026E-01	NOT IDENT.
CO-60	1.612E-02	3.260E-02	3.340E-02	NOT IDENT.
ZN-65	2.618E-02	9.320E-02	9.394E-02	NOT IDENT.
GE-68	-2.008E-01	1.041E+00	1.045E+00	NOT IDENT.
AS-74	4.168E-02	1.725E-01	1.735E-01	NOT IDENT.
SE-75	-3.100E-03	4.444E-02	4.446E-02	NOT IDENT.
BR-77	1.258E+04	1.077E+04	1.217E+04	SHORT HLIF
SR-82	-3.423E-01	4.751E-01	4.995E-01	NOT IDENT.
RB-83	-4.126E-02	7.651E-02	7.874E-02	NOT IDENT.
RB-84	-8.159E-03	7.881E-02	7.889E-02	NOT IDENT.
KR-85	3.665E+00	7.611E+00	7.788E+00	NOT IDENT.
SR-85	2.227E-02	4.681E-02	4.788E-02	NOT IDENT.
RB-86	-3.523E-01	1.116E+00	1.128E+00	NOT IDENT.
Y-88	3.112E-03	3.373E-02	3.376E-02	NOT IDENT.
Y-91	-1.563E+01	1.891E+01	2.018E+01	NOT IDENT.
NB-94	8.397E-03	3.547E-02	3.567E-02	FAIL ABUN
NB-95	-1.012E-02	5.290E-02	5.309E-02	NOT IDENT.
NB-95M	6.124E-02	1.504E-01	1.529E-01	NOT IDENT.
ZR-95	-2.630E-02	9.129E-02	9.206E-02	NOT IDENT.
NB-97	1.000E+41	1.322E+41	0.000E+00	SHORT HLIF
ZR-97	2.246E+12	1.977E+12	2.221E+12	SHORT HLIF
MO-99	-2.424E+02	4.568E+02	4.697E+02	SHORT HLIF
TC-99M	-4.624E+32	3.764E+33	0.000E+00	SHORT HLIF
RH-101	-4.336E-02	3.141E-02	3.700E-02	NOT IDENT.
RH-102	-2.046E-02	5.861E-02	5.933E-02	NOT IDENT.
RU-103	-6.511E-03	5.099E-02	5.107E-02	FAIL ABUN
RH-106	2.803E-01	3.131E-01	3.377E-01	NOT IDENT.
RU-106	2.803E-01	3.131E-01	3.377E-01	NOT IDENT.
AG-108M	-9.981E-03	2.668E-02	2.705E-02	NOT IDENT.
AG-110	5.302E-01	7.465E-01	7.838E-01	NOT IDENT.
AG-110M	2.762E-02	4.592E-02	4.757E-02	NOT IDENT.
SN-113	-1.557E-02	4.924E-02	4.973E-02	NOT IDENT.
CD-115	1.180E+03	1.704E+03	1.785E+03	SHORT HLIF
SN-117M	8.875E-03	1.127E-01	1.127E-01	NOT IDENT.
SB-122	1.090E+01	7.577E+01	7.593E+01	SHORT HLIF
TE-123M	4.946E-03	3.050E-02	3.058E-02	NOT IDENT.
SB-124	-2.910E-02	8.600E-02	8.700E-02	NOT IDENT.
SB-125	4.081E-02	8.626E-02	8.820E-02	FAIL ABUN
TE-125M	5.916E+00	9.842E+00	1.020E+01	NOT IDENT.
I-126	1.290E-01	4.839E-01	4.874E-01	NOT IDENT.
SB-126	2.378E-01	3.180E-01	3.355E-01	NOT IDENT.
SB-127	2.444E+00	1.835E+01	1.838E+01	NOT IDENT.
I-131	3.929E-01	3.784E-01	4.178E-01	NOT IDENT.
I-132	1.000E+41	2.745E+42	0.000E+00	SHORT HLIF
TE-132	-2.993E-01	1.541E+01	1.541E+01	NOT IDENT.
BA-133	1.936E-02	4.265E-02	4.353E-02	NOT IDENT.
I-133	4.408E+07	4.910E+08	4.914E+08	SHORT HLIF
CS-134	7.176E-02	4.236E-02	5.330E-02	NOT IDENT.
I-135	-5.126E+30	1.878E+31	0.000E+00	SHORT HLIF
CS-136	5.879E-02	1.769E-01	1.788E-01	NOT IDENT.
BA-137M	-8.836E-03	3.619E-02	3.640E-02	NOT IDENT.
CS-137	-9.335E-03	3.823E-02	3.846E-02	NOT IDENT.
LA-138	8.744E-04	5.033E-02	5.034E-02	NOT IDENT.
CE-139	-9.235E-03	3.046E-02	3.074E-02	NOT IDENT.
BA-140	-9.099E-02	5.987E-01	6.001E-01	NOT IDENT.
LA-140	-2.225E-01	2.051E-01	2.283E-01	FAIL ABUN
CE-141	1.150E-02	8.692E-02	8.708E-02	NOT IDENT.
CE-143	2.077E+05	1.602E+05	1.855E+05	SHORT HLIF
CE-144	-8.440E-02	1.844E-01	1.883E-01	NOT IDENT.
PM-144	1.040E-02	3.177E-02	3.211E-02	NOT IDENT.
PR-144	8.039E-01	2.398E+00	2.425E+00	NOT IDENT.
PM-146	-2.778E-03	3.825E-02	3.827E-02	NOT IDENT.
ND-147	-1.038E+00	1.573E+00	1.641E+00	NOT IDENT.
PM-147	-4.457E+02	6.684E+02	6.979E+02	NOT IDENT.
PM-149	3.474E+03	6.950E+03	7.124E+03	SHORT HLIF
EU-150	1.394E-02	3.239E-02	3.299E-02	FAIL ABUN
EU-152	1.805E-02	9.173E-02	9.209E-02	FAIL ABUN
GD-153	2.198E-02	7.352E-02	7.419E-02	NOT IDENT.
EU-154	-2.327E-02	9.937E-02	9.993E-02	FAIL ABUN

EU-155	4.194E-02	8.393E-02	8.604E-02	FAIL ABUN
TB-160	-3.412E-02	1.341E-01	1.350E-01	FAIL ABUN
HO-166M	1.860E-03	5.796E-02	5.797E-02	NOT IDENT.
TM-171	5.807E+00	9.404E+00	9.762E+00	FAIL ABUN
HF-172	1.019E-01	1.732E-01	1.792E-01	FAIL ABUN
LU-172	-1.295E-02	5.557E-02	5.587E-02	FAIL ABUN
LU-176	-2.674E-03	2.467E-02	2.470E-02	FAIL ABUN
HF-181	2.561E-03	5.069E-02	5.070E-02	NOT IDENT.
TA-182	-6.449E-02	1.853E-01	1.875E-01	FAIL ABUN
RE-183	-5.844E-02	8.662E-02	9.054E-02	NOT IDENT.
RE-184	8.669E-02	1.764E-01	1.806E-01	NOT IDENT.
W-188	2.003E+00	7.640E+00	7.693E+00	FAIL ABUN
IR-192	-2.027E-02	3.447E-02	3.566E-02	FAIL ABUN
HG-203	-2.356E-02	4.447E-02	4.572E-02	NOT IDENT.
TL-204	2.307E+00	2.933E+00	3.112E+00	NOT IDENT.
BI-207	-6.365E-03	4.785E-02	4.794E-02	FAIL ABUN
BI-210	9.244E-01	5.365E-01	6.793E-01	NOT IDENT.
PB-210	9.244E-01	5.365E-01	6.793E-01	NOT IDENT.
PB-211	-2.839E-01	7.165E-01	7.279E-01	NOT IDENT.
BI-213	1.977E-02	9.731E-02	9.772E-02	NOT IDENT.
RN-219	1.559E-01	3.965E-01	4.027E-01	FAIL ABUN
RA-223	-7.455E-02	6.688E-01	6.697E-01	FAIL ABUN
AC-225	-7.973E-02	1.529E+00	1.530E+00	NOT IDENT.
AC-227	-7.597E-02	2.087E-01	2.115E-01	FAIL ABUN
TH-227	-7.597E-02	2.087E-01	2.115E-01	FAIL ABUN
TH-231	-7.455E-02	6.688E-01	6.697E-01	FAIL ABUN
PA-233	-4.402E-02	5.941E-02	6.263E-02	FAIL ABUN
PA-234	-1.900E-01	3.552E-01	3.654E-01	NOT IDENT.
PA-234M	1.003E+01	6.096E+00	7.591E+00	FAIL ABUN
NP-237	-4.402E-02	5.941E-02	6.263E-02	FAIL ABUN
NP-238	1.646E+03	1.946E+03	2.083E+03	SHORT HLIF
NP-239	-1.872E-01	2.358E-01	2.504E-01	NOT IDENT.
PU-239	4.325E+01	3.188E+02	3.194E+02	NOT IDENT.
AM-241	5.984E-02	6.634E-02	7.161E-02	NOT IDENT.
CM-243	-5.198E-02	8.453E-02	8.772E-02	NOT IDENT.
BK-247	-1.360E-02	7.743E-02	7.767E-02	FAIL ABUN
CM-247	1.604E-03	3.734E-02	3.734E-02	NOT IDENT.
CF-249	5.991E-03	3.900E-02	3.909E-02	NOT IDENT.
CF-251	5.926E-02	1.220E-01	1.249E-01	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	131.0287	85.43	192.0219	131.20	153.4375
45.60	222.8448	86.55	253.8636	133.02	153.8489
46.54	259.7777	86.79	253.9828	133.52	140.6697
49.72	251.8266	86.94	254.0566	136.00	121.1664
51.35	285.6955	87.09	255.4986	136.47	130.1468
51.87	293.6664	87.57	255.7363	140.51	0.0000
52.39	271.3647	88.03	316.1916	143.76	120.2525
52.97	258.8347	88.34	316.3819	144.24	120.3326
53.44	259.1628	88.47	298.6523	145.44	126.1624
54.07	273.8639	89.96	257.6027	152.43	138.7299
57.36	0.0000	1093.63	257.9365	153.25	129.7755
57.53	304.1806	91.11	274.0015	323.87	133.3585
57.98	328.5454	92.59	234.0332	156.02	157.6695
59.27	295.8873	93.35	234.3660	158.56	139.8488
59.32	295.9236	94.56	234.8919	159.00	135.3410
59.54	286.7645	94.65	234.9316	162.33	133.6152
60.96	317.4597	94.67	234.9402	162.66	129.0625
61.17	321.4984	94.87	235.0264	163.33	134.9385
62.93	317.0455	97.43	143.4869	165.86	127.2697
63.29	317.3216	98.43	154.9104	176.31	113.6734
63.58	317.5430	98.44	154.9127	176.60	110.1964
64.28	318.0752	99.53	170.9465	177.52	105.6226
66.73	299.6354	100.11	162.7245	181.07	0.0000
67.24	279.0295	102.03	144.3156	181.52	111.6265
125.81	295.0493	103.18	159.3822	184.41	105.2991
67.75	295.0951	103.37	159.4352	143.76	105.4594
68.89	305.7310	105.21	136.6403	193.51	109.9856
69.67	305.2846	105.31	136.6629	197.03	108.0162
70.82	254.8969	106.12	143.2181	198.01	134.5671
70.83	254.9028	106.47	157.1032	201.83	130.3050
72.81	285.2079	109.28	148.2506	203.43	120.8618
72.87	285.2451	111.00	170.0681	205.31	117.8780
74.66	265.7159	111.76	159.5721	210.85	100.7071
74.82	265.8072	114.06	161.2484	215.65	99.1736
74.97	265.8925	116.30	134.8600	218.12	96.9720
77.11	267.1101	116.74	161.9465	222.11	78.8809
78.74	264.6686	119.76	131.2627	227.09	87.9483
79.69	262.4984	121.12	153.2850	227.38	87.9732
80.03	242.4738	121.22	153.3098	228.16	95.4816
80.12	242.5214	121.78	150.1784	228.18	95.4839
80.19	242.5562	122.06	141.5339	116.74	95.4839
80.57	222.5177	122.92	140.6322	235.69	96.6088
81.00	242.9608	123.07	140.6646	235.96	96.6336
81.07	242.9956	265.00	137.5222	238.63	100.2246
81.75	243.3325	125.81	131.4001	238.98	0.0000
82.47	247.7511	127.23	171.1862	240.99	100.4517
83.79	238.9063	127.91	140.6055	242.00	100.5493
84.00	239.0065	129.30	140.8965	244.70	100.8069

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	76.1517	344.28	54.7473	563.25	27.0717
252.80	77.8730	345.93	64.8638	564.24	0.0000
254.15	0.0000	351.06	65.1064	569.33	32.3762
256.23	73.0244	351.93	65.1469	946.00	32.3787
260.90	0.0000	355.39	0.0000	569.70	30.2933
264.66	74.9515	356.01	51.0737	583.19	39.9591
264.80	74.9604	364.49	45.3643	584.27	39.9807
265.00	74.4612	366.42	0.0000	595.83	38.0889
269.46	74.7568	372.51	48.4125	427.87	36.0558
270.03	74.7939	375.05	58.7562	602.52	0.0000
271.23	74.8718	377.52	56.0535	604.72	30.2824
273.65	80.2057	356.01	46.9126	607.14	23.9346
276.40	75.2099	388.16	54.5768	609.32	30.8809
277.37	83.0605	388.63	49.8881	610.33	30.8963
277.60	80.4800	391.69	57.7236	614.28	32.0215
278.00	76.1800	264.66	61.1984	618.01	29.9380
279.20	90.1240	401.81	50.3248	620.36	32.1118
279.54	84.0817	402.40	56.9934	621.93	23.5666
279.70	78.8918	404.85	54.2296	630.19	0.0000
280.46	72.8711	410.95	58.2647	631.29	38.7305
283.69	73.0710	413.71	43.0582	633.25	33.3815
284.31	68.7585	414.70	40.2133	634.78	33.4042
285.41	71.4364	423.72	46.2207	635.95	37.7344
285.90	0.0000	427.09	60.7928	636.99	38.8315
287.50	69.8161	427.87	40.5482	657.50	25.0393
290.67	57.7513	433.94	43.6075	657.76	25.0421
293.27	0.0000	439.40	42.7817	657.90	0.0000
351.93	61.9227	440.45	37.3609	661.66	27.8128
295.96	61.9600	453.88	39.2334	664.57	0.0000
879.38	31.7073	463.37	31.5632	666.33	31.6952
299.98	51.5826	468.07	45.9910	666.50	33.8835
300.09	51.5874	473.00	40.6672	667.71	0.0000
300.13	51.5886	475.06	36.7426	677.62	17.5736
301.36	51.6410	476.78	41.7496	685.70	26.4531
302.85	54.3543	477.60	34.8070	692.65	0.0000
256.23	63.7192	482.18	35.8953	695.00	34.8582
304.85	61.0811	487.02	46.9924	696.49	23.2533
306.78	70.0427	492.35	0.0000	696.51	23.2533
308.46	66.5848	497.08	42.2299	697.00	23.2584
311.90	73.8898	505.52	25.7589	697.30	23.2618
316.51	63.4366	507.63	0.0000	697.49	25.4791
319.41	55.5202	511.00	37.4874	702.65	33.3057
320.08	57.3411	514.00	39.5776	706.68	33.3630
321.04	58.2807	514.00	39.5776	711.68	26.7461
323.87	68.7414	520.40	40.7324	720.70	18.4571
325.23	68.8130	520.69	0.0000	721.93	0.0000
328.76	65.8414	522.65	0.0000	722.78	28.5495
333.37	63.3563	527.90	0.0000	722.91	28.5505
333.97	51.6133	528.26	29.6549	723.31	25.1962
334.37	48.9122	529.59	27.6295	724.19	35.2875
338.28	63.5899	529.87	0.0000	727.33	34.7716
338.32	63.5913	531.02	44.5479	733.00	32.3789
311.90	60.0542	537.26	42.1244	735.93	28.1403
340.48	60.0542	546.56	0.0000	333.97	25.9059
340.55	60.0569	552.55	38.3158	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	21.4593	949.00	18.2562	1384.29	9.2895
747.24	22.6156	667.71	0.0000	1408.01	16.6094
748.06	28.2796	962.31	22.0034	1434.09	8.3564
752.31	33.9929	964.08	20.5488	1435.80	9.4043
753.82	22.6758	966.17	17.4414	1457.56	0.0000
756.73	34.0527	911.20	17.4576	1460.82	7.3576
756.80	34.0540	983.53	10.1547	1489.16	13.7538
884.68	29.0278	984.45	0.0000	1505.03	21.2354
765.81	29.0496	1274.44	3.7078	1584.12	14.0474
766.42	27.3467	1001.03	11.1401	1596.21	16.2506
766.84	22.2231	1002.74	11.1460	1620.50	7.6234
772.60	0.0000	1004.73	11.1533	1621.92	6.5361
776.52	28.5990	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	6.6310
778.90	33.2067	1028.54	0.0000	1750.46	0.0000
783.70	43.5927	1037.84	15.0254	1764.49	8.9731
788.74	36.7813	1038.76	0.0000	1063.66	11.2292
792.07	32.2246	631.29	18.8330	1771.35	8.9854
795.86	14.9831	1048.07	12.2470	1791.20	0.0000
810.06	15.6434	1049.04	11.3079	1808.65	4.5256
810.29	15.6451	1050.41	14.1412	1810.72	0.0000
344.28	20.8616	1063.66	19.8772	1836.06	4.5496
810.76	27.8184	1077.00	17.1057		
815.77	16.2581	1077.34	15.2070		
1048.07	24.4120	1085.87	16.7696		
832.01	18.4006	1093.63	13.7522		
834.85	21.0513	1099.45	21.0466		
835.71	34.2202	1112.07	18.2439		
836.80	0.0000	1112.84	17.2881		
846.75	0.0000	1115.54	18.4547		
846.77	21.1436	1120.29	18.2880		
856.80	7.0735	1120.55	18.2891		
860.56	19.2253	1221.41	18.2926		
871.09	19.2982	1129.67	10.6160		
873.19	28.4600	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	21.3918	1173.23	13.6787		
880.51	26.7508	1177.95	9.7833		
881.60	18.7326	1189.05	13.7394		
883.24	20.5286	1204.77	18.7263		
884.68	16.0741	1221.41	17.4249		
889.28	19.6777	1231.02	18.5288		
894.76	19.7153	1235.36	19.0805		
898.04	26.0175	1238.28	17.9022		
900.72	28.7363	1260.41	0.0000		
903.28	25.1665	1271.87	15.0513		
911.20	25.2349	1274.44	14.0573		
912.08	25.2426	1274.54	14.0573		
923.98	0.0000	1291.59	18.1538		
926.50	27.9549	1298.22	0.0000		
929.11	23.2133	1312.11	12.1663		
935.54	14.5396	1332.49	8.1523		
937.49	27.6428	1362.66	0.0000		
944.13	24.6055	1365.19	13.3555		
946.00	25.5331	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 13-DEC-2023 07:02:53.76

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*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981004.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM06.CNF;917
Background date    : 10-DEC-2023 10:44:45
Sample date       : 13-NOV-2023 12:00:00 Acquisition date : 13-DEC-2023 05:01:46
Sample ID        : G645981004 Sample quantity : 1.36590E+02 GRAM
Detector name     : GAM06 Detector geometry: CAN
Elapsed live time : 0 02:00:00.00 Elapsed real time: 0 02:00:01.21 0.0%
Energy tolerance  : 1.50000 keV Analyst Initials : RXF2
Abundance limit   : 75.00000 Sensitivity : 3.00000
Batch ID          : 2529194 Detector SN# :
Matrix Spike ID   : LCS ID :
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.02*	121	301	1.06	124.90	121	9	1.68E-02	28.2	
2	4	74.74	253	270	1.03	148.34	143	14	3.52E-02	11.9	9.87E-01
3	4	77.05*	406	261	1.00	152.97	143	14	5.64E-02	8.2	
4	4	84.03	103	260	1.31	166.93	163	30	1.44E-02	28.0	2.25E+00
5	4	87.24*	144	216	1.11	173.34	163	30	2.00E-02	19.1	
6	4	89.95	120	235	1.33	178.78	163	30	1.66E-02	24.5	
7	4	92.61*	208	221	1.34	184.08	163	30	2.89E-02	16.0	
8	4	95.07	35	156	0.92	189.00	163	30	4.90E-03	65.7	
9	0	105.60	56	200	1.59	210.06	206	8	7.80E-03	45.8	
10	0	109.07	84	141	1.90	217.01	214	7	1.17E-02	25.8	
11	0	120.10	52	175	1.34	239.08	236	8	7.25E-03	46.3	
12	0	143.82*	55	184	1.31	286.53	283	7	7.64E-03	44.3	
13	0	185.81*	172	393	1.33	370.51	365	14	2.39E-02	26.0	
14	0	209.31	89	152	1.15	417.53	414	8	1.24E-02	26.3	
15	0	221.12	30	121	0.91	441.16	438	7	4.12E-03	65.0	
16	7	238.76*	590	126	1.04	476.44	471	17	8.19E-02	5.2	1.29E+00
17	7	241.87	224	163	1.45	482.65	471	17	3.11E-02	13.1	
18	0	270.25	97	148	3.23	539.44	532	13	1.35E-02	27.9	
19	2	295.30	460	80	1.22	589.55	583	24	6.39E-02	5.7	8.29E-01
20	2	300.29	38	114	1.53	599.53	583	24	5.26E-03	52.7	
21	0	328.02	73	158	3.18	655.01	649	15	1.01E-02	39.5	
22	0	338.39*	107	99	0.83	675.76	672	8	1.49E-02	19.1	
23	0	351.99*	737	118	1.29	702.97	698	11	1.02E-01	4.7	
24	0	406.63	152	189	13.25	812.29	797	33	2.10E-02	28.8	
25	0	464.00	24	55	0.98	927.08	924	7	3.38E-03	55.6	
26	0	511.37*	9	131	1.31	1021.85	1015	15	1.25E-03	322.1	
27	0	583.23*	242	39	1.33	1165.66	1158	16	3.37E-02	8.9	
28	0	609.50*	546	46	1.52	1218.21	1213	12	7.58E-02	5.0	
29	0	633.34	29	13	0.94	1265.93	1262	9	4.06E-03	29.1	
30	0	727.83	34	54	0.97	1455.03	1448	12	4.69E-03	46.8	
31	0	768.85	51	43	1.39	1537.11	1532	10	7.14E-03	27.5	
32	0	825.29	18	19	1.33	1650.08	1645	11	2.52E-03	52.3	
33	0	911.74*	121	48	1.73	1823.11	1817	13	1.69E-02	15.2	
34	1	934.25	35	24	2.06	1868.18	1861	29	4.91E-03	32.1	2.32E+00

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	1	943.47	16	16	2.07	1886.62	1861	29	2.19E-03	43.9	
36	1	964.68	28	30	2.08	1929.08	1923	23	3.86E-03	43.5	5.11E+00
37	1	969.32*	80	24	2.09	1938.38	1923	23	1.11E-02	17.8	
38	0	1001.00	31	7	0.72	2001.79	1997	10	4.27E-03	24.5	
39	0	1120.34	138	12	1.70	2240.70	2232	16	1.91E-02	10.2	
40	0	1145.95	14	19	3.06	2291.98	2283	13	1.96E-03	73.2	
41	0	1155.70	23	21	0.98	2311.49	2307	9	3.18E-03	42.5	
42	0	1238.14	61	9	0.92	2476.53	2468	18	8.47E-03	17.2	
43	1	1280.82	25	13	2.11	2562.00	2558	15	3.50E-03	29.0	1.26E+00
44	1	1283.82	19	7	2.11	2568.00	2558	15	2.68E-03	34.2	
45	0	1354.40	8	7	0.89	2709.33	2704	9	1.14E-03	72.4	
46	0	1378.05*	29	17	2.20	2756.69	2747	14	4.09E-03	36.3	
47	0	1461.20*	114	15	1.86	2923.18	2916	12	1.58E-02	12.1	
48	0	1477.03	10	5	1.30	2954.89	2950	9	1.32E-03	51.7	
49	0	1484.54	6	12	3.67	2969.92	2960	12	8.10E-04	126.0	
50	0	1507.25	11	6	0.67	3015.40	3008	11	1.46E-03	53.1	
51	0	1511.82	9	5	1.93	3024.57	3018	9	1.27E-03	53.7	
52	0	1539.38	9	9	2.87	3079.77	3073	12	1.24E-03	75.0	
53	0	1730.37	21	7	2.95	3462.29	3453	14	2.92E-03	34.5	
54	0	1764.98*	108	7	3.18	3531.61	3523	22	1.51E-02	11.5	
55	0	1848.64	16	7	1.58	3699.19	3691	13	2.15E-03	42.4	
56	0	1916.48	10	0	0.50	3835.10	3828	12	1.39E-03	31.6	
57	0	2029.20	13	0	0.58	4060.92	4055	12	1.81E-03	27.7	
58	0	2035.84	8	3	1.32	4074.22	4068	10	1.04E-03	53.7	

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

VMS Nuclide Identification Report V3.1 Generated 13-DEC-2023 07:02:55

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981004.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 13-NOV-2023 12:00:00	Acquisition date	: 13-DEC-2023 05:01:46
Sample ID	: G645981004	Sample quantity	: 136.59 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA6	Detector geometry	: CAN
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:01.21 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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	109	10.66*	9.860E-01	2.848E+00	2.848E+00	24.12
CD-109	88.03	170	3.70*	5.254E+00	2.410E+00	2.520E+00	38.20
TE-125M	109.28	99	0.27*	6.121E+00	1.638E+01	2.346E+01	51.67
SN-126	64.28	147	9.60	2.603E+00	1.611E+00	1.611E+00	56.36
	86.94	170	8.90	5.254E+00	1.002E+00	1.002E+00	38.20
	87.57	170	37.00*	5.254E+00	2.410E-01	2.410E-01	38.20
PM-147	121.22	60	0.00*	6.197E+00	9.404E+02	9.609E+02	92.56
EU-155	86.55	170	30.70	5.254E+00	2.905E-01	2.940E-01	38.20
	105.31	66	21.10*	6.057E+00	1.411E-01	1.428E-01	91.52
TL-208	277.37	-----	6.60	3.940E+00	-----	Line Not Found	-----
	583.19	250	85.00*	2.228E+00	3.626E-01	3.626E-01	17.74
	860.56	-----	12.50	1.593E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.892E+00	-----	Line Not Found	-----
	351.06	789	12.92*	3.293E+00	5.098E+00	5.098E+00	9.42
BI-212	727.33	34	6.67*	1.849E+00	7.620E-01	7.620E-01	93.63
	1620.50	-----	1.47	9.117E-01	-----	Line Not Found	-----
PB-212	74.82	303	10.28	4.109E+00	1.974E+00	1.974E+00	23.79
	77.11	485	17.10	4.362E+00	1.788E+00	1.788E+00	16.42
	238.63	650	43.60*	4.404E+00	9.309E-01	9.309E-01	10.45
	300.09	41	3.30	3.712E+00	9.210E-01	9.210E-01	105.38
BI-214	609.32	561	45.49*	2.149E+00	1.577E+00	1.577E+00	10.05
	1120.29	135	14.92	1.247E+00	1.989E+00	1.989E+00	20.43
	1764.49	102	15.30	8.633E-01	2.123E+00	2.123E+00	22.94
PB-214	74.82	303	5.80	4.109E+00	3.498E+00	3.499E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
RN-222	609.32	561	45.49*	2.149E+00	1.577E+00	1.577E+00	10.05
	1120.29	135	14.92	1.247E+00	1.989E+00	1.989E+00	20.43
	1764.49	102	15.30	8.633E-01	2.123E+00	2.123E+00	22.94
RA-224	240.99	247	4.10*	4.362E+00	3.788E+00	3.788E+00	26.26
RA-226	74.82	303	5.80	4.109E+00	3.498E+00	3.499E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
AC-228	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----
	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59
RA-228	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----
	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	74.82	303	10.28	4.109E+00	1.974E+00	1.974E+00	23.79
	77.11	485	17.10	4.362E+00	1.788E+00	1.788E+00	16.42
	238.63	650	43.60*	4.404E+00	9.309E-01	9.309E-01	10.45
	300.09	41	3.30	3.712E+00	9.210E-01	9.210E-01	105.38
TH-229	85.43	123	14.70	5.012E+00	4.578E-01	4.578E-01	56.04
	88.47	170	24.00	5.254E+00	3.716E-01	3.716E-01	38.20
	193.51	-----	4.41*	5.103E+00	-----	Line Not Found	-----
	210.85	-----	2.80	4.814E+00	-----	Line Not Found	-----
TH-230	74.82	303	5.80	4.109E+00	3.498E+00	3.498E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
PA-231	283.69	-----	1.70	3.874E+00	-----	Line Not Found	-----
TH-232	301.36	41	5.35*	3.712E+00	5.681E-01	5.681E-01	105.38
	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----
TH-234	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59
	63.29	147	3.70*	2.603E+00	4.180E+00	4.180E+00	56.36
	92.59	245	4.23	5.585E+00	2.853E+00	2.853E+00	31.94
U-234	74.82	303	5.80	4.109E+00	3.498E+00	3.498E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
U-235	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
	89.96	141	3.47	5.433E+00	2.061E+00	2.061E+00	48.95
	93.35	245	5.60	5.585E+00	2.155E+00	2.155E+00	31.94
	143.76	63	10.96*	5.982E+00	2.637E-01	2.637E-01	88.60
	163.33	-----	5.08	5.649E+00	-----	Line Not Found	-----
U-238	185.72	194	57.20	5.239E+00	1.775E-01	1.775E-01	51.98
	205.31	-----	5.01	4.904E+00	-----	Line Not Found	-----
	63.29	147	3.70*	2.603E+00	4.180E+00	4.180E+00	56.36
	92.59	245	4.23	5.585E+00	2.853E+00	2.853E+00	31.94
AM-243	43.53	-----	5.90	3.651E-01	-----	Line Not Found	-----
ANH-511	74.66	303	67.20*	4.109E+00	3.019E-01	3.020E-01	23.79
	511.00	9	100.00*	2.474E+00	1.040E-02	1.040E-02	644.22

Flag: "*" = Keyline

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981004.CNF;1
Acquisition date : 13-DEC-2023 05:01:46 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 02:00:01.21 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Analyst initials: RXF2
Sample ID : G645981004 Sample Quantity : 1.3659E+02 GRAM
Batch Number : 2529194 Wet Weight : 0.00000
Wet wt corr : 1.00000 Dry Weight : 0.00000
Nuclide Library : SOLID.NLB;17

CALIBRATION INFORMATION

Eff. Cal. date : 25-SEP-2023 07:18:20 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM06_CAN.CNF;22

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	2.848E+00	6.732E-01	5.849E-01
CD-109	2.520E+00	9.436E-01	8.629E-01
TE-125M	2.346E+01	1.188E+01	1.160E+01
SN-126	2.410E-01	9.024E-02	8.297E-02
PM-147	9.609E+02	8.716E+02	8.066E+02
EU-155	1.428E-01	1.281E-01	1.154E-01
TL-208	3.626E-01	6.306E-02	3.641E-02
BI-211	5.098E+00	4.708E-01	2.701E-01
BI-212	7.620E-01	6.992E-01	5.244E-01
PB-212	9.309E-01	9.529E-02	7.077E-02
BI-214	1.577E+00	1.552E-01	8.327E-02
PB-214	1.850E+00	1.709E-01	9.825E-02
RN-222	1.577E+00	1.552E-01	8.327E-02
RA-224	3.788E+00	9.749E-01	7.589E-01
RA-226	1.850E+00	1.709E-01	9.825E-02
AC-228	8.515E-01	2.543E-01	1.790E-01
RA-228	8.515E-01	2.543E-01	1.790E-01
TH-228	9.309E-01	9.529E-02	7.077E-02
TH-229	1.271E-01	3.527E-01	6.501E-01
TH-230	1.850E+00	1.709E-01	9.825E-02
PA-231	5.681E-01	5.867E-01	5.701E-01
TH-232	8.515E-01	2.543E-01	1.790E-01
TH-234	4.180E+00	2.309E+00	1.678E+00
U-234	1.850E+00	1.709E-01	9.825E-02
U-235	2.637E-01	2.290E-01	2.383E-01
U-238	4.180E+00	2.309E+00	1.678E+00
AM-243	3.020E-01	7.040E-02	6.712E-02
ANH-511	1.040E-02	6.566E-02	4.165E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	-1.061E-02	2.777E-01	5.188E-01	NOT IDENT.
NA-22	-2.899E-02	2.520E-02	3.450E-02	NOT IDENT.

NA-24	0.000E+00	5.623E+12	0.000E+00	SHORT HLIF
AL-26	7.912E-03	1.810E-02	4.348E-02	NOT IDENT.
SC-46	-1.050E-02	2.738E-02	5.096E-02	FAIL ABUN
V-48	8.402E-03	7.980E-02	1.586E-01	FAIL ABUN
CR-51	8.986E-02	3.559E-01	6.972E-01	NOT IDENT.
MN-52	-1.157E+00	1.060E+00	1.554E+00	FAIL ABUN
MN-54	-6.384E-03	2.381E-02	4.501E-02	NOT IDENT.
CO-56	4.382E-03	2.293E-02	4.734E-02	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-1.311E-02	1.706E-02	2.775E-02	NOT IDENT.
CO-58	6.361E-03	2.776E-02	5.614E-02	NOT IDENT.
FE-59	2.370E-03	6.558E-02	1.284E-01	NOT IDENT.
CO-60	-2.422E-02	2.830E-02	4.560E-02	NOT IDENT.
ZN-65	1.971E-02	5.971E-02	1.083E-01	NOT IDENT.
GE-68	4.155E-01	9.572E-01	1.916E+00	NOT IDENT.
AS-73	5.035E-01	7.524E-01	1.541E+00	NOT IDENT.
AS-74	2.567E-02	1.193E-01	2.249E-01	FAIL ABUN
SE-75	-9.731E-03	3.663E-02	5.763E-02	FAIL ABUN
BR-77	0.000E+00	1.055E+03	0.000E+00	SHORT HLIF
SR-82	3.633E-01	3.817E-01	7.666E-01	NOT IDENT.
RB-83	3.106E-02	5.321E-02	1.058E-01	NOT IDENT.
RB-84	-1.691E-02	5.710E-02	1.078E-01	NOT IDENT.
KR-85	6.289E+00	5.872E+00	1.087E+01	NOT IDENT.
SR-85	3.874E-02	3.628E-02	6.712E-02	NOT IDENT.
RB-86	4.468E-01	9.800E-01	1.972E+00	NOT IDENT.
Y-88	1.246E-02	2.782E-02	6.297E-02	NOT IDENT.
Y-91	-3.134E+00	1.408E+01	2.614E+01	NOT IDENT.
NB-94	-8.576E-03	2.337E-02	4.072E-02	NOT IDENT.
NB-95	7.681E-03	3.532E-02	5.953E-02	NOT IDENT.
NB-95M	-8.237E-03	1.079E-01	1.742E-01	NOT IDENT.
ZR-95	5.391E-02	6.448E-02	1.278E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	2.209E+12	0.000E+00	SHORT HLIF
MO-99	0.000E+00	3.557E+02	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	8.545E+33	0.000E+00	SHORT HLIF
RH-101	9.463E-03	2.181E-02	4.134E-02	NOT IDENT.
RH-102	2.220E-02	3.507E-02	6.555E-02	NOT IDENT.
RU-103	-1.655E-03	3.329E-02	6.250E-02	FAIL ABUN
RH-106	-7.243E-02	2.389E-01	4.244E-01	NOT IDENT.
RU-106	-7.243E-02	2.389E-01	4.244E-01	NOT IDENT.
AG-108M	1.599E-03	2.098E-02	3.984E-02	NOT IDENT.
AG-110	3.364E-01	4.423E-01	9.118E-01	NOT IDENT.
AG-110M	7.600E-03	3.479E-02	6.935E-02	NOT IDENT.
SN-113	2.588E-03	3.360E-02	6.421E-02	NOT IDENT.
CD-115	0.000E+00	7.484E+02	0.000E+00	SHORT HLIF
SN-117M	-4.655E-02	7.435E-02	1.303E-01	NOT IDENT.
SB-122	0.000E+00	5.300E+01	0.000E+00	SHORT HLIF
TE-123M	2.540E-03	1.924E-02	3.556E-02	NOT IDENT.
SB-124	4.910E-02	6.907E-02	1.634E-01	NOT IDENT.
SB-125	-5.922E-03	6.780E-02	1.266E-01	FAIL ABUN
I-126	4.426E-01	3.811E-01	7.712E-01	NOT IDENT.
SB-126	1.071E-01	2.176E-01	4.242E-01	NOT IDENT.
SB-127	-4.224E+00	1.401E+01	2.462E+01	NOT IDENT.
I-131	-7.320E-02	2.739E-01	5.126E-01	NOT IDENT.
I-132	0.000E+00	1.400E+41	0.000E+00	SHORT HLIF
TE-132	4.827E+00	1.206E+01	2.205E+01	NOT IDENT.
BA-133	1.763E-02	2.920E-02	5.375E-02	NOT IDENT.
I-133	0.000E+00	4.815E+08	0.000E+00	SHORT HLIF
CS-134	2.090E-02	2.827E-02	5.900E-02	NOT IDENT.
I-135	0.000E+00	4.362E+31	0.000E+00	SHORT HLIF
CS-136	2.760E-02	1.479E-01	2.931E-01	NOT IDENT.
BA-137M	-8.707E-03	2.344E-02	4.122E-02	NOT IDENT.
CS-137	-9.198E-03	2.476E-02	4.354E-02	NOT IDENT.
LA-138	-1.157E-02	3.269E-02	5.961E-02	NOT IDENT.
CE-139	-1.223E-03	2.133E-02	3.868E-02	NOT IDENT.
BA-140	2.260E-01	3.958E-01	7.852E-01	NOT IDENT.
LA-140	-3.771E-02	1.275E-01	2.467E-01	FAIL ABUN
CE-141	3.612E-03	5.819E-02	9.950E-02	NOT IDENT.
CE-143	0.000E+00	1.311E+05	0.000E+00	SHORT HLIF
CE-144	-3.158E-02	1.290E-01	2.355E-01	NOT IDENT.
PM-144	-2.941E-03	2.443E-02	4.401E-02	NOT IDENT.
PR-144	-2.356E-01	1.840E+00	3.313E+00	NOT IDENT.
PM-146	-2.342E-02	3.071E-02	5.364E-02	FAIL ABUN
ND-147	-1.037E+00	9.530E-01	1.562E+00	FAIL ABUN
PM-149	0.000E+00	6.545E+03	0.000E+00	SHORT HLIF
EU-150	7.485E-03	2.473E-02	3.574E-02	FAIL ABUN
EU-152	-1.090E-03	6.770E-02	1.292E-01	FAIL ABUN
GD-153	-2.317E-02	5.715E-02	9.782E-02	NOT IDENT.

EU-154	-9.617E-02	7.049E-02	9.739E-02	NOT IDENT.
TB-160	-8.816E-02	9.364E-02	1.598E-01	FAIL ABUN
HO-166M	6.276E-03	3.751E-02	7.103E-02	FAIL ABUN
TM-171	-3.113E+00	1.428E+01	2.801E+01	NOT IDENT.
HF-172	-1.008E-01	1.302E-01	2.308E-01	FAIL ABUN
LU-172	1.479E-02	4.138E-02	8.370E-02	FAIL ABUN
LU-176	7.690E-03	1.736E-02	3.456E-02	FAIL ABUN
HF-181	6.488E-03	3.555E-02	6.852E-02	NOT IDENT.
TA-182	6.734E-02	1.348E-01	2.713E-01	FAIL ABUN
RE-183	-5.445E-03	1.652E-01	3.246E-01	NOT IDENT.
RE-184	1.658E-01	1.292E-01	2.782E-01	NOT IDENT.
W-188	-1.823E+00	5.925E+00	1.006E+01	FAIL ABUN
IR-192	-6.893E-03	2.598E-02	4.913E-02	FAIL ABUN
HG-203	2.640E-02	3.659E-02	6.744E-02	NOT IDENT.
TL-204	-2.037E+00	3.592E+00	6.226E+00	NOT IDENT.
BI-207	-9.737E-03	3.293E-02	6.094E-02	FAIL ABUN
BI-210	-7.998E-01	3.203E+00	6.208E+00	NOT IDENT.
PB-210	-7.998E-01	3.203E+00	6.208E+00	NOT IDENT.
PB-211	3.855E-01	4.856E-01	9.797E-01	NOT IDENT.
BI-213	-1.312E-03	6.770E-02	1.282E-01	NOT IDENT.
RN-219	2.876E-01	2.826E-01	5.780E-01	FAIL ABUN
RA-223	1.173E-02	4.712E-01	8.180E-01	FAIL ABUN
AC-225	1.378E-01	1.266E+00	2.094E+00	NOT IDENT.
AC-227	-1.240E-01	1.870E-01	3.108E-01	FAIL ABUN
TH-227	-1.240E-01	1.870E-01	3.108E-01	FAIL ABUN
TH-231	1.173E-02	4.712E-01	8.180E-01	FAIL ABUN
PA-233	-4.877E-03	4.300E-02	8.222E-02	FAIL ABUN
PA-234	-6.309E-02	2.471E-01	3.859E-01	FAIL ABUN
PA-234M	7.169E+00	3.441E+00	7.392E+00	FAIL ABUN
NP-237	-4.877E-03	4.300E-02	8.222E-02	FAIL ABUN
NP-238	0.000E+00	1.520E+03	0.000E+00	SHORT HLIF
NP-239	-5.297E-02	1.707E-01	2.900E-01	FAIL ABUN
PU-239	-1.583E+02	2.344E+02	4.168E+02	NOT IDENT.
AM-241	2.546E-02	1.193E-01	2.208E-01	NOT IDENT.
CM-243	-2.919E-02	6.913E-02	1.176E-01	NOT IDENT.
BK-247	-1.150E-02	6.095E-02	9.670E-02	FAIL ABUN
CM-247	2.184E-02	2.551E-02	5.169E-02	NOT IDENT.
CF-249	-2.110E-02	2.654E-02	4.707E-02	NOT IDENT.
CF-251	-7.603E-02	8.975E-02	1.530E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	109	10.66*	9.860E-01	2.848E+00	2.848E+00	24.12
CD-109	88.03	170	3.70*	5.254E+00	2.410E+00	2.520E+00	38.20
TE-125M	109.28	99	0.27*	6.121E+00	1.638E+01	2.346E+01	51.67
SN-126	64.28	147	9.60	2.603E+00	1.611E+00	1.611E+00	56.36
	86.94	170	8.90	5.254E+00	1.002E+00	1.002E+00	38.20
	87.57	170	37.00*	5.254E+00	2.410E-01	2.410E-01	38.20
PM-147	121.22	60	0.00*	6.197E+00	9.404E+02	9.609E+02	92.56
EU-155	86.55	170	30.70	5.254E+00	2.905E-01	2.940E-01	38.20
	105.31	66	21.10*	6.057E+00	1.411E-01	1.428E-01	91.52
TL-208	277.37	-----	6.60	3.940E+00	-----	Line Not Found	-----
	583.19	250	85.00*	2.228E+00	3.626E-01	3.626E-01	17.74
	860.56	-----	12.50	1.593E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.892E+00	-----	Line Not Found	-----
	351.06	789	12.92*	3.293E+00	5.098E+00	5.098E+00	9.42
BI-212	727.33	34	6.67*	1.849E+00	7.620E-01	7.620E-01	93.63
	1620.50	-----	1.47	9.117E-01	-----	Line Not Found	-----
PB-212	74.82	303	10.28	4.109E+00	1.974E+00	1.974E+00	23.79
	77.11	485	17.10	4.362E+00	1.788E+00	1.788E+00	16.42
	238.63	650	43.60*	4.404E+00	9.309E-01	9.309E-01	10.45
	300.09	41	3.30	3.712E+00	9.210E-01	9.210E-01	105.38
BI-214	609.32	561	45.49*	2.149E+00	1.577E+00	1.577E+00	10.05
	1120.29	135	14.92	1.247E+00	1.989E+00	1.989E+00	20.43
	1764.49	102	15.30	8.633E-01	2.123E+00	2.123E+00	22.94
PB-214	74.82	303	5.80	4.109E+00	3.498E+00	3.499E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
RN-222	609.32	561	45.49*	2.149E+00	1.577E+00	1.577E+00	10.05
	1120.29	135	14.92	1.247E+00	1.989E+00	1.989E+00	20.43
	1764.49	102	15.30	8.633E-01	2.123E+00	2.123E+00	22.94
RA-224	240.99	247	4.10*	4.362E+00	3.788E+00	3.788E+00	26.26
RA-226	74.82	303	5.80	4.109E+00	3.498E+00	3.499E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
AC-228	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----
	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59
RA-228	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59
	74.82	303	10.28	4.109E+00	1.974E+00	1.974E+00	23.79
	77.11	485	17.10	4.362E+00	1.788E+00	1.788E+00	16.42
	238.63	650	43.60*	4.404E+00	9.309E-01	9.309E-01	10.45
TH-229	300.09	41	3.30	3.712E+00	9.210E-01	9.210E-01	105.38
	85.43	123	14.70	5.012E+00	4.578E-01	4.578E-01	56.04
	88.47	170	24.00	5.254E+00	3.716E-01	3.716E-01	38.20
	193.51	-----	4.41*	5.103E+00	-----	Line Not Found	-----
TH-230	210.85	-----	2.80	4.814E+00	-----	Line Not Found	-----
	74.82	303	5.80	4.109E+00	3.498E+00	3.498E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
PA-231	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
	283.69	-----	1.70	3.874E+00	-----	Line Not Found	-----
	301.36	41	5.35*	3.712E+00	5.681E-01	5.681E-01	105.38
TH-232	105.21	66	1.10	6.057E+00	2.707E+00	2.707E+00	91.52
	338.32	115	11.27	3.393E+00	8.291E-01	8.291E-01	38.19
	835.71	-----	1.61	1.636E+00	-----	Line Not Found	-----
TH-234	911.20	121	25.80*	1.511E+00	8.515E-01	8.515E-01	30.48
	968.97	79	15.80	1.428E+00	9.640E-01	9.640E-01	35.59
	63.29	147	3.70*	2.603E+00	4.180E+00	4.180E+00	56.36
	92.59	245	4.23	5.585E+00	2.853E+00	2.853E+00	31.94
U-234	74.82	303	5.80	4.109E+00	3.498E+00	3.498E+00	23.79
	77.11	485	9.70	4.362E+00	3.151E+00	3.151E+00	16.42
	87.09	170	3.41	5.254E+00	2.615E+00	2.615E+00	38.20
	242.00	247	7.25	4.362E+00	2.142E+00	2.142E+00	26.26
	295.22	499	18.42	3.759E+00	1.981E+00	1.981E+00	11.37
U-235	351.93	789	35.60*	3.293E+00	1.850E+00	1.850E+00	9.42
	89.96	141	3.47	5.433E+00	2.061E+00	2.061E+00	48.95
	93.35	245	5.60	5.585E+00	2.155E+00	2.155E+00	31.94
	143.76	63	10.96*	5.982E+00	2.637E-01	2.637E-01	88.60
	163.33	-----	5.08	5.649E+00	-----	Line Not Found	-----
U-238	185.72	194	57.20	5.239E+00	1.775E-01	1.775E-01	51.98
	205.31	-----	5.01	4.904E+00	-----	Line Not Found	-----
	63.29	147	3.70*	2.603E+00	4.180E+00	4.180E+00	56.36
	92.59	245	4.23	5.585E+00	2.853E+00	2.853E+00	31.94
AM-243	43.53	-----	5.90	3.651E-01	-----	Line Not Found	-----
ANH-511	74.66	303	67.20*	4.109E+00	3.019E-01	3.020E-01	23.79
	511.00	9	100.00*	2.474E+00	1.040E-02	1.040E-02	644.22

