

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples
according to the schedule indicated:

SHIP DATE: 9/25/98
REPORT DUE: 10/25/98
TURN AROUND REQ'D: 30 days

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

These samples are on:

LANL Request Number: 4662R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MR3R12082642

RAD SCREENING: Not Required

COMMENTS: 15 - 1086 , GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: 

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0029	01	S	9/23/98	
H3		RE15-98-0029	02	S	9/23/98	
ISOU		RE15-98-0029	04	S	9/23/98	
GAMMA SPE		RE15-98-0030	01	S	9/23/98	
H3		RE15-98-0030	02	S	9/23/98	
ISOU		RE15-98-0030	04	S	9/23/98	
GAMMA SPE		RE15-98-0031	01	S	9/23/98	
H3		RE15-98-0031	02	S	9/23/98	
ISOU		RE15-98-0031	04	S	9/23/98	
GAMMA SPE		RE15-98-0032	01	S	9/23/98	
H3		RE15-98-0032	02	S	9/23/98	
ISOU		RE15-98-0032	04	S	9/23/98	
GAMMA SPE		RE15-98-0033	01	S	9/23/98	
H3		RE15-98-0033	02	S	9/23/98	
ISOU		RE15-98-0033	04	S	9/23/98	
GAMMA SPE		RE15-98-0034	01	S	9/23/98	
H3		RE15-98-0034	02	S	9/23/98	
ISOU		RE15-98-0034	04	S	9/23/98	
GAMMA SPE		RE15-98-0035	01	S	9/23/98	
H3		RE15-98-0035	02	S	9/23/98	
ISOU		RE15-98-0035	04	S	9/23/98	
GAMMA SPE		RE15-98-0036	01	S	9/23/98	
H3		RE15-98-0036	02	S	9/23/98	
ISOU		RE15-98-0036	04	S	9/23/98	

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0037	01	S	9/23/98	
H3		RE15-98-0037	02	S	9/23/98	
ISOU		RE15-98-0037	04	S	9/23/98	

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By:

Date Time

SI Hogelberg *[Signature]* 9-25-98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

Friday, September 25, 1998

COC DOC NUMBER: 4862RC

REQUEST NUMBER: 4862R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE		
RE15-98-0035	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0036	02	500 ml Polyethylene	H3	None	S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0037	02	500 ml Polyethylene	H3	None	S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None	S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4862R

Page 2

Relinquished By:

Date Time

SI Hagelberg S. Hag 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

Los Alamos National Laboratory Environmental Restoration (Los Alamos, NM 87545)
CHAIN OF CUSTODY/REQUEST FOR ANALYSIS

Technical Area 15	Send Lab Report to Nancy Ness	Field Unit Leader Roy Michelotti
Operable Unit 1086	M892	(505)665-7444
Date 09/23/98	LANL Destination SMO	Turnaround 30 days
OU Contact John McCann	LANL Contact John Miglio	Lab Report Required 10/23/98
Contact Phone No (505) 665-1091	LANL Mail Stop	Charge Code MP3R12082642

Relinquished by: L. Karl Messers (Signature): <i>[Signature]</i> Affiliation: ICF Kaiser Engineers, Inc	Date: 9-25-98 Time: 13:55	Relinquished by: (Signature): Affiliation:	Date: (Signature): Affiliation:	Date:
Received by: (Signature): <i>[Signature]</i> Affiliation:	Time:	Received by: (Signature):	Time:	Time:
POSSIBLE HAZARD IDENTIFICATION: (please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances): Radiological _____ Highly Toxic _____ Flammable _____ Skin Irritant _____ Non-Hazard _____ Other _____				
SCREENING METHOD: NA			DISPOSAL: Disposal by Lab	
Comments:				

Field Unique Sample #/ID	Cont ID	Date & Time Collected	Sample Container Volume/Material	Matrix	Preserv	ANALYSIS REQUESTED: (SMO Order Codes)	REMARKS (Conditions of receipt, etc.)
RE15-98-0029	01	09/23/98 1345	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0029	02	09/23/98 1345	500 ml Polyethylene	Soil	None	H3	
RE15-98-0029	03	09/23/98 1345	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0029	04	09/23/98 1345	125 ml Polyethylene	Soil	None	ISOU	
RE15-98-0029	05	09/23/98 1345	125 ml Polyethylene	Soil	Ice	METAL	
RE15-98-0029	06	09/23/98 1345	125 ml Glass	Soil	Ice	PESTPCB	
RE15-98-0029	07	09/23/98 1345	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0029	08	09/23/98 1345	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
RE15-98-0030	01	09/23/98 1400	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0030	02	09/23/98 1400	500 ml Polyethylene	Soil	None	H3	
RE15-98-0030	03	09/23/98 1400	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0030	04	09/23/98 1400	125 ml Polyethylene	Soil	None	ISOU	

Original - LANL Destination

Yellow - RPF

Pink - FTL Copy

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Field Unique Sample #/ID	Cont ID	Date & Time Collected	Sample Container Volume/Material	Matrix	Preserv	ANALYSIS REQUESTED: (SMO Order Codes)	REMARKS (Conditions of receipt, etc.)
~RE15-98-0030	05	09/23/98 1400	125 ml Polyethylene	Soil	Ice	METAL	
~RE15-98-0030	06	09/23/98 1400	125 ml Glass	Soil	Ice	PESTPCB	
~RE15-98-0030	07	09/23/98 1400	125 ml Glass	Soil	Ice	SEMIN	
~RE15-98-0030	08	09/23/98 1400	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
~RE15-98-0031	01	09/23/98 1410	500 ml Polyethylene	Soil	None	GSPEC	
~RE15-98-0031	02	09/23/98 1410	500 ml Polyethylene	Soil	None	H3	
~RE15-98-0031	03	09/23/98 1410	125 ml Glass	Soil	Ice	HEXP	
~RE15-98-0031	04	09/23/98 1410	125 ml Polyethylene	Soil	None	ISOU	
~RE15-98-0031	05	09/23/98 1410	125 ml Polyethylene	Soil	Ice	METAL	
~RE15-98-0031	06	09/23/98 1410	125 ml Glass	Soil	Ice	PESTPCB	
~RE15-98-0031	07	09/23/98 1410	125 ml Glass	Soil	Ice	SEMIN	
~RE15-98-0031	08	09/23/98 1410	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
~RE15-98-0032	01	09/23/98 1435	500 ml Polyethylene	Soil	None	GSPEC	
~RE15-98-0032	02	09/23/98 1435	500 ml Polyethylene	Soil	None	H3	
~RE15-98-0032	03	09/23/98 1435	125 ml Glass	Soil	Ice	HEXP	
~RE15-98-0032	04	09/23/98 1435	125 ml Polyethylene	Soil	None	ISOU	
~RE15-98-0032	05	09/23/98 1435	125 ml Polyethylene	Soil	Ice	METAL	
~RE15-98-0032	06	09/23/98 1435	125 ml Glass	Soil	Ice	PESTPCB	
~RE15-98-0032	07	09/23/98 1435	125 ml Glass	Soil	Ice	SEMIN	
~RE15-98-0032	08	09/23/98 1435	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
~RE15-98-0033	01	09/23/98 1451	500 ml Polyethylene	Soil	None	GSPEC	
~RE15-98-0033	02	09/23/98 1451	500 ml Polyethylene	Soil	None	H3	
~RE15-98-0033	03	09/23/98 1451	125 ml Glass	Soil	Ice	HEXP	
~RE15-98-0033	04	09/23/98 1451	125 ml Polyethylene	Soil	None	ISOU	
~RE15-98-0033	05	09/23/98 1451	125 ml Polyethylene	Soil	Ice	METAL	

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OU Contact John McCann	LANL Contact John Milglio	Lab Report Required 10/23/98
Contact Phone No (505) 565-1091	LANL Mail Stop	Charge Code MR3R12082642

Field Unique Sample #/ID	Cont ID	Date & Time Collected	Sample Container Volume/Material	Matrix	Preserv	ANALYSIS REQUESTED: (SMO Order Codes)	REMARKS (Conditions of receipt, etc.)
RE15-98-0033	06	09/23/98 1451	125 ml Glass	Soil	Ice	PESTPCB	
RE15-98-0033	08	09/23/98 1451	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0033	09	09/23/98 1451	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
RE15-98-0034	01	09/23/98 1505	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0034	02	09/23/98 1505	500 ml Polyethylene	Soil	None	H3	
RE15-98-0034	03	09/23/98 1505	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0034	04	09/23/98 1505	125 ml Polyethylene	Soil	None	ISOU	
RE15-98-0034	05	09/23/98 1505	125 ml Polyethylene	Soil	Ice	METTAL	
RE15-98-0034	06	09/23/98 1505	125 ml Glass	Soil	Ice	PESTPCB	
RE15-98-0034	08	09/23/98 1505	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0034	09	09/23/98 1505	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
RE15-98-0035	01	09/23/98 1525	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0035	02	09/23/98 1525	500 ml Polyethylene	Soil	None	H3	
RE15-98-0035	03	09/23/98 1525	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0035	04	09/23/98 1525	125 ml Polyethylene	Soil	None	ISOU	
RE15-98-0035	05	09/23/98 1525	125 ml Polyethylene	Soil	Ice	METTAL	
RE15-98-0035	06	09/23/98 1525	125 ml Glass	Soil	Ice	PESTPCB	
RE15-98-0035	07	09/23/98 1525	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0035	08	09/23/98 1525	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
RE15-98-0036	01	09/23/98 1540	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0036	02	09/23/98 1540	500 ml Polyethylene	Soil	None	H3	
RE15-98-0036	03	09/23/98 1540	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0036	04	09/23/98 1540	125 ml Polyethylene	Soil	None	ISOU	
RE15-98-0036	05	09/23/98 1540	125 ml Polyethylene	Soil	Ice	METTAL	
RE15-98-0036	06	09/23/98 1540	125 ml Glass	Soil	Ice	PESTPCB	

Original - LANL Destination

Yellow - RPF

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OU Contact	John McCann	LANL Contact John Miglio	Lab Report Required 10/23/98
Contact Phone No	(505) 665-1091	LANL Mail Stop	Charge Code MR3R12082642

Field Unique Sample #/ID	Cont ID	Date & Time Collected	Sample Container Volume/Material	Matrix	Preserv	ANALYSIS REQUESTED: (SMO Order Codes)	REMARKS (Conditions of receipt, etc.)
RE15-98-0036	08	09/23/98 1540	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0036	09	09/23/98 1540	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	
RE15-98-0037	01	09/23/98 1554	500 ml Polyethylene	Soil	None	GSPEC	
RE15-98-0037	02	09/23/98 1554	500 ml Polyethylene	Soil	None	H3	
RE15-98-0037	03	09/23/98 1554	125 ml Glass	Soil	Ice	HEXP	
RE15-98-0037	04	09/23/98 1554	125 ml Polyethylene	Soil	None	ISOU	
RE15-98-0037	05	09/23/98 1554	125 ml Polyethylene	Soil	Ice	METAL	
RE15-98-0037	06	09/23/98 1554	125 ml Glass	Soil	Ice	PESTPCB	
RE15-98-0037	07	09/23/98 1554	125 ml Glass	Soil	Ice	SEMIN	
RE15-98-0037	08	09/23/98 1554	125 ml Septum Amber G	Soil	Ice	VOAGCMSN	

SCREENING DATA RELEASE FORM

To: Field Support Facility

From: KARL MANESS, JCF KE

TA/OU: ~~1086/15~~ TA-15/1086

The following samples were received at the Field Support Facility (FSF) without screening data.

SAMPLE #

I understand that these samples will not be shipped until radiological screening data and corresponding C-O-C documentation arrive at the FSF. I further understand that it is my responsibility to ensure this information arrives in a timely manner to the FSF. If holding times are missed because screening data does arrive, I will pick up the samples and return them to the site from which they were collected.

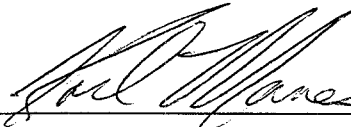
The following samples do not require screening data for the reasons stated below:

SAMPLES # RE 15-98-0029 thru RE 15-98-0037

Reason:

Field Screening Data Attached

Signature



Date

9/24/88

Los Alamos National Laboratory
Los Alamos, NM 87545

Date: 09/24/98

NOTIFICATION OF RADIOACTIVE MATERIAL SHIPMENT

To: SND

Phone/Fax No. _____

From: ICF Kaiser

Phone/Fax No. 505 661-5200 661-5222

Please expect the following samples to arrive at your laboratory.

Sample ID #	Isotope (if known)	Activity per Unit Mass or Volume (pCi/g, μ Ci/L, etc.)	Contamination Level (d/m/100cm ²)		Comments
			Gross α	Gross β	
<u>REL5-98-0029</u>	<u>Du</u>	<u>< 2</u>	<u>NDA</u>	<u>NDA</u>	<u>Dry Soil</u>
<u>30</u>					
<u>31</u>					
<u>32</u>					
<u>33</u>					
<u>34</u>					
<u>35</u>					
<u>36</u>					
<u>37</u>	<u>Du</u>	<u>< 2</u>	<u>NDA</u>	<u>NDA</u>	<u>Dry Soil</u>

Screening Instrument: Ludlum 2221 w 2x2 Ludlum Mod 12 P/C Probe

Analyst: Ph Bahr



PARAGON ANALYTICS, INC.

225 Commerce Drive ♦ Fort Collins, CO 80524 ♦ (800) 443-1511 ♦ (970) 490-1511 ♦ FAX (970) 490-1522

November 11, 1998

Ms. Joylene Valdez
Los Alamos National Laboratory SMO
SMO TA-3, Bldg. 271
Los Alamos, NM 87545

RE: Paragon Workorder: 98-09-192
Client Project Name: None Submitted
Client Project Number: 4662R

Dear Ms. Valdez:

Nine soil samples were received from Los Alamos National Laboratory SMO on September 26, 1998. The samples were scheduled for the following analyses:

Gamma Spectroscopy	pages 1-273
Isotopic Uranium	pages 274-442
Tritium	pages 443-488

The results for these analyses are contained in the enclosed reports.

Please note that an EDD was sent out on November 10, 1998.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

Paragon Analytics, Inc.
Lance Steere
Senior Project Manager

Report Sent To: _____

Approved By: For Tang, T.

Date Sent: 11/13/98

LRS/kmp
Enclosure: Report

An Employee Owned Small Business

CHAIN OF CUSTODY FORM (Example)

SECTION I. DATA PACKAGE INFORMATION (Relinquisher completes)

New Issue ☐ Yes ☐ No

Request Number(s): 4708 4876 4882 4870
4662 4901 4900 5059

Data Package Requestor (check one): ☐ Editing/Validation ☐ User

Name (print) Joylene Wade Focus Area: SMO
Phone 5-4968 Z Number: 14122

SECTION II. AUTHORIZING SIGNATURES (Relinquished/Received signatures)

Relinquished By: [Signature] Date: 2-26-99

I accept custody of the above listed data package(s).

Received By: [Signature] Date: 2-26-99

Relinquished By: _____ Date: _____

I accept custody of the above listed data package(s).

Received By: _____ Date: _____

Comments:

CCS/VALIDATION COVER SHEET

M Code SDG/RN: **4662R** LAB NAME: **Paragon** LAB CODE _____

NAME OF VALIDATOR: **Herman Ramsey** COMPANY: **ICF Kaiser**

VALIDATION DATE: 12-Jan-99 EDS ENTRY DATE _____

ANALYTICAL SUITE:

<input type="radio"/> VOLATILES	<input type="radio"/> HIGH EXPLOSIVES
<input type="radio"/> SEMIVOLATILES	<input type="radio"/> INORGANICS
<input type="radio"/> PESTICIDES/AROCLORS	<input checked="" type="radio"/> RADIOCHEMISTRY

GENERAL CHECKLIST

PRESENT?

Ö if "yes"

0 if "no"

1. Case Narrative _____
2. Airbills (no. Of shipments____) _____
3. Chain-of-custody records _____
4. Sample tags _____
5. Sample log-in sheets _____
6. Internal lab sample transfer records
and tracking sheets _____
7. Other? Identify _____

Are all samples assigned to the SDG present? " YES " NO
Identify any samples in the assigned SDG/RN that are missing

Comments/problems noted, including information about requests to the laboratory and agreed upon data of resolution and lab contact: (attach additional comment sheets as necessary)

Signature/1st validation: Herman Ramsey 1/12/99

Signature/2nd validation: _____

Qualifiers entered by: _____ Date: _____

CCS AND VALIDATION

Explanation of qualifiers (Q):

- U The analyte was analyzed for but not detected above the reported EQL
- J The analyte was positively identified, the associated numerical value is the approximate concentration of the analyte in the sample
 - J+ Likely has a high bias
 - J- Likely has a low bias
- UJ The analyte was analyzed for but not detected. The associated value is an estimate
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified.

Note: Any results qualified as "R" should be looked at for relevance for data use. Thus, "R" implies "PM" also, and must not be used alone
- P Use professional judgment based on data use . It usually has an "M" with it, indicating that a manual check should be made if the data that is qualified with the "P" is important to the data user.

In addition, PM also means that a decision must be made by the project manager/delegee regarding the need for further review of the data. This review should include some consideration of potential impact that could result from using the P qualified data. (For example, in the case of holding time exceedance, the project manager/delegee can decide to use the data with no qualification when analytes of interest are known to not be adversely affected by holding time exceedances. Another example is the case where soil sample duplicate analyses for metals exceed the precision criteria. Since this is likely because of sample non-homogeneity rather than lab error, the manager/delegee must decide how to use the data.)

- PM Manual review of raw data is recommended to determine if the defect impacts data use, as in "R" above.

REASON CODES FOR VALIDATION QUALIFIERS

RADIOCHEMISTRY (R)

- 1 Tracer/carrier recovery < 10%.
- 1a Tracer recovery 10-30% and the result > EQL.
- 1b Tracer recovery 10-30% and the result < EQL.
- 1c Carrier recovery 10-40% and result > EQL.
- 1d Carrier recovery 10-40% and the result < EQL.
- 3 Spike recovery > upper limit.
- 3a Spike recovery < lower limit.
- 3b Spike recovery outside criterion but sample is not of same matrix as was matrix spike sample
- 4 Sample result > EQL but < 5X the amount found in the blank.
- 6 Recovery of analyte in the LCS > upper limit.
- 6a Recovery of analyte in the LCS < lower limit.
- 6d LCS tracer/carrier recovery < 10 % and sample result is a non-detect.
- 7 For the set of duplicates, both results are > EQL or no EQL is available, but there is not a 3 σ agreement between the results - within an SDG.
- 8 One result > EQL and the difference > a factor of 1xEQL for water and 2xEQL for soil.
- 9a Result < MDA and MDA is < EQL.
- 9b Result > MDA but < EQL.
- 10a Result < both MDA and EQL.

10b Result < MDA but > EQL.

11 Result is less than three times the reported 1-sigma uncertainty.

RADIOCHEMISTRY

<p>Lab Control Sample (LCS)</p> <p>Present? X yes no</p> <p>1/SDG</p> <p>75-125% recovery</p> <p><i>The LCS for iso-U contained U-234 and U-238.</i></p> <p><i>The LCS for gamma spec contained Co-57, Co-60, Y-88, Cd-109, Sn-113, Cs-137, Ce-139, and Am-241.</i></p>	<p>OK See comment</p>	<p>Obtain from lab. Q=A</p> <p>If criterion not met, qualify each analyte associated with the LCS in the same batch as <u>J-</u></p> <p>for < 75% and <u>J+</u> for > 125%</p> <p>If the LCS sample tracer/ carrier recovery is < 10%, qualify the associated sample data as <u>P</u> for non-detects.</p>	<p><u>R6a</u></p> <p><u>R6</u></p> <p><u>R6d</u></p>
<p>Matrix Spike (MS)</p> <p>1/SDG</p> <p>Present? X yes no</p> <p>75-125% recovery</p> <p>(Note: As opposed to other tests, the matrix spike test will qualify samples on the basis of their connection by SDG and not by analytical batch).</p> <p><i>The matrix spike for tritium analysis was from LANL 4602R. Recovery was in control.</i></p>	<p>OK See com ment</p>	<p>Obtain from lab. Q=A</p> <p>If criterion not met, qualify all analytes associated with the MS with a <u>J-</u> for <75%</p> <p>and <u>J+</u> for > 125%,</p> <p>if all samples in batch of same matrix. If there is variation of matrix, <u>P</u> for samples not of same matrix as spiked sample.</p>	<p><u>R3a</u></p> <p><u>R3</u></p> <p><u>R3b</u></p>

HAR
1/12/99

<p><u>Method blank</u></p> <p>Present? X yes no</p> <p>1/SDG</p> <p>target analytes $\leq 5x$ the amount in the blank</p>	<p>OK See comment</p>	<p>Obtain from lab. Q=A</p> <p>If the sample result > EQL or no EQL is available but <5x the amount found in the associated blank, it should be qualified as <u>U</u>. In making this comparison the differing aliquot size of the blank and sample being tested should be taken into account.</p>	<p>R4</p>
<p><u>Duplicate</u></p> <p>Present? X yes no</p> <p>1/SDG</p> <p>(Note: As opposed to other tests, the duplicate tests will qualify samples on the basis of their connection by SDG and not by analytical batch).</p>	<p>OK See comment</p>	<p>Obtain from lab. Q=A</p> <p>If both results are above the EQL or no EQL is available, all results for same analyte in same SDG should be qualified as <u>J</u> if there is not 3σ agreement between results.</p> <p>If both results are < EQL no test should be done.</p> <p>If one result > EQL and difference > factor of 1X EQL for water and 2X EQL for soil, qualify with <u>J</u>.</p>	<p><u>R7</u></p> <p><u>R8</u></p>

Handwritten:
RDP
1/12/99

<p><u>EQL</u></p> <p>Denote those samples where the result is less than the reported sample MDA or EQL.</p> <p>Confirm that the MDA of each reported analyte in each sample and blank is <EQL.</p> <p><i>Note: see gamma spec narrative for indication of <u>false identification</u> of some nuclides</i></p>	<p>U See com ment</p>	<p>When the MDA < the EQL or no EQL is available:</p> <p>Qualify as <u>U</u> those sample results < the MDA.</p> <p>Qualify as <u>U</u> those sample results > MDA but < EQL.</p> <p>When the MDA is >EQL:</p> <p>Qualify as <u>U</u> those sample and blank results < both the MDA and EQL.</p> <p>Qualify as <u>U</u> those sample and blank results < than the MDA but > EQL.</p>	<p><u>R9a</u></p> <p><u>R9b</u></p> <p><u>R10a</u></p> <p><u>R10b</u></p>
<p><u>Detection with respect to the reported uncertainty</u></p> <p>This is a more conservative test of detection than simply considering the MDA or EQL since sample results > than both the EQL and MDA may still be qualified using this test.</p>	<p>NA</p>	<p>Qualify as <u>U</u> those results < three times the reported 1-sigma uncertainty. Equivalently qualify as <u>U</u> those results < 1.5 times the reported 2-sigma uncertainty or < the reported 3-sigma uncertainty.</p>	<p><u>R11</u></p>
<p><u>Tracer/carrier recovery</u></p> <p>Present? X yes no</p> <p>Tracer recovery for alpha spec analyses 330 %</p> <p>Carrier recovery for beta/gamma analyses 3 40%</p>	<p>OK</p>	<p>Obtain from lab. Q=A</p> <p>If tracer/carrier recovery < 10 %, qualify results as <u>R</u></p> <p>If tracer recovery is 10-30%, Q=<u>J</u></p> <p>if result > EQL and <u>UJ</u> if result < EQL</p> <p>If carrier recovery is 10-40%, Q=J</p> <p>if result > EQL and <u>UJ</u> if < EQL</p>	<p><u>R10</u></p> <p><u>R11a</u></p> <p><u>R11b</u></p> <p><u>R11c</u></p> <p><u>R11d</u></p>

1400
1/12/99



PARAGON ANALYTICS, INC.

225 Commerce Drive ♦ Fort Collins, CO 80524 ♦ (800) 443-1511 ♦ (970) 490-1511 ♦ FAX (970) 490-1522

November 11, 1998

Ms. Joylene Valdez
Los Alamos National Laboratory SMO
SMO TA-3, Bldg. 271
Los Alamos, NM 87545

RE: Paragon Workorder: 98-09-192
Client Project Name: None Submitted
Client Project Number: 4662R

Dear Ms. Valdez:

Nine soil samples were received from Los Alamos National Laboratory SMO on September 26, 1998. The samples were scheduled for the following analyses:

Gamma Spectroscopy	pages 1-273
Isotopic Uranium	pages 274-442
Tritium	pages 443-488

The results for these analyses are contained in the enclosed reports.

Please note that an EDD was sent out on November 10, 1998.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

Paragon Analytics, Inc.
Lance Steere
Senior Project Manager

LRS/kmp
Enclosure: Report

An Employee Owned Small Business

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9809192

Client Name: Los Alamos National Laboratory SMO

Client Project Name:

Client Project Number: 4662R

Client PO Number: 7794L0014-9S

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
RE15-98-0029 ✓	9809192-1	4662RC ✓	Soil ✓	9/23/98	✓
RE15-98-0030 ✓	9809192-2	4662RC	Soil	9/23/98	
RE15-98-0031 /	9809192-3	4662RC	Soil	9/23/98	
RE15-98-0032 /	9809192-4	4662RC	Soil	9/23/98	
RE15-98-0033 /	9809192-5	4662RC	Soil	9/23/98	
RE15-98-0034 /	9809192-6	4662RC	Soil	9/23/98	
RE15-98-0035 ✓	9809192-7	4662RC	Soil	9/23/98	
RE15-98-0036 /	9809192-8	4662RC	Soil	9/23/98	
RE15-98-0037 /	9809192-9	4662RC	Soil	9/23/98	

Friday, September 25, 1998

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

Please analyze the enclosed samples
according to the schedule indicated:

These samples are on:

SHIP DATE: 9/25/98
REPORT DUE: 10/25/98
TURN AROUND REQ'D: 30 days

LANL Request Number: 4662R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MR3R12082642

RAD SCREENING: Not Required

COMMENTS: 15 - 1086 , GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: 

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
------------------------	------------	--------------	------------	------------------	-----------------	----------

	GAMMA SPE	RE15-98-0029	01	S	9/23/98	
01	H3	RE15-98-0029	02	S	9/23/98	
	ISOU	RE15-98-0029	04	S	9/23/98	
	GAMMA SPE	RE15-98-0030	01	S	9/23/98	
02	H3	RE15-98-0030	02	S	9/23/98	
	ISOU	RE15-98-0030	04	S	9/23/98	
	GAMMA SPE	RE15-98-0031	01	S	9/23/98	
03	H3	RE15-98-0031	02	S	9/23/98	
	ISOU	RE15-98-0031	04	S	9/23/98	
	GAMMA SPE	RE15-98-0032	01	S	9/23/98	
04	H3	RE15-98-0032	02	S	9/23/98	
	ISOU	RE15-98-0032	04	S	9/23/98	
	GAMMA SPE	RE15-98-0033	01	S	9/23/98	
05	H3	RE15-98-0033	02	S	9/23/98	
	ISOU	RE15-98-0033	04	S	9/23/98	
	GAMMA SPE	RE15-98-0034	01	S	9/23/98	
06	H3	RE15-98-0034	02	S	9/23/98	
	ISOU	RE15-98-0034	04	S	9/23/98	
	GAMMA SPE	RE15-98-0035	01	S	9/23/98	
07	H3	RE15-98-0035	02	S	9/23/98	
	ISOU	RE15-98-0035	04	S	9/23/98	
	GAMMA SPE	RE15-98-0036	01	S	9/23/98	
08	H3	RE15-98-0036	02	S	9/23/98	
	ISOU	RE15-98-0036	04	S	9/23/98	

Friday, September 25, 1998

9809192

REQUEST NUMBER: 4662R

Page 2

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0037	01	S	9/23/98	
H3		RE15-98-0037	02	S	9/23/98	
ISOU		RE15-98-0037	04	S	9/23/98	

Final Page of REQUEST NUMBER 4662R

Page 2

Friday, September 25, 1998

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

Los Alamos
NATIONAL LABORATORY

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By:

Date Time

SI Hagelberg *SI Hagelberg* 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

Friday, September 25, 1998

980919Z

COC DOC NUMBER: 4662RC

REQUEST NUMBER: 4662R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE		
RE15-98-0035	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0036	02	500 ml Polyethylene	H3	None	S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0037	02	500 ml Polyethylene	H3	None	S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None	S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4662R

Page 2

Relinquished By:

Date Time

SI Hagelberg S Hag 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LAWL

SHIPPING CONTAINER #: Client Cooler

WORKORDER NO. 980919Z

INITIALS: JH

DATE: 9/26/97

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature _____ b. Lot No's. _____ c. Airbill Number _____		Yes	<u>No</u>
2.	Are custody seals on the cooler intact? If so, how many <u>4</u>	N/A	<u>Yes</u>	No
3.	Are custody seals on sample containers intact?	N/A	<u>Yes</u>	No
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		<u>Yes</u>	No
5.	Is the COC complete? Relinquished: Yes <u>X</u> No Requested Analysis: Yes <u>X</u> No	N/A	<u>Yes</u>	No
6.	Is the COC in agreement with the samples received? No. of Samples: Yes <u>X</u> No Sample ID's: Yes <u>X</u> No Matrix: Yes <u>X</u> No No. of Containers: Yes <u>X</u> No		<u>Yes</u>	No
7.	Are the samples requiring chemical preservation preserved correctly?	<u>N/A</u>	<u>Yes</u>	No
8.	Is there enough sample? If so, are they in the proper containers?		<u>Yes</u>	No
9.	Are all samples within holding times for the requested analyses?		<u>Yes</u>	No
10.	Were the sample(s) shipped on ice?	N/A	<u>Yes</u>	No
11.	Were all sample containers received intact? (not broken or leaking, etc.)		<u>Yes</u>	No
12.	Are samples requiring no headspace, headspace free?	<u>N/A</u>	<u>Yes</u>	No
13.	Do the samples require quarantine?		<u>Yes</u>	No
14.	Do samples require Paragon disposal?		<u>Yes</u>	No
15.	Did the client return any unused bottles?		Yes	<u>No</u>

Describe "NO" items (except No's 1, 13, & 14): _____

Was the client contacted? Yes _____ No _____
 If yes, Date: _____ Name of person contacted: _____

Describe actions taken or client instructions: _____

Group Leader's Signature: _____ Date: _____

Cooler Temperature: 60



Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4662R

Date File Saved: 10/22/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

9809192-1
9809192-2
9809192-3
9809192-4
9809192-5
9809192-6
9809192-7
9809192-8
9809192-9

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The samples under Request Number 4662R (Work Order 9809192) were received on 09/26/98 and scheduled for isotopic uranium analyses.

These samples were prepared according to Paragon Analytics, Inc. PAI SOP773R3 and PAI SOP778R3.

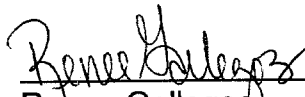
These samples were analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/14/98. The analysis results for these samples are reported in units of pCi/g.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

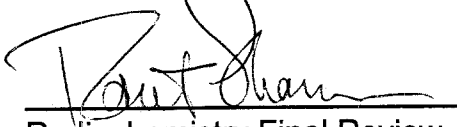
No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.


Renee Gallegos
Radiochemistry Instrument Technician

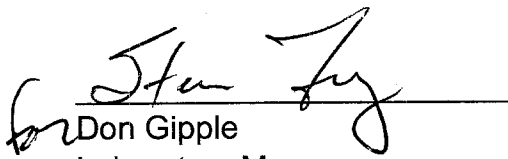
10/22/98
Date


Radiochemistry Final Review

10/26/98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.


Don Gipple
Laboratory Manager

11/10/98
Date

000275

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:	Sample Matrix: Soil	Date Collected: 06-Oct-98	Final Aliquot: 2
Lab ID: AS01679LCS1	Date Prepared: 06-Oct-98	Date Analyzed: 14-Oct-98	Aliquot Units: g
	Prep SOP: PAI SOP 778R3	Analytical SOP: PAI SOP 714R4	Report Basis: Dry
	Prep Batch: AS01679		Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	2.49 +/- 0.16	0.017	2.41	pCi/g	104%	+/- 25%	Pass
U-235	0.103 +/- 0.017	0.017	N/A	pCi/g	N/A	N/A	
U-238	2.42 +/- 0.16	0.022	2.41	pCi/g	100%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.73	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000282

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:

Lab ID: AS01679BLK1

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 06-Oct-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2

Aliquot Units: g

Report Basis: Dry

Target Nuclide	Decision Level	Reporting Units
U-234	0.019	pCi/g
U-235	0.017	pCi/g
U-238	0.016	pCi/g

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

000281

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:

Lab ID: AS01679BLK1

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 06-Oct-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.0110 +/- 0.0066	0.024	pCi/g	U
U-235	0.0024 +/- 0.0046	0.023	pCi/g	U
U-238	0.0010 +/- 0.0039	0.021	pCi/g	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

000280

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0037	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: 9809192-9	10/6/98	10/14/98	AS01679	2
DUP ID: 9809192-9-D1	10/6/98	10/14/98	AS01679	2

Sample Matrix: Soil
Date Collected: 23-Sep-98
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 778R3
Aliquot Units: g
Report Basis: Dry

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	1.833 +/- 0.062	2.05 +/- 0.14	pCi/g	0.71	< 1.42	
U-235	0.0631 +/- 0.0063	0.093 +/- 0.015	pCi/g	0.91	< 1.42	LT
U-238	1.990 +/- 0.067	2.12 +/- 0.14	pCi/g	0.42	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.88	pCi/g	89%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000283



Paragon Analytics, Inc.
Case Narrative File

Request Number: 4662R
Date File Saved: 10/16/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

98-09-192-01
98-09-192-02
98-09-192-03
98-09-192-04
98-09-192-05
98-09-192-06
98-09-192-07
98-09-192-08
98-09-192-09

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: H3

Samples under Request Number 4662R (PAI Work Order 98-09-192) were received on 9/26/98 and scheduled for tritium analysis, which was completed on 10/9/98.

These samples were analysed in batch 09129h3s. The matrix spike analyzed with this batch were prepared from samples in LANL request number 4602R.

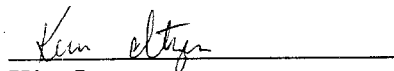
The analysis results for these samples are reported in units of pCi/gram.

This work order was prepared using PAI SOP754R0, and analyzed using PAI SOP704R4.

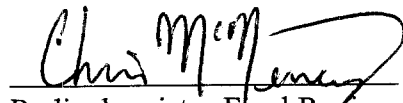
Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.


Kim Itzen
Radiochemistry Instrument Technician

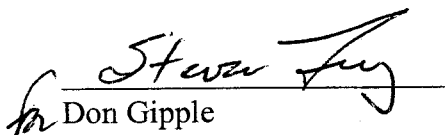
10-16-98
Date


Radiochemistry Final Review

10/16/98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.


Don Gipple
Laboratory Manager

11-10-98
Date

000444

TRITIUM DECISION LEVEL REPORT

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 100 Min.

Client Project ID: Blank

Analyzed By : KI

Client ID	PAI ID	Matrix	Decision Level
Blank	09-129-B1	SOIL	0.04

Decision Level Values calculated as recommended by ANSI N42.23
Reported sample activities should be compared to these Decision Levels

000413

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 100 Min.

Client Project ID: Blank

Analyzed By : KI

Client ID	PAI ID	Matrix	H-3 (pCi/g)	MDC
Blank	09-129-B1	SOIL	0.00 ± 0.04	0.07

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP754 and analyzed using PAI SOP704.

Remarks:

QC shared between work orders 98-09-129 and 98-09-192.

000448

TRITIUM LCS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 62 Min.

Client Project ID: LCS

Units : pCi/g

Client ID	PAI ID	Matrix	Known Activity	Reported Activity	MDC	Percent Recovery
LCS	09-129-S1	SOIL	1.851	1.727 ± 0.236	0.089	93

PAI sets control limits for tritium measurements as follows :
Control Limits = Known ± 15% for Water, Known ± 25% for other matrices

Remarks:

QC shared by work orders 98-09-129 and 98-09-192.