Flag: "*" = Keyline

Total number of lines in spectrum 58
Number of unidentified lines 20
Number of lines tentatively identified by NID 38 65.52%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	2.848E+00	2.848E+00	0.687E+00	24.12	
CD-109	461.40D	1.05	2.410E+00	2.520E+00	0.963E+00	38.20	
TE-125M	57.40D	1.43	1.638E+01	2.346E+01	1.212E+01	51.67	
SN-126	2.30E+05Y	1.00	2.410E-01	2.410E-01	0.921E-01	38.20	
PM-147	2.62Y	1.02	9.404E+02	9.609E+02	8.894E+02	92.56	
EU-155	4.75Y	1.01	1.411E-01	1.428E-01	1.307E-01	91.52	
TL-208	1.41E+10Y	1.00	3.626E-01	3.626E-01	0.643E-01	17.74	
BI-211	7.04E+08Y	1.00	5.098E+00	5.098E+00	0.480E+00	9.42	
BI-212	1.41E+10Y	1.00	7.620E-01	7.620E-01	7.135E-01	93.63	
PB-212	1.41E+10Y	1.00	9.309E-01	9.309E-01	0.972E-01	10.45	
BI-214	1600.00Y	1.00	1.577E+00	1.577E+00	0.158E+00	10.05	
PB-214	1600.00Y	1.00	1.850E+00	1.850E+00	0.174E+00	9.42	
RN-222	1600.00Y	1.00	1.577E+00	1.577E+00	0.158E+00	10.05	
RA-224	1.41E+10Y	1.00	3.788E+00	3.788E+00	0.995E+00	26.26	
RA-226	1600.00Y	1.00	1.850E+00	1.850E+00	0.174E+00	9.42	
AC-228	1.41E+10Y	1.00	8.515E-01	8.515E-01	2.595E-01	30.48	
RA-228	1.41E+10Y	1.00	8.515E-01	8.515E-01	2.595E-01	30.48	
TH-228	1.41E+10Y	1.00	9.309E-01	9.309E-01	0.972E-01	10.45	
TH-229	7340.00Y	1.00	3.716E-01	3.716E-01	1.420E-01	38.20	K
TH-230	7.54E+04Y	1.00	1.850E+00	1.850E+00	0.174E+00	9.42	
PA-231	7.04E+08Y	1.00	5.681E-01	5.681E-01	5.986E-01	105.38	
TH-232	1.41E+10Y	1.00	8.515E-01	8.515E-01	2.595E-01	30.48	
TH-234	4.47E+09Y	1.00	4.180E+00	4.180E+00	2.356E+00	56.36	
U-234	2.45E+05Y	1.00	1.850E+00	1.850E+00	0.174E+00	9.42	
U-235	7.04E+08Y	1.00	2.637E-01	2.637E-01	2.336E-01	88.60	
U-238	4.47E+09Y	1.00	4.180E+00	4.180E+00	2.356E+00	56.36	
AM-243	7370.00Y	1.00	3.019E-01	3.020E-01	0.718E-01	23.79	
ANH-511	1.00E+09Y	1.00	1.040E-02	1.040E-02	6.700E-02	644.22	
Total Activity :			9.973E+02	1.025E+03			

Grand Total Activity : 9.973E+02 1.025E+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	95.07	42	184	0.92	189.00	163	30	4.90E-03	****	5.71E+00	T
0	209.31	99	169	1.15	417.53	414	8	1.24E-02	52.6	4.84E+00	
0	221.12	33	135	0.91	441.16	438	7	4.12E-03	****	4.66E+00	T
0	270.25	106	162	3.23	539.44	532	13	1.35E-02	55.8	4.02E+00	T
0	328.02	78	170	3.18	655.01	649	15	1.01E-02	79.0	3.47E+00	T
0	406.63	161	201	13.25	812.29	797	33	2.10E-02	57.6	2.95E+00	
0	464.00	26	57	0.98	927.08	924	7	3.38E-03	****	2.67E+00	T
0	633.34	30	13	0.94	1265.93	1262	9	4.06E-03	58.2	2.08E+00	T
0	768.85	52	43	1.39	1537.11	1532	10	7.14E-03	55.1	1.76E+00	
0	825.29	18	19	1.33	1650.08	1645	11	2.52E-03	****	1.65E+00	
1	934.25	35	24	2.06	1868.18	1861	29	4.91E-03	64.2	1.48E+00	T
1	943.47	16	16	2.07	1886.62	1861	29	2.19E-03	87.8	1.46E+00	T
1	964.68	28	29	2.08	1929.08	1923	23	3.86E-03	87.1	1.43E+00	T
0	1001.00	30	7	0.72	2001.79	1997	10	4.27E-03	49.0	1.39E+00	T
0	1145.95	14	18	3.06	2291.98	2283	13	1.96E-03	****	1.22E+00	
0	1155.70	22	21	0.98	2311.49	2307	9	3.18E-03	84.9	1.21E+00	
0	1238.14	59	9	0.92	2476.53	2468	18	8.47E-03	34.5	1.14E+00	T
1	1280.82	24	12	2.11	2562.00	2558	15	3.50E-03	58.0	1.10E+00	
1	1283.82	19	7	2.11	2568.00	2558	15	2.68E-03	68.3	1.10E+00	
0	1354.40	8	7	0.89	2709.33	2704	9	1.14E-03	****	1.05E+00	
0	1378.05	28	16	2.20	2756.69	2747	14	4.09E-03	72.6	1.04E+00	
0	1477.03	9	4	1.30	2954.89	2950	9	1.32E-03	****	9.77E-01	
0	1484.54	6	12	3.67	2969.92	2960	12	8.10E-04	****	9.74E-01	
0	1507.25	10	5	0.67	3015.40	3008	11	1.46E-03	****	9.62E-01	
0	1511.82	9	5	1.93	3024.57	3018	9	1.27E-03	****	9.60E-01	
0	1539.38	9	9	2.87	3079.77	3073	12	1.24E-03	****	9.46E-01	
0	1730.37	20	7	2.95	3462.29	3453	14	2.92E-03	69.0	8.73E-01	
0	1848.64	15	6	1.58	3699.19	3691	13	2.15E-03	84.7	8.42E-01	
0	1916.48	9	0	0.50	3835.10	3828	12	1.39E-03	63.2	8.29E-01	
0	2029.20	12	0	0.58	4060.92	4055	12	1.81E-03	55.5	8.13E-01	
0	2035.84	7	2	1.32	4074.22	4068	10	1.04E-03	****	8.12E-01	

Flags: "T" = Tentatively associated

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981004.CNF;1
Acquisition date : 13-DEC-2023 05:01:46 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 02:00:01.21 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981004 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3659E+02 GRAM
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 25-SEP-2023 07:18:20 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM06_CAN.CNF;22

Combined Critical Level Report

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

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	2.571E-01
CD-109	4.107E-01
TE-125M	5.463E+00
SN-126	3.949E-02
PM-147	3.809E+02
EU-155	5.461E-02
TL-208	1.621E-02
BI-211	1.261E-01
BI-212	2.317E-01
PB-212	3.339E-02
BI-214	3.777E-02
PB-214	4.588E-02
RN-222	3.777E-02
RA-224	3.581E-01
RA-226	4.588E-02
AC-228	7.989E-02
RA-228	7.989E-02
TH-228	3.339E-02
TH-229	3.080E-01
TH-230	4.588E-02
PA-231	2.658E-01
TH-232	7.989E-02
TH-234	7.989E-01
U-234	4.588E-02
U-235	1.133E-01
U-238	7.989E-01
AM-243	3.215E-02
ANH-511	1.930E-02

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

Nuclide	Lc (pCi/GRAM)	
BE-7	2.389E-01	NOT IDENT.
NA-22	1.380E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF

AL-26	1.737E-02	NOT IDENT.
SC-46	2.237E-02	FAIL ABUN
V-48	6.963E-02	FAIL ABUN
CR-51	3.257E-01	NOT IDENT.
MN-52	6.281E-01	FAIL ABUN
MN-54	2.005E-02	NOT IDENT.
CO-56	2.063E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	1.309E-02	NOT IDENT.
CO-58	2.506E-02	NOT IDENT.
FE-59	5.592E-02	NOT IDENT.
CO-60	1.926E-02	NOT IDENT.
ZN-65	4.771E-02	NOT IDENT.
GE-68	8.612E-01	NOT IDENT.
AS-73	7.329E-01	NOT IDENT.
AS-74	1.031E-01	FAIL ABUN
SE-75	2.692E-02	FAIL ABUN
BR-77	0.000E+00	SHORT HLIF
SR-82	3.511E-01	NOT IDENT.
RB-83	4.853E-02	NOT IDENT.
RB-84	4.736E-02	NOT IDENT.
KR-85	5.078E+00	NOT IDENT.
SR-85	3.137E-02	NOT IDENT.
RB-86	8.851E-01	NOT IDENT.
Y-88	2.612E-02	NOT IDENT.
Y-91	1.132E+01	NOT IDENT.
NB-94	1.838E-02	NOT IDENT.
NB-95	2.683E-02	NOT IDENT.
NB-95M	8.230E-02	NOT IDENT.
ZR-95	5.859E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.973E-02	NOT IDENT.
RH-102	2.950E-02	NOT IDENT.
RU-103	2.847E-02	FAIL ABUN
RH-106	1.932E-01	NOT IDENT.
RU-106	1.932E-01	NOT IDENT.
AG-108M	1.843E-02	NOT IDENT.
AG-110	4.108E-01	NOT IDENT.
AG-110M	3.107E-02	NOT IDENT.
SN-113	2.980E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	6.160E-02	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	1.683E-02	NOT IDENT.
SB-124	6.930E-02	NOT IDENT.
SB-125	5.874E-02	FAIL ABUN
I-126	3.574E-01	NOT IDENT.
SB-126	1.922E-01	NOT IDENT.
SB-127	1.119E+01	NOT IDENT.
I-131	2.373E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	1.042E+01	NOT IDENT.
BA-133	2.499E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	2.686E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	1.296E-01	NOT IDENT.
BA-137M	1.851E-02	NOT IDENT.
CS-137	1.956E-02	NOT IDENT.
LA-138	2.412E-02	NOT IDENT.
CE-139	1.834E-02	NOT IDENT.
BA-140	3.598E-01	NOT IDENT.
LA-140	1.020E-01	FAIL ABUN
CE-141	4.722E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.116E-01	NOT IDENT.
PM-144	1.992E-02	NOT IDENT.
PR-144	1.499E+00	NOT IDENT.
PM-146	2.465E-02	FAIL ABUN
ND-147	7.023E-01	FAIL ABUN
PM-149	0.000E+00	SHORT HLIF
EU-150	1.671E-02	FAIL ABUN
EU-152	6.030E-02	FAIL ABUN
GD-153	4.640E-02	NOT IDENT.
EU-154	3.901E-02	NOT IDENT.

TB-160	6.926E-02	FAIL ABUN
HO-166M	3.182E-02	FAIL ABUN
TM-171	1.328E+01	NOT IDENT.
HF-172	1.097E-01	FAIL ABUN
LU-172	3.706E-02	FAIL ABUN
LU-176	1.616E-02	FAIL ABUN
HF-181	3.130E-02	NOT IDENT.
TA-182	1.213E-01	FAIL ABUN
RE-183	1.543E-01	NOT IDENT.
RE-184	1.275E-01	NOT IDENT.
W-188	4.694E+00	FAIL ABUN
IR-192	2.286E-02	FAIL ABUN
HG-203	3.186E-02	NOT IDENT.
TL-204	2.975E+00	NOT IDENT.
BI-207	2.663E-02	FAIL ABUN
BI-210	2.946E+00	NOT IDENT.
PB-210	2.946E+00	NOT IDENT.
PB-211	4.559E-01	NOT IDENT.
BI-213	5.883E-02	NOT IDENT.
RN-219	2.697E-01	FAIL ABUN
RA-223	3.818E-01	FAIL ABUN
AC-225	9.909E-01	NOT IDENT.
AC-227	1.458E-01	FAIL ABUN
TH-227	1.458E-01	FAIL ABUN
TH-231	3.818E-01	FAIL ABUN
PA-233	3.837E-02	FAIL ABUN
PA-234	1.715E-01	FAIL ABUN
PA-234M	3.375E+00	FAIL ABUN
NP-237	3.837E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
NP-239	1.371E-01	FAIL ABUN
PU-239	1.985E+02	NOT IDENT.
AM-241	1.052E-01	NOT IDENT.
CM-243	5.569E-02	NOT IDENT.
BK-247	4.522E-02	FAIL ABUN
CM-247	2.407E-02	NOT IDENT.
CF-249	2.165E-02	NOT IDENT.
CF-251	7.238E-02	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G645981004.CNF;1
Acquisition date : 13-DEC-2023 05:01:46 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 02:00:01.21 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G645981004 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3659E+02 GRAM
Quantity Err(%) : 1.4642E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 25-SEP-2023 07:18:20 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM06_CAN.CNF;22

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	2.848E+00	7.245E-01	7.245E-01
CD-109	2.520E+00	9.814E-01	9.814E-01
TE-125M	2.346E+01	1.202E+01	1.202E+01
SN-126	2.410E-01	9.298E-02	9.298E-02
PM-147	9.609E+02	8.744E+02	8.744E+02
EU-155	1.428E-01	1.287E-01	1.287E-01
TL-208	3.626E-01	7.062E-02	7.062E-02
BI-211	5.098E+00	6.264E-01	6.264E-01
BI-212	7.620E-01	7.028E-01	7.028E-01
PB-212	9.309E-01	1.217E-01	1.217E-01
BI-214	1.577E+00	2.077E-01	2.077E-01
PB-214	1.850E+00	2.254E-01	2.254E-01
RN-222	1.577E+00	2.077E-01	2.077E-01
RA-224	3.788E+00	1.023E+00	1.023E+00
RA-226	1.850E+00	2.254E-01	2.254E-01
AC-228	8.515E-01	2.677E-01	2.677E-01
RA-228	8.515E-01	2.677E-01	2.677E-01
TH-228	9.309E-01	1.217E-01	1.217E-01
TH-229	1.271E-01	3.528E-01	3.528E-01
TH-230	1.850E+00	2.253E-01	2.253E-01
PA-231	5.681E-01	6.001E-01	6.001E-01
TH-232	8.515E-01	2.677E-01	2.677E-01
TH-234	4.180E+00	2.503E+00	2.503E+00
U-234	1.850E+00	2.253E-01	2.253E-01
U-235	2.637E-01	2.299E-01	2.299E-01
U-238	4.180E+00	2.503E+00	2.503E+00
AM-243	3.020E-01	7.523E-02	7.523E-02
ANH-511	1.040E-02	6.567E-02	6.567E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.061E-02	2.777E-01	2.778E-01	NOT IDENT.
NA-22	-2.899E-02	2.532E-02	2.849E-02	NOT IDENT.

NA-24	-1.919E+12	5.627E+12	5.693E+12	SHORT HLIF
AL-26	7.912E-03	1.811E-02	1.846E-02	NOT IDENT.
SC-46	-1.050E-02	2.739E-02	2.780E-02	FAIL ABUN
V-48	8.402E-03	7.980E-02	7.989E-02	FAIL ABUN
CR-51	8.986E-02	3.560E-01	3.583E-01	NOT IDENT.
MN-52	-1.157E+00	1.065E+00	1.186E+00	FAIL ABUN
MN-54	-6.384E-03	2.381E-02	2.399E-02	NOT IDENT.
CO-56	4.382E-03	2.294E-02	2.302E-02	FAIL ABUN
MN-56	1.000E+41	5.036E+41	0.000E+00	SHORT HLIF
CO-57	-1.311E-02	1.709E-02	1.808E-02	NOT IDENT.
CO-58	6.361E-03	2.777E-02	2.791E-02	NOT IDENT.
FE-59	2.370E-03	6.558E-02	6.559E-02	NOT IDENT.
CO-60	-2.422E-02	2.838E-02	3.041E-02	NOT IDENT.
ZN-65	1.971E-02	5.973E-02	6.039E-02	NOT IDENT.
GE-68	4.155E-01	9.579E-01	9.760E-01	NOT IDENT.
AS-73	5.035E-01	7.603E-01	7.935E-01	NOT IDENT.
AS-74	2.567E-02	1.193E-01	1.199E-01	FAIL ABUN
SE-75	-9.731E-03	3.664E-02	3.690E-02	FAIL ABUN
BR-77	1.031E+04	8.948E+03	1.008E+04	SHORT HLIF
SR-82	3.633E-01	3.831E-01	4.166E-01	NOT IDENT.
RB-83	3.106E-02	5.343E-02	5.523E-02	NOT IDENT.
RB-84	-1.691E-02	5.712E-02	5.763E-02	NOT IDENT.
KR-85	6.289E+00	5.897E+00	6.544E+00	NOT IDENT.
SR-85	3.874E-02	3.644E-02	4.041E-02	NOT IDENT.
RB-86	4.468E-01	9.807E-01	1.001E+00	NOT IDENT.
Y-88	1.246E-02	2.783E-02	2.840E-02	NOT IDENT.
Y-91	-3.134E+00	1.408E+01	1.415E+01	NOT IDENT.
NB-94	-8.576E-03	2.338E-02	2.370E-02	NOT IDENT.
NB-95	7.681E-03	3.532E-02	3.549E-02	NOT IDENT.
NB-95M	-8.237E-03	1.079E-01	1.079E-01	NOT IDENT.
ZR-95	5.391E-02	6.466E-02	6.908E-02	NOT IDENT.
NB-97	1.000E+41	2.454E+41	0.000E+00	SHORT HLIF
ZR-97	2.203E+12	2.217E+12	2.430E+12	SHORT HLIF
MO-99	-1.523E+02	3.560E+02	3.626E+02	SHORT HLIF
TC-99M	-1.157E+33	8.546E+33	0.000E+00	SHORT HLIF
RH-101	9.463E-03	2.188E-02	2.229E-02	NOT IDENT.
RH-102	2.220E-02	3.515E-02	3.655E-02	NOT IDENT.
RU-103	-1.655E-03	3.329E-02	3.330E-02	FAIL ABUN
RH-106	-7.243E-02	2.390E-01	2.412E-01	NOT IDENT.
RU-106	-7.243E-02	2.390E-01	2.412E-01	NOT IDENT.
AG-108M	1.599E-03	2.099E-02	2.100E-02	NOT IDENT.
AG-110	3.364E-01	4.433E-01	4.685E-01	NOT IDENT.
AG-110M	7.600E-03	3.480E-02	3.497E-02	NOT IDENT.
SN-113	2.588E-03	3.360E-02	3.362E-02	NOT IDENT.
CD-115	6.828E+02	7.514E+02	8.120E+02	SHORT HLIF
SN-117M	-4.655E-02	7.445E-02	7.735E-02	NOT IDENT.
SB-122	6.767E+00	5.300E+01	5.309E+01	SHORT HLIF
TE-123M	2.540E-03	1.924E-02	1.928E-02	NOT IDENT.
SB-124	4.910E-02	6.919E-02	7.264E-02	NOT IDENT.
SB-125	-5.922E-03	6.780E-02	6.785E-02	FAIL ABUN
I-126	4.426E-01	3.835E-01	4.323E-01	NOT IDENT.
SB-126	1.071E-01	2.180E-01	2.233E-01	NOT IDENT.
SB-127	-4.224E+00	1.403E+01	1.416E+01	NOT IDENT.
I-131	-7.320E-02	2.740E-01	2.760E-01	NOT IDENT.
I-132	1.000E+41	2.308E+41	0.000E+00	SHORT HLIF
TE-132	4.827E+00	1.208E+01	1.227E+01	NOT IDENT.
BA-133	1.763E-02	2.923E-02	3.029E-02	NOT IDENT.
I-133	-3.140E+08	4.858E+08	5.061E+08	SHORT HLIF
CS-134	2.090E-02	2.834E-02	2.986E-02	NOT IDENT.
I-135	-3.657E+31	5.021E+31	0.000E+00	SHORT HLIF
CS-136	2.760E-02	1.479E-01	1.485E-01	NOT IDENT.
BA-137M	-8.707E-03	2.345E-02	2.377E-02	NOT IDENT.
CS-137	-9.198E-03	2.477E-02	2.511E-02	NOT IDENT.
LA-138	-1.157E-02	3.271E-02	3.312E-02	NOT IDENT.
CE-139	-1.223E-03	2.134E-02	2.134E-02	NOT IDENT.
BA-140	2.260E-01	3.963E-01	4.092E-01	NOT IDENT.
LA-140	-3.771E-02	1.276E-01	1.287E-01	FAIL ABUN
CE-141	3.612E-03	5.819E-02	5.821E-02	NOT IDENT.
CE-143	1.921E+05	1.320E+05	1.578E+05	SHORT HLIF
CE-144	-3.158E-02	1.290E-01	1.298E-01	NOT IDENT.
PM-144	-2.941E-03	2.443E-02	2.446E-02	NOT IDENT.
PR-144	-2.356E-01	1.841E+00	1.844E+00	NOT IDENT.
PM-146	-2.342E-02	3.080E-02	3.256E-02	FAIL ABUN
ND-147	-1.037E+00	9.574E-01	1.066E+00	FAIL ABUN
PM-149	1.219E+03	6.548E+03	6.571E+03	SHORT HLIF
EU-150	7.485E-03	2.474E-02	2.497E-02	FAIL ABUN
EU-152	-1.090E-03	6.770E-02	6.770E-02	FAIL ABUN
GD-153	-2.317E-02	5.719E-02	5.813E-02	NOT IDENT.

EU-154	-9.617E-02	7.098E-02	8.318E-02	NOT IDENT.
TB-160	-8.816E-02	9.407E-02	1.021E-01	FAIL ABUN
HO-166M	6.276E-03	3.752E-02	3.762E-02	FAIL ABUN
TM-171	-3.113E+00	1.428E+01	1.435E+01	NOT IDENT.
HF-172	-1.008E-01	1.313E-01	1.390E-01	FAIL ABUN
LU-172	1.479E-02	4.142E-02	4.195E-02	FAIL ABUN
LU-176	7.690E-03	1.737E-02	1.771E-02	FAIL ABUN
HF-181	6.488E-03	3.555E-02	3.567E-02	NOT IDENT.
TA-182	6.734E-02	1.349E-01	1.383E-01	FAIL ABUN
RE-183	-5.445E-03	1.652E-01	1.652E-01	NOT IDENT.
RE-184	1.658E-01	1.306E-01	1.505E-01	NOT IDENT.
W-188	-1.823E+00	5.929E+00	5.986E+00	FAIL ABUN
IR-192	-6.893E-03	2.598E-02	2.617E-02	FAIL ABUN
HG-203	2.640E-02	3.664E-02	3.853E-02	NOT IDENT.
TL-204	-2.037E+00	3.598E+00	3.714E+00	NOT IDENT.
BI-207	-9.737E-03	3.294E-02	3.323E-02	FAIL ABUN
BI-210	-7.998E-01	3.204E+00	3.224E+00	NOT IDENT.
PB-210	-7.998E-01	3.204E+00	3.224E+00	NOT IDENT.
PB-211	3.855E-01	4.868E-01	5.169E-01	NOT IDENT.
BI-213	-1.312E-03	6.770E-02	6.770E-02	NOT IDENT.
RN-219	2.876E-01	2.857E-01	3.137E-01	FAIL ABUN
RA-223	1.173E-02	4.713E-01	4.713E-01	FAIL ABUN
AC-225	1.378E-01	1.266E+00	1.267E+00	NOT IDENT.
AC-227	-1.240E-01	1.879E-01	1.960E-01	FAIL ABUN
TH-227	-1.240E-01	1.879E-01	1.960E-01	FAIL ABUN
TH-231	1.173E-02	4.713E-01	4.713E-01	FAIL ABUN
PA-233	-4.877E-03	4.300E-02	4.306E-02	FAIL ABUN
PA-234	-6.309E-02	2.575E-01	2.590E-01	FAIL ABUN
PA-234M	7.169E+00	3.504E+00	4.767E+00	FAIL ABUN
NP-237	-4.877E-03	4.300E-02	4.306E-02	FAIL ABUN
NP-238	1.766E+01	1.520E+03	1.520E+03	SHORT HLIF
NP-239	-5.297E-02	1.708E-01	1.725E-01	FAIL ABUN
PU-239	-1.583E+02	2.347E+02	2.453E+02	NOT IDENT.
AM-241	2.546E-02	1.193E-01	1.198E-01	NOT IDENT.
CM-243	-2.919E-02	6.920E-02	7.044E-02	NOT IDENT.
BK-247	-1.150E-02	6.099E-02	6.121E-02	FAIL ABUN
CM-247	2.184E-02	2.582E-02	2.763E-02	NOT IDENT.
CF-249	-2.110E-02	2.664E-02	2.828E-02	NOT IDENT.
CF-251	-7.603E-02	9.028E-02	9.657E-02	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	118.2977	85.43	129.4607	131.20	132.9980
45.60	102.8815	86.55	129.8573	133.02	115.4141
46.54	111.1804	86.79	129.9408	133.52	117.5374
49.72	115.8522	86.94	129.9946	136.00	128.2015
51.35	108.5690	87.09	130.0474	136.47	130.3385
51.87	112.0154	87.57	130.2166	140.51	0.0000
52.39	117.8965	88.03	130.3781	143.76	122.9333
52.97	117.3534	88.34	130.4868	144.24	123.0432
53.44	107.8367	88.47	130.5319	145.44	113.7248
54.07	109.7235	89.96	131.0504	152.43	130.0888
57.36	0.0000	1093.63	131.2855	153.25	120.8976
57.53	125.1485	91.11	131.4481	323.87	106.4871
57.98	122.8791	92.59	131.9557	156.02	126.7236
59.27	120.4140	93.35	132.2139	158.56	118.8676
59.32	120.4357	94.56	132.6248	159.00	100.0083
59.54	131.5883	94.65	132.6555	162.33	121.7523
60.96	121.1370	94.67	132.6621	162.66	117.5835
61.17	127.8992	94.87	132.7291	163.33	112.4147
62.93	131.7585	97.43	126.1656	165.86	113.9569
63.29	131.9207	98.43	116.5600	176.31	101.8257
63.58	132.0513	98.44	116.5629	176.60	91.0342
64.28	132.3648	99.53	130.5525	177.52	128.0686
66.73	154.1331	100.11	117.6645	181.07	0.0000
67.24	146.4451	102.03	108.8314	181.52	99.0200
125.81	150.0657	103.18	130.4570	184.41	103.1194
67.75	150.0992	103.37	120.4766	143.76	103.3260
68.89	149.7978	105.21	104.6171	193.51	97.8667
69.67	164.7612	105.31	104.6416	197.03	112.9053
70.82	158.4703	106.12	104.8409	198.01	124.2619
70.83	158.4760	106.47	87.2285	201.83	122.6949
72.81	169.8566	109.28	87.7963	203.43	128.6153
72.87	169.8880	111.00	100.9142	205.31	117.6459
74.66	170.8211	111.76	102.3673	210.85	92.7175
74.82	170.9034	114.06	123.4727	215.65	118.1900
74.97	170.9811	116.30	104.6950	218.12	99.7799
77.11	172.0787	116.74	109.9707	222.11	72.5329
78.74	131.7376	119.76	95.7136	227.09	90.8719
79.69	148.6137	121.12	95.9902	227.38	80.4172
80.03	129.2771	121.22	96.0112	228.16	88.6647
80.12	129.3128	121.78	103.3178	228.18	88.6671
80.19	129.3395	122.06	115.1554	116.74	88.6671
80.57	140.1221	122.92	115.3639	235.69	100.5169
81.00	163.3809	123.07	115.3997	235.96	100.5508
81.07	163.4146	265.00	106.3562	238.63	93.4014
81.75	118.6452	125.81	147.3801	238.98	0.0000
82.47	123.6439	127.23	132.9286	240.99	93.6751
83.79	128.8740	127.91	121.1930	242.00	93.7932
84.00	128.9498	129.30	154.4070	244.70	82.5904

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	85.3666	344.28	66.2064	563.25	38.4935
252.80	86.6107	345.93	73.3815	564.24	0.0000
254.15	0.0000	351.06	66.6214	569.33	36.5481
256.23	94.2115	351.93	66.6748	946.00	36.5523
260.90	0.0000	355.39	0.0000	569.70	34.4677
264.66	74.8118	356.01	45.5070	583.19	22.1134
264.80	74.8230	364.49	57.5417	584.27	22.1279
265.00	74.8417	366.42	0.0000	595.83	37.1334
269.46	66.2294	372.51	61.5710	427.87	40.4291
270.03	66.2723	375.05	56.2619	602.52	0.0000
271.23	66.3613	377.52	61.8381	604.72	27.1944
273.65	64.0780	356.01	48.4593	607.14	43.2521
276.40	97.6482	388.16	59.6481	609.32	32.0789
277.37	71.7672	388.63	52.3277	610.33	32.0984
277.60	77.9752	391.69	54.3030	614.28	28.9534
278.00	78.0098	264.66	44.5078	618.01	31.1653
279.20	78.1136	401.81	44.5498	620.36	37.6632
279.54	88.0653	402.40	44.5713	621.93	39.8500
279.70	88.0805	404.85	44.6602	630.19	0.0000
280.46	85.6709	410.95	44.8809	631.29	17.8649
283.69	62.3001	413.71	44.9805	633.25	24.9298
284.31	59.8477	414.70	47.8291	634.78	29.2906
285.41	84.8859	423.72	48.1705	635.95	21.1678
285.90	0.0000	427.09	53.9802	636.99	29.3269
287.50	75.0677	427.87	56.8555	657.50	17.5749
290.67	72.8133	433.94	49.5064	657.76	20.8733
293.27	0.0000	439.40	45.8887	657.90	0.0000
351.93	63.0737	440.45	42.0977	661.66	31.9264
295.96	63.1226	453.88	57.9871	664.57	0.0000
879.38	63.2950	463.37	64.2302	666.33	32.0067
299.98	63.3881	468.07	48.3368	666.50	25.3865
300.09	63.3957	473.00	46.0581	667.71	0.0000
300.13	63.3972	475.06	51.0330	677.62	29.9784
301.36	63.4796	476.78	37.3390	685.70	39.0247
302.85	61.0342	477.60	46.2092	692.65	0.0000
256.23	67.5051	482.18	34.5222	695.00	31.3713
304.85	67.5294	487.02	37.6088	696.49	32.5164
306.78	60.4292	492.35	0.0000	696.51	32.5164
308.46	59.6806	497.08	35.8777	697.00	37.0109
311.90	67.5885	505.52	42.0983	697.30	38.1379
316.51	65.3218	507.63	0.0000	697.49	38.1421
319.41	68.9583	511.00	53.3192	702.65	34.8687
320.08	62.1035	514.00	43.8505	706.68	22.5423
321.04	57.8453	514.00	43.8505	711.68	22.5993
323.87	64.9323	520.40	31.3822	720.70	23.8369
325.23	65.0177	520.69	0.0000	721.93	0.0000
328.76	60.8911	522.65	0.0000	722.78	28.9749
333.37	74.7047	527.90	0.0000	722.91	28.9770
333.97	60.3217	528.26	32.5612	723.31	30.6870
334.37	73.4641	529.59	34.6267	724.19	25.5844
338.28	73.7358	529.87	0.0000	727.33	19.3602
338.32	73.7393	531.02	44.8522	733.00	26.0387
311.90	67.2924	537.26	30.7043	735.93	14.8678
340.48	67.2924	546.56	0.0000	333.97	33.1914
340.55	67.2955	552.55	40.3044	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	28.7079	949.00	26.3679	1384.29	13.0532
747.24	27.5996	667.71	0.0000	1408.01	15.3304
748.06	24.1599	962.31	13.6314	1434.09	16.5445
752.31	24.2095	964.08	17.0508	1435.80	8.8276
753.82	34.6094	966.17	17.0645	1457.56	0.0000
756.73	26.5713	911.20	17.0832	1460.82	17.7754
756.80	27.7275	983.53	16.2244	1489.16	8.9551
884.68	22.6056	984.45	0.0000	1505.03	14.3883
765.81	24.3658	1274.44	10.7410	1584.12	17.4349
766.42	22.6318	1001.03	12.4894	1596.21	10.1245
766.84	26.1191	1002.74	10.7669	1620.50	8.3333
772.60	0.0000	1004.73	13.8538	1621.92	12.0409
776.52	24.4889	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	3.7670
778.90	33.2720	1028.54	0.0000	1750.46	0.0000
783.70	27.2035	1037.84	19.4775	1764.49	9.5789
788.74	30.7852	1038.76	0.0000	1063.66	7.9928
792.07	35.2380	631.29	21.4938	1771.35	6.3958
795.86	23.8269	1048.07	17.5946	1791.20	0.0000
810.06	23.9810	1049.04	14.6677	1808.65	2.9023
810.29	23.0952	1050.41	19.5667	1810.72	0.0000
344.28	23.0975	1063.66	19.6594	1836.06	4.8665
810.76	20.4352	1077.00	19.7522		
815.77	20.4809	1077.34	20.7424		
1048.07	16.9398	1085.87	15.8516		
832.01	22.4236	1093.63	15.8945		
834.85	26.0441	1099.45	14.9313		
835.71	26.9522	1112.07	22.8516		
836.80	0.0000	1112.84	20.8000		
846.75	0.0000	1115.54	14.4132		
846.77	13.5411	1120.29	13.0333		
856.80	29.9203	1120.55	13.0341		
860.56	22.7036	1221.41	13.0373		
871.09	31.9281	1129.67	10.0574		
873.19	26.4777	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	25.6322	1173.23	26.5300		
880.51	25.6442	1177.95	24.5273		
881.60	21.0747	1189.05	18.4614		
883.24	17.4211	1204.77	16.4932		
884.68	22.0188	1221.41	17.6163		
889.28	22.0613	1231.02	19.9570		
894.76	21.1905	1235.36	16.6533		
898.04	23.9870	1238.28	12.5010		
900.72	27.7075	1260.41	0.0000		
903.28	21.2649	1271.87	11.5787		
911.20	23.1888	1274.44	18.9613		
912.08	23.1972	1274.54	16.8555		
923.98	0.0000	1291.59	13.7657		
926.50	18.6664	1298.22	0.0000		
929.11	17.9385	1312.11	21.3074		
935.54	22.4810	1332.49	19.2920		
937.49	22.4985	1362.66	0.0000		
944.13	27.0694	1365.19	14.0648		
946.00	24.0789	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 13-DEC-2023 07:03:41.57

```
*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581249.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM11.CNF;920
Background date    : 10-DEC-2023 10:48:06
Sample date       : 21-NOV-2023 00:00:00 Acquisition date : 13-DEC-2023 05:02:45
Sample ID        : G1205581249 Sample quantity : 1.37890E+02 GRAM
Detector name    : GAM11 Detector geometry: CAN
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:00.47 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID        : 2529194 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	3	59.95	23	66	1.25	119.62	116	15	3.19E-03	68.0	1.39E+00
2	6	87.55	31	59	1.79	174.90	171	22	4.37E-03	51.4	3.38E+00
3	6	90.44	18	59	1.35	180.67	171	22	2.54E-03	90.5	
4	6	92.37*	36	66	1.35	184.54	171	22	4.95E-03	57.4	
5	6	94.60	17	68	1.50	189.01	171	22	2.40E-03	80.8	
6	0	142.57*	12	68	1.55	285.06	283	8	1.60E-03	135.7	
7	0	163.75*	1	101	1.52	327.47	319	10	1.96E-04	*****	
8	0	185.36*	5	70	1.14	370.73	367	9	6.39E-04	408.5	
9	0	208.47	17	37	1.02	417.01	414	7	2.34E-03	64.7	
10	0	212.64	8	34	1.40	425.35	422	6	1.09E-03	122.9	
11	0	238.20*	1	93	1.30	476.54	473	9	2.07E-04	*****	
12	0	247.51	11	51	0.98	495.17	489	10	1.50E-03	128.4	
13	0	306.56	21	41	0.89	613.39	608	10	2.93E-03	61.6	
14	0	571.90	9	28	1.94	1144.59	1135	11	1.18E-03	124.3	
15	0	619.83	33	85	16.67	1240.53	1214	39	4.63E-03	93.6	
16	0	662.01*	8	9	1.59	1324.97	1318	12	1.11E-03	113.2	
17	0	669.05	22	8	1.42	1339.06	1334	11	3.08E-03	32.7	
18	0	855.78	7	5	0.53	1712.82	1709	7	9.14E-04	69.9	
19	0	881.12	12	4	2.31	1763.54	1760	8	1.67E-03	40.8	
20	0	904.49	6	3	0.66	1810.31	1807	6	8.95E-04	57.0	
21	0	987.65	16	0	3.91	1976.75	1971	11	2.22E-03	25.0	
22	0	1027.94	8	2	1.42	2057.39	2054	7	1.04E-03	46.3	
23	0	1085.71	7	5	1.23	2173.00	2168	8	9.37E-04	72.6	
24	0	1119.93	11	5	0.96	2241.48	2236	9	1.46E-03	47.7	
25	0	1204.49	7	3	1.47	2410.70	2403	11	9.86E-04	59.0	
26	0	1461.39*	5	9	0.60	2924.77	2918	12	7.38E-04	137.9	
27	0	1871.16	7	0	0.96	3744.57	3739	10	9.72E-04	37.8	

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

VMS Nuclide Identification Report V3.1 Generated 13-DEC-2023 07:03:42

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581249.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 21-NOV-2023 00:00:00	Acquisition date	: 13-DEC-2023 05:02:45
Sample ID	: G1205581249	Sample quantity	: 137.89 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA11	Detector geometry	: CAN
Elapsed live time	: 0 02:00:00.00	Elapsed real time	: 0 02:00:00.47 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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	5	10.66*	1.236E+00	1.051E-01	1.051E-01	275.86
RB-84	881.60	12	68.90*	1.912E+00	2.478E-02	3.965E-02	81.65
Y-91	1204.77	7	0.26*	1.451E+00	4.987E+00	6.492E+00	118.05
CD-109	88.03	37	3.70*	6.656E+00	4.140E-01	4.281E-01	102.78
SN-126	64.28	-----	9.60	4.100E+00	-----	Line Not Found	-----
	86.94	37	8.90	6.656E+00	1.721E-01	1.721E-01	102.78
	87.57	37	37.00*	6.656E+00	4.140E-02	4.140E-02	102.78
BA-137M	661.66	8	89.90*	2.440E+00	1.017E-02	1.018E-02	226.45
CS-137	661.66	8	85.10*	2.440E+00	1.074E-02	1.075E-02	226.45
U-235	89.96	22	3.47	6.825E+00	2.498E-01	2.498E-01	181.06
	93.35	42	5.60	6.922E+00	2.969E-01	2.969E-01	114.86
	143.76	13	10.96*	7.084E+00	4.650E-02	4.650E-02	271.33
	163.33	2	5.08	6.659E+00	1.291E-02	1.291E-02	2829.07
	185.72	5	57.20	6.210E+00	3.984E-03	3.984E-03	817.07
	205.31	-----	5.01	5.822E+00	-----	Line Not Found	-----
AM-241	59.54	28	35.90*	3.399E+00	6.264E-02	6.264E-02	136.06

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]G1205581249.CNF;1
* Acquisition date   : 13-DEC-2023 05:02:45 Sensitivity      : 3.000
* Detector ID        : GAM11 Energy tolerance: 1.500
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 02:00:00.47 Half life ratio : *****
* Sample date        : 21-NOV-2023 00:00:00 Analyst initials: RXF2
* Sample ID          : G1205581249 Sample Quantity : 1.3789E+02 GRAM
* Batch Number       : 2529194 Wet Weight : 0.00000
* Wet wt corr        : 1.00000 Dry Weight : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 21-AUG-2023 09:01:46 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM11_CAN.CNF;21
*****

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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/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.051E-01	2.841E-01	2.581E-01
RB-84	3.965E-02	3.172E-02	4.698E-02
Y-91	6.492E+00	7.510E+00	1.384E+01
CD-109	4.281E-01	4.312E-01	4.021E-01
SN-126	4.140E-02	4.170E-02	3.904E-02
BA-137M	1.018E-02	2.259E-02	2.316E-02
CS-137	1.075E-02	2.387E-02	2.446E-02
U-235	4.650E-02	1.236E-01	1.233E-01
AM-241	6.264E-02	8.353E-02	7.502E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	-3.157E-02	1.334E-01	2.504E-01	NOT IDENT.
NA-22	4.765E-04	1.533E-02	3.124E-02	NOT IDENT.
NA-24	0.000E+00	7.284E+08	0.000E+00	SHORT HLIF
AL-26	-2.473E-03	1.589E-02	3.260E-02	NOT IDENT.
SC-46	1.148E-03	1.307E-02	2.784E-02	FAIL ABUN
V-48	-6.051E-03	3.029E-02	5.315E-02	NOT IDENT.
CR-51	2.149E-02	1.455E-01	2.950E-01	NOT IDENT.
MN-52	-9.410E-03	1.722E-01	3.701E-01	NOT IDENT.
MN-54	-6.340E-03	1.244E-02	2.327E-02	NOT IDENT.
CO-56	-9.373E-03	1.555E-02	2.839E-02	NOT IDENT.
MN-56	0.000E+00	1.659E+41	0.000E+00	SHORT HLIF
CO-57	3.639E-03	8.334E-03	1.644E-02	NOT IDENT.
CO-58	-4.629E-03	1.714E-02	3.313E-02	NOT IDENT.
FE-59	1.285E-02	3.277E-02	7.265E-02	NOT IDENT.
CO-60	1.539E-02	1.391E-02	3.546E-02	NOT IDENT.
ZN-65	1.497E-03	2.988E-02	5.528E-02	NOT IDENT.
GE-68	2.048E-01	4.025E-01	9.228E-01	NOT IDENT.
AS-73	6.154E-02	2.507E-01	5.091E-01	NOT IDENT.
AS-74	4.796E-05	4.727E-02	9.075E-02	NOT IDENT.
SE-75	6.356E-03	1.726E-02	3.532E-02	NOT IDENT.
BR-77	2.435E+00	6.159E+01	6.847E+01	FAIL ABUN

SR-82	1.358E-01	1.433E-01	3.350E-01	NOT IDENT.
RB-83	-7.385E-03	3.174E-02	5.877E-02	NOT IDENT.
KR-85	-5.540E+00	4.062E+00	6.440E+00	NOT IDENT.
SR-85	-3.170E-02	2.319E-02	3.676E-02	NOT IDENT.
RB-86	1.342E-01	3.157E-01	7.179E-01	NOT IDENT.
Y-88	-2.289E-02	1.766E-02	2.136E-02	NOT IDENT.
NB-94	-1.499E-02	1.604E-02	2.537E-02	NOT IDENT.
NB-95	6.634E-03	1.697E-02	3.607E-02	NOT IDENT.
NB-95M	1.987E-02	5.119E-02	9.543E-02	NOT IDENT.
ZR-95	1.589E-02	2.578E-02	5.847E-02	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	1.191E+09	0.000E+00	SHORT HLIF
MO-99	-6.456E+00	2.443E+01	4.492E+01	NOT IDENT.
TC-99M	0.000E+00	4.520E+24	0.000E+00	SHORT HLIF
RH-101	-6.015E-05	1.009E-02	1.899E-02	NOT IDENT.
RH-102	-1.909E-02	2.302E-02	3.757E-02	NOT IDENT.
RU-103	6.902E-03	1.547E-02	3.253E-02	NOT IDENT.
RH-106	-2.653E-03	1.280E-01	2.438E-01	NOT IDENT.
RU-106	-2.653E-03	1.280E-01	2.438E-01	NOT IDENT.
AG-108M	1.345E-02	1.024E-02	2.365E-02	NOT IDENT.
AG-110	8.079E-02	2.820E-01	5.234E-01	NOT IDENT.
AG-110M	-4.797E-03	1.819E-02	3.101E-02	FAIL ABUN
SN-113	-1.974E-03	1.727E-02	3.330E-02	NOT IDENT.
CD-115	-1.039E+01	4.022E+01	7.471E+01	NOT IDENT.
SN-117M	-8.560E-03	3.450E-02	5.641E-02	NOT IDENT.
SB-122	-9.930E-02	4.031E+00	7.549E+00	NOT IDENT.
TE-123M	9.611E-04	1.267E-02	2.156E-02	NOT IDENT.
SB-124	-3.419E-02	4.948E-02	8.722E-02	NOT IDENT.
SB-125	1.899E-02	3.275E-02	6.914E-02	NOT IDENT.
TE-125M	-2.198E+00	3.776E+00	6.724E+00	NOT IDENT.
I-126	8.822E-02	1.048E-01	2.095E-01	NOT IDENT.
SB-126	2.307E-02	7.654E-02	1.556E-01	FAIL ABUN
SB-127	-1.665E+00	1.957E+00	3.133E+00	NOT IDENT.
I-131	-1.768E-02	8.307E-02	1.583E-01	NOT IDENT.
I-132	0.000E+00	6.418E+40	0.000E+00	SHORT HLIF
TE-132	6.393E-01	1.165E+00	2.265E+00	NOT IDENT.
BA-133	-8.552E-04	1.576E-02	3.066E-02	NOT IDENT.
I-133	0.000E+00	6.678E+05	0.000E+00	SHORT HLIF
CS-134	3.890E-03	1.560E-02	3.275E-02	NOT IDENT.
I-135	0.000E+00	1.318E+23	0.000E+00	SHORT HLIF
CS-136	-1.938E-02	6.198E-02	1.170E-01	NOT IDENT.
LA-138	9.644E-03	1.481E-02	3.997E-02	NOT IDENT.
CE-139	1.832E-03	1.155E-02	2.004E-02	NOT IDENT.
BA-140	-9.833E-03	1.478E-01	2.835E-01	FAIL ABUN
LA-140	9.714E-03	5.902E-02	1.279E-01	NOT IDENT.
CE-141	3.854E-05	2.672E-02	4.578E-02	NOT IDENT.
CE-143	0.000E+00	1.739E+03	0.000E+00	SHORT HLIF
CE-144	2.174E-02	6.370E-02	1.241E-01	NOT IDENT.
PM-144	2.500E-04	1.545E-02	2.895E-02	NOT IDENT.
PR-144	2.245E-02	1.161E+00	2.176E+00	NOT IDENT.
PM-146	7.285E-03	1.462E-02	3.079E-02	NOT IDENT.
ND-147	1.354E-01	3.462E-01	7.057E-01	FAIL ABUN
PM-147	-9.062E+01	2.502E+02	4.536E+02	NOT IDENT.
PM-149	0.000E+00	3.064E+02	0.000E+00	SHORT HLIF
EU-150	-6.090E-03	1.131E-02	2.075E-02	NOT IDENT.
EU-152	6.789E-03	3.676E-02	7.345E-02	FAIL ABUN
GD-153	8.609E-03	3.153E-02	5.556E-02	NOT IDENT.
EU-154	2.655E-04	4.300E-02	8.726E-02	NOT IDENT.
EU-155	-4.762E-02	3.921E-02	6.047E-02	FAIL ABUN
TB-160	2.489E-02	5.863E-02	1.158E-01	FAIL ABUN
HO-166M	4.294E-03	2.216E-02	4.405E-02	FAIL ABUN
TM-171	2.166E+00	4.669E+00	9.752E+00	NOT IDENT.
HF-172	1.854E-02	6.149E-02	1.194E-01	FAIL ABUN
LU-172	8.498E-03	1.973E-02	4.480E-02	FAIL ABUN
LU-176	1.516E-02	1.830E-02	2.140E-02	FAIL ABUN
HF-181	-2.390E-03	1.811E-02	3.463E-02	NOT IDENT.
TA-182	1.659E-02	5.099E-02	1.157E-01	FAIL ABUN
RE-183	-5.607E-03	5.127E-02	9.437E-02	FAIL ABUN
RE-184	3.799E-02	4.245E-02	1.099E-01	FAIL ABUN
W-188	-8.595E-01	3.005E+00	5.733E+00	NOT IDENT.
IR-192	3.655E-04	1.269E-02	2.528E-02	NOT IDENT.
HG-203	-5.669E-03	1.458E-02	2.777E-02	NOT IDENT.
TL-204	-9.978E-01	1.265E+00	2.282E+00	NOT IDENT.
BI-207	1.585E-02	2.060E-02	4.711E-02	NOT IDENT.
TL-208	4.489E-04	1.968E-02	3.667E-02	NOT IDENT.
BI-210	-7.506E-01	1.163E+00	1.968E+00	NOT IDENT.
PB-210	-7.506E-01	1.163E+00	1.968E+00	NOT IDENT.
BI-211	-8.104E-02	9.754E-02	1.692E-01	NOT IDENT.

PB-211	-9.235E-02	3.249E-01	6.025E-01	NOT IDENT.
BI-212	3.620E-02	1.662E-01	3.370E-01	NOT IDENT.
PB-212	1.960E-03	4.957E-02	5.615E-02	FAIL ABUN
BI-213	3.677E-03	3.507E-02	7.031E-02	NOT IDENT.
BI-214	5.298E-03	3.577E-02	6.523E-02	FAIL ABUN
PB-214	-1.800E-02	3.595E-02	6.455E-02	FAIL ABUN
RN-219	-4.152E-02	1.641E-01	3.082E-01	NOT IDENT.
RN-222	5.298E-03	3.577E-02	6.523E-02	FAIL ABUN
RA-223	3.001E-01	2.388E-01	5.278E-01	FAIL ABUN
RA-224	3.802E-01	2.402E-01	5.027E-01	NOT IDENT.
AC-225	3.350E-01	3.562E-01	7.146E-01	NOT IDENT.
RA-226	-1.800E-02	3.595E-02	6.455E-02	FAIL ABUN
AC-227	-4.639E-02	8.943E-02	1.687E-01	NOT IDENT.
TH-227	-4.639E-02	8.943E-02	1.687E-01	NOT IDENT.
AC-228	-1.678E-02	7.382E-02	1.259E-01	NOT IDENT.
RA-228	-1.678E-02	7.382E-02	1.259E-01	NOT IDENT.
TH-228	1.960E-03	4.957E-02	5.615E-02	FAIL ABUN
TH-229	4.795E-02	2.123E-01	3.922E-01	FAIL ABUN
TH-230	-1.800E-02	3.595E-02	6.455E-02	FAIL ABUN
PA-231	-1.323E-01	1.916E-01	3.051E-01	NOT IDENT.
TH-231	3.001E-01	2.388E-01	5.278E-01	FAIL ABUN
TH-232	-1.678E-02	7.382E-02	1.259E-01	NOT IDENT.
PA-233	3.060E-03	2.176E-02	4.400E-02	NOT IDENT.
PA-234	-2.043E-02	8.307E-02	1.676E-01	FAIL ABUN
PA-234M	-1.685E+00	1.823E+00	2.948E+00	NOT IDENT.
TH-234	-1.452E-01	4.208E-01	8.689E-01	FAIL ABUN
U-234	-1.800E-02	3.595E-02	6.455E-02	FAIL ABUN
NP-237	3.060E-03	2.176E-02	4.400E-02	FAIL ABUN
NP-238	0.000E+00	7.367E+01	0.000E+00	SHORT HLIF
U-238	-1.452E-01	4.208E-01	8.689E-01	FAIL ABUN
NP-239	1.965E-02	8.657E-02	1.674E-01	NOT IDENT.
PU-239	-8.817E-01	1.094E+02	2.054E+02	NOT IDENT.
AM-243	-3.477E-03	1.482E-02	2.805E-02	NOT IDENT.
CM-243	1.166E-02	3.285E-02	6.488E-02	NOT IDENT.
BK-247	2.705E-02	2.961E-02	6.347E-02	NOT IDENT.
CM-247	-6.243E-04	1.600E-02	3.065E-02	NOT IDENT.
CF-249	-6.558E-03	1.433E-02	2.644E-02	NOT IDENT.
CF-251	1.032E-02	4.805E-02	8.982E-02	NOT IDENT.
ANH-511	-9.500E-02	2.722E-02	4.978E-02	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	5	10.66*	1.236E+00	1.051E-01	1.051E-01	275.86
RB-84	881.60	12	68.90*	1.912E+00	2.478E-02	3.965E-02	81.65
Y-91	1204.77	7	0.26*	1.451E+00	4.987E+00	6.492E+00	118.05
CD-109	88.03	37	3.70*	6.656E+00	4.140E-01	4.281E-01	102.78
SN-126	64.28	-----	9.60	4.100E+00	-----	Line Not Found	-----
	86.94	37	8.90	6.656E+00	1.721E-01	1.721E-01	102.78
	87.57	37	37.00*	6.656E+00	4.140E-02	4.140E-02	102.78
BA-137M	661.66	8	89.90*	2.440E+00	1.017E-02	1.018E-02	226.45
CS-137	661.66	8	85.10*	2.440E+00	1.074E-02	1.075E-02	226.45
U-235	89.96	22	3.47	6.825E+00	2.498E-01	2.498E-01	181.06
	93.35	42	5.60	6.922E+00	2.969E-01	2.969E-01	114.86
	143.76	13	10.96*	7.084E+00	4.650E-02	4.650E-02	271.33
	163.33	2	5.08	6.659E+00	1.291E-02	1.291E-02	2829.07
	185.72	5	57.20	6.210E+00	3.984E-03	3.984E-03	817.07
	205.31	-----	5.01	5.822E+00	-----	Line Not Found	-----
AM-241	59.54	28	35.90*	3.399E+00	6.264E-02	6.264E-02	136.06

Flag: "*" = Keyline

Total number of lines in spectrum 27
Number of unidentified lines 6
Number of lines tentatively identified by NID 21 77.78%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.051E-01	1.051E-01	2.899E-01	275.86	
RB-84	32.82D	1.60	2.478E-02	3.965E-02	3.237E-02	81.65	
Y-91	58.51D	1.30	4.987E+00	6.492E+00	7.663E+00	118.05	
CD-109	461.40D	1.03	4.140E-01	4.281E-01	4.400E-01	102.78	
SN-126	2.30E+05Y	1.00	4.140E-02	4.140E-02	4.255E-02	102.78	
BA-137M	30.08Y	1.00	1.017E-02	1.018E-02	2.305E-02	226.45	
CS-137	30.08Y	1.00	1.074E-02	1.075E-02	2.435E-02	226.45	
U-235	7.04E+08Y	1.00	4.650E-02	4.650E-02	12.62E-02	271.33	
AM-241	432.60Y	1.00	6.264E-02	6.264E-02	8.523E-02	136.06	
Total Activity :			5.703E+00	7.236E+00			

Grand Total Activity : 5.703E+00 7.236E+00

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	94.60	20	80	1.50	189.01	171	22	2.40E-03	****	7.02E+00	T
0	208.47	19	42	1.02	417.01	414	7	2.34E-03	****	5.76E+00	
0	212.64	9	38	1.40	425.35	422	6	1.09E-03	****	5.69E+00	
0	238.20	2	104	1.30	476.54	473	9	2.07E-04	****	5.26E+00	T
0	247.51	12	57	0.98	495.17	489	10	1.50E-03	****	5.12E+00	
0	306.56	23	44	0.89	613.39	608	10	2.93E-03	****	4.39E+00	T
0	571.90	9	28	1.94	1144.59	1135	11	1.18E-03	****	2.75E+00	
0	619.83	34	87	16.67	1240.53	1214	39	4.63E-03	****	2.57E+00	T
0	669.05	23	8	1.42	1339.06	1334	11	3.08E-03	65.5	2.42E+00	T
0	855.78	7	5	0.53	1712.82	1709	7	9.14E-04	****	1.96E+00	T
0	904.49	6	3	0.66	1810.31	1807	6	8.95E-04	****	1.87E+00	T
0	987.65	16	0	3.91	1976.75	1971	11	2.22E-03	50.0	1.73E+00	
0	1027.94	7	1	1.42	2057.39	2054	7	1.04E-03	92.6	1.67E+00	T
0	1085.71	7	5	1.23	2173.00	2168	8	9.37E-04	****	1.59E+00	T
0	1119.93	10	4	0.96	2241.48	2236	9	1.46E-03	95.5	1.55E+00	T
0	1871.16	7	0	0.96	3744.57	3739	10	9.72E-04	75.6	1.05E+00	

Flags: "T" = Tentatively associated

```
*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*                                     DETECTOR AND SAMPLE DATA                *
*                                     *                                       *
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581249.CNF;1 *
* Acquisition date   : 13-DEC-2023 05:02:45 Sensitivity      : 3.000          *
* Detector ID       : GAM11 Energy tolerance: 1.500          *
* Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000      *
* Elapsed real time : 0 02:00:00.47 Half life ratio : *****          *
* Sample date       : 21-NOV-2023 00:00:00 Nuclide Library : SOLID          *
* Sample ID        : G1205581249 Analyst initials: RXF2          *
* Batch Number     : 2529194 Sample Quantity : 1.3789E+02 GRAM      *
* Wet wt corr      : 1.00000 Wet Weight : 0.00000          *
*                                     Dry Weight : 0.00000          *
*****
*                                     CALIBRATION INFORMATION                  *
*                                     *                                       *
* Eff. Cal. date    : 21-AUG-2023 09:01:46 Eff. Geometry   : CAN          *
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM11_CAN.CNF;21          *
*****
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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/GRAM)
K-40	1.011E-01
RB-84	1.896E-02
Y-91	5.643E+00
CD-109	1.848E-01
SN-126	1.794E-02
BA-137M	9.868E-03
CS-137	1.042E-02
U-235	5.670E-02
AM-241	3.424E-02

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

Nuclide	Lc (pCi/GRAM)	
BE-7	1.099E-01	NOT IDENT.
NA-22	1.290E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.286E-02	NOT IDENT.
SC-46	1.156E-02	FAIL ABUN
V-48	2.094E-02	NOT IDENT.
CR-51	1.318E-01	NOT IDENT.
MN-52	1.385E-01	NOT IDENT.
MN-54	9.679E-03	NOT IDENT.
CO-56	1.189E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	7.570E-03	NOT IDENT.
CO-58	1.430E-02	NOT IDENT.
FE-59	3.041E-02	NOT IDENT.
CO-60	1.493E-02	NOT IDENT.
ZN-65	2.261E-02	NOT IDENT.
GE-68	3.852E-01	NOT IDENT.
AS-73	2.346E-01	NOT IDENT.
AS-74	3.967E-02	NOT IDENT.
SE-75	1.616E-02	NOT IDENT.
BR-77	3.218E+01	FAIL ABUN
SR-82	1.462E-01	NOT IDENT.

RB-83	2.601E-02	NOT IDENT.
KR-85	2.929E+00	NOT IDENT.
SR-85	1.672E-02	NOT IDENT.
RB-86	2.976E-01	NOT IDENT.
Y-88	6.647E-03	NOT IDENT.
NB-94	1.107E-02	NOT IDENT.
NB-95	1.583E-02	NOT IDENT.
NB-95M	4.403E-02	NOT IDENT.
ZR-95	2.523E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	1.866E+01	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	8.712E-03	NOT IDENT.
RH-102	1.611E-02	NOT IDENT.
RU-103	1.426E-02	NOT IDENT.
RH-106	1.066E-01	NOT IDENT.
RU-106	1.066E-01	NOT IDENT.
AG-108M	1.060E-02	NOT IDENT.
AG-110	2.256E-01	NOT IDENT.
AG-110M	1.264E-02	FAIL ABUN
SN-113	1.484E-02	NOT IDENT.
CD-115	3.260E+01	NOT IDENT.
SN-117M	2.616E-02	NOT IDENT.
SB-122	3.218E+00	NOT IDENT.
TE-123M	1.001E-02	NOT IDENT.
SB-124	3.464E-02	NOT IDENT.
SB-125	3.082E-02	NOT IDENT.
TE-125M	3.108E+00	NOT IDENT.
I-126	8.927E-02	NOT IDENT.
SB-126	6.712E-02	FAIL ABUN
SB-127	1.330E+00	NOT IDENT.
I-131	7.097E-02	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	1.033E+00	NOT IDENT.
BA-133	1.378E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.424E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	4.935E-02	NOT IDENT.
LA-138	1.548E-02	NOT IDENT.
CE-139	9.211E-03	NOT IDENT.
BA-140	1.238E-01	FAIL ABUN
LA-140	5.279E-02	NOT IDENT.
CE-141	2.107E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	5.700E-02	NOT IDENT.
PM-144	1.280E-02	NOT IDENT.
PR-144	9.623E-01	NOT IDENT.
PM-146	1.362E-02	NOT IDENT.
ND-147	3.127E-01	FAIL ABUN
PM-147	2.081E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	9.416E-03	NOT IDENT.
EU-152	3.318E-02	FAIL ABUN
GD-153	2.578E-02	NOT IDENT.
EU-154	3.594E-02	NOT IDENT.
EU-155	2.771E-02	FAIL ABUN
TB-160	4.991E-02	FAIL ABUN
HO-166M	1.902E-02	FAIL ABUN
TM-171	4.476E+00	NOT IDENT.
HF-172	5.495E-02	FAIL ABUN
LU-172	1.859E-02	FAIL ABUN
LU-176	9.778E-03	FAIL ABUN
HF-181	1.517E-02	NOT IDENT.
TA-182	4.689E-02	FAIL ABUN
RE-183	4.255E-02	FAIL ABUN
RE-184	4.685E-02	FAIL ABUN
W-188	2.609E+00	NOT IDENT.
IR-192	1.132E-02	NOT IDENT.
HG-203	1.250E-02	NOT IDENT.
TL-204	1.042E+00	NOT IDENT.
BI-207	2.048E-02	NOT IDENT.
TL-208	1.671E-02	NOT IDENT.
BI-210	9.094E-01	NOT IDENT.
PB-210	9.094E-01	NOT IDENT.
BI-211	7.722E-02	NOT IDENT.
PB-211	2.734E-01	NOT IDENT.

BI-212	1.436E-01	NOT IDENT.
PB-212	2.642E-02	FAIL ABUN
BI-213	3.083E-02	NOT IDENT.
BI-214	2.946E-02	FAIL ABUN
PB-214	2.960E-02	FAIL ABUN
RN-219	1.382E-01	NOT IDENT.
RN-222	2.946E-02	FAIL ABUN
RA-223	2.414E-01	FAIL ABUN
RA-224	2.336E-01	NOT IDENT.
AC-225	3.293E-01	NOT IDENT.
RA-226	2.960E-02	FAIL ABUN
AC-227	7.634E-02	NOT IDENT.
TH-227	7.634E-02	NOT IDENT.
AC-228	5.518E-02	NOT IDENT.
RA-228	5.518E-02	NOT IDENT.
TH-228	2.642E-02	FAIL ABUN
TH-229	1.818E-01	FAIL ABUN
TH-230	2.960E-02	FAIL ABUN
PA-231	1.366E-01	NOT IDENT.
TH-231	2.414E-01	FAIL ABUN
TH-232	5.518E-02	NOT IDENT.
PA-233	1.973E-02	NOT IDENT.
PA-234	6.650E-02	FAIL ABUN
PA-234M	1.215E+00	NOT IDENT.
TH-234	4.078E-01	FAIL ABUN
U-234	2.960E-02	FAIL ABUN
NP-237	1.973E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
U-238	4.078E-01	FAIL ABUN
NP-239	7.710E-02	NOT IDENT.
PU-239	9.431E+01	NOT IDENT.
AM-243	1.298E-02	NOT IDENT.
CM-243	2.990E-02	NOT IDENT.
BK-247	2.914E-02	NOT IDENT.
CM-247	1.387E-02	NOT IDENT.
CF-249	1.167E-02	NOT IDENT.
CF-251	4.144E-02	NOT IDENT.
ANH-511	2.365E-02	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581249.CNF;1
Acquisition date : 13-DEC-2023 05:02:45 Sensitivity : 3.000
Detector ID : GAM11 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:00.47 Half life ratio : *****
Sample date : 21-NOV-2023 00:00:00 Nuclide Library : SOLID
Sample ID : G1205581249 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3789E+02 GRAM
Quantity Err(%) : 1.4504E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 21-AUG-2023 09:01:46 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM11_CAN.CNF;21

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.051E-01	2.843E-01	2.843E-01
RB-84	3.965E-02	3.194E-02	3.194E-02
Y-91	6.492E+00	7.527E+00	7.527E+00
CD-109	4.281E-01	4.347E-01	4.347E-01
SN-126	4.140E-02	4.198E-02	4.198E-02
BA-137M	1.018E-02	2.262E-02	2.262E-02
CS-137	1.075E-02	2.389E-02	2.389E-02
U-235	4.650E-02	1.237E-01	1.237E-01
AM-241	6.264E-02	8.380E-02	8.380E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-3.157E-02	1.335E-01	1.342E-01	NOT IDENT.
NA-22	4.765E-04	1.533E-02	1.533E-02	NOT IDENT.
NA-24	2.951E+08	7.289E+08	7.409E+08	SHORT HLIF
AL-26	-2.473E-03	1.589E-02	1.593E-02	NOT IDENT.
SC-46	1.148E-03	1.307E-02	1.308E-02	FAIL ABUN
V-48	-6.051E-03	3.030E-02	3.042E-02	NOT IDENT.
CR-51	2.149E-02	1.455E-01	1.458E-01	NOT IDENT.
MN-52	-9.410E-03	1.722E-01	1.722E-01	NOT IDENT.
MN-54	-6.340E-03	1.246E-02	1.278E-02	NOT IDENT.
CO-56	-9.373E-03	1.557E-02	1.614E-02	NOT IDENT.
MN-56	-1.000E+41	1.661E+41	0.000E+00	SHORT HLIF
CO-57	3.639E-03	8.338E-03	8.498E-03	NOT IDENT.
CO-58	-4.629E-03	1.714E-02	1.727E-02	NOT IDENT.
FE-59	1.285E-02	3.280E-02	3.330E-02	NOT IDENT.
CO-60	1.539E-02	1.398E-02	1.561E-02	NOT IDENT.
ZN-65	1.497E-03	2.988E-02	2.989E-02	NOT IDENT.
GE-68	2.048E-01	4.028E-01	4.133E-01	NOT IDENT.
AS-73	6.154E-02	2.510E-01	2.526E-01	NOT IDENT.
AS-74	4.796E-05	4.727E-02	4.727E-02	NOT IDENT.
SE-75	6.356E-03	1.727E-02	1.751E-02	NOT IDENT.
BR-77	2.435E+00	6.161E+01	6.162E+01	FAIL ABUN

SR-82	1.358E-01	1.439E-01	1.564E-01	NOT IDENT.
RB-83	-7.385E-03	3.176E-02	3.194E-02	NOT IDENT.
KR-85	-5.540E+00	4.096E+00	4.797E+00	NOT IDENT.
SR-85	-3.170E-02	2.339E-02	2.741E-02	NOT IDENT.
RB-86	1.342E-01	3.159E-01	3.217E-01	NOT IDENT.
Y-88	-2.289E-02	1.774E-02	2.053E-02	NOT IDENT.
NB-94	-1.499E-02	1.611E-02	1.747E-02	NOT IDENT.
NB-95	6.634E-03	1.698E-02	1.725E-02	NOT IDENT.
NB-95M	1.987E-02	5.123E-02	5.201E-02	NOT IDENT.
ZR-95	1.589E-02	2.583E-02	2.681E-02	NOT IDENT.
NB-97	1.000E+41	8.161E+41	0.000E+00	SHORT HLIF
ZR-97	-2.443E+09	1.214E+09	1.639E+09	SHORT HLIF
MO-99	-6.456E+00	2.444E+01	2.461E+01	NOT IDENT.
TC-99M	-8.612E+23	4.521E+24	0.000E+00	SHORT HLIF
RH-101	-6.015E-05	1.009E-02	1.009E-02	NOT IDENT.
RH-102	-1.909E-02	2.315E-02	2.469E-02	NOT IDENT.
RU-103	6.902E-03	1.549E-02	1.580E-02	NOT IDENT.
RH-106	-2.653E-03	1.280E-01	1.280E-01	NOT IDENT.
RU-106	-2.653E-03	1.280E-01	1.280E-01	NOT IDENT.
AG-108M	1.345E-02	1.031E-02	1.196E-02	NOT IDENT.
AG-110	8.079E-02	2.821E-01	2.845E-01	NOT IDENT.
AG-110M	-4.797E-03	1.820E-02	1.833E-02	FAIL ABUN
SN-113	-1.974E-03	1.727E-02	1.730E-02	NOT IDENT.
CD-115	-1.039E+01	4.023E+01	4.050E+01	NOT IDENT.
SN-117M	-8.560E-03	3.451E-02	3.473E-02	NOT IDENT.
SB-122	-9.930E-02	4.031E+00	4.031E+00	NOT IDENT.
TE-123M	9.611E-04	1.267E-02	1.268E-02	NOT IDENT.
SB-124	-3.419E-02	4.956E-02	5.190E-02	NOT IDENT.
SB-125	1.899E-02	3.279E-02	3.389E-02	NOT IDENT.
TE-125M	-2.198E+00	3.781E+00	3.909E+00	NOT IDENT.
I-126	8.822E-02	1.052E-01	1.125E-01	NOT IDENT.
SB-126	2.307E-02	7.660E-02	7.731E-02	FAIL ABUN
SB-127	-1.665E+00	1.972E+00	2.110E+00	NOT IDENT.
I-131	-1.768E-02	8.309E-02	8.347E-02	NOT IDENT.
I-132	1.000E+41	1.518E+41	0.000E+00	SHORT HLIF
TE-132	6.393E-01	1.167E+00	1.202E+00	NOT IDENT.
BA-133	-8.552E-04	1.576E-02	1.576E-02	NOT IDENT.
I-133	-4.488E+05	6.723E+05	7.021E+05	SHORT HLIF
CS-134	3.890E-03	1.561E-02	1.571E-02	NOT IDENT.
I-135	8.990E+22	1.397E+23	0.000E+00	SHORT HLIF
CS-136	-1.938E-02	6.202E-02	6.264E-02	NOT IDENT.
LA-138	9.644E-03	1.484E-02	1.546E-02	NOT IDENT.
CE-139	1.832E-03	1.156E-02	1.159E-02	NOT IDENT.
BA-140	-9.833E-03	1.478E-01	1.479E-01	FAIL ABUN
LA-140	9.714E-03	5.903E-02	5.919E-02	NOT IDENT.
CE-141	3.854E-05	2.672E-02	2.672E-02	NOT IDENT.
CE-143	-9.505E+01	1.739E+03	1.739E+03	SHORT HLIF
CE-144	2.174E-02	6.373E-02	6.448E-02	NOT IDENT.
PM-144	2.500E-04	1.545E-02	1.545E-02	NOT IDENT.
PR-144	2.245E-02	1.161E+00	1.161E+00	NOT IDENT.
PM-146	7.285E-03	1.464E-02	1.501E-02	NOT IDENT.
ND-147	1.354E-01	3.465E-01	3.518E-01	FAIL ABUN
PM-147	-9.062E+01	2.503E+02	2.536E+02	NOT IDENT.
PM-149	1.283E+02	3.070E+02	3.124E+02	SHORT HLIF
EU-150	-6.090E-03	1.132E-02	1.165E-02	NOT IDENT.
EU-152	6.789E-03	3.677E-02	3.689E-02	FAIL ABUN
GD-153	8.609E-03	3.154E-02	3.178E-02	NOT IDENT.
EU-154	2.655E-04	4.300E-02	4.300E-02	NOT IDENT.
EU-155	-4.762E-02	3.949E-02	4.495E-02	FAIL ABUN
TB-160	2.489E-02	5.868E-02	5.975E-02	FAIL ABUN
HO-166M	4.294E-03	2.216E-02	2.225E-02	FAIL ABUN
TM-171	2.166E+00	4.675E+00	4.776E+00	NOT IDENT.
HF-172	1.854E-02	6.157E-02	6.213E-02	FAIL ABUN
LU-172	8.498E-03	1.976E-02	2.012E-02	FAIL ABUN
LU-176	1.516E-02	1.833E-02	1.956E-02	FAIL ABUN
HF-181	-2.390E-03	1.812E-02	1.815E-02	NOT IDENT.
TA-182	1.659E-02	5.100E-02	5.155E-02	FAIL ABUN
RE-183	-5.607E-03	5.127E-02	5.133E-02	FAIL ABUN
RE-184	3.799E-02	4.267E-02	4.598E-02	FAIL ABUN
W-188	-8.595E-01	3.006E+00	3.031E+00	NOT IDENT.
IR-192	3.655E-04	1.269E-02	1.269E-02	NOT IDENT.
HG-203	-5.669E-03	1.458E-02	1.481E-02	NOT IDENT.
TL-204	-9.978E-01	1.271E+00	1.348E+00	NOT IDENT.
BI-207	1.585E-02	2.064E-02	2.184E-02	NOT IDENT.
TL-208	4.489E-04	1.968E-02	1.969E-02	NOT IDENT.
BI-210	-7.506E-01	1.166E+00	1.214E+00	NOT IDENT.
PB-210	-7.506E-01	1.166E+00	1.214E+00	NOT IDENT.
BI-211	-8.104E-02	9.777E-02	1.044E-01	NOT IDENT.

PB-211	-9.235E-02	3.250E-01	3.277E-01	NOT IDENT.
BI-212	3.620E-02	1.662E-01	1.670E-01	NOT IDENT.
PB-212	1.960E-03	4.957E-02	4.958E-02	FAIL ABUN
BI-213	3.677E-03	3.507E-02	3.511E-02	NOT IDENT.
BI-214	5.298E-03	3.577E-02	3.585E-02	FAIL ABUN
PB-214	-1.800E-02	3.598E-02	3.688E-02	FAIL ABUN
RN-219	-4.152E-02	1.642E-01	1.653E-01	NOT IDENT.
RN-222	5.298E-03	3.577E-02	3.585E-02	FAIL ABUN
RA-223	3.001E-01	2.403E-01	2.758E-01	FAIL ABUN
RA-224	3.802E-01	2.422E-01	2.967E-01	NOT IDENT.
AC-225	3.350E-01	3.578E-01	3.884E-01	NOT IDENT.
RA-226	-1.800E-02	3.598E-02	3.688E-02	FAIL ABUN
AC-227	-4.639E-02	8.969E-02	9.209E-02	NOT IDENT.
TH-227	-4.639E-02	8.969E-02	9.209E-02	NOT IDENT.
AC-228	-1.678E-02	7.384E-02	7.423E-02	NOT IDENT.
RA-228	-1.678E-02	7.384E-02	7.423E-02	NOT IDENT.
TH-228	1.960E-03	4.957E-02	4.958E-02	FAIL ABUN
TH-229	4.795E-02	2.123E-01	2.134E-01	FAIL ABUN
TH-230	-1.800E-02	3.598E-02	3.688E-02	FAIL ABUN
PA-231	-1.323E-01	1.938E-01	2.028E-01	NOT IDENT.
TH-231	3.001E-01	2.403E-01	2.758E-01	FAIL ABUN
TH-232	-1.678E-02	7.384E-02	7.423E-02	NOT IDENT.
PA-233	3.060E-03	2.177E-02	2.181E-02	NOT IDENT.
PA-234	-2.043E-02	8.631E-02	8.680E-02	FAIL ABUN
PA-234M	-1.685E+00	1.829E+00	1.980E+00	NOT IDENT.
TH-234	-1.452E-01	4.222E-01	4.272E-01	FAIL ABUN
U-234	-1.800E-02	3.598E-02	3.688E-02	FAIL ABUN
NP-237	3.060E-03	2.177E-02	2.181E-02	FAIL ABUN
NP-238	-1.790E+01	7.369E+01	7.413E+01	SHORT HLIF
U-238	-1.452E-01	4.222E-01	4.272E-01	FAIL ABUN
NP-239	1.965E-02	8.659E-02	8.704E-02	NOT IDENT.
PU-239	-8.817E-01	1.094E+02	1.094E+02	NOT IDENT.
AM-243	-3.477E-03	1.482E-02	1.490E-02	NOT IDENT.
CM-243	1.166E-02	3.288E-02	3.330E-02	NOT IDENT.
BK-247	2.705E-02	3.015E-02	3.252E-02	NOT IDENT.
CM-247	-6.243E-04	1.600E-02	1.600E-02	NOT IDENT.
CF-249	-6.558E-03	1.435E-02	1.465E-02	NOT IDENT.
CF-251	1.032E-02	4.807E-02	4.830E-02	NOT IDENT.
ANH-511	-9.500E-02	2.868E-02	5.154E-02	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	34.9647	85.43	54.9595	131.20	40.5647
45.60	46.0483	86.55	43.3372	133.02	35.1870
46.54	38.9476	86.79	43.3599	133.52	36.3163
49.72	36.6075	86.94	43.3743	136.00	36.4613
51.35	46.9152	87.09	43.3884	136.47	33.1714
51.87	35.9344	87.57	43.4340	140.51	31.1578
52.39	34.1464	88.03	43.4773	143.76	43.6167
52.97	43.4524	88.34	43.5065	144.24	47.7526
53.44	41.6631	88.47	43.5187	145.44	44.8505
54.07	36.1769	89.96	43.6584	152.43	41.9225
57.36	0.0000	1093.63	43.7217	153.25	41.9728
57.53	29.9888	91.11	43.7650	323.87	48.8481
57.98	30.0276	92.59	43.9018	156.02	47.8377
59.27	36.7312	93.35	43.9714	158.56	60.9684
59.32	36.7364	94.56	44.0820	159.00	54.9060
59.54	36.7593	94.65	44.0902	162.33	47.1203
60.96	36.9062	94.67	44.0918	162.66	47.1422
61.17	36.9277	94.87	44.1102	163.33	36.8286
62.93	37.1070	97.43	38.4977	165.86	40.0384
63.29	37.1432	98.43	48.5634	176.31	37.4844
63.58	37.1725	98.44	48.5645	176.60	43.3577
64.28	37.2427	99.53	48.6703	177.52	43.4102
66.73	38.4467	100.11	36.2857	181.07	40.8620
67.24	42.3477	102.03	44.7486	181.52	48.7484
125.81	45.2871	103.18	37.5480	184.41	58.4004
67.75	45.2953	103.37	39.6485	143.76	49.8026
68.89	28.9970	105.21	46.0719	193.51	49.0935
69.67	34.8659	105.31	56.5539	197.03	44.4959
70.82	51.4796	106.12	48.2500	198.01	45.7530
70.83	51.4812	106.47	45.1332	201.83	35.0778
72.81	50.7598	109.28	62.2554	203.43	36.3570
72.87	48.8148	111.00	45.5176	205.31	30.7699
74.66	55.8928	111.76	50.8813	210.85	39.1201
74.82	55.9146	114.06	38.3214	215.65	44.2535
74.97	55.9350	116.30	39.5447	218.12	29.5851
77.11	40.4410	116.74	41.7148	222.11	27.2415
78.74	53.4689	119.76	37.6364	227.09	27.3919
79.69	39.6945	121.12	48.5043	227.38	27.4006
80.03	45.6841	121.22	48.5129	228.16	27.4238
80.12	45.6940	121.78	41.0061	228.18	27.4245
80.19	45.7013	122.06	37.7870	116.74	27.4245
80.57	49.7192	122.92	48.6554	235.69	40.2148
81.00	43.7962	123.07	48.6677	235.96	40.2266
81.07	43.8033	265.00	42.2227	238.63	53.7871
81.75	38.8860	125.81	39.1163	238.98	53.8073
82.47	56.9269	127.23	41.3875	240.99	27.8031
83.79	42.7386	127.91	41.4351	242.00	40.4834
84.00	49.4398	129.30	42.6235	244.70	41.8663

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	37.5090	344.28	26.8441	563.25	18.1503
252.80	37.5243	345.93	33.3677	564.24	11.5370
254.15	0.0000	351.06	29.7806	569.33	23.5657
256.23	38.5098	351.93	27.9382	946.00	23.5684
260.90	32.6709	355.39	0.0000	569.70	23.5710
264.66	32.7915	356.01	27.0931	583.19	21.5820
264.80	32.7962	364.49	28.2111	584.27	24.8334
265.00	27.6230	366.42	26.3691	595.83	16.2933
269.46	30.3437	372.51	17.9760	427.87	28.3116
270.03	34.6981	375.05	27.4896	602.52	0.0000
271.23	37.3433	377.52	25.6404	604.72	19.6421
273.65	40.0413	356.01	26.7148	607.14	11.4720
276.40	28.7998	388.16	24.8849	609.32	16.4069
277.37	30.5737	388.63	22.0211	610.33	16.4154
277.60	33.2013	391.69	23.9888	614.28	16.4478
278.00	36.7098	264.66	26.0750	618.01	16.4789
279.20	33.2515	401.81	28.9960	620.36	16.4984
279.54	35.8875	402.40	30.9421	621.93	16.5112
279.70	35.8934	404.85	36.8071	630.19	0.0000
280.46	28.9099	410.95	20.4279	631.29	22.1175
283.69	29.8759	413.71	22.4160	633.25	12.1763
284.31	35.1685	414.70	20.4809	634.78	16.6168
285.41	39.6048	423.72	20.6078	635.95	12.1924
285.90	0.0000	427.09	17.7041	636.99	19.9614
287.50	31.7446	427.87	15.7454	657.50	10.0803
290.67	38.9118	433.94	9.8810	657.76	10.0814
293.27	0.0000	439.40	11.9001	657.90	0.0000
351.93	40.8480	440.45	15.8779	661.66	11.2227
295.96	36.4322	453.88	14.0151	664.57	0.0000
879.38	29.3920	463.37	24.1714	666.33	3.3743
299.98	33.8878	468.07	18.1824	666.50	6.7490
300.09	33.8909	473.00	13.1722	667.71	0.0000
300.13	33.8925	475.06	24.3491	677.62	13.5688
301.36	36.1609	476.78	22.3438	685.70	20.4294
302.85	22.7981	477.60	20.3231	692.65	14.8017
256.23	34.9185	482.18	18.3424	695.00	22.7962
304.85	34.9296	487.02	14.3085	696.49	19.3899
306.78	24.2227	492.35	14.3546	696.51	19.3899
308.46	20.2153	497.08	12.3389	697.00	22.8174
311.90	23.4292	505.52	27.9025	697.30	23.9617
316.51	24.4270	507.63	0.0000	697.49	25.1045
319.41	25.3938	511.00	51.8372	702.65	28.5950
320.08	21.7783	514.00	60.2373	706.68	16.0422
321.04	31.7864	514.00	60.2373	711.68	11.4844
323.87	20.0275	520.40	22.9337	720.70	10.3777
325.23	28.2527	520.69	25.0225	721.93	0.0000
328.76	30.1634	522.65	0.0000	722.78	8.0789
333.37	35.7833	527.90	18.8445	722.91	8.0792
333.97	41.3086	528.26	20.9424	723.31	9.2350
334.37	42.2406	529.59	23.0545	724.19	13.8579
338.28	22.1089	529.87	0.0000	727.33	9.2516
338.32	22.1094	531.02	15.7318	733.00	8.1151
311.90	29.5306	537.26	16.8398	735.93	6.9648
340.48	29.5306	546.56	0.0000	333.97	12.7774
340.55	29.5326	552.55	16.9837	739.50	10.4634

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	10.4850	949.00	5.6776	1384.29	7.5456
747.24	20.9971	667.71	0.0000	1408.01	9.7603
748.06	14.0029	962.31	10.4575	1434.09	3.2747
752.31	16.6586	964.08	9.5126	1435.80	1.0920
753.82	15.7923	966.17	14.2795	1457.56	0.0000
756.73	7.9060	911.20	10.4817	1460.82	4.3953
756.80	7.9060	983.53	6.1293	1489.16	1.1064
884.68	14.0981	984.45	0.0000	1505.03	5.5530
765.81	13.2271	1274.44	15.3896	1584.12	5.4302
766.42	14.9948	1001.03	7.7073	1596.21	6.3526
766.84	17.6440	1002.74	14.4594	1620.50	5.4750
772.60	0.0000	1004.73	5.7876	1621.92	6.3896
776.52	7.0862	507.63	0.0000	1678.03	0.0000
739.50	12.4081	1025.87	0.0000	1690.97	10.1943
778.90	15.0732	1028.54	0.0000	1750.46	0.0000
783.70	14.2148	1037.84	12.6786	1764.49	2.8239
788.74	19.5864	1038.76	0.0000	1063.66	7.5395
792.07	21.3962	631.29	10.7583	1771.35	4.7134
795.86	12.5004	1048.07	12.7207	1791.20	0.0000
810.06	19.7569	1049.04	6.8517	1808.65	5.6994
810.29	19.7589	1050.41	5.8755	1810.72	0.0000
344.28	18.8614	1063.66	4.9173	1836.06	8.5970
810.76	16.1691	1077.00	4.9384		
815.77	10.8010	1077.34	4.9387		
1048.07	12.6153	1085.87	3.1693		
832.01	7.2473	1093.63	4.9643		
834.85	12.6969	1099.45	5.9678		
835.71	8.1650	1112.07	10.9839		
836.80	0.0000	1112.84	9.9878		
846.75	0.0000	1115.54	6.3977		
846.77	14.5786	1120.29	6.4070		
856.80	16.0988	1120.55	6.4074		
860.56	6.2813	1221.41	6.4090		
871.09	17.4739	1129.67	10.0397		
873.19	6.4429	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	8.8567	1173.23	13.2230		
880.51	10.3373	1177.95	8.1484		
881.60	5.9094	1189.05	8.1753		
883.24	8.8696	1204.77	6.5699		
884.68	8.8743	1221.41	4.1260		
889.28	7.4080	1231.02	9.3087		
894.76	8.3510	1235.36	9.3203		
898.04	13.0062	1238.28	11.4008		
900.72	7.4395	1260.41	0.0000		
903.28	8.3773	1271.87	6.2772		
911.20	8.4015	1274.44	7.3286		
912.08	6.5367	1274.54	7.3286		
923.98	0.0000	1291.59	6.3113		
926.50	12.2030	1298.22	0.0000		
929.11	8.4562	1312.11	8.4614		
935.54	10.3592	1332.49	2.1270		
937.49	11.3090	1362.66	0.0000		
944.13	4.7232	1365.19	7.5084		
946.00	6.6168	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 13-DEC-2023 07:04:24.61

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
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Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581250.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM12.CNF;1011
Background date  : 11-DEC-2023 08:21:56
Sample date      : 13-NOV-2023 12:00:00 Acquisition date : 13-DEC-2023 05:03:21
Sample ID        : G1205581250 Sample quantity : 1.33160E+02 GRAM
Detector name    : GAM12 Detector geometry: CAN
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:01.04 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID         : 2529194 Detector SN# :
Matrix Spike ID  : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	37.38*	165	240	3.73	74.69	69	15	2.30E-02	22.9	
2	3	74.87	183	372	1.37	149.67	146	13	2.54E-02	19.7	1.49E+00
3	3	77.30*	329	337	1.35	154.52	146	13	4.56E-02	11.8	
4	1	84.18*	56	418	1.69	168.26	161	29	7.73E-03	67.2	2.19E+00
5	1	87.20*	71	386	1.69	174.31	161	29	9.84E-03	54.1	
6	1	89.89	108	286	1.41	179.69	161	29	1.49E-02	30.0	
7	1	92.70*	162	319	1.61	185.31	161	29	2.25E-02	24.9	
8	0	144.65*	67	260	2.25	289.18	284	11	9.33E-03	49.3	
9	0	185.81*	206	271	1.74	371.47	366	12	2.86E-02	18.1	
10	0	209.02	90	146	1.65	417.89	414	8	1.25E-02	25.7	
11	3	238.44*	724	205	1.46	476.71	471	18	1.01E-01	5.2	4.92E-01
12	3	241.76	267	190	1.86	483.35	471	18	3.71E-02	13.4	
13	0	269.88	39	107	0.89	539.59	536	7	5.48E-03	46.3	
14	0	276.57	33	107	1.12	552.96	550	7	4.53E-03	55.6	
15	4	294.93	480	112	1.53	589.68	580	25	6.67E-02	6.0	1.08E+00
16	4	299.29	89	122	2.51	598.41	580	25	1.23E-02	31.3	
17	0	337.78*	65	164	1.39	675.37	672	10	9.06E-03	39.4	
18	0	351.63*	730	148	1.40	703.07	697	13	1.01E-01	5.1	
19	0	411.06	55	166	3.83	821.92	811	21	7.70E-03	59.9	
20	0	462.60	33	57	1.58	925.00	920	9	4.65E-03	44.0	
21	0	485.95	46	44	4.40	971.72	966	12	6.37E-03	32.7	
22	0	511.10*	73	127	2.19	1022.02	1013	21	1.02E-02	44.8	
23	0	568.84	104	91	0.72	1137.52	1128	20	1.45E-02	24.8	
24	0	582.77*	213	84	1.72	1165.37	1156	17	2.96E-02	12.3	
25	0	608.87	565	56	1.40	1217.59	1210	15	7.84E-02	5.1	
26	0	631.50	31	59	3.64	1262.86	1254	18	4.30E-03	60.7	
27	0	641.46	22	31	0.60	1282.78	1276	10	3.03E-03	54.3	
28	0	727.54	59	53	2.23	1454.99	1449	13	8.22E-03	28.9	
29	0	742.54	23	27	1.14	1485.01	1481	9	3.13E-03	46.7	
30	0	772.69	12	25	1.08	1545.33	1541	7	1.63E-03	78.9	
31	0	795.19	24	36	1.31	1590.35	1584	13	3.33E-03	55.4	
32	0	830.58	19	20	3.79	1661.16	1655	10	2.64E-03	49.7	
33	0	860.85	61	36	2.30	1721.72	1715	19	8.53E-03	27.1	
34	0	876.52	12	30	0.56	1753.06	1746	11	1.66E-03	96.6	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	910.99*	146	26	1.43	1822.05	1814	15	2.03E-02	11.6	
36	0	933.63	34	36	1.53	1867.34	1860	13	4.75E-03	39.9	
37	0	964.66	30	29	2.07	1929.45	1923	11	4.18E-03	39.6	
38	0	968.75	90	20	1.99	1937.62	1933	10	1.25E-02	14.1	
39	1	1000.45*	24	26	2.24	2001.06	1990	26	3.37E-03	47.2	2.51E+00
40	1	1003.42	17	24	2.03	2007.00	1990	26	2.39E-03	61.9	
41	0	1061.55	14	38	3.01	2123.33	2108	17	1.96E-03	103.7	
42	0	1119.90	110	39	2.76	2240.11	2233	14	1.52E-02	15.4	
43	0	1158.56	17	39	2.98	2317.49	2303	17	2.36E-03	90.5	
44	0	1189.75	12	15	0.94	2379.93	2374	11	1.60E-03	69.5	
45	0	1230.12	12	27	5.14	2460.72	2452	15	1.70E-03	95.6	
46	0	1238.03	44	29	2.10	2476.55	2470	17	6.13E-03	32.0	
47	0	1377.20	42	19	1.51	2755.16	2750	11	5.84E-03	25.4	
48	0	1400.42	28	0	3.21	2801.64	2795	13	3.89E-03	18.9	
49	0	1408.06	28	3	4.37	2816.93	2810	14	3.85E-03	23.7	
50	0	1418.13	11	10	4.27	2837.09	2827	14	1.53E-03	69.1	
51	0	1441.26	18	3	1.40	2883.41	2876	14	2.46E-03	32.6	
52	0	1460.12*	107	20	1.69	2921.16	2914	16	1.48E-02	14.0	
53	0	1537.07	20	6	2.43	3075.23	3068	14	2.72E-03	36.3	
54	0	1544.91	7	5	0.86	3090.93	3084	10	9.72E-04	70.7	
55	0	1559.40	15	0	0.96	3119.93	3115	11	2.08E-03	25.8	
56	0	1588.08	9	24	0.87	3177.36	3172	13	1.26E-03	113.8	
57	0	1621.77	17	11	0.81	3244.83	3236	15	2.34E-03	49.8	
58	0	1763.40	103	4	1.50	3528.45	3521	15	1.44E-02	10.6	
59	0	1907.14	11	3	4.51	3816.34	3809	14	1.51E-03	47.0	

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

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581250.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title : RXF2
Sample date : 13-NOV-2023 12:00:00 Acquisition date : 13-DEC-2023 05:03:21
Sample ID : G1205581250 Sample quantity : 133.16 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA12 Detector geometry: CAN
Elapsed live time: 0 02:00:00.00 Elapsed real time: 0 02:00:01.04 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
U-235	143.76	CE-141	145.44