000450

TRITIUM MATRIX SPIKE ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 09/14/98

Client Name: Los Alamos National Lab

Date Analyzed : 10/08/98

Client Project ID: 4602R

Sample Matrix : SOIL

Lab Sample ID Series: 98-09-129

Count Duration: 32 Min.

Lab Sample ID	Spike Added	Native Activity	Reported Activity	Percent Recovery
98-09-129-M1	2.030	< 0.036	1.893	93.3

PAI sets control limits for Tritium measurements as follows :
Recovery Limits = 75 % to 125 % of Known, where Known =
(Known Spike Value + Native Activity Value)

Remarks:

Sample 98-09-129-M1 is a matrix spike of sample 98-09-129-04.

000451



Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4662R

Date File Saved: 11/02/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

9809192-1
9809192-2
9809192-3
9809192-4
9809192-5
9809192-6
9809192-7
9809192-8
9809192-9

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 4662R (Work Order 9809192) were received on 09/26/98 and scheduled for gamma spec. analyses, which were completed on 10/20/98.

The analysis results for these samples are reported on a dry weight basis in units of pCi/gram.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.23, the actual values for each measurement have been reported. The decision levels for each analyte are calculated for the associated blank. These values are reported in the hard copy and in the MDA fields in the electronic deliverable. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

000001

PARAGON ANALYTICS, INC.

Sample volumes were insufficient to allow preparation of a duplicate. Duplicate analysis of samples RE15-98-0029 and RE15-98-0031(PAI ID 9809192-01, -03) were performed in lieu of a preparation duplicate.

Several nuclides in the target list are subject to spectral interferences. The observed photopeaks at the energies listed are generally attributable to the naturally-occurring radionuclides listed as interferences, causing false identifications for the target analytes.

Analyte	Interference	Photopeak Energy (keV)
¹⁰⁹ Cd	K _β x ray of Pb	87
²³⁷ Np	K _β x ray of Pb	87
²²⁶ Ra	²³⁵ U	186
²⁰³ Hg	²⁰⁸ Tl	277
²²⁴ Ra	²¹⁴ Pb	241
²³¹ Pa	²¹² Pb	300
²¹¹ Bi	²¹⁴ Pb	351
⁵⁴ Mn	²²⁸ Ac	835

A special case of the above, the GDR software often identifies ²²⁶Ra above the decision level for soil samples. The identifications are reasonable, when radium progeny (e.g. ²¹⁴Pb, ²¹⁴Bi) are also identified. However, quantification at low levels based upon the 186 keV photopeak is unreliable due to interference from ²³⁵U, which also has a photopeak at 186 keV. Low levels of ²³⁵U, though undetectable by this method, can cause greatly exaggerated ²²⁶Ra results. The ²²⁶Ra activity reported should be considered qualitative.

All activity concentration results above the 2σ total propagated uncertainty (TPU) for which spectral interference is suspected are given an "SI" flag.

Due to peak interference, the GDR software may not attempt to quantify activity concentrations or the corresponding uncertainties for some analytes. In such cases, zero values are reported in the hard copy reports, and data are flagged with an "SQ" qualifier.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with a "TI" qualifier.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.

000002

Jennifer Hancock
Radiochemistry Instrumentation

11/2/98
Date

Robert S. Sauer
Radiochemistry Final Review

11/3/98
Date

000003

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Lab Control

Lab Sample ID: 98-09-192-S1

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:46

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	62	66	93	Pass
Co-60	136	140	98	Pass
Y-88	289	300	96	Pass
Cd-109	2940	2800	105	Pass
Sn-113	185	170	106	Pass
Cs-137	92	87	105	Pass
Ce-139	104	110	99	Pass
Am-241	187	200	92	Pass

Data stored in file 20000546.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000007

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1

Date Collected: 10/06/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 15:23

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.030 ± 0.049	163.3	U
Na-22	0.008 ± 0.022	283.3	U
K-40	-0.14 ± 0.44	N/A	U
Mn-54	0.002 ± 0.029	1380.9	U
Co-57	-0.003 ± 0.018	N/A	U
Co-60	0.014 ± 0.032	229.3	U
Zn-65	-0.011 ± 0.053	N/A	U
Se-75	-0.008 ± 0.030	N/A	U
Sr-85	-0.006 ± 0.049	N/A	U
Y-88	-0.012 ± 0.036	N/A	U
Ru-106	0.17 ± 0.28	167.4	U
Cd-109	0.20 ± 0.54	267.4	U
Sn-113	0.005 ± 0.034	714.3	U
Cs-134	-0.012 ± 0.032	N/A	U
Cs-137	-0.018 ± 0.024	N/A	U
Ce-139	-0.025 ± 0.020	N/A	U
Ba-140	-0.03 ± 0.18	N/A	U
La-140	3.9 ± 7.6	194.0	U
Ce-144	0.14 ± 0.14	100.5	U
Eu-152	-0.032 ± 0.078	N/A	U
Hg-203	0.021 ± 0.031	148.1	U
Tl-208	-0.010 ± 0.033	N/A	U
Bi-211	0.02 ± 0.17	900.6	U
Pb-211	0.01 ± 0.72	9842.3	U
Bi-212	-0.15 ± 0.60	N/A	U
Pb-212	0.005 ± 0.049	926.9	U
Bi-214	-0.025 ± 0.078	N/A	U
Pb-214	-0.003 ± 0.062	N/A	U
Rn-219	0.25 ± 0.34	138.4	U
Ra-223	-0.18 ± 0.45	N/A	U
Ra-224	-0.28 ± 0.47	N/A	U
Ra-226	0.07 ± 0.64	970.9	U

Data stored in file 10001267.SPC

Continued on next page...

000010

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1 Date Collected: 10/06/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 15:23
Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.12 ± 0.16	N/A	U
Ac-228	-0.036 ± 0.097	N/A	U
Pa-231	0.25 ± 0.83	337.4	U
Pa-233	0.027 ± 0.049	179.5	U
Pa-234m	0.5 ± 4.4	873.4	U
Th-234	-0.04 ± 0.89	N/A	U
U-235	-0.012 ± 0.039	N/A	U
Np-237	-0.10 ± 0.16	N/A	U
Am-241	0.00 ± 0.12	4931.6	U

Data stored in file 10001267.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.

000011

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1 Date Collected: 10/06/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 15:23
Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	< 0.13	BDL	
Ac-228	< 0.080	BDL	
Pa-231	< 0.70	BDL	
Pa-233	< 0.068	BDL	
Pa-234m	< 4.1	BDL	
Th-234	< 0.73	BDL	
U-235	< 0.032	BDL	
Np-237	< 0.13	BDL	
Am-241	< 0.098	BDL	

Data stored in file 10001267.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

000009

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1

Date Collected: 10/06/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 15:23

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	< 0.037	BDL	
Na-22	< 0.026	BDL	
K-40	< 0.36	BDL	
Mn-54	< 0.026	BDL	
Co-57	< 0.015	BDL	
Co-60	< 0.041	BDL	
Zn-65	< 0.043	BDL	
Se-75	< 0.025	BDL	
Sr-85	< 0.041	BDL	
Y-88	< 0.029	BDL	
Ru-106	< 0.40	BDL	
Cd-109	< 0.65	BDL	
Sn-113	< 0.033	BDL	
Cs-134	< 0.026	BDL	
Cs-137	< 0.020	BDL	
Ce-139	< 0.016	BDL	
Ba-140	< 0.15	BDL	
La-140	< 10	BDL	
Ce-144	< 0.25	BDL	
Eu-152	< 0.064	BDL	
Hg-203	< 0.046	BDL	
Tl-208	< 0.027	BDL	
Bi-211	< 0.16	BDL	
Pb-211	< 0.60	BDL	
Bi-212	< 0.49	BDL	
Pb-212	< 0.046	BDL	
Bi-214	< 0.064	BDL	
Pb-214	< 0.051	BDL	
Rn-219	< 0.52	BDL	
Ra-223	< 0.37	BDL	
Ra-224	< 0.39	BDL	
Ra-226	< 0.59	BDL	

Data stored in file 10001267.SPC

Continued on next page...

000008

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 09/23/98

Client Name: Los Alamos National Lab

Date Analyzed: 10/09/98

Lab Sample ID Series: 98-09-192

Count Duration: 100 Min.

Client Project ID: 4662R

Analyzed By : KI

Client ID	PAI ID	Matrix	H-3 (pCi/g)	MDC
RE15-98-0029	09-192-01	SOIL	0.00 ± 0.02	0.03
RE15-98-0030	09-192-02	SOIL	0.00 ± 0.02	0.03
RE15-98-0031	09-192-03	SOIL	0.02 ± 0.02	0.03
RE15-98-0032	09-192-04	SOIL	0.01 ± 0.02	0.03
RE15-98-0033	09-192-05	SOIL	0.02 ± 0.02	0.04
RE15-98-0034	09-192-06	SOIL	0.01 ± 0.02	0.04
RE15-98-0035	09-192-07	SOIL	-0.01 ± 0.02	0.03
RE15-98-0036	09-192-08	SOIL	0.02 ± 0.02	0.03
RE15-98-0037	09-192-09	SOIL	0.01 ± 0.02	0.03
RE15-98-0032	09-192-D1	SOIL	0.00 ± 0.02	0.03

(u, R9a)

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP754 and analyzed using PAI SOP704.

Remarks:

98-09-192-D1 is a duplicate of 98-09-192-04.

000446

KDR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 1 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0029

Lab ID: 9809192-1

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.618 +/- 0.052	0.018	pCi/g	
U-235	0.0349 +/- 0.0095	0.020	pCi/g	LT
U-238	0.879 +/- 0.067	0.018	pCi/g	

(u, R9b)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000285

HDR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 2 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0030

Lab ID: 9809192-2

Sample Matrix: Soil

Date Collected: 23-Sep-98

Final Aliquot: 2.000

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.793 +/- 0.063	0.019	pCi/g	
U-235	0.053 +/- 0.011	0.014	pCi/g	LT
U-238	1.103 +/- 0.081	0.017	pCi/g	

(u, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.77	pCi/g	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000286

HOR
1/2/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 3 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0031

Lab ID: 9809192-3

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.911 +/- 0.069	0.018	pCi/g	
U-235	0.036 +/- 0.010	0.026	pCi/g	LT
U-238	1.78 +/- 0.12	0.022	pCi/g	

(u, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.84	pCi/g	88%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000287

NDR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 4 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0032

Lab ID: 9809192-4

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.742 +/- 0.060	0.021	pCi/g	
U-235	0.078 +/- 0.015	0.028	pCi/g	LT
U-238	1.077 +/- 0.080	0.017	pCi/g	

(U, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.71	pCi/g	81%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000288

KOR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 5 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0033

Lab ID: 9809192-5

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.569 +/- 0.049	0.017	pCi/g	
U-235	0.0317 +/- 0.0094	0.021	pCi/g	LT
U-238	0.971 +/- 0.074	0.0071	pCi/g	

(u, 1296)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.74	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000289

NOR
1/12/97

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 6 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0034

Lab ID: 9809192-6

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.783 +/- 0.062	0.0071	pCi/g	
U-235	0.047 +/- 0.011	0.019	pCi/g	LT
U-238	1.222 +/- 0.089	0.017	pCi/g	

(U, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.73	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000290

HDR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 7 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0035

Lab ID: 9809192-7

Sample Matrix: Soil

Date Collected: 23-Sep-98

Final Aliquot: 2.000

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.495 +/- 0.044	0.0069	pCi/g	
U-235	0.048 +/- 0.011	0.024	pCi/g	LT
U-238	1.62 +/- 0.11	0.022	pCi/g	

(u, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.74	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

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NOR
1/12/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 8 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0036
Lab ID: 9809192-8

Sample Matrix: Soil

Date Collected: 23-Sep-98

Final Aliquot: 2.000

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.591 +/- 0.051	0.015	pCi/g	
U-235	0.039 +/- 0.010	0.015	pCi/g	LT
U-238	0.734 +/- 0.060	0.018	pCi/g	

(u, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.53	pCi/g	73%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000292

HOR
1/14/99

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 9 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0037

Lab ID: 9809192-9

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.83 +/- 0.12	0.017	pCi/g	
U-235	0.063 +/- 0.013	0.017	pCi/g	LT
U-238	1.99 +/- 0.13	0.019	pCi/g	

(u, R96)

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.77	pCi/g	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000293

HDR
1/14/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0029

Lab Sample ID: 98-09-192-01 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/14/98 20:31
Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.101 ± 0.062	61.3	U
Na-22	0.038 ± 0.044	116.0	
K-40	29.5 ± 5.2	17.7	
Mn-54	0.005 ± 0.039 (u, R9a)	804.5	U
Co-57	0.001 ± 0.023	1892.2	U
Co-60	0.007 ± 0.040	587.8	U
Zn-65	-0.045 ± 0.092	N/A	U
Se-75	0.032 ± 0.044	138.5	U
Sr-85	-0.059 ± 0.051 (u, R9a)	N/A	U
Y-88	-0.001 ± 0.042	N/A	U
Ru-106	-0.29 ± 0.30	N/A	U
Cd-109	1.71 ± 0.93	54.2	SI
Sn-113	-0.017 ± 0.040 (u, R9a)	N/A	U
Cs-134	-0.002 ± 0.033	N/A	U
Cs-137	0.015 ± 0.034	221.7	U
Ce-139	0.026 ± 0.031	119.8	U
Ba-140	0.11 ± 0.33 (u, R9a)	313.1	U
La-140	-10 ± 40	N/A	U
Ce-144	0.10 ± 0.19	185.6	U
Eu-152	0.087 ± 0.085	98.3	TI
Hg-203	0.008 ± 0.041 (u, R9a)	538.4	U
Tl-208	0.279 ± 0.086	30.7	SI
Bi-211	0.54 ± 0.44	82.3	
Pb-211	-0.68 ± 0.92 (u, R9a)	N/A	U
Bi-212	-0.3 ± 1.2	N/A	U
Pb-212	1.00 ± 0.21	21.1	
Bi-214	0.80 ± 0.19	23.6	
Pb-214	0.65 ± 0.16	25.2	
Rn-219	-0.02 ± 0.38 (u, R9a)	N/A	U
Ra-223	-0.12 ± 0.56	N/A	U
Ra-224	1.3 ± 1.3	101.9	U
Ra-226	1.8 ± 1.3	73.7	SI

Data stored in file 20000526.SPC

Continued on next page...

000013

NOR
1/12/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0029

Lab Sample ID: 98-09-192-01 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/14/98 20:31
Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.25 ± 0.48 (U, RPA)	N/A	U
Ac-228	1.02 ± 0.26	25.2	
Pa-231	1.7 ± 1.1	63.0	SI
Pa-233	0.012 ± 0.053 (U, RPA)	434.1	U
Pa-234m	0.8 ± 6.9 ↓	872.6	U
Th-234	1.5 ± 1.2	78.0	TI
U-235	0.066 ± 0.054	83.1	TI
Np-237	-0.01 ± 0.25 (U, RPA)	N/A	U
Am-241	0.04 ± 0.12 ↓	300.6	U

Data stored in file 20000526.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

000014

1/12/99
HAR

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0030

Lab Sample ID: 98-09-192-02

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:40

Count Duration: 30 Min.

Aliquot: 368.900

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.098 ± 0.070	71.2	
Na-22	-0.023 ± 0.056 (u, R9a)	N/A	U
K-40	32.1 ± 5.7	17.7	
Mn-54	0.025 ± 0.047 (u, R9a)	190.7	U
Co-57	-0.011 ± 0.033 ↓	N/A	U
Co-60	0.072 ± 0.051	70.5	TI
Zn-65	-0.03 ± 0.10 (u, R9a)	N/A	U
Se-75	-0.011 ± 0.059	N/A	U
Sr-85	-0.137 ± 0.081	N/A	U
Y-88	-0.067 ± 0.057	N/A	U
Ru-106	-0.32 ± 0.41	N/A	U
Cd-109	0.3 ± 1.3	474.8	U
Sn-113	-0.034 ± 0.054	N/A	U
Cs-134	-0.034 ± 0.047 ↓	N/A	U
Cs-137	0.043 ± 0.045	103.8	U
Ce-139	-0.014 ± 0.036 (u, R9a)	N/A	U
Ba-140	0.40 ± 0.55	138.6	U
La-140	-24 ± 40 (u, R9a)	N/A	U
Ce-144	-0.19 ± 0.26	N/A	U
Eu-152	-0.04 ± 0.11	N/A	U
Hg-203	-0.039 ± 0.062 ↓	N/A	U
Tl-208	0.26 ± 0.11	40.9	
Bi-211	0.55 ± 0.53	96.2	SI
Pb-211	0.6 ± 1.1	184.8	U
Bi-212	1.1 ± 1.2	116.4	U
Pb-212	1.20 ± 0.26	21.3	
Bi-214	0.66 ± 0.19	29.3	
Pb-214	0.77 ± 0.20	25.6	
Rn-219	0.22 ± 0.46 (u, R9a)	204.6	U
Ra-223	0.43 ± 0.80	186.0	U
Ra-224	1.7 ± 1.5	92.9	SI
Ra-226	3.2 ± 1.7	52.4	SI

Data stored in file 10001259.SPC

Continued on next page...

000017

1/12/99
HAR

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0030

Lab Sample ID: 98-09-192-02 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:40
Count Duration: 30 Min. Aliquot: 368.900

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.35 ± 0.54 (U, R9a)	N/A	U
Ac-228	1.23 ± 0.31	25.0	
Pa-231	1.7 ± 1.5	89.3	SI
Pa-233	-0.026 ± 0.074 (U, R9a)	N/A	U
Pa-234m	4.1 ± 8.0	192.9	U
Th-234	-0.1 ± 1.8	N/A	U
U-235	0.133 ± 0.068	51.4	TI
Np-237	-0.31 ± 0.37 (U, R9a)	N/A	U
Am-241	0.02 ± 0.24	1312.8	U

Data stored in file 10001259.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an a priori detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.

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1/12/99
HOP

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0031

Lab Sample ID: 98-09-192-03

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/14/98 21:16

Count Duration: 30 Min.

Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.072 ± 0.089	123.8	U
Na-22	0.022 ± 0.062 (u, R9a)	284.6	U
K-40	29.9 ± 5.8	19.4	
Mn-54	-0.027 ± 0.049 (u, R9a)	N/A	U
Co-57	-0.025 ± 0.026	N/A	U
Co-60	0.000 ± 0.079	N/A	U
Zn-65	0.06 ± 0.13	214.4	U
Se-75	-0.029 ± 0.050 (u, R9a)	N/A	U
Sr-85	-0.030 ± 0.062	N/A	U
Y-88	0.020 ± 0.072	367.0	U
Ru-106	0.11 ± 0.44	403.7	U
Cd-109	0.1 ± 1.2	2116.7	U
Sn-113	-0.067 ± 0.052	N/A	U
Cs-134	-0.042 ± 0.050	N/A	U
Cs-137	0.008 ± 0.060	712.9	U
Ce-139	-0.015 ± 0.039	N/A	U
Ba-140	-0.07 ± 0.51	N/A	U
La-140	-40 ± 67	N/A	U
Ce-144	0.05 ± 0.21	401.4	U
Eu-152	-0.08 ± 0.11	N/A	U
Hg-203	0.005 ± 0.055	1051.3	U
Tl-208	0.33 ± 0.13	40.6	
Bi-211	0.48 ± 0.65	136.9	U
Pb-211	-0.03 ± 1.00 (u, R9a)	N/A	U
Bi-212	1.6 ± 2.4	149.1	U
Pb-212	0.88 ± 0.24	27.5	
Bi-214	1.04 ± 0.28	26.7	
Pb-214	0.77 ± 0.23	30.0	
Rn-219	-0.19 ± 0.46 (u, R9a)	N/A	U
Ra-223	1.01 ± 0.90	89.8	TI
Ra-224	-5.7 ± 1.7 (u, R9a)	N/A	U
Ra-226	2.3 ± 1.3	54.8	SI

Data stored in file 10001231.SPC

Continued on next page...

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HOK
1/12/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0031

Lab Sample ID: 98-09-192-03

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/14/98 21:16

Count Duration: 30 Min.

Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.20 ± 0.29 (U, R9a)	N/A	U
Ac-228	0.78 ± 0.34	43.1	
Pa-231	1.2 ± 1.6	126.8	U
Pa-233	-0.025 ± 0.081 (U, R9a)	N/A	U
Pa-234m	8.0 ± 9.9	123.6	U
Th-234	0.5 ± 1.7 (U, R9a)	313.2	U
U-235	0.073 ± 0.073	99.3	TI
Np-237	0.18 ± 0.36	200.7	U
Am-241	-0.18 ± 0.28 (U, R9a)	N/A	U

Data stored in file 10001231.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an a priori detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.

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HJR
1/12/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0032

Lab Sample ID: 98-09-192-04

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:41

Count Duration: 30 Min.

Aliquot: 405.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.08 ± 0.10	127.9	U
Na-22	-0.045 ± 0.058 (u, R9a)	N/A	U
K-40	30.7 ± 5.9	19.2	
Mn-54	-0.010 ± 0.050 (u, R9a)	N/A	U
Co-57	-0.018 ± 0.035 ↓	N/A	U
Co-60	0.062 ± 0.072	115.3	U
Zn-65	0.03 ± 0.12 (u, R9a)	430.9	U
Se-75	0.033 ± 0.059	175.1	U
Sr-85	-0.090 ± 0.071 (u, R9a)	N/A	U
Y-88	0.068 ± 0.067	97.8	TI
Ru-106	0.00 ± 0.67 (u, R9a)	N/A	U
Cd-109	2.1 ± 1.5	70.1	SI
Sn-113	-0.017 ± 0.062 (u, R9a)	N/A	U
Cs-134	0.015 ± 0.048 ↓	317.3	U
Cs-137	0.038 ± 0.067	177.5	U
Ce-139	0.007 ± 0.041 (u, R9a)	619.7	U
Ba-140	-0.45 ± 0.60	N/A	U
La-140	-25 ± 36	N/A	U
Ce-144	-0.07 ± 0.28	N/A	U
Eu-152	0.02 ± 0.14	582.2	U
Hg-203	-0.053 ± 0.070 ↓	N/A	U
Tl-208	0.47 ± 0.15	31.4	
Bi-211	0 ± 0 (u, R9a)	N/A	SQ
Pb-211	-0.7 ± 1.2 ↓	N/A	U
Bi-212	1.6 ± 1.8	108.6	U
Pb-212	1.17 ± 0.27	23.3	
Bi-214	0.67 ± 0.25	37.5	
Pb-214	1.06 ± 0.26	25.0	
Rn-219	0.49 ± 0.58 (u, R9a)	118.7	U
Ra-223	0.25 ± 0.86 ↓	345.1	U
Ra-224	1.41 ± 0.23	16.5	SI
Ra-226	2.9 ± 2.1	70.3	SI

Data stored in file 10001260.SPC

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1/12/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0032

Lab Sample ID: 98-09-192-04

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:41

Count Duration: 30 Min.

Aliquot: 405.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	0.15 ± 0.29	194.0	U
Ac-228	0.78 ± 0.33	42.8	
Pa-231	1.7 ± 1.8	101.9	U
Pa-233	-0.041 ± 0.099 (u, R9a)	N/A	U
Pa-234m	15.1 ± 9.8	65.1	
Th-234	1.4 ± 2.0	142.4	U
U-235	0.137 ± 0.077	56.1	TI
Np-237	-0.35 ± 0.41 (u, R9a)	N/A	U
Am-241	0.28 ± 0.33	119.4	U

Data stored in file 10001260.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an a priori detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative
for discussion.

000026

HDR
1/14/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0033

Lab Sample ID: 98-09-192-05

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 14:26

Count Duration: 30 Min.

Aliquot: 403.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.052 ± 0.067	128.9	U
Na-22	-0.007 ± 0.044 (u, R9a)	N/A	U
K-40	30.8 ± 5.4	17.7	
Mn-54	0.006 ± 0.046 (u, R9a)	715.1	U
Co-57	-0.015 ± 0.032	N/A	U
Co-60	0.002 ± 0.049	1985.0	U
Zn-65	-0.017 ± 0.096	N/A	U
Se-75	-0.013 ± 0.054	N/A	U
Sr-85	-0.120 ± 0.076	N/A	U
Y-88	-0.011 ± 0.056	N/A	U
Ru-106	0.08 ± 0.35	438.8	U
Cd-109	1.6 ± 1.2	74.4	SI
Sn-113	-0.005 ± 0.048 (u, R9a)	N/A	U
Cs-134	0.034 ± 0.042	125.8	U
Cs-137	0.051 ± 0.047	93.5	
Ce-139	0.006 ± 0.033 (u, R9a)	586.6	U
Ba-140	0.08 ± 0.49	636.3	U
La-140	14 ± 29	203.4	U
Ce-144	-0.01 ± 0.25 (u, R9a)	N/A	U
Eu-152	0.14 ± 0.10	71.1	TI
Hg-203	-0.019 ± 0.054 (u, R9a)	N/A	U
Tl-208	0.30 ± 0.10	34.0	
Bi-211	0.50 ± 0.46	93.0	SI
Pb-211	-0.14 ± 0.97 (u, R9a)	N/A	U
Bi-212	-0.3 ± 1.4	N/A	U
Pb-212	1.14 ± 0.24	20.7	
Bi-214	0.85 ± 0.20	23.9	
Pb-214	0.79 ± 0.19	23.9	
Rn-219	0.10 ± 0.42 (u, R9a)	410.2	U
Ra-223	0.33 ± 0.68	202.3	U
Ra-224	0.97 ± 0.16	16.5	SI
Ra-226	1.8 ± 1.4	81.3	SI

Data stored in file 10001263.SPC

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1/12/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0033

Lab Sample ID: 98-09-192-05 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 14:26
Count Duration: 30 Min. Aliquot: 403.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.08 ± 0.48 (U, R9a)	N/A	U
Ac-228	0.95 ± 0.26	27.4	
Pa-231	2.0 ± 1.4	71.9	SI
Pa-233	0.108 ± 0.076	70.5	TI
Pa-234m	9.0 ± 6.6	73.5	
Th-234	1.5 ± 1.6	107.3	U
U-235	0.084 ± 0.059	70.4	TI
Np-237	0.05 ± 0.34 (U, R9a)	710.5	U
Am-241	-0.02 ± 0.21 ↓	N/A	U

Data stored in file 10001263.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0034

Lab Sample ID: 98-09-192-06

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:44

Count Duration: 30 Min.

Aliquot: 393.800

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.11 ± 0.11	99.9	
Na-22	-0.018 ± 0.067 (u, R9a)	N/A	U
K-40	31.5 ± 6.2	19.6	
Mn-54	0.037 ± 0.057	154.0	U
Co-57	0.045 ± 0.044	96.2	
Co-60	0.013 ± 0.084 (u, R9a)	642.8	U
Zn-65	-0.03 ± 0.15 ↓	N/A	U
Se-75	0.048 ± 0.072	149.6	U
Sr-85	-0.018 ± 0.077 (u, R9a)	N/A	U
Y-88	-0.017 ± 0.080 ↓	N/A	U
Ru-106	0.33 ± 0.57 ↓	174.6	U
Cd-109	1.9 ± 1.7	86.5	SI
Sn-113	0.000 ± 0.072 (u, R9a)	N/A	U
Cs-134	0.041 ± 0.058	143.2	U
Cs-137	0.022 ± 0.075	346.8	U
Ce-139	-0.033 ± 0.046 (u, R9a)	N/A	U
Ba-140	-0.13 ± 0.77 ↓	N/A	U
La-140	6 ± 59 ↓	936.9	U
Ce-144	-0.13 ± 0.30 ↓	N/A	U
Eu-152	-0.02 ± 0.12 ↓	N/A	U
Hg-203	-0.066 ± 0.078 ↓	N/A	U
Tl-208	0.34 ± 0.14	43.0	
Bi-211	0.299 ± 0.049	16.5	SI
Pb-211	-0.5 ± 1.2 (u, R9a)	N/A	U
Bi-212	0.1 ± 2.2 ↓	2623.0	U
Pb-212	1.24 ± 0.30	23.8	
Bi-214	0.81 ± 0.26	31.9	TI
Pb-214	0.79 ± 0.24	30.0	
Rn-219	0.31 ± 0.63 (u, R9a)	202.0	U
Ra-223	-0.2 ± 1.0 ↓	N/A	U
Ra-224	2.5 ± 2.2	86.2	SI
Ra-226	2.2 ± 2.0	91.1	SI

Data stored in file 10001261.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: RE15-98-0034

Lab Sample ID: 98-09-192-06 Date Collected: 09/23/98 12:00
 Sample Matrix: Soil Date Analyzed: 10/20/98 13:44
 Count Duration: 30 Min. Aliquot: 393.800

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.21 ± 0.31 (u, R9a)	N/A	U
Ac-228	1.01 ± 0.39	39.0	U
Pa-231	1.0 ± 1.9	189.5	U
Pa-233	0.09 ± 0.11	119.2	U
Pa-234m	-2 ± 12 (u, R9a)	N/A	U
Th-234	-1.3 ± 2.0 ↓	N/A	U
U-235	0.097 ± 0.083	85.7	TI
Np-237	0.04 ± 0.46 (u, R9a)	1246.4	U
Am-241	0.04 ± 0.39 ↓	939.5	U

Data stored in file 10001261.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
 See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
 censored by an *a priori* detection limit estimate. Sample results should
 be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or
 less than the 2-sigma total propagated uncertainty.
- SI = Identification is tentative due to spectral interference. See
 narrative for further discussion.
- TI = Nuclide identification is tentative. See narrative for discussion.

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ADR
 1/12/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: RE15-98-0035

Lab Sample ID: 98-09-192-07

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:45

Count Duration: 30 Min.

Aliquot: 434.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.022 ± 0.062 (u, R9a)	283.4	U
Na-22	-0.015 ± 0.054 ↓	N/A	U
K-40	24.6 ± 4.8	19.6	
Mn-54	-0.019 ± 0.045 (u, R9a)	N/A	U
Co-57	0.010 ± 0.025 ↓	252.2	U
Co-60	-0.059 ± 0.070 ↓	N/A	U
Zn-65	0.16 ± 0.12	74.5	TI
Se-75	-0.012 ± 0.047 (u, R9a)	N/A	U
Sr-85	-0.048 ± 0.065 ↓	N/A	U
Y-88	0.024 ± 0.052 ↓	212.8	U
Ru-106	0.20 ± 0.40 ↓	203.0	U
Cd-109	0.29 ± 0.96 ↓	337.1	U
Sn-113	0.000 ± 0.055 ↓	N/A	U
Cs-134	0.015 ± 0.038 ↓	253.6	U
Cs-137	0.010 ± 0.042 ↓	433.5	U
Ce-139	-0.021 ± 0.033 ↓	N/A	U
Ba-140	-0.01 ± 0.56 ↓	N/A	U
La-140	16 ± 35	219.2	U
Ce-144	0.01 ± 0.20 (u, R9a)	1562.1	U
Eu-152	0.05 ± 0.11 ↓	214.1	U
Hg-203	-0.011 ± 0.041 ↓	N/A	U
Tl-208	0.31 ± 0.11	34.8	
Bi-211	0 ± 0 (u, R9a)	N/A	SQ
Pb-211	0.58 ± 1.00 ↓	171.1	U
Bi-212	0.4 ± 1.2 ↓	303.1	U
Pb-212	0.70 ± 0.19	26.7	
Bi-214	0.67 ± 0.20	29.6	
Pb-214	0.44 ± 0.16	37.7	
Rn-219	-0.33 ± 0.41 (u, R9a)	N/A	U
Ra-223	0.20 ± 0.67 ↓	327.2	U
Ra-224	0.84 ± 0.14	16.5	SI
Ra-226	2.0 ± 1.4	68.6	SI

Data stored in file 10001262.SPC

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0035

Lab Sample ID: 98-09-192-07

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:45

Count Duration: 30 Min.

Aliquot: 434.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	0.04 ± 0.23 (u, R9a)	572.5	U
Ac-228	0.53 ± 0.26	49.6	TI
Pa-231	1.4 ± 1.3	89.3	SI
Pa-233	-0.018 ± 0.062 (u, R9a)	N/A	U
Pa-234m	2.6 ± 6.8 ↓	258.7	U
Th-234	1.8 ± 1.5	84.8	TI
U-235	0.087 ± 0.058	66.0	TI
Np-237	0.02 ± 0.27 (u, R9a)	1760.8	U
Am-241	0.06 ± 0.22 ↓	361.1	U

Data stored in file 10001262.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.

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HJR
1/12/97

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0036

Lab Sample ID: 98-09-192-08

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:00

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.104 ± 0.067	64.2	
Na-22	-0.038 ± 0.052 (u, R9a)	N/A	U
K-40	34.2 ± 6.0	17.6	
Mn-54	0.013 ± 0.038 (u, R9a)	284.3	U
Co-57	-0.008 ± 0.026	N/A	U
Co-60	0.012 ± 0.049	410.9	U
Zn-65	0.029 ± 0.100	340.4	U
Se-75	0.015 ± 0.050	336.4	U
Sr-85	-0.074 ± 0.059	N/A	U
Y-88	-0.021 ± 0.047	N/A	U
Ru-106	-0.08 ± 0.33	N/A	U
Cd-109	1.1 ± 1.0	94.7	SI
Sn-113	-0.019 ± 0.044 (u, R9a)	N/A	U
Cs-134	0.011 ± 0.038	333.9	U
Cs-137	0.039 ± 0.037	93.2	
Ce-139	0.019 ± 0.034	181.2	U
Ba-140	0.44 ± 0.47	107.0	U
La-140	-4 ± 38 (u, R9a)	N/A	U
Ce-144	-0.13 ± 0.20	N/A	U
Eu-152	-0.007 ± 0.086	N/A	U
Hg-203	0.026 ± 0.046	175.8	U
Tl-208	0.349 ± 0.098	28.0	
Bi-211	0.0091 ± 0.0015 (u, R9a)	16.5	U
Pb-211	1.01 ± 0.91	90.6	TI
Bi-212	0.5 ± 1.4	272.3	U
Pb-212	1.20 ± 0.24	20.3	
Bi-214	0.80 ± 0.20	25.7	
Pb-214	0.91 ± 0.21	22.7	
Rn-219	-0.30 ± 0.41 (u, R9a)	N/A	U
Ra-223	0.58 ± 0.63	109.2	U
Ra-224	1.04 ± 0.17	16.5	SI
Ra-226	2.6 ± 1.5	57.8	SI

Data stored in file 20000543.SPC

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NDR
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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: RE15-98-0036

Lab Sample ID: 98-09-192-08 Date Collected: 09/23/98 12:00
 Sample Matrix: Soil Date Analyzed: 10/20/98 13:00
 Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.55 ± 0.53 (u, R9a)	N/A	U
Ac-228	1.29 ± 0.30	23.2	
Pa-231	1.8 ± 1.2	67.8	SI
Pa-233	0.071 ± 0.062	87.9	TI
Pa-234m	3.1 ± 7.0 (u, R9a)	226.7	U
Th-234	-2.3 ± 1.4 ↓	N/A	U
U-235	0.105 ± 0.063	59.7	TI
Np-237	-0.12 ± 0.27 (u, R9a)	N/A	U
Am-241	-0.03 ± 0.13 ↓	N/A	U

Data stored in file 20000543.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
 See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
 censored by an a priori detection limit estimate. Sample results should
 be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or
 less than the 2-sigma total propagated uncertainty.
- SI = Identification is tentative due to spectral interference. See
 narrative for further discussion.
- TI = Nuclide identification is tentative. See narrative for discussion.

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: RE15-98-0037

Lab Sample ID: 98-09-192-09
 Sample Matrix: Soil
 Count Duration: 30 Min.