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
K-40	1460.82	10.66*	1.082E+00	2.491E+00	2.491E+00	28.09	OK
CD-109	88.03	3.70*	4.328E+00	1.453E+00	1.520E+00	108.16	OK
SN-126	64.28	9.60	2.090E+00	----- Line	Not Found	-----	Absent
	86.94	8.90	4.328E+00	6.041E-01	6.041E-01	108.16	OK
	87.57	37.00*	4.328E+00	1.453E-01	1.453E-01	108.16	OK
CE-141	145.44	48.29*	5.810E+00	2.456E-02	4.632E-02	313.47	OK
TL-208	277.37	6.60	4.139E+00	3.634E-01	3.634E-01	111.28	OK
	583.19	85.00*	2.289E+00	3.156E-01	3.156E-01	24.63	OK
	860.56	12.50	1.668E+00	8.254E-01	8.254E-01	54.23	OK
BI-211	72.87	1.23	3.022E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	3.434E+00	4.919E+00	4.919E+00	10.24	OK
BI-212	727.33	6.67*	1.913E+00	1.316E+00	1.316E+00	57.70	OK
	1620.50	1.47	9.970E-01	3.066E+00	3.066E+00	99.50	OK
PB-212	74.82	10.28	3.228E+00	1.824E+00	1.824E+00	39.42	OK
	77.11	17.10	3.470E+00	1.833E+00	1.833E+00	23.53	OK
	238.63	43.60*	4.607E+00	1.108E+00	1.108E+00	10.45	OK
	300.09	3.30	3.897E+00	2.085E+00	2.085E+00	62.52	OK
BI-214	609.32	45.49*	2.209E+00	1.615E+00	1.615E+00	10.21	OK
	1120.29	14.92	1.344E+00	1.500E+00	1.500E+00	30.71	OK
	1764.49	15.30	9.363E-01	1.912E+00	1.912E+00	21.29	OK
PB-214	74.82	5.80	3.228E+00	3.233E+00	3.233E+00	39.42	OK
	77.11	9.70	3.470E+00	3.231E+00	3.231E+00	23.53	OK
	87.09	3.41	4.328E+00	1.577E+00	1.577E+00	108.16	OK
	242.00	7.25	4.563E+00	2.475E+00	2.475E+00	26.89	OK
	295.22	18.42	3.942E+00	2.003E+00	2.003E+00	12.03	OK
	351.93	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24	OK
RN-222	609.32	45.49*	2.209E+00	1.615E+00	1.615E+00	10.21	OK
	1120.29	14.92	1.344E+00	1.500E+00	1.500E+00	30.71	OK
	1764.49	15.30	9.363E-01	1.912E+00	1.912E+00	21.29	OK
RA-224	240.99	4.10*	4.563E+00	4.377E+00	4.377E+00	26.89	OK
RA-226	74.82	5.80	3.228E+00	3.233E+00	3.233E+00	39.42	OK
	77.11	9.70	3.470E+00	3.231E+00	3.231E+00	23.53	OK
	87.09	3.41	4.328E+00	1.577E+00	1.577E+00	108.16	OK
	242.00	7.25	4.563E+00	2.475E+00	2.475E+00	26.89	OK
	295.22	18.42	3.942E+00	2.003E+00	2.003E+00	12.03	OK
	351.93	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24	OK
AC-228	105.21	1.10	5.335E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.546E+00	4.893E-01	4.893E-01	78.83	OK
	835.71	1.61	1.709E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16	OK
	968.97	15.80	1.514E+00	1.041E+00	1.041E+00	28.22	OK
RA-228	105.21	1.10	5.335E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.546E+00	4.893E-01	4.893E-01	78.83	OK
	835.71	1.61	1.709E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16	OK
	968.97	15.80	1.514E+00	1.041E+00	1.041E+00	28.22	OK
TH-228	74.82	10.28	3.228E+00	1.824E+00	1.824E+00	39.42	OK
	77.11	17.10	3.470E+00	1.833E+00	1.833E+00	23.53	OK
	238.63	43.60*	4.607E+00	1.108E+00	1.108E+00	10.45	OK

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
TH-229	300.09	3.30	3.897E+00	2.085E+00	2.085E+00	62.52	OK
	85.43	14.70	4.089E+00	3.048E-01	3.048E-01	134.33	OK
	88.47	24.00	4.328E+00	2.240E-01	2.240E-01	108.16	OK
	193.51	4.41*	5.245E+00	----- Line	Not Found	-----	Absent
TH-230	210.85	2.80	4.992E+00	----- Line	Not Found	-----	Absent
	74.82	5.80	3.228E+00	3.233E+00	3.233E+00	39.42	OK
	77.11	9.70	3.470E+00	3.231E+00	3.231E+00	23.53	OK
	87.09	3.41	4.328E+00	1.577E+00	1.577E+00	108.16	OK
	242.00	7.25	4.563E+00	2.475E+00	2.475E+00	26.89	OK
	295.22	18.42	3.942E+00	2.003E+00	2.003E+00	12.03	OK
TH-232	351.93	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24	OK
	105.21	1.10	5.335E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.546E+00	4.893E-01	4.893E-01	78.83	OK
	835.71	1.61	1.709E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16	OK
U-234	968.97	15.80	1.514E+00	1.041E+00	1.041E+00	28.22	OK
	74.82	5.80	3.228E+00	3.233E+00	3.233E+00	39.42	OK
	77.11	9.70	3.470E+00	3.231E+00	3.231E+00	23.53	OK
	87.09	3.41	4.328E+00	1.577E+00	1.577E+00	108.16	OK
	242.00	7.25	4.563E+00	2.475E+00	2.475E+00	26.89	OK
U-235	295.22	18.42	3.942E+00	2.003E+00	2.003E+00	12.03	OK
	351.93	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24	OK
	89.96	3.47	4.524E+00	2.246E+00	2.246E+00	59.95	OK
	93.35	5.60	4.710E+00	2.007E+00	2.007E+00	49.71	OK
	143.76	10.96*	5.814E+00	----- Line	Not Found	-----	<<INT Reject
AM-243	163.33	5.08	5.651E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	5.356E+00	2.103E-01	2.103E-01	36.19	OK
	205.31	5.01	5.073E+00	----- Line	Not Found	-----	Absent
	43.53	5.90	2.847E-01	----- Line	Not Found	-----	Absent
ANH-511	74.66	67.20*	3.228E+00	2.791E-01	2.791E-01	39.42	OK
	511.00	100.00*	2.544E+00	8.380E-02	8.380E-02	89.56	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]G1205581250.CNF;1
* Acquisition date   : 13-DEC-2023 05:03:21 Sensitivity      : 3.000
* Detector ID        : GAM12 Energy tolerance: 1.500
* Elapsed live time  : 0 02:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 02:00:01.04 Half life ratio : *****
* Sample date        : 13-NOV-2023 12:00:00 Analyst initials: RXF2
* Sample ID          : G1205581250 Sample Quantity : 1.3316E+02 GRAM
* Batch Number       : 2529194 Wet Weight : 0.00000
* Wet wt corr        : 1.00000 Dry Weight : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 11-OCT-2023 07:18:34 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM12_CAN.CNF;20
*****

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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/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	2.491E+00	6.859E-01	4.604E-01
CD-109	1.520E+00	1.611E+00	1.430E+00
SN-126	1.453E-01	1.540E-01	1.378E-01
CE-141	4.632E-02	1.423E-01	1.331E-01
TL-208	3.156E-01	7.615E-02	5.274E-02
BI-211	4.919E+00	4.936E-01	2.990E-01
BI-212	1.316E+00	7.441E-01	6.746E-01
PB-212	1.108E+00	1.134E-01	8.833E-02
BI-214	1.615E+00	1.617E-01	9.407E-02
PB-214	1.785E+00	1.791E-01	1.087E-01
RN-222	1.615E+00	1.617E-01	9.407E-02
RA-224	4.377E+00	1.153E+00	9.460E-01
RA-226	1.785E+00	1.791E-01	1.087E-01
AC-228	9.915E-01	2.251E-01	1.700E-01
RA-228	9.915E-01	2.251E-01	1.700E-01
TH-228	1.108E+00	1.134E-01	8.833E-02
TH-229	-3.903E-01	4.656E-01	7.892E-01
TH-230	1.785E+00	1.791E-01	1.087E-01
TH-232	9.915E-01	2.251E-01	1.700E-01
U-234	1.785E+00	1.791E-01	1.087E-01
U-235	3.353E-01	3.241E-01	3.287E-01
AM-243	2.791E-01	1.078E-01	1.113E-01
ANH-511	8.380E-02	7.355E-02	3.971E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	9.390E-02	2.875E-01	5.602E-01	NOT IDENT.
NA-22	-3.115E-03	2.885E-02	5.349E-02	NOT IDENT.
NA-24	0.000E+00	4.399E+12	0.000E+00	SHORT HLIF
AL-26	-5.925E-03	2.085E-02	4.130E-02	NOT IDENT.
SC-46	5.339E-04	3.136E-02	5.943E-02	FAIL ABUN
V-48	5.355E-02	7.639E-02	1.625E-01	NOT IDENT.
CR-51	-2.671E-01	4.366E-01	7.342E-01	NOT IDENT.

MN-52	-2.865E-01	1.150E+00	1.915E+00	NOT IDENT.
MN-54	-2.653E-02	3.359E-02	4.830E-02	NOT IDENT.
CO-56	1.326E-02	3.546E-02	6.891E-02	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-1.954E-02	2.429E-02	4.207E-02	NOT IDENT.
CO-58	4.050E-04	3.022E-02	5.760E-02	NOT IDENT.
FE-59	9.665E-04	7.582E-02	1.431E-01	NOT IDENT.
CO-60	6.110E-03	2.866E-02	5.580E-02	NOT IDENT.
ZN-65	2.073E-02	6.148E-02	1.091E-01	NOT IDENT.
GE-68	5.750E-01	8.637E-01	1.778E+00	NOT IDENT.
AS-73	2.661E-02	1.377E+00	2.559E+00	NOT IDENT.
AS-74	-1.422E-02	1.251E-01	2.334E-01	NOT IDENT.
SE-75	2.060E-02	4.234E-02	7.394E-02	NOT IDENT.
BR-77	0.000E+00	1.256E+03	0.000E+00	SHORT HLIF
SR-82	1.922E-01	3.760E-01	6.798E-01	NOT IDENT.
RB-83	1.814E-04	5.986E-02	1.100E-01	NOT IDENT.
RB-84	3.753E-02	7.145E-02	1.346E-01	NOT IDENT.
KR-85	1.034E+01	5.835E+00	1.224E+01	NOT IDENT.
SR-85	6.375E-02	3.605E-02	7.560E-02	NOT IDENT.
RB-86	7.297E-01	8.987E-01	1.882E+00	NOT IDENT.
Y-88	6.161E-04	2.960E-02	6.115E-02	NOT IDENT.
Y-91	-7.273E-01	1.390E+01	2.626E+01	NOT IDENT.
NB-94	-1.375E-03	2.485E-02	4.643E-02	NOT IDENT.
NB-95	-1.025E-02	4.137E-02	7.494E-02	NOT IDENT.
NB-95M	2.330E-01	1.395E-01	2.446E-01	NOT IDENT.
ZR-95	-2.083E-02	6.207E-02	1.127E-01	NOT IDENT.
NB-97	0.000E+00	1.673E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	2.556E+12	0.000E+00	SHORT HLIF
MO-99	0.000E+00	4.441E+02	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.222E+34	0.000E+00	SHORT HLIF
RH-101	8.637E-03	2.964E-02	5.407E-02	NOT IDENT.
RH-102	7.498E-02	8.925E-02	8.400E-02	FAIL ABUN
RU-103	7.959E-03	4.181E-02	7.997E-02	FAIL ABUN
RH-106	1.170E-01	1.994E-01	4.079E-01	NOT IDENT.
RU-106	1.170E-01	1.994E-01	4.079E-01	NOT IDENT.
AG-108M	4.836E-04	2.200E-02	4.183E-02	NOT IDENT.
AG-110	-2.373E-01	5.394E-01	9.749E-01	NOT IDENT.
AG-110M	-3.886E-03	3.722E-02	6.937E-02	NOT IDENT.
SN-113	-2.149E-04	3.822E-02	7.227E-02	NOT IDENT.
CD-115	0.000E+00	7.540E+02	0.000E+00	SHORT HLIF
SN-117M	-5.593E-02	9.774E-02	1.697E-01	NOT IDENT.
SB-122	0.000E+00	7.812E+01	0.000E+00	SHORT HLIF
TE-123M	-1.333E-02	2.603E-02	4.534E-02	NOT IDENT.
SB-124	-2.214E-02	8.230E-02	1.489E-01	NOT IDENT.
SB-125	-8.645E-03	7.048E-02	1.322E-01	FAIL ABUN
TE-125M	-3.418E+00	1.043E+01	1.860E+01	NOT IDENT.
I-126	-1.821E-02	3.746E-01	6.996E-01	NOT IDENT.
SB-126	2.001E-03	2.620E-01	4.750E-01	NOT IDENT.
SB-127	-2.111E+00	1.347E+01	2.503E+01	NOT IDENT.
I-131	-2.628E-01	2.968E-01	5.280E-01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-5.428E+00	1.370E+01	2.373E+01	NOT IDENT.
BA-133	-4.132E-03	3.932E-02	6.081E-02	FAIL ABUN
I-133	0.000E+00	4.903E+08	0.000E+00	SHORT HLIF
CS-134	4.565E-02	4.954E-02	6.473E-02	FAIL ABUN
I-135	0.000E+00	4.117E+31	0.000E+00	SHORT HLIF
CS-136	-4.175E-02	1.690E-01	3.065E-01	NOT IDENT.
BA-137M	-1.440E-02	2.891E-02	4.865E-02	NOT IDENT.
CS-137	-1.521E-02	3.054E-02	5.139E-02	NOT IDENT.
LA-138	2.520E-02	3.878E-02	7.749E-02	NOT IDENT.
CE-139	3.787E-04	2.661E-02	4.767E-02	NOT IDENT.
BA-140	-2.720E-02	4.283E-01	8.084E-01	NOT IDENT.
LA-140	-2.151E-02	1.424E-01	2.648E-01	FAIL ABUN
CE-143	0.000E+00	2.228E+05	0.000E+00	SHORT HLIF
CE-144	-8.742E-03	1.821E-01	3.269E-01	NOT IDENT.
PM-144	-1.784E-02	2.428E-02	4.226E-02	NOT IDENT.
PR-144	-1.350E+00	1.831E+00	3.185E+00	NOT IDENT.
PM-146	-7.355E-03	3.344E-02	6.211E-02	NOT IDENT.
ND-147	-3.326E-01	1.006E+00	1.855E+00	FAIL ABUN
PM-147	1.646E+02	6.752E+02	1.235E+03	NOT IDENT.
PM-149	0.000E+00	7.721E+03	0.000E+00	SHORT HLIF
EU-150	-6.940E-04	2.648E-02	4.123E-02	NOT IDENT.
EU-152	-9.842E-02	8.150E-02	1.292E-01	FAIL ABUN
GD-153	-5.912E-02	8.835E-02	1.473E-01	NOT IDENT.
EU-154	-4.726E-03	8.179E-02	1.526E-01	FAIL ABUN
EU-155	4.195E-02	9.717E-02	1.802E-01	FAIL ABUN
TB-160	-5.840E-02	1.288E-01	1.963E-01	FAIL ABUN
HO-166M	1.744E-02	4.348E-02	8.542E-02	FAIL ABUN

TM-171	1.580E+01	2.648E+01	5.059E+01	NOT IDENT.
HF-172	8.518E-02	1.784E-01	3.286E-01	NOT IDENT.
LU-172	-3.851E-02	4.435E-02	7.305E-02	FAIL ABUN
LU-176	-1.733E-02	2.181E-02	3.618E-02	FAIL ABUN
HF-181	1.333E-02	4.388E-02	7.655E-02	NOT IDENT.
TA-182	3.913E-02	1.171E-01	2.273E-01	FAIL ABUN
RE-183	-1.517E-01	3.000E-01	5.415E-01	NOT IDENT.
RE-184	9.925E-02	1.272E-01	2.467E-01	NOT IDENT.
W-188	8.090E-01	8.147E+00	1.288E+01	NOT IDENT.
IR-192	-2.396E-02	3.267E-02	5.440E-02	FAIL ABUN
HG-203	-3.238E-02	4.625E-02	6.789E-02	NOT IDENT.
TL-204	1.026E-01	6.446E+00	1.055E+01	NOT IDENT.
BI-207	-1.054E-02	4.142E-02	6.498E-02	FAIL ABUN
BI-210	1.720E+00	5.808E+00	1.096E+01	NOT IDENT.
PB-210	1.720E+00	5.808E+00	1.096E+01	NOT IDENT.
PB-211	-3.984E-01	6.451E-01	1.009E+00	FAIL ABUN
BI-213	-2.120E-02	7.804E-02	1.448E-01	NOT IDENT.
RN-219	1.997E-01	3.469E-01	6.588E-01	FAIL ABUN
RA-223	4.302E-02	5.290E-01	9.392E-01	FAIL ABUN
AC-225	-9.316E-03	1.402E+00	2.485E+00	NOT IDENT.
AC-227	-2.008E-01	2.099E-01	3.475E-01	FAIL ABUN
TH-227	-2.008E-01	2.099E-01	3.475E-01	FAIL ABUN
PA-231	2.856E-01	4.362E-01	7.268E-01	NOT IDENT.
TH-231	4.302E-02	5.290E-01	9.392E-01	FAIL ABUN
PA-233	-4.671E-02	5.482E-02	9.046E-02	FAIL ABUN
PA-234	8.454E-02	2.151E-01	4.243E-01	FAIL ABUN
PA-234M	5.427E+00	5.016E+00	6.920E+00	FAIL ABUN
TH-234	3.786E-01	1.703E+00	3.101E+00	FAIL ABUN
NP-237	-4.671E-02	5.482E-02	9.046E-02	FAIL ABUN
NP-238	0.000E+00	1.523E+03	0.000E+00	SHORT HLIF
U-238	3.786E-01	1.703E+00	3.101E+00	FAIL ABUN
NP-239	-2.060E-01	2.519E-01	4.366E-01	FAIL ABUN
PU-239	2.962E+01	3.145E+02	5.681E+02	NOT IDENT.
AM-241	-6.963E-02	1.965E-01	3.569E-01	NOT IDENT.
CM-243	-2.996E-02	1.010E-01	1.807E-01	FAIL ABUN
BK-247	3.857E-02	7.032E-02	1.233E-01	FAIL ABUN
CM-247	2.163E-02	3.216E-02	5.955E-02	FAIL ABUN
CF-249	-1.910E-02	3.203E-02	5.804E-02	NOT IDENT.
CF-251	-5.475E-02	1.127E-01	1.956E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	102	10.66*	1.082E+00	2.491E+00	2.491E+00	28.09
CD-109	88.03	83	3.70*	4.328E+00	1.453E+00	1.520E+00	108.16
SN-126	64.28	-----	9.60	2.090E+00	-----	Line Not Found	-----
	86.94	83	8.90	4.328E+00	6.041E-01	6.041E-01	108.16
	87.57	83	37.00*	4.328E+00	1.453E-01	1.453E-01	108.16
CE-141	145.44	76	48.29*	5.810E+00	7.610E-02	1.435E-01	98.63
TL-208	277.37	35	6.60	4.139E+00	3.634E-01	3.634E-01	111.28
	583.19	218	85.00*	2.289E+00	3.156E-01	3.156E-01	24.63
	860.56	61	12.50	1.668E+00	8.254E-01	8.254E-01	54.23
BI-211	72.87	-----	1.23	3.022E+00	-----	Line Not Found	-----
	351.06	774	12.92*	3.434E+00	4.919E+00	4.919E+00	10.24
BI-212	727.33	60	6.67*	1.913E+00	1.316E+00	1.316E+00	57.70
	1620.50	16	1.47	9.970E-01	3.066E+00	3.066E+00	99.50
PB-212	74.82	215	10.28	3.228E+00	1.824E+00	1.824E+00	39.42
	77.11	386	17.10	3.470E+00	1.833E+00	1.833E+00	23.53
	238.63	789	43.60*	4.607E+00	1.108E+00	1.108E+00	10.45
	300.09	95	3.30	3.897E+00	2.085E+00	2.085E+00	62.52
BI-214	609.32	576	45.49*	2.209E+00	1.615E+00	1.615E+00	10.21
	1120.29	107	14.92	1.344E+00	1.500E+00	1.500E+00	30.71
	1764.49	97	15.30	9.363E-01	1.912E+00	1.912E+00	21.29
PB-214	74.82	215	5.80	3.228E+00	3.233E+00	3.233E+00	39.42
	77.11	386	9.70	3.470E+00	3.231E+00	3.231E+00	23.53
	87.09	83	3.41	4.328E+00	1.577E+00	1.577E+00	108.16
	242.00	291	7.25	4.563E+00	2.475E+00	2.475E+00	26.89
	295.22	516	18.42	3.942E+00	2.003E+00	2.003E+00	12.03
	351.93	774	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24
RN-222	609.32	576	45.49*	2.209E+00	1.615E+00	1.615E+00	10.21
	1120.29	107	14.92	1.344E+00	1.500E+00	1.500E+00	30.71
	1764.49	97	15.30	9.363E-01	1.912E+00	1.912E+00	21.29
RA-224	240.99	291	4.10*	4.563E+00	4.377E+00	4.377E+00	26.89
RA-226	74.82	215	5.80	3.228E+00	3.233E+00	3.233E+00	39.42
	77.11	386	9.70	3.470E+00	3.231E+00	3.231E+00	23.53
	87.09	83	3.41	4.328E+00	1.577E+00	1.577E+00	108.16
	242.00	291	7.25	4.563E+00	2.475E+00	2.475E+00	26.89
	295.22	516	18.42	3.942E+00	2.003E+00	2.003E+00	12.03
	351.93	774	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24
AC-228	105.21	-----	1.10	5.335E+00	-----	Line Not Found	-----
	338.32	69	11.27	3.546E+00	4.893E-01	4.893E-01	78.83
	835.71	-----	1.61	1.709E+00	-----	Line Not Found	-----
	911.20	145	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16
	968.97	88	15.80	1.514E+00	1.041E+00	1.041E+00	28.22
RA-228	105.21	-----	1.10	5.335E+00	-----	Line Not Found	-----
	338.32	69	11.27	3.546E+00	4.893E-01	4.893E-01	78.83
	835.71	-----	1.61	1.709E+00	-----	Line Not Found	-----
	911.20	145	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16
	968.97	88	15.80	1.514E+00	1.041E+00	1.041E+00	28.22
TH-228	74.82	215	10.28	3.228E+00	1.824E+00	1.824E+00	39.42

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-229	77.11	386	17.10	3.470E+00	1.833E+00	1.833E+00	23.53
	238.63	789	43.60*	4.607E+00	1.108E+00	1.108E+00	10.45
	300.09	95	3.30	3.897E+00	2.085E+00	2.085E+00	62.52
	85.43	65	14.70	4.089E+00	3.048E-01	3.048E-01	134.33
	88.47	83	24.00	4.328E+00	2.240E-01	2.240E-01	108.16
TH-230	193.51	-----	4.41*	5.245E+00	-----	Line Not Found	-----
	210.85	-----	2.80	4.992E+00	-----	Line Not Found	-----
	74.82	215	5.80	3.228E+00	3.233E+00	3.233E+00	39.42
	77.11	386	9.70	3.470E+00	3.231E+00	3.231E+00	23.53
	87.09	83	3.41	4.328E+00	1.577E+00	1.577E+00	108.16
TH-232	242.00	291	7.25	4.563E+00	2.475E+00	2.475E+00	26.89
	295.22	516	18.42	3.942E+00	2.003E+00	2.003E+00	12.03
	351.93	774	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24
	105.21	-----	1.10	5.335E+00	-----	Line Not Found	-----
	338.32	69	11.27	3.546E+00	4.893E-01	4.893E-01	78.83
U-234	835.71	-----	1.61	1.709E+00	-----	Line Not Found	-----
	911.20	145	25.80*	1.593E+00	9.915E-01	9.915E-01	23.16
	968.97	88	15.80	1.514E+00	1.041E+00	1.041E+00	28.22
	74.82	215	5.80	3.228E+00	3.233E+00	3.233E+00	39.42
	77.11	386	9.70	3.470E+00	3.231E+00	3.231E+00	23.53
U-235	87.09	83	3.41	4.328E+00	1.577E+00	1.577E+00	108.16
	242.00	291	7.25	4.563E+00	2.475E+00	2.475E+00	26.89
	295.22	516	18.42	3.942E+00	2.003E+00	2.003E+00	12.03
	351.93	774	35.60*	3.434E+00	1.785E+00	1.785E+00	10.24
	89.96	125	3.47	4.524E+00	2.246E+00	2.246E+00	59.95
AM-243	93.35	188	5.60	4.710E+00	2.007E+00	2.007E+00	49.71
	143.76	76	10.96*	5.810E+00	3.353E-01	3.353E-01	98.63
	163.33	-----	5.08	5.651E+00	-----	Line Not Found	-----
	185.72	229	57.20	5.356E+00	2.103E-01	2.103E-01	36.19
	205.31	-----	5.01	5.073E+00	-----	Line Not Found	-----
ANH-511	43.53	-----	5.90	2.847E-01	-----	Line Not Found	-----
	74.66	215	67.20*	3.228E+00	2.791E-01	2.791E-01	39.42
	511.00	76	100.00*	2.544E+00	8.380E-02	8.380E-02	89.56

Flag: "*" = Keyline

Total number of lines in spectrum 59
Number of unidentified lines 16
Number of lines tentatively identified by NID 43 72.88%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	2.491E+00	2.491E+00	0.700E+00	28.09	
CD-109	461.40D	1.05	1.453E+00	1.520E+00	1.643E+00	108.16	
SN-126	2.30E+05Y	1.00	1.453E-01	1.453E-01	1.572E-01	108.16	
CE-141	32.51D	1.89	7.610E-02	1.435E-01	1.415E-01	98.63	
TL-208	1.41E+10Y	1.00	3.156E-01	3.156E-01	0.777E-01	24.63	
BI-211	7.04E+08Y	1.00	4.919E+00	4.919E+00	0.504E+00	10.24	
BI-212	1.41E+10Y	1.00	1.316E+00	1.316E+00	0.759E+00	57.70	
PB-212	1.41E+10Y	1.00	1.108E+00	1.108E+00	0.116E+00	10.45	
BI-214	1600.00Y	1.00	1.615E+00	1.615E+00	0.165E+00	10.21	
PB-214	1600.00Y	1.00	1.785E+00	1.785E+00	0.183E+00	10.24	
RN-222	1600.00Y	1.00	1.615E+00	1.615E+00	0.165E+00	10.21	
RA-224	1.41E+10Y	1.00	4.377E+00	4.377E+00	1.177E+00	26.89	
RA-226	1600.00Y	1.00	1.785E+00	1.785E+00	0.183E+00	10.24	
AC-228	1.41E+10Y	1.00	9.915E-01	9.915E-01	2.297E-01	23.16	
RA-228	1.41E+10Y	1.00	9.915E-01	9.915E-01	2.297E-01	23.16	
TH-228	1.41E+10Y	1.00	1.108E+00	1.108E+00	0.116E+00	10.45	
TH-229	7340.00Y	1.00	2.240E-01	2.240E-01	2.423E-01	108.16	K
TH-230	7.54E+04Y	1.00	1.785E+00	1.785E+00	0.183E+00	10.24	
TH-232	1.41E+10Y	1.00	9.915E-01	9.915E-01	2.297E-01	23.16	
U-234	2.45E+05Y	1.00	1.785E+00	1.785E+00	0.183E+00	10.24	
U-235	7.04E+08Y	1.00	3.353E-01	3.353E-01	3.307E-01	98.63	
AM-243	7370.00Y	1.00	2.791E-01	2.791E-01	1.100E-01	39.42	
ANH-511	1.00E+09Y	1.00	8.380E-02	8.380E-02	7.505E-02	89.56	
Total Activity :			3.158E+01	3.171E+01			

Grand Total Activity : 3.158E+01 3.171E+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	37.38	203	294	3.73	74.69	69	15	2.30E-02	45.9	8.27E-02	
0	209.02	99	161	1.65	417.89	414	8	1.25E-02	51.4	5.02E+00	
0	269.88	43	115	0.89	539.59	536	7	5.48E-03	92.5	4.22E+00	T
0	411.06	58	174	3.83	821.92	811	21	7.70E-03	****	3.03E+00	T
0	462.60	35	59	1.58	925.00	920	9	4.65E-03	87.9	2.76E+00	T
0	485.95	48	46	4.40	971.72	966	12	6.37E-03	65.4	2.65E+00	T
0	568.84	107	93	0.72	1137.52	1128	20	1.45E-02	49.7	2.33E+00	T
0	631.50	31	60	3.64	1262.86	1254	18	4.30E-03	****	2.15E+00	T
0	641.46	22	32	0.60	1282.78	1276	10	3.03E-03	****	2.12E+00	
0	742.54	23	28	1.14	1485.01	1481	9	3.13E-03	93.5	1.88E+00	
0	772.69	12	25	1.08	1545.33	1541	7	1.63E-03	****	1.82E+00	T
0	795.19	24	36	1.31	1590.35	1584	13	3.33E-03	****	1.78E+00	T
0	830.58	19	20	3.79	1661.16	1655	10	2.64E-03	99.3	1.72E+00	T
0	876.52	12	30	0.56	1753.06	1746	11	1.66E-03	****	1.64E+00	T
0	933.63	34	35	1.53	1867.34	1860	13	4.75E-03	79.7	1.56E+00	
0	964.66	30	28	2.07	1929.45	1923	11	4.18E-03	79.3	1.52E+00	T
1	1000.45	24	26	2.24	2001.06	1990	26	3.37E-03	94.3	1.47E+00	T
1	1003.42	17	24	2.03	2007.00	1990	26	2.39E-03	****	1.47E+00	T
0	1061.55	14	37	3.01	2123.33	2108	17	1.96E-03	****	1.40E+00	
0	1158.56	17	38	2.98	2317.49	2303	17	2.36E-03	****	1.31E+00	
0	1189.75	11	14	0.94	2379.93	2374	11	1.60E-03	****	1.28E+00	T
0	1230.12	12	26	5.14	2460.72	2452	15	1.70E-03	****	1.24E+00	T
0	1238.03	43	28	2.10	2476.55	2470	17	6.13E-03	63.9	1.24E+00	T
0	1377.20	40	18	1.51	2755.16	2750	11	5.84E-03	50.8	1.13E+00	
0	1400.42	27	0	3.21	2801.64	2795	13	3.89E-03	37.8	1.12E+00	
0	1408.06	27	3	4.37	2816.93	2810	14	3.85E-03	47.4	1.11E+00	T
0	1418.13	11	10	4.27	2837.09	2827	14	1.53E-03	****	1.11E+00	
0	1441.26	17	3	1.40	2883.41	2876	14	2.46E-03	65.2	1.09E+00	
0	1537.07	19	6	2.43	3075.23	3068	14	2.72E-03	72.6	1.04E+00	
0	1544.91	7	5	0.86	3090.93	3084	10	9.72E-04	****	1.04E+00	
0	1559.40	14	0	0.96	3119.93	3115	11	2.08E-03	51.6	1.03E+00	
0	1588.08	9	23	0.87	3177.36	3172	13	1.26E-03	****	1.01E+00	
0	1907.14	10	3	4.51	3816.34	3809	14	1.51E-03	94.1	8.86E-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]G1205581250.CNF;1      *
* Acquisition date   : 13-DEC-2023 05:03:21 Sensitivity      : 3.000                *
* Detector ID       : GAM12 Energy tolerance: 1.500          *
* Elapsed live time : 0 02:00:00.00 Abundance limit : 75.000   *
* Elapsed real time : 0 02:00:01.04 Half life ratio : ***** *
* Sample date       : 13-NOV-2023 12:00:00 Nuclide Library : SOLID *
* Sample ID         : G1205581250 Analyst initials: RXF2      *
* Batch Number      : 2529194 Sample Quantity : 1.3316E+02 GRAM *
* Wet wt corr       : 1.00000 Wet Weight      : 0.00000       *
*                                     Dry Weight   : 0.00000       *
*****
*                                     CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 11-OCT-2023 07:18:34 Eff. Geometry   : CAN *
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM12_CAN.CNF;20 *
*****
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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/GRAM)
K-40	1.971E-01
CD-109	6.897E-01
SN-126	6.647E-02
CE-141	6.389E-02
TL-208	2.438E-02
BI-211	1.408E-01
BI-212	3.071E-01
PB-212	4.222E-02
BI-214	4.319E-02
PB-214	5.119E-02
RN-222	4.319E-02
RA-224	4.522E-01
RA-226	5.119E-02
AC-228	7.565E-02
RA-228	7.565E-02
TH-228	4.222E-02
TH-229	3.777E-01
TH-230	5.119E-02
TH-232	7.565E-02
U-234	5.119E-02
U-235	1.582E-01
AM-243	5.384E-02
ANH-511	1.833E-02

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

Nuclide	Lc (pCi/GRAM)	
BE-7	2.598E-01	NOT IDENT.
NA-22	2.351E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.650E-02	NOT IDENT.
SC-46	2.669E-02	FAIL ABUN
V-48	7.193E-02	NOT IDENT.
CR-51	3.447E-01	NOT IDENT.
MN-52	8.184E-01	NOT IDENT.

MN-54	2.175E-02	NOT IDENT.
CO-56	3.149E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	2.017E-02	NOT IDENT.
CO-58	2.584E-02	NOT IDENT.
FE-59	6.367E-02	NOT IDENT.
CO-60	2.459E-02	NOT IDENT.
ZN-65	4.847E-02	NOT IDENT.
GE-68	7.964E-01	NOT IDENT.
AS-73	1.228E+00	NOT IDENT.
AS-74	1.074E-01	NOT IDENT.
SE-75	3.513E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	3.082E-01	NOT IDENT.
RB-83	5.065E-02	NOT IDENT.
RB-84	6.094E-02	NOT IDENT.
KR-85	5.766E+00	NOT IDENT.
SR-85	3.562E-02	NOT IDENT.
RB-86	8.445E-01	NOT IDENT.
Y-88	2.546E-02	NOT IDENT.
Y-91	1.148E+01	NOT IDENT.
NB-94	2.125E-02	NOT IDENT.
NB-95	3.457E-02	NOT IDENT.
NB-95M	1.176E-01	NOT IDENT.
ZR-95	5.108E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.602E-02	NOT IDENT.
RH-102	3.874E-02	FAIL ABUN
RU-103	3.722E-02	FAIL ABUN
RH-106	1.850E-01	NOT IDENT.
RU-106	1.850E-01	NOT IDENT.
AG-108M	1.944E-02	NOT IDENT.
AG-110	4.426E-01	NOT IDENT.
AG-110M	3.117E-02	NOT IDENT.
SN-113	3.387E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	8.121E-02	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	2.169E-02	NOT IDENT.
SB-124	6.279E-02	NOT IDENT.
SB-125	6.160E-02	FAIL ABUN
TE-125M	8.916E+00	NOT IDENT.
I-126	3.217E-01	NOT IDENT.
SB-126	2.178E-01	NOT IDENT.
SB-127	1.141E+01	NOT IDENT.
I-131	2.454E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	1.128E+01	NOT IDENT.
BA-133	2.855E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	2.977E-02	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	1.371E-01	NOT IDENT.
BA-137M	2.224E-02	NOT IDENT.
CS-137	2.350E-02	NOT IDENT.
LA-138	3.344E-02	NOT IDENT.
CE-139	2.282E-02	NOT IDENT.
BA-140	3.715E-01	NOT IDENT.
LA-140	1.125E-01	FAIL ABUN
CE-143	0.000E+00	SHORT HLIF
CE-144	1.569E-01	NOT IDENT.
PM-144	1.906E-02	NOT IDENT.
PR-144	1.437E+00	NOT IDENT.
PM-146	2.891E-02	NOT IDENT.
ND-147	8.489E-01	FAIL ABUN
PM-147	5.929E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	1.948E-02	NOT IDENT.
EU-152	6.041E-02	FAIL ABUN
GD-153	7.068E-02	NOT IDENT.
EU-154	6.723E-02	FAIL ABUN
EU-155	8.655E-02	FAIL ABUN
TB-160	8.779E-02	FAIL ABUN
HO-166M	3.906E-02	FAIL ABUN
TM-171	2.430E+01	NOT IDENT.

HF-172	1.581E-01	NOT IDENT.
LU-172	3.195E-02	FAIL ABUN
LU-176	1.700E-02	FAIL ABUN
HF-181	3.534E-02	NOT IDENT.
TA-182	1.001E-01	FAIL ABUN
RE-183	2.597E-01	NOT IDENT.
RE-184	1.121E-01	NOT IDENT.
W-188	6.112E+00	NOT IDENT.
IR-192	2.553E-02	FAIL ABUN
HG-203	3.213E-02	NOT IDENT.
TL-204	5.093E+00	NOT IDENT.
BI-207	2.882E-02	FAIL ABUN
BI-210	5.269E+00	NOT IDENT.
PB-210	5.269E+00	NOT IDENT.
PB-211	4.710E-01	FAIL ABUN
BI-213	6.721E-02	NOT IDENT.
RN-219	3.104E-01	FAIL ABUN
RA-223	4.430E-01	FAIL ABUN
AC-225	1.188E+00	NOT IDENT.
AC-227	1.644E-01	FAIL ABUN
TH-227	1.644E-01	FAIL ABUN
PA-231	3.446E-01	NOT IDENT.
TH-231	4.430E-01	FAIL ABUN
PA-233	4.255E-02	FAIL ABUN
PA-234	1.915E-01	FAIL ABUN
PA-234M	3.151E+00	FAIL ABUN
TH-234	1.496E+00	FAIL ABUN
NP-237	4.255E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
U-238	1.496E+00	FAIL ABUN
NP-239	2.096E-01	FAIL ABUN
PU-239	2.733E+02	NOT IDENT.
AM-241	1.714E-01	NOT IDENT.
CM-243	8.676E-02	FAIL ABUN
BK-247	5.861E-02	FAIL ABUN
CM-247	2.803E-02	FAIL ABUN
CF-249	2.717E-02	NOT IDENT.
CF-251	9.368E-02	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581250.CNF;1
Acquisition date : 13-DEC-2023 05:03:21 Sensitivity : 3.000
Detector ID : GAM12 Energy tolerance: 1.500
Elapsed live time: 0 02:00:00.00 Abundance limit : 75.000
Elapsed real time: 0 02:00:01.04 Half life ratio : *****
Sample date : 13-NOV-2023 12:00:00 Nuclide Library : SOLID
Sample ID : G1205581250 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.3316E+02 GRAM
Quantity Err(%) : 1.5020E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 11-OCT-2023 07:18:34 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM12_CAN.CNF;20

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	2.491E+00	7.173E-01	7.173E-01
CD-109	1.520E+00	1.617E+00	1.617E+00
SN-126	1.453E-01	1.545E-01	1.545E-01
CE-141	4.618E-02	1.427E-01	1.427E-01
TL-208	3.156E-01	8.307E-02	8.307E-02
BI-211	4.919E+00	6.452E-01	6.452E-01
BI-212	1.316E+00	7.575E-01	7.575E-01
PB-212	1.108E+00	1.434E-01	1.434E-01
BI-214	1.615E+00	2.369E-01	2.369E-01
PB-214	1.785E+00	2.324E-01	2.324E-01
RN-222	1.615E+00	2.369E-01	2.369E-01
RA-224	4.377E+00	1.205E+00	1.205E+00
RA-226	1.785E+00	2.324E-01	2.324E-01
AC-228	9.915E-01	2.399E-01	2.399E-01
RA-228	9.915E-01	2.399E-01	2.399E-01
TH-228	1.108E+00	1.434E-01	1.434E-01
TH-229	-3.903E-01	4.665E-01	4.665E-01
TH-230	1.785E+00	2.324E-01	2.324E-01
TH-232	9.915E-01	2.399E-01	2.399E-01
U-234	1.785E+00	2.324E-01	2.324E-01
U-235	3.353E-01	3.251E-01	3.251E-01
AM-243	2.791E-01	1.100E-01	1.100E-01
ANH-511	8.380E-02	7.402E-02	7.402E-02

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	9.390E-02	2.877E-01	2.908E-01	NOT IDENT.
NA-22	-3.115E-03	2.886E-02	2.889E-02	NOT IDENT.
NA-24	-1.092E+12	4.400E+12	4.428E+12	SHORT HLIF
AL-26	-5.925E-03	2.085E-02	2.102E-02	NOT IDENT.
SC-46	5.339E-04	3.136E-02	3.136E-02	FAIL ABUN
V-48	5.355E-02	7.650E-02	8.022E-02	NOT IDENT.
CR-51	-2.671E-01	4.371E-01	4.534E-01	NOT IDENT.

MN-52	-2.865E-01	1.150E+00	1.157E+00	NOT IDENT.
MN-54	-2.653E-02	3.368E-02	3.574E-02	NOT IDENT.
CO-56	1.326E-02	3.548E-02	3.598E-02	FAIL ABUN
MN-56	1.000E+41	2.711E+41	0.000E+00	SHORT HLIF
CO-57	-1.954E-02	2.433E-02	2.588E-02	NOT IDENT.
CO-58	4.050E-04	3.022E-02	3.022E-02	NOT IDENT.
FE-59	9.665E-04	7.582E-02	7.582E-02	NOT IDENT.
CO-60	6.110E-03	2.866E-02	2.879E-02	NOT IDENT.
ZN-65	2.073E-02	6.150E-02	6.221E-02	NOT IDENT.
GE-68	5.750E-01	8.648E-01	9.028E-01	NOT IDENT.
AS-73	2.661E-02	1.377E+00	1.377E+00	NOT IDENT.
AS-74	-1.422E-02	1.251E-01	1.253E-01	NOT IDENT.
SE-75	2.060E-02	4.237E-02	4.337E-02	NOT IDENT.
BR-77	1.227E+04	1.065E+04	1.200E+04	SHORT HLIF
SR-82	1.922E-01	3.765E-01	3.863E-01	NOT IDENT.
RB-83	1.814E-04	5.986E-02	5.986E-02	NOT IDENT.
RB-84	3.753E-02	7.151E-02	7.349E-02	NOT IDENT.
KR-85	1.034E+01	5.924E+00	7.538E+00	NOT IDENT.
SR-85	6.375E-02	3.660E-02	4.653E-02	NOT IDENT.
RB-86	7.297E-01	9.005E-01	9.587E-01	NOT IDENT.
Y-88	6.161E-04	2.960E-02	2.961E-02	NOT IDENT.
Y-91	-7.273E-01	1.390E+01	1.391E+01	NOT IDENT.
NB-94	-1.375E-03	2.485E-02	2.485E-02	NOT IDENT.
NB-95	-1.025E-02	4.138E-02	4.164E-02	NOT IDENT.
NB-95M	2.330E-01	1.414E-01	1.762E-01	NOT IDENT.
ZR-95	-2.083E-02	6.211E-02	6.281E-02	NOT IDENT.
NB-97	-1.000E+41	1.677E+41	0.000E+00	SHORT HLIF
ZR-97	1.476E+12	2.560E+12	2.645E+12	SHORT HLIF
MO-99	-3.551E+02	4.457E+02	4.736E+02	SHORT HLIF
TC-99M	-8.380E+33	1.226E+34	0.000E+00	SHORT HLIF
RH-101	8.637E-03	2.968E-02	2.993E-02	NOT IDENT.
RH-102	7.498E-02	8.977E-02	9.593E-02	FAIL ABUN
RU-103	7.959E-03	4.181E-02	4.197E-02	FAIL ABUN
RH-106	1.170E-01	1.999E-01	2.067E-01	NOT IDENT.
RU-106	1.170E-01	1.999E-01	2.067E-01	NOT IDENT.
AG-108M	4.836E-04	2.200E-02	2.200E-02	NOT IDENT.
AG-110	-2.373E-01	5.401E-01	5.506E-01	NOT IDENT.
AG-110M	-3.886E-03	3.722E-02	3.726E-02	NOT IDENT.
SN-113	-2.149E-04	3.822E-02	3.822E-02	NOT IDENT.
CD-115	4.198E+02	7.554E+02	7.788E+02	SHORT HLIF
SN-117M	-5.593E-02	9.783E-02	1.010E-01	NOT IDENT.
SB-122	-3.565E+00	7.812E+01	7.814E+01	SHORT HLIF
TE-123M	-1.333E-02	2.605E-02	2.673E-02	NOT IDENT.
SB-124	-2.214E-02	8.232E-02	8.292E-02	NOT IDENT.
SB-125	-8.645E-03	7.048E-02	7.059E-02	FAIL ABUN
TE-125M	-3.418E+00	1.043E+01	1.054E+01	NOT IDENT.
I-126	-1.821E-02	3.746E-01	3.747E-01	NOT IDENT.
SB-126	2.001E-03	2.620E-01	2.620E-01	NOT IDENT.
SB-127	-2.111E+00	1.348E+01	1.351E+01	NOT IDENT.
I-131	-2.628E-01	2.976E-01	3.203E-01	NOT IDENT.
I-132	-1.000E+41	4.438E+41	0.000E+00	SHORT HLIF
TE-132	-5.428E+00	1.371E+01	1.393E+01	NOT IDENT.
BA-133	-4.132E-03	3.932E-02	3.936E-02	FAIL ABUN
I-133	-9.223E+07	4.907E+08	4.924E+08	SHORT HLIF
CS-134	4.565E-02	4.973E-02	5.382E-02	FAIL ABUN
I-135	-2.069E+31	4.350E+31	0.000E+00	SHORT HLIF
CS-136	-4.175E-02	1.691E-01	1.701E-01	NOT IDENT.
BA-137M	-1.440E-02	2.896E-02	2.967E-02	NOT IDENT.
CS-137	-1.521E-02	3.059E-02	3.135E-02	NOT IDENT.
LA-138	2.520E-02	3.883E-02	4.046E-02	NOT IDENT.
CE-139	3.787E-04	2.661E-02	2.661E-02	NOT IDENT.
BA-140	-2.720E-02	4.283E-01	4.284E-01	NOT IDENT.
LA-140	-2.151E-02	1.425E-01	1.428E-01	FAIL ABUN
CE-143	1.434E+06	2.508E+05	6.934E+05	SHORT HLIF
CE-144	-8.742E-03	1.821E-01	1.821E-01	NOT IDENT.
PM-144	-1.784E-02	2.436E-02	2.565E-02	NOT IDENT.
PR-144	-1.350E+00	1.836E+00	1.935E+00	NOT IDENT.
PM-146	-7.355E-03	3.345E-02	3.361E-02	NOT IDENT.
ND-147	-3.326E-01	1.007E+00	1.018E+00	FAIL ABUN
PM-147	1.646E+02	6.753E+02	6.793E+02	NOT IDENT.
PM-149	-1.794E+03	7.726E+03	7.768E+03	SHORT HLIF
EU-150	-6.940E-04	2.648E-02	2.648E-02	NOT IDENT.
EU-152	-9.842E-02	8.198E-02	9.322E-02	FAIL ABUN
GD-153	-5.912E-02	8.846E-02	9.239E-02	NOT IDENT.
EU-154	-4.726E-03	8.179E-02	8.182E-02	FAIL ABUN
EU-155	4.195E-02	9.723E-02	9.905E-02	FAIL ABUN
TB-160	-5.840E-02	1.289E-01	1.315E-01	FAIL ABUN
HO-166M	1.744E-02	4.352E-02	4.423E-02	FAIL ABUN

TM-171	1.580E+01	2.652E+01	2.746E+01	NOT IDENT.
HF-172	8.518E-02	1.790E-01	1.830E-01	NOT IDENT.
LU-172	-3.851E-02	4.460E-02	4.786E-02	FAIL ABUN
LU-176	-1.733E-02	2.185E-02	2.320E-02	FAIL ABUN
HF-181	1.333E-02	4.390E-02	4.431E-02	NOT IDENT.
TA-182	3.913E-02	1.171E-01	1.184E-01	FAIL ABUN
RE-183	-1.517E-01	3.004E-01	3.081E-01	NOT IDENT.
RE-184	9.925E-02	1.276E-01	1.352E-01	NOT IDENT.
W-188	8.090E-01	8.148E+00	8.156E+00	NOT IDENT.
IR-192	-2.396E-02	3.272E-02	3.446E-02	FAIL ABUN
HG-203	-3.238E-02	4.631E-02	4.856E-02	NOT IDENT.
TL-204	1.026E-01	6.446E+00	6.446E+00	NOT IDENT.
BI-207	-1.054E-02	4.143E-02	4.170E-02	FAIL ABUN
BI-210	1.720E+00	5.810E+00	5.862E+00	NOT IDENT.
PB-210	1.720E+00	5.810E+00	5.862E+00	NOT IDENT.
PB-211	-3.984E-01	6.461E-01	6.706E-01	FAIL ABUN
BI-213	-2.120E-02	7.806E-02	7.865E-02	NOT IDENT.
RN-219	1.997E-01	3.482E-01	3.596E-01	FAIL ABUN
RA-223	4.302E-02	5.290E-01	5.294E-01	FAIL ABUN
AC-225	-9.316E-03	1.402E+00	1.402E+00	NOT IDENT.
AC-227	-2.008E-01	2.119E-01	2.305E-01	FAIL ABUN
TH-227	-2.008E-01	2.119E-01	2.305E-01	FAIL ABUN
PA-231	2.856E-01	4.408E-01	4.592E-01	NOT IDENT.
TH-231	4.302E-02	5.290E-01	5.294E-01	FAIL ABUN
PA-233	-4.671E-02	5.496E-02	5.885E-02	FAIL ABUN
PA-234	8.454E-02	2.359E-01	2.389E-01	FAIL ABUN
PA-234M	5.427E+00	5.035E+00	5.598E+00	FAIL ABUN
TH-234	3.786E-01	1.706E+00	1.714E+00	FAIL ABUN
NP-237	-4.671E-02	5.496E-02	5.885E-02	FAIL ABUN
NP-238	-3.194E+02	1.524E+03	1.530E+03	SHORT HLIF
U-238	3.786E-01	1.706E+00	1.714E+00	FAIL ABUN
NP-239	-2.060E-01	2.527E-01	2.692E-01	FAIL ABUN
PU-239	2.962E+01	3.145E+02	3.148E+02	NOT IDENT.
AM-241	-6.963E-02	1.966E-01	1.991E-01	NOT IDENT.
CM-243	-2.996E-02	1.011E-01	1.020E-01	FAIL ABUN
BK-247	3.857E-02	7.079E-02	7.289E-02	FAIL ABUN
CM-247	2.163E-02	3.241E-02	3.385E-02	FAIL ABUN
CF-249	-1.910E-02	3.210E-02	3.323E-02	NOT IDENT.
CF-251	-5.475E-02	1.129E-01	1.156E-01	NOT IDENT.

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	212.7920	85.43	240.9003	131.20	200.8139
45.60	221.1864	86.55	241.1097	133.02	188.3391
46.54	193.7390	86.79	241.1539	133.52	191.5705
49.72	198.3698	86.94	241.1826	136.00	198.2157
51.35	180.8253	87.09	241.2102	136.47	187.6682
51.87	182.9106	87.57	241.2999	140.51	0.0000
52.39	175.0516	88.03	241.3848	143.76	192.7341
52.97	189.0882	88.34	241.4422	144.24	192.7875
53.44	187.1872	88.47	241.4662	145.44	192.9201
54.07	203.2477	89.96	241.7401	152.43	186.1954
57.36	0.0000	1093.63	241.8645	153.25	178.7864
57.53	189.9502	91.11	241.9507	323.87	193.8794
57.98	202.0349	92.59	242.2186	156.02	193.0005
59.27	218.3088	93.35	202.4787	158.56	186.8273
59.32	209.3061	94.56	184.0954	159.00	182.5774
59.54	209.3503	94.65	184.1072	162.33	177.5264
60.96	229.6936	94.67	184.1099	162.66	170.0255
61.17	229.7390	94.87	185.6845	163.33	174.3926
62.93	219.0633	97.43	213.3172	165.86	167.0842
63.29	217.1255	98.43	206.8512	176.31	177.7534
63.58	230.2550	98.44	206.8532	176.60	174.5280
64.28	240.4648	99.53	178.0329	177.52	187.6243
66.73	282.3420	100.11	178.1064	181.07	0.0000
67.24	267.3385	102.03	193.9033	181.52	171.1617
125.81	235.1486	103.18	213.7765	184.41	168.1451
67.75	235.1628	103.37	203.4270	143.76	170.9777
68.89	250.5556	105.21	175.6282	193.51	196.7780
69.67	260.8371	105.31	179.7983	197.03	171.9264
70.82	256.5442	106.12	185.0980	198.01	180.7709
70.83	256.5468	106.47	193.4633	201.83	171.2233
72.81	269.1488	109.28	191.7509	203.43	164.7614
72.87	282.8485	111.00	199.2770	205.31	155.0134
74.66	281.4509	111.76	194.1596	210.85	147.1469
74.82	281.4890	114.06	194.4567	215.65	170.1153
74.97	281.5242	116.30	215.6845	218.12	153.7181
77.11	282.0276	116.74	220.9829	222.11	137.3771
78.74	272.0139	119.76	176.2928	227.09	137.6811
79.69	284.4592	121.12	181.6980	227.38	136.5883
80.03	284.5358	121.22	181.7095	228.16	134.4128
80.12	284.5585	121.78	204.8904	228.18	134.4141
80.19	284.5741	122.06	211.2326	116.74	134.4141
80.57	284.6621	122.92	195.5759	235.69	140.4285
81.00	235.7690	123.07	195.5948	235.96	140.4439
81.07	235.7820	265.00	206.1894	238.63	156.2282
81.75	284.9317	125.81	194.8782	238.98	0.0000
82.47	240.3393	127.23	204.5398	240.99	156.3863
83.79	240.5905	127.91	209.9000	242.00	156.4532
84.00	240.6300	129.30	210.0797	244.70	100.6924

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	101.0175	344.28	101.0787	563.25	57.9554
252.80	105.5243	345.93	85.4435	564.24	0.0000
254.15	0.0000	351.06	86.1737	569.33	46.5088
256.23	131.5298	351.93	86.1993	946.00	46.5103
260.90	0.0000	355.39	0.0000	569.70	46.5134
264.66	105.5856	356.01	82.2357	583.19	50.4025
264.80	105.5914	364.49	77.2041	584.27	50.4157
265.00	105.5990	366.42	0.0000	595.83	46.8124
269.46	111.8906	372.51	73.8896	427.87	44.9927
270.03	119.8301	375.05	72.1904	602.52	0.0000
271.23	122.1482	377.52	66.9615	604.72	34.5281
273.65	101.8890	356.01	67.9813	607.14	42.2466
276.40	123.5320	388.16	85.7557	609.32	42.2685
277.37	110.5405	388.63	76.9268	610.33	42.2781
277.60	110.5504	391.69	74.3459	614.28	28.5881
278.00	122.4756	264.66	90.5325	618.01	37.6501
279.20	129.3401	401.81	74.0757	620.36	36.7291
279.54	129.3563	402.40	68.6756	621.93	23.5527
279.70	122.5569	404.85	82.4744	630.19	0.0000
280.46	105.5654	410.95	63.2181	631.29	36.8232
283.69	118.1997	413.71	63.2723	633.25	36.8398
284.31	119.3640	414.70	65.6084	634.78	45.3574
285.41	114.8661	423.72	70.6149	635.95	45.3706
285.90	0.0000	427.09	59.0552	636.99	45.3809
287.50	119.5114	427.87	64.4381	657.50	39.8967
290.67	112.8192	433.94	57.3828	657.76	40.8492
293.27	0.0000	439.40	51.1883	657.90	0.0000
351.93	86.7571	440.45	61.0865	661.66	43.7371
295.96	86.7818	453.88	64.9325	664.57	0.0000
879.38	86.8669	463.37	56.4281	666.33	44.7352
299.98	86.9117	468.07	48.6384	666.50	40.9293
300.09	86.9163	473.00	49.8723	667.71	0.0000
300.13	86.9179	475.06	44.4571	677.62	40.0774
301.36	90.9611	476.78	53.5561	685.70	38.2373
302.85	82.4253	477.60	48.1202	692.65	0.0000
256.23	73.8853	482.18	42.1817	695.00	38.3167
304.85	80.7683	487.02	47.3361	696.49	40.2453
306.78	103.1818	492.35	0.0000	696.51	40.2453
308.46	89.4797	497.08	56.5952	697.00	37.3742
311.90	107.9703	505.52	49.7715	697.30	33.5431
316.51	97.7953	507.63	0.0000	697.49	32.5868
319.41	86.3800	511.00	48.5618	702.65	40.2991
320.08	95.6175	514.00	48.6006	706.68	49.9386
321.04	87.5828	514.00	48.6006	711.68	31.7260
323.87	89.9796	520.40	45.1401	720.70	40.7320
325.23	122.3382	520.69	0.0000	721.93	0.0000
328.76	115.5579	522.65	0.0000	722.78	37.0055
333.37	109.3791	527.90	0.0000	722.91	37.0066
333.97	98.9829	528.26	42.3417	723.31	38.5522
334.37	105.9439	529.59	42.3557	724.19	46.2715
338.28	104.3481	529.87	0.0000	727.33	34.7267
338.32	104.3500	531.02	45.1345	733.00	46.3579
311.90	104.4287	537.26	44.2852	735.93	28.0247
340.48	104.4287	546.56	0.0000	333.97	30.9346
340.55	104.4305	552.55	43.5332	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	34.0764	949.00	29.2071	1384.29	16.1710
747.24	34.0979	667.71	0.0000	1408.01	5.1917
748.06	36.1701	962.31	30.6895	1434.09	14.4727
752.31	38.7878	964.08	27.4681	1435.80	6.9484
753.82	31.0400	966.17	0.0000	1457.56	0.0000
756.73	36.8832	911.20	19.4057	1460.82	11.9822
756.80	36.8832	983.53	12.1597	1489.16	15.3074
884.68	51.5184	984.45	0.0000	1505.03	15.3398
765.81	52.5103	1274.44	14.6237	1584.12	12.3963
766.42	42.2358	1001.03	16.2622	1596.21	12.1937
766.84	38.9050	1002.74	16.2666	1620.50	4.4475
772.60	0.0000	1004.73	16.2725	1621.92	4.4482
776.52	23.3892	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	12.3361
778.90	41.9266	1028.54	0.0000	1750.46	0.0000
783.70	35.1354	1037.84	29.6602	1764.49	8.1453
788.74	40.3822	1038.76	0.0000	1063.66	7.7624
792.07	12.5137	631.29	17.4130	1771.35	7.0444
795.86	23.4814	1048.07	27.6625	1791.20	0.0000
810.06	27.4728	1049.04	24.5918	1808.65	7.2770
810.29	26.4924	1050.41	24.5977	1810.72	0.0000
344.28	26.4933	1063.66	24.6519	1836.06	8.2125
810.76	25.5136	1077.00	15.4413		
815.77	12.7695	1077.34	16.4717		
1048.07	15.7246	1085.87	23.7117		
832.01	34.6865	1093.63	27.8701		
834.85	42.5936	1099.45	21.6973		
835.71	35.5001	1112.07	17.7487		
836.80	0.0000	1112.84	20.7092		
846.75	0.0000	1115.54	16.5742		
846.77	31.6230	1120.29	20.7336		
856.80	12.6738	1120.55	20.7349		
860.56	30.7162	1221.41	24.8848		
871.09	20.6508	1129.67	18.6877		
873.19	33.3724	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	31.8203	1173.23	24.0430		
880.51	22.2790	1177.95	23.0138		
881.60	22.5484	1189.05	15.7187		
883.24	25.8723	1204.77	16.8066		
884.68	27.8701	1221.41	14.4417		
889.28	25.9016	1231.02	25.3096		
894.76	28.9203	1235.36	16.8838		
898.04	22.9502	1238.28	18.0981		
900.72	38.9357	1260.41	0.0000		
903.28	21.3079	1271.87	18.0366		
911.20	22.0060	1274.44	19.1052		
912.08	22.0094	1274.54	19.1052		
923.98	0.0000	1291.59	13.8323		
926.50	26.7489	1298.22	0.0000		
929.11	9.6340	1312.11	12.8064		
935.54	22.5053	1332.49	16.0538		
937.49	22.5135	1362.66	0.0000		
944.13	18.1126	1365.19	8.6016		
946.00	23.1516	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 13-DEC-2023 06:17:26.62

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581251.CNF;1
Background file    : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM21.CNF;808
Background date    : 11-DEC-2023 05:17:22
Sample date       : 21-NOV-2023 00:00:00 Acquisition date : 13-DEC-2023 06:01:53
Sample ID        : G1205581251 Sample quantity : 1.15000E+02 GRAM
Detector name    : GAM21 Detector geometry: CAN
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:06.16 0.7%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit  : 75.00000 Sensitivity : 3.00000
Batch ID         : 2529194 Detector SN# :
Matrix Spike ID  : LCS ID :
*****
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	31.73	2764	5621	0.82	62.89	60	8	3.07E+00	5.0	9.58E+02
2	0	36.18	1089	6306	0.68	71.79	71	5	1.21E+00	11.3	
3	3	39.47	2378	6011	0.76	78.38	75	20	2.64E+00	5.7	
4	3	42.98	2983	5993	0.78	85.39	75	20	3.31E+00	4.8	
5	3	46.21	74253	5946	0.80	91.86	75	20	8.25E+01	0.4	
6	0	49.44	870	8070	0.74	98.32	97	5	9.66E-01	15.9	
7	0	59.28	78171	7235	0.69	117.98	114	8	8.69E+01	0.4	
8	0	76.47*	171	920	0.99	152.37	150	6	1.90E-01	29.1	
9	0	87.74	66	824	1.05	174.92	172	6	7.30E-02	70.1	
10	0	197.88	93	497	2.05	395.19	392	7	1.03E-01	41.1	
11	0	266.65	91	336	1.27	532.75	530	6	1.01E-01	33.7	
12	0	433.21	42	306	0.93	865.90	863	6	4.72E-02	66.9	
13	0	545.81	21	215	0.81	1091.15	1089	9	2.28E-02	131.9	
14	0	628.54	41	136	2.92	1256.65	1253	10	4.53E-02	55.6	
15	0	661.19	11258	216	1.46	1321.98	1314	16	1.25E+01	1.0	
16	0	887.52	23	114	1.68	1774.80	1773	8	2.60E-02	81.6	
17	0	938.84	34	169	1.27	1877.47	1875	9	3.78E-02	70.6	
18	0	972.53	40	160	1.24	1944.90	1940	11	4.47E-02	63.2	
19	0	978.47	34	183	0.94	1956.77	1951	13	3.80E-02	83.2	
20	0	1093.40	25	82	1.49	2186.75	2182	8	2.81E-02	65.2	
21	0	1146.93	39	60	1.41	2293.87	2288	13	4.30E-02	44.7	
22	0	1172.54	2991	144	2.16	2345.11	2334	23	3.32E+00	2.1	
23	0	1331.71	2603	23	2.13	2663.65	2655	18	2.89E+00	2.0	
24	0	1451.92	5	5	1.40	2904.22	2897	9	5.00E-03	97.2	
25	0	1758.37	8	2	2.71	3517.62	3512	10	8.56E-03	52.4	

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

VMS Nuclide Identification Report V3.1 Generated 13-DEC-2023 06:17:27

Configuration	: DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581251.CNF;1		
Analyses by	: PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4		
Sample title	: RXF2		
Sample date	: 21-NOV-2023 00:00:00	Acquisition date	: 13-DEC-2023 06:01:53
Sample ID	: G1205581251	Sample quantity	: 115.00 GRAM
Sample type	: SOLID	Sample geometry	:
Detector name	: GAMMA21	Detector geometry	: CAN
Elapsed live time	: 0 00:15:00.00	Elapsed real time	: 0 00:15:06.16 0.7%
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/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-60	1173.23	2849	99.85	1.156E+00	6.444E+01	6.496E+01	4.21
	1332.49	2466	99.98*	1.017E+00	6.333E+01	6.383E+01	4.01
CD-109	88.03	70	3.70*	1.121E+01	4.396E+00	4.545E+00	140.17
SN-126	64.28	-----	9.60	1.191E+01	-----	Line Not Found	-----
	86.94	70	8.90	1.121E+01	1.827E+00	1.827E+00	140.17
	87.57	70	37.00*	1.121E+01	4.396E-01	4.396E-01	140.17
BA-137M	661.66	10996	89.90*	2.099E+00	1.522E+02	1.524E+02	1.97
CS-137	661.66	10996	85.10*	2.099E+00	1.607E+02	1.610E+02	1.97
BI-210	46.54	80865	4.25*	1.143E+01	4.347E+03	4.355E+03	0.85
PB-210	46.54	80865	4.25*	1.143E+01	4.347E+03	4.355E+03	0.85
AM-241	59.54	84310	35.90*	1.192E+01	5.144E+02	5.145E+02	0.81

Flag: "*" = Keyline

```

*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*                                     DETECTOR AND SAMPLE DATA                *
*                                     *                                       *
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581251.CNF;1 *
* Acquisition date   : 13-DEC-2023 06:01:53 Sensitivity      : 3.000          *
* Detector ID        : GAM21 Energy tolerance: 1.500         *
* Elapsed live time  : 0 00:15:00.00 Abundance limit : 75.000        *
* Elapsed real time  : 0 00:15:06.16 Half life ratio : *****          *
* Sample date        : 21-NOV-2023 00:00:00 Analyst initials: RXF2         *
* Sample ID          : G1205581251 Sample Quantity : 1.1500E+02 GRAM      *
* Batch Number       : 2529194 Wet Weight : 0.00000         *
* Wet wt corr        : 1.00000 Dry Weight : 0.00000          *
* Nuclide Library    : SOLID.NLB;17                                         *
*****
*                                     CALIBRATION INFORMATION                  *
*                                     *                                       *
* Eff. Cal. date     : 3-JUL-2023 09:20:00 Eff. Geometry   : CAN          *
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25          *
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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/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
CO-60	6.383E+01	2.510E+00	4.920E-01
CD-109	4.545E+00	6.244E+00	6.670E+00
SN-126	4.396E-01	6.038E-01	6.435E-01
BA-137M	1.524E+02	2.947E+00	6.258E-01
CS-137	1.610E+02	3.113E+00	6.611E-01
BI-210	4.355E+03	3.625E+01	1.423E+01
PB-210	4.355E+03	3.625E+01	1.423E+01
AM-241	5.145E+02	4.088E+00	1.434E+00

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L. Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	4.807E+00	5.373E+00	9.936E+00	NOT IDENT.
NA-22	5.501E-03	2.885E-01	5.506E-01	NOT IDENT.
NA-24	0.000E+00	1.181E+10	0.000E+00	SHORT HLIF
AL-26	4.316E-02	2.193E-01	4.850E-01	NOT IDENT.
K-40	-1.319E+00	2.060E+00	3.574E+00	NOT IDENT.
SC-46	-1.783E-01	7.283E-01	1.078E+00	NOT IDENT.
V-48	-1.608E-01	1.623E+00	2.576E+00	NOT IDENT.
CR-51	-1.895E+00	4.693E+00	7.818E+00	NOT IDENT.
MN-52	-1.164E+00	2.771E+00	5.074E+00	NOT IDENT.
MN-54	-2.223E-01	5.015E-01	8.366E-01	NOT IDENT.
CO-56	1.619E-01	5.761E-01	1.011E+00	NOT IDENT.
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-2.251E-02	1.555E-01	2.877E-01	NOT IDENT.
CO-58	-2.754E-01	5.447E-01	9.090E-01	NOT IDENT.
FE-59	-7.692E-01	1.569E+00	2.727E+00	NOT IDENT.
ZN-65	1.793E-01	1.147E+00	2.089E+00	NOT IDENT.
GE-68	6.703E+00	1.866E+01	3.434E+01	NOT IDENT.
AS-73	-2.264E+00	4.607E+00	7.514E+00	NOT IDENT.
AS-74	3.357E-01	1.219E+00	2.228E+00	NOT IDENT.
SE-75	9.408E-02	4.781E-01	7.723E-01	NOT IDENT.
BR-77	-1.771E+02	6.300E+02	1.089E+03	NOT IDENT.
SR-82	-1.310E-02	4.894E+00	8.535E+00	NOT IDENT.

RB-83	-3.757E-02	9.117E-01	1.636E+00	NOT IDENT.
RB-84	-3.471E-01	1.194E+00	1.999E+00	NOT IDENT.
KR-85	-1.244E+01	8.027E+01	1.433E+02	NOT IDENT.
SR-85	-7.136E-02	4.585E-01	8.184E-01	NOT IDENT.
RB-86	2.506E+00	1.510E+01	2.746E+01	NOT IDENT.
Y-88	2.349E-02	2.263E-01	5.054E-01	NOT IDENT.
Y-91	-7.816E+01	1.899E+02	3.350E+02	NOT IDENT.
NB-94	-2.370E-01	3.311E-01	5.544E-01	NOT IDENT.
NB-95	-2.764E-01	4.916E-01	8.237E-01	NOT IDENT.
NB-95M	-6.148E-02	1.088E+00	1.899E+00	NOT IDENT.
ZR-95	3.102E-01	8.917E-01	1.602E+00	NOT IDENT.
NB-97	0.000E+00	1.248E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	2.252E+10	0.000E+00	SHORT HLIF
MO-99	3.709E+02	8.763E+02	1.580E+03	NOT IDENT.
TC-99M	0.000E+00	7.896E+25	0.000E+00	SHORT HLIF
RH-101	1.328E-01	1.903E-01	3.608E-01	FAIL ABUN
RH-102	-3.698E-01	6.860E-01	1.041E+00	NOT IDENT.
RU-103	-1.195E-01	5.796E-01	1.034E+00	NOT IDENT.
RH-106	1.871E+00	3.456E+00	6.375E+00	NOT IDENT.
RU-106	1.871E+00	3.456E+00	6.375E+00	NOT IDENT.
AG-108M	3.733E-01	4.895E-01	7.354E-01	FAIL ABUN
AG-110	1.840E+00	8.385E+00	1.364E+01	NOT IDENT.
AG-110M	2.933E-01	8.569E-01	1.339E+00	FAIL ABUN
SN-113	1.089E-02	5.893E-01	9.784E-01	NOT IDENT.
CD-115	1.160E+02	1.247E+03	2.251E+03	NOT IDENT.
SN-117M	-2.892E-01	5.200E-01	9.269E-01	NOT IDENT.
SB-122	2.562E+01	1.222E+02	2.231E+02	NOT IDENT.
TE-123M	-9.908E-02	1.930E-01	3.446E-01	NOT IDENT.
SB-124	2.893E-01	6.416E-01	1.445E+00	NOT IDENT.
SB-125	-5.175E-01	1.225E+00	2.192E+00	NOT IDENT.
TE-125M	4.003E+00	5.764E+01	1.083E+02	NOT IDENT.
I-126	-1.850E+00	3.829E+00	5.797E+00	NOT IDENT.
SB-126	-7.427E-01	2.268E+00	3.905E+00	NOT IDENT.
SB-127	-5.792E+00	5.109E+01	8.979E+01	NOT IDENT.
I-131	-2.350E+00	2.500E+00	3.986E+00	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-1.371E+01	2.928E+01	5.044E+01	FAIL ABUN
BA-133	-2.841E-02	4.763E-01	7.972E-01	NOT IDENT.
I-133	0.000E+00	2.093E+07	0.000E+00	SHORT HLIF
CS-134	-2.169E-02	4.612E-01	8.025E-01	NOT IDENT.
I-135	0.000E+00	2.534E+24	0.000E+00	SHORT HLIF
CS-136	4.851E-01	2.176E+00	3.990E+00	NOT IDENT.
LA-138	1.098E-01	2.509E-01	5.849E-01	NOT IDENT.
CE-139	7.695E-02	2.109E-01	3.872E-01	NOT IDENT.
BA-140	3.952E+00	4.441E+00	8.359E+00	NOT IDENT.
LA-140	-2.134E-01	8.687E-01	1.606E+00	NOT IDENT.
CE-141	-2.302E-02	4.550E-01	8.327E-01	NOT IDENT.
CE-143	0.000E+00	4.159E+04	0.000E+00	SHORT HLIF
CE-144	-2.801E-03	1.216E+00	2.247E+00	NOT IDENT.
PM-144	-2.899E-03	3.497E-01	6.197E-01	NOT IDENT.
PR-144	-3.233E+00	2.654E+01	4.661E+01	NOT IDENT.
PM-146	-1.958E-01	6.445E-01	1.149E+00	NOT IDENT.
ND-147	3.944E+00	1.063E+01	1.944E+01	NOT IDENT.
PM-147	-6.841E+01	4.471E+03	8.312E+03	NOT IDENT.
PM-149	0.000E+00	8.203E+03	0.000E+00	SHORT HLIF
EU-150	3.918E-02	2.913E-01	4.954E-01	NOT IDENT.
EU-152	3.792E-01	1.102E+00	1.886E+00	NOT IDENT.
GD-153	-1.873E-01	5.453E-01	8.473E-01	NOT IDENT.
EU-154	2.965E-02	8.168E-01	1.562E+00	NOT IDENT.
EU-155	-2.057E-01	5.784E-01	1.075E+00	FAIL ABUN
TB-160	-2.050E+00	2.134E+00	3.400E+00	FAIL ABUN
HO-166M	-1.018E-01	5.722E-01	1.003E+00	NOT IDENT.
TM-171	-6.875E+01	8.542E+01	1.390E+02	NOT IDENT.
HF-172	1.942E-01	1.168E+00	2.178E+00	NOT IDENT.
LU-172	8.235E-01	1.052E+00	1.745E+00	FAIL ABUN
LU-176	6.054E-03	2.777E-01	4.740E-01	FAIL ABUN
HF-181	3.485E-01	6.738E-01	1.237E+00	NOT IDENT.
TA-182	3.763E-01	1.502E+00	2.868E+00	NOT IDENT.
RE-183	0.000E+00	5.333E+00	3.214E+00	FAIL ABUN
RE-184	-1.916E-01	2.280E+00	3.850E+00	NOT IDENT.
W-188	4.975E+01	7.073E+01	1.257E+02	NOT IDENT.
IR-192	-2.668E-01	3.931E-01	6.469E-01	NOT IDENT.
HG-203	2.829E-02	3.973E-01	6.869E-01	NOT IDENT.
TL-204	4.528E+00	1.761E+01	2.898E+01	NOT IDENT.
BI-207	-3.405E-01	7.442E-01	1.304E+00	NOT IDENT.
TL-208	-4.550E-02	3.926E-01	6.975E-01	NOT IDENT.
BI-211	-1.872E+00	2.227E+00	3.592E+00	NOT IDENT.
PB-211	3.154E+00	8.250E+00	1.532E+01	NOT IDENT.

BI-212	5.251E+00	5.397E+00	1.016E+01	NOT IDENT.
PB-212	-2.428E-01	5.015E-01	8.599E-01	FAIL ABUN
BI-213	1.260E+00	1.474E+00	2.743E+00	NOT IDENT.
BI-214	-1.794E-01	7.276E-01	1.281E+00	NOT IDENT.
PB-214	-5.487E-01	8.043E-01	1.308E+00	FAIL ABUN
RN-219	4.305E-01	4.979E+00	8.287E+00	NOT IDENT.
RN-222	-1.794E-01	7.276E-01	1.281E+00	NOT IDENT.
RA-223	-1.684E+00	6.994E+00	1.172E+01	NOT IDENT.
RA-224	2.797E+00	5.214E+00	9.305E+00	NOT IDENT.
AC-225	1.191E+00	8.811E+00	1.557E+01	NOT IDENT.
RA-226	-5.487E-01	8.043E-01	1.308E+00	FAIL ABUN
AC-227	-1.919E+00	2.299E+00	3.850E+00	NOT IDENT.
TH-227	-1.919E+00	2.299E+00	3.850E+00	NOT IDENT.
AC-228	-2.514E-01	2.307E+00	3.878E+00	NOT IDENT.
RA-228	-2.514E-01	2.307E+00	3.878E+00	NOT IDENT.
TH-228	-2.428E-01	5.015E-01	8.599E-01	FAIL ABUN
TH-229	-1.968E+00	4.041E+00	7.077E+00	FAIL ABUN
TH-230	-5.487E-01	8.043E-01	1.308E+00	FAIL ABUN
PA-231	5.090E-01	4.717E+00	8.100E+00	NOT IDENT.
TH-231	-1.684E+00	6.994E+00	1.172E+01	NOT IDENT.
TH-232	-2.514E-01	2.307E+00	3.878E+00	NOT IDENT.
PA-233	-1.099E-01	6.947E-01	1.173E+00	NOT IDENT.
PA-234	-5.359E-01	4.962E+00	8.930E+00	NOT IDENT.
PA-234M	2.652E+01	6.296E+01	1.171E+02	NOT IDENT.
TH-234	3.417E+00	3.891E+00	6.601E+00	NOT IDENT.
U-234	-5.487E-01	8.043E-01	1.308E+00	FAIL ABUN
U-235	1.064E-01	1.272E+00	2.339E+00	NOT IDENT.
NP-237	-1.099E-01	6.947E-01	1.173E+00	NOT IDENT.
NP-238	0.000E+00	3.532E+03	0.000E+00	SHORT HLIF
U-238	3.417E+00	3.891E+00	6.601E+00	NOT IDENT.
NP-239	-1.192E+00	1.523E+00	2.771E+00	NOT IDENT.
PU-239	-1.298E+03	1.999E+03	3.621E+03	NOT IDENT.
AM-243	1.394E-02	2.033E-01	3.305E-01	FAIL ABUN
CM-243	3.302E-01	6.022E-01	1.149E+00	NOT IDENT.
BK-247	1.390E-01	8.257E-01	1.332E+00	NOT IDENT.
CM-247	5.332E-02	4.202E-01	7.742E-01	NOT IDENT.
CF-249	-1.264E-01	5.054E-01	8.287E-01	NOT IDENT.
CF-251	-4.872E-01	8.915E-01	1.573E+00	NOT IDENT.
ANH-511	-2.109E-01	3.599E-01	6.387E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-60	1173.23	2849	99.85	1.156E+00	6.444E+01	6.496E+01	4.21
	1332.49	2466	99.98*	1.017E+00	6.333E+01	6.383E+01	4.01
CD-109	88.03	70	3.70*	1.121E+01	4.396E+00	4.545E+00	140.17
SN-126	64.28	-----	9.60	1.191E+01	-----	Line Not Found	-----
	86.94	70	8.90	1.121E+01	1.827E+00	1.827E+00	140.17
	87.57	70	37.00*	1.121E+01	4.396E-01	4.396E-01	140.17
BA-137M	661.66	10996	89.90*	2.099E+00	1.522E+02	1.524E+02	1.97
CS-137	661.66	10996	85.10*	2.099E+00	1.607E+02	1.610E+02	1.97
BI-210	46.54	80865	4.25*	1.143E+01	4.347E+03	4.355E+03	0.85
PB-210	46.54	80865	4.25*	1.143E+01	4.347E+03	4.355E+03	0.85
AM-241	59.54	84310	35.90*	1.192E+01	5.144E+02	5.145E+02	0.81

Flag: "*" = Keyline

Total number of lines in spectrum 25
Number of unidentified lines 10
Number of lines tentatively identified by NID 15 60.00%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.01	6.333E+01	6.383E+01	0.256E+01	4.01	
CD-109	461.40D	1.03	4.396E+00	4.545E+00	6.371E+00	140.17	
SN-126	2.30E+05Y	1.00	4.396E-01	4.396E-01	6.162E-01	140.17	
BA-137M	30.08Y	1.00	1.522E+02	1.524E+02	0.030E+02	1.97	
CS-137	30.08Y	1.00	1.607E+02	1.610E+02	0.032E+02	1.97	
BI-210	22.20Y	1.00	4.347E+03	4.355E+03	0.037E+03	0.85	
PB-210	22.20Y	1.00	4.347E+03	4.355E+03	0.037E+03	0.85	
AM-241	432.60Y	1.00	5.144E+02	5.145E+02	0.042E+02	0.81	
Total Activity :			9.590E+03	9.607E+03			

Grand Total Activity : 9.590E+03 9.607E+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	31.73	3054	6211	0.82	62.89	60	8	3.07E+00	10.1	9.28E+00	
0	36.18	1197	6933	0.68	71.79	71	5	1.21E+00	22.7	1.02E+01	
3	39.47	2606	6586	0.76	78.38	75	20	2.64E+00	11.3	1.07E+01	
3	42.98	3257	6545	0.78	85.39	75	20	3.31E+00	9.6	1.11E+01	T
0	49.44	945	8766	0.74	98.32	97	5	9.66E-01	31.8	1.16E+01	T
0	76.47	182	982	0.99	152.37	150	6	1.90E-01	58.1	1.16E+01	T
0	197.88	96	511	2.05	395.19	392	7	1.03E-01	82.2	6.85E+00	T
0	266.65	92	341	1.27	532.75	530	6	1.01E-01	67.4	5.27E+00	
0	433.21	42	304	0.93	865.90	863	6	4.72E-02	****	3.26E+00	T
0	545.81	20	212	0.81	1091.15	1089	9	2.28E-02	****	2.57E+00	T
0	628.54	40	133	2.92	1256.65	1253	10	4.53E-02	****	2.21E+00	
0	887.52	23	110	1.68	1774.80	1773	8	2.60E-02	****	1.54E+00	
0	938.84	33	163	1.27	1877.47	1875	9	3.78E-02	****	1.45E+00	T
0	972.53	39	153	1.24	1944.90	1940	11	4.47E-02	****	1.40E+00	
0	978.47	33	176	0.94	1956.77	1951	13	3.80E-02	****	1.39E+00	
0	1093.40	24	78	1.49	2186.75	2182	8	2.81E-02	****	1.24E+00	T
0	1146.93	37	57	1.41	2293.87	2288	13	4.30E-02	89.5	1.18E+00	T
0	1451.92	4	4	1.40	2904.22	2897	9	5.00E-03	****	9.33E-01	
0	1758.37	7	2	2.71	3517.62	3512	10	8.56E-03	****	7.75E-01	

Flags: "T" = Tentatively associated


```
*****
*                                     GEL Laboratories LLC                      *
*                                     2040 Savage Road                        *
*                                     Charleston, SC 29407                     *
*****
*
*                                     DETECTOR AND SAMPLE DATA                *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581251.CNF;1
* Acquisition date   : 13-DEC-2023 06:01:53 Sensitivity      : 3.000
* Detector ID        : GAM21 Energy tolerance: 1.500
* Elapsed live time  : 0 00:15:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 00:15:06.16 Half life ratio : *****
* Sample date        : 21-NOV-2023 00:00:00 Nuclide Library : SOLID
* Sample ID          : G1205581251 Analyst initials:  RXF2
* Batch Number       : 2529194 Sample Quantity : 1.1500E+02 GRAM
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000
*                                     Dry Weight   : 0.00000
*****
*
*                                     CALIBRATION INFORMATION                  *
*
* Eff. Cal. date     : 3-JUL-2023 09:20:00 Eff. Geometry    : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25
*****
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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/GRAM)
CO-60	2.111E-01
CD-109	3.247E+00
SN-126	3.132E-01
BA-137M	2.942E-01
CS-137	3.108E-01
BI-210	7.044E+00
PB-210	7.044E+00
AM-241	7.088E-01

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

Nuclide	Lc (pCi/GRAM)	
BE-7	4.816E+00	NOT IDENT.
NA-22	2.417E-01	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.958E-01	NOT IDENT.
K-40	1.432E+00	NOT IDENT.
SC-46	5.116E-01	NOT IDENT.
V-48	1.221E+00	NOT IDENT.
CR-51	3.769E+00	NOT IDENT.
MN-52	1.949E+00	NOT IDENT.
MN-54	3.959E-01	NOT IDENT.
CO-56	4.788E-01	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	1.393E-01	NOT IDENT.
CO-58	4.286E-01	NOT IDENT.
FE-59	1.293E+00	NOT IDENT.
ZN-65	9.837E-01	NOT IDENT.
GE-68	1.626E+01	NOT IDENT.
AS-73	3.723E+00	NOT IDENT.
AS-74	1.053E+00	NOT IDENT.
SE-75	3.733E-01	NOT IDENT.
BR-77	5.271E+02	NOT IDENT.
SR-82	4.026E+00	NOT IDENT.
RB-83	7.832E-01	NOT IDENT.

RB-84	9.470E-01	NOT IDENT.
KR-85	6.867E+01	NOT IDENT.
SR-85	3.922E-01	NOT IDENT.
RB-86	1.300E+01	NOT IDENT.
Y-88	1.977E-01	NOT IDENT.
Y-91	1.519E+02	NOT IDENT.
NB-94	2.593E-01	NOT IDENT.
NB-95	3.869E-01	NOT IDENT.
NB-95M	9.187E-01	NOT IDENT.
ZR-95	7.557E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	7.476E+02	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.748E-01	FAIL ABUN
RH-102	4.915E-01	NOT IDENT.
RU-103	4.967E-01	NOT IDENT.
RH-106	3.023E+00	NOT IDENT.
RU-106	3.023E+00	NOT IDENT.
AG-108M	3.558E-01	FAIL ABUN
AG-110	6.426E+00	NOT IDENT.
AG-110M	6.364E-01	FAIL ABUN
SN-113	4.721E-01	NOT IDENT.
CD-115	1.077E+03	NOT IDENT.
SN-117M	4.478E-01	NOT IDENT.
SB-122	1.057E+02	NOT IDENT.
TE-123M	1.664E-01	NOT IDENT.
SB-124	6.042E-01	NOT IDENT.
SB-125	1.060E+00	NOT IDENT.
TE-125M	5.249E+01	NOT IDENT.
I-126	2.729E+00	NOT IDENT.
SB-126	1.834E+00	NOT IDENT.
SB-127	4.229E+01	NOT IDENT.
I-131	1.917E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.440E+01	FAIL ABUN
BA-133	3.843E-01	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	3.770E-01	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	1.886E+00	NOT IDENT.
LA-138	2.356E-01	NOT IDENT.
CE-139	1.873E-01	NOT IDENT.
BA-140	3.994E+00	NOT IDENT.
LA-140	6.580E-01	NOT IDENT.
CE-141	4.027E-01	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.086E+00	NOT IDENT.
PM-144	2.913E-01	NOT IDENT.
PR-144	2.191E+01	NOT IDENT.
PM-146	5.570E-01	NOT IDENT.
ND-147	9.307E+00	NOT IDENT.
PM-147	4.025E+03	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	2.391E-01	NOT IDENT.
EU-152	9.108E-01	NOT IDENT.
GD-153	4.116E-01	NOT IDENT.
EU-154	6.862E-01	NOT IDENT.
EU-155	5.213E-01	FAIL ABUN
TB-160	1.607E+00	FAIL ABUN
HO-166M	4.683E-01	NOT IDENT.
TM-171	6.885E+01	NOT IDENT.
HF-172	1.055E+00	NOT IDENT.
LU-172	8.266E-01	FAIL ABUN
LU-176	2.289E-01	FAIL ABUN
HF-181	5.970E-01	NOT IDENT.
TA-182	1.300E+00	NOT IDENT.
RE-183	1.597E+00	FAIL ABUN
RE-184	1.831E+00	NOT IDENT.
W-188	6.059E+01	NOT IDENT.
IR-192	3.117E-01	NOT IDENT.
HG-203	3.315E-01	NOT IDENT.
TL-204	1.410E+01	NOT IDENT.
BI-207	6.152E-01	NOT IDENT.
TL-208	3.315E-01	NOT IDENT.
BI-211	1.729E+00	NOT IDENT.
PB-211	7.395E+00	NOT IDENT.
BI-212	4.802E+00	NOT IDENT.

PB-212	4.161E-01	FAIL ABUN
BI-213	1.329E+00	NOT IDENT.
BI-214	6.066E-01	NOT IDENT.
PB-214	6.294E-01	FAIL ABUN
RN-219	3.992E+00	NOT IDENT.
RN-222	6.066E-01	NOT IDENT.
RA-223	5.657E+00	NOT IDENT.
RA-224	4.504E+00	NOT IDENT.
AC-225	7.556E+00	NOT IDENT.
RA-226	6.294E-01	FAIL ABUN
AC-227	1.857E+00	NOT IDENT.
TH-227	1.857E+00	NOT IDENT.
AC-228	1.849E+00	NOT IDENT.
RA-228	1.849E+00	NOT IDENT.
TH-228	4.161E-01	FAIL ABUN
TH-229	3.424E+00	FAIL ABUN
TH-230	6.294E-01	FAIL ABUN
PA-231	3.910E+00	NOT IDENT.
TH-231	5.657E+00	NOT IDENT.
TH-232	1.849E+00	NOT IDENT.
PA-233	5.666E-01	NOT IDENT.
PA-234	4.263E+00	NOT IDENT.
PA-234M	5.548E+01	NOT IDENT.
TH-234	3.220E+00	NOT IDENT.
U-234	6.294E-01	FAIL ABUN
U-235	1.132E+00	NOT IDENT.
NP-237	5.666E-01	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
U-238	3.220E+00	NOT IDENT.
NP-239	1.340E+00	NOT IDENT.
PU-239	1.750E+03	NOT IDENT.
AM-243	1.608E-01	FAIL ABUN
CM-243	5.583E-01	NOT IDENT.
BK-247	6.437E-01	NOT IDENT.
CM-247	3.733E-01	NOT IDENT.
CF-249	3.998E-01	NOT IDENT.
CF-251	7.590E-01	NOT IDENT.
ANH-511	3.066E-01	NOT IDENT.

GEL Laboratories LLC
2040 Savage Road
Charleston, SC 29407

DETECTOR AND SAMPLE DATA

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205581251.CNF;1
Acquisition date : 13-DEC-2023 06:01:53 Sensitivity : 3.000
Detector ID : GAM21 Energy tolerance: 1.500
Elapsed live time: 0 00:15:00.00 Abundance limit : 75.000
Elapsed real time: 0 00:15:06.16 Half life ratio : *****
Sample date : 21-NOV-2023 00:00:00 Nuclide Library : SOLID
Sample ID : G1205581251 Analyst initials: RXF2
Batch Number : 2529194 Sample Quantity : 1.1500E+02 GRAM
Quantity Err(%) : 1.7391E-03 %
Wet wt corr : 1.00000 Wet Weight : 0.00000
Dry Weight : 0.00000

CALIBRATION INFORMATION

Eff. Cal. date : 3-JUL-2023 09:20:00 Eff. Geometry : CAN
Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM21_CAN.CNF;25

Combined Activity-MDA Report

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

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CO-60	6.383E+01	5.790E+00	5.790E+00
CD-109	4.545E+00	6.260E+00	6.260E+00
SN-126	4.396E-01	6.050E-01	6.050E-01
BA-137M	1.524E+02	2.045E+01	2.045E+01
CS-137	1.610E+02	2.160E+01	2.160E+01
BI-210	4.355E+03	4.111E+02	4.111E+02
PB-210	4.355E+03	4.111E+02	4.111E+02
AM-241	5.145E+02	4.211E+01	4.211E+01

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

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	4.807E+00	5.395E+00	5.814E+00	NOT IDENT.
NA-22	5.501E-03	2.885E-01	2.885E-01	NOT IDENT.
NA-24	-2.388E+08	1.181E+10	1.181E+10	SHORT HLIF
AL-26	4.316E-02	2.193E-01	2.202E-01	NOT IDENT.
K-40	-1.319E+00	2.064E+00	2.147E+00	NOT IDENT.
SC-46	-1.783E-01	7.286E-01	7.330E-01	NOT IDENT.
V-48	-1.608E-01	1.623E+00	1.624E+00	NOT IDENT.
CR-51	-1.895E+00	4.696E+00	4.773E+00	NOT IDENT.
MN-52	-1.164E+00	2.773E+00	2.822E+00	NOT IDENT.
MN-54	-2.223E-01	5.021E-01	5.120E-01	NOT IDENT.
CO-56	1.619E-01	5.764E-01	5.810E-01	NOT IDENT.
MN-56	1.000E+41	3.595E+41	0.000E+00	SHORT HLIF
CO-57	-2.251E-02	1.555E-01	1.558E-01	NOT IDENT.
CO-58	-2.754E-01	5.456E-01	5.596E-01	NOT IDENT.
FE-59	-7.692E-01	1.572E+00	1.609E+00	NOT IDENT.
ZN-65	1.793E-01	1.147E+00	1.150E+00	NOT IDENT.
GE-68	6.703E+00	1.867E+01	1.891E+01	NOT IDENT.
AS-73	-2.264E+00	4.631E+00	4.742E+00	NOT IDENT.
AS-74	3.357E-01	1.219E+00	1.229E+00	NOT IDENT.
SE-75	9.408E-02	4.782E-01	4.801E-01	NOT IDENT.
BR-77	-1.771E+02	6.404E+02	6.454E+02	NOT IDENT.
SR-82	-1.310E-02	4.894E+00	4.894E+00	NOT IDENT.