Date Collected: 09/23/98 12:00
 Date Analyzed: 10/20/98 13:01
 Aliquot: 414.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.076 ± 0.080	105.1	U
Na-22	-0.015 ± 0.062 (u, R9a)	N/A	U
K-40	32.0 ± 6.1	19.0	
Mn-54	0.014 ± 0.049 (u, R9a)	346.8	U
Co-57	-0.018 ± 0.025	N/A	U
Co-60	-0.024 ± 0.067	N/A	U
Zn-65	0.02 ± 0.14	642.8	U
Se-75	-0.018 ± 0.057	N/A	U
Sr-85	-0.096 ± 0.067	N/A	U
Y-88	-0.006 ± 0.051	N/A	U
Ru-106	-0.20 ± 0.35	N/A	U
Cd-109	0.3 ± 1.2	368.1	U
Sn-113	0.005 ± 0.053	1016.6	U
Cs-134	-0.012 ± 0.042	N/A	U
Cs-137	0.044 ± 0.055	124.4	U
Ce-139	-0.018 ± 0.033 (u, R9a)	N/A	U
Ba-140	0.23 ± 0.55	235.9	U
La-140	-4 ± 50 (u, R9a)	N/A	U
Ce-144	0.02 ± 0.21	1000.1	U
Eu-152	-0.01 ± 0.10	N/A	U
Hg-203	0.007 ± 0.054	758.8	U
Tl-208	0.28 ± 0.11	39.3	
Bi-211	0.59 ± 0.56	94.5	SI
Pb-211	0.0 ± 1.2 (u, R9a)	N/A	U
Bi-212	0.3 ± 1.6	583.3	U
Pb-212	0.79 ± 0.21	26.7	
Bi-214	0.52 ± 0.18	35.2	TI
Pb-214	0.49 ± 0.18	36.3	
Rn-219	0.05 ± 0.52 (u, R9a)	961.3	U
Ra-223	0.08 ± 0.71	868.1	U
Ra-224	0.575 ± 0.095	16.5	SI
Ra-226	0.75 ± 0.95	127.3	U

Data stored in file 20000544.SPC

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 1/12/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0037

Lab Sample ID: 98-09-192-09

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:01

Count Duration: 30 Min.

Aliquot: 414.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.08 ± 0.26 (u, R9a)	N/A	U
Ac-228	0.57 ± 0.30	52.8	TI
Pa-231	1.1 ± 1.3	123.0	U
Pa-233	0.013 ± 0.067 (u, R9a)	537.7	U
Pa-234m	0 ± 10	N/A	U
Th-234	-0.5 ± 1.5	N/A	U
U-235	0.008 ± 0.056	730.0	U
Np-237	-0.23 ± 0.35	N/A	U
Am-241	0.07 ± 0.37	523.1	U

Data stored in file 20000544.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.

SI = Identification is tentative due to spectral interference. See narrative for further discussion.

TI = Nuclide identification is tentative. See narrative for discussion.

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HNR
1/14/98

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D1
 Sample Matrix: Soil
 Count Duration: 30 Min.

Date Collected: 09/23/98 12:00
 Date Analyzed: 10/20/98 14:29
 Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.115 ± 0.084	72.9	
Na-22	0.018 ± 0.058 <i>u</i>	320.2	U
K-40	28.5 ± 5.5	19.2	
Mn-54	0.014 ± 0.053 <i>u</i>	371.5	U
Co-57	0.017 ± 0.026	157.1	U
Co-60	0.040 ± 0.059	145.2	U
Zn-65	0.00 ± 0.15	N/A	U
Se-75	0.000 ± 0.056	N/A	U
Sr-85	-0.049 ± 0.060	N/A	U
Y-88	-0.007 ± 0.050	N/A	U
Ru-106	-0.05 ± 0.37	N/A	U
Cd-109	-0.4 ± 1.0	N/A	U
Sn-113	-0.022 ± 0.045	N/A	U
Cs-134	-0.034 ± 0.043	N/A	U
Cs-137	0.035 ± 0.045	129.3	U
Ce-139	0.022 ± 0.037	171.0	U
Ba-140	-0.38 ± 0.64	N/A	U
La-140	-11 ± 38	N/A	U
Ce-144	0.11 ± 0.22	198.6	U
Eu-152	0.03 ± 0.11	369.2	U
Hg-203	-0.004 ± 0.049	N/A	U
Tl-208	0.31 ± 0.12	38.9	
Bi-211	0.78 ± 0.59	75.7	SI
Pb-211	-0.26 ± 0.96 <i>u</i>	N/A	U
Bi-212	0.3 ± 1.8	643.1	U
Pb-212	1.13 ± 0.26	22.6	
Bi-214	0.70 ± 0.22	30.9	TI
Pb-214	0.58 ± 0.19	32.7	
Rn-219	0.23 ± 0.42 <i>u</i>	181.3	U
Ra-223	0.72 ± 0.68	94.2	TI
Ra-224	1.10 ± 0.18	16.5	SI
Ra-226	1.7 ± 1.6	93.9	SI

Data stored in file 10001266.SPC

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000015 *NDR*
1/12/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D1 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 14:29
Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.09 ± 0.25 <i>u</i>	N/A	U
Ac-228	1.34 ± 0.36	27.2	
Pa-231	1.1 ± 1.4	126.8	U
Pa-233	-0.013 ± 0.063 <i>u</i>	N/A	U
Pa-234m	0.1 ± 7.4	7636.8	U
Th-234	-0.5 ± 1.4 ↓	N/A	U
U-235	0.060 ± 0.063	106.4	U
Np-237	0.11 ± 0.30 <i>u</i>	281.9	U
Am-241	-0.02 ± 0.25 ↓	N/A	U

Data stored in file 10001266.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an a priori detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

Remarks: Sample 98-09-192-D1 is a duplicate of 98-09-192-01.

000016

NDR
1/14/99

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:45

Count Duration: 30 Min.

Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.054 ± 0.069	126.2	U
Na-22	-0.014 ± 0.048 <i>u</i>	N/A	U
K-40	30.2 ± 5.4	18.0	
Mn-54	0.009 ± 0.042 <i>u</i>	460.1	U
Co-57	-0.011 ± 0.028	N/A	U
Co-60	0.035 ± 0.042	120.0	U
Zn-65	-0.09 ± 0.11	N/A	U
Se-75	-0.041 ± 0.048	N/A	U
Sr-85	-0.050 ± 0.060	N/A	U
Y-88	-0.003 ± 0.045	N/A	U
Ru-106	-0.04 ± 0.34	N/A	U
Cd-109	1.8 ± 1.4 <i>u</i>	80.4	SI
Sn-113	0.009 ± 0.044	497.5	U
Cs-134	0.009 ± 0.040	440.3	U
Cs-137	0.031 ± 0.044	142.1	U
Ce-139	-0.036 ± 0.034 <i>u</i>	N/A	U
Ba-140	-0.11 ± 0.48	N/A	U
La-140	-24 ± 40	N/A	U
Ce-144	0.12 ± 0.21	165.0	U
Eu-152	0.014 ± 0.091	648.9	U
Hg-203	-0.032 ± 0.047 <i>u</i>	N/A	U
Tl-208	0.36 ± 0.11	30.5	
Bi-211	0 ± 0 <i>u</i>	N/A	SQ
Pb-211	-0.3 ± 1.0 <i>u</i>	N/A	U
Bi-212	0.7 ± 1.3	187.1	U
Pb-212	1.12 ± 0.24	21.1	
Bi-214	0.87 ± 0.22	24.6	
Pb-214	0.91 ± 0.21	22.9	
Rn-219	-0.38 ± 0.47 <i>u</i>	N/A	U
Ra-223	0.09 ± 0.62 <i>u</i>	713.6	U
Ra-224	0.87 ± 0.14	16.5	SI
Ra-226	2.4 ± 1.4	59.6	SI

Data stored in file 20000545.SPC

Continued on next page...

000019

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1/12/99

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:45
Count Duration: 30 Min. Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.44 ± 0.53 <i>u</i>	N/A	U
Ac-228	1.05 ± 0.28	27.0	
Pa-231	1.6 ± 1.2	74.8	SI
Pa-233	0.011 ± 0.066 <i>u</i>	621.2	U
Pa-234m	-4.1 ± 7.8	N/A	U
Th-234	-2.7 ± 1.4 <i>↓</i>	N/A	U
U-235	0.070 ± 0.059	83.8	TI
Np-237	0.50 ± 0.40 <i>u</i>	80.4	SI
Am-241	-0.04 ± 0.13 <i>↓</i>	N/A	U

Data stored in file 20000545.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative
for discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

Remarks: Sample 98-09-192-D2 is a duplicate of 98-09-192-03.

000020

NOR
1/12/99

CCS/VALIDATION COVER SHEET

MR3R12082642 4662 LAB NAME PAI Agon LAB CODE _____
C CODE _____ SDG _____

NAME OF CCS CHECKER _____ COMPANY _____

NAME OF VALIDATOR _____ COMPANY _____

CCS DATA _____ VALIDATION DATE _____ EDS ENTRY DATE _____

ANALYTICAL SUITE:

☐ VOLATILES
☐ SEMIVOLATILES
☐ PESTICIDES

☐ HIGH EXPLOSIVE
☐ INORGANICS
☒ RADIOCHEMISTRY

GENERAL CHECKLIST

PRESENT
X IF "YES"
O IF "NO"

1. CASE NARRATIVE _____
2. AIRBILLS (NO. OF SHIPMENTS _____)
3. CHAIN-OF-CUSTODY RECORDS _____
4. SAMPLE TAGS _____
5. SAMPLE LOG-IN SHEETS _____
6. INTERNAL LAB SAMPLE TRANSFER RECORDS
AND TRACKING SHEETS _____
7. OTHER? IDENTIFY _____

ARE ALL SAMPLES ASSIGNED TO THE SDG PRESENT

YES _____

NO _____

IDENTIFY ANY SAMPLES IN THE ASSIGNED SDG?RN THAT ARE MISSING

COMMENTS/ PROBLEMS NOTED, INCLUDING INFORMATION ABOUT REQUEST TO THE
LABORATORY AND AGREED UPON DATA OF RESOLUTION AND LAB CONTACT:



PARAGON ANALYTICS, INC.

225 Commerce Drive ♦ Fort Collins, CO 80524 ♦ (800) 443-1511 ♦ (970) 490-1511 ♦ FAX (970) 490-1522

November 11, 1998

Ms. Joylene Valdez
Los Alamos National Laboratory SMO
SMO TA-3, Bldg. 271
Los Alamos, NM 87545

RE: Paragon Workorder: 98-09-192
Client Project Name: None Submitted
Client Project Number: 4662R

Dear Ms. Valdez:

Nine soil samples were received from Los Alamos National Laboratory SMO on September 26, 1998. The samples were scheduled for the following analyses:

Gamma Spectroscopy	pages 1-273
Isotopic Uranium	pages 274-442
Tritium	pages 443-488

The results for these analyses are contained in the enclosed reports.

Please note that an EDD was sent out on November 10, 1998.

Thank you for your confidence in Paragon Analytics, Inc. Should you have any questions, please call.

Sincerely,

Paragon Analytics, Inc.
Lance Steere
Senior Project Manager

LRS/kmp
Enclosure: Report

An Employee Owned Small Business

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9809192

Client Name: Los Alamos National Laboratory SMO

Client Project Name:

Client Project Number: 4662R

Client PO Number: 7794L0014-9S

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
RE15-98-0029 ✓	9809192-1	4662RC ✓	Soil ✓	9/23/98	✓
RE15-98-0030 ✓	9809192-2	4662RC	Soil	9/23/98	
RE15-98-0031 ✓	9809192-3	4662RC	Soil	9/23/98	
RE15-98-0032 ✓	9809192-4	4662RC	Soil	9/23/98	
RE15-98-0033 ✓	9809192-5	4662RC	Soil	9/23/98	
RE15-98-0034 ✓	9809192-6	4662RC	Soil	9/23/98	
RE15-98-0035 ✓	9809192-7	4662RC	Soil	9/23/98	
RE15-98-0036 ✓	9809192-8	4662RC	Soil	9/23/98	
RE15-98-0037 ✓	9809192-9	4662RC	Soil	9/23/98	

Friday, September 25, 1998

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

Please analyze the enclosed samples
according to the schedule indicated:

These samples are on:

SHIP DATE: 9/25/98

REPORT DUE: 10/25/98

TURN AROUND REQ'D: 30 days

LANL Request Number: 4662R

Per Agreement Number: 7794L0014-9S

Project Cost Code: MR3R12082642

RAD SCREENING: Not Required

COMMENTS: 15 - 1086 , GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: 

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
01	GAMMA SPE	RE15-98-0029	01	S	9/23/98	
	H3	RE15-98-0029	02	S	9/23/98	
	ISOU	RE15-98-0029	04	S	9/23/98	
	GAMMA SPE	RE15-98-0030	01	S	9/23/98	
02	H3	RE15-98-0030	02	S	9/23/98	
	ISOU	RE15-98-0030	04	S	9/23/98	
	GAMMA SPE	RE15-98-0031	01	S	9/23/98	
03	H3	RE15-98-0031	02	S	9/23/98	
	ISOU	RE15-98-0031	04	S	9/23/98	
	GAMMA SPE	RE15-98-0032	01	S	9/23/98	
04	H3	RE15-98-0032	02	S	9/23/98	
	ISOU	RE15-98-0032	04	S	9/23/98	
	GAMMA SPE	RE15-98-0033	01	S	9/23/98	
05	H3	RE15-98-0033	02	S	9/23/98	
	ISOU	RE15-98-0033	04	S	9/23/98	
	GAMMA SPE	RE15-98-0034	01	S	9/23/98	
06	H3	RE15-98-0034	02	S	9/23/98	
	ISOU	RE15-98-0034	04	S	9/23/98	
	GAMMA SPE	RE15-98-0035	01	S	9/23/98	
07	H3	RE15-98-0035	02	S	9/23/98	
	ISOU	RE15-98-0035	04	S	9/23/98	
	GAMMA SPE	RE15-98-0036	01	S	9/23/98	
08	H3	RE15-98-0036	02	S	9/23/98	
	ISOU	RE15-98-0036	04	S	9/23/98	

Friday, September 25, 1998

9809192

REQUEST NUMBER: 4662R
Page 2

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
09 GAMMA SPE H3 ISOU		RE15-98-0037	01	S	9/23/98	
		RE15-98-0037	02	S	9/23/98	
		RE15-98-0037	04	S	9/23/98	

Friday, September 25, 1998

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

Los Alamos
NATIONAL LABORATORY

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By: _____ Date _____ Time _____

PRINTED NAME

S. Hagelberg
SIGNATURE

9.25.98 1319

PRINTED NAME

S. Hagelberg
SIGNATURE

PRINTED NAME

S. Hagelberg
SIGNATURE

Received for DISPOSAL By: _____ Date _____ Time _____

PRINTED NAME

S. Hagelberg
SIGNATURE

Received By: _____ Date _____ Time _____

PRINTED NAME

Signature
SIGNATURE

PRINTED NAME

Signature
SIGNATURE

PRINTED NAME

Signature
SIGNATURE

Remarks:

Friday, September 25, 1998

980919Z

COC DOC NUMBER: 4662RC

REQUEST NUMBER: 4662R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE		
RE15-98-0035	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0036	02	500 ml Polyethylene	H3	None	S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0037	02	500 ml Polyethylene	H3	None	S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None	S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4662R

Page 2

Relinquished By:

Date Time

S. Hagelberg S. Hag 9/25/98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LANU

SHIPPING CONTAINER #: Client Cooler

WORKORDER NO. 980919Z

INITIALS: JH

DATE: 9/26/96

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature _____ b. Lot No's. _____ c. Airbill Number _____		Yes	<u>No</u>
2.	Are custody seals on the cooler intact? If so, how many <u>4</u>	N/A	<u>Yes</u>	No
3.	Are custody seals on sample containers intact?	N/A	<u>Yes</u>	No
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		<u>Yes</u>	No
5.	Is the COC complete? Relinquished: Yes <u>X</u> No Requested Analysis: Yes <u>X</u> No	N/A	<u>Yes</u>	No
6.	Is the COC in agreement with the samples received? No. of Samples: Yes <u>X</u> No Sample ID's: Yes <u>X</u> No Matrix: Yes <u>X</u> No No. of Containers: Yes <u>X</u> No		<u>Yes</u>	No
7.	Are the samples requiring chemical preservation preserved correctly?	<u>N/A</u>	<u>Yes</u>	No
8.	Is there enough sample? If so, are they in the proper containers?		<u>Yes</u>	No
9.	Are all samples within holding times for the requested analyses?		<u>Yes</u>	No
10.	Were the sample(s) shipped on ice?	N/A	<u>Yes</u>	No
11.	Were all sample containers received intact? (not broken or leaking, etc.)		<u>Yes</u>	No
12.	Are samples requiring no headspace, headspace free?	<u>N/A</u>	<u>Yes</u>	No
13.	Do the samples require quarantine?		<u>Yes</u>	No
14.	Do samples require Paragon disposal?		<u>Yes</u>	No
15.	Did the client return any unused bottles?		Yes	<u>No</u>

Describe "NO" items (except No's 1, 13, & 14): _____

Was the client contacted? Yes _____ No _____

If yes, Date: _____ Name of person contacted: _____

Describe actions taken or client instructions: _____

Group Leader's Signature: _____

Date: _____

Cooler Temperature: 60



Paragon Analytics, Inc.
Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4662R

Date File Saved: 11/02/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

9809192-1
9809192-2
9809192-3
9809192-4
9809192-5
9809192-6
9809192-7
9809192-8
9809192-9

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

All samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: Gamma Spectroscopy

The samples under Request Number 4662R (Work Order 9809192) were received on 09/26/98 and scheduled for gamma spec. analyses, which were completed on 10/20/98.

The analysis results for these samples are reported on a dry weight basis in units of pCi/gram.

This work order was prepared using PAI SOP739R2 and analyzed using PAI SOP713R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.23, the actual values for each measurement have been reported. The decision levels for each analyte are calculated for the associated blank. These values are reported in the hard copy and in the MDA fields in the electronic deliverable. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

000001

PARAGON ANALYTICS, INC.

Sample volumes were insufficient to allow preparation of a duplicate. Duplicate analysis of samples RE15-98-0029 and RE15-98-0031(PAI ID 9809192-01, -03) were performed in lieu of a preparation duplicate.

Several nuclides in the target list are subject to spectral interferences. The observed photopeaks at the energies listed are generally attributable to the naturally-occurring radionuclides listed as interferences, causing false identifications for the target analytes.

Analyte	Interference	Photopeak Energy (keV)
¹⁰⁹ Cd	K _β x ray of Pb	87
²³⁷ Np	K _β x ray of Pb	87
²²⁶ Ra	²³⁵ U	186
²⁰³ Hg	²⁰⁸ Tl	277
²²⁴ Ra	²¹⁴ Pb	241
²³¹ Pa	²¹² Pb	300
²¹¹ Bi	²¹⁴ Pb	351
⁵⁴ Mn	²²⁸ Ac	835

A special case of the above, the GDR software often identifies ²²⁶Ra above the decision level for soil samples. The identifications are reasonable, when radium progeny (e.g. ²¹⁴Pb, ²¹⁴Bi) are also identified. However, quantification at low levels based upon the 186 keV photopeak is unreliable due to interference from ²³⁵U, which also has a photopeak at 186 keV. Low levels of ²³⁵U, though undetectable by this method, can cause greatly exaggerated ²²⁶Ra results. The ²²⁶Ra activity reported should be considered qualitative.

All activity concentration results above the 2σ total propagated uncertainty (TPU) for which spectral interference is suspected are given an “SI” flag.

Due to peak interference, the GDR software may not attempt to quantify activity concentrations or the corresponding uncertainties for some analytes. In such cases, zero values are reported in the hard copy reports, and data are flagged with an “SQ” qualifier.

Activity concentrations above the 2σ TPU are reported in some instances where no supporting photopeaks are observed. These anomalous identifications result from the GDR software attempting to calculate net activity concentrations for analytes for which no peaks are observed. Such data have been flagged with a “TI” qualifier.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager’s or designee’s signature in the hard copy report.

000002

Jennifer Hancock
Radiochemistry Instrumentation

11/2/98
Date

Robert Schumacher
Radiochemistry Final Review

11/3/98
Date

000003

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 1

**SAMPLE RESULTS
SUMMARY**

~~00000341~~
000004

A summary report is not provided.
Please refer to the individual sample results data in section 3.

000005

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

2

Section 2

**QC RESULTS
SUMMARY**

000006

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Lab Control

Lab Sample ID: 98-09-192-S1

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:46

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	62	66	93	Pass
Co-60	136	140	98	Pass
Y-88	289	300	96	Pass
Cd-109	2940	2800	105	Pass
Sn-113	185	170	106	Pass
Cs-137	92	87	105	Pass
Ce-139	104	110	99	Pass
Am-241	187	200	92	Pass

Data stored in file 20000546.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000007

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1

Date Collected: 10/06/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 15:23

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	< 0.037	BDL	
Na-22	< 0.026	BDL	
K-40	< 0.36	BDL	
Mn-54	< 0.026	BDL	
Co-57	< 0.015	BDL	
Co-60	< 0.041	BDL	
Zn-65	< 0.043	BDL	
Se-75	< 0.025	BDL	
Sr-85	< 0.041	BDL	
Y-88	< 0.029	BDL	
Ru-106	< 0.40	BDL	
Cd-109	< 0.65	BDL	
Sn-113	< 0.033	BDL	
Cs-134	< 0.026	BDL	
Cs-137	< 0.020	BDL	
Ce-139	< 0.016	BDL	
Ba-140	< 0.15	BDL	
La-140	< 10	BDL	
Ce-144	< 0.25	BDL	
Eu-152	< 0.064	BDL	
Hg-203	< 0.046	BDL	
Tl-208	< 0.027	BDL	
Bi-211	< 0.16	BDL	
Pb-211	< 0.60	BDL	
Bi-212	< 0.49	BDL	
Pb-212	< 0.046	BDL	
Bi-214	< 0.064	BDL	
Pb-214	< 0.051	BDL	
Rn-219	< 0.52	BDL	
Ra-223	< 0.37	BDL	
Ra-224	< 0.39	BDL	
Ra-226	< 0.59	BDL	

Data stored in file 10001267.SPC

Continued on next page...

000008

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1 Date Collected: 10/06/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 15:23
Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	< 0.13	BDL	
Ac-228	< 0.080	BDL	
Pa-231	< 0.70	BDL	
Pa-233	< 0.068	BDL	
Pa-234m	< 4.1	BDL	
Th-234	< 0.73	BDL	
U-235	< 0.032	BDL	
Np-237	< 0.13	BDL	
Am-241	< 0.098	BDL	

Data stored in file 10001267.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

BDL = Below Detection Limit; see method for DL determination

000009

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1

Date Collected: 10/06/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 15:23

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.030 ± 0.049	163.3	U
Na-22	0.008 ± 0.022	283.3	U
K-40	-0.14 ± 0.44	N/A	U
Mn-54	0.002 ± 0.029	1380.9	U
Co-57	-0.003 ± 0.018	N/A	U
Co-60	0.014 ± 0.032	229.3	U
Zn-65	-0.011 ± 0.053	N/A	U
Se-75	-0.008 ± 0.030	N/A	U
Sr-85	-0.006 ± 0.049	N/A	U
Y-88	-0.012 ± 0.036	N/A	U
Ru-106	0.17 ± 0.28	167.4	U
Cd-109	0.20 ± 0.54	267.4	U
Sn-113	0.005 ± 0.034	714.3	U
Cs-134	-0.012 ± 0.032	N/A	U
Cs-137	-0.018 ± 0.024	N/A	U
Ce-139	-0.025 ± 0.020	N/A	U
Ba-140	-0.03 ± 0.18	N/A	U
La-140	3.9 ± 7.6	194.0	U
Ce-144	0.14 ± 0.14	100.5	U
Eu-152	-0.032 ± 0.078	N/A	U
Hg-203	0.021 ± 0.031	148.1	U
Tl-208	-0.010 ± 0.033	N/A	U
Bi-211	0.02 ± 0.17	900.6	U
Pb-211	0.01 ± 0.72	9842.3	U
Bi-212	-0.15 ± 0.60	N/A	U
Pb-212	0.005 ± 0.049	926.9	U
Bi-214	-0.025 ± 0.078	N/A	U
Pb-214	-0.003 ± 0.062	N/A	U
Rn-219	0.25 ± 0.34	138.4	U
Ra-223	-0.18 ± 0.45	N/A	U
Ra-224	-0.28 ± 0.47	N/A	U
Ra-226	0.07 ± 0.64	970.9	U

Data stored in file 10001267.SPC

Continued on next page...

000010

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Blank

Lab Sample ID: 98-09-192-B1 Date Collected: 10/06/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 15:23
Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.12 ± 0.16	N/A	U
Ac-228	-0.036 ± 0.097	N/A	U
Pa-231	0.25 ± 0.83	337.4	U
Pa-233	0.027 ± 0.049	179.5	U
Pa-234m	0.5 ± 4.4	873.4	U
Th-234	-0.04 ± 0.89	N/A	U
U-235	-0.012 ± 0.039	N/A	U
Np-237	-0.10 ± 0.16	N/A	U
Am-241	0.00 ± 0.12	4931.6	U

Data stored in file 10001267.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2 σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.

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PARAGON ANALYTICS, INC.
Radiochemistry Data Package

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Section 3

**INDIVIDUAL
SAMPLE RESULTS**

000012

Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: RE15-98-0029

Lab Sample ID: 98-09-192-01 Date Collected: 09/23/98 12:00
 Sample Matrix: Soil Date Analyzed: 10/14/98 20:31
 Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.101 ± 0.062	61.3	
Na-22	0.038 ± 0.044	116.0	U
K-40	29.5 ± 5.2	17.7	
Mn-54	0.005 ± 0.039	804.5	U
Co-57	0.001 ± 0.023	1892.2	U
Co-60	0.007 ± 0.040	587.8	U
Zn-65	-0.045 ± 0.092	N/A	U
Se-75	0.032 ± 0.044	138.5	U
Sr-85	-0.059 ± 0.051	N/A	U
Y-88	-0.001 ± 0.042	N/A	U
Ru-106	-0.29 ± 0.30	N/A	U
Cd-109	1.71 ± 0.93	54.2	SI
Sn-113	-0.017 ± 0.040	N/A	U
Cs-134	-0.002 ± 0.033	N/A	U
Cs-137	0.015 ± 0.034	221.7	U
Ce-139	0.026 ± 0.031	119.8	U
Ba-140	0.11 ± 0.33	313.1	U
La-140	-10 ± 40	N/A	U
Ce-144	0.10 ± 0.19	185.6	U
Eu-152	0.087 ± 0.085	98.3	TI
Hg-203	0.008 ± 0.041	538.4	U
Tl-208	0.279 ± 0.086	30.7	
Bi-211	0.54 ± 0.44	82.3	SI
Pb-211	-0.68 ± 0.92	N/A	U
Bi-212	-0.3 ± 1.2	N/A	U
Pb-212	1.00 ± 0.21	21.1	
Bi-214	0.80 ± 0.19	23.6	
Pb-214	0.65 ± 0.16	25.2	
Rn-219	-0.02 ± 0.38	N/A	U
Ra-223	-0.12 ± 0.56	N/A	U
Ra-224	1.3 ± 1.3	101.9	U
Ra-226	1.8 ± 1.3	73.7	SI

Data stored in file 20000526.SPC

Continued on next page...

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0029

Lab Sample ID: 98-09-192-01 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/14/98 20:31
Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.25 ± 0.48	N/A	U
Ac-228	1.02 ± 0.26	25.2	
Pa-231	1.7 ± 1.1	63.0	SI
Pa-233	0.012 ± 0.053	434.1	U
Pa-234m	0.8 ± 6.9	872.6	U
Th-234	1.5 ± 1.2	78.0	TI
U-235	0.066 ± 0.054	83.1	TI
Np-237	-0.01 ± 0.25	N/A	U
Am-241	0.04 ± 0.12	300.6	U

Data stored in file 20000526.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

000014

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D1

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 14:29

Count Duration: 30 Min.

Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.115 ± 0.084	72.9	
Na-22	0.018 ± 0.058	320.2	U
K-40	28.5 ± 5.5	19.2	
Mn-54	0.014 ± 0.053	371.5	U
Co-57	0.017 ± 0.026	157.1	U
Co-60	0.040 ± 0.059	145.2	U
Zn-65	0.00 ± 0.15	N/A	U
Se-75	0.000 ± 0.056	N/A	U
Sr-85	-0.049 ± 0.060	N/A	U
Y-88	-0.007 ± 0.050	N/A	U
Ru-106	-0.05 ± 0.37	N/A	U
Cd-109	-0.4 ± 1.0	N/A	U
Sn-113	-0.022 ± 0.045	N/A	U
Cs-134	-0.034 ± 0.043	N/A	U
Cs-137	0.035 ± 0.045	129.3	U
Ce-139	0.022 ± 0.037	171.0	U
Ba-140	-0.38 ± 0.64	N/A	U
La-140	-11 ± 38	N/A	U
Ce-144	0.11 ± 0.22	198.6	U
Eu-152	0.03 ± 0.11	369.2	U
Hg-203	-0.004 ± 0.049	N/A	U
Tl-208	0.31 ± 0.12	38.9	
Bi-211	0.78 ± 0.59	75.7	SI
Pb-211	-0.26 ± 0.96	N/A	U
Bi-212	0.3 ± 1.8	643.1	U
Pb-212	1.13 ± 0.26	22.6	
Bi-214	0.70 ± 0.22	30.9	TI
Pb-214	0.58 ± 0.19	32.7	
Rn-219	0.23 ± 0.42	181.3	U
Ra-223	0.72 ± 0.68	94.2	TI
Ra-224	1.10 ± 0.18	16.5	SI
Ra-226	1.7 ± 1.6	93.9	SI

Data stored in file 10001266.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D1 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 14:29
Count Duration: 30 Min. Aliquot: 436.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.09 ± 0.25	N/A	U
Ac-228	1.34 ± 0.36	27.2	
Pa-231	1.1 ± 1.4	126.8	U
Pa-233	-0.013 ± 0.063	N/A	U
Pa-234m	0.1 ± 7.4	7636.8	U
Th-234	-0.5 ± 1.4	N/A	U
U-235	0.060 ± 0.063	106.4	U
Np-237	0.11 ± 0.30	281.9	U
Am-241	-0.02 ± 0.25	N/A	U

Data stored in file 10001266.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

Remarks: Sample 98-09-192-D1 is a duplicate of 98-09-192-01.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0030

Lab Sample ID: 98-09-192-02

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:40

Count Duration: 30 Min.

Aliquot: 368.900

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.098 ± 0.070	71.2	
Na-22	-0.023 ± 0.056	N/A	U
K-40	32.1 ± 5.7	17.7	
Mn-54	0.025 ± 0.047	190.7	U
Co-57	-0.011 ± 0.033	N/A	U
Co-60	0.072 ± 0.051	70.5	TI
Zn-65	-0.03 ± 0.10	N/A	U
Se-75	-0.011 ± 0.059	N/A	U
Sr-85	-0.137 ± 0.081	N/A	U
Y-88	-0.067 ± 0.057	N/A	U
Ru-106	-0.32 ± 0.41	N/A	U
Cd-109	0.3 ± 1.3	474.8	U
Sn-113	-0.034 ± 0.054	N/A	U
Cs-134	-0.034 ± 0.047	N/A	U
Cs-137	0.043 ± 0.045	103.8	U
Ce-139	-0.014 ± 0.036	N/A	U
Ba-140	0.40 ± 0.55	138.6	U
La-140	-24 ± 40	N/A	U
Ce-144	-0.19 ± 0.26	N/A	U
Eu-152	-0.04 ± 0.11	N/A	U
Hg-203	-0.039 ± 0.062	N/A	U
Tl-208	0.26 ± 0.11	40.9	
Bi-211	0.55 ± 0.53	96.2	SI
Pb-211	0.6 ± 1.1	184.8	U
Bi-212	1.1 ± 1.2	116.4	U
Pb-212	1.20 ± 0.26	21.3	
Bi-214	0.66 ± 0.19	29.3	
Pb-214	0.77 ± 0.20	25.6	
Rn-219	0.22 ± 0.46	204.6	U
Ra-223	0.43 ± 0.80	186.0	U
Ra-224	1.7 ± 1.5	92.9	SI
Ra-226	3.2 ± 1.7	52.4	SI

Data stored in file 10001259.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0030

Lab Sample ID: 98-09-192-02 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:40
Count Duration: 30 Min. Aliquot: 368.900

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.35 ± 0.54	N/A	U
Ac-228	1.23 ± 0.31	25.0	
Pa-231	1.7 ± 1.5	89.3	SI
Pa-233	-0.026 ± 0.074	N/A	U
Pa-234m	4.1 ± 8.0	192.9	U
Th-234	-0.1 ± 1.8	N/A	U
U-235	0.133 ± 0.068	51.4	TI
Np-237	-0.31 ± 0.37	N/A	U
Am-241	0.02 ± 0.24	1312.8	U

Data stored in file 10001259.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2 σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:45

Count Duration: 30 Min.

Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.054 ± 0.069	126.2	U
Na-22	-0.014 ± 0.048	N/A	U
K-40	30.2 ± 5.4	18.0	
Mn-54	0.009 ± 0.042	460.1	U
Co-57	-0.011 ± 0.028	N/A	U
Co-60	0.035 ± 0.042	120.0	U
Zn-65	-0.09 ± 0.11	N/A	U
Se-75	-0.041 ± 0.048	N/A	U
Sr-85	-0.050 ± 0.060	N/A	U
Y-88	-0.003 ± 0.045	N/A	U
Ru-106	-0.04 ± 0.34	N/A	U
Cd-109	1.8 ± 1.4	80.4	SI
Sn-113	0.009 ± 0.044	497.5	U
Cs-134	0.009 ± 0.040	440.3	U
Cs-137	0.031 ± 0.044	142.1	U
Ce-139	-0.036 ± 0.034	N/A	U
Ba-140	-0.11 ± 0.48	N/A	U
La-140	-24 ± 40	N/A	U
Ce-144	0.12 ± 0.21	165.0	U
Eu-152	0.014 ± 0.091	648.9	U
Hg-203	-0.032 ± 0.047	N/A	U
Tl-208	0.36 ± 0.11	30.5	
Bi-211	0 ± 0	N/A	SQ
Pb-211	-0.3 ± 1.0	N/A	U
Bi-212	0.7 ± 1.3	187.1	U
Pb-212	1.12 ± 0.24	21.1	
Bi-214	0.87 ± 0.22	24.6	
Pb-214	0.91 ± 0.21	22.9	
Rn-219	-0.38 ± 0.47	N/A	U
Ra-223	0.09 ± 0.62	713.6	U
Ra-224	0.87 ± 0.14	16.5	SI
Ra-226	2.4 ± 1.4	59.6	SI

Data stored in file 20000545.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:45
Count Duration: 30 Min. Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.44 ± 0.53	N/A	U
Ac-228	1.05 ± 0.28	27.0	
Pa-231	1.6 ± 1.2	74.8	SI
Pa-233	0.011 ± 0.066	621.2	U
Pa-234m	-4.1 ± 7.8	N/A	U
Th-234	-2.7 ± 1.4	N/A	U
U-235	0.070 ± 0.059	83.8	TI
Np-237	0.50 ± 0.40	80.4	SI
Am-241	-0.04 ± 0.13	N/A	U

Data stored in file 20000545.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2 σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative for discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

Remarks: Sample 98-09-192-D2 is a duplicate of 98-09-192-03.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0031

Lab Sample ID: 98-09-192-03

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/14/98 21:16

Count Duration: 30 Min.

Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.072 ± 0.089	123.8	U
Na-22	0.022 ± 0.062	284.6	U
K-40	29.9 ± 5.8	19.4	
Mn-54	-0.027 ± 0.049	N/A	U
Co-57	-0.025 ± 0.026	N/A	U
Co-60	0.000 ± 0.079	N/A	U
Zn-65	0.06 ± 0.13	214.4	U
Se-75	-0.029 ± 0.050	N/A	U
Sr-85	-0.030 ± 0.062	N/A	U
Y-88	0.020 ± 0.072	367.0	U
Ru-106	0.11 ± 0.44	403.7	U
Cd-109	0.1 ± 1.2	2116.7	U
Sn-113	-0.067 ± 0.052	N/A	U
Cs-134	-0.042 ± 0.050	N/A	U
Cs-137	0.008 ± 0.060	712.9	U
Ce-139	-0.015 ± 0.039	N/A	U
Ba-140	-0.07 ± 0.51	N/A	U
La-140	-40 ± 67	N/A	U
Ce-144	0.05 ± 0.21	401.4	U
Eu-152	-0.08 ± 0.11	N/A	U
Hg-203	0.005 ± 0.055	1051.3	U
Tl-208	0.33 ± 0.13	40.6	
Bi-211	0.48 ± 0.65	136.9	U
Pb-211	-0.03 ± 1.00	N/A	U
Bi-212	1.6 ± 2.4	149.1	U
Pb-212	0.88 ± 0.24	27.5	
Bi-214	1.04 ± 0.28	26.7	
Pb-214	0.77 ± 0.23	30.0	
Rn-219	-0.19 ± 0.46	N/A	U
Ra-223	1.01 ± 0.90	89.8	TI
Ra-224	-5.7 ± 1.7	N/A	U
Ra-226	2.3 ± 1.3	54.8	SI

Data stored in file 10001231.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0031

Lab Sample ID: 98-09-192-03 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/14/98 21:16
Count Duration: 30 Min. Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.20 ± 0.29	N/A	U
Ac-228	0.78 ± 0.34	43.1	
Pa-231	1.2 ± 1.6	126.8	U
Pa-233	-0.025 ± 0.081	N/A	U
Pa-234m	8.0 ± 9.9	123.6	U
Th-234	0.5 ± 1.7	313.2	U
U-235	0.073 ± 0.073	99.3	TI
Np-237	0.18 ± 0.36	200.7	U
Am-241	-0.18 ± 0.28	N/A	U

Data stored in file 10001231.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
 Method 901.1 (Modified)

Page 1

Client Name: Los Alamos National Laboratory SMO
 Client Project Id: 4662R
 Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2 Date Collected: 09/23/98 12:00
 Sample Matrix: Soil Date Analyzed: 10/20/98 13:45
 Count Duration: 30 Min. Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.054 ± 0.069	126.2	U
Na-22	-0.014 ± 0.048	N/A	U
K-40	30.2 ± 5.4	18.0	
Mn-54	0.009 ± 0.042	460.1	U
Co-57	-0.011 ± 0.028	N/A	U
Co-60	0.035 ± 0.042	120.0	U
Zn-65	-0.09 ± 0.11	N/A	U
Se-75	-0.041 ± 0.048	N/A	U
Sr-85	-0.050 ± 0.060	N/A	U
Y-88	-0.003 ± 0.045	N/A	U
Ru-106	-0.04 ± 0.34	N/A	U
Cd-109	1.8 ± 1.4	80.4	SI
Sn-113	0.009 ± 0.044	497.5	U
Cs-134	0.009 ± 0.040	440.3	U
Cs-137	0.031 ± 0.044	142.1	U
Ce-139	-0.036 ± 0.034	N/A	U
Ba-140	-0.11 ± 0.48	N/A	U
La-140	-24 ± 40	N/A	U
Ce-144	0.12 ± 0.21	165.0	U
Eu-152	0.014 ± 0.091	648.9	U
Hg-203	-0.032 ± 0.047	N/A	U
Tl-208	0.36 ± 0.11	30.5	
Bi-211	0 ± 0	N/A	SQ
Pb-211	-0.3 ± 1.0	N/A	U
Bi-212	0.7 ± 1.3	187.1	U
Pb-212	1.12 ± 0.24	21.1	
Bi-214	0.87 ± 0.22	24.6	
Pb-214	0.91 ± 0.21	22.9	
Rn-219	-0.38 ± 0.47	N/A	U
Ra-223	0.09 ± 0.62	713.6	U
Ra-224	0.87 ± 0.14	16.5	SI
Ra-226	2.4 ± 1.4	59.6	SI

Data stored in file 20000545.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: Duplicate

Lab Sample ID: 98-09-192-D2 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:45
Count Duration: 30 Min. Aliquot: 381.200

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.44 ± 0.53	N/A	U
Ac-228	1.05 ± 0.28	27.0	
Pa-231	1.6 ± 1.2	74.8	SI
Pa-233	0.011 ± 0.066	621.2	U
Pa-234m	-4.1 ± 7.8	N/A	U
Th-234	-2.7 ± 1.4	N/A	U
U-235	0.070 ± 0.059	83.8	TI
Np-237	0.50 ± 0.40	80.4	SI
Am-241	-0.04 ± 0.13	N/A	U

Data stored in file 20000545.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative
for discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

Remarks: Sample 98-09-192-D2 is a duplicate of 98-09-192-03.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0032

Lab Sample ID: 98-09-192-04

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:41

Count Duration: 30 Min.

Aliquot: 405.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.08 ± 0.10	127.9	U
Na-22	-0.045 ± 0.058	N/A	U
K-40	30.7 ± 5.9	19.2	
Mn-54	-0.010 ± 0.050	N/A	U
Co-57	-0.018 ± 0.035	N/A	U
Co-60	0.062 ± 0.072	115.3	U
Zn-65	0.03 ± 0.12	430.9	U
Se-75	0.033 ± 0.059	175.1	U
Sr-85	-0.090 ± 0.071	N/A	U
Y-88	0.068 ± 0.067	97.8	TI
Ru-106	0.00 ± 0.67	N/A	U
Cd-109	2.1 ± 1.5	70.1	SI
Sn-113	-0.017 ± 0.062	N/A	U
Cs-134	0.015 ± 0.048	317.3	U
Cs-137	0.038 ± 0.067	177.5	U
Ce-139	0.007 ± 0.041	619.7	U
Ba-140	-0.45 ± 0.60	N/A	U
La-140	-25 ± 36	N/A	U
Ce-144	-0.07 ± 0.28	N/A	U
Eu-152	0.02 ± 0.14	582.2	U
Hg-203	-0.053 ± 0.070	N/A	U
Tl-208	0.47 ± 0.15	31.4	
Bi-211	0 ± 0	N/A	SQ
Pb-211	-0.7 ± 1.2	N/A	U
Bi-212	1.6 ± 1.8	108.6	U
Pb-212	1.17 ± 0.27	23.3	
Bi-214	0.67 ± 0.25	37.5	
Pb-214	1.06 ± 0.26	25.0	
Rn-219	0.49 ± 0.58	118.7	U
Ra-223	0.25 ± 0.86	345.1	U
Ra-224	1.41 ± 0.23	16.5	SI
Ra-226	2.9 ± 2.1	70.3	SI

Data stored in file 10001260.SPC

Continued on next page...

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0032

Lab Sample ID: 98-09-192-04 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:41
Count Duration: 30 Min. Aliquot: 405.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	0.15 ± 0.29	194.0	U
Ac-228	0.78 ± 0.33	42.8	
Pa-231	1.7 ± 1.8	101.9	U
Pa-233	-0.041 ± 0.099	N/A	U
Pa-234m	15.1 ± 9.8	65.1	
Th-234	1.4 ± 2.0	142.4	U
U-235	0.137 ± 0.077	56.1	TI
Np-237	-0.35 ± 0.41	N/A	U
Am-241	0.28 ± 0.33	119.4	U

Data stored in file 10001260.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
TI = Nuclide identification is tentative. See narrative for discussion.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.
SQ = Spectral interference prevents accurate quantitation. See narrative for discussion.

000026

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0033

Lab Sample ID: 98-09-192-05

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 14:26

Count Duration: 30 Min.

Aliquot: 403.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.052 ± 0.067	128.9	U
Na-22	-0.007 ± 0.044	N/A	U
K-40	30.8 ± 5.4	17.7	
Mn-54	0.006 ± 0.046	715.1	U
Co-57	-0.015 ± 0.032	N/A	U
Co-60	0.002 ± 0.049	1985.0	U
Zn-65	-0.017 ± 0.096	N/A	U
Se-75	-0.013 ± 0.054	N/A	U
Sr-85	-0.120 ± 0.076	N/A	U
Y-88	-0.011 ± 0.056	N/A	U
Ru-106	0.08 ± 0.35	438.8	U
Cd-109	1.6 ± 1.2	74.4	SI
Sn-113	-0.005 ± 0.048	N/A	U
Cs-134	0.034 ± 0.042	125.8	U
Cs-137	0.051 ± 0.047	93.5	
Ce-139	0.006 ± 0.033	586.6	U
Ba-140	0.08 ± 0.49	636.3	U
La-140	14 ± 29	203.4	U
Ce-144	-0.01 ± 0.25	N/A	U
Eu-152	0.14 ± 0.10	71.1	TI
Hg-203	-0.019 ± 0.054	N/A	U
Tl-208	0.30 ± 0.10	34.0	
Bi-211	0.50 ± 0.46	93.0	SI
Pb-211	-0.14 ± 0.97	N/A	U
Bi-212	-0.3 ± 1.4	N/A	U
Pb-212	1.14 ± 0.24	20.7	
Bi-214	0.85 ± 0.20	23.9	
Pb-214	0.79 ± 0.19	23.9	
Rn-219	0.10 ± 0.42	410.2	U
Ra-223	0.33 ± 0.68	202.3	U
Ra-224	0.97 ± 0.16	16.5	SI
Ra-226	1.8 ± 1.4	81.3	SI

Data stored in file 10001263.SPC

Continued on next page...

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0033

Lab Sample ID: 98-09-192-05 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 14:26
Count Duration: 30 Min. Aliquot: 403.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.08 ± 0.48	N/A	U
Ac-228	0.95 ± 0.26	27.4	
Pa-231	2.0 ± 1.4	71.9	SI
Pa-233	0.108 ± 0.076	70.5	TI
Pa-234m	9.0 ± 6.6	73.5	
Th-234	1.5 ± 1.6	107.3	U
U-235	0.084 ± 0.059	70.4	TI
Np-237	0.05 ± 0.34	710.5	U
Am-241	-0.02 ± 0.21	N/A	U

Data stored in file 10001263.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

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GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0034

Lab Sample ID: 98-09-192-06

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:44

Count Duration: 30 Min.

Aliquot: 393.800

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.11 ± 0.11	99.9	
Na-22	-0.018 ± 0.067	N/A	U
K-40	31.5 ± 6.2	19.6	
Mn-54	0.037 ± 0.057	154.0	U
Co-57	0.045 ± 0.044	96.2	
Co-60	0.013 ± 0.084	642.8	U
Zn-65	-0.03 ± 0.15	N/A	U
Se-75	0.048 ± 0.072	149.6	U
Sr-85	-0.018 ± 0.077	N/A	U
Y-88	-0.017 ± 0.080	N/A	U
Ru-106	0.33 ± 0.57	174.6	U
Cd-109	1.9 ± 1.7	86.5	SI
Sn-113	0.000 ± 0.072	N/A	U
Cs-134	0.041 ± 0.058	143.2	U
Cs-137	0.022 ± 0.075	346.8	U
Ce-139	-0.033 ± 0.046	N/A	U
Ba-140	-0.13 ± 0.77	N/A	U
La-140	6 ± 59	936.9	U
Ce-144	-0.13 ± 0.30	N/A	U
Eu-152	-0.02 ± 0.12	N/A	U
Hg-203	-0.066 ± 0.078	N/A	U
Tl-208	0.34 ± 0.14	43.0	
Bi-211	0.299 ± 0.049	16.5	SI
Pb-211	-0.5 ± 1.2	N/A	U
Bi-212	0.1 ± 2.2	2623.0	U
Pb-212	1.24 ± 0.30	23.8	
Bi-214	0.81 ± 0.26	31.9	TI
Pb-214	0.79 ± 0.24	30.0	
Rn-219	0.31 ± 0.63	202.0	U
Ra-223	-0.2 ± 1.0	N/A	U
Ra-224	2.5 ± 2.2	86.2	SI
Ra-226	2.2 ± 2.0	91.1	SI

Data stored in file 10001261.SPC

Continued on next page...

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0034

Lab Sample ID: 98-09-192-06 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:44
Count Duration: 30 Min. Aliquot: 393.800

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.21 ± 0.31	N/A	U
Ac-228	1.01 ± 0.39	39.0	
Pa-231	1.0 ± 1.9	189.5	U
Pa-233	0.09 ± 0.11	119.2	U
Pa-234m	-2 ± 12	N/A	U
Th-234	-1.3 ± 2.0	N/A	U
U-235	0.097 ± 0.083	85.7	TI
Np-237	0.04 ± 0.46	1246.4	U
Am-241	0.04 ± 0.39	939.5	U

Data stored in file 10001261.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

000030

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0035

Lab Sample ID: 98-09-192-07

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:45

Count Duration: 30 Min.

Aliquot: 434.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.022 ± 0.062	283.4	U
Na-22	-0.015 ± 0.054	N/A	U
K-40	24.6 ± 4.8	19.6	
Mn-54	-0.019 ± 0.045	N/A	U
Co-57	0.010 ± 0.025	252.2	U
Co-60	-0.059 ± 0.070	N/A	U
Zn-65	0.16 ± 0.12	74.5	TI
Se-75	-0.012 ± 0.047	N/A	U
Sr-85	-0.048 ± 0.065	N/A	U
Y-88	0.024 ± 0.052	212.8	U
Ru-106	0.20 ± 0.40	203.0	U
Cd-109	0.29 ± 0.96	337.1	U
Sn-113	0.000 ± 0.055	N/A	U
Cs-134	0.015 ± 0.038	253.6	U
Cs-137	0.010 ± 0.042	433.5	U
Ce-139	-0.021 ± 0.033	N/A	U
Ba-140	-0.01 ± 0.56	N/A	U
La-140	16 ± 35	219.2	U
Ce-144	0.01 ± 0.20	1562.1	U
Eu-152	0.05 ± 0.11	214.1	U
Hg-203	-0.011 ± 0.041	N/A	U
Tl-208	0.31 ± 0.11	34.8	
Bi-211	0 ± 0	N/A	SQ
Pb-211	0.58 ± 1.00	171.1	U
Bi-212	0.4 ± 1.2	303.1	U
Pb-212	0.70 ± 0.19	26.7	
Bi-214	0.67 ± 0.20	29.6	
Pb-214	0.44 ± 0.16	37.7	
Rn-219	-0.33 ± 0.41	N/A	U
Ra-223	0.20 ± 0.67	327.2	U
Ra-224	0.84 ± 0.14	16.5	SI
Ra-226	2.0 ± 1.4	68.6	SI

Data stored in file 10001262.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0035

Lab Sample ID: 98-09-192-07 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:45
Count Duration: 30 Min. Aliquot: 434.300

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	0.04 ± 0.23	572.5	U
Ac-228	0.53 ± 0.26	49.6	TI
Pa-231	1.4 ± 1.3	89.3	SI
Pa-233	-0.018 ± 0.062	N/A	U
Pa-234m	2.6 ± 6.8	258.7	U
Th-234	1.8 ± 1.5	84.8	TI
U-235	0.087 ± 0.058	66.0	TI
Np-237	0.02 ± 0.27	1760.8	U
Am-241	0.06 ± 0.22	361.1	U

Data stored in file 10001262.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2 σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

- U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
- TI = Nuclide identification is tentative. See narrative for discussion.
- SQ = Spectral interference prevents accurate quantitation. See narrative
for discussion.
- SI = Identification is tentative due to spectral interference. See
narrative for further discussion.

000032

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0036

Lab Sample ID: 98-09-192-08

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:00

Count Duration: 30 Min.

Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.104 ± 0.067	64.2	
Na-22	-0.038 ± 0.052	N/A	U
K-40	34.2 ± 6.0	17.6	
Mn-54	0.013 ± 0.038	284.3	U
Co-57	-0.008 ± 0.026	N/A	U
Co-60	0.012 ± 0.049	410.9	U
Zn-65	0.029 ± 0.100	340.4	U
Se-75	0.015 ± 0.050	336.4	U
Sr-85	-0.074 ± 0.059	N/A	U
Y-88	-0.021 ± 0.047	N/A	U
Ru-106	-0.08 ± 0.33	N/A	U
Cd-109	1.1 ± 1.0	94.7	SI
Sn-113	-0.019 ± 0.044	N/A	U
Cs-134	0.011 ± 0.038	333.9	U
Cs-137	0.039 ± 0.037	93.2	
Ce-139	0.019 ± 0.034	181.2	U
Ba-140	0.44 ± 0.47	107.0	U
La-140	-4 ± 38	N/A	U
Ce-144	-0.13 ± 0.20	N/A	U
Eu-152	-0.007 ± 0.086	N/A	U
Hg-203	0.026 ± 0.046	175.8	U
Tl-208	0.349 ± 0.098	28.0	
Bi-211	0.0091 ± 0.0015	16.5	U
Pb-211	1.01 ± 0.91	90.6	TI
Bi-212	0.5 ± 1.4	272.3	U
Pb-212	1.20 ± 0.24	20.3	
Bi-214	0.80 ± 0.20	25.7	
Pb-214	0.91 ± 0.21	22.7	
Rn-219	-0.30 ± 0.41	N/A	U
Ra-223	0.58 ± 0.63	109.2	U
Ra-224	1.04 ± 0.17	16.5	SI
Ra-226	2.6 ± 1.5	57.8	SI

Data stored in file 20000543.SPC

Continued on next page...

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0036

Lab Sample ID: 98-09-192-08 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:00
Count Duration: 30 Min. Aliquot: 403.600

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-2.55 ± 0.53	N/A	U
Ac-228	1.29 ± 0.30	23.2	
Pa-231	1.8 ± 1.2	67.8	SI
Pa-233	0.071 ± 0.062	87.9	TI
Pa-234m	3.1 ± 7.0	226.7	U
Th-234	-2.3 ± 1.4	N/A	U
U-235	0.105 ± 0.063	59.7	TI
Np-237	-0.12 ± 0.27	N/A	U
Am-241	-0.03 ± 0.13	N/A	U

Data stored in file 20000543.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

000034

GAMMA SPECTROMETRY RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Los Alamos National Laboratory SMO

Client Project Id: 4662R

Client Sample ID: RE15-98-0037

Lab Sample ID: 98-09-192-09

Date Collected: 09/23/98 12:00

Sample Matrix: Soil

Date Analyzed: 10/20/98 13:01

Count Duration: 30 Min.

Aliquot: 414.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Ann-Rad	0.076 ± 0.080	105.1	U
Na-22	-0.015 ± 0.062	N/A	U
K-40	32.0 ± 6.1	19.0	
Mn-54	0.014 ± 0.049	346.8	U
Co-57	-0.018 ± 0.025	N/A	U
Co-60	-0.024 ± 0.067	N/A	U
Zn-65	0.02 ± 0.14	642.8	U
Se-75	-0.018 ± 0.057	N/A	U
Sr-85	-0.096 ± 0.067	N/A	U
Y-88	-0.006 ± 0.051	N/A	U
Ru-106	-0.20 ± 0.35	N/A	U
Cd-109	0.3 ± 1.2	368.1	U
Sn-113	0.005 ± 0.053	1016.6	U
Cs-134	-0.012 ± 0.042	N/A	U
Cs-137	0.044 ± 0.055	124.4	U
Ce-139	-0.018 ± 0.033	N/A	U
Ba-140	0.23 ± 0.55	235.9	U
La-140	-4 ± 50	N/A	U
Ce-144	0.02 ± 0.21	1000.1	U
Eu-152	-0.01 ± 0.10	N/A	U
Hg-203	0.007 ± 0.054	758.8	U
Tl-208	0.28 ± 0.11	39.3	
Bi-211	0.59 ± 0.56	94.5	SI
Pb-211	0.0 ± 1.2	N/A	U
Bi-212	0.3 ± 1.6	583.3	U
Pb-212	0.79 ± 0.21	26.7	
Bi-214	0.52 ± 0.18	35.2	TI
Pb-214	0.49 ± 0.18	36.3	
Rn-219	0.05 ± 0.52	961.3	U
Ra-223	0.08 ± 0.71	868.1	U
Ra-224	0.575 ± 0.095	16.5	SI
Ra-226	0.75 ± 0.95	127.3	U

Data stored in file 20000544.SPC

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Paragon Analytics, Inc.
GAMMA SPECTROMETRY RESULTS SUMMARY
Method 901.1 (Modified)

Page 2

Client Name: Los Alamos National Laboratory SMO
Client Project Id: 4662R
Client Sample ID: RE15-98-0037

Lab Sample ID: 98-09-192-09 Date Collected: 09/23/98 12:00
Sample Matrix: Soil Date Analyzed: 10/20/98 13:01
Count Duration: 30 Min. Aliquot: 414.500

Nuclide	Activity (pCi/Gram)	% Uncertainty	Flag
Th-227	-0.08 ± 0.26	N/A	U
Ac-228	0.57 ± 0.30	52.8	TI
Pa-231	1.1 ± 1.3	123.0	U
Pa-233	0.013 ± 0.067	537.7	U
Pa-234m	0 ± 10	N/A	U
Th-234	-0.5 ± 1.5	N/A	U
U-235	0.008 ± 0.056	730.0	U
Np-237	-0.23 ± 0.35	N/A	U
Am-241	0.07 ± 0.37	523.1	U

Data stored in file 20000544.SPC

Reported Uncertainties are the Estimated Total Propagated Uncertainty (2 σ).
See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or
censored by an *a priori* detection limit estimate. Sample results should
be compared to the decision level calculated from the appropriate blank.

Flags:

U = Result is less than the sample specific minimum detectable activity or
less than the 2-sigma total propagated uncertainty.
SI = Identification is tentative due to spectral interference. See
narrative for further discussion.
TI = Nuclide identification is tentative. See narrative for discussion.

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PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 4

RAW DATA

4

000037

Sample ID : 98-09-192-01 B:09192GS

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Sample Size . . . . / 1.00e+000 Sample | Spectrum File . . \gdr\spc\20000526.SPC
Sampling Start. . . / .09-23-98 12:00 | Counting Start. . . . 10-14-98 20:31
Sampling Stop . . . / .09-23-98 12:00 | Live Time . . . . . / . . . . 1800 Sec
Current Date. . . . . / 10-29-98 17:48 | Real Time . . . . . / . . . . 1815 Sec
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Detector #: 9
Energy(keV)= -1.12 + 0.500*Ch + 1.30e-007*Ch^2 + 0.00e+000*Ch^3 / 10-14-98 06:09
FWHM(keV) = 0.90 + 0.007*En + 8.40e-004*En^2 + 0.00e+000*En^3 / 11-15-97 17:56
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . / . . . . 0.20 | Search Start / End. . . . . 80 / 4000
Sigma Multiplier. . . . / . . . . 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.16	94.56	33	49	42	240	0.47	NET < CL
2	74.79	151.84	166	66	56	343	1.00	a
3	77.04	156.33	312	64	47	303	1.07	b
4	87.28	176.82	38	54	45	313	0.51	NET < CL
5	92.74	187.74	140	60	50	291	1.13	
6	99.43	201.12	6	31	24	130	0.12	NET < CL
7	186.00	374.27	117	54	45	228	1.82	
8	198.59	399.44	47	41	34	160	1.18	
9	209.06	420.38	35	53	48	233	0.98	NET < CL
10	238.56	479.37	537	67	46	198	1.26	a
11	241.62	485.49	136	57	50	227	1.67	b
12	295.06	592.35	174	46	35	117	1.18	a
13	299.77	601.77	19	24	18	65	0.64	b
14	338.30	678.81	140	39	28	90	1.30	
15	351.87	705.95	386	51	30	103	1.37	
16	462.78	927.72	35	37	34	98	1.72	
17	510.89	1023.90	214	43	31	86	2.40	
18	583.30	1168.66	171	40	29	84	2.48	
19	609.39	1220.82	320	45	25	62	2.37	
20	726.97	1455.85	96	33	26	48	3.78	
21	768.08	1538.03	29	28	25	61	2.97	
22	795.10	1592.04	10	28	26	63	0.85	NET < CL
23	860.26	1722.25	14	26	23	57	0.65	NET < CL
24	911.33	1824.32	135	39	29	80	2.09	
25	964.59	1930.76	36	31	29	52	2.11	a
26	969.00	1939.56	88	33	27	54	2.09	b
27	1120.71	2242.70	102	35	28	53	2.86	
28	1460.61	2921.71	1246	77	32	59	2.83	
29	1764.80	3529.17	46	23	18	25	3.41	

000038

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-01 B:09192GS

Bkg File:	DET09.bkg	Counting Start.	10-14-98 20:31
ID.: 98-22-006-09 B:GS09BG 10/10/98		Current Date	10-29-98 17:49

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	46.16	0.47	33	49	-6	49	NET < CL
2	74.79	1.00	166	66	141	66	
3	77.04	1.07	312	64	279	64	
4	87.28	0.51	38	54	28	54	NET < CL
5	92.74	1.13	140	60	95	60	
7	186.00	1.82	117	54	76	54	
8	198.59	1.18	47	41	22	42	NET < CL
10	238.56	1.26	537	67	512	67	
11	241.62	1.67	136	57	113	57	
12	295.06	1.18	174	46	129	46	
14	338.30	1.30	140	39	136	39	
15	351.87	1.37	386	51	289	52	
17	510.89	2.40	214	43	75	44	
18	583.30	2.48	171	40	158	41	
19	609.39	2.37	320	45	244	45	
20	726.97	3.78	96	33	93	33	
21	768.08	2.97	29	28	20	29	NET < CL
24	911.33	2.09	135	39	124	39	
26	969.00	2.09	88	33	82	34	
27	1120.71	2.86	102	35	86	35	
28	1460.61	2.83	1246	77	1205	77	
29	1764.80	3.41	46	23	26	23	

000039

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-01 B:09192GS

Sample Size	1.00e+000	Sample	Spectrum File . . .	\gdr\spc\20000526.SPC
Sampling Start.	09-23-98 12:00		Counting Start.	10-14-98 20:31
Sampling Stop	09-23-98 12:00		Buildup Time.	0.00e+000 Hrs
Current Date.	10-29-98 17:49		Decay Time.	5.13e+002 Hrs

Efficiency File.	DET0913.EFF	Library File.	LANLINT.LIB
ID.	500gSAND#462.1284.57	ID.	LANL Gamma library 07/25/96

Eff.= 1/[3.34e-002*En^-2.41e+000 + 5.98e+001*En^6.29e-001] 10-29-97 18:56

Gamma Fraction Limit >= . . .	75.00 %	Decay Limit <= . . .	8.000 Halflives
Library Energy Tolerance. . .	2.00		

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Cd-109	88.03	1.65e+003 +/-8.55e+002	1.11e+004	1 of 1
Ce-139	165.85	2.51e+001 +/-2.98e+001	3.30e+003	1 of 1
Ra-226	186.21	1.75e+003 +/-1.25e+003	1.40e+007	1 of 1
Pb-212	Average:	9.68e+002 +/-1.27e+002	1.23e+014	2 of 2
	238.63	9.83e+002 +/-1.29e+002		
	300.09	5.50e+002 +/-6.80e+002		
Ra-224	240.98	1.25e+003 +/-1.25e+003	1.23e+014	1 of 1
Pb-214	Average:	6.34e+002 +/-1.20e+002	1.40e+007	3 of 3
	241.98	6.36e+002 +/-6.52e+002		
	295.21	6.34e+002 +/-2.26e+002		
	351.92	6.34e+002 +/-1.46e+002		
Ac-228	Average:	9.92e+002 +/-1.89e+002	1.23e+014	3 of 3
	338.32	1.24e+003 +/-3.57e+002		
	911.07	8.55e+002 +/-2.69e+002		
	969.11	9.83e+002 +/-4.02e+002		
Bi-211	351.07	5.19e+002 +/-4.19e+002	2.87e+008	1 of 1
Ann-Rad	511.00	9.74e+001 +/-5.75e+001	8.76e+013	1 of 1
Tl-208	583.14	2.71e+002 +/-7.01e+001	1.23e+014	1 of 3
Bi-214	Average:	7.72e+002 +/-1.31e+002	1.40e+007	3 of 3
	609.31	7.71e+002 +/-1.43e+002		
	1120.30	1.21e+003 +/-4.98e+002		
	1764.50	4.68e+002 +/-4.21e+002		
Na-22	1274.50	3.66e+001 +/-4.21e+001	2.28e+004	1 of 1
K-40	1460.80	2.86e+004 +/-1.84e+003	1.12e+013	1 of 1
Am-241	59.54	3.99e+001 +/-1.20e+002	3.79e+006	NET
Np-237	86.50	-8.85e+000 +/-2.45e+002	1.87e+010	NET
Th-234	92.38	1.49e+003 +/-1.14e+003	3.91e+013	NET
Co-57	122.06	1.17e+000 +/-2.21e+001	6.50e+003	NET
Ce-144	133.54	9.86e+001 +/-1.82e+002	6.82e+003	NET
U-235	185.72	6.35e+001 +/-5.17e+001	6.17e+012	NET
Th-227	236.00	-2.18e+003 +/-2.97e+002	2.87e+008	NET

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Se-75	264.65	3.09e+001	+ -4.25e+001	2.87e+003	NET
Hg-203	279.19	7.34e+000	+ -3.95e+001	1.12e+003	NET
Pa-231	300.08	1.63e+003	+ -9.95e+002	2.87e+008	NET
Pa-233	311.98	1.18e+001	+ -5.12e+001	1.87e+010	NET
Ra-223	323.87	-1.16e+002	+ -5.40e+002	2.87e+008	NET
Eu-152	344.27	8.42e+001	+ -8.16e+001	1.19e+005	NET
Sn-113	391.69	-1.63e+001	+ -3.89e+001	2.76e+003	NET
Rn-219	401.81	-1.74e+001	+ -3.64e+002	2.87e+008	NET
Pb-211	404.84	-6.59e+002	+ -8.80e+002	2.87e+008	NET
Sr-85	513.99	-5.71e+001	+ -4.86e+001	1.56e+003	NET
Ba-140	537.32	1.03e+002	+ -3.23e+002	3.07e+002	NET
Cs-134	604.70	-1.52e+000	+ -3.18e+001	1.81e+004	NET
Ru-106	621.84	-2.83e+002	+ -2.85e+002	8.84e+003	NET
Cs-137	661.65	1.48e+001	+ -3.27e+001	2.64e+005	NET
Mn-54	834.83	4.67e+000	+ -3.76e+001	7.50e+003	NET
Y-88	898.02	-1.36e+000	+ -4.07e+001	2.56e+003	NET
Pa-234m	1001.00	7.64e+002	+ -6.66e+003	3.91e+013	NET
Zn-65	1115.50	-4.33e+001	+ -8.91e+001	5.87e+003	NET
Co-60	1173.22	6.67e+000	+ -3.92e+001	4.62e+004	NET
La-140	1596.50	-9.60e+003	+ -3.89e+004	4.02e+001	NET
Bi-212	1620.60	-3.32e+002	+ -1.13e+003	1.23e+014	NET

TOTAL: 3.76e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.79	151.84	141	66	56	343	1.00	2.278e+000
77.04	156.33	279	64	47	303	1.07	4.363e+000
92.74	187.74	95	60	50	291	1.13	1.250e+000
462.78	927.72	35	37	34	98	1.72	7.104e-001
726.97	1455.85	93	33	26	48	3.78	2.526e+000
964.59	1930.76	36	31	29	52	2.11	1.160e+000

Pb214

000041

Sample ID : 98-09-192-D1 B:09192GS.XLS

Sample Size	/ 1.00e+000 Sample	Spectrum File	\gdr\spc\10001266.SPC
Sampling Start.	/ 09-23-98 12:00	Counting Start.	10-20-98 14:29
Sampling Stop	/ 09-23-98 12:00	Live Time	1800 Sec
Current Date.	10-29-98 17:51	Real Time	1811 Sec

✓ Detector #: 4

Energy(keV)= -0.54 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 0.59 + 0.018*En + 4.22e-004*En^2 + 0.00e+000*En^3 11-15-97 21:13

Where En = Sqrt(Energy in keV)

Sensitivity	/ 0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
=====								
1	74.81	150.65	67	41	34	148	0.72	a
2	76.99	155.02	109	42	31	150	0.84	b
3	92.96	186.95	19	41	35	172	0.60	NET < CL
4	186.07	373.10	45	34	28	107	0.86	
5	209.01	418.96	7	34	30	113	0.17	NET < CL
6	238.52	477.97	293	45	27	73	1.07	a
7	241.61	484.13	50	32	26	79	1.30	b
8	270.41	541.72	42	27	21	55	1.24	
9	295.14	591.17	57	29	22	67	0.85	
10	327.64	656.14	10	24	20	52	0.48	NET < CL
11	338.17	677.20	61	27	20	55	1.07	
12	351.76	704.36	142	32	20	48	1.16	
13	463.11	926.99	14	22	20	39	0.79	NET < CL
14	510.95	1022.63	81	27	19	32	2.20	
15	535.19	1071.11	1	16	14	26	0.11	NET < CL
16	583.11	1166.91	79	27	19	35	1.78	
17	609.28	1219.22	115	28	17	32	1.51	
18	727.44	1455.47	13	20	17	29	0.81	NET < CL
19	755.08	1510.72	5	15	13	20	0.47	NET < CL
20	767.87	1536.30	6	19	16	30	0.56	NET < CL
21	860.23	1720.96	-4	16	15	25	0.24	NET < CL
22	904.07	1808.62	20	22	21	16	3.81	a NET < CL
23	911.01	1822.48	93	23	13	11	2.36	b
24	968.80	1938.02	30	20	16	24	2.02	
25	1232.55	2465.35	-6	19	19	32	0.65	NET < CL
26	1460.79	2921.67	445	43	10	9	2.34	
27	1764.25	3528.38	7	12	10	9	1.03	NET < CL

000042

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-D1 B:09192GS.XLS

Bkg File:	DET04.bkg	Counting Start.	10-20-98 14:29
ID.: 98-22-006-04 B:GS04BG	10/10/98	Current Date	10-29-98 17:51

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
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3	92.96	0.60	19	41	8	41	NET < CL
4	186.07	0.86	45	34	37	35	
6	238.52	1.07	293	45	290	45	
9	295.14	0.85	57	29	55	29	
12	351.76	1.16	142	32	138	33	
14	510.95	2.20	81	27	38	27	
16	583.11	1.78	79	27	76	27	
17	609.28	1.51	115	28	112	28	
23	911.01	2.36	93	23	92	23	
24	968.80	2.02	30	20	29	20	
26	1460.79	2.34	445	43	439	44	
27	1764.25	1.03	7	12	7	12	NET < CL

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NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-D1 B:09192GS.XLS

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Sample Size . . . . 1.00e+000 Sample | Spectrum File . . \gdr\spc\10001266.SPC
Sampling Start. . . .09-23-98 12:00 | Counting Start. . . . 10-20-98 14:29
Sampling Stop . . . .09-23-98 12:00 | Buildup Time. . . . 0.00e+000 Hrs
Current Date. . . .10-29-98 17:51 | Decay Time. . . . 6.50e+002 Hrs
-----
Efficiency File. . . .DET0413.EFF | Library File. . . . LANLINT.LIB
ID. . . . .500gSAND#485.1572.24 | ID. . . . LANL Gamma library 07/25/96
-----
Eff.= 1/[4.17e-003*En^-3.67e+000 + 1.50e+002*En^7.77e-001] / 10-09-98 15:03
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Gamma Fraction Limit >= . 75.00 % | Decay Limit <= . 8.000 Halflives
Library Energy Tolerance. . 2.00
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FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 2.00sigma (DPM/Sample)	Half-life (hrs)	Peaks Found
Co-57	122.06	1.61e+001 +/-2.52e+001	6.50e+003	1 of 2
Ra-226	186.21	1.61e+003 +/-1.49e+003	1.40e+007	1 of 1
Pb-212	238.63	1.10e+003 +/-1.69e+002	1.23e+014	1 of 2
Pb-214	Average:	5.61e+002 +/-1.58e+002	1.40e+007	3 of 3
	241.98	5.61e+002 +/-7.07e+002		
	295.21	5.59e+002 +/-2.97e+002		
	351.92	5.61e+002 +/-1.94e+002		
Ac-228	Average:	1.30e+003 +/-2.81e+002	1.23e+014	3 of 3
	338.32	1.18e+003 +/-5.29e+002		
	911.07	1.56e+003 +/-3.97e+002		
	969.11	8.61e+002 +/-6.01e+002		
Bi-211	351.07	7.55e+002 +/-5.58e+002	2.87e+008	1 of 1
Ann-Rad	511.00	1.11e+002 +/-7.92e+001	8.76e+013	1 of 1
Tl-208	583.14	3.01e+002 +/-1.06e+002	1.23e+014	1 of 3
Cs-137	661.65	3.41e+001 +/-4.37e+001	2.64e+005	1 of 1
K-40	1460.80	2.76e+004 +/-2.73e+003	1.12e+013	1 of 1
Am-241	59.54	-2.04e+001 +/-2.44e+002	3.79e+006	NET
Np-237	86.50	1.03e+002 +/-2.89e+002	1.87e+010	NET
Cd-109	88.03	-4.00e+002 +/-1.00e+003	1.11e+004	NET
Th-234	92.38	-4.52e+002 +/-1.35e+003	3.91e+013	NET
Ce-144	133.54	1.07e+002 +/-2.11e+002	6.82e+003	NET
Ce-139	165.85	2.10e+001 +/-3.57e+001	3.30e+003	NET
U-235	185.72	5.77e+001 +/-6.07e+001	6.17e+012	NET
Th-227	236.00	-9.10e+001 +/-2.45e+002	2.87e+008	NET
Ra-224	240.98	1.07e+003 +/-0.00e+000	1.23e+014	NET
Se-75	264.65	0.00e+000 +/-4.62e+001	2.87e+003	NET
Hg-203	279.19	-3.61e+000 +/-4.70e+001	1.12e+003	NET
Pa-231	300.08	1.06e+003 +/-1.33e+003	2.87e+008	NET
Pa-233	311.98	-1.23e+001 +/-6.06e+001	1.87e+010	NET
Ra-223	323.87	6.99e+002 +/-6.48e+002	2.87e+008	NET
Eu-152	344.27	2.76e+001 +/-1.02e+002	1.19e+005	NET