RB-83	-3.757E-02	9.117E-01	9.119E-01	NOT IDENT.
RB-84	-3.471E-01	1.195E+00	1.205E+00	NOT IDENT.
KR-85	-1.244E+01	8.028E+01	8.048E+01	NOT IDENT.
SR-85	-7.136E-02	4.586E-01	4.597E-01	NOT IDENT.
RB-86	2.506E+00	1.510E+01	1.514E+01	NOT IDENT.
Y-88	2.349E-02	2.264E-01	2.266E-01	NOT IDENT.
Y-91	-7.816E+01	1.900E+02	1.933E+02	NOT IDENT.
NB-94	-2.370E-01	3.326E-01	3.493E-01	NOT IDENT.
NB-95	-2.764E-01	4.928E-01	5.083E-01	NOT IDENT.
NB-95M	-6.148E-02	1.088E+00	1.088E+00	NOT IDENT.
ZR-95	3.102E-01	8.926E-01	9.035E-01	NOT IDENT.
NB-97	1.000E+41	1.255E+41	0.000E+00	SHORT HLIF
ZR-97	-7.235E+09	2.254E+10	2.277E+10	SHORT HLIF
MO-99	3.709E+02	8.776E+02	8.934E+02	NOT IDENT.
TC-99M	-1.293E+25	7.899E+25	0.000E+00	SHORT HLIF
RH-101	1.328E-01	1.926E-01	2.017E-01	FAIL ABUN
RH-102	-3.698E-01	6.881E-01	7.080E-01	NOT IDENT.
RU-103	-1.195E-01	5.797E-01	5.822E-01	NOT IDENT.
RH-106	1.871E+00	3.465E+00	3.566E+00	NOT IDENT.
RU-106	1.871E+00	3.465E+00	3.566E+00	NOT IDENT.
AG-108M	3.733E-01	4.906E-01	5.187E-01	FAIL ABUN
AG-110	1.840E+00	8.389E+00	8.429E+00	NOT IDENT.
AG-110M	2.933E-01	8.575E-01	8.676E-01	FAIL ABUN
SN-113	1.089E-02	5.893E-01	5.893E-01	NOT IDENT.
CD-115	1.160E+02	1.247E+03	1.248E+03	NOT IDENT.
SN-117M	-2.892E-01	5.215E-01	5.375E-01	NOT IDENT.
SB-122	2.562E+01	1.222E+02	1.228E+02	NOT IDENT.
TE-123M	-9.908E-02	1.935E-01	1.986E-01	NOT IDENT.
SB-124	2.893E-01	6.421E-01	6.552E-01	NOT IDENT.
SB-125	-5.175E-01	1.226E+00	1.248E+00	NOT IDENT.
TE-125M	4.003E+00	5.764E+01	5.767E+01	NOT IDENT.
I-126	-1.850E+00	3.838E+00	3.928E+00	NOT IDENT.
SB-126	-7.427E-01	2.271E+00	2.296E+00	NOT IDENT.
SB-127	-5.792E+00	5.110E+01	5.117E+01	NOT IDENT.
I-131	-2.350E+00	2.508E+00	2.722E+00	NOT IDENT.
I-132	-1.000E+41	5.093E+42	0.000E+00	SHORT HLIF
TE-132	-1.371E+01	2.934E+01	2.998E+01	FAIL ABUN
BA-133	-2.841E-02	4.763E-01	4.765E-01	NOT IDENT.
I-133	5.308E+06	2.095E+07	2.108E+07	SHORT HLIF
CS-134	-2.169E-02	4.612E-01	4.613E-01	NOT IDENT.
I-135	2.123E+23	2.536E+24	0.000E+00	SHORT HLIF
CS-136	4.851E-01	2.176E+00	2.187E+00	NOT IDENT.
LA-138	1.098E-01	2.511E-01	2.559E-01	NOT IDENT.
CE-139	7.695E-02	2.117E-01	2.145E-01	NOT IDENT.
BA-140	3.952E+00	4.463E+00	4.805E+00	NOT IDENT.
LA-140	-2.134E-01	8.688E-01	8.741E-01	NOT IDENT.
CE-141	-2.302E-02	4.550E-01	4.551E-01	NOT IDENT.
CE-143	5.382E+03	4.160E+04	4.167E+04	SHORT HLIF
CE-144	-2.801E-03	1.216E+00	1.216E+00	NOT IDENT.
PM-144	-2.899E-03	3.497E-01	3.497E-01	NOT IDENT.
PR-144	-3.233E+00	2.654E+01	2.658E+01	NOT IDENT.
PM-146	-1.958E-01	6.449E-01	6.509E-01	NOT IDENT.
ND-147	3.944E+00	1.064E+01	1.079E+01	NOT IDENT.
PM-147	-6.841E+01	4.471E+03	4.471E+03	NOT IDENT.
PM-149	2.804E+03	8.213E+03	8.310E+03	SHORT HLIF
EU-150	3.918E-02	2.913E-01	2.918E-01	NOT IDENT.
EU-152	3.792E-01	1.103E+00	1.116E+00	NOT IDENT.
GD-153	-1.873E-01	5.456E-01	5.521E-01	NOT IDENT.
EU-154	2.965E-02	8.168E-01	8.169E-01	NOT IDENT.
EU-155	-2.057E-01	5.789E-01	5.863E-01	FAIL ABUN
TB-160	-2.050E+00	2.147E+00	2.337E+00	FAIL ABUN
HO-166M	-1.018E-01	5.724E-01	5.742E-01	NOT IDENT.
TM-171	-6.875E+01	8.566E+01	9.110E+01	NOT IDENT.
HF-172	1.942E-01	1.169E+00	1.172E+00	NOT IDENT.
LU-172	8.235E-01	1.058E+00	1.121E+00	FAIL ABUN
LU-176	6.054E-03	2.777E-01	2.777E-01	FAIL ABUN
HF-181	3.485E-01	6.748E-01	6.928E-01	NOT IDENT.
TA-182	3.763E-01	1.502E+00	1.512E+00	NOT IDENT.
RE-183	6.711E+02	7.296E+01	3.112E+02	FAIL ABUN
RE-184	-1.916E-01	2.280E+00	2.281E+00	NOT IDENT.
W-188	4.975E+01	7.101E+01	7.447E+01	NOT IDENT.
IR-192	-2.668E-01	3.937E-01	4.116E-01	NOT IDENT.
HG-203	2.829E-02	3.973E-01	3.975E-01	NOT IDENT.
TL-204	4.528E+00	1.761E+01	1.773E+01	NOT IDENT.
BI-207	-3.405E-01	7.449E-01	7.605E-01	NOT IDENT.
TL-208	-4.550E-02	3.926E-01	3.932E-01	NOT IDENT.
BI-211	-1.872E+00	2.232E+00	2.386E+00	NOT IDENT.
PB-211	3.154E+00	8.255E+00	8.377E+00	NOT IDENT.

BI-212	5.251E+00	5.441E+00	5.933E+00	NOT IDENT.
PB-212	-2.428E-01	5.022E-01	5.140E-01	FAIL ABUN
BI-213	1.260E+00	1.478E+00	1.584E+00	NOT IDENT.
BI-214	-1.794E-01	7.280E-01	7.324E-01	NOT IDENT.
PB-214	-5.487E-01	8.055E-01	8.427E-01	FAIL ABUN
RN-219	4.305E-01	4.980E+00	4.984E+00	NOT IDENT.
RN-222	-1.794E-01	7.280E-01	7.324E-01	NOT IDENT.
RA-223	-1.684E+00	6.996E+00	7.037E+00	NOT IDENT.
RA-224	2.797E+00	5.223E+00	5.373E+00	NOT IDENT.
AC-225	1.191E+00	8.813E+00	8.829E+00	NOT IDENT.
RA-226	-5.487E-01	8.055E-01	8.427E-01	FAIL ABUN
AC-227	-1.919E+00	2.318E+00	2.474E+00	NOT IDENT.
TH-227	-1.919E+00	2.318E+00	2.474E+00	NOT IDENT.
AC-228	-2.514E-01	2.307E+00	2.310E+00	NOT IDENT.
RA-228	-2.514E-01	2.307E+00	2.310E+00	NOT IDENT.
TH-228	-2.428E-01	5.022E-01	5.140E-01	FAIL ABUN
TH-229	-1.968E+00	4.049E+00	4.145E+00	FAIL ABUN
TH-230	-5.487E-01	8.055E-01	8.427E-01	FAIL ABUN
PA-231	5.090E-01	4.718E+00	4.723E+00	NOT IDENT.
TH-231	-1.684E+00	6.996E+00	7.037E+00	NOT IDENT.
TH-232	-2.514E-01	2.307E+00	2.310E+00	NOT IDENT.
PA-233	-1.099E-01	6.948E-01	6.966E-01	NOT IDENT.
PA-234	-5.359E-01	5.000E+00	5.006E+00	NOT IDENT.
PA-234M	2.652E+01	6.301E+01	6.413E+01	NOT IDENT.
TH-234	3.417E+00	3.967E+00	4.255E+00	NOT IDENT.
U-234	-5.487E-01	8.055E-01	8.427E-01	FAIL ABUN
U-235	1.064E-01	1.272E+00	1.273E+00	NOT IDENT.
NP-237	-1.099E-01	6.948E-01	6.966E-01	NOT IDENT.
NP-238	-1.044E+03	3.534E+03	3.565E+03	SHORT HLIF
U-238	3.417E+00	3.967E+00	4.255E+00	NOT IDENT.
NP-239	-1.192E+00	1.533E+00	1.625E+00	NOT IDENT.
PU-239	-1.298E+03	2.008E+03	2.091E+03	NOT IDENT.
AM-243	1.394E-02	2.033E-01	2.034E-01	FAIL ABUN
CM-243	3.302E-01	6.038E-01	6.219E-01	NOT IDENT.
BK-247	1.390E-01	8.262E-01	8.286E-01	NOT IDENT.
CM-247	5.332E-02	4.203E-01	4.210E-01	NOT IDENT.
CF-249	-1.264E-01	5.056E-01	5.088E-01	NOT IDENT.
CF-251	-4.872E-01	8.952E-01	9.217E-01	NOT IDENT.
ANH-511	-2.109E-01	3.606E-01	3.730E-01	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	2943.1011	85.43	409.7223	131.20	273.0647
45.60	2981.1755	86.55	412.8575	133.02	300.9523
46.54	2998.1824	86.79	436.3323	133.52	283.8528
49.72	3836.7205	86.94	436.5765	136.00	290.6686
51.35	3691.9954	87.09	436.8162	136.47	295.2061
51.87	3705.1106	87.57	437.5765	140.51	306.6472
52.39	3708.2463	88.03	438.3046	143.76	301.3880
52.97	3588.0671	88.34	427.1739	144.24	302.5875
53.44	3673.3066	88.47	427.3713	145.44	288.0271
54.07	3519.2188	89.96	366.8102	152.43	270.1006
57.36	0.0000	90.64	417.4979	153.25	263.6233
57.53	3998.7942	91.11	399.1140	154.21	285.1903
57.98	2348.2627	92.59	379.0530	156.02	273.1785
59.27	2363.4773	93.35	377.0915	158.56	293.2761
59.32	2364.0664	94.56	357.8668	159.00	282.9492
59.54	2366.6326	94.65	357.9771	162.33	299.2654
60.96	525.1262	94.67	358.0028	162.66	308.3938
61.17	525.6608	94.87	398.3809	163.33	287.4200
62.93	447.6434	97.43	398.8174	165.86	274.6184
63.29	461.5166	98.43	344.4819	176.31	252.1938
63.58	464.7736	98.44	344.4924	176.60	284.4615
64.28	537.4253	99.53	363.8425	177.52	276.7128
66.73	476.8890	100.11	366.7990	181.07	296.2646
67.24	476.6519	102.03	342.4404	181.52	287.2618
67.68	492.3044	103.18	355.9138	184.41	335.4840
67.75	459.0012	103.37	361.4766	185.72	338.2040
68.89	481.5050	105.21	356.6519	193.51	314.7860
69.67	431.8701	105.31	352.1518	197.03	292.9841
70.82	419.0992	106.12	339.9353	198.01	293.5088
70.83	419.1227	106.47	334.9004	201.83	299.3973
72.81	410.3577	109.28	315.9919	203.43	325.3580
72.87	407.7265	111.00	324.6684	205.31	312.8865
74.66	408.0208	111.76	323.8347	210.85	313.9762
74.82	405.5330	114.06	331.5569	215.65	339.2496
74.97	405.7798	116.30	333.7102	218.12	348.5894
77.11	431.6046	116.74	323.7878	222.11	337.9551
78.74	409.1903	119.76	329.7733	227.09	301.5244
79.69	454.3272	121.12	311.6945	227.38	301.6663
80.03	440.8392	121.22	311.7802	228.16	313.1212
80.12	441.0016	121.78	329.2090	228.18	313.1355
80.19	441.1210	122.06	314.1216	235.69	296.5237
80.57	509.5181	122.92	326.1953	235.96	296.6481
81.00	411.4034	123.07	326.3275	238.63	317.3366
81.07	411.5188	123.68	306.5944	238.98	317.5069
81.75	433.8611	125.81	309.9966	240.99	274.3171
82.47	405.2039	127.23	285.7885	242.00	318.9922
83.79	432.9456	127.91	303.5340	244.70	294.4803
84.00	418.9879	129.30	305.4681	252.40	280.1290

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.80	265.6505	351.06	252.4565	569.33	105.3809
254.15	0.0000	351.93	245.5851	569.50	104.4362
256.23	283.8119	355.39	0.0000	569.70	111.1572
260.90	243.4064	356.01	240.7257	583.19	125.7682
264.66	268.1268	364.49	252.5665	584.27	120.0544
264.80	268.1807	366.42	224.1616	595.83	92.7193
265.00	268.2576	372.51	238.9515	600.60	109.6667
269.46	251.3744	375.05	261.4801	602.52	0.0000
270.03	274.4453	377.52	249.9626	604.72	116.8501
271.23	275.9801	383.85	257.7319	607.14	117.0389
273.65	261.8212	388.16	258.8599	609.32	113.2733
276.40	273.6227	388.63	250.3551	610.33	101.5205
277.37	254.4925	391.69	249.8862	614.28	101.7930
277.60	239.4054	400.66	270.8460	618.01	102.0444
278.00	259.0504	401.81	226.1671	620.36	93.2733
279.20	250.7881	402.40	233.3846	621.93	96.3527
279.54	242.2117	404.85	238.9559	630.19	0.0000
279.70	253.1301	410.95	273.9880	631.29	113.9351
280.46	275.1360	413.71	280.6165	633.25	102.0706
283.69	265.4105	414.70	264.0110	634.78	104.1777
284.31	277.6575	423.72	296.8900	635.95	100.2482
285.41	257.2607	427.09	288.4401	636.99	102.3196
285.90	0.0000	427.87	301.4562	657.50	82.3250
287.50	251.3912	433.94	279.5345	657.76	82.3381
290.67	208.3453	439.40	300.3440	657.90	0.0000
293.27	0.0000	440.45	286.8052	661.66	82.5392
295.22	230.6484	453.88	348.8409	664.57	0.0000
295.96	278.5910	463.37	326.1664	666.33	101.1753
298.58	240.5544	468.07	366.4362	666.50	98.1172
299.98	262.1805	473.00	353.7562	667.71	0.0000
300.09	262.2163	475.06	350.8101	677.62	81.2984
300.13	262.2307	476.78	305.8403	685.70	91.0078
301.36	250.3457	477.60	287.3119	692.65	67.5020
302.85	240.7399	482.18	232.8849	695.00	90.4763
304.50	278.2659	487.02	232.0226	696.49	82.2306
304.85	264.9166	492.35	233.0409	696.51	85.3533
306.78	257.6809	497.08	207.6431	697.00	81.2151
308.46	283.0261	505.52	192.6225	697.30	83.3105
311.90	267.2429	507.63	0.0000	697.49	88.5278
316.51	263.0614	511.00	199.8799	702.65	87.7563
319.41	226.2728	514.00	181.9753	706.68	67.0208
320.08	256.1904	514.00	181.9753	711.68	69.3167
321.04	254.1943	520.40	170.8781	720.70	87.6302
323.87	269.9904	520.69	169.9919	721.93	0.0000
325.23	247.4127	522.65	0.0000	722.78	82.4497
328.76	246.1317	527.90	157.0072	722.91	83.5132
333.37	250.9431	528.26	169.1291	723.31	84.5898
333.97	245.3017	529.59	162.7879	724.19	85.6901
334.37	244.2545	529.87	0.0000	727.33	74.1870
338.28	255.8654	531.02	154.5848	733.00	74.4291
338.32	255.8787	537.26	125.3796	735.93	82.0068
340.48	251.8219	546.56	0.0000	737.46	89.5405
340.55	251.8416	552.55	137.2296	739.50	90.7103
344.28	247.0294	563.25	95.3817	744.23	77.0420
345.93	253.3769	564.24	103.0869	747.24	90.0327

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
748.06	93.2906	954.55	0.0000	1408.01	6.3248
752.31	92.4388	962.31	131.4781	1434.09	6.3757
753.82	96.8188	964.08	131.5813	1435.80	3.1895
756.73	84.0461	966.17	133.1104	1457.56	0.0000
756.80	84.0493	968.97	139.2196	1460.82	9.6416
763.94	82.2158	983.53	115.5547	1489.16	6.4819
765.81	95.2939	984.45	0.0000	1505.03	3.2562
766.42	83.4104	996.26	101.6675	1584.12	3.3303
766.84	75.8447	1001.03	97.3247	1596.21	8.9106
772.60	0.0000	1002.74	104.6785	1620.50	8.9702
776.52	92.5814	1004.73	109.3213	1621.92	6.7302
777.92	123.1707	1021.30	0.0000	1678.03	0.0000
778.90	105.7898	1025.87	0.0000	1690.97	5.4841
783.70	109.3424	1028.54	0.0000	1750.46	0.0000
788.74	96.4792	1037.84	97.9193	1764.49	0.9314
792.07	79.0781	1038.76	0.0000	1770.23	4.6638
795.86	81.4373	1046.59	93.6334	1771.35	1.8660
801.95	85.0114	1048.07	93.6888	1791.20	0.0000
1093.63	104.2201	1049.04	96.5098	1808.65	4.7083
810.29	107.5581	1050.41	88.2101	1810.72	0.0000
810.45	107.5660	1063.66	105.4892	1836.06	3.7920
810.76	105.3636	1077.00	99.4850		
815.77	107.8620	1077.34	95.7433		
818.51	110.2430	1085.87	88.5323		
832.01	100.9131	1093.63	107.3251		
834.85	116.7757	1099.45	124.9907		
835.71	108.9632	1112.07	100.8630		
836.80	0.0000	1112.84	102.7991		
846.75	0.0000	1115.54	83.8481		
846.77	100.5342	1120.29	70.6396		
856.80	111.2509	1120.55	67.7802		
860.56	110.3209	1121.30	67.8019		
871.09	99.4574	1129.67	65.1445		
873.19	113.2925	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	129.6999	1173.23	48.6908		
880.51	97.6137	1177.95	48.3830		
881.60	117.1987	1189.05	37.2184		
883.24	110.3906	1204.77	38.4168		
884.68	110.4688	1221.41	27.7454		
889.28	124.5498	1231.02	21.8738		
894.76	122.5625	1235.36	20.9116		
898.04	108.8558	1238.28	15.9492		
900.72	129.8646	1260.41	0.0000		
903.28	128.8586	1271.87	19.1600		
911.20	142.1546	1274.44	17.1588		
912.08	132.8840	1274.54	17.1588		
923.98	0.0000	1291.59	14.2128		
926.50	136.4149	1298.22	0.0000		
929.11	137.4569	1312.11	12.2666		
935.54	124.4289	1332.49	12.3486		
937.49	151.4301	1362.66	0.0000		
944.13	164.6600	1365.19	7.2803		
946.00	150.9445	1368.63	0.0000		
949.00	150.2629	1384.29	8.3706		

Continuing Calibration Data

Review of Gamma Spectrometer QA results (Daily calibration & background checks)
12-DEC-2023 09:43:05

Run Date	Detector	Parameter	Flag	Status	Comments
12-DEC-23	GAM01	All Parameters Passed			
12-DEC-23	GAM02	Cal Check PSFWHM-59	Investigate		
12-DEC-23	GAM03	Cal Check PSFWHM-59	Investigate		
12-DEC-23	GAM04	Cal Check PSFWHM-59	Action	Lockout	Detector locked out.
12-DEC-23	GAM04	Cal Check NLACTVTY-1332	Investigate		
12-DEC-23	GAM05	Cal Check NLACTVTY-59	Investigate		
12-DEC-23	GAM06	All Parameters Passed			
12-DEC-23	GAM07	All Parameters Passed			
12-DEC-23	GAM08	Cal Check NLACTVTY-59	Investigate		
12-DEC-23	GAM11	All Parameters Passed			
12-DEC-23	GAM12	Cal Check PSFWHM-59	Investigate		
12-DEC-23	GAM12	Cal Check PSFWHM-662	Investigate		
12-DEC-23	GAM12	Cal Check PSFWHM-1332	Investigate		
12-DEC-23	GAM14	All Parameters Passed			
12-DEC-23	GAM16	All Parameters Passed			
12-DEC-23	GAM18	All Parameters Passed			
12-DEC-23	GAM19	All Parameters Passed			
12-DEC-23	GAM20	Cal Check PSFWHM-1332	Investigate		
12-DEC-23	GAM21	All Parameters Passed			
	GAM22	Cal Check may not have run since 12-DEC-2023			Detector locked out.
10-DEC-23	GAM22	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
12-DEC-23	GAM23	All Parameters Passed			
12-DEC-23	GAM24	All Parameters Passed			
12-DEC-23	GAM27	Cal Check NLACTVTY-59	Investigate		
03-DEC-23	GAM29	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
12-DEC-23	GAM30	Cal Check PSFWHM-662	Investigate		
03-DEC-23	GAM30	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
12-DEC-23	GAM31	All Parameters Passed			
12-DEC-23	GAM32	Cal Check NLACTVTY-662	Investigate		
09-DEC-23	GAM33	Cal Check may not have run since 12-DEC-2023			Detector locked out.
03-DEC-23	GAM33	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
06-DEC-23	GAM34	Cal Check may not have run since 12-DEC-2023			Detector locked out.
04-DEC-23	GAM34	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
12-DEC-23	GAM38	All Parameters Passed			
12-DEC-23	GAM40	Cal Check NLACTVTY-59	Investigate		

12-DEC-23	GAM41	Cal Check PSFWHM-59	Action	Lockout	Detector locked out.
12-DEC-23	GAM41	Cal Check PSFWHM-662	Action	Lockout	Detector locked out.
12-DEC-23	GAM41	Cal Check PSFWHM-1332	Investigate		
12-DEC-23	GAM43	Cal Check PSFWHM-1332	Investigate		
12-DEC-23	GAM43	Cal Check NLACTVTY-59	Investigate		
18-MAY-23	GAM44	Cal Check may not have run since 12-DEC-2023			Detector locked out.
21-MAY-23	GAM44	Bkg Check may not have run since 12-DEC-2023			Detector locked out.
12-DEC-23	GAM46	All Parameters Passed			
12-DEC-23	GAM47	All Parameters Passed			
12-DEC-23	GAM48	All Parameters Passed			
12-DEC-23	GAM50	Cal Check PSFWHM-59	Investigate		
12-DEC-23	GAM50	Cal Check PSFWHM-662	Investigate		
12-DEC-23	GAM50	Cal Check PSFWHM-1332	Investigate		
12-DEC-23	GAM52	Cal Check NLACTVTY-1332	Investigate		
12-DEC-23	GAM53	All Parameters Passed			
12-DEC-23	GAM56	Cal Check PSFWHM-59	Investigate		
12-DEC-23	GAM56	Cal Check NLACTVTY-1332	Investigate		
12-DEC-23	XRAY1	Cal Check PSFWHM-40	Action	Approved	Low FWHM, approved for use.
12-DEC-23	XRAY1	Bkg Check BACKRATE	Investigate		
12-DEC-23	XRAY2	All Parameters Passed			
12-DEC-23	XRAY3	All Parameters Passed			
12-DEC-23	XRAY6	Cal Check PSFWHM-29	Action	Approved	Low FWHM, approved for use.
12-DEC-23	XRAY7	Cal Check PSFWHM-40	Investigate		

APPROVAL DATE: 12-DEC-2023

APPROVAL TIME: 09:52:42

APPROVED BY: Rebekah Futch

PROCEDURE # GL-RAD-I-001

The Investigate flag does not indicate a lockout and is approved for use. Action flags that have not been approved are locked out of service.

Review of Gamma Spectrometer QA results (Daily calibration & background checks)
13-DEC-2023 08:41:31

Run Date	Detector	Parameter	Flag	Status	Comments
13-DEC-23	GAM01	Cal Check NLACTVTY-1332	Investigate		
13-DEC-23	GAM02	Cal Check PSFWHM-59	Investigate		
13-DEC-23	GAM03	Cal Check NLACTVTY-59	Investigate		
13-DEC-23	GAM04	All Parameters Passed			
13-DEC-23	GAM05	All Parameters Passed			
13-DEC-23	GAM06	Bkg Check BACKRATE	Investigate		
13-DEC-23	GAM07	Cal Check NLACTVTY-59	Investigate		
13-DEC-23	GAM08	All Parameters Passed			
13-DEC-23	GAM11	All Parameters Passed			
13-DEC-23	GAM12	All Parameters Passed			
13-DEC-23	GAM14	All Parameters Passed			
13-DEC-23	GAM16	All Parameters Passed			
13-DEC-23	GAM18	All Parameters Passed			
13-DEC-23	GAM19	All Parameters Passed			
13-DEC-23	GAM20	Cal Check PSFWHM-662	Investigate		
13-DEC-23	GAM21	All Parameters Passed			
	GAM22	Cal Check may not have run since 13-DEC-2023			Detector locked out.
10-DEC-23	GAM22	Bkg Check may not have run since 13-DEC-2023			Detector locked out.
13-DEC-23	GAM23	Cal Check NLACTVTY-59	Investigate		
13-DEC-23	GAM24	All Parameters Passed			
13-DEC-23	GAM27	All Parameters Passed			
13-DEC-23	GAM29	Cal Check NLACTVTY-662	Investigate		
13-DEC-23	GAM30	Bkg Check BACKRATE	Investigate		
13-DEC-23	GAM31	All Parameters Passed			
13-DEC-23	GAM32	All Parameters Passed			
09-DEC-23	GAM33	Cal Check may not have run since 13-DEC-2023			Detector locked out.
03-DEC-23	GAM33	Bkg Check may not have run since 13-DEC-2023			Detector locked out.
06-DEC-23	GAM34	Cal Check may not have run since 13-DEC-2023			Detector locked out.
04-DEC-23	GAM34	Bkg Check may not have run since 13-DEC-2023			Detector locked out.
13-DEC-23	GAM38	All Parameters Passed			
13-DEC-23	GAM40	Cal Check NLACTVTY-59	Investigate		
13-DEC-23	GAM41	Cal Check PSFWHM-59	Action	Lockout	Detector locked out.
13-DEC-23	GAM41	Cal Check PSFWHM-662	Action	Lockout	Detector locked out.
13-DEC-23	GAM43	Cal Check NLACTVTY-1332	Investigate		
18-MAY-23	GAM44	Cal Check may not have run since 13-DEC-2023			Detector locked out.
21-MAY-23	GAM44	Bkg Check may not have run since 13-DEC-2023			Detector locked out.
13-DEC-23	GAM46	All Parameters Passed			
13-DEC-23	GAM47	All Parameters Passed			
13-DEC-23	GAM48	All Parameters Passed			

13-DEC-23	GAM50	Bkg Check BACKRATE	Investigate		
13-DEC-23	GAM52	All Parameters Passed			
12-DEC-23	GAM53	Cal Check may not have run since 13-DEC-2023			Not Run
08-DEC-23	GAM53	Bkg Check may not have run since 13-DEC-2023			Not Run
12-DEC-23	GAM56	Cal Check may not have run since 13-DEC-2023			Not Run
08-DEC-23	GAM56	Bkg Check may not have run since 13-DEC-2023			Not Run
13-DEC-23	XRAY1	Cal Check NLACTVTY-40	Investigate		
13-DEC-23	XRAY2	All Parameters Passed			
13-DEC-23	XRAY3	All Parameters Passed			
13-DEC-23	XRAY6	Cal Check PSFWHM-29	Investigate		
13-DEC-23	XRAY6	Cal Check PSFWHM-40	Investigate		
13-DEC-23	XRAY7	All Parameters Passed			

APPROVAL DATE: 13-DEC-2023

APPROVAL TIME: 09:30:59

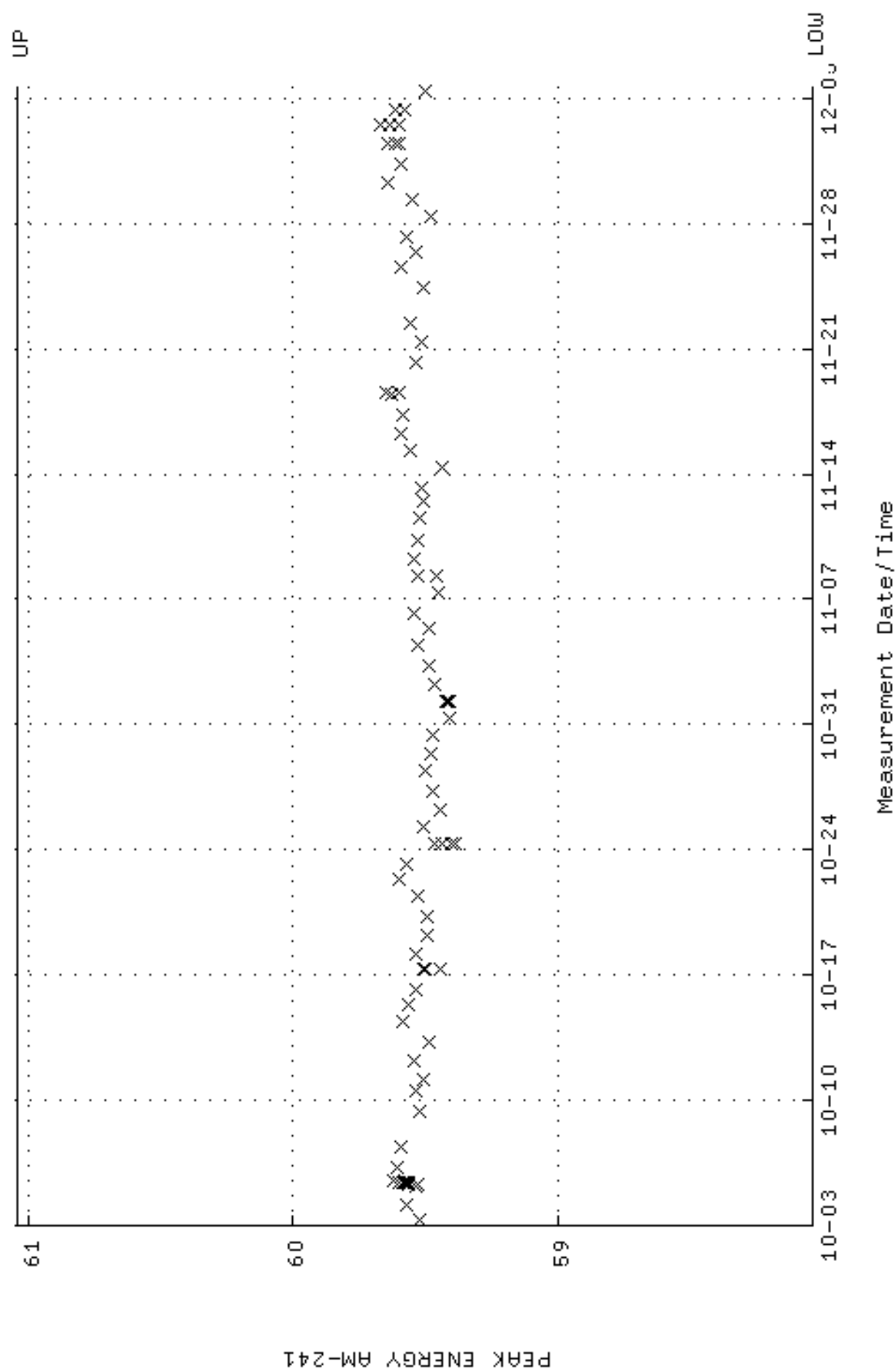
APPROVED BY: Rebekah Futch

PROCEDURE # GL-RAD-I-001

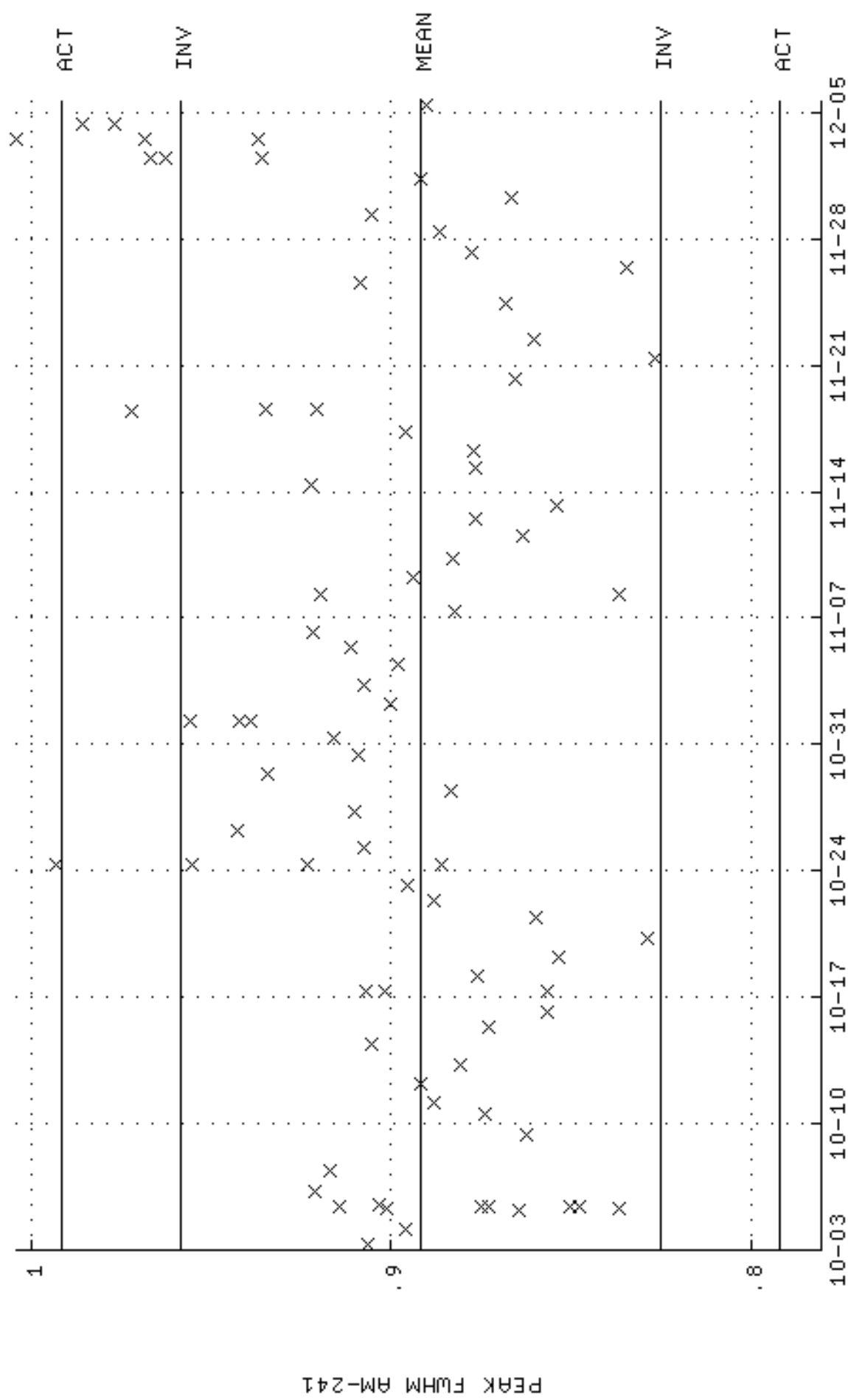
The Investigate flag does not indicate a lockout and is approved for use. Action flags that have not been approved are locked out of service.

Background and Efficiency Data

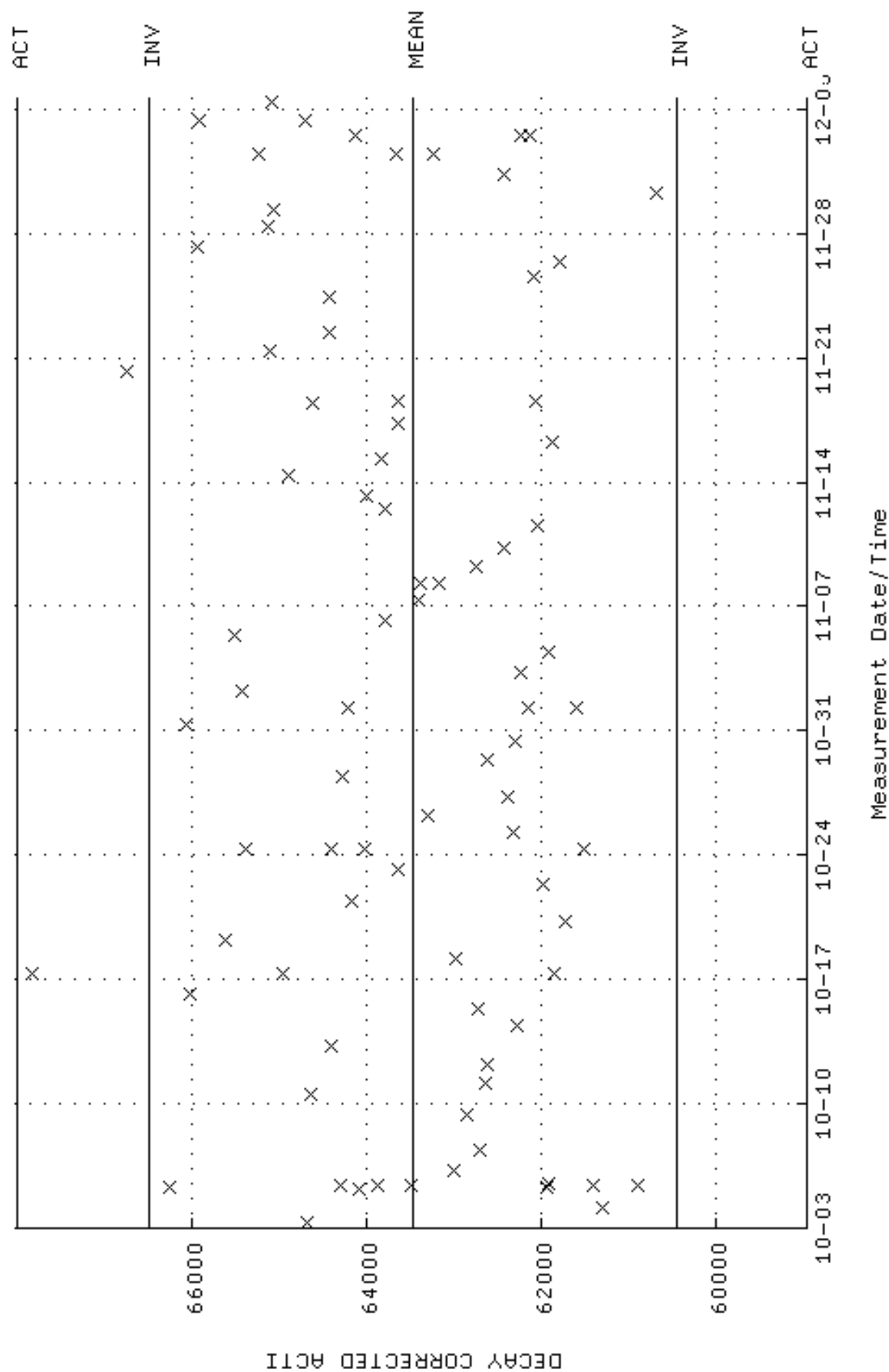
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM06_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 3-OCT-2023 06:44:30 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



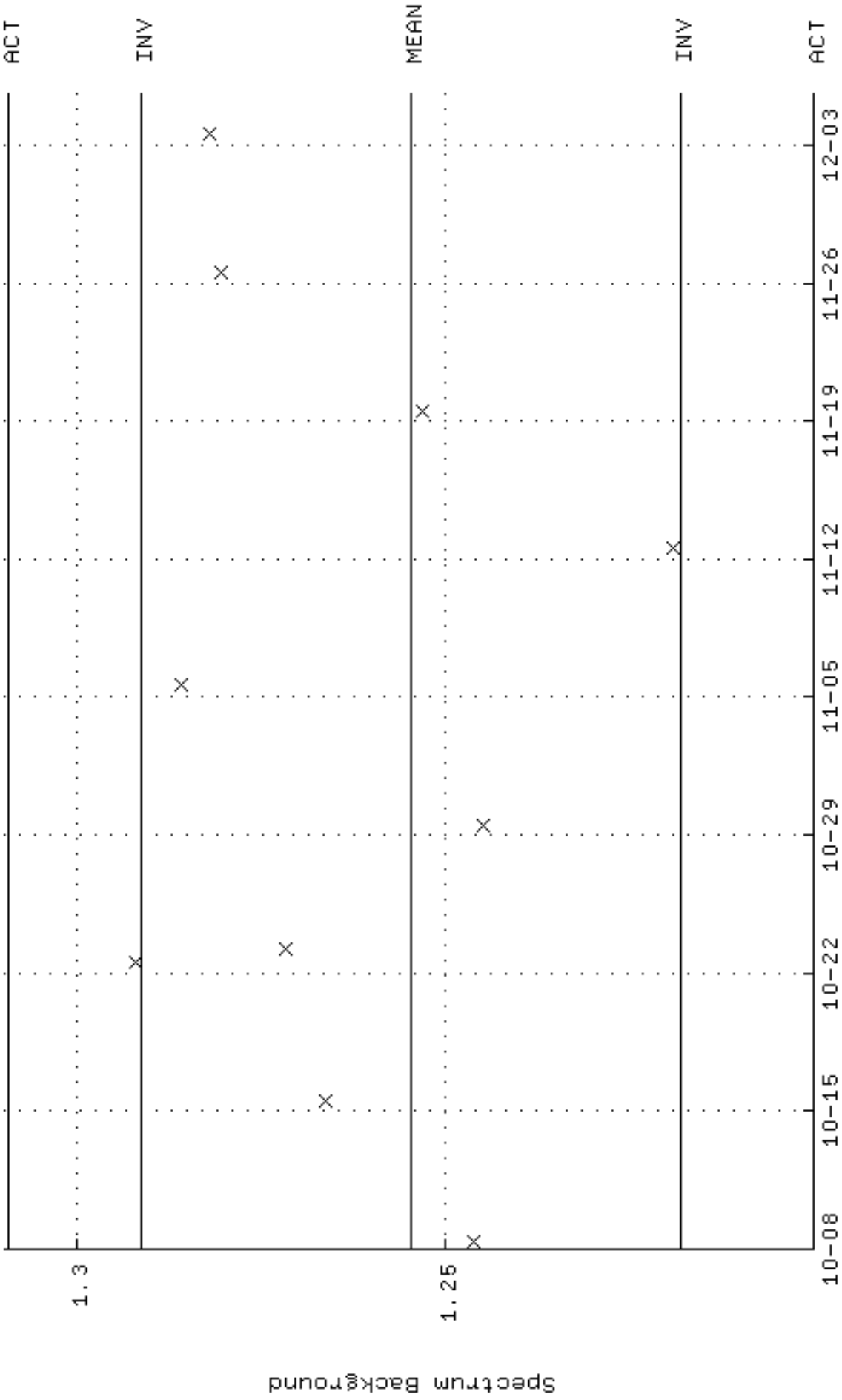
QA filename : DKA100:[CANBERRA,GAMMA,SCUSR,QA]QCC_GAM06_CAN.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 3-OCT-2023 06:44:30 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 0.891957 +- 3.327383E-02 (3.73 %)



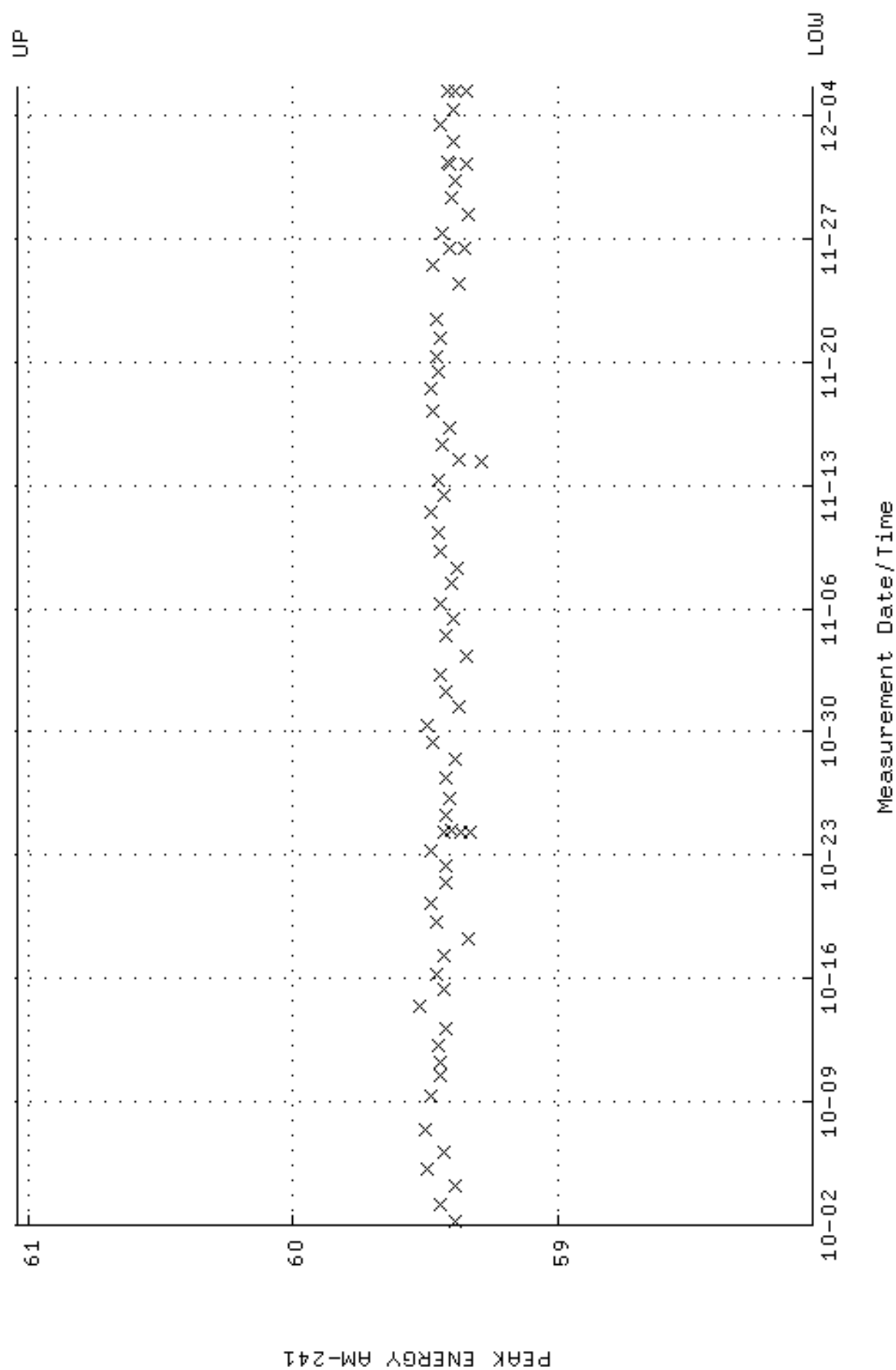
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM06-CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 3-OCT-2023 06:44:30 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 63473.8 +- 1503.81 (2.37 %)



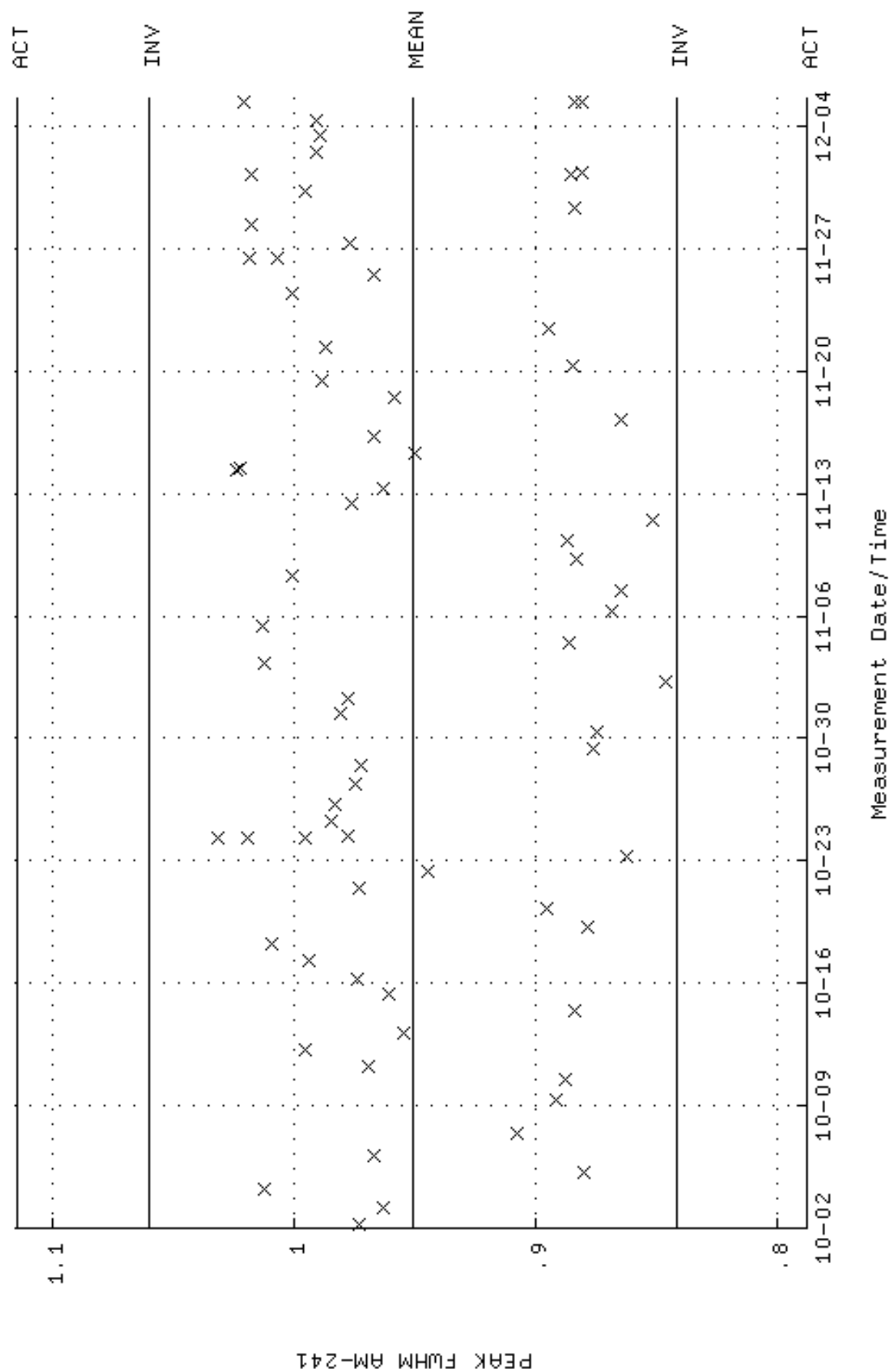
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM06.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 8-OCT-2023 09:36:32 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.25484 +- 1.824749E-02 (1.45 %)



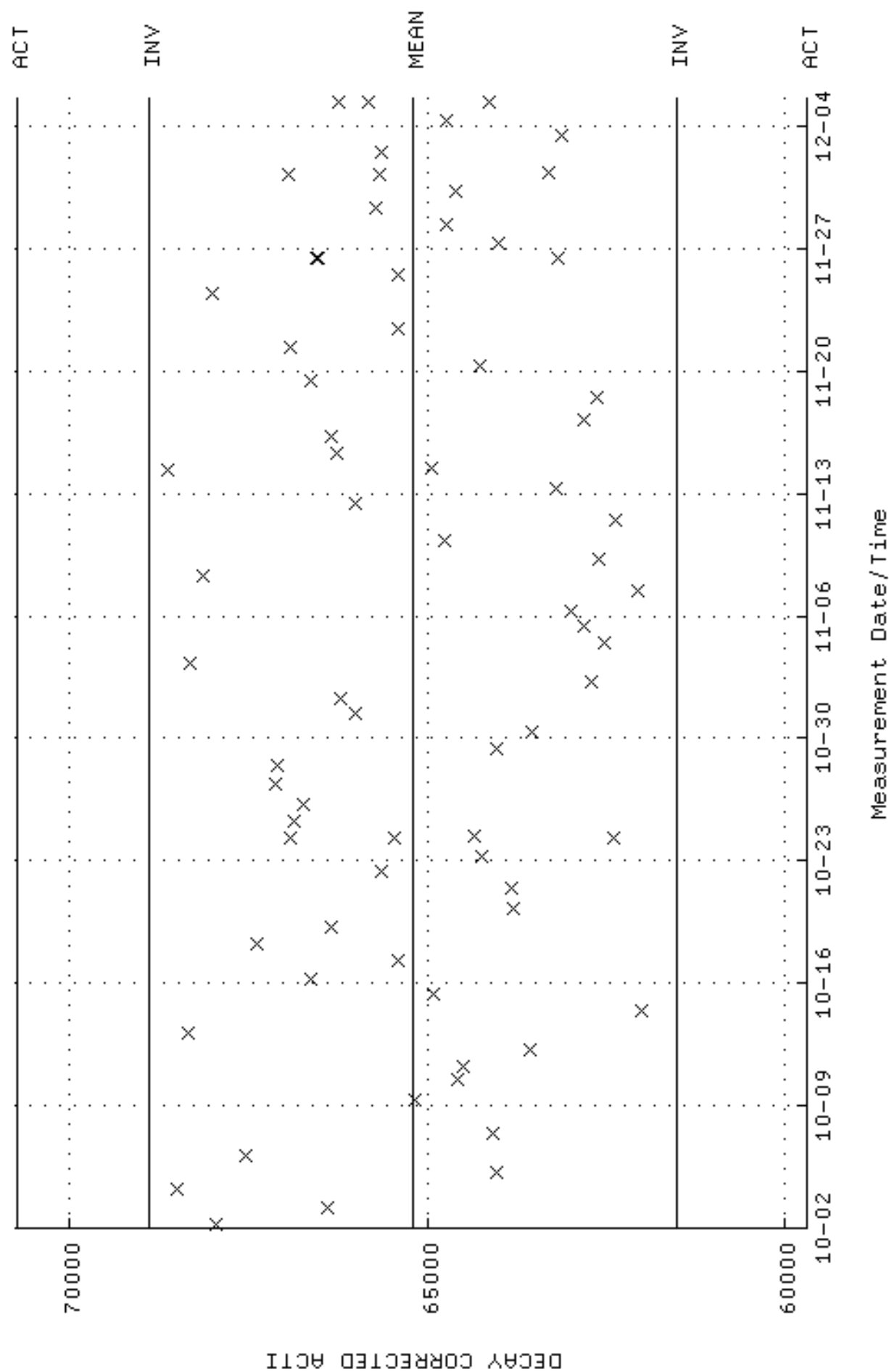
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM11_JAR.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-OCT-2023 04:54:54 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



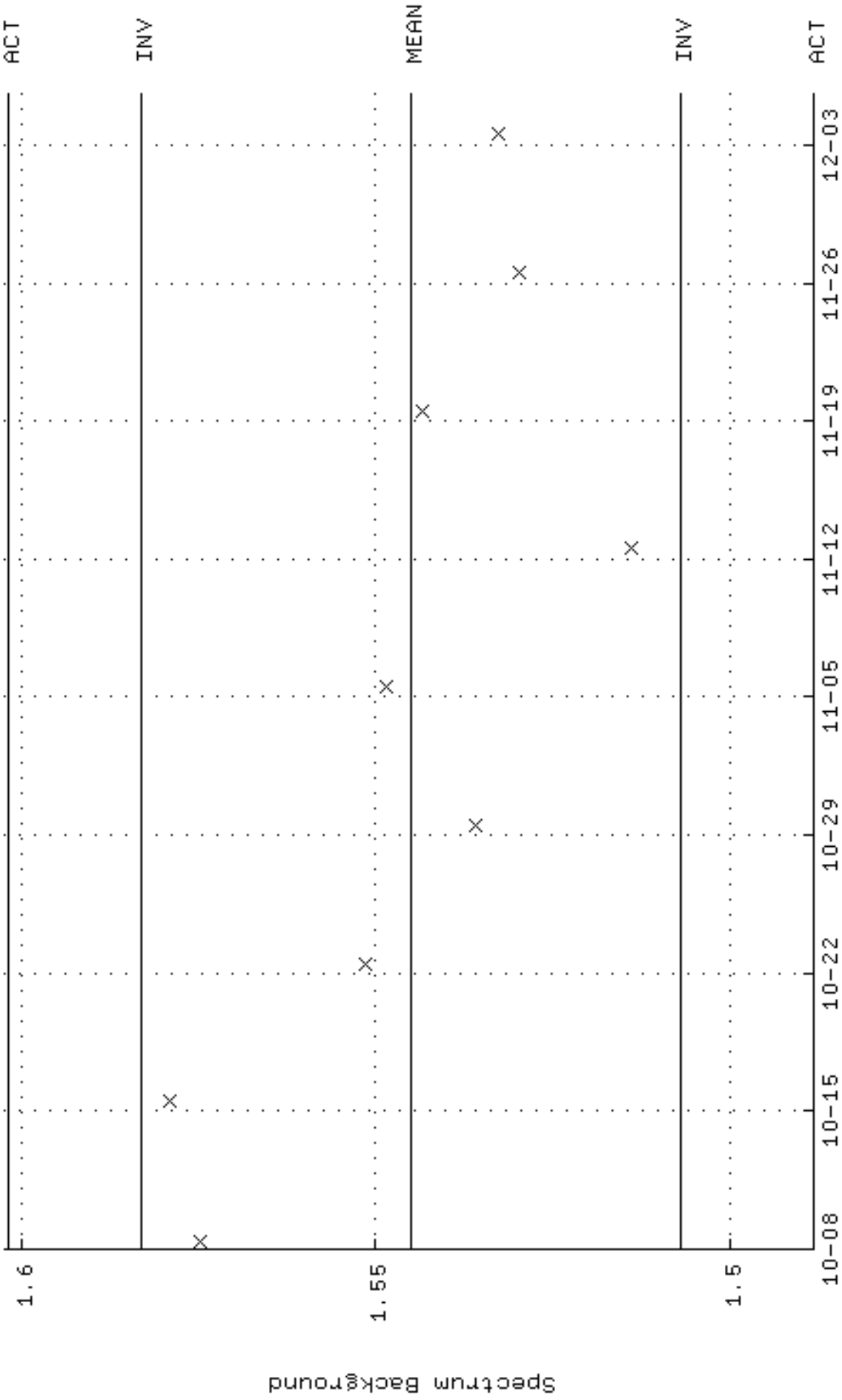
QA filename : DKA100:[CANNBERRA,GAMMA,SCUSR,QA]QCC_GAM11_JAR.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-OCT-2023 04:54:54 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 0.951196 +- 5.437409E-02 (5.72 %)



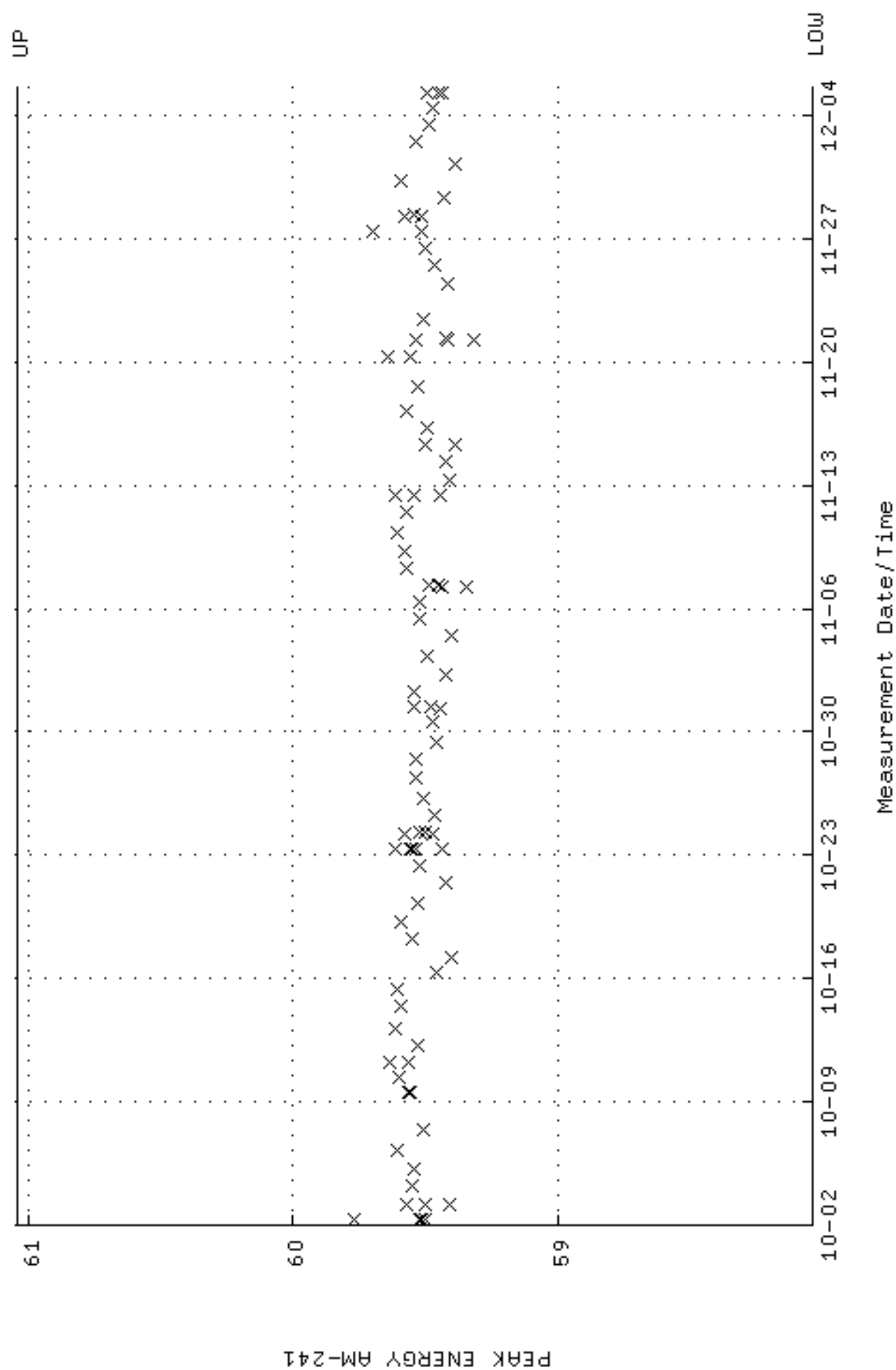
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM11_JAR.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-OCT-2023 04:54:54 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 65210.2 +- 1836.30 (2.82 %)



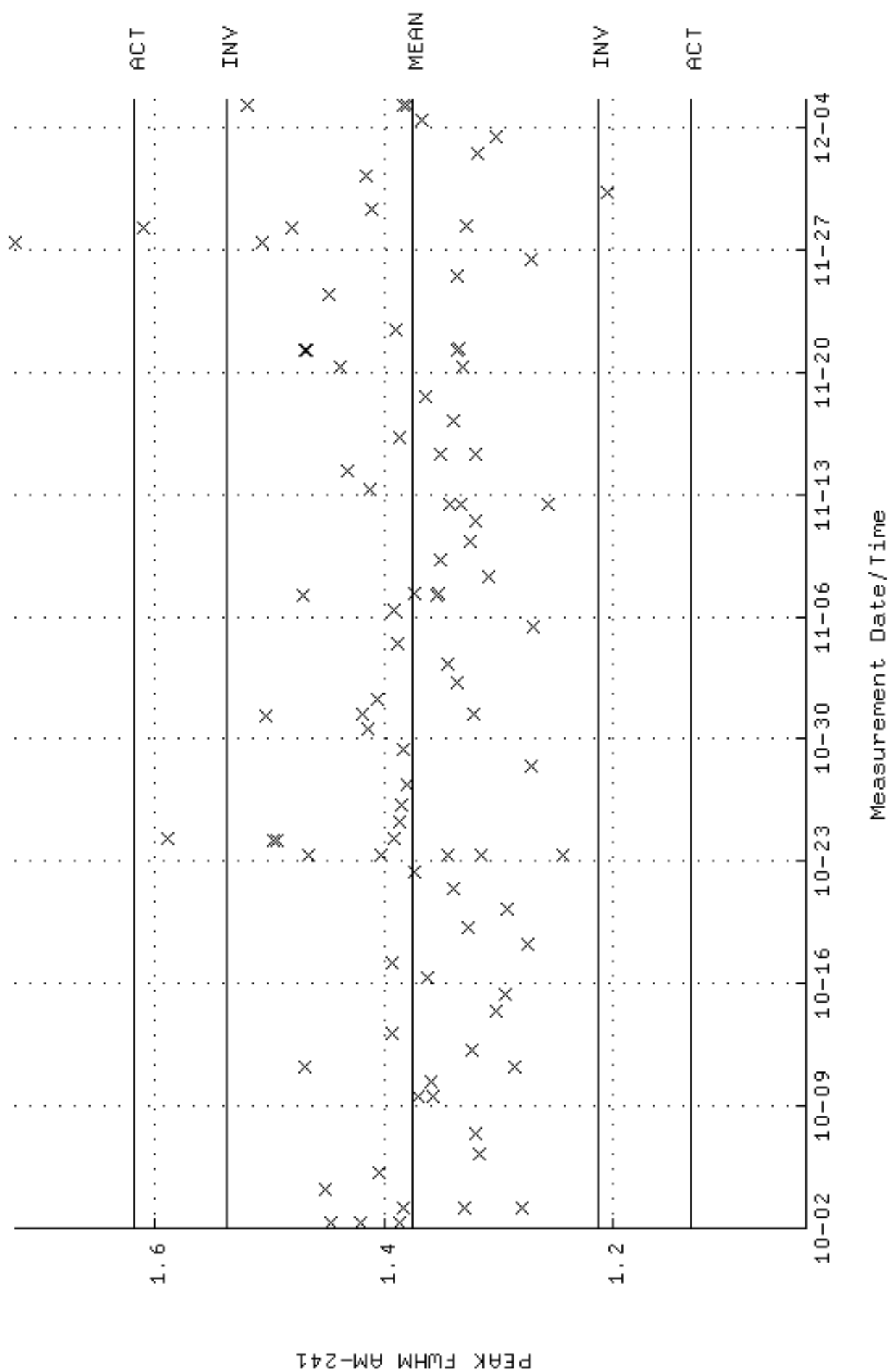
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM11.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 8-OCT-2023 09:36:48 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.54514 +- 1.902434E-02 (1.23 %)



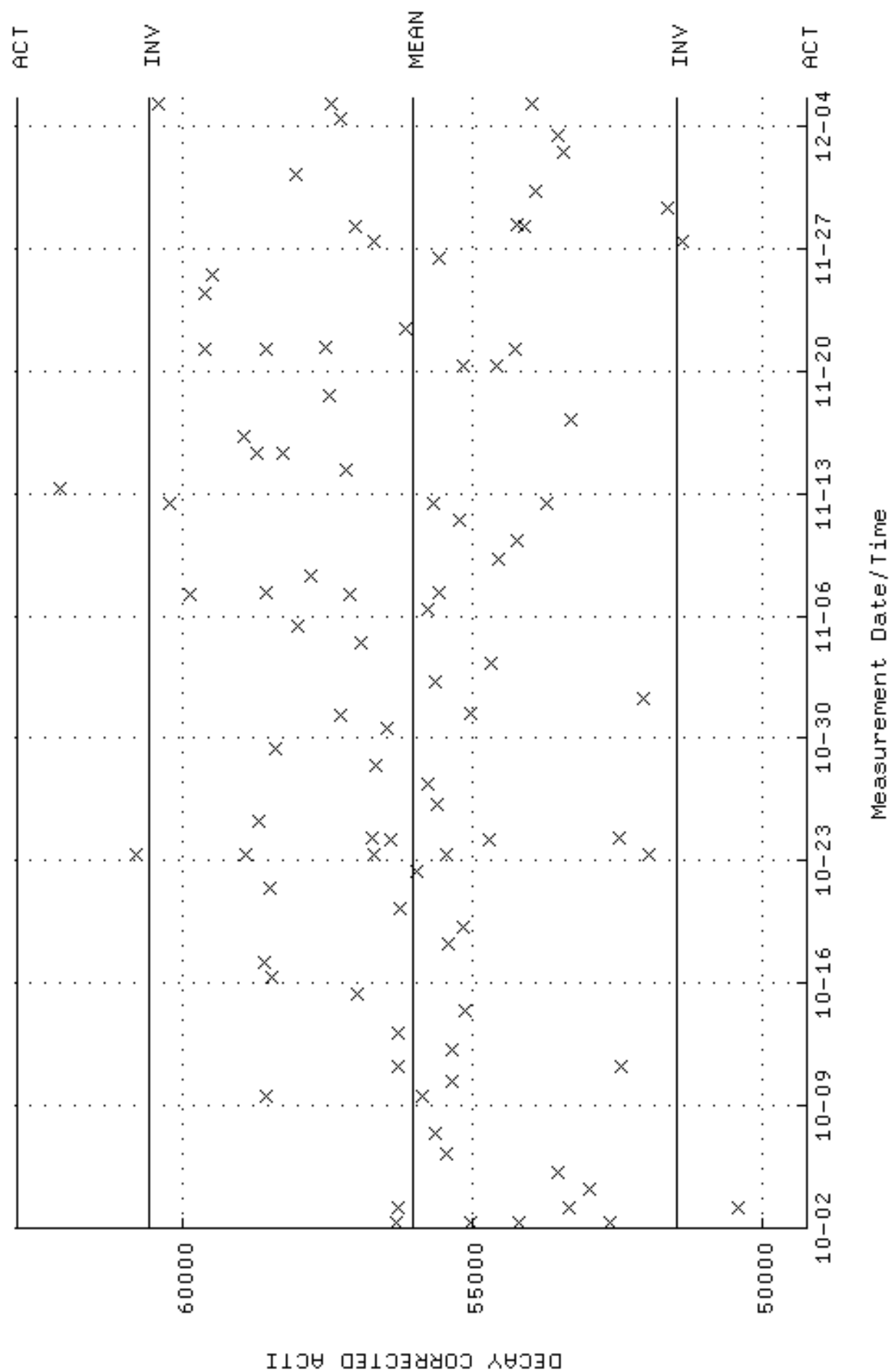
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM12_JAR.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-OCT-2023 06:31:48 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



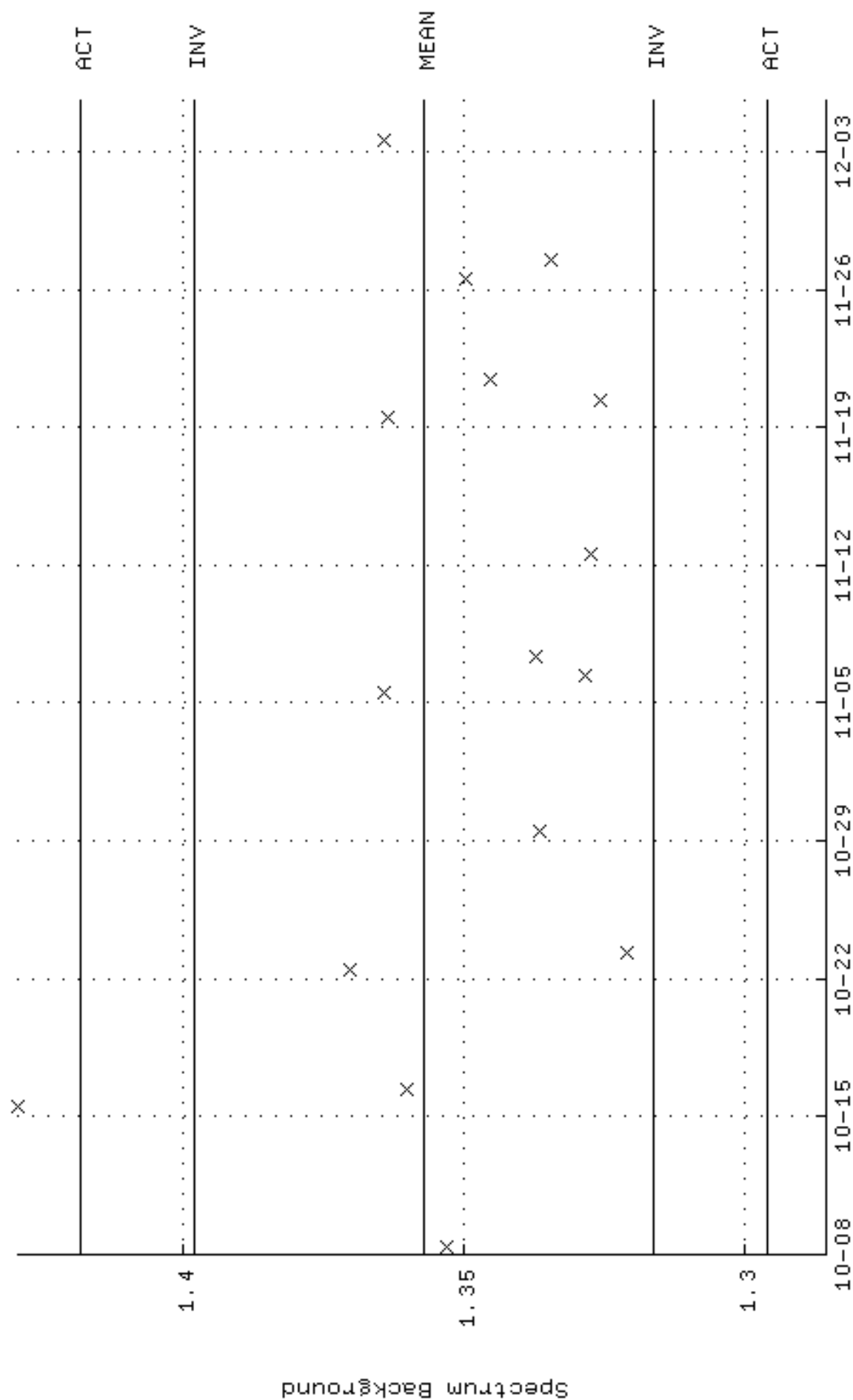
QA filename : DKA100:[CANBERRA,GAMMA,SCUSR,QA]QCC_GAM12_JAR.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-OCT-2023 06:31:48 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.37576 +- 8.111428E-02 (5.90 %)



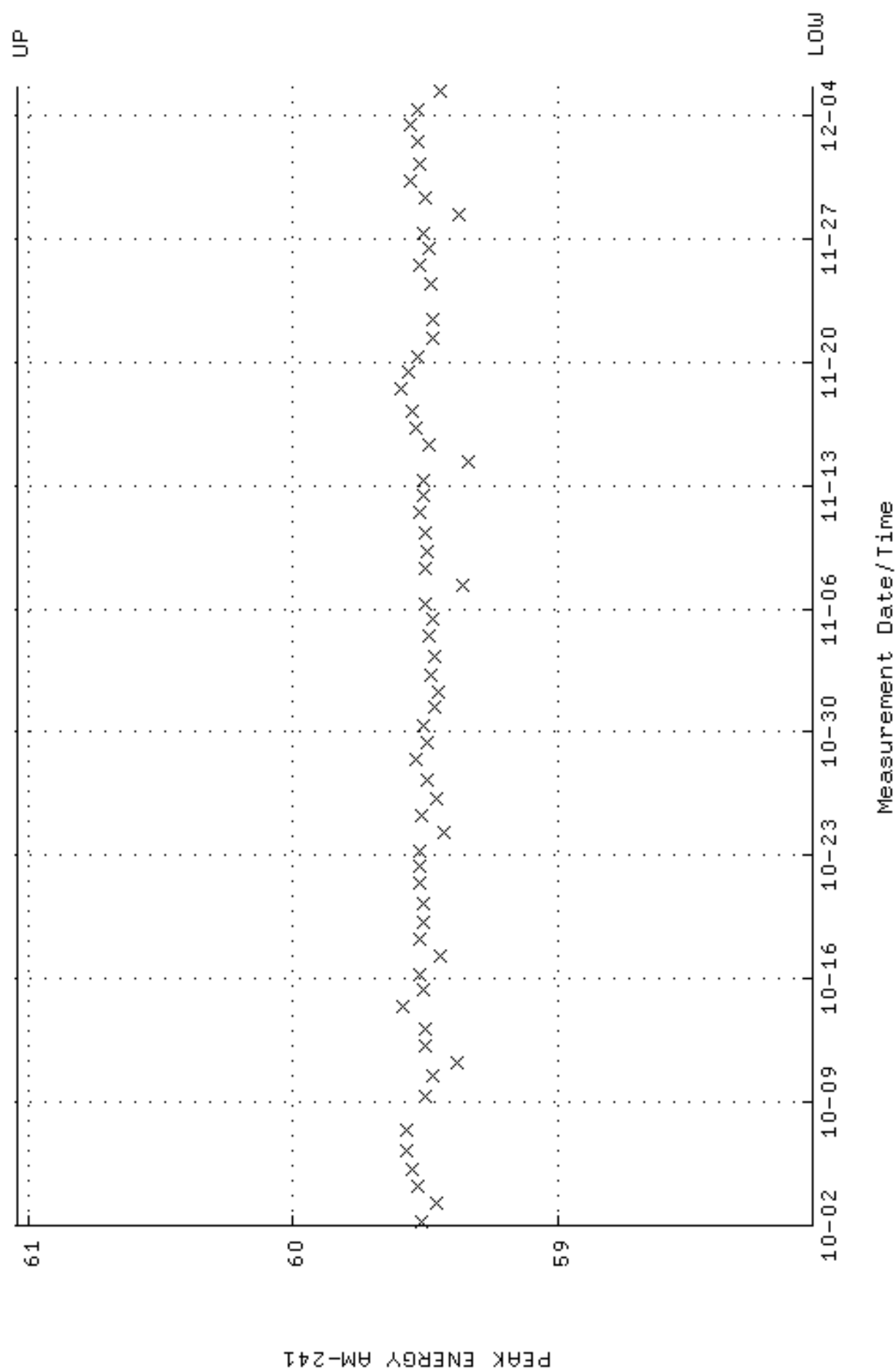
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 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-OCT-2023 06:31:48 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 56049.2 +- 2274.21 (4.06 %)



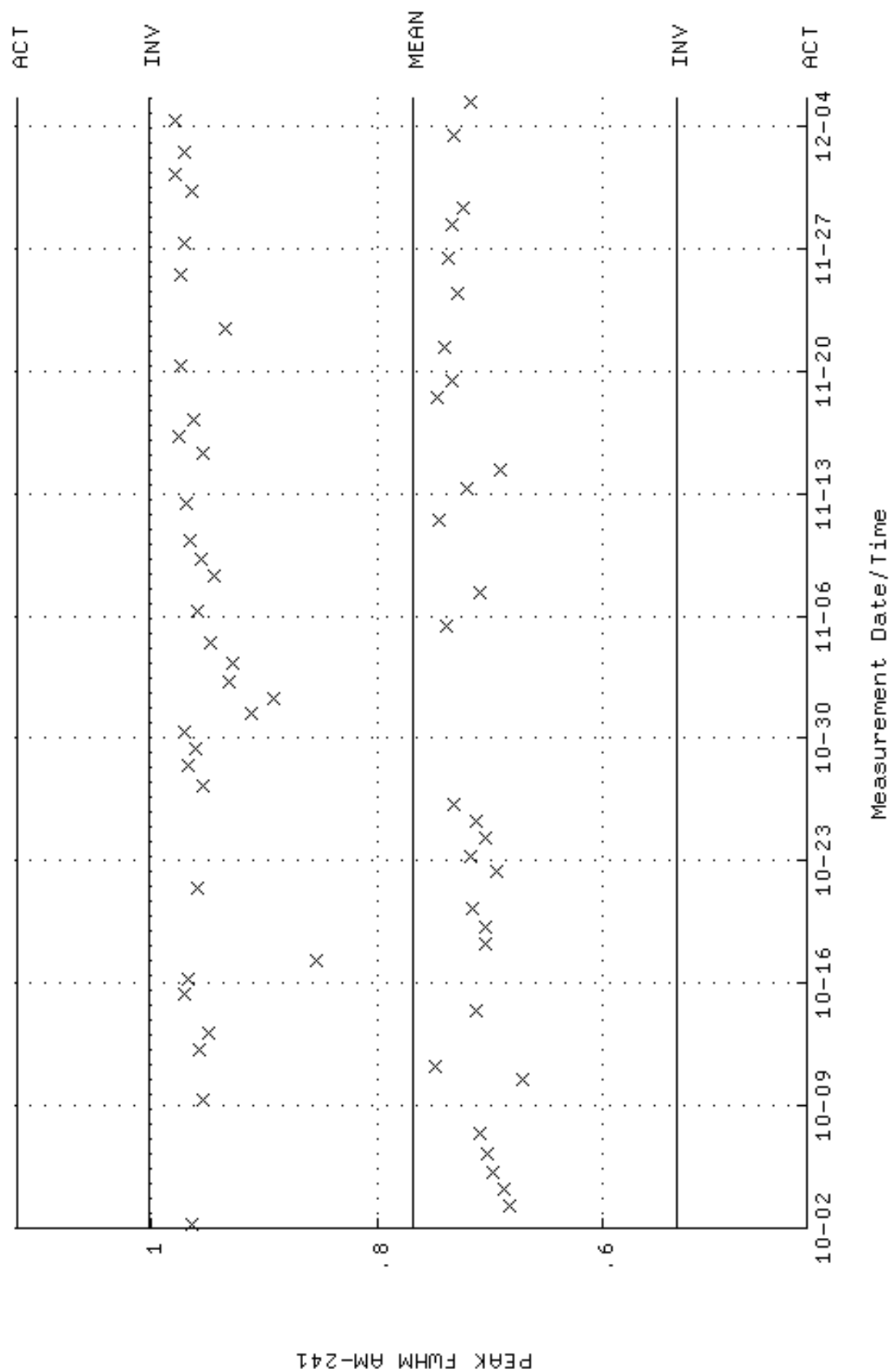
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 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 8-OCT-2023 09:36:53 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.35724 +- 2.036170E-02 (1.50 %)



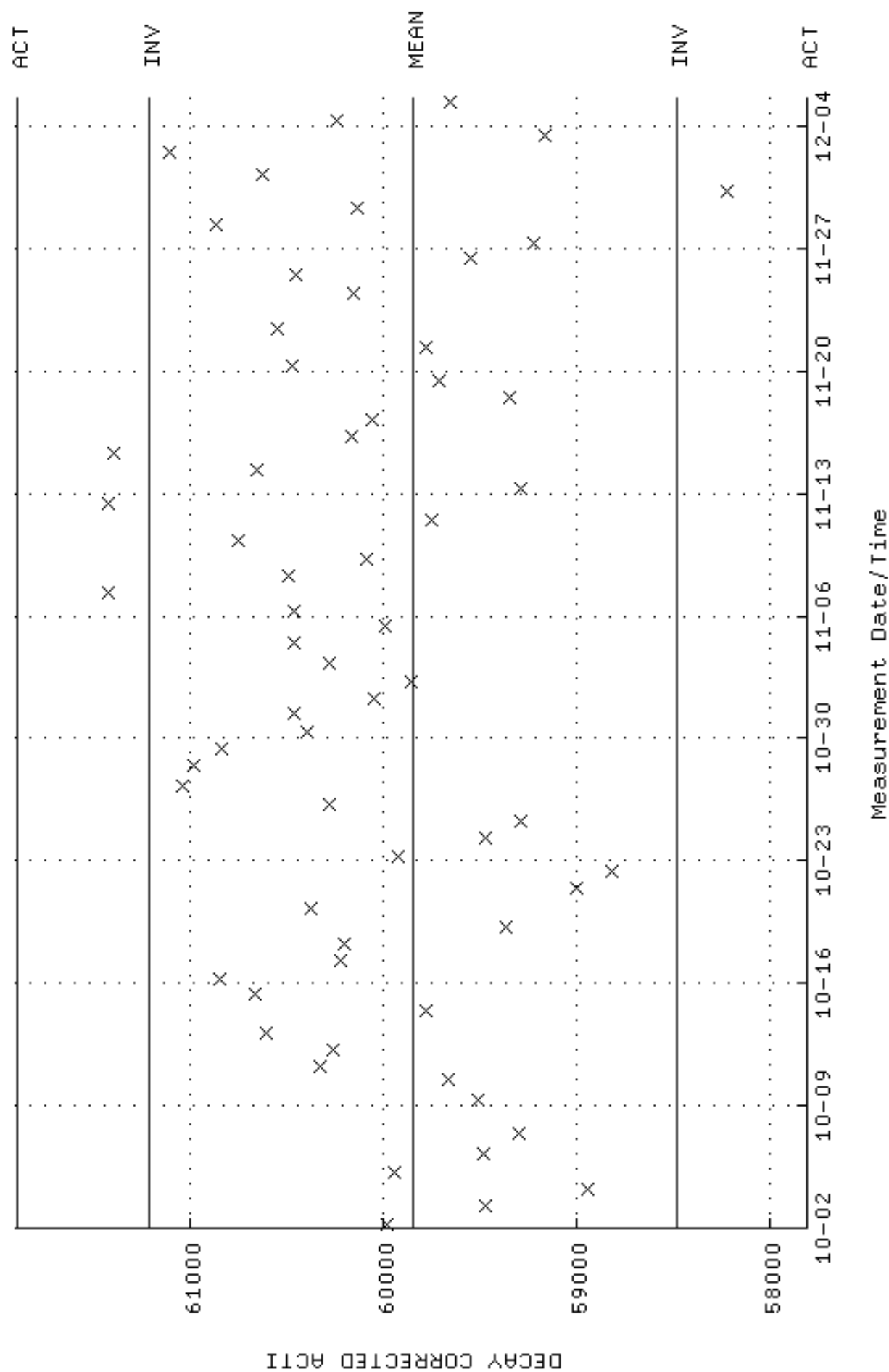
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM21_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-OCT-2023 04:55:14 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



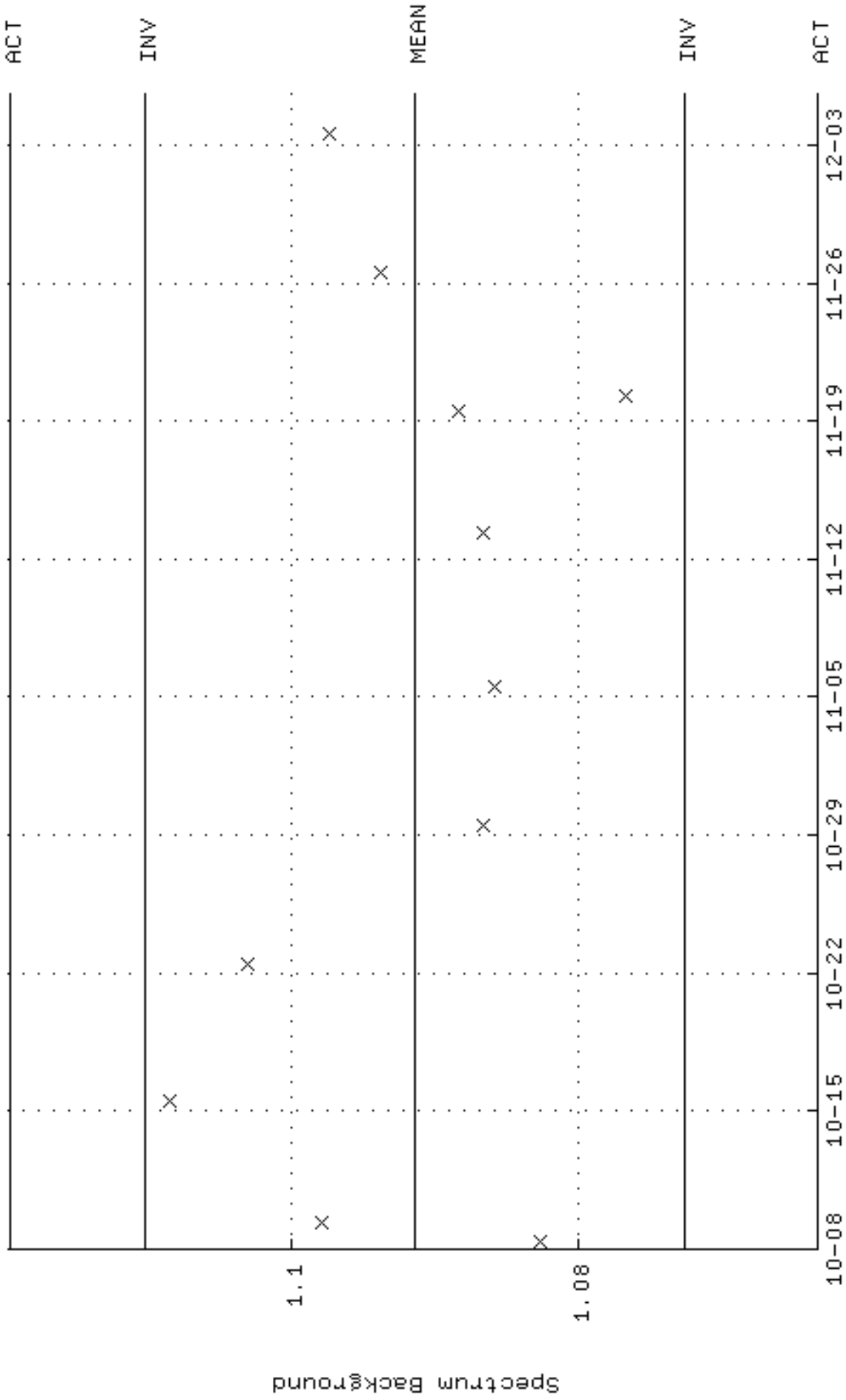
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM21_CAN.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-OCT-2023 04:55:14 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 0.769359 +- 0.116623 (15.16 %)



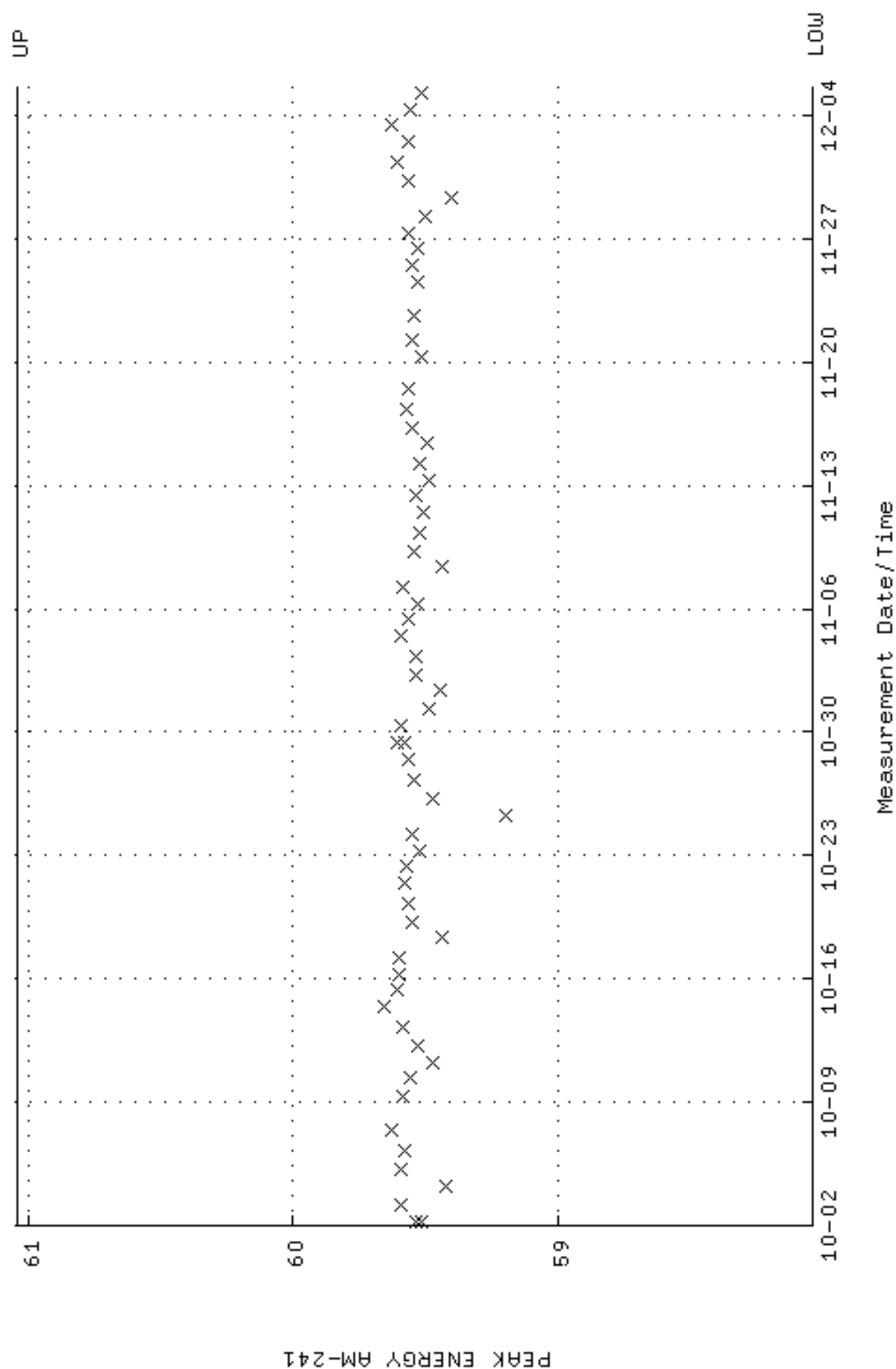
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM21-CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-OCT-2023 04:55:14 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 59847.2 +- 681.106 (1.14 %)