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Sn-113	391.69	-2.11e+001	+ -4.38e+001	2.76e+003	NET
Rn-219	401.81	2.27e+002	+ -4.10e+002	2.87e+008	NET
Pb-211	404.84	-2.53e+002	+ -9.27e+002	2.87e+008	NET
Sr-85	513.99	-4.74e+001	+ -5.80e+001	1.56e+003	NET
Ba-140	537.32	-3.71e+002	+ -6.16e+002	3.07e+002	NET
Cs-134	604.70	-3.31e+001	+ -4.10e+001	1.81e+004	NET
Bi-214	609.31	6.76e+002	+ -1.77e+002	1.40e+007	NET
Ru-106	621.84	-4.93e+001	+ -3.56e+002	8.84e+003	NET
Mn-54	834.83	1.38e+001	+ -5.13e+001	7.50e+003	NET
Y-88	898.02	-7.08e+000	+ -4.83e+001	2.56e+003	NET
Pa-234m	1001.00	9.37e+001	+ -7.16e+003	3.91e+013	NET
Zn-65	1115.50	-1.71e+000	+ -1.46e+002	5.87e+003	NET
Co-60	1173.22	3.92e+001	+ -5.65e+001	4.62e+004	NET
Na-22	1274.50	1.74e+001	+ -5.57e+001	2.28e+004	NET
La-140	1596.50	-1.03e+004	+ -3.64e+004	4.02e+001	NET
Bi-212	1620.60	2.68e+002	+ -1.72e+003	1.23e+014	NET

TOTAL: 3.34e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.81	150.65	67	41	34	148	0.72	2.851e+000
76.99	155.02	109	42	31	150	0.84	4.285e+000
270.41	541.72	42	27	21	55	1.24	1.270e+000
609.28	1219.22	112	28	17	32	1.51	6.357e+000

000045

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GDR_C          Paragon Analytics, Inc.          Fort Collins, CO          Version 6.2
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Sample ID : 98-09-192-02 B:09192GS.XLS

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Sample Size . . . . / 1.00e+000 Sample | Spectrum File . . \gdr\spc\10001259.SPC
Sampling Start. . . . / .09-23-98 12:00 | Counting Start. . . . . 10-20-98 13:40
Sampling Stop . . . . / .09-23-98 12:00 | Live Time . . . . . 1800 Sec
Current Date. . . . . / 10-29-98 17:53 | Real Time . . . . . 1811 Sec
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Detector #: 1
Energy(keV)= -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 / 10-20-98 12:26
FWHM(keV) = 0.95 + 0.021*En + 4.19e-004*En^2 + 0.00e+000*En^3 / 10-08-98 11:48
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . / 0.20 | Search Start / End. . . . / 60 / 4000
Sigma Multiplier. . . . . / 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.94	151.67	105	61	53	293	1.17	a
2	77.01	155.81	188	58	45	275	1.02	b
3	93.26	188.23	70	67	62	353	1.13	
4	185.85	373.02	144	52	44	193	1.48	
5	209.38	419.99	57	46	40	173	1.52	
6	238.61	478.32	507	65	44	187	1.36	a
7	241.26	483.61	110	53	47	202	1.52	b
8	270.62	542.20	49	49	45	173	1.58	
9	295.29	591.43	126	44	35	132	1.17	
10	338.12	676.93	127	41	32	105	2.09	
11	351.80	704.22	279	50	35	114	1.65	
12	463.03	926.22	32	32	28	81	1.78	
13	510.95	1021.84	201	40	27	73	2.23	
14	583.16	1165.95	134	44	36	118	1.12	
15	609.27	1218.06	198	46	35	112	1.88	
16	727.22	1453.46	35	30	26	62	1.88	
17	794.92	1588.58	16	26	23	56	0.98	NET < CL
18	822.93	1644.49	8	20	18	31	0.60	NET < CL
19	911.27	1820.80	167	36	24	48	2.04	
20	968.86	1935.73	60	35	30	70	1.61	
21	1119.90	2237.17	34	28	24	50	1.22	
22	1460.72	2917.38	1174	71	19	24	2.51	
23	1764.47	3523.58	29	18	14	14	1.93	

000046

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-02 B:09192GS.XLS

Bkg File:	DET01.bkg	Counting Start.	10-20-98 13:40
ID.: 98-22-006-01 B:GS01BG 10/10/98		Current Date	10-29-98 17:53

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
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3	93.26	1.13	70	67	27	67	NET < CL
4	185.85	1.48	144	52	107	53	
6	238.61	1.36	507	65	482	65	
9	295.29	1.17	126	44	120	44	
10	338.12	2.09	127	41	124	42	
11	351.80	1.65	279	50	264	50	
13	510.95	2.23	201	40	60	41	
14	583.16	1.12	134	44	119	45	
15	609.27	1.88	198	46	180	47	
19	911.27	2.04	167	36	154	36	
20	968.86	1.61	60	35	54	35	
21	1119.90	1.22	34	28	30	28	
22	1460.72	2.51	1174	71	1124	71	
23	1764.47	1.93	29	18	22	18	

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NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-02 B:09192GS.XLS

Sample Size 1.00e+000 Sample	Spectrum File . . \gdr\spc\10001259.SPC
Sampling Start. . . . /09-23-98 12:00	Counting Start. . . . 10-20-98 13:40
Sampling Stop /09-23-98 12:00	Buildup Time. 0.00e+000 Hrs
Current Date. /10-29-98 17:53	Decay Time. 6.50e+002 Hrs

Efficiency File. . . . /DET0113.EFF	Library File. / . LANLINT.LIB
ID. 500gSoil 485.1572.24	ID. LANL Gamma library 07/25/96

Eff.= 1/[5.69e-003*En^-3.26e+000 + 6.02e+001*En^5.76e-001] / 10-08-98 11:48

Gamma Fraction Limit >= . . / 75.00 %	Decay Limit <= 8.000 Halflives
Library Energy Tolerance. . . / 2.00	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Ra-226	186.21	2.62e+003 +-1.31e+003	1.40e+007	1 of 1
Pb-212	238.63	9.85e+002 +-1.33e+002	1.23e+014	1 of 2
Ra-224	240.98	1.36e+003 +-1.24e+003	1.23e+014	1 of 1
Pb-214	Average:	6.28e+002 +-1.23e+002	1.40e+007	3 of 3
	241.98	6.28e+002 +-6.45e+002		
	295.21	6.28e+002 +-2.31e+002		
	351.92	6.27e+002 +-1.49e+002		
Ac-228	Average:	1.01e+003 +-1.90e+002	1.23e+014	3 of 3
	338.32	1.19e+003 +-4.02e+002		
	911.07	1.07e+003 +-2.53e+002		
	969.11	6.49e+002 +-4.18e+002		
Bi-211	351.07	4.53e+002 +-4.29e+002	2.87e+008	1 of 1
Ann-Rad	511.00	8.06e+001 +-5.59e+001	8.76e+013	1 of 1
Tl-208	583.14	2.11e+002 +-7.91e+001	1.23e+014	1 of 3
Bi-214	Average:	5.37e+002 +-1.30e+002	1.40e+007	3 of 3
	609.31	5.87e+002 +-1.53e+002		
	1120.30	4.27e+002 +-3.96e+002		
	1764.50	3.90e+002 +-3.20e+002		
Cs-137	661.65	3.54e+001 +-3.63e+001	2.64e+005	1 of 1
K-40	1460.80	2.63e+004 +-1.67e+003	1.12e+013	1 of 1
Bi-212	1620.60	8.67e+002 +-9.99e+002	1.23e+014	1 of 1
Am-241	59.54	1.48e+001 +-1.95e+002	3.79e+006	NET
Np-237	86.50	-2.58e+002 +-3.01e+002	1.87e+010	NET
Cd-109	88.03	2.24e+002 +-1.06e+003	1.11e+004	NET
Th-234	92.38	-1.11e+002 +-1.45e+003	3.91e+013	NET
Co-57	122.06	-8.95e+000 +-2.70e+001	6.50e+003	NET
Ce-144	133.54	-1.56e+002 +-2.10e+002	6.82e+003	NET
Ce-139	165.85	-1.15e+001 +-2.98e+001	3.30e+003	NET
U-235	185.72	1.09e+002 +-5.31e+001	6.17e+012	NET
Th-227	236.00	-1.93e+003 +-3.02e+002	2.87e+008	NET
Se-75	264.65	-9.28e+000 +-4.79e+001	2.87e+003	NET

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Hg-203	279.19	-3.21e+001	+-5.02e+001	1.12e+003	NET
Pa-231	300.08	1.37e+003	+-1.20e+003	2.87e+008	NET
Pa-233	311.98	-2.15e+001	+-6.02e+001	1.87e+010	NET
Ra-223	323.87	3.54e+002	+-6.56e+002	2.87e+008	NET
Eu-152	344.27	-3.31e+001	+-8.61e+001	1.19e+005	NET
Sn-113	391.69	-2.77e+001	+-4.37e+001	2.76e+003	NET
Rn-219	401.81	1.83e+002	+-3.74e+002	2.87e+008	NET
Pb-211	404.84	4.88e+002	+-8.99e+002	2.87e+008	NET
Sr-85	513.99	-1.12e+002	+-6.39e+001	1.56e+003	NET
Ba-140	537.32	3.25e+002	+-4.47e+002	3.07e+002	NET
Cs-134	604.70	-2.82e+001	+-3.82e+001	1.81e+004	NET
Ru-106	621.84	-2.60e+002	+-3.33e+002	8.84e+003	NET
Mn-54	834.83	2.03e+001	+-3.85e+001	7.50e+003	NET
Y-88	898.02	-5.45e+001	+-4.59e+001	2.56e+003	NET
Pa-234m	1001.00	3.39e+003	+-6.52e+003	3.91e+013	NET
Zn-65	1115.50	-2.43e+001	+-8.23e+001	5.87e+003	NET
Co-60	1173.22	5.94e+001	+-4.07e+001	4.62e+004	NET
Na-22	1274.50	-1.92e+001	+-4.54e+001	2.28e+004	NET
La-140	1596.50	-1.98e+004	+-3.25e+004	4.02e+001	NET

TOTAL: 3.51e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.94	151.67	105	61	53	293	1.17	2.348e+000
77.01	155.81	188	58	45	275	1.02	3.985e+000
209.38	419.99	57	46	40	173	1.52	8.002e-001
270.62	542.20	49	49	45	173	1.58	7.783e-001
463.03	926.22	32	32	28	81	1.78	6.958e-001
727.22	1453.46	35	30	26	62	1.88	9.740e-001

Pb214

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GDR_C	Paragon Analytics, Inc.	Fort Collins, CO	Version 6.2
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Sample ID : 98-09-192-03 B:09192GS

Sample Size	1.00e+000	Sample	Spectrum File . . .	\gdr\spc\10001231.SPC
Sampling Start.	09-23-98 12:00		Counting Start.	10-14-98 21:16
Sampling Stop	09-23-98 12:00		Live Time	1800 Sec
Current Date.	10-29-98 17:57		Real Time	1840 Sec

Detector #: 4

Energy(keV) = -0.54 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-14-98 06:55

FWHM(keV) = 0.59 + 0.018*En + 4.22e-004*En^2 + 0.00e+000*En^3 11-15-97 21:13

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End. . .	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.70	150.42	48	32	25	106	0.53	a
2	77.17	155.36	94	37	26	118	0.75	b
3	87.27	175.56	23	34	26	129	0.63	NET < CL
4	92.60	186.21	46	41	35	160	1.23	
5	209.20	419.32	20	35	32	110	0.62	NET < CL
6	238.47	477.83	200	43	29	117	0.95	
7	269.92	540.71	19	21	16	45	0.72	
8	295.12	591.10	66	31	24	71	1.15	
9	328.04	656.91	6	24	22	53	0.46	NET < CL
10	338.20	677.22	27	27	22	64	0.60	
11	351.76	704.34	137	32	19	47	1.24	
12	389.68	780.14	1	16	14	29	0.14	NET < CL
13	452.83	906.39	11	16	12	23	1.07	NET < CL
14	511.01	1022.72	64	25	18	31	1.36	
15	583.14	1166.91	74	26	18	39	1.13	
16	609.19	1218.99	127	28	15	22	1.53	
17	686.08	1372.73	-0	13	12	18	0.03	NET < CL
18	727.22	1454.96	21	17	13	19	2.46	
19	778.80	1558.09	-2	18	17	29	0.89	NET < CL
20	911.10	1822.58	43	21	15	22	0.96	
21	968.63	1937.60	25	21	17	28	1.11	
22	1120.48	2241.18	25	18	14	18	1.38	
23	1460.72	2921.42	410	41	7	4	2.20	
24	1764.38	3528.50	13	12	10	8	2.33	

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-03 B:09192GS

Bkg File:	DET04.bkg	Counting Start.	10-14-98 21:16
ID.: 98-22-006-04 B:GS04BG	10/10/98	Current Date	10-29-98 17:57

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
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4	92.60	1.23	46	41	35	42	
6	238.47	0.95	200	43	197	43	
8	295.12	1.15	66	31	64	31	
11	351.76	1.24	137	32	133	32	
14	511.01	1.36	64	25	21	25	
15	583.14	1.13	74	26	71	26	
16	609.19	1.53	127	28	124	28	
20	911.10	0.96	43	21	41	21	
21	968.63	1.11	25	21	25	21	
23	1460.72	2.20	410	41	404	41	
24	1764.38	2.33	13	12	13	12	

000051

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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NUCLIDE ACTIVITY SUMMARY

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Sample ID: 98-09-192-03 B:09192GS

Sample Size	/1.00e+000 Sample	Spectrum File . . .	/\gdr\spc\10001231.SPC
Sampling Start.	/09-23-98 12:00	Counting Start. ✓	10-14-98 21:16
Sampling Stop	09-23-98 12:00	Buildup Time.	0.00e+000 Hrs
Current Date.	/10-29-98 17:57	Decay Time.	5.13e+002 Hrs

Efficiency File. /DET0413.EFF | Library File. ✓ LANLINT.LIB
ID. 500gSAND#485.1572.24 | ID. LANL Gamma library 07/25/96

Eff.= 1/[4.17e-003*En^-3.67e+000 + 1.50e+002*En^7.77e-001] 10-09-98 15:03

Gamma Fraction Limit >= . . . / 75.00 % | Decay Limit <= 8.000 Halflives
Library Energy Tolerance. . . / 2.00

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Ra-226	186.21	1.99e+003 +-1.04e+003	1.40e+007	1 of 1
Pb-212	238.63	7.46e+002 +-1.64e+002	1.23e+014	1 of 2
Pb-214	Average:	6.51e+002 +-1.63e+002	1.40e+007	2 of 3
	295.21	6.50e+002 +-3.16e+002		
	351.92	6.51e+002 +-1.91e+002		
Ac-228	Average:	6.58e+002 +-2.62e+002	1.23e+014	3 of 3
	338.32	5.20e+002 +-5.11e+002		
	911.07	6.97e+002 +-3.51e+002		
	969.11	7.43e+002 +-6.20e+002		
Bi-211	351.07	4.03e+002 +-5.48e+002	2.87e+008	1 of 1
Ann-Rad	511.00	6.06e+001 +-7.44e+001	8.76e+013	1 of 1
Tl-208	583.14	2.81e+002 +-1.04e+002	1.23e+014	1 of 3
Bi-214	Average:	8.80e+002 +-1.85e+002	1.40e+007	3 of 3
	609.31	9.08e+002 +-2.04e+002		
	1120.30	8.99e+002 +-6.39e+002		
	1764.50	6.12e+002 +-6.11e+002		
Pa-234m	1001.00	6.75e+003 +-8.26e+003	3.91e+013	1 of 1
K-40	1460.80	2.53e+004 +-2.58e+003	1.12e+013	1 of 1
Am-241	59.54	-1.50e+002 +-2.33e+002	3.79e+006	NET
Np-237	86.50	1.54e+002 +-3.08e+002	1.87e+010	NET
Cd-109	88.03	4.96e+001 +-1.05e+003	1.11e+004	NET
Th-234	92.38	4.52e+002 +-1.41e+003	3.91e+013	NET
Co-57	122.06	-2.14e+001 +-2.15e+001	6.50e+003	NET
Ce-144	133.54	4.33e+001 +-1.74e+002	6.82e+003	NET
Ce-139	165.85	-1.30e+001 +-3.31e+001	3.30e+003	NET
U-235	185.72	6.21e+001 +-6.08e+001	6.17e+012	NET
Th-227	236.00	-1.72e+002 +-2.43e+002	2.87e+008	NET
Ra-224	240.98	-4.82e+003 +-1.21e+003	1.23e+014	NET
Se-75	264.65	-2.49e+001 +-4.20e+001	2.87e+003	NET
Hg-203	279.19	4.43e+000 +-4.65e+001	1.12e+003	NET
Pa-231	300.08	1.06e+003 +-1.33e+003	2.87e+008	NET

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Pa-233	311.98	-2.10e+001	+-6.86e+001	1.87e+010	NET
Ra-223	323.87	8.51e+002	+-7.51e+002	2.87e+008	NET
Eu-152	344.27	-6.62e+001	+-9.36e+001	1.19e+005	NET
Sn-113	391.69	-5.64e+001	+-4.31e+001	2.76e+003	NET
Rn-219	401.81	-1.62e+002	+-3.86e+002	2.87e+008	NET
Pb-211	404.84	-2.81e+001	+-8.46e+002	2.87e+008	NET
Sr-85	513.99	-2.51e+001	+-5.23e+001	1.56e+003	NET
Ba-140	537.32	-5.89e+001	+-4.34e+002	3.07e+002	NET
Cs-134	604.70	-3.53e+001	+-4.22e+001	1.81e+004	NET
Ru-106	621.84	9.15e+001	+-3.69e+002	8.84e+003	NET
Cs-137	661.65	7.10e+000	+-5.06e+001	2.64e+005	NET
Mn-54	834.83	-2.27e+001	+-4.17e+001	7.50e+003	NET
Y-88	898.02	1.66e+001	+-6.08e+001	2.56e+003	NET
Zn-65	1115.50	5.31e+001	+-1.13e+002	5.87e+003	NET
Co-60	1173.22	0.00e+000	+-5.72e+001	4.62e+004	NET
Na-22	1274.50	1.84e+001	+-5.22e+001	2.28e+004	NET
La-140	1596.50	-3.34e+004	+-5.66e+004	4.02e+001	NET
Bi-212	1620.60	1.37e+003	+-2.03e+003	1.23e+014	NET

TOTAL: 3.77e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.70	150.42	48	32	25	106	0.53	2.038e+000
77.17	155.36	94	37	26	118	0.75	3.695e+000
92.60	186.21	35	42	35	160	1.23	9.670e-001
269.92	540.71	19	21	16	45	0.72	5.765e-001
727.22	1454.96	21	17	13	19	2.46	1.347e+000

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GDR_C          Paragon Analytics, Inc.   Fort Collins, CO          Version 6.2
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Sample ID : 98-09-192-D2 B:09192GS.XLS

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Sample Size . . . . 1.00e+000 Sample | Spectrum File . . \gdr\spc\20000545.SPC
Sampling Start. . . . /09-23-98 12:00 | Counting Start. . . . 10-20-98 13:45
Sampling Stop . . . . /09-23-98 12:00 | Live Time . . . . . 1800 Sec
Current Date. . . . /10-29-98 18:01 | Real Time . . . . . 1846 Sec
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Detector #: 9
Energy(keV)= -1.10 + 0.500*Ch + 1.38e-007*Ch^2 + 0.00e+000*Ch^3 10-20-98 11:40
FWHM(keV) = 0.90 + 0.007*En + 8.40e-004*En^2 + 0.00e+000*En^3 11-15-97 17:56
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . / 0.20 | Search Start / End. . . . . 80 / 4000
Sigma Multiplier. . . . . / 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.73	151.70	255	75	64	381	1.45	a
2	77.11	156.45	271	58	41	267	0.99	b
3	84.00	170.24	39	46	38	230	0.75	a
4	87.27	176.77	74	50	40	265	0.72	b
5	93.16	188.55	100	71	64	391	1.34	
6	186.10	374.45	128	50	41	182	1.63	
7	209.28	420.82	69	44	36	164	0.95	
8	238.49	479.22	513	64	42	177	1.29	a
9	241.62	485.49	127	52	44	194	1.54	b
10	295.14	592.52	215	47	34	125	1.43	
11	338.16	678.54	127	41	32	110	1.19	
12	351.92	706.07	364	52	32	115	1.36	
13	463.45	929.07	36	31	26	77	2.04	
14	511.03	1024.21	174	43	32	96	2.56	
15	558.93	1119.96	48	34	30	78	1.73	
16	583.16	1168.40	187	44	33	102	1.89	
17	597.15	1196.37	22	29	25	68	0.70	NET < CL
18	609.27	1220.60	286	47	31	93	1.79	
19	727.51	1456.95	62	27	21	39	4.79	
20	768.31	1538.52	23	31	28	74	0.91	NET < CL
21	794.73	1591.33	18	24	21	47	1.64	NET < CL
22	911.06	1823.81	131	36	27	63	2.35	
23	934.76	1871.17	31	24	21	37	1.79	
24	969.14	1939.87	66	34	29	77	2.03	
25	1119.60	2240.52	73	32	27	56	2.28	
26	1460.75	2921.99	1095	76	38	87	3.05	
27	1764.06	3527.67	74	19	9	5	6.08	

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-D2 B:09192GS.XLS

Bkg File:	DET09.bkg	Counting Start.	10-20-98 13:45
ID.: 98-22-006-09 B:GS09BG	10/10/98	Current Date	10-29-98 18:01

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	74.73	1.45	255	75	229	75	
2	77.11	0.99	271	58	238	59	
3	84.00	0.75	39	46	36	46	NET < CL
4	87.27	0.72	74	50	64	50	
5	93.16	1.34	100	71	55	71	NET < CL
6	186.10	1.63	128	50	87	50	
8	238.49	1.29	513	64	489	64	
9	241.62	1.54	127	52	104	53	
10	295.14	1.43	215	47	161	47	
11	338.16	1.19	127	41	123	42	
12	351.92	1.36	364	52	267	52	
14	511.03	2.56	174	43	35	44	
15	558.93	1.73	48	34	28	35	NET < CL
16	583.16	1.89	187	44	174	45	
18	609.27	1.79	286	47	210	48	
19	727.51	4.79	62	27	59	28	
20	768.31	0.91	23	31	14	32	NET < CL
22	911.06	2.35	131	36	120	37	
23	934.76	1.79	31	24	27	25	
24	969.14	2.03	66	34	60	35	
25	1119.60	2.28	73	32	65	32	
26	1460.75	3.05	1095	76	1054	76	
27	1764.06	6.08	74	19	54	20	

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NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-D2 B:09192GS.XLS

Sample Size 1.00e+000 Sample	Spectrum File . . \gdr\spc\20000545.SPC
Sampling Start. 09-23-98 12:00	Counting Start. 10-20-98 13:45
Sampling Stop 09-23-98 12:00	Buildup Time. 0.00e+000 Hrs
Current Date. 10-29-98 18:01	Decay Time. 6.50e+002 Hrs

Efficiency File. DET0913.EFF	Library File. LANLINT.LIB
ID. 500gSAND#485.1572.24	ID. LANL Gamma library 07/25/96

Eff.= 1/[3.97e-002*En^-2.34e+000 + 6.09e+001*En^6.37e-001] 10-09-98 16:20

Gamma Fraction Limit >= . . . 75.00 %	Decay Limit <= 8.000 Halflives
Library Energy Tolerance. . . . 2.00	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Np-237	86.50	4.23e+002 +/-3.33e+002	1.87e+010	1 of 3
Cd-109	88.03	1.49e+003 +/-1.17e+003	1.11e+004	1 of 1
Ra-226	186.21	2.03e+003 +/-1.16e+003	1.40e+007	1 of 1
Pb-212	238.63	9.46e+002 +/-1.24e+002	1.23e+014	1 of 2
Pb-214	Average:	7.72e+002 +/-1.23e+002	1.40e+007	3 of 3
	241.98	8.02e+002 +/-6.03e+002		
	295.21	7.99e+002 +/-2.35e+002		
	351.92	7.60e+002 +/-1.49e+002		
Ac-228	Average:	8.90e+002 +/-1.90e+002	1.23e+014	3 of 3
	338.32	1.14e+003 +/-3.83e+002		
	911.07	8.42e+002 +/-2.56e+002		
	969.11	7.25e+002 +/-4.20e+002		
Ann-Rad	511.00	4.61e+001 +/-5.76e+001	8.76e+013	1 of 1
Tl-208	583.14	3.03e+002 +/-7.78e+001	1.23e+014	1 of 3
Bi-214	Average:	7.40e+002 +/-1.36e+002	1.40e+007	3 of 3
	609.31	6.73e+002 +/-1.54e+002		
	1120.30	9.38e+002 +/-4.65e+002		
	1764.50	9.95e+002 +/-3.65e+002		
K-40	1460.80	2.55e+004 +/-1.85e+003	1.12e+013	1 of 1
Am-241	59.54	-3.69e+001 +/-1.11e+002	3.79e+006	NET
Th-234	92.38	-2.30e+003 +/-1.10e+003	3.91e+013	NET
Co-57	122.06	-9.26e+000 +/-2.35e+001	6.50e+003	NET
Ce-144	133.54	1.06e+002 +/-1.73e+002	6.82e+003	NET
Ce-139	165.85	-3.08e+001 +/-2.81e+001	3.30e+003	NET
U-235	185.72	5.94e+001 +/-4.88e+001	6.17e+012	NET
Th-227	236.00	-2.07e+003 +/-2.94e+002	2.87e+008	NET
Ra-224	240.98	7.39e+002 +/-0.00e+000	1.23e+014	NET
Se-75	264.65	-3.46e+001 +/-4.01e+001	2.87e+003	NET
Hg-203	279.19	-2.69e+001 +/-3.97e+001	1.12e+003	NET
Pa-231	300.08	1.34e+003 +/-9.81e+002	2.87e+008	NET
Pa-233	311.98	8.95e+000 +/-5.55e+001	1.87e+010	NET

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Ra-223	323.87	7.36e+001	+ -5.25e+002	2.87e+008	NET
Eu-152	344.27	1.19e+001	+ -7.70e+001	1.19e+005	NET
Bi-211	351.07	0.00e+000	+ -0.00e+000	2.87e+008	NET
Sn-113	391.69	7.51e+000	+ -3.73e+001	2.76e+003	NET
Rn-219	401.81	-3.17e+002	+ -3.93e+002	2.87e+008	NET
Pb-211	404.84	-2.35e+002	+ -8.72e+002	2.87e+008	NET
Sr-85	513.99	-4.24e+001	+ -5.05e+001	1.56e+003	NET
Ba-140	537.32	-9.52e+001	+ -4.10e+002	3.07e+002	NET
Cs-134	604.70	7.76e+000	+ -3.41e+001	1.81e+004	NET
Ru-106	621.84	-3.23e+001	+ -2.88e+002	8.84e+003	NET
Cs-137	661.65	2.64e+001	+ -3.73e+001	2.64e+005	NET
Mn-54	834.83	7.69e+000	+ -3.54e+001	7.50e+003	NET
Y-88	898.02	-2.54e+000	+ -3.78e+001	2.56e+003	NET
Pa-234m	1001.00	-3.43e+003	+ -6.55e+003	3.91e+013	NET
Zn-65	1115.50	-7.57e+001	+ -9.21e+001	5.87e+003	NET
Co-60	1173.22	2.95e+001	+ -3.51e+001	4.62e+004	NET
Na-22	1274.50	-1.21e+001	+ -4.05e+001	2.28e+004	NET
La-140	1596.50	-2.06e+004	+ -3.38e+004	4.02e+001	NET
Bi-212	1620.60	5.77e+002	+ -1.08e+003	1.23e+014	NET

TOTAL: 3.32e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.73	151.70	229	75	64	381	1.45	3.692e+000
77.11	156.45	238	59	41	267	0.99	3.712e+000
209.29	420.82	69	44	36	164	0.95	9.145e-001
463.45	929.07	36	31	26	77	2.04	7.578e-001
727.51	1456.95	59	28	21	39	4.79	1.632e+000
934.76	1871.17	27	25	21	37	1.79	8.810e-001

000057

Sample ID : 98-09-192-04 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File	\gdr\spc\10001260.SPC
Sampling Start.	09-23-98 12:00		Counting Start.	10-20-98 13:41
Sampling Stop	09-23-98 12:00		Live Time	1800 Sec
Current Date.	10-29-98 18:04		Real Time	1811 Sec

Detector #: 2

Energy(keV)= 0.26 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 1.03 + -0.011*En + 1.01e-003*En^2 + 0.00e+000*En^3 10-08-98 14:10

Where En = Sqrt(Energy in keV)

Sensitivity 0.20

Sigma Multiplier. 2.00

Search Start / End. 60 / 4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	62.57	124.75	10	45	41	188	0.28	NET < CL
2	76.99	153.62	83	44	35	180	1.06	
3	87.10	173.86	0	37	32	161	0.00	NET < CL
4	92.84	185.34	66	43	35	171	1.10	
5	185.78	371.40	68	40	34	127	1.57	
6	209.37	418.63	11	25	19	70	0.36	NET < CL
7	238.71	477.37	274	44	27	85	0.97	a
8	241.51	482.97	74	46	41	141	1.89	b
9	270.46	540.93	46	31	26	70	1.86	
10	295.28	590.62	103	34	25	67	1.23	
11	338.46	677.06	27	28	24	71	0.77	
12	351.98	704.13	158	35	22	53	1.20	
13	463.12	926.63	-4	18	16	35	0.37	NET < CL
14	510.78	1022.02	70	30	24	52	2.09	
15	583.21	1167.04	107	28	18	33	1.67	
16	609.32	1219.30	83	30	22	55	1.37	
17	726.73	1454.34	26	19	15	20	1.67	
18	911.43	1824.10	48	22	16	26	1.94	
19	968.83	1939.02	25	20	16	30	0.90	
20	1171.92	2345.58	9	16	14	18	2.79	NET < CL
21	1460.63	2923.56	457	44	11	9	2.22	
22	1621.07	3244.75	5	8	6	3	0.66	NET < CL
23	1764.43	3531.75	18	10	5	2	1.72	

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BACKGROUND SUBTRACT RESULTS

Sample ID : 98-09-192-04 B:09192GS.XLS

Bkg File: / DET02.bkg | Counting Start. 10-20-98 13:41
ID.: 98-22-006-02 B:GS02BG / 10/10/98 | Current Date 10-29-98 18:04

Table with 8 columns: PK#, ENERGY (keV), FWHM (keV), OLD NET COUNTS, OLD UN-CERTAINTY, NEW NET COUNTS, NEW UN-CERTAINTY, FLAG. It contains 14 rows of data for various peaks, with a 'NET < CL' flag for peak 1.