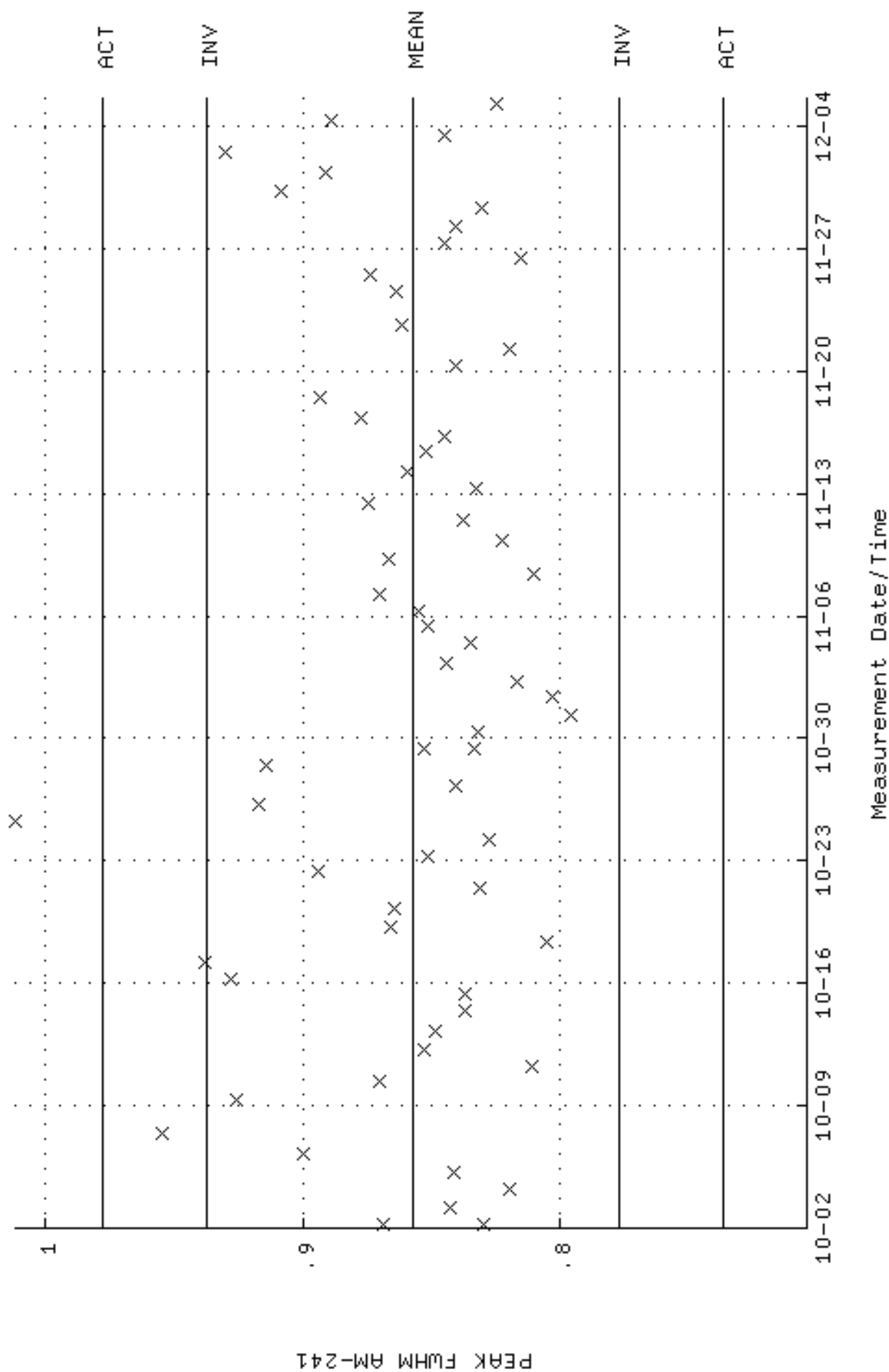
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM21.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 8-OCT-2023 09:37:24 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.09141 +- 9.379522E-03 (0.86 %)



QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM23_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-OCT-2023 05:27:38 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



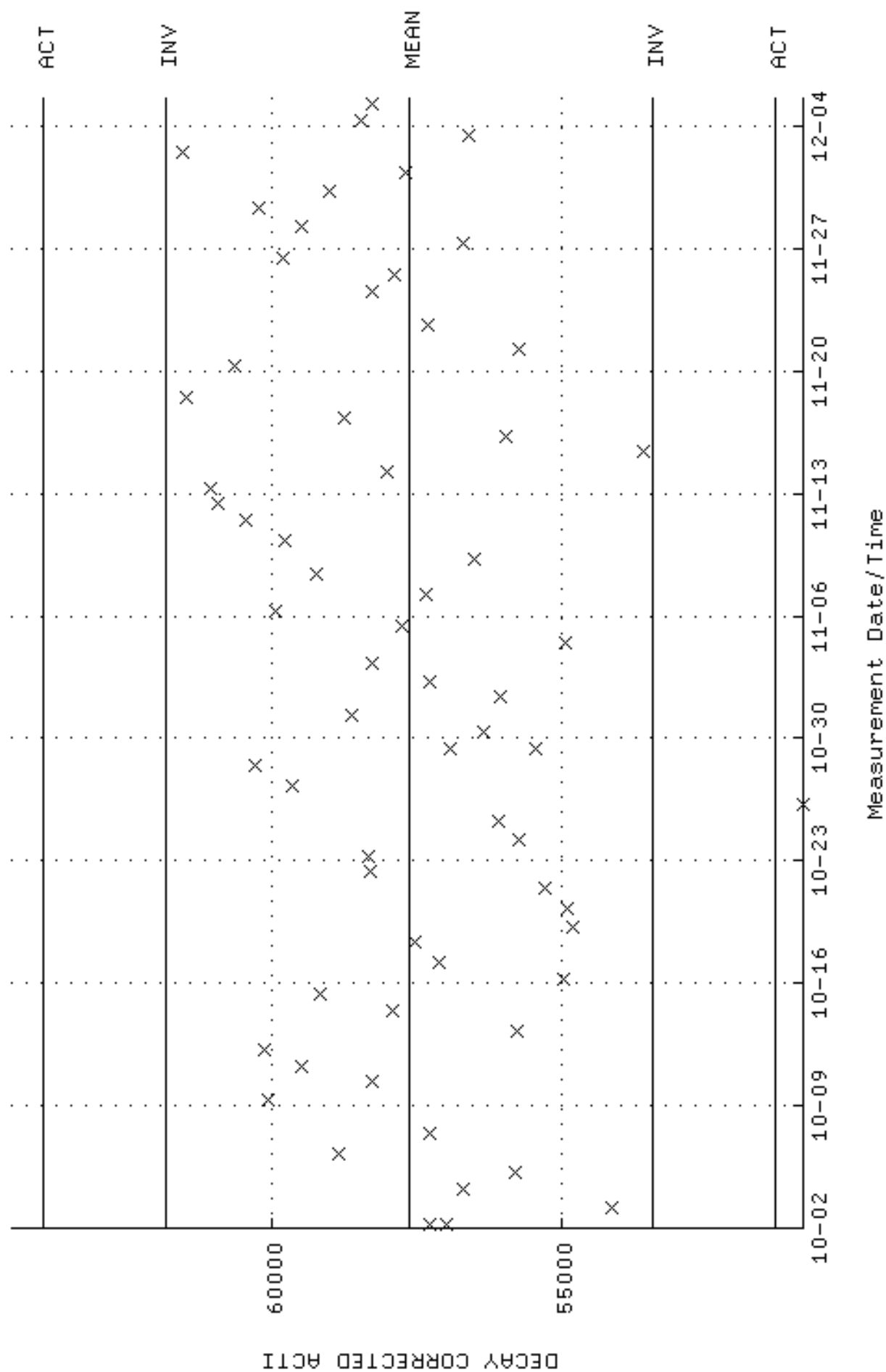
QA filename : DKA100:[CANBERRA,GAMMA,SCUSR,QA]QCC_GAM23_CAN.QAF;1
 Parameter Name : PSFUHM-59 (PEAK FUHM AM-241)
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 Mean +- Std Dev : 0.857576 +- 4.018595E-02 (4.69 %)



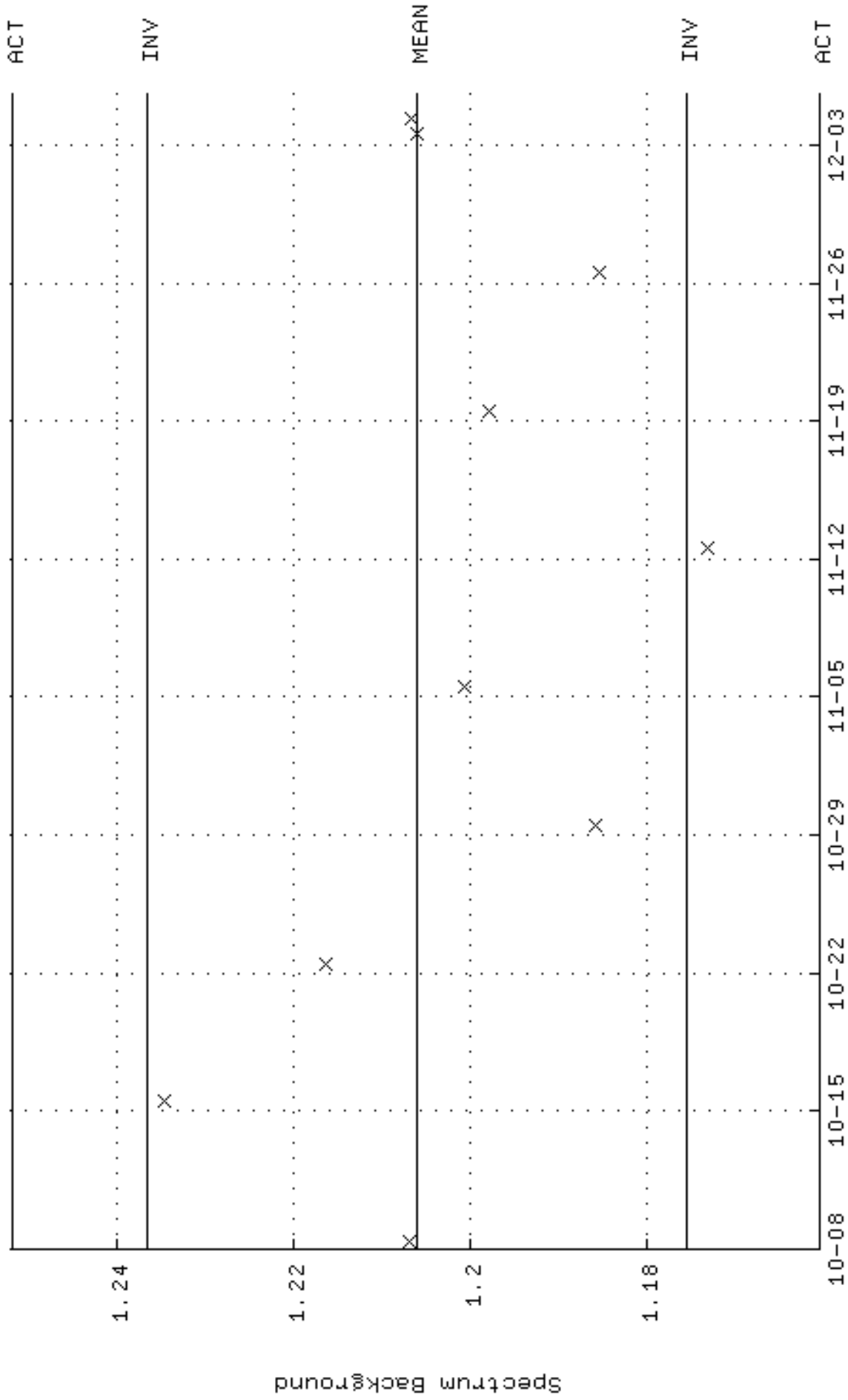
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QA filename      : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM23_CAN.QAF;1
Parameter Name   : NLACTVY-59 (DECAY CORRECTED ACTIVITY AM-241)
Start/End Dates  : 2-OCT-2023 05:27:38 through 5-DEC-2023 12:00:00
Mean +- Std Dev : 57639.9 +- 2100.85 (3.64 %)

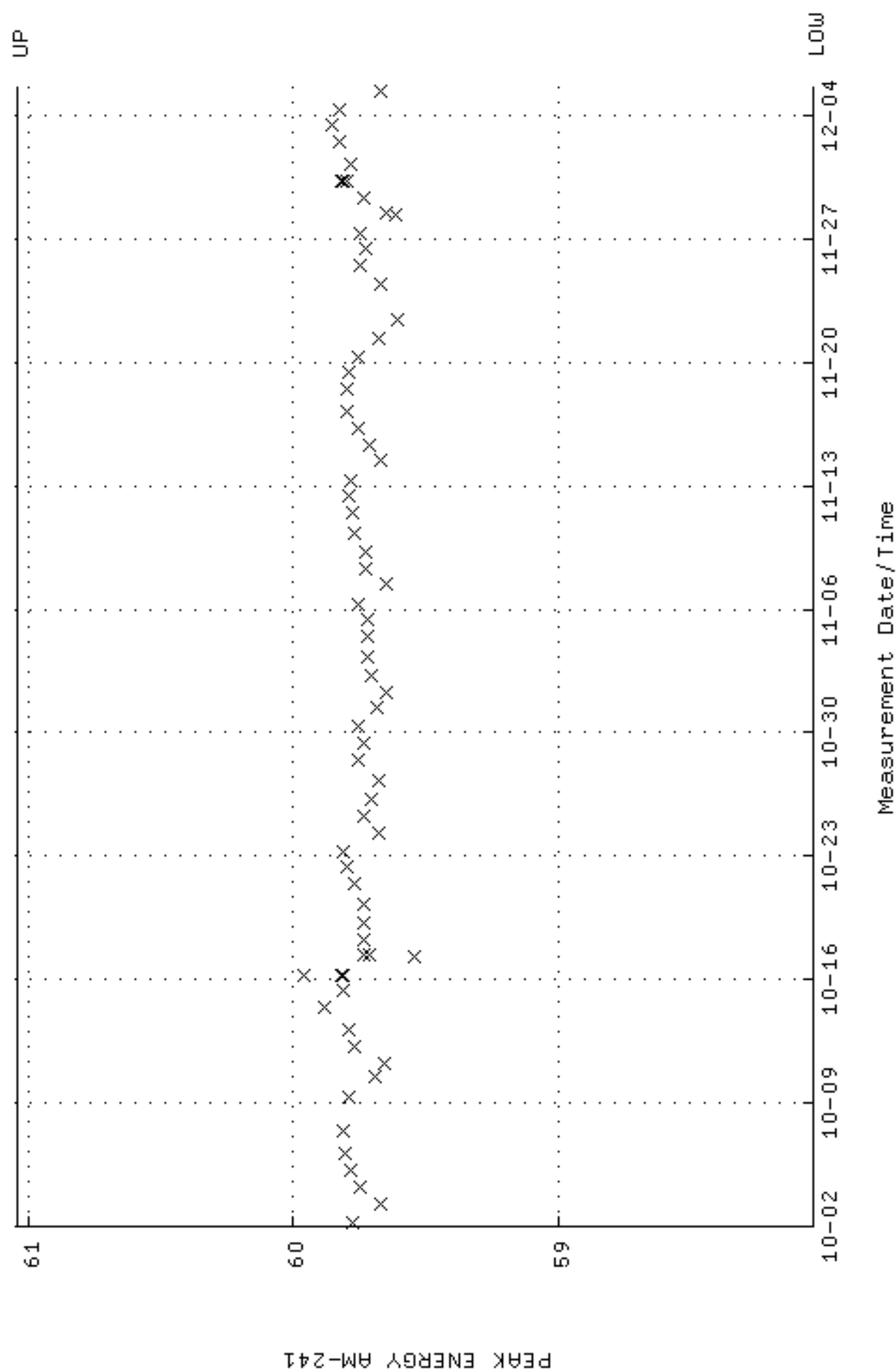
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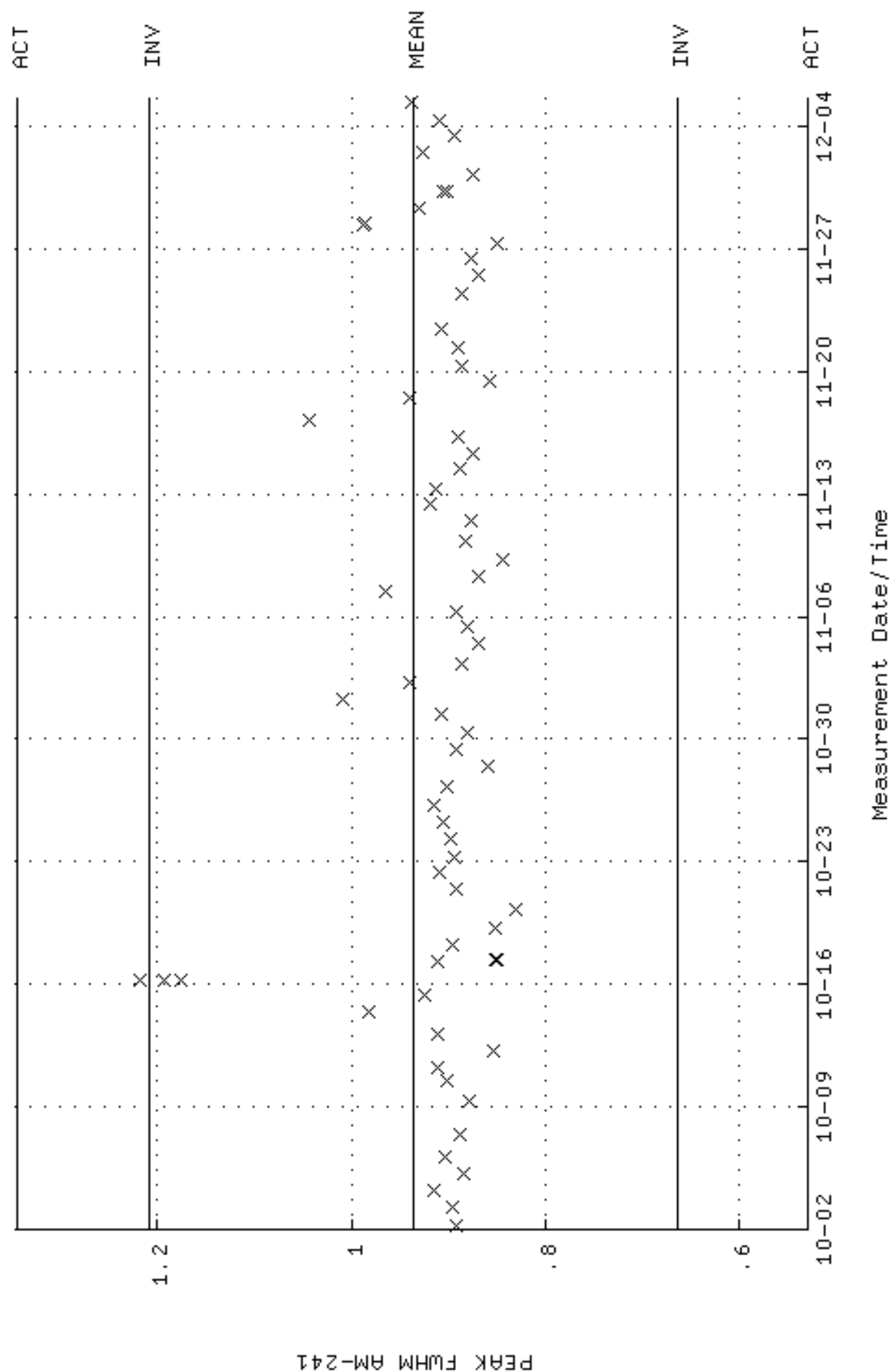
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM23.QAF;1
Parameter Name : BACKRATE (Spectrum Background Rate)
Start/End Dates : 8-OCT-2023 09:37:30 through 5-DEC-2023 12:00:00
Mean +- Std Dev : 1.20621 +- 1.524024E-02 (1.26 %)



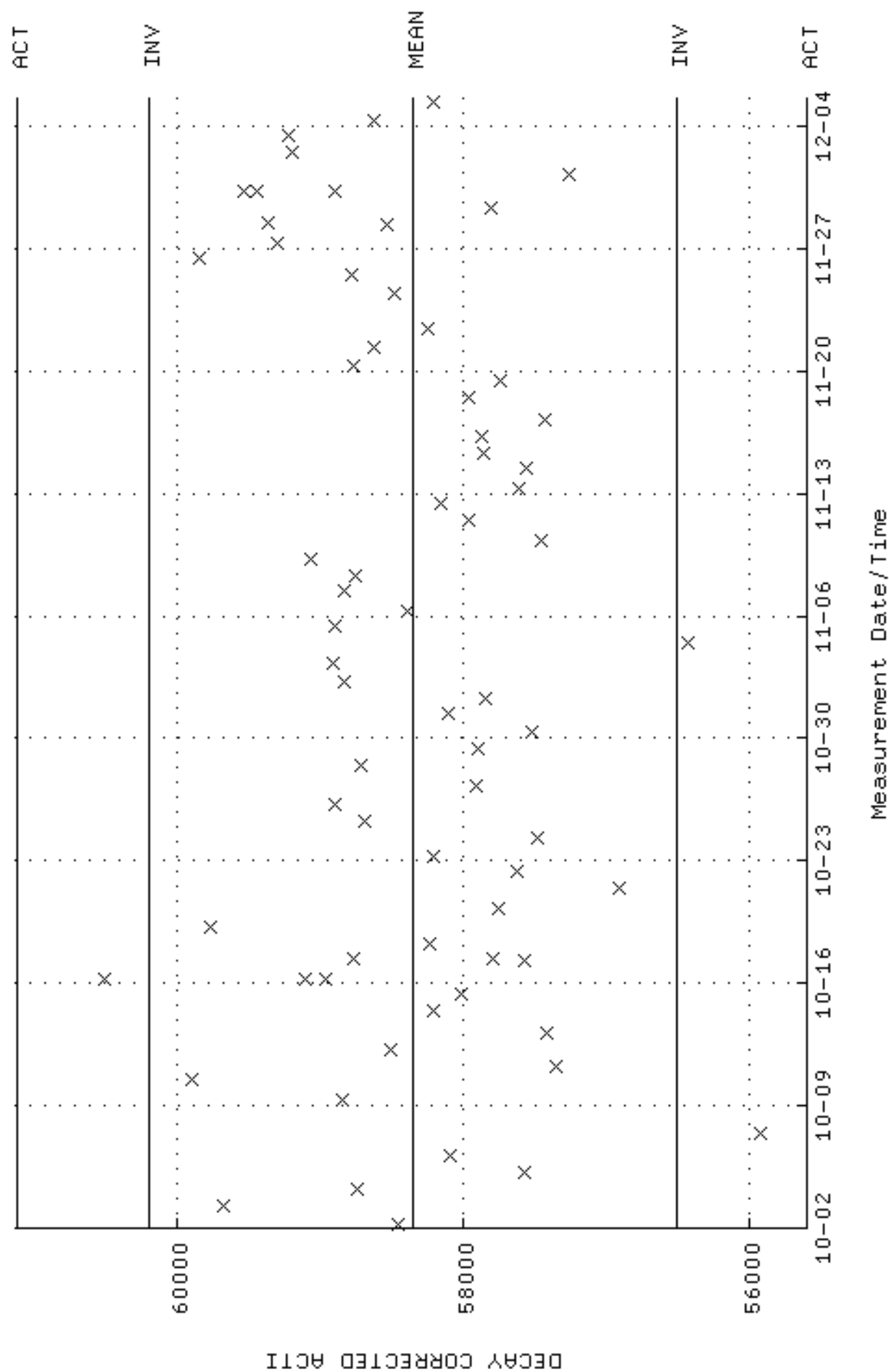
QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC_GAM31_CAN.QAF;1
 Parameter Name : PSENERGY-59 (PEAK ENERGY AM-241)
 Start/End Dates : 2-OCT-2023 04:55:28 through 5-DEC-2023 12:00:00
 Lower/Upper Lmts: 58.0400 through 61.0400



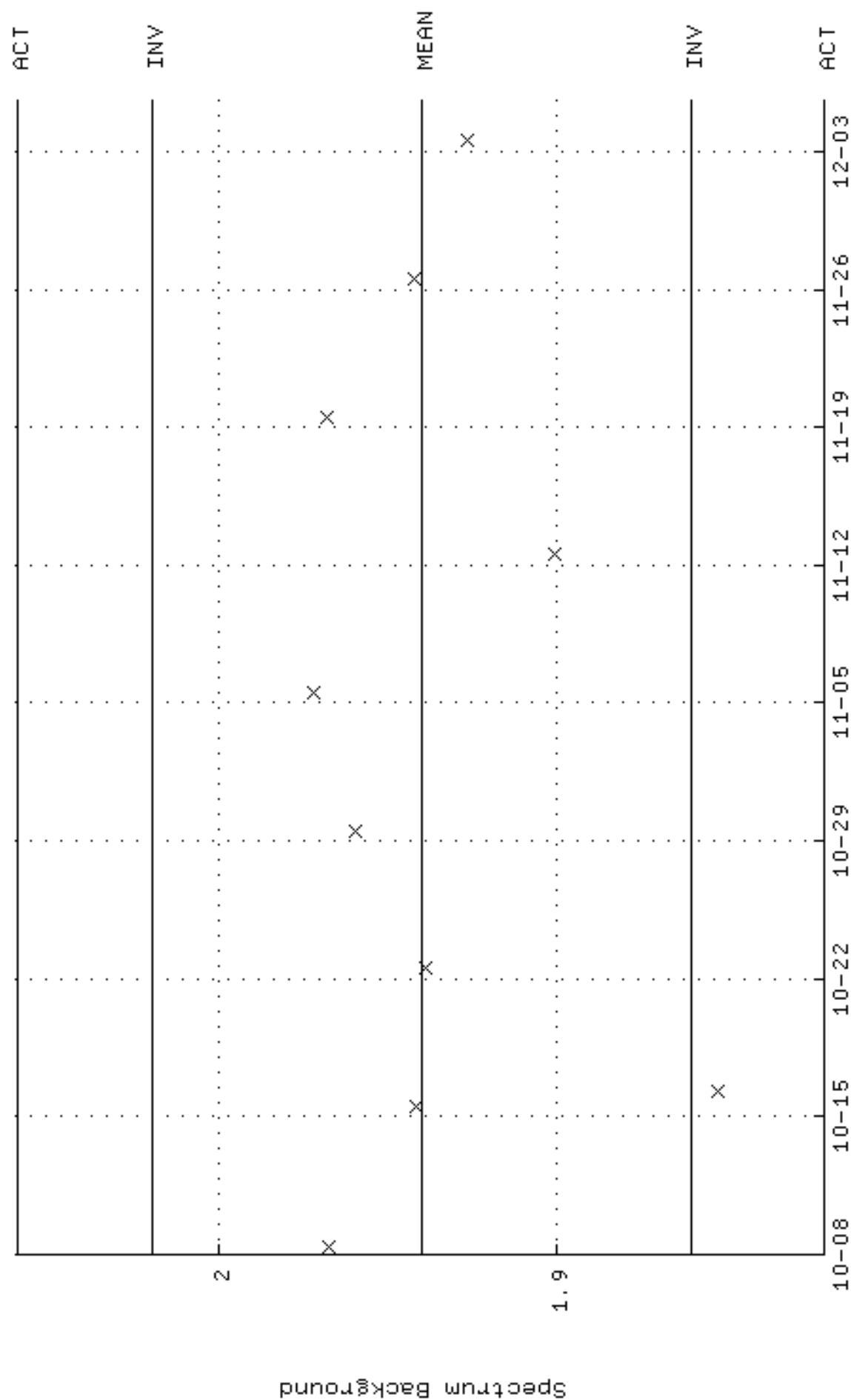
QA filename : DKA100:[CANSBERRA.GAMMA.SCUSR.QA]QCC_GAM31_CAN.QAF;1
 Parameter Name : PSFWM-59 (PEAK FWHM AM-241)
 Start/End Dates : 2-OCT-2023 04:55:28 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 0.936858 +- 0.135831 (14.50 %)



QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]QCC-GAM31-CAN.QAF;1
 Parameter Name : NLAIVITY-59 (DECAY CORRECTED ACTIVITY AM-241)
 Start/End Dates : 2-OCT-2023 04:55:28 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 58358.7 +- 920.014 (1.58 %)



QA filename : DKA100:[CANBERRA.GAMMA.SCUSR.QA]LBC_GAM31.QAF;1
 Parameter Name : BACKRATE (Spectrum Background Rate)
 Start/End Dates : 8-OCT-2023 09:37:50 through 5-DEC-2023 12:00:00
 Mean +- Std Dev : 1.93998 +- 3.976747E-02 (2.05 %)



RAD Standards Traceability

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

1556

84680-278

100 mL Solid in Aluminum Can

Customer: GEL Labs

P.O. No.: 489884RD, Item 3

Reference Date: 01-Apr-2011 12:00 PM EST **Grams of Master Source:** 0.0066498

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. 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 1, February, 1979, 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* $\mu\text{ps/gram}$	This Source μps	Uncertainty, %			Calibration Method
					Type	u_A	u_B	U
Pb-210	46.5	8.120E+03	—	1.129E+03	0.1	2.1	4.1	4 π LS
Am-241	59.5	1.580E+05	—	7.538E+02	0.1	1.7	3.5	4 π LS
Cd-109	88.0	4.626E+02	1.659E+05	1.103E+03	0.6	2.3	4.8	HPGe
Co-57	122.1	2.718E+02	8.949E+04	5.951E+02	0.6	2.0	4.2	HPGe
Ce-139	165.9	1.376E+02	1.247E+05	8.292E+02	0.6	1.9	4.0	HPGe
Hg-203	279.2	4.661E+01	2.899E+05	1.928E+03	0.6	1.9	4.0	HPGe
Sn-113	391.7	1.151E+02	1.739E+05	1.156E+03	0.6	1.9	4.0	HPGe
Cs-137	661.7	1.098E+04	1.107E+05	7.361E+02	0.8	1.9	4.1	HPGe
Y-88	898.0	1.066E+02	4.246E+05	2.824E+03	0.6	1.9	4.0	HPGe
Zn-65	1115.6	2.441E+02	—	1.445E+03	0.1	1.7	3.5	IC
Co-60	1173.2	1.925E+03	2.118E+05	1.408E+03	0.7	1.9	4.0	HPGe
Co-60	1332.5	1.925E+03	2.118E+05	1.408E+03	0.7	1.9	4.0	HPGe
Y-88	1836.1	1.066E+02	4.495E+05	2.989E+03	0.7	1.9	4.0	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4 π LS - 4 π 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)



PC-S-060-101

This standard will expire one year after the reference date.

Source Prepared by: M. Williford
M. Williford, Radiochemist

QA Approved: J. D. McCorvey
J. D. McCorvey, QA Manager Alternate

Date: 6/27/11



Standard Logbook

Serial ID: 1556 Open/Reference Date: 01-APR-11 Aliquot : 1 mL
Name: Mixed Gamma LCS CAN Received: 01-APR-11 Density : Hand Calculated
Type: Source Material Expires: 01-APR-37 Lot Number : 84680-278
Employee: Maggie Stamps Verified: 14-JUL-11
Supplier: Eckert & Zeigler Analytics
Description: 84680-278
Comments: None

Analyte	Concentration	Analyte	Concentration
Americium-241	125983.3 dpm/mL	Cesium-137	51898.9 dpm/mL
Cobalt-60	84496.9 dpm/mL		

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope	Result	Isotopic Abundance:
Pb-210	pCi/L	0.0425
Mixed Gamma N1	722900	1129
Mixed Gamma N2	752300	
Mixed Gamma N3	692100	

Mean Value (Counting) = 100.622 Pass
Stdev = Rule 3 (Pass/Fail)

Certificate Value = 717965.0 pCi/L
Lower Limit = 662227.9072 pCi/L
Upper Limit = 782638.7594 pCi/L
Rule 1 Pass/Fail Pass
Two sigma = 60205.42611
10 % of Mean = 72243.33333
Rule 2 (Pass/Fail) Pass

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

mg
7/20/11
H. Stamp
7/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton 7/14/2011	Isotope Am-241	Result pCi/L	Isotopic Abundance: Certificate Value (dps):	0.359 753.8
	Mixed Gamma N1	58390		
	Mixed Gamma N2	60740		
	Mixed Gamma N3	57770		
Mean Value (Counting) =	58966.67	pCi/L	103.9074	Pass
Sidev =	1566.727	pCi/L		Rule 3 (Pass/Fail)
Certificate Value =	56749.2	pCi/L		
Lower Limit =	55833.21277	pCi/L		
Upper Limit =	62100.12057	pCi/L		
Rule 1 Pass/Fail	Pass			
Two sigma =	3133.453898			
10 % of Mean =	5896.666667			
Rule 2 (Pass/Fail)	Pass			

Verification Rules

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- Rule 3 = The determined mean value shall be within 5% of the certificate value.

msH
7/20/11
U.S. Stamp
7/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope	Result
Cd-109	pCi/L
Mixed Gamma N1	818400
Mixed Gamma N2	798000
Mixed Gamma N3	764700

Isotopic Abundance:
Certificate Value (dps): 0.037
1103

Mean Value (Counting) = 98.51091 Pass
Sidev = pCi/L Rule 3 (Pass/Fail)
pCi/L

Certificate Value = pCi/L
Lower Limit = pCi/L
Upper Limit = pCi/L
Rule 1 Pass/Fail Pass
Two sigma = 54214.02033
10 % of Mean = 79370
Rule 2 (Pass/Fail) Pass

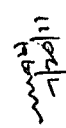
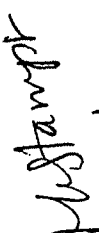
Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

WCH
7/20/11
Stamp
7/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton 7/14/2011	Isotope	Result	Isotopic Abundance: Certificate Value (dps):	0.856 595.1
	Co-57	pCi/L		
	Mixed Gamma N1	19090		
	Mixed Gamma N2	18820		
	Mixed Gamma N3	18830		
Mean Value (Counting) =		pCi/L	100.6592	Pass
Stdev =		pCi/L		Rule 3 (Pass/Fail)
Certificate Value =		pCi/L		
Lower Limit =		pCi/L		
Upper Limit =		pCi/L		
Rule 1 Pass/Fail				
Two sigma =				
10 % of Mean =				
Rule 2 (Pass/Fail)				



 7/20/11

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope Ce-139	Result pCi/L	
Mixed Gamma N1	28740	
Mixed Gamma N2	29410	Isotopic Abundance: 0.8
Mixed Gamma N3	27560	Certificate Value (dps): 829.2

Mean Value (Counting) = 101.9865 Pass
Stdev = Rule 3 (Pass/Fail)

Certificate Value =
Lower Limit =
Upper Limit =
Rule 1 Pass/Fail
Two sigma =
10 % of Mean =
Rule 2 (Pass/Fail)

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

7/20/11

Stamp
7/20/11

CAN

1556

Verification for Mixed Gamma Standard

Michael Hilton
7/14/2011

Isotope
Hg-203
Mixed Gamma N1
Mixed Gamma N2
Mixed Gamma N3

Result
pCi/L
66300
68180
64480

Isotopic Abundance:
Certificate Value (dps):
0.8156
1928

Mean Value (Counting) = 66320.00 pCi/L 103.8046 Pass
Stdev = 1850.081 pCi/L Rule 3 (Pass/Fail)

Certificate Value = 63889.3 pCi/L
Lower Limit = 62619.83784 pCi/L
Upper Limit = 70020.16216 pCi/L
Rule 1 Pass/Fail Pass
Two sigma = 3700.162159
10 % of Mean = 6632
Rule 2 (Pass/Fail) Pass

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
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- Rule 3 = The determined mean value shall be within 5% of the certificate value.

might
7/20/11
V. Stanev
7/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton 7/14/2011	Isotope Sn-113	Result pCi/L	Isotopic Abundance: Certificate Value (dps):
	Mixed Gamma N1	49560	0.6497
	Mixed Gamma N2	49620	1156
	Mixed Gamma N3	48300	
Mean Value (Counting) = Sidev =	49160.00 745.386	pCi/L pCi/L	Pass Rule 3 (Pass/Fail)
Certificate Value =	48088.7	pCi/L	
Lower Limit =	47669.22839	pCi/L	
Upper Limit =	50650.77161	pCi/L	
Rule 1 Pass/Fail	Pass		
Two sigma =	1490.771612		
10 % of Mean =	4916		
Rule 2 (Pass/Fail)	Pass		

7/20/11
7/20/11
7/20/11

Verification Rules

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- Rule 3 = The determined mean value shall be within 5% of the certificate value.

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope	Result	Isotopic Abundance:
Cs-137	pCi/L	Certificate Value (dps):
Mixed Gamma N1	23710	0.851
Mixed Gamma N2	23950	736.1
Mixed Gamma N3	24040	

Mean Value (Counting) = 102.2333 Pass
Sidev = Rule 3 (Pass/Fail)

Certificate Value =
Lower Limit =
Upper Limit =
Rule 1 Pass/Fail
Two sigma =
10 % of Mean =
Rule 2 (Pass/Fail)

23900.00
170.587

23377.9
23558.82556
24241.17444
Fail
341.1744422
2390
Pass

*exception taken due to full recovery of standard

7/20/11

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
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7/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton 7/14/2011	Isotope Y-88 (898)	Result pCi/L	Isotopic Abundance: Certificate Value (dps):
	Mixed Gamma N1	82690	0.937
	Mixed Gamma N2	81320	2824
	Mixed Gamma N3	80940	

Mean Value (Counting) = 100.2381 Pass
Sidev = Rule 3 (Pass/Fail)

Certificate Value =
Lower Limit =
Upper Limit =
Rule 1 Pass/Fail
Two sigma =
10 % of Mean =
Rule 2 (Pass/Fail)

7/20/11

7/20/11

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope	Result	Isotopic Abundance:
Co-60 (1173)	pCi/L	
Mixed Gamma N1	38910	0.9985
Mixed Gamma N2	39750	1408
Mixed Gamma N3	38840	

Mean Value (Counting) = 102.7694 Pass
 Stdev = Rule 3 (Pass/Fail)

Certificate Value =
 Lower Limit =
 Upper Limit =
 Rule 1 Pass/Fail
 Two sigma =
 10 % of Mean =
 Rule 2 (Pass/Fail)

*exception taken due to full recovery of standard

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

1/20/11

1/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton
7/14/2011

Isotope	Result	Isotopic Abundance: Certificate Value (dps):
Co-60 (1332.50)	pCi/L	0.9998
Mixed Gamma N1	38940	1408
Mixed Gamma N2	40200	
Mixed Gamma N3	39150	

Mean Value (Counting) =
Stdev =

pCi/L 103.595 Pass
pCi/L Rule 3 (Pass/Fail)

Certificate Value =
Lower Limit =
Upper Limit =
Rule 1 Pass/Fail
Two sigma =
10 % of Mean =
Rule 2 (Pass/Fail)

38061.7
38079.88889
40780.11111
Fail
1350.111107
3943
Pass

*exception taken due to full recovery of standard

7/20/11

Verification Rules

- Rule 1 = The certificate value (NOT including any uncertainty) shall lie within the 95% confidence interval determined from the mean and two sigma standard deviation of the three measurements
- Rule 2 = The two sigma value used for the 95% confidence interval shall not exceed 10% of the mean value of the three verification measurements.
- Rule 3 = The determined mean value shall be within 5% of the certificate value.

1/20/11

Verification for Mixed Gamma Standard 1556 CAN

Michael Hilton 7/14/2011		Isotope Y-88 (1836.1)	Result pCi/L	Isotopic Abundance: Certificate Value (dps): 0.992 2989
		Mixed Gamma N1	82870	
		Mixed Gamma N2	83080	
		Mixed Gamma N3	84640	
Mean Value (Counting) =		83530.00	pCi/L	Pass Rule 3 (Pass/Fail)
Stdev =		967.006	pCi/L	
Certificate Value =		81435.3	pCi/L	*exception taken due to full recovery of standard
Lower Limit =		81595.98862	pCi/L	
Upper Limit =		85464.01138	pCi/L	
Rule 1 Pass/Fail		Fail		
Two sigma =		1934.011375		mgH 7/20/11 H. H. H. 7/20/11
10 % of Mean =		8353		
Rule 2 (Pass/Fail)		Pass		

Verification Rules

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- Rule 3 = The determined mean value shall be within 5% of the certificate value.

Standard Logbook

Serial ID: 1556 **Open/Reference Date:** 01-APR-11 **Aliquot :** 1 mL
Name: Mixed Gamma LCS CAN **Received:** 01-APR-11 **Density :** Hand Calculated
Type: Source Material **Expires:** 01-APR-37 **Lot Number :** 84680-278
Employee: Maggie Stamps **Verified:** 14-JUL-11
Supplier: Eckert & Zeigler Analytics
Description: 84680-278
Comments: None

Analyte	Concentration	Analyte	Concentration
Americium-241	125983.3 dpm/mL	Cesium-137	51898.9 dpm/mL
Cobalt-60	84496.9 dpm/mL		

Runlogs

Instrument Run Log

Instrument Type: GAMMA SPECTROMETER

Batch ID: 2529194

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
645981001	SAMPLE	RXF2	GAM21	DEC-12-23 19:28:47	DONE CAN		03-JUL-23 00:00
645981002	SAMPLE	RXF2	GAM23	DEC-12-23 19:29:15	DONE CAN		06-SEP-23 00:00
645981003	SAMPLE	RXF2	GAM31	DEC-12-23 19:30:01	DONE CAN		05-JUN-23 00:00
645981004	SAMPLE	RXF2	GAM06	DEC-13-23 05:01:46	DONE CAN		25-SEP-23 00:00
1205581249	MB	RXF2	GAM11	DEC-13-23 05:02:45	DONE CAN		21-AUG-23 00:00
1205581250	DUP	RXF2	GAM12	DEC-13-23 05:03:21	DONE CAN		11-OCT-23 00:00
1205581251	LCS	RXF2	GAM21	DEC-13-23 06:01:53	DONE CAN		03-JUL-23 00:00

Addendum: MOD-PAC Aerial Map of Facility and Locations



- MJW RSO Alexander Bartels gathered all background readings near the remediated sports fields on Monday, November 13, 2023.
- MJW Radiological Control Technicians will gather daily Background and QC readings at the same location when further investigations/digging is required.

Photo of TENORM after Segregation 2/8/23



*MJW added stations and rope barriers on 2/15/23 with TENORM posting

Single Channel Scaler Instrumentation Set-Up Sheet

Inst. Model/SN: Ludlum 2241-2/44-10

Detector Model/SN: 196664/PR413155

High Voltage:

Date/Time: 11/13/2023

Source Type: Th-232

Activity: Unknown

Source ID: MJW 6

Technician: A Bartels

Record 10, one-minute background counts:

1	4990
2	5230
3	5100
4	5250
5	5080
6	5050
7	5130
8	4980
9	5200
10	5280

Record 10, one-minute gross source counts:

1	80120
2	80230
3	79800
4	79950
5	80010
6	80190
7	79990
8	80080
9	80100
10	80020

Calculate the average background count:

Avg: 5129.0

Calculate the average background count:

Avg: 80049

Calculate the Background Range +/- 20%*

Low: 4103
High: 6155

Calculate the Source Count Range +/- 20%*

Low: 64039
High: 96058

* Instrument is analog. Ranges adjusted to nearest whole number detectable per instrument scale.

RSO or designee Review/Date: Alexander Bartels 11/25/23

Single Channel Scaler Response Test Sheet

Inst. Model/SN: 2241-10/222619
Detector Model/SN: 44-10/PR413155
High Voltage:

Source Type: Th-232
Activity:
Source ID: MJW 6

Background Range +/- 20%*

Low: 4103

High: 6155

Source Count Range +/- 20%*

Low: 64039

High: 96058

* Instrument is analog. Ranges adjusted to nearest whole number detectable per instrument scale.

[illegible]

S = Satisfactory

U = Unsatisfactory

N/A = Not applicable for this instrument

RSO or designee Review/Date: Alexander Bartels 11/25/23

Multiscale Set-Up and Response Test Sheet

Inst. Model/SN: Bicron / 19264

Detector Model/SN: N/A

High Voltage: Yes

Source Type: Th-232

Activity: Unknown

Source ID: MJW 6

Date/Time: 11/13/23 @ 1200

Technician: AB

Units: $\mu\text{rem/hr}$

	Scale 1 (x 0.1)		Scale 2 (x 1.0)		Scale 3 (x 10)		Scale 4 (x 100)		Scale 5 (x 1000)	
Background	5		N/A		N/A		N/A		N/A	
Background Range +/- 20%	Low	High	Low	High	Low	High	Low	High	Low	High
	4	6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Source Gross	N/A		N/A		250		N/A		N/A	
Source Range +/- 20%	Low	High	Low	High	Low	High	Low	High	Low	High
	N/A	N/A	N/A	N/A	200	300	N/A	N/A	N/A	N/A

Response Test

Date	Time	Cal. Due	High Voltage (S/U)	Battery Check (S/U)	BKG	Scale 1 (x 0.1)	Scale 2 (x 1.0)	Scale 3 (x 10)	Scale 4 (x 100)	Scale 5 (x 1000)	Inst. QC (S/U)	Tech
11/13/23	1200	09/28/24	S	S	5	N/A	N/A	250	N/A	N/A	S	AB
11/20/23	0800	09/28/24	S	S	5	N/A	N/A	250	N/A	N/A	S	EO
11/21/23	0800	09/28/24	S	S	5	N/A	N/A	250	N/A	N/A	S	EO

S = Satisfactory

U = Unsatisfactory

N/A = Not applicable for this instrument

RSO or designee Review/Date: Alexander Bartels 11/25/23