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-04 B:09192GS.XLS

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Sample Size . . . . . 1.00e+000 Sample | Spectrum File . . \gdr\spc\10001260.SPC
Sampling Start. . . . . 09-23-98 12:00 | Counting Start. . . 10-20-98 13:41
Sampling Stop . . . . . 09-23-98 12:00 | Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . 10-29-98 18:04 | Decay Time. . . . . 6.50e+002 Hrs
-----
Efficiency File. . . . . DET0213.EFF | Library File. . . . . LANLINT.LIB
ID. . . . . 500gSAND#485.1572.24 | ID. . . . . LANL Gamma library 07/25/96
-----
Eff.= 1/[2.79e-003*En^-3.83e+000 + 1.48e+002*En^7.45e-001] 10-08-98 14:10
-----
Gamma Fraction Limit >= . . 75.00 % | Decay Limit <= . . . . 8.000 Halflives
Library Energy Tolerance. . . 2.00
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FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Am-241	59.54	2.48e+002 +-2.94e+002	3.79e+006	1 of 1
Cd-109	88.03	1.91e+003 +-1.30e+003	1.11e+004	1 of 1
Ra-226	186.21	2.65e+003 +-1.81e+003	1.40e+007	1 of 1
Pb-212	238.63	1.05e+003 +-1.73e+002	1.23e+014	1 of 2
Pb-214	Average:	9.52e+002 +-1.79e+002	1.40e+007	3 of 3
	241.98	1.04e+003 +-1.06e+003		
	295.21	1.03e+003 +-3.50e+002		
	351.92	9.20e+002 +-2.12e+002		
Ac-228	Average:	6.99e+002 +-2.76e+002	1.23e+014	3 of 3
	338.32	5.22e+002 +-5.61e+002		
	911.07	7.64e+002 +-3.73e+002		
	969.11	7.35e+002 +-6.02e+002		
Rn-219	401.81	4.41e+002 +-5.18e+002	2.87e+008	1 of 1
Ann-Rad	511.00	7.10e+001 +-9.01e+001	8.76e+013	1 of 1
Tl-208	583.14	4.22e+002 +-1.13e+002	1.23e+014	1 of 3
Bi-214	Average:	6.05e+002 +-2.03e+002	1.40e+007	2 of 3
	609.31	5.75e+002 +-2.25e+002		
	1764.50	7.41e+002 +-4.79e+002		
Pa-234m	1001.00	1.36e+004 +-8.58e+003	3.91e+013	1 of 1
K-40	1460.80	2.76e+004 +-2.71e+003	1.12e+013	1 of 1
Bi-212	1620.60	1.48e+003 +-1.59e+003	1.23e+014	1 of 1
Np-237	86.50	-3.19e+002 +-3.63e+002	1.87e+010	NET
Th-234	92.38	1.29e+003 +-1.82e+003	3.91e+013	NET
Co-57	122.06	-1.60e+001 +-3.17e+001	6.50e+003	NET
Ce-144	133.54	-6.03e+001 +-2.50e+002	6.82e+003	NET
Ce-139	165.85	5.92e+000 +-3.67e+001	3.30e+003	NET
U-235	185.72	1.23e+002 +-6.59e+001	6.17e+012	NET
Th-227	236.00	1.33e+002 +-2.58e+002	2.87e+008	NET
Ra-224	240.98	1.27e+003 +-0.00e+000	1.23e+014	NET
Se-75	264.65	3.01e+001 +-5.25e+001	2.87e+003	NET
Hg-203	279.19	-4.77e+001 +-6.27e+001	1.12e+003	NET

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Pa-231	300.08	1.57e+003	+ -1.58e+003	2.87e+008	NET
Pa-233	311.98	-3.68e+001	+ -8.89e+001	1.87e+010	NET
Ra-223	323.87	2.25e+002	+ -7.75e+002	2.87e+008	NET
Eu-152	344.27	2.12e+001	+ -1.23e+002	1.19e+005	NET
Bi-211	351.07	0.00e+000	+ -0.00e+000	2.87e+008	NET
Sn-113	391.69	-1.49e+001	+ -5.60e+001	2.76e+003	NET
Pb-211	404.84	-5.85e+002	+ -1.09e+003	2.87e+008	NET
Sr-85	513.99	-8.09e+001	+ -6.26e+001	1.56e+003	NET
Ba-140	537.32	-4.01e+002	+ -5.34e+002	3.07e+002	NET
Cs-134	604.70	1.36e+001	+ -4.31e+001	1.81e+004	NET
Ru-106	621.84	0.00e+000	+ -5.15e+002	8.84e+003	NET
Cs-137	661.65	3.41e+001	+ -6.03e+001	2.64e+005	NET
Mn-54	834.83	-9.16e+000	+ -4.49e+001	7.50e+003	NET
Y-88	898.02	6.16e+001	+ -5.93e+001	2.56e+003	NET
Zn-65	1115.50	2.53e+001	+ -1.09e+002	5.87e+003	NET
Co-60	1173.22	5.58e+001	+ -6.37e+001	4.62e+004	NET
Na-22	1274.50	-4.02e+001	+ -5.15e+001	2.28e+004	NET
La-140	1596.50	-2.25e+004	+ -3.19e+004	4.02e+001	NET

TOTAL: 5.18e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
76.99	153.62	83	44	35	180	1.06	3.348e+000
92.84	185.34	52	43	35	171	1.10	1.456e+000
270.46	540.93	46	31	26	70	1.86	1.449e+000
726.73	1454.34	26	19	15	20	1.67	1.685e+000

000061

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GDR_C	Paragon Analytics, Inc.	Fort Collins, CO	Version 6.2
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Sample ID : 98-09-192-05 B:09192GS.XLS

Sample Size	✓1.00e+000	Sample	Spectrum File . . .	\gdr\spc\10001263.SPC
Sampling Start.	✓.09-23-98 12:00		Counting Start.	10-20-98 14:26
Sampling Stop	✓.09-23-98 12:00		Live Time	✓1800 Sec
Current Date. . . . .	.10-29-98 18:09		Real Time	✓1812 Sec

Detector #: ✓1

Energy(keV)= -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 0.95 + 0.021*En + 4.19e-004*En^2 + 0.00e+000*En^3 10-08-98 11:48

Where En = Sqrt(Energy in keV)

Sensitivity	✓0.20	Search Start / End.	✓60 / 4000
Sigma Multiplier.	✓2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.43	150.66	182	84	79	425	2.18	a
2	77.07	155.91	212	59	46	255	1.21	b
3	92.67	187.06	115	65	59	297	1.23	a
4	98.37	198.44	32	38	31	152	0.78	b
5	185.83	372.97	101	50	43	200	1.25	
6	238.59	478.28	523	62	39	155	1.47	a
7	241.46	484.01	97	53	47	193	1.69	b
8	295.12	591.09	142	49	40	167	1.23	
9	338.21	677.10	142	42	32	103	1.65	
10	351.81	704.23	306	48	30	97	1.41	
11	510.97	1021.89	175	43	31	102	2.14	
12	583.10	1165.85	165	44	34	108	1.69	
13	609.36	1218.25	256	46	31	88	1.64	
14	727.12	1453.26	32	31	27	72	1.41	
15	911.17	1820.60	142	36	26	58	2.26	
16	969.05	1936.11	35	31	27	72	1.71	
17	999.86	1997.60	16	24	21	39	3.76	NET < CL
18	1120.22	2237.80	73	31	25	48	3.15	
19	1460.75	2917.44	1228	74	23	37	2.50	
20	1764.44	3523.53	39	20	15	16	1.67	
21	1847.32	3688.93	6	11	10	8	1.63	NET < CL

000062

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-05 B:09192GS.XLS

Bkg File:	DET01.bkg	Counting Start.	10-20-98 14:26
ID.: 98-22-006-01 B:GS01BG/	10/10/98	Current Date	10-29-98 18:09

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
3	92.67	1.23	115	65	76	65	
5	185.83	1.25	101	50	64	51	
6	238.59	1.47	523	62	498	63	
8	295.12	1.23	142	49	136	50	
9	338.21	1.65	142	42	139	42	
10	351.81	1.41	306	48	291	48	
11	510.97	2.14	175	43	34	44	
12	583.10	1.69	165	44	150	45	
13	609.36	1.64	256	46	238	46	
15	911.17	2.26	142	36	129	36	
16	969.05	1.71	35	31	29	31	
17	999.86	3.76	16	24	14	24	NET < CL
18	1120.22	3.15	73	31	69	31	
19	1460.75	2.50	1228	74	1178	74	
20	1764.44	1.67	39	20	32	20	

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NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-05 B:09192GS.XLS

Sample Size 1.00e+000 Sample	Spectrum File . . \gdr\spc\10001263.SPC
Sampling Start. 09-23-98 12:00	Counting Start. 10-20-98 14:26
Sampling Stop 09-23-98 12:00	Buildup Time. 0.00e+000 Hrs
Current Date. 10-29-98 18:09	Decay Time. 6.50e+002 Hrs

Efficiency File. DET0113.EFF	Library File. LANLINT.LIB
ID. 500gSoil 485.1572.24	ID. LANL Gamma library 07/25/96

Eff.= 1/[5.69e-003*En^-3.26e+000 + 6.02e+001*En^5.76e-001] 10-08-98 11:48

Gamma Fraction Limit >= . . . 75.00 %	Decay Limit <= . . . 8.000 Halflives
Library Energy Tolerance. . . 2.00	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Cd-109	88.03	1.47e+003 +/-1.07e+003	1.11e+004	1 of 1
Ra-226	186.21	1.58e+003 +/-1.25e+003	1.40e+007	1 of 1
Pb-212	238.63	1.02e+003 +/-1.28e+002	1.23e+014	1 of 2
Pb-214	Average:	7.11e+002 +/-1.23e+002	1.40e+007	3 of 3
	241.98	7.13e+002 +/-6.41e+002		
	295.21	7.10e+002 +/-2.60e+002		
	351.92	7.10e+002 +/-1.42e+002		
Pa-233	311.98	9.66e+001 +/-6.61e+001	1.87e+010	1 of 2
Ac-228	Average:	8.55e+002 +/-1.87e+002	1.23e+014	3 of 3
	338.32	1.35e+003 +/-4.07e+002		
	911.07	9.01e+002 +/-2.54e+002		
	969.11	3.43e+002 +/-3.73e+002		
Bi-211	351.07	4.47e+002 +/-4.09e+002	2.87e+008	1 of 1
Ann-Rad	511.00	4.62e+001 +/-5.91e+001	8.76e+013	1 of 1
Tl-208	583.14	2.66e+002 +/-7.92e+001	1.23e+014	1 of 3
Bi-214	Average:	7.64e+002 +/-1.32e+002	1.40e+007	3 of 3
	609.31	7.77e+002 +/-1.51e+002		
	1120.30	9.69e+002 +/-4.41e+002		
	1764.50	5.62e+002 +/-3.52e+002		
Cs-137	661.65	4.53e+001 +/-4.17e+001	2.64e+005	1 of 1
Pa-234m	1001.00	8.03e+003 +/-5.75e+003	3.91e+013	1 of 1
K-40	1460.80	2.76e+004 +/-1.73e+003	1.12e+013	1 of 1
Am-241	59.54	-2.22e+001 +/-1.85e+002	3.79e+006	NET
Np-237	86.50	4.30e+001 +/-3.05e+002	1.87e+010	NET
Th-234	92.38	1.37e+003 +/-1.45e+003	3.91e+013	NET
Co-57	122.06	-1.35e+001 +/-2.82e+001	6.50e+003	NET
Ce-144	133.54	-1.14e+001 +/-2.26e+002	6.82e+003	NET
Ce-139	165.85	5.01e+000 +/-2.94e+001	3.30e+003	NET
U-235	185.72	7.56e+001 +/-5.17e+001	6.17e+012	NET
Th-227	236.00	-1.86e+003 +/-2.96e+002	2.87e+008	NET
Ra-224	240.98	8.72e+002 +/-0.00e+000	1.23e+014	NET

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Se-75	264.65	-1.14e+001	+-4.80e+001	2.87e+003	NET
Hg-203	279.19	-1.70e+001	+-4.82e+001	1.12e+003	NET
Pa-231	300.08	1.63e+003	+-1.24e+003	2.87e+008	NET
Ra-223	323.87	3.00e+002	+-6.04e+002	2.87e+008	NET
Eu-152	344.27	1.28e+002	+-8.88e+001	1.19e+005	NET
Sn-113	391.69	-4.26e+000	+-4.26e+001	2.76e+003	NET
Rn-219	401.81	9.17e+001	+-3.76e+002	2.87e+008	NET
Pb-211	404.84	-1.22e+002	+-8.65e+002	2.87e+008	NET
Sr-85	513.99	-1.07e+002	+-6.61e+001	1.56e+003	NET
Ba-140	537.32	6.92e+001	+-4.40e+002	3.07e+002	NET
Cs-134	604.70	3.00e+001	+-3.74e+001	1.81e+004	NET
Ru-106	621.84	7.10e+001	+-3.12e+002	8.84e+003	NET
Mn-54	834.83	5.77e+000	+-4.12e+001	7.50e+003	NET
Y-88	898.02	-9.64e+000	+-5.04e+001	2.56e+003	NET
Zn-65	1115.50	-1.49e+001	+-8.60e+001	5.87e+003	NET
Co-60	1173.22	2.22e+000	+-4.41e+001	4.62e+004	NET
Na-22	1274.50	-6.43e+000	+-3.91e+001	2.28e+004	NET
La-140	1596.50	1.28e+004	+-2.60e+004	4.02e+001	NET
Bi-212	1620.60	-2.33e+002	+-1.26e+003	1.23e+014	NET

TOTAL: 4.29e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.43	150.66	182	84	79	425	2.18	4.127e+000
77.07	155.91	212	59	46	255	1.21	4.489e+000
92.67	187.06	76	65	59	297	1.23	1.204e+000
98.37	198.44	32	38	31	152	0.78	4.764e-001
727.11	1453.26	32	31	27	72	1.41	8.776e-001

7Pb 214

000065

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GDR_C          Paragon Analytics, Inc.          Fort Collins, CO          Version 6.2
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Sample ID : 98-09-192-06 B:09192GS.XLS

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Sample Size . . . . 1.00e+000 Sample | Spectrum File . . \gdr\spc\10001261.SPC
Sampling Start. . . . 09-23-98 12:00 | Counting Start. . . . 10-20-98 13:44
Sampling Stop . . . . 09-23-98 12:00 | Live Time . . . . . 1800 Sec
Current Date. . . . 10-29-98 18:12 | Real Time . . . . . 1810 Sec
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Detector #: 3
Energy(keV)= -0.48 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3/10-20-98 12:26
FWHM(keV) = 0.83 + 0.010*En + 5.64e-004*En^2 + 0.00e+000*En^3/11-15-97 20:25
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . 0.20 | Search Start / End. . . 30 / 4000
Sigma Multiplier. . . . . 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.93	150.73	46	39	33	141	0.76	a
2	77.06	154.99	96	41	30	146	0.84	b
3	92.85	186.54	50	42	36	149	1.02	
4	185.82	372.34	50	34	28	105	1.32	
5	209.20	419.08	38	32	27	90	1.29	
6	238.61	477.86	258	43	27	71	1.28	a
7	241.73	484.09	71	38	32	89	1.88	b
8	295.18	590.92	62	29	22	62	1.22	
9	327.57	655.65	18	24	20	52	1.38	NET < CL
10	338.05	676.58	40	24	18	47	0.94	
11	351.74	703.96	120	30	19	44	1.30	
12	463.02	926.36	14	20	17	36	1.32	NET < CL
13	511.23	1022.71	74	28	21	44	1.93	
14	583.22	1166.59	72	26	19	34	2.46	
15	604.29	1208.69	9	18	16	28	1.05	a NET < CL
16	609.47	1219.06	83	28	20	39	1.24	b
17	727.78	1455.51	27	22	18	30	1.20	
18	742.78	1485.48	-3	16	15	25	0.32	NET < CL
19	820.35	1640.53	14	11	7	6	1.80	
20	911.46	1822.60	48	23	18	30	1.25	
21	968.85	1937.32	28	25	21	39	1.88	
22	1460.69	2920.30	412	43	14	15	1.92	
23	1497.56	2994.00	5	7	5	2	0.61	
24	1588.11	3174.96	12	7	0	0	1.88	

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-06 B:09192GS.XLS

Bkg File:	DET03.bkg	Counting Start. /	10-20-98 13:44
ID.: 98-22-008-03 B:GS03BG 10/10/98		Current Date	10-29-98 18:12

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
3	92.85	1.02	50	42	35	42	NET < CL
4	185.82	1.32	50	34	39	35	
6	238.61	1.28	258	43	252	43	
8	295.18	1.22	62	29	60	29	
11	351.74	1.30	120	30	116	30	
13	511.23	1.93	74	28	29	29	
14	583.22	2.46	72	26	67	27	
16	609.47	1.24	83	28	79	28	
20	911.46	1.25	48	23	47	23	
21	968.85	1.88	28	25	27	25	
22	1460.69	1.92	412	43	405	43	

000067

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-06 B:09192GS.XLS

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Sample Size . . . . . 1.00e+000 Sample Spectrum File . . \gdr\spc\10001261.SPC
Sampling Start. . . . . 09-23-98 12:00 Counting Start. . . . . 10-20-98 13:44
Sampling Stop . . . . . 09-23-98 12:00 Buildup Time. . . . . 0.00e+000 Hrs
Current Date. . . . . 10-29-98 18:12 Decay Time. . . . . 6.50e+002 Hrs
-----
Efficiency File. . . . . DET0313.EFF Library File. . . . . LANLINT.LIB
ID. . . . . 500gSAND#485.1572.24 ID. . . . . LANL Gamma library 07/25/96
-----
Eff.= 1/[2.54e-003*En^-3.88e+000 + 1.64e+002*En^7.46e-001] 10-09-98 12:17
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Gamma Fraction Limit >= . . . 75.00 % | Decay Limit <= . . . 8.000 Halflives
Library Energy Tolerance. . . 2.00
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FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Cd-109	88.03	1.68e+003 +-1.43e+003	1.11e+004	1 of 1
Co-57	122.06	3.96e+001 +-3.75e+001	6.50e+003	1 of 2
Ra-226	186.21	1.90e+003 +-1.70e+003	1.40e+007	1 of 1
Pb-212	238.63	1.09e+003 +-1.86e+002	1.23e+014	1 of 2
Ra-224	240.98	2.18e+003 +-1.85e+003	1.23e+014	1 of 1
Pb-214	Average:	6.88e+002 +-1.72e+002	1.40e+007	3 of 3
	241.98	6.90e+002 +-9.60e+002		
	295.21	6.90e+002 +-3.38e+002		
	351.92	6.87e+002 +-2.05e+002		
Pa-233	311.98	7.73e+001 +-9.13e+001	1.87e+010	1 of 2
Ac-228	Average:	8.80e+002 +-3.11e+002	1.23e+014	3 of 3
	338.32	8.77e+002 +-5.31e+002		
	911.07	8.83e+002 +-4.35e+002		
	969.11	8.78e+002 +-8.05e+002		
Ann-Rad	511.00	9.50e+001 +-9.36e+001	8.76e+013	1 of 1
Tl-208	583.14	2.93e+002 +-1.17e+002	1.23e+014	1 of 3
K-40	1460.80	2.75e+004 +-2.93e+003	1.12e+013	1 of 1
Am-241	59.54	3.60e+001 +-3.38e+002	3.79e+006	NET
Np-237	86.50	3.21e+001 +-4.00e+002	1.87e+010	NET
Th-234	92.38	-1.10e+003 +-1.74e+003	3.91e+013	NET
Ce-144	133.54	-1.18e+002 +-2.63e+002	6.82e+003	NET
Ce-139	165.85	-2.89e+001 +-4.01e+001	3.30e+003	NET
U-235	185.72	8.46e+001 +-7.12e+001	6.17e+012	NET
Th-227	236.00	-1.85e+002 +-2.69e+002	2.87e+008	NET
Se-75	264.65	4.19e+001 +-6.22e+001	2.87e+003	NET
Hg-203	279.19	-5.74e+001 +-6.79e+001	1.12e+003	NET
Pa-231	300.08	8.90e+002 +-1.68e+003	2.87e+008	NET
Ra-223	323.87	-1.62e+002 +-9.05e+002	2.87e+008	NET
Eu-152	344.27	-2.03e+001 +-1.07e+002	1.19e+005	NET
Bi-211	351.07	2.61e+002 +-0.00e+000	2.87e+008	NET
Sn-113	391.69	0.00e+000 +-5.38e+001	2.76e+003	NET

000068

Rn-219	401.81	2.73e+002	+-5.50e+002	2.87e+008	NET
Pb-211	404.84	-3.94e+002	+-1.05e+003	2.87e+008	NET
Sr-85	513.99	-1.58e+001	+-6.77e+001	1.56e+003	NET
Ba-140	537.32	-1.16e+002	+-6.77e+002	3.07e+002	NET
Cs-134	604.70	3.55e+001	+-5.04e+001	1.81e+004	NET
Bi-214	609.31	7.04e+002	+-1.92e+002	1.40e+007	NET
Ru-106	621.84	2.88e+002	+-5.00e+002	8.84e+003	NET
Cs-137	661.65	1.89e+001	+-6.54e+001	2.64e+005	NET
Mn-54	834.83	3.24e+001	+-4.96e+001	7.50e+003	NET
Y-88	898.02	-1.45e+001	+-6.96e+001	2.56e+003	NET
Pa-234m	1001.00	-2.13e+003	+-1.06e+004	3.91e+013	NET
Zn-65	1115.50	-2.52e+001	+-1.34e+002	5.87e+003	NET
Co-60	1173.22	1.14e+001	+-7.31e+001	4.62e+004	NET
Na-22	1274.50	-1.56e+001	+-5.89e+001	2.28e+004	NET
La-140	1596.50	5.55e+003	+-5.20e+004	4.02e+001	NET
Bi-212	1620.60	7.21e+001	+-1.89e+003	1.23e+014	NET

TOTAL: 3.64e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.93	150.73	46	39	33	141	0.76	2.113e+000
77.06	154.99	96	41	30	146	0.84	4.171e+000
209.20	419.08	38	32	27	90	1.29	1.087e+000
609.47	1219.06	79	28	20	39	1.24	4.976e+000
727.78	1455.51	27	22	18	30	1.20	1.938e+000
820.35	1640.53	14	11	7	6	1.80	1.059e+000
1497.56	2994.00	5	7	5	2	0.61	6.147e-001
1588.11	3174.97	12	7	0	0	1.88	1.541e+000

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GDR_C	Paragon Analytics, Inc.	Fort Collins, CO	Version 6.2
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Sample ID : 98-09-192-07 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File . . .	\gdr\spc\10001262.SPC
Sampling Start.	09-23-98 12:00		Counting Start.	10-20-98 13:45
Sampling Stop	09-23-98 12:00		Live Time	1800 Sec
Current Date.	10-29-98 18:13		Real Time	1810 Sec

Detector #: 4

Energy(keV) = -0.54 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 0.59 + 0.018*En + 4.22e-004*En^2 + 0.00e+000*En^3 11-15-97 21:13

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End. . .	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.86	150.76	33	36	31	117	0.76	a
2	77.01	155.04	88	37	28	121	0.84	b
3	84.14	169.30	-4	31	27	113	0.17	NET < CL
4	92.58	186.17	71	39	31	131	1.01	
5	129.21	259.41	-19	31	28	108	1.04	NET < CL
6	140.39	281.77	-4	27	24	88	0.17	NET < CL
7	159.83	320.63	6	31	28	95	0.31	NET < CL
8	185.93	372.82	52	29	22	68	1.19	
9	238.56	478.04	181	37	23	68	0.87	a
10	241.51	483.94	41	29	23	74	1.04	b
11	270.08	541.06	20	23	19	49	0.72	
12	295.39	591.67	52	30	24	65	0.79	
13	338.32	677.49	16	23	19	53	0.66	NET < CL
14	351.98	704.80	70	28	20	50	0.98	
15	510.76	1022.25	61	26	19	42	2.66	
16	552.33	1105.38	11	15	12	19	1.42	NET < CL
17	583.03	1166.75	80	23	14	23	1.52	
18	609.08	1218.82	84	25	15	29	1.27	
19	831.32	1663.17	-2	12	11	14	2.07	NET < CL
20	911.14	1822.74	41	16	9	7	2.05	
21	950.31	1901.05	8	15	13	17	0.54	NET < CL
22	964.64	1929.71	15	16	13	18	3.20	
23	1114.70	2229.73	8	12	10	9	1.20	a
24	1120.35	2241.03	26	15	11	11	1.64	b
25	1175.55	2351.39	12	15	12	13	1.19	NET < CL
26	1350.52	2701.20	4	6	4	1	0.91	NET < CL
27	1460.78	2921.65	384	40	7	4	2.03	
28	1764.62	3529.13	15	8	0	0	1.41	

000070

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-07 B:09192GS.XLS

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Bkg File:	DET04.bkg	Counting Start.	10-20-98 13:45
ID.: 98-22-006-04 B:GS04BG	10/10/98	Current Date	10-29-98 18:13

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
3	84.14	0.17	-4	31	-4	31	NET < CL
4	92.58	1.01	71	39	60	39	
8	185.93	1.19	52	29	44	29	
9	238.56	0.87	181	37	178	37	
12	295.39	0.79	52	30	50	30	
14	351.98	0.98	70	28	66	28	
15	510.76	2.66	61	26	18	27	NET < CL
17	583.03	1.52	80	23	77	23	
18	609.08	1.27	84	25	81	25	
20	911.14	2.05	41	16	39	16	
27	1460.78	2.03	384	40	378	40	
28	1764.62	1.41	15	8	15	8	

000071

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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NUCLIDE ACTIVITY SUMMARY

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Sample ID: 98-09-192-07 B:09192GS.XLS

Sample Size / 1.00e+000	Sample Spectrum File . . \gdr\spc\10001262.SPC
Sampling Start. . . / .09-23-98 12:00	Counting Start. . . / . . . 10-20-98 13:45
Sampling Stop . . . / .09-23-98 12:00	Buildup Time. 0.00e+000 Hrs
Current Date. . . . / 10-29-98 18:13	Decay Time. 6.50e+002 Hrs

Efficiency File. . . . / .DET0413.EFF | Library File. LANLINT.LIB
ID. 500gSAND#485.1572.24 | ID. LANL Gamma library 07/25/96

Eff.= 1/[4.17e-003*En^-3.67e+000 + 1.50e+002*En^7.77e-001] / 10-09-98 15:03

Gamma Fraction Limit >= . . / 75.00 % | Decay Limit <= 8.000 Halflives
Library Energy Tolerance. . / 2.00

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Ra-226	186.21	1.90e+003 +-1.26e+003	1.40e+007	1 of 1
Pb-212	238.63	6.73e+002 +-1.42e+002	1.23e+014	1 of 2
Pb-214	Average:	4.21e+002 +-1.43e+002	1.40e+007	3 of 3
	241.98	4.93e+002 +-6.57e+002		
	295.21	5.01e+002 +-3.01e+002		
	351.92	3.91e+002 +-1.67e+002		
Tl-208	583.14	3.02e+002 +-9.28e+001	1.23e+014	1 of 3
Bi-214	Average:	6.44e+002 +-1.59e+002	1.40e+007	3 of 3
	609.31	5.90e+002 +-1.84e+002		
	1120.30	9.27e+002 +-5.50e+002		
	1764.50	7.34e+002 +-3.80e+002		
Zn-65	1115.50	1.54e+002 +-1.12e+002	5.87e+003	1 of 1
K-40	1460.80	2.37e+004 +-2.50e+003	1.12e+013	1 of 1
Am-241	59.54	5.94e+001 +-2.14e+002	3.79e+006	NET
Np-237	86.50	1.47e+001 +-2.58e+002	1.87e+010	NET
Cd-109	88.03	2.75e+002 +-9.27e+002	1.11e+004	NET
Th-234	92.38	1.72e+003 +-1.43e+003	3.91e+013	NET
Co-57	122.06	9.66e+000 +-2.43e+001	6.50e+003	NET
Ce-144	133.54	1.25e+001 +-1.96e+002	6.82e+003	NET
Ce-139	165.85	-2.03e+001 +-3.12e+001	3.30e+003	NET
U-235	185.72	8.42e+001 +-5.38e+001	6.17e+012	NET
Th-227	236.00	3.83e+001 +-2.19e+002	2.87e+008	NET
Ra-224	240.98	8.12e+002 +-0.00e+000	1.23e+014	NET
Se-75	264.65	-1.17e+001 +-4.56e+001	2.87e+003	NET
Hg-203	279.19	-1.08e+001 +-3.98e+001	1.12e+003	NET
Pa-231	300.08	1.37e+003 +-1.20e+003	2.87e+008	NET
Pa-233	311.98	-1.75e+001 +-5.97e+001	1.87e+010	NET
Ra-223	323.87	1.97e+002 +-6.44e+002	2.87e+008	NET
Eu-152	344.27	4.80e+001 +-1.03e+002	1.19e+005	NET
Bi-211	351.07	0.00e+000 +-0.00e+000	2.87e+008	NET
Sn-113	391.69	0.00e+000 +-4.52e+001	2.76e+003	NET

000072

Rn-219	401.81	-3.15e+002	+-3.95e+002	2.87e+008	NET
Pb-211	404.84	5.61e+002	+-9.56e+002	2.87e+008	NET
Ann-Rad	511.00	2.10e+001	+-5.95e+001	8.76e+013	NET
Sr-85	513.99	-4.63e+001	+-6.17e+001	1.56e+003	NET
Ba-140	537.32	-8.91e+000	+-5.43e+002	3.07e+002	NET
Cs-134	604.70	1.44e+001	+-3.65e+001	1.81e+004	NET
Ru-106	621.84	1.92e+002	+-3.88e+002	8.84e+003	NET
Cs-137	661.65	9.23e+000	+-4.00e+001	2.64e+005	NET
Mn-54	834.83	-1.84e+001	+-4.32e+001	7.50e+003	NET
Y-88	898.02	2.34e+001	+-4.97e+001	2.56e+003	NET
Ac-228	911.07	5.10e+002	+-2.38e+002	1.23e+014	NET
Pa-234m	1001.00	2.53e+003	+-6.53e+003	3.91e+013	NET
Co-60	1173.22	-5.70e+001	+-6.66e+001	4.62e+004	NET
Na-22	1274.50	-1.43e+001	+-5.20e+001	2.28e+004	NET
La-140	1596.50	1.54e+004	+-3.37e+004	4.02e+001	NET
Bi-212	1620.60	3.87e+002	+-1.17e+003	1.23e+014	NET

TOTAL: 2.78e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.86	150.76	33	36	31	117	0.76	1.383e+000
77.01	155.04	88	37	28	121	0.84	3.478e+000
92.58	186.17	60	39	31	131	1.01	1.653e+000
270.08	541.06	20	23	19	49	0.72	5.970e-001
911.14	1822.74	39	16	9	7	2.05	2.991e+000
964.64	1929.71	15	16	13	18	3.20	1.186e+000

000073

Sample ID : 98-09-192-08 B:09192GS.XLS

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Sample Size . . . . / 1.00e+000 Sample | Spectrum File . . \gdr\spc\20000543.SPC
Sampling Start. . . / .09-23-98 12:00 | Counting Start. . / . . 10-20-98 13:00
Sampling Stop . . . / .09-23-98 12:00 | Live Time . . . . / . . . . 1800 Sec
Current Date. . . . / .10-29-98 18:14 | Real Time . . . . / . . . . 1810 Sec
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Detector #: 9
Energy(keV)= -1.10 + 0.500*Ch + 1.38e-007*Ch^2 + 0.00e+000*Ch^3 10-20-98 11:40
FWHM(keV) = 0.90 + 0.007*En + 8.40e-004*En^2 + 0.00e+000*En^3 11-15-97 17:56
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . / 0.20 | Search Start / End. . / . . 80 / 4000
Sigma Multiplier. . . . . / 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.85	151.93	227	65	52	340	0.95	a
2	77.10	156.43	335	64	45	317	1.00	b
3	87.10	176.44	8	56	48	363	0.09	NET < CL
4	93.02	188.28	57	66	58	407	0.65	NET < CL
5	185.91	374.06	140	54	45	225	1.15	
6	208.79	419.83	26	44	39	186	0.85	NET < CL
7	238.57	479.38	579	65	41	172	1.30	a
8	241.58	485.40	136	54	46	203	1.65	b
9	295.06	592.36	217	53	43	140	1.51	a
10	300.27	602.77	42	44	40	142	1.51	b
11	338.06	678.35	156	42	31	103	2.05	
12	351.91	706.04	386	52	32	110	1.43	
13	462.62	927.42	35	43	40	120	1.27	NET < CL
14	510.87	1023.88	210	43	31	86	2.16	
15	583.39	1168.86	188	41	28	81	1.53	
16	609.34	1220.73	296	49	33	108	2.07	
17	661.88	1325.77	-4	27	26	67	0.21	NET < CL
18	699.68	1401.33	25	26	22	55	1.57	
19	727.39	1456.72	42	36	33	84	1.52	
20	755.49	1512.89	22	27	25	52	3.58	NET < CL
21	860.15	1722.08	40	29	25	52	2.09	
22	910.91	1823.50	174	36	23	46	1.96	
23	927.80	1857.26	10	22	20	37	0.66	NET < CL
24	969.29	1940.17	80	35	29	67	2.20	
25	1120.64	2242.59	63	33	28	72	2.47	
26	1460.70	2921.90	1306	78	31	57	3.18	
27	1764.82	3529.18	63	21	13	13	3.60	

000074

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-08 B:09192GS.XLS

Bkg File:	DET09.bkg	Counting Start.	10-20-98 13:00
ID.: 98-22-006-09 B:GS09BG 10/10/98		Current Date	10-29-98 18:14

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	74.85	0.95	227	65	201	66	
2	77.10	1.00	335	64	302	64	
3	87.10	0.09	8	56	-2	57	NET < CL
4	93.02	0.65	57	66	12	66	NET < CL
5	185.91	1.15	140	54	99	55	
7	238.57	1.30	579	65	553	66	
8	241.58	1.65	136	54	113	54	
9	295.06	1.51	217	53	165	53	
11	338.06	2.05	156	42	152	42	
12	351.91	1.43	386	52	289	53	
14	510.87	2.16	210	43	71	44	
15	583.39	1.53	188	41	175	41	
16	609.34	2.07	296	49	220	50	
19	727.39	1.52	42	36	39	36	
22	910.91	1.96	174	36	163	36	
24	969.29	2.20	80	35	74	35	
25	1120.64	2.47	63	33	47	34	
26	1460.70	3.18	1306	78	1265	79	
27	1764.82	3.60	63	21	43	21	

000075

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-08 B:09192GS.XLS

Sample Size ✓ 1.00e+000 Sample	Spectrum File . . \gdr\spc\20000543.SPC
Sampling Start. . . ✓ .09-23-98 12:00	Counting Start. . . ✓ . 10-20-98 13:00
Sampling Stop . . . ✓ .09-23-98 12:00	Buildup Time. 0.00e+000 Hrs
Current Date. . . . ✓ .10-29-98 18:14	Decay Time. ✓ . 6.49e+002 Hrs

Efficiency File. . . . ✓ .DET0913.EFF	Library File. . . . ✓ . . . LANLINT.LIB
ID. 500gSAND#485.1572.24	ID. LANL Gamma library 07/25/96

Eff.= 1/[3.97e-002*En^-2.34e+000 + 6.09e+001*En^6.37e-001] 10-09-98 16:20

Gamma Fraction Limit >= . . ✓ 75.00 %	Decay Limit <= 8.000 Halflives
Library Energy Tolerance. . ✓ 2.00	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
=====				
Cd-109	88.03	9.56e+002 +-8.91e+002	1.11e+004	1 of 1
Ra-226	186.21	2.30e+003 +-1.28e+003	1.40e+007	1 of 1
Pb-212	Average:	1.07e+003 +-1.26e+002	1.23e+014	2 of 2
	238.63	1.07e+003 +-1.27e+002		
	300.09	1.21e+003 +-1.26e+003		
Pb-214	Average:	8.19e+002 +-1.27e+002	1.40e+007	3 of 3
	241.98	8.13e+002 +-6.22e+002		
	295.21	8.19e+002 +-2.64e+002		
	351.92	8.19e+002 +-1.50e+002		
Pa-233	311.98	6.35e+001 +-5.48e+001	1.87e+010	1 of 2
Ac-228	Average:	1.15e+003 +-1.89e+002	1.23e+014	3 of 3
	338.32	1.40e+003 +-3.88e+002		
	911.07	1.14e+003 +-2.52e+002		
	969.11	9.02e+002 +-4.26e+002		
Ann-Rad	511.00	9.34e+001 +-5.80e+001	8.76e+013	1 of 1
Ba-140	537.32	3.95e+002 +-4.17e+002	3.07e+002	1 of 2
Tl-208	Average:	3.13e+002 +-7.07e+001	1.23e+014	2 of 3
	583.14	3.05e+002 +-7.17e+001		
	860.37	6.01e+002 +-4.30e+002		
Bi-214	Average:	7.14e+002 +-1.41e+002	1.40e+007	3 of 3
	609.31	7.06e+002 +-1.59e+002		
	1120.30	6.77e+002 +-4.86e+002		
	1764.50	7.82e+002 +-3.85e+002		
Cs-137	661.65	3.53e+001 +-3.24e+001	2.64e+005	1 of 1
K-40	1460.80	3.06e+004 +-1.90e+003	1.12e+013	1 of 1
Am-241	59.54	-2.46e+001 +-1.17e+002	3.79e+006	NET
Np-237	86.50	-1.04e+002 +-2.46e+002	1.87e+010	NET
Th-234	92.38	-2.02e+003 +-1.16e+003	3.91e+013	NET
Co-57	122.06	-6.87e+000 +-2.34e+001	6.50e+003	NET
Ce-144	133.54	-1.17e+002 +-1.79e+002	6.82e+003	NET
Ce-139	165.85	1.68e+001 +-3.03e+001	3.30e+003	NET

000076

U-235	185.72	9.40e+001	+-5.39e+001	6.17e+012	NET
Th-227	236.00	-2.28e+003	+-2.92e+002	2.87e+008	NET
Ra-224	240.98	9.30e+002	+-0.00e+000	1.23e+014	NET
Se-75	264.65	1.32e+001	+-4.43e+001	2.87e+003	NET
Hg-203	279.19	2.35e+001	+-4.12e+001	1.12e+003	NET
Pa-231	300.08	1.57e+003	+-1.03e+003	2.87e+008	NET
Ra-223	323.87	5.21e+002	+-5.62e+002	2.87e+008	NET
Eu-152	344.27	-5.94e+000	+-7.71e+001	1.19e+005	NET
Bi-211	351.07	8.16e+000	+-0.00e+000	2.87e+008	NET
Sn-113	391.69	-1.67e+001	+-3.91e+001	2.76e+003	NET
Rn-219	401.81	-2.65e+002	+-3.65e+002	2.87e+008	NET
Pb-211	404.84	9.01e+002	+-8.03e+002	2.87e+008	NET
Sr-85	513.99	-6.64e+001	+-5.19e+001	1.56e+003	NET
Cs-134	604.70	1.03e+001	+-3.43e+001	1.81e+004	NET
Ru-106	621.84	-6.74e+001	+-2.99e+002	8.84e+003	NET
Mn-54	834.83	1.19e+001	+-3.38e+001	7.50e+003	NET
Y-88	898.02	-1.90e+001	+-4.23e+001	2.56e+003	NET
Pa-234m	1001.00	2.78e+003	+-6.29e+003	3.91e+013	NET
Zn-65	1115.50	2.62e+001	+-8.92e+001	5.87e+003	NET
Co-60	1173.22	1.06e+001	+-4.35e+001	4.62e+004	NET
Na-22	1274.50	-3.39e+001	+-4.61e+001	2.28e+004	NET
La-140	1596.50	-3.27e+003	+-3.44e+004	4.02e+001	NET
Bi-212	1620.60	4.75e+002	+-1.29e+003	1.23e+014	NET

TOTAL: 3.86e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.85	151.93	201	66	52	340	0.95	3.237e+000
77.10	156.43	302	64	45	317	1.00	4.699e+000
699.68	1401.33	25	26	22	55	1.57	6.748e-001
727.39	1456.72	39	36	33	84	1.52	1.079e+000

7Pb214

000077

Sample ID : 98-09-192-09 B:09192GS.XLS

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Sample Size . . . . 1.00e+000 Sample | Spectrum File . . \gdr\spc\20000544.SPC
Sampling Start. . . . 09-23-98 12:00 | Counting Start. . . 10-20-98 13:01
Sampling Stop . . . . 09-23-98 12:00 | Live Time . . . . 1800 Sec
Current Date. . . . 10-29-98 18:15 | Real Time . . . . 1810 Sec
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Detector #: 10
Energy(keV) = -0.80 + 0.500*Ch + 1.97e-007*Ch^2 + 0.00e+000*Ch^3 10-20-98 11:40
FWHM(keV) = 0.66 + 0.009*En + 7.42e-004*En^2 + 0.00e+000*En^3 11-15-97 17:40
Where En = Sqrt(Energy in keV)
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Sensitivity . . . . . 0.20 | Search Start / End. . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	74.85	151.39	38	33	26	117	0.74	a
2	77.20	156.09	45	35	28	120	0.77	b
3	84.66	171.02	18	35	30	124	0.80	NET < CL
4	92.99	187.69	3	40	36	159	0.09	NET < CL
5	238.66	479.14	200	40	26	77	0.87	a
6	241.62	485.07	32	29	23	74	1.04	b
7	295.19	592.23	49	29	23	63	1.15	
8	304.21	610.27	6	20	17	43	0.35	NET < CL
9	338.52	678.90	37	27	22	59	1.39	
10	352.06	705.99	113	30	18	42	0.91	
11	511.13	1024.11	75	25	17	29	3.38	
12	583.02	1167.85	71	24	16	27	1.38	
13	609.48	1220.77	70	25	17	36	1.49	
14	785.49	1572.62	12	15	12	17	4.61	
15	824.37	1650.33	1	13	12	14	0.25	NET < CL
16	860.73	1723.00	6	17	15	21	0.69	NET < CL
17	911.16	1823.78	45	21	15	21	1.52	
18	969.12	1939.61	8	17	15	25	1.51	NET < CL
19	1460.70	2921.51	519	48	13	14	2.77	

000078

Sample ID : 98-09-192-09 B:09192GS.XLS

Bkg File: DET10.bkg Counting Start. 10-20-98 13:01

ID.: 98-22-006-10 B:GS10BG 10/10/98 Current Date 10-29-98 18:15

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
4	92.99	0.09	3	40	-13	40	NET < CL
5	238.66	0.87	200	40	191	40	
7	295.19	1.15	49	29	45	29	
10	352.06	0.91	113	30	109	30	
11	511.13	3.38	75	25	25	26	
12	583.02	1.38	71	24	67	24	
13	609.48	1.49	70	25	63	26	
17	911.16	1.52	45	21	43	21	
18	969.12	1.51	8	17	6	17	NET < CL
19	1460.70	2.77	519	48	510	48	

GDR/PC

Paragon Analytics, Inc. Fort Collins, CO

Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-09 B:09192GS.XLS

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Sample Size . . . . . (1.00e+000 Sample
Sampling Start. . . . . 09-23-98 12:00 | Spectrum File . . . \gdr\spc\20000544.SPC
Sampling Stop . . . . . 09-23-98 12:00 | Counting Start. . . . . 10-20-98 13:01
Current Date. . . . . 10-29-98 18:15 | Buildup Time. . . . . 0.00e+000 Hrs
Decay Time. . . . . 6.49e+002 Hrs
-----
Efficiency File. . . . . DET1013.EFF | Library File. . . . . LANLINT.LIB
ID. . . . . 500gSAND#485.1572.24 | ID. . . . . LANL Gamma library 07/25/96
-----
Eff.= 1/[1.17e-003*En^-4.30e+000 + 1.40e+002*En^7.25e-001] / 10-17-98 11:25
-----
Gamma Fraction Limit >= . . . 75.00 % | Decay Limit <= . . . 8.000 Halflives
Library Energy Tolerance. . . 2.00
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FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Ra-226	186.21	6.86e+002 +-8.65e+002	1.40e+007	1 of 1
Pb-212	238.63	7.27e+002 +-1.53e+002	1.23e+014	1 of 2
Pb-214	Average:	4.54e+002 +-1.47e+002	1.40e+007	3 of 3
	241.98	4.50e+002 +-6.43e+002		
	295.21	4.53e+002 +-2.92e+002		
	351.92	4.55e+002 +-1.76e+002		
Bi-211	351.07	5.43e+002 +-5.05e+002	2.87e+008	1 of 1
Ann-Rad	511.00	7.02e+001 +-7.29e+001	8.76e+013	1 of 1
Tl-208	583.14	2.57e+002 +-9.16e+001	1.23e+014	1 of 3
Cs-137	661.65	4.08e+001 +-5.03e+001	2.64e+005	1 of 1
K-40	1460.80	2.94e+004 +-2.75e+003	1.12e+013	1 of 1
Am-241	59.54	6.55e+001 +-3.42e+002	3.79e+006	NET
Np-237	86.50	-2.14e+002 +-3.17e+002	1.87e+010	NET
Cd-109	88.03	3.01e+002 +-1.11e+003	1.11e+004	NET
Th-234	92.38	-4.22e+002 +-1.41e+003	3.91e+013	NET
Co-57	122.06	-1.69e+001 +-2.24e+001	6.50e+003	NET
Ce-144	133.54	1.94e+001 +-1.94e+002	6.82e+003	NET
Ce-139	165.85	-1.70e+001 +-3.00e+001	3.30e+003	NET
U-235	185.72	7.08e+000 +-5.17e+001	6.17e+012	NET
Th-227	236.00	-7.22e+001 +-2.39e+002	2.87e+008	NET
Ra-224	240.98	5.29e+002 +-0.00e+000	1.23e+014	NET
Se-75	264.65	-1.64e+001 +-5.27e+001	2.87e+003	NET
Hg-203	279.19	6.52e+000 +-4.95e+001	1.12e+003	NET
Pa-231	300.08	9.94e+002 +-1.21e+003	2.87e+008	NET
Pa-233	311.98	1.15e+001 +-6.21e+001	1.87e+010	NET
Ra-223	323.87	7.50e+001 +-6.51e+002	2.87e+008	NET
Eu-152	344.27	-1.09e+001 +-9.58e+001	1.19e+005	NET
Sn-113	391.69	4.78e+000 +-4.86e+001	2.76e+003	NET
Rn-219	401.81	4.96e+001 +-4.76e+002	2.87e+008	NET
Pb-211	404.84	-1.38e+001 +-1.10e+003	2.87e+008	NET
Sr-85	513.99	-8.85e+001 +-5.98e+001	1.56e+003	NET

000080

Ba-140	537.32	2.15e+002	+-5.06e+002	3.07e+002	NET
Cs-134	604.70	-1.08e+001	+-3.86e+001	1.81e+004	NET
Bi-214	609.31	4.76e+002	+-1.48e+002	1.40e+007	NET
Ru-106	621.84	-1.84e+002	+-3.24e+002	8.84e+003	NET
Mn-54	834.83	1.31e+001	+-4.53e+001	7.50e+003	NET
Y-88	898.02	-5.52e+000	+-4.67e+001	2.56e+003	NET
Ac-228	911.07	5.28e+002	+-2.65e+002	1.23e+014	NET
Pa-234m	1001.00	-2.64e+002	+-9.36e+003	3.91e+013	NET
Zn-65	1115.50	1.97e+001	+-1.27e+002	5.87e+003	NET
Co-60	1173.22	-2.20e+001	+-6.13e+001	4.62e+004	NET
Na-22	1274.50	-1.39e+001	+-5.69e+001	2.28e+004	NET
La-140	1596.50	-3.53e+003	+-4.63e+004	4.02e+001	NET
Bi-212	1620.60	2.45e+002	+-1.43e+003	1.23e+014	NET

TOTAL: 3.22e+004 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
74.85	151.39	38	33	26	117	0.74	2.166e+000
77.20	156.09	45	35	28	120	0.77	2.338e+000
338.52	678.90	37	27	22	59	1.39	1.299e+000
609.48	1220.77	63	26	17	36	1.49	3.429e+000
785.49	1572.61	12	15	12	17	4.61	8.068e-001
911.16	1823.78	43	21	15	21	1.52	3.157e+000

000081

Sample ID : 98-09-192-S1 B:09192GS.XLS

Sample Size / 1.00e+000 Sample	Spectrum File GDR10.SPC
Sampling Start. . . / .07-01-97 10:00	Counting Start. 10-20-98 13:46
Sampling Stop . . . / .07-01-97 10:00	Live Time : 1800 Sec
Current Date. 10-20-98 15:01	Real Time : 1848 Sec

Detector #: 10

Energy(keV) = -0.80 + 0.500*Ch + 1.97e-007*Ch^2 + 0.00e+000*Ch^3 10-20-98 11:40

FWHM(keV) = 0.66 + 0.009*En + 7.42e-004*En^2 + 0.00e+000*En^3 11-15-97 17:40

Where En = Sqrt(Energy in keV)

Sensitivity / 0.20	Search Start / End. 60 / 4000
Sigma Multiplier. / 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.56	120.81	9490	303	199	6222	0.81	
2	88.08	177.87	27764	400	192	5406	0.82	
3	122.05	245.85	12903	289	153	3674	0.88	
4	136.46	274.69	1632	180	137	2977	0.93	
5	165.87	333.51	6225	231	148	3045	1.11	
6	391.68	785.23	3199	187	137	2082	1.20	
7	661.71	1325.19	24218	336	118	1397	1.57	
8	898.04	1797.58	3270	171	119	1428	1.84	
9	1173.30	2347.55	24101	326	96	787	2.21	
10	1332.54	2665.62	22069	304	64	325	2.39	
11	1836.05	3670.78	1919	94	34	74	3.42	

000082

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-S1 B:09192GS.XLS

Bkg File:	DET10.bkg	Counting Start.	10-20-98 13:46
ID.: 98-22-006-10 B:GS10BG 10/10/98		Current Date	10-20-98 15:01

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
8	898.04	1.84	3270	171	3267	171	

=====

GDR/PC

Paragon Analytics, Inc. Fort Collins, CO

Ver. 6.02a

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-S1 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File	GDR10.SPC
Sampling Start . . . . .	.07-01-97 10:00		Counting Start	10-20-98 13:46
Sampling Stop . . . . .	.07-01-97 10:00		Buildup Time	0.00e+000 Hrs
Current Date . . . . .	.10-20-98 15:01		Decay Time	1.14e+004 Hrs
Efficiency File	DET1013.EFF		Library File	ANALYTIC.LIB
ID . . . . .	.500gSAND#485.1572.24		ID . . . . .	.PAI LCS Library Rev. MG 12/8/97
Eff.= 1/[1.17e-003*En^-4.30e+000 + 1.40e+002*En^7.25e-001]			10-17-98 11:25	
Gamma Fraction Limit >= . . . 75.00 %			Decay Limit <= . . . 8.000 Halflives	
Library Energy Tolerance . . . 2.00				

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +/- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Am-241	59.54	2.07e+005 +/-6.62e+003	3.79e+006	1 of 1
Cd-109	88.03	3.26e+006 +/-4.70e+004	1.11e+004	1 of 1
Co-57	Average:	6.87e+004 +/-1.51e+003	6.50e+003	2 of 2
	122.06	6.87e+004 +/-1.54e+003		
	136.48	6.80e+004 +/-7.50e+003		
Ce-139	165.85	1.16e+005 +/-4.29e+003	3.30e+003	1 of 1
Sn-113	391.69	2.06e+005 +/-1.20e+004	2.76e+003	1 of 1
Cs-137	661.65	1.02e+005 +/-1.41e+003	2.64e+005	1 of 1
Y-88	Average:	3.20e+005 +/-1.15e+004	2.56e+003	2 of 2
	898.02	3.34e+005 +/-1.75e+004		
	1836.01	3.10e+005 +/-1.52e+004		
Co-60	Average:	1.51e+005 +/-1.45e+003	4.62e+004	2 of 2
	1173.22	1.50e+005 +/-2.03e+003		
	1332.49	1.51e+005 +/-2.08e+003		
TOTAL:		4.43e+006 DPM/Sample		

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
None							

000084

Sample ID : 98-09-192-B1 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File . . .	\gdr\spc\10001267.SPC
Sampling Start . . . . .	.10-06-98 12:00		Counting Start	10-20-98 15:23
Sampling Stop . . . . .	.10-06-98 12:00		Live Time	1800 Sec
Current Date . . . . .	.10-26-98 16:40		Real Time	1808 Sec

Detector #: 1

Energy(keV) = -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 0.95 + 0.021*En + 4.19e-004*En^2 + 0.00e+000*En^3 10-08-98 11:48

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End	60 / 4000
Sigma Multiplier	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	92.54	186.80	53	29	23	65	1.79	
2	139.74	281.01	13	36	34	99	0.49	NET < CL
3	186.11	373.54	27	32	27	89	1.26	
4	511.23	1022.40	161	31	17	28	2.84	
5	583.39	1166.42	2	20	19	38	0.13	NET < CL
6	1460.98	2917.88	47	19	14	12	2.16	
7	1546.84	3089.25	3	9	8	5	0.94	NET < CL

000085

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-B1 B:09192GS.XLS

Bkg File:	DET01.bkg	Counting Start.	10-20-98 15:23
ID.: 98-22-006-01 B:GS01BG 10/10/98		Current Date	10-26-98 16:40

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	92.54	1.79	53	29	10	30	NET < CL
2	139.74	0.49	13	36	-3	37	NET < CL
3	186.11	1.26	27	32	-10	33	NET < CL
4	511.23	2.84	161	31	20	32	
5	583.39	0.13	2	20	-13	21	NET < CL
6	1460.98	2.16	47	19	-3	20	NET < CL

000086

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-B1 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File . . .	\gdr\spc\10001267.SPC
Sampling Start. . . . .	.10-06-98 12:00		Counting Start.	10-20-98 15:23
Sampling Stop . . . . .	.10-06-98 12:00		Buildup Time.	0.00e+000 Hrs
Current Date. . . . .	.10-26-98 16:40		Decay Time.	3.39e+002 Hrs

Efficiency File. . . . .	.DET0113.EFF	Library File. . . . .	.LANLDL.LIB
ID. . . . .	.500gSoil 485.1572.24	ID. . . . .	.LANL DL Lib. 7/25/96 RTS

Eff.= 1/[5.69e-003*En^-3.26e+000 + 6.02e+001*En^5.76e-001] 10-08-98 11:48

Gamma Fraction Limit >=101.00 %	Decay Limit <=	8.000 Halflives
Library Energy Tolerance. . . .	2.00		

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FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Am-241	59.54	< 8.80e+001	3.79e+006	LTL
Np-237	86.50	< 1.18e+002	1.87e+010	LTL
Cd-109	88.03	< 5.83e+002	1.11e+004	LTL
Th-234	92.38	< 6.58e+002	3.91e+013	LTL
Co-57	122.06	< 1.33e+001	6.50e+003	LTL
Ce-144	133.54	< 2.20e+002	6.82e+003	LTL
Ce-139	165.85	< 1.47e+001	3.30e+003	LTL
U-235	185.72	< 2.85e+001	6.17e+012	LTL
Ra-226	186.21	< 5.31e+002	1.40e+007	LTL
Th-227	236.00	< 1.18e+002	2.87e+008	LTL
Pb-212	238.63	< 4.11e+001	1.23e+014	LTL
Ra-224	240.98	< 3.46e+002	1.23e+014	LTL
Se-75	264.65	< 2.23e+001	2.87e+003	LTL
Hg-203	279.19	< 4.13e+001	1.12e+003	LTL
Pa-231	300.08	< 6.24e+002	2.87e+008	LTL
Pa-233	311.98	< 6.07e+001	1.87e+010	LTL
Ra-223	323.87	< 3.29e+002	2.87e+008	LTL
Eu-152	344.27	< 5.73e+001	1.19e+005	LTL
Bi-211	351.07	< 1.43e+002	2.87e+008	LTL
Pb-214	351.92	< 4.57e+001	1.40e+007	LTL
Sn-113	391.69	< 2.96e+001	2.76e+003	LTL
Rn-219	401.81	< 4.69e+002	2.87e+008	LTL
Pb-211	404.84	< 5.38e+002	2.87e+008	LTL
Ann-Rad	511.00	< 3.34e+001	8.76e+013	LTL
Sr-85	513.99	< 3.63e+001	1.56e+003	LTL
Ba-140	537.32	< 1.35e+002	3.07e+002	LTL
Tl-208	583.14	< 2.43e+001	1.23e+014	LTL
Cs-134	604.70	< 2.32e+001	1.81e+004	LTL
Bi-214	609.31	< 5.77e+001	1.40e+007	LTL
Ru-106	621.84	< 3.60e+002	8.84e+003	LTL
Cs-137	661.65	< 1.79e+001	2.64e+005	LTL

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Mn-54	834.83	< 2.31e+001			
Y-88	898.02	< 2.64e+001	7.50e+003	LTL	
Ac-228	911.07	< 7.16e+001	2.56e+003	LTL	
Pa-234m	1001.00	< 3.70e+003	1.23e+014	LTL	
Zn-65	1115.50	< 3.87e+001	3.91e+013	LTL	
Co-60	1173.22	< 3.63e+001	5.87e+003	LTL	
Na-22	1274.50	< 2.33e+001	4.62e+004	LTL	
K-40	1460.80	< 3.20e+002	2.28e+004	LTL	
La-140	1596.50	< 9.09e+003	1.12e+013	LTL	
Bi-212	1620.60	< 4.42e+002	4.02e+001	LTL	
			1.23e+014	LTL	

TOTAL: 0.00e+000 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
511.23	1022.40	20	32	17	28	2.84	4.554e-001

000088

Sample ID : 98-09-192-B1 B:09192GS.XLS

Sample Size	1.00e+000	Sample	Spectrum File	GDR01.SPC
Sampling Start . . . . .	.10-06-98 12:00		Counting Start	10-20-98 15:23
Sampling Stop . . . . .	.10-06-98 12:00		Live Time	1800 Sec
Current Date . . . . .	.10-20-98 15:51		Real Time	1808 Sec

Detector #: 1

Energy(keV) = -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-20-98 12:26

FWHM(keV) = 0.95 + 0.021*En + 4.19e-004*En^2 + 0.00e+000*En^3 10-08-98 11:48

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End	60 / 4000
Sigma Multiplier	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	92.54	186.80	53	29	23	65	1.79	
2	139.74	281.01	13	36	34	99	0.49	NET < CL
3	186.11	373.54	27	32	27	89	1.26	
4	511.22	1022.40	161	31	17	28	2.84	
5	583.39	1166.42	2	20	19	38	0.13	NET < CL
6	1460.97	2917.88	47	19	14	12	2.16	
7	1546.83	3089.25	3	9	8	5	0.94	NET < CL

000083

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GDR/PC Paragon Analytics, Inc. Fort Collins, CO Ver. 6.02a

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-09-192-B1 B:09192GS.XLS

Bkg File: DET01.bkg Counting Start. 10-20-98 15:23

ID.: 98-22-006-01 B:GS01BG 10/10/98 Current Date 10-20-98 15:51

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	92.54	1.79	53	29	10	30	NET < CL
2	139.74	0.49	13	36	-3	37	NET < CL
3	186.11	1.26	27	32	-10	33	NET < CL
4	511.22	2.84	161	31	20	32	
5	583.39	0.13	2	20	-13	21	NET < CL
6	1460.97	2.16	47	19	-3	20	NET < CL

000090

NUCLIDE ACTIVITY SUMMARY

Sample ID: 98-09-192-B1 B:09192GS.XLS

Sample Size 1.00e+000	Sample	Spectrum File GDR01.SPC
Sampling Start 10-06-98 12:00		Counting Start 10-20-98 15:23
Sampling Stop 10-06-98 12:00		Buildup Time 0.00e+000 Hrs
Current Date 10-20-98 15:51		Decay Time 3.39e+002 Hrs

Efficiency File DET0113.EFF	Library File LANLINT.LIB
ID 500gSoil 485.1572.24	ID LANL Gamma library 07/25/96

Eff. = 1/[5.69e-003*En^-3.26e+000 + 6.02e+001*En^5.76e-001] 10-08-98 11:48

Gamma Fraction Limit >= . . . 75.00 %	Decay Limit <= . . . 8.000 Halflives
Library Energy Tolerance . . . 2.00	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 2.00sigma (DPM/Sample)	Halflife (hrs)	Peaks Found
Ce-144	133.54	1.21e+002 +-1.20e+002	6.82e+003	
Ann-Rad	511.00	2.70e+001 +-4.39e+001	8.76e+013	1 of 1
Am-241	59.54	2.12e+000 +-1.04e+002	3.79e+006	1 of 1
Np-237	86.50	-8.87e+001 +-1.44e+002	1.87e+010	NET
Cd-109	88.03	1.82e+002 +-4.87e+002	1.11e+004	NET
Th-234	92.38	-3.50e+001 +-8.00e+002	3.91e+013	NET
Co-57	122.06	-2.52e+000 +-1.62e+001	6.50e+003	NET
Ce-139	165.85	-2.26e+001 +-1.78e+001	3.30e+003	NET
U-235	185.72	-1.07e+001 +-3.46e+001	6.17e+012	NET
Ra-226	186.21	5.91e+001 +-5.74e+002	1.40e+007	NET
Th-227	236.00	-1.04e+002 +-1.43e+002	2.87e+008	NET
Pb-212	238.63	4.77e+000 +-4.42e+001	1.23e+014	NET
Ra-224	240.98	-2.52e+002 +-4.21e+002	1.23e+014	NET
Se-75	264.65	-6.89e+000 +-2.71e+001	2.87e+003	NET
Hg-203	279.19	1.87e+001 +-2.75e+001	1.12e+003	NET
Pa-231	300.08	2.20e+002 +-7.43e+002	2.87e+008	NET
Pa-233	311.98	2.46e+001 +-4.39e+001	1.87e+010	NET
Ra-223	323.87	-1.63e+002 +-4.00e+002	2.87e+008	NET
Eu-152	344.27	-2.89e+001 +-6.97e+001	1.19e+005	NET
Bi-211	351.07	1.71e+001 +-1.54e+002	2.87e+008	NET
Pb-214	351.92	-2.97e+000 +-5.55e+001	1.40e+007	NET
Sn-113	391.69	4.31e+000 +-3.08e+001	2.76e+003	NET
Rn-219	401.81	2.20e+002 +-3.02e+002	2.87e+008	NET
Pb-211	404.84	6.56e+000 +-6.46e+002	2.87e+008	NET
Sr-85	513.99	-5.75e+000 +-4.42e+001	1.56e+003	NET
Ba-140	537.32	-2.62e+001 +-1.64e+002	3.07e+002	NET
Tl-208	583.14	-9.37e+000 +-2.95e+001	1.23e+014	NET
Cs-134	604.70	-1.08e+001 +-2.82e+001	1.81e+004	NET
Bi-214	609.31	-2.28e+001 +-7.01e+001	1.40e+007	NET
Ru-106	621.84	1.52e+002 +-2.53e+002	8.84e+003	NET
Cs-137	661.65	-1.64e+001 +-2.18e+001	2.64e+005	NET

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Mn-54	834.83	1.87e+000	+-2.58e+001	7.50e+003	NET
Y-88	898.02	-1.11e+001	+-3.21e+001	2.56e+003	NET
Ac-228	911.07	-3.25e+001	+-8.70e+001	1.23e+014	NET
Pa-234m	1001.00	4.53e+002	+-3.95e+003	3.91e+013	NET
Zn-65	1115.50	-1.02e+001	+-4.71e+001	5.87e+003	NET
Co-60	1173.22	1.26e+001	+-2.88e+001	4.62e+004	NET
Na-22	1274.50	7.00e+000	+-1.98e+001	2.28e+004	NET
K-40	1460.80	-1.29e+002	+-3.89e+002	1.12e+013	NET
La-140	1596.50	3.51e+003	+-6.79e+003	4.02e+001	NET
Bi-212	1620.60	-1.30e+002	+-5.38e+002	1.23e+014	NET

TOTAL: 1.48e+002 DPM/Sample

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un- Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
None							

000092

Paragon Analytics Inc.
Gamma Spectrometer Run Log

Date: 10/14/98

Reviewed By 167445

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
98-09-242-13	JH	1	13	15min	8:10	JH	U238 lib / 10001212.spc
-14		2					10001213
-15		3					10001214
-D1		4					10001215
-D2		9					20000518.spc
✓ -S1	✓	10	✓	✓	✓	✓	ANALYTIC / 20000519
98-09-130-D2	JH	1	13	30min	9:00	JH	LANL int / 10001217.spc
98-09-128-B1	JH	2	10				10001218
-01		3					10001219
-02		4					10001220
-03		9					20000520.spc
✓ -04	✓	10	✓	✓	✓	✓	20000521
98-09-128-S1	JH	2	10	30min	11:00	JH	ANALYTIC / 10001221.spc
98-09-119-B1		3	1	45min		JH	Litconet / 10001222
-01		4					10001223
-D1		9					20000522
✓ -S1	✓	10	✓	✓	✓	✓	ANALYTIC / 20000523
9822003-01 Gross Gamma 98-21-999	JH	1	10	30min		JH	Gross Gamma / 62200301.MS 19-98
9809151-B1	RG	1	13	30min	2:00	JH	LANL int / 10001224.spc
✓ -02		2					10001225
9809153-02		3					10001226
9809153-02	✓	4					10001227
-03	RG	9					20000524
✓ -04	✓	10	✓	✓	✓	✓	20000525
9809137-C9	MB	7	FeSS	4000 (Pw) cts	1418	MB	FeSS chkl 9816012-05 / 60913709
↓ Cp	↓	8	↓	↓	↓	↓	↓ ↓ ↓ ↓
9809137-1A D6100	RG	7	FeSS	7200s	1535	MB	FeSS / F09137D6
↓ -1A	↓	8	↓	↓	↓	↓	F091371A
9809137-3A	RG	7	FeSS	120min	1800	RG	FeSS / F091373A
9809137-DA(03)	↓	8	↓	↓	↓	↓	↓ / F09137DA(03)
9809137-4A	MB	7	FeSS	120min	2051	RG	FeSS / F091374A
✓ -6A	↓	8	↓	↓	2051	↓	↓ / F091376A

000093
Cm't on page 167446

Reviewed By: 167446

RG 10114198

Paragon Analytics Inc.
Gamma Spectrometer Run Log

170402

Date: 10/20/98

Reviewed By: RG 10/21/98

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
98-09-192-02	JH	1	13	30min	1345	JH	Lanlint.lib/10001259.spc
-04		2					/10001260
-06		3					/10001261
-07		4					/10001262
-08		9					/20000543.spc
✓ -09	✓	10	✓	✓	✓	✓	✓20000544
98-09-192-05	JH	1	13	30min	1430	JH	Lanlint.lib/10001263.spc
98-09-196-01		2					/10001264
✓ -02		3					/10001265
98-09-192-D1		4					/10001266
✓ -D2		9					✓20000545.spc
✓ -S1	✓	10	✓	✓	✓	✓	✓ANALYTIC / 20000546
98-09-192-B1	JH	1	13	30min	1530	JH	Lanlint.lib/10001267.spc
98-09-154-B1		2	10				FANP / 10001268
-01		3					/10001269
-02		4					✓10001270
✓ -S1		9	✓				ANALYTIC / 20000547
98-09-178-B1	✓	10	13	✓	✓	✓	Lanlint.lib/20000548
98-09-154-D1	JH	1	10	30min	1630	JH	FANP / 10001271.spc
98-09-178-01	JH	2	13				Lanlint.lib/10001272
✓ -02		3					/10001273
98-09-189-01		4					/10001274
-02		9					✓20000549
✓ -03	✓	10	✓	✓	✓	✓	✓20000550
98-09-189-04	JH	1	13	30min	1720	JH	Lanlint.lib/10001275.spc
-05	✓	2					/10001276
-06	JH	3					/10001277
✓ -07	✓	4					/10001278
98-09-178-D1	JH	9					✓20000551.spc
✓ -S1	✓	10	✓	✓	✓	✓	ANALYTIC / 20000552
98-09-180-B1	JH	1	10	30min	1825	JH	Lanlint / 10001279.spc
✓ -01	✓	2	✓	✓	✓	✓	✓/10001280

Continued on page 170403

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Continued from page
170402

Paragon Analytics Inc. 170403

Gamma Spectrometer Run Log

Date: 10/20/98

Reviewed By: BG 10/21/98

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
98-09-180 -D1	JH	3	10	30min	1825	JH	Lanlint / 10001281 spc
↓ -02	↓	4	↓	↓	↓	↓	↓ / 10001282
↓ -03	↓	9	↓	↓	↓	↓	↓ / 20000553
↓ -04	↓	10	↓	↓	↓	↓	↓ / 20000554
BG 10-21-98							

000096

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 5

**QUALITY ASSURANCE
SUMMARY REPORTS**

5

000097

No *NON-CONFORMANCE REPORTS* or
QUALITY ASSURANCE SUMMARY SHEETS
are included in this data package.

000098

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 6

**LABORATORY
BENCH SHEETS**

6

000099

Gamma Spectroscopy Analysis Benchsheet

Batch ID: 09192GS.XLS
 Analyst: PSB
 Prep. Date: 10-06-98

Analytical Balance No.: NA
 Top Load Balance No.: 15

Spreadsheet Unprotected:

OASS/NCR:

Y / N ID #

Pretreatment

Y / N Batch:

Work Order Number	Client Sample ID	Collection Date	Aliquot			% Moist.	Report		Remarks	Det. No.	Geo. No.	Count Dur	Count Date
			Size	Units	Basis		Size	Units					
1 98-09-192 B1	BLANK	10-06-98	403.6	g	D	N/A	403.6	g	D	13	13	30	10/14/98
2 98-09-192 1	see WO	see WO	436.5	g	D	N/A	436.5	g	D	13	13	30	10/14/98
3 98-09-192 2	see WO	see WO	368.9	g	D	N/A	368.9	g	D	13	13	30	10/14/98
4 98-09-192 3	see WO	see WO	381.2	g	D	N/A	381.2	g	D	13	13	30	10/20/98
5 98-09-192 4	see WO	see WO	405.5	g	D	N/A	405.5	g	D	13	13	30	10/14/98
6 98-09-192 5	see WO	see WO	403.3	g	D	N/A	403.3	g	D	13	13	30	10/20/98
7 98-09-192 6	see WO	see WO	393.8	g	D	N/A	393.8	g	D	13	13	30	10/20/98
8 98-09-192 7	see WO	see WO	434.3	g	D	N/A	434.3	g	D	13	13	30	10/20/98
9 98-09-192 8	see WO	see WO	403.6	g	D	N/A	403.6	g	D	13	13	30	10/20/98
10 98-09-192 9	see WO	see WO	414.5	g	D	N/A	414.5	g	D	13	13	30	10/20/98
11 98-09-196 1	see WO	see WO	389.5	g	D	N/A	389.5	g	D	13	13	30	10/20/98
12 98-09-196 2	see WO	see WO	408.6	g	D	N/A	408.6	g	D	13	13	30	10/20/98
13 98-09-192 D1 Dup of 01							436.5	g					
14 98-09-192 D2 Dup of 03							381.2	g					
15 98-09-192 S1 LSS 402.1284.57							500	g					

Relinquished by: PSB
 date: 10-06-98

Received by: PH
 date: 10-06-98

000100

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 7

**STANDARDS
TRACEABILITY
DOCUMENTS**

7

000101

A mixed gamma standard ~~was~~ for geometry 13 was prepared.

500g clean silica sand was transferred to each of two 0.5 L wide mouth polypropylene (Lerner) jars.

One was sealed for use as a calibration blank (if needed) (Blank was labeled Geo 13 Blank). (i.e. jar).

To the second was added Analytical Standard mixed gamma solution PAI # 462-1284.53 as follows:

Vial Start 28.4821g
Vial end 26.3220g

Jar tare 60.2g
Jar + sand 560.2
Jar + Sand + std 562.3

transferred 2.1601g

The solution was distributed over the top surface of the sand and allowed to dry. transferred ~ 2.1

GEO_13.XLS

Preparation of mixed gamma calibration standard for Geo 13 (500g sand in 500mL Lerner jar)

ID #: 462.1284.57
Cal. Date: 7/1/97 10:00
Expires: 10/2/97 0:00

Prep. Date: 10/2/97
Prep. by: RTS

2.1601 grams of PAI #462.1284.53 was added to 500g of quartz sand in a 500mL Lerner jar.
The standard was allowed to dry then homogenized by tumbling.
Dilution factor from original standard #462 = $2.1601 / 10.6363 = 0.2031$

Preparation of PAI #462.1284.53:

Analytical Std. 54624-307 (PAI #462) was transferred to a VOA vial:

Grams in std (from certificate): 10.63625

Vial tare: 18.9321 grams
Vial + std.: 29.5026 grams

Ampoule full: 16.3238 grams
Ampoule final: 5.7326 grams

Transferred: 10.5705 grams
-10.5912 grams

Final composition:

Nuclide	Line	TOC	T-1/2 (d)	standard gamma/sec	dilution factor	decay fraction	current g/s added	gamma abundance	Bq added	pCi added	final concentration (pCi/g)
Am-241	59.5	7/1/97 10:00	157861.1	6667	0.20309	1	1354.0	0.359	3772	101934	203.87
Cd-109	88.0	7/1/97 10:00	464	9499	0.20309	1	1929.1	0.0372	51859	1401582	2803.16
Co-57	122.1	7/1/97 10:00	270.9	5172	0.20309	1	1050.4	0.8551	1228	33199	66.40
Ce-139	165.9	7/1/97 10:00	137.66	7733	0.20309	1	1570.5	0.8035	1955	52826	105.85
Hg-203	279.2	7/1/97 10:00	46.6	14910	0.20309	1	3028.0	0.773	3917	105872	211.74
Sn-113	391.7	7/1/97 10:00	115.1	10320	0.20309	1	2095.9	0.649	3229	87281	174.58
Cs-137	661.7	7/1/97 10:00	11019.59	6736	0.20309	1	1368.0	0.8512	1607	43436	86.87
Y-88	898.1	7/1/97 10:00	106.60	25760	0.20309	1	5231.6	0.934	5601	151385	302.77
Co-60	1173.2	7/1/97 10:00	1925.233	12570	0.20309	1	2552.8	1	2553	68995	137.99
Co-60	1332.5	7/1/97 10:00	1925.233	12640	0.20309	1	2567.0	1	2587	69379	138.76
Y-88	1838.1	7/1/97 10:00	106.60	27120	0.20309	1	5507.8	0.9938	5542	149787	299.57

Continued on Page

Read and Understood By

Signed

Date

Signed

Date

000102


PROJECT 462.1284.53 Mixed Gamma Stock Soln

Notebook No. 001284
Continued From Page

8/15/97 Analytics solution 54624-307 was transferred to a 40 ml VOA vial as follows:

vial tare 18.9321 g
vial + stud. 29.5026 g
mass transferred + 10.5705 g

ampoule full 16.3238 g
ampoule final 5.7326 g
Mass transferred - 10.5912

 1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318
Phone 404 352-8677
Type Am-241 SRS 54624-307
Amount 10.218 µCi Expires -----
Date 7/1/97 12:00 EST QA [signature]
PO# 20789, Item 1
10.63625 grams solution in HCl

 CAUTION:
RADIOACTIVE MATERIAL

	Start	Finish	transferred	By
8/15/97 aliquots removed	29.5026 g	28.3534 g	1.1492 g	TR
8/15/97 label applied	28.3534 g	28.4835 g	0.1301 g	TR
8/10/97 Start	28.4821 g			
10/2/97 462.1284.57	28.4821 g			

Continued on Page

10/14/97 signed _____ Date 8/15/97
Read and Understood By _____
Signed _____ 000103 Date _____

Preparation of mixed gamma calibration standard for Geo 13 (500g sand in 500mL Lerner jar)

ID #: 462.1284.57

Cal. Date: 7/1/97 10:00

Expires: 10/2/97 0:00

Prep. Date: 10/2/97

Prep. by: RTS

2.1601 grams of PAI #462.1284.53 was added to 500g of quartz sand in a 500ml Lerner jar
The standard was allowed to dry then homogenized by tumbling.
Dilution factor from original standard #462 = $2.1601 / 10.6363 = 0.2031$

Preparation of PAI #462.1284.53:

Analytics Std. 54624-307 (PAI #462) was transferred to a VOA vial:

Grams in std (from certificate): 10.63625

Vial tare: 18.9321 grams
Vial + std.: 29.5026 grams
Ampoule full: 16.3238 grams
Ampoule final: 5.7326 grams

Transferred: 10.5705 grams
-10.5912 grams

Final composition:

Nuclide	Line	TOC	T-1/2 (d)	standard gamma/sec	dilution factor	decay fraction	current g/s added	gamma abundance	Bq added	pCi added	final concentration (pCi/g)
Am-241		59.5	7/1/97 10:00	157861.1	6667	0.20309	1	1354.0	3772	101934	203.87
Cd-109		88.0	7/1/97 10:00	464	9499	0.20309	1	1929.1	51859	1401582	2803.16
Co-57		122.1	7/1/97 10:00	270.9	5172	0.20309	1	1050.4	1228	33199	66.40
Ce-139		165.9	7/1/97 10:00	137.66	7733	0.20309	1	1570.5	1955	52826	105.65
Hg-203		279.2	7/1/97 10:00	46.6	14910	0.20309	1	3028.0	3917	105872	211.74
Sn-113		391.7	7/1/97 10:00	115.1	10320	0.20309	1	2095.9	3229	87281	174.56
Cs-137		661.7	7/1/97 10:00	11019.59	6736	0.20309	1	1368.0	1607	43436	86.87
Y-88		898.1	7/1/97 10:00	106.60	25760	0.20309	1	5231.6	5601	151385	302.77
Co-60		1173.2	7/1/97 10:00	1925.233	12570	0.20309	1	2552.8	1	2553	137.99
Co-60		1332.5	7/1/97 10:00	1925.233	12640	0.20309	1	2567.0	1	2567	138.76
Y-88		1836.1	7/1/97 10:00	106.60	27120	0.20309	1	5507.8	5542	149787	299.57

000104

Standards File.GDRSTD13.STD | Assay Date 07-01-97 10:00

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

000105

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

000106

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9809192

Client Name: Los Alamos National Laboratory SMO

Client Project Name:

Client Project Number: 4662R

Client PO Number: 7794L0014-9S

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
RE15-98-0029 ✓	9809192-1	4662RC ✓	Soil ✓	9/23/98	✓
RE15-98-0030 ✓	9809192-2	4662RC	Soil	9/23/98	
RE15-98-0031 ✓	9809192-3	4662RC	Soil	9/23/98	
RE15-98-0032 ✓	9809192-4	4662RC	Soil	9/23/98	
RE15-98-0033 ✓	9809192-5	4662RC	Soil	9/23/98	
RE15-98-0034 ✓	9809192-6	4662RC	Soil	9/23/98	
RE15-98-0035 ✓	9809192-7	4662RC	Soil	9/23/98	
RE15-98-0036 ✓	9809192-8	4662RC	Soil	9/23/98	
RE15-98-0037 ✓	9809192-9	4662RC	Soil	9/23/98	

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

Please analyze the enclosed samples
according to the schedule indicated:

SHIP DATE: 9/25/98

REPORT DUE: 10/25/98

TURN AROUND REQ'D: 30 days

RAD SCREENING: Not Required

COMMENTS: 15 - 1086, GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: *Joylene Valdez*

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

9809192

These samples are on:

LANL Request Number: 4662R

Per Agreement Number: 7794L0014-9S

Project Cost Code: MR3R12082642

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
01 GAMMA SPE		RE15-98-0029	01	S	9/23/98	
H3		RE15-98-0029	02	S	9/23/98	
ISOU		RE15-98-0029	04	S	9/23/98	
02 GAMMA SPE		RE15-98-0030	01	S	9/23/98	
H3		RE15-98-0030	02	S	9/23/98	
ISOU		RE15-98-0030	04	S	9/23/98	
03 GAMMA SPE		RE15-98-0031	01	S	9/23/98	
H3		RE15-98-0031	02	S	9/23/98	
ISOU		RE15-98-0031	04	S	9/23/98	
04 GAMMA SPE		RE15-98-0032	01	S	9/23/98	
H3		RE15-98-0032	02	S	9/23/98	
ISOU		RE15-98-0032	04	S	9/23/98	
05 GAMMA SPE		RE15-98-0033	01	S	9/23/98	
H3		RE15-98-0033	02	S	9/23/98	
ISOU		RE15-98-0033	04	S	9/23/98	
06 GAMMA SPE		RE15-98-0034	01	S	9/23/98	
H3		RE15-98-0034	02	S	9/23/98	
ISOU		RE15-98-0034	04	S	9/23/98	
07 GAMMA SPE		RE15-98-0035	01	S	9/23/98	
H3		RE15-98-0035	02	S	9/23/98	
ISOU		RE15-98-0035	04	S	9/23/98	
08 GAMMA SPE		RE15-98-0036	01	S	9/23/98	
H3		RE15-98-0036	02	S	9/23/98	
ISOU		RE15-98-0036	04	S	9/23/98	

000108

Friday, September 25, 1998

9809192

REQUEST NUMBER: 4662R

Page 2

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0037	01	S	9/23/98	
H3		RE15-98-0037	02	S	9/23/98	
ISOU		RE15-98-0037	04	S	9/23/98	

Final Page of REQUEST NUMBER 4662R

Page 2

000109

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry

Paragon/ATI

225 COMMERCE

FT. COLLINS, CO 80524

9809192

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By:

Date Time

SI Hogelberg 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

000110

Friday, September 25, 1998

9809192

COC DOC NUMBER: 4662RC

REQUEST NUMBER: 4662R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE			
RE15-98-0035	04	125 ml Polyethylene	ISOU	None		S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None		S
RE15-98-0036	02	500 ml Polyethylene	H3	None		S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None		S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None		S
RE15-98-0037	02	500 ml Polyethylene	H3	None		S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None		S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4662R

Page 2

Relinquished By:

Date Time

SHagelberg SHag 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

000111

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LAW

SHIPPING CONTAINER #: Client Cooler

WORKORDER NO. 980919Z

INITIALS: JH

DATE: 9/26/97

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature _____ b. Lot No's. _____ c. Airbill Number _____		Yes	<u>No</u>
2.	Are custody seals on the cooler intact? If so, how many	<u>4</u>	N/A	<u>Yes</u>
3.	Are custody seals on sample containers intact?		N/A	<u>Yes</u>
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		<u>Yes</u>	<u>No</u>
5.	Is the COC complete? Relinquished: Yes <u>X</u> No _____ Requested Analysis: Yes <u>X</u> No _____	N/A	<u>Yes</u>	<u>No</u>
6.	Is the COC in agreement with the samples received? No. of Samples: Yes <u>X</u> No _____ Sample ID's: Yes <u>X</u> No _____ Matrix: Yes <u>X</u> No _____ No. of Containers: Yes <u>X</u> No _____		<u>Yes</u>	<u>No</u>
7.	Are the samples requiring chemical preservation preserved correctly?	<u>N/A</u>	<u>Yes</u>	<u>No</u>
8.	Is there enough sample? If so, are they in the proper containers?		<u>Yes</u>	<u>No</u>
9.	Are all samples within holding times for the requested analyses?		<u>Yes</u>	<u>No</u>
10.	Were the sample(s) shipped on ice?		<u>Yes</u>	<u>No</u>
11.	Were all sample containers received intact? (not broken or leaking, etc.)	<u>N/A</u>	<u>Yes</u>	<u>No</u>
12.	Are samples requiring no headspace, headspace free?		<u>Yes</u>	<u>No</u>
13.	Do the samples require quarantine?	<u>N/A</u>	<u>Yes</u>	<u>No</u>
14.	Do samples require Paragon disposal?		<u>Yes</u>	<u>No</u>
15.	Did the client return any unused bottles?		<u>Yes</u>	<u>No</u>

Describe "NO" items (except No's 1, 13, & 14): _____

Was the client contacted? Yes _____ No _____
 If yes, Date: _____ Name of person contacted: _____

Describe actions taken or client instructions: _____

Group Leader's Signature: _____ Date: _____

Cooler Temperature: 60

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 9

**ADDITIONAL
SUPPORTING
DOCUMENTATION**

9

000113

Gamma Spectroscopy

Initial Calibration

Standards Traceability

000114

A mixed gamma standard for Geometry 13 was prepared.

500g clean silica sand was transferred to each of two 0.5 L wide mouth polypropylene (Lerner) jars.

One was sealed for use as a calibration blank (if needed) (Blank was labeled Geo 13 Blank). (11-3 star).

To the second was added Analytix standard mixed gamma solution PAI # 462.1284.53 as follows:

Vial Start 28.4821g
Vial end 26.3220g

transferred 2.1601g

Jar tare 60.2g
Jar + sand 560.2g
Jar + sand + std 562.3g

The solution was distributed over the top surface of the sand and allowed to dry. transferred ~ 2.1

GEO_13.XLS

Preparation of mixed gamma calibration standard for Geo 13 (500g sand in 500mL Lerner jar)

ID #: 462.1284.57
Cal. Date: 7/1/97 10:00
Expires: 10/2/97 0:00

Prep. Date: 10/2/97
Prep. by: RTS

2.1601 grams of PAI #462.1284.53 was added to 500g of quartz sand in a 500mL Lerner jar
The standard was allowed to dry then homogenized by tumbling.
Dilution factor from original standard #462 = $2.1601 / 10.5363 = 0.2031$

Preparation of PAI #462.1284.53:

Analytix Std. #4624-307 (PAI #462) was transferred to a VOA vial:

Grams in std (from certificate): 10.83625

Vial tare: 18.9321 grams
Vial + std.: 29.5026 grams
Transferred: 10.5705 grams

Ampoule full: 18.3236 grams
Ampoule final: 5.7326 grams
-10.5912 grams

Final composition:

Nuclide	Line	TOC	T-1/2 (d)	standard gamma/sec	dilution factor	decay fraction	current g/s added	gamma abundance	Bq added	pCi added	final concentration (pCi/g)
Am-241	59.5	7/1/97 10:00	157881.1	6667	0.20309	1	1354.0	0.359	3772	101934	203.87
Cd-109	88.0	7/1/97 10:00	464	9499	0.20309	1	1929.1	0.0372	51859	1401562	2803.16
Co-57	122.1	7/1/97 10:00	270.9	5172	0.20309	1	1050.4	0.8551	1228	33199	66.40
Co-139	165.9	7/1/97 10:00	137.66	7733	0.20309	1	1570.5	0.8036	1955	52826	105.65
Hg-203	279.2	7/1/97 10:00	46.8	14910	0.20309	1	3028.0	0.773	3917	105872	211.74
Sn-113	391.7	7/1/97 10:00	115.1	10320	0.20309	1	2095.9	0.649	3229	87281	174.56
Cs-137	661.7	7/1/97 10:00	11019.59	6736	0.20309	1	1368.0	0.8512	1607	43436	86.87
Y-86	826.1	7/1/97 10:00	106.60	25760	0.20309	1	8231.6	0.934	8601	151385	302.77
Co-60	1173.2	7/1/97 10:00	1925.233	12570	0.20309	1	2552.8	1	2553	68995	137.99
Co-60	1332.5	7/1/97 10:00	1925.233	12640	0.20309	1	2567.0	1	2567	69379	134.76
Y-88	1836.1	7/1/97 10:00	106.60	27120	0.20309	1	8507.8	0.9938	8542	149787	299.57

Continued on Page

Read and Understood By

Signed

Date

Signed 000115

Date

SUBJECT 462.1284.53 Mixed Gamma Stock Soln

Notebook No. 001281

Continued From Page

7/15/97 Analytics solution 54624-307 was transferred to a 40 ml VOA vial as follows:

Vial tare 18.9321 g
Vial + stud. 29.5026 g

Mass transferred + 10.5705 g

ampoule fill 16.3238 g
ampoule final 5.7326 g

Mass transferred - 10.5912



1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318
Phone 404 352-8677

Type Am-241 SRS-54624-307

Amount 10.218 μ Ci Expires

Date 7/1/97 12:00 EST QA

PO# 20789, Item 1

10.63625 grams solution in HCl



CAUTION:
RADIOACTIVE MATERIAL

aliquots removed

Date	Description	Start	Finish	Transferred	By
9/11/97	462.1284.54	29.5026 g	28.3534 g	1.1492 g	JG
9/15/97	label applied	28.3534 g	28.4835 g	0.1301 g	RB
10/2/97	Start	28.4821 g			
10/2/97	462.1284.57	28.4821 g			

Continued on Page

Read and Understood By

20/4

9/15/97
Date

Signed

000116

Date

Preparation of mixed gamma calibration standard for Geo 13 (500g sand in 500mL Lermer jar)

ID #: 462.1284.57

Cal. Date: 7/1/97 10:00

Expires: 10/2/97 0:00

Prep. Date: 10/2/97

Prep. by: RTS

2.1601 grams of PAI #462.1284.53 was added to 500g of quartz sand in a 500ml Lermer jar
The standard was allowed to dry then homogenized by tumbling.
Dilution factor from original standard #462 = $2.1601 / 10.6363 = 0.2031$

Preparation of PAI #462.1284.53:

Analytics Std. 54624-307 (PAI #462) was transferred to a VOA vial:

Grams in std (from certificate): 10.63625

Vial tare: 18.9321 grams
Vial + std.: 29.5026 grams

Ampoule full: 16.3238 grams
Ampoule final: 5.7326 grams

Transferred: 10.5705 grams

-10.5912 grams

Final composition:

Nuclide	Line	TOC	T-1/2 (d)	standard gamma/sec	dilution factor	decay fraction	current g/s added	gamma abundance	Bq added	pCi added	final concentration (pCi/g)
Am-241		59.5	7/1/97 10:00	157861.1	6667	0.20309	1	1354.0	3772	101934	203.87
Cd-109		88.0	7/1/97 10:00	464	9499	0.20309	1	1929.1	51859	1401582	2803.16
Co-57		122.1	7/1/97 10:00	270.9	5172	0.20309	1	1050.4	1228	33199	66.40
Ce-139		165.9	7/1/97 10:00	137.66	7733	0.20309	1	1570.5	1955	52826	105.65
Hg-203		279.2	7/1/97 10:00	46.6	14910	0.20309	1	3026.0	3917	105872	211.74
Sn-113		391.7	7/1/97 10:00	115.1	10320	0.20309	1	2095.9	3229	87281	174.56
Cs-137		661.7	7/1/97 10:00	11019.59	6736	0.20309	1	1368.0	1607	43436	86.87
Y-88		898.1	7/1/97 10:00	106.60	25760	0.20309	1	5231.6	5601	151385	302.77
Co-60		1173.2	7/1/97 10:00	1925.233	12570	0.20309	1	2552.8	1	2553	137.99
Co-60		1332.5	7/1/97 10:00	1925.233	12640	0.20309	1	2567.0	1	2567	138.76
Y-88		1836.1	7/1/97 10:00	106.60	27120	0.20309	1	5507.8	0.9938	5542	299.57

0001117

Standards File.GDRSTD13.STD | Assay Date 07-01-97 10:00

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

000118

DETECTOR CALIBRATION

=====

Sample ID: 97-22-101-01 CAL0113 CS:PAI #462.1284.57

ML
12/4/97

Stds Match Tolerance(keV) 2.00 Number of Grams 1.00e+000 Current Date. 10-04-97 18:55	Spectrum File . c:\gdr\spc\s2210101.97s Counting Start. 10-04-97 16:05 Decay Time. 2.29e+003 Hrs
---	--

Standards File. GDRSTD13.STD | Assay Date 07-01-97 10:00

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0113.EFF | ID. 500gSoil 462.1284.57

Detector Number 1 | Calibration Date. 10-04-97 16:05

Eff = 1 / [6.60e-003*En^-3.56e+000 + 1.84e+002*En^8.38e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	5.63e-003	5.88e-003	4.14
2	88.03	1.70e-002	1.62e-002	-5.31
3	122.06	2.21e-002	2.31e-002	3.97
4	165.85	2.22e-002	2.23e-002	0.73
5	279.19	1.60e-002	1.57e-002	-2.01
6	391.69	1.24e-002	1.19e-002	-3.83
7	661.66	8.05e-003	7.68e-003	-4.72
8	898.07	5.69e-003	5.95e-003	4.28
9	1173.24	4.80e-003	4.75e-003	-0.96
10	1332.50	4.08e-003	4.27e-003	4.48
11	1836.08	3.16e-003	3.27e-003	3.40

Geometry File DET0113.EFF | ID. 500gSoil 462.1284.57

Detector Number 1 | Calibration Date. 10-04-97 16:05

000119

 Eff = 1 / [4.91e-003*En^-3.66e+000 + 1.84e+002*En^8.30e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	5.63e-003	5.91e-003	4.67
2	88.03	1.70e-002	1.65e-002	-2.99
3	88.03	1.70e-002	1.65e-002	-2.99
4	122.06	2.21e-002	2.33e-002	4.96
5	165.85	2.22e-002	2.23e-002	0.52
6	279.19	1.60e-002	1.56e-002	-2.69
7	391.69	1.24e-002	1.18e-002	-4.40
8	661.66	8.05e-003	7.67e-003	-4.87
9	898.07	5.69e-003	5.95e-003	4.38
10	1173.24	4.80e-003	4.77e-003	-0.63
11	1332.50	4.08e-003	4.29e-003	4.88
12	1836.08	3.16e-003	3.29e-003	4.06

Effic. coefficients stored on DET0113.EFF.

000120

Sample ID : 97-22-101-01 CAL0113 CS:PAI #462.1284.57

Sample Size 5.00e+002 Gram	Spectrum File . c:\gdr\spc\s2210101.97s
Sampling Start. 07-01-97 10:00	Counting Start. 10-04-97 16:05
Sampling Stop 07-01-97 10:00	Live Time 1800 Sec
Current Date. 10-04-97 18:54	Real Time 1911 Sec

Energy(keV) = -0.85 + 0.502*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-04-97 14:13

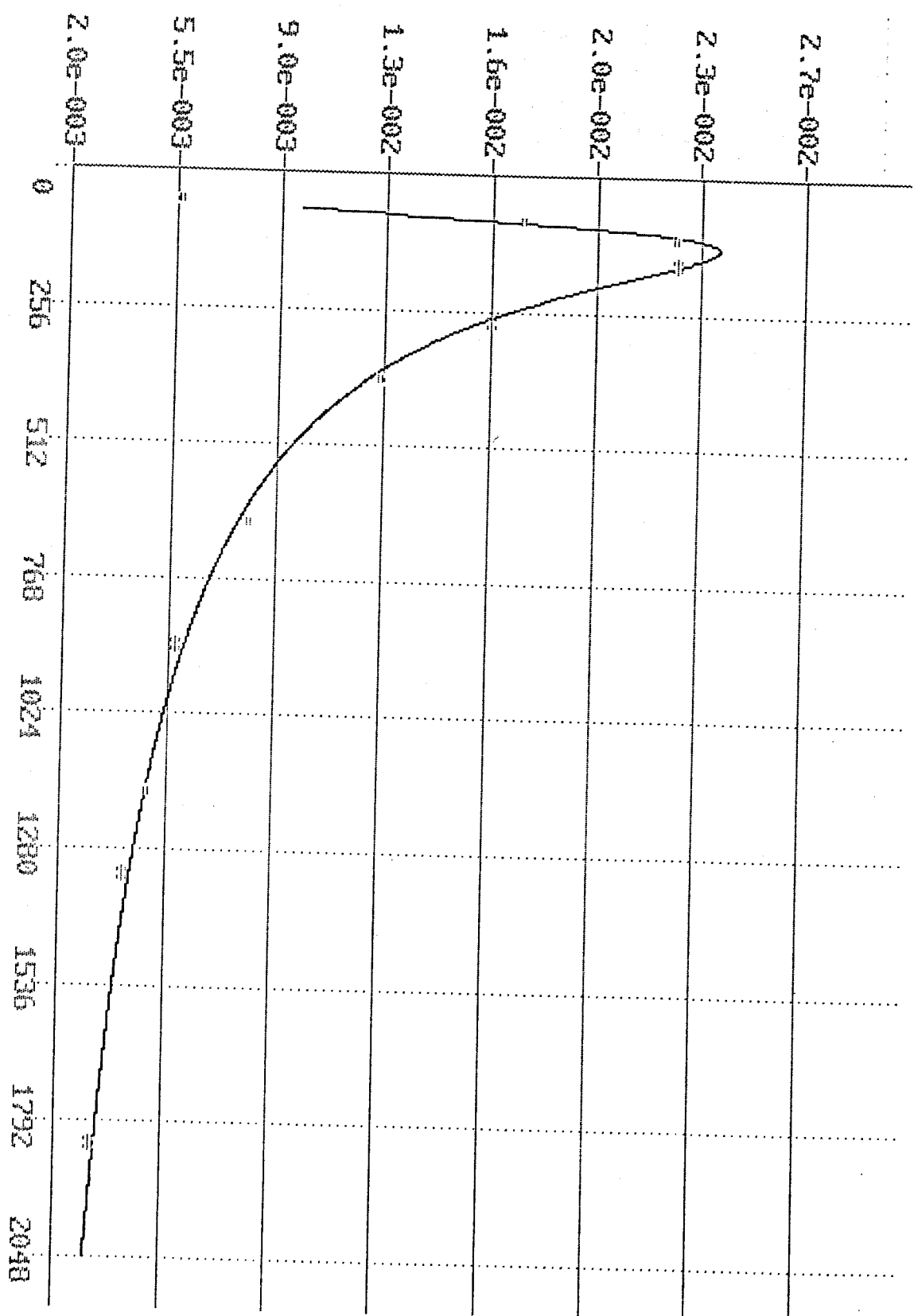
FWHM(keV) = 0.64 + 0.018*En + 7.02e-004*En^2 + 0.00e+000*En^3 06-09-97 16:57
 Where En = Sqrt(Energy in keV)

Sensitivity 0.20	Search Start / End. 60 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.51	120.30	13724	447	335	15523	1.13	
2	88.03	177.13	51266	599	352	15682	0.99	
3	122.11	245.05	32799	492	293	11875	1.02	
4	136.52	273.75	4293	333	270	10041	1.06	
5	165.90	332.32	38825	486	250	8664	1.19	
6	255.21	510.29	1273	252	218	5858	1.40	
7	279.21	558.13	21156	382	228	5740	1.26	
8	391.73	782.36	26268	386	193	4117	1.54	
9	510.77	1019.59	789	224	209	3696	2.91	
10	661.69	1320.35	19694	352	202	3776	1.84	
11	813.91	1623.70	422	176	165	2312	1.82	
12	898.09	1791.46	28866	404	210	3761	1.98	
13	1173.25	2339.82	21316	341	175	2146	2.29	
14	1332.51	2657.20	18225	314	158	1796	2.52	
15	1836.00	3660.57	16839	298	149	1236	2.81	

000121



000122

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 12:00

Client Name: GS0113CalVer

Date Analyzed : 10/04/97 18:13

Lab Sample ID: 97-22-101-T1

Sample Matrix : Soil

Client Sample ID: 243.1284.02

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	81.6	90.9	89.8	Pass
Cd-109	893	974	91.7	Pass
Co-57	22.5	23.8	94.3	Pass
Cs-137	269	247	109	Pass
Co-60	252	256	98.6	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Remarks:

Calibration verification LCS

000123

DETECTOR CALIBRATION

=====

Sample ID: 97-22-101-02 CAL0213 CS:PAI #462.1284.57

M6
10/4/97

Stds Match Tolerance(keV) 2.00 Number of Grams 1.00e+000 Current Date. 10-04-97 19:30	Spectrum File . c:\gdr\spc\s2210102.97s Counting Start. 10-04-97 16:57 Decay Time. 2.29e+003 Hrs
Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0213.EFF | ID. 500gSAND#462.1284.57

Detector Number 2 | Calibration Date. 10-04-97 16:57

Eff = 1 / [4.19e-003*En^-3.70e+000 + 1.51e+002*En^7.54e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	5.99e-003	6.19e-003	3.22
2	88.03	1.80e-002	1.73e-002	-4.14
3	122.06	2.36e-002	2.44e-002	3.38
4	165.85	2.35e-002	2.37e-002	0.62
5	279.19	1.75e-002	1.72e-002	-1.67
6	391.69	1.38e-002	1.34e-002	-3.05
7	661.66	9.41e-003	9.03e-003	-4.23
8	898.07	6.99e-003	7.17e-003	2.53
9	1173.24	5.74e-003	5.86e-003	2.09
10	1332.50	5.20e-003	5.32e-003	2.33
11	1836.08	4.10e-003	4.18e-003	2.01

Effic. coefficients stored on DET0213.EFF.

000124

Sample ID : 97-22-101-02 CAL0213 CS:PAI #462.1284.57

Sample Size	5.00e+002 Gram	Spectrum File .	c:\gdr\spc\s2210102.97s
Sampling Start. . . . .	.07-01-97 10:00	Counting Start.	10-04-97 16:57
Sampling Stop . . . . .	.07-01-97 10:00	Live Time	1800 Sec
Current Date. . . . .	.10-04-97 19:29	Real Time	1887 Sec

Energy(keV) = 0.32 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-04-97 14:13

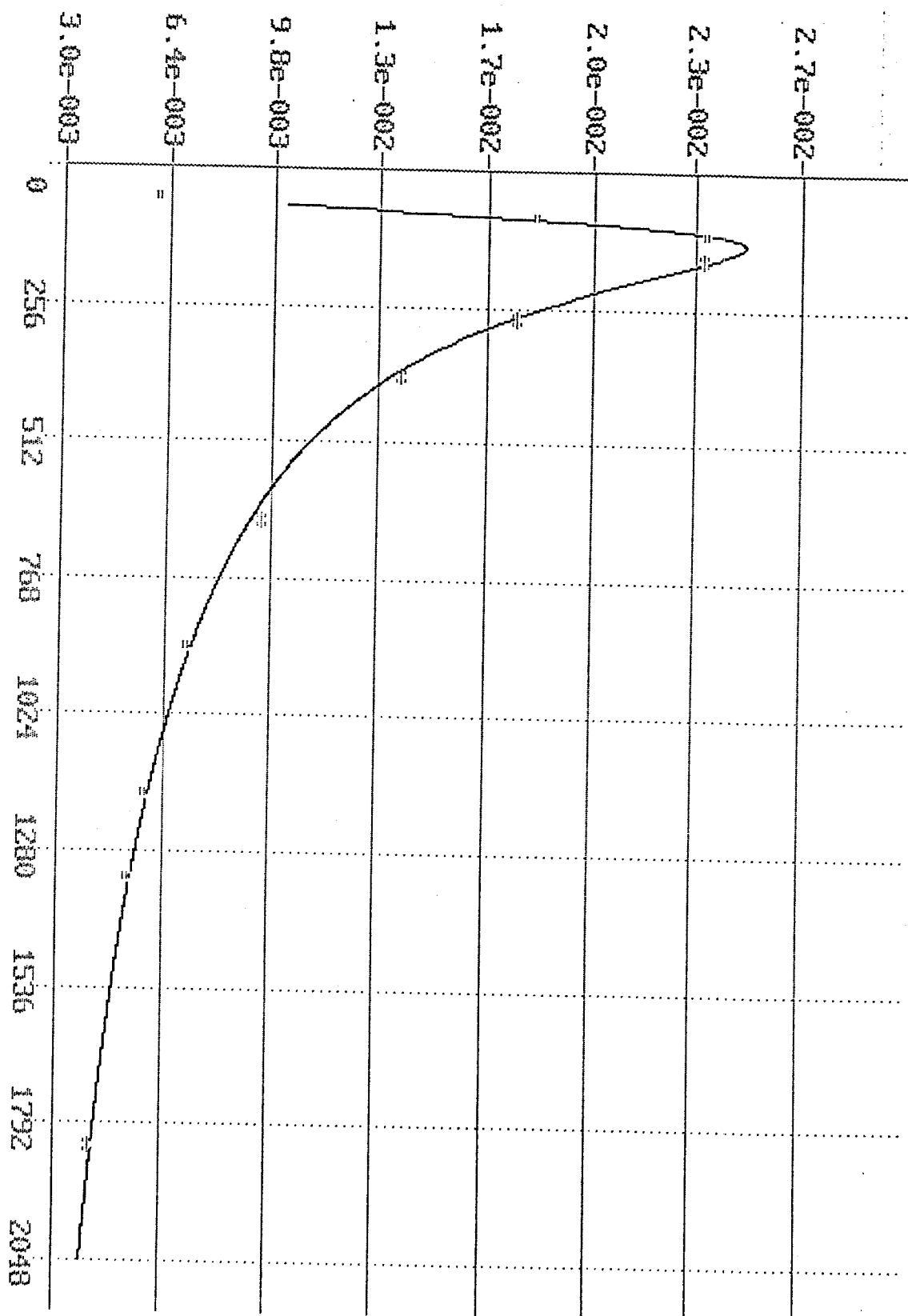
FWHM(keV) = 1.21 + -0.050*En + 2.91e-003*En^2 +-2.89e-005*En^3 09-19-97 15:21
Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.20	117.87	14600	451	344	14531	1.23	
2	87.98	175.47	54203	606	341	16059	1.25	
3	122.13	243.83	34913	522	329	13325	1.07	
4	136.55	272.71	4262	335	271	10183	1.05	
5	165.88	331.42	41188	498	254	8923	1.24	
6	255.07	509.95	1406	257	222	6062	1.24	
7	279.12	558.09	23068	383	211	5457	1.21	
8	391.57	783.18	29316	405	199	4368	1.34	
9	510.55	1021.36	628	233	220	4097	2.20	
10	661.32	1323.15	23030	365	189	3595	1.56	
11	813.61	1628.01	590	162	145	2121	1.56	
12	897.53	1796.00	35420	414	161	2605	1.72	
13	1172.48	2346.38	25482	344	122	1360	2.08	
14	1324.51	2650.69	637	169	168	1318	2.69	a
15	1331.48	2664.64	23219	325	112	901	2.11	b
16	1834.56	3671.68	21860	309	88	526	2.48	
17	1964.25	3931.30	43	33	30	68	2.35	

000125



000126

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0213

Date Analyzed : 10/04/97 18:52

Lab Sample ID: 97-22-101-T2

Sample Matrix : Soil

Client Sample ID: 243.1284.02

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	86.0	90.9	94.7	Pass
Cd-109	899	974	92.3	Pass
Co-57	23.0	23.8	96.8	Pass
Cs-137	267	247	108	Pass
Co-60	257	256	100	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Remarks:
Calibration Verification LCS

000127

DETECTOR CALIBRATION

Sample ID: 97-22-101-03 CAL0313 CS:462-1284-57

Mb
10/30/97

Std Match Tolerance(keV) 2.00	Spectrum File . C:\GDR\SPC\S2210103.97S
Number of Grams 1.00e+000	Counting Start. 10-29-97 20:36
Current Date. 10-30-97 11:04	Decay Time. 2.89e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
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ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0313.EFF	ID. 500gSAND#462.1284.57
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Detector Number 3	Calibration Date. 10-29-97 20:36
-----------------------------	--

Eff = 1 / [4.32e-003*En^-3.69e+000 + 1.62e+002*En^7.60e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	5.96e-003	6.10e-003	2.25
2	88.03	1.72e-002	1.68e-002	-2.85
3	122.06	2.28e-002	2.33e-002	2.26
4	165.85	2.22e-002	2.24e-002	0.98
5	279.19	1.65e-002	1.62e-002	-2.00
6	391.69	1.28e-002	1.26e-002	-1.81
7	661.66	8.80e-003	8.46e-003	-4.07
8	898.07	6.51e-003	6.71e-003	2.90
9	1173.24	5.36e-003	5.47e-003	2.14
10	1332.50	4.92e-003	4.97e-003	1.08
11	1836.08	3.84e-003	3.90e-003	1.52

Effic. coefficients stored on DET0313.EFF.

000128

Sample ID : 97-22-101-03 CAL0313 CS:462-1284-57

Sample Size	5.00e+002 GRAM	Spectrum File .	C:\GDR\SPC\S2210103.97S
Sampling Start. . . . .	.07-01-97 10:00	Counting Start.	10-29-97 20:36
Sampling Stop . . . . .	.07-01-97 10:00	Live Time	1800 Sec
Current Date. . . . .	.10-30-97 11:03	Real Time	2074 Sec

Detector #: 3

Energy(keV) = -0.50 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-29-97 03:28

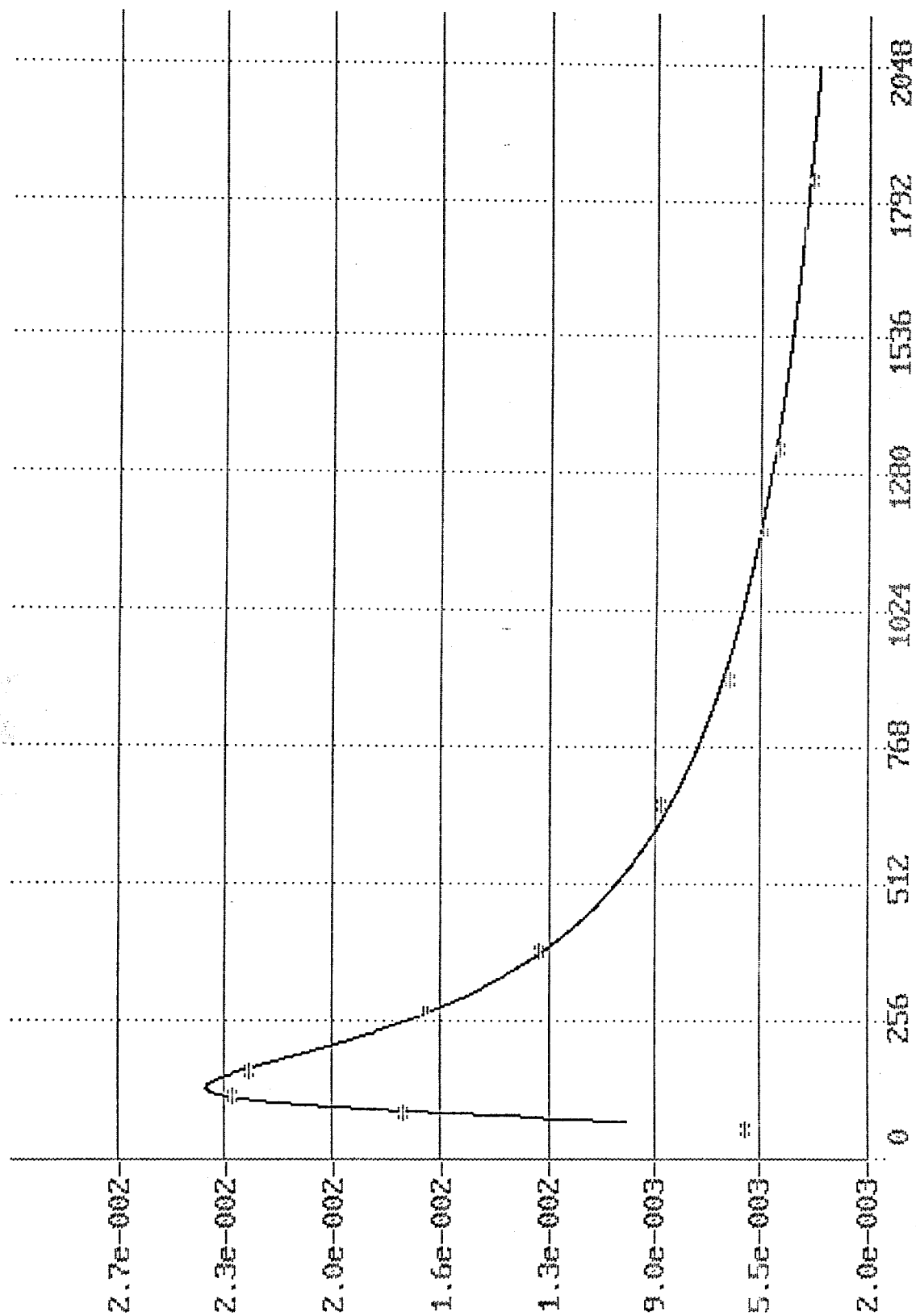
FWHM(keV) = 0.96 + 0.008*En + 4.98e-004*En^2 + 0.00e+000*En^3 10-12-96 19:19

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.52	119.84	14515	447	340	14199	0.99	
2	88.00	176.71	49977	600	361	15975	1.04	
3	122.09	244.79	31599	487	300	11073	1.04	
4	136.55	273.66	3944	338	283	9854	1.05	
5	165.87	332.21	34213	483	286	9062	1.09	
6	255.12	510.43	912	220	186	4803	1.11	
7	279.19	558.48	14983	340	217	5200	1.28	
8	391.71	783.18	23382	365	183	3702	1.26	
9	510.92	1021.22	630	216	203	3486	3.19	
10	661.65	1322.20	21505	342	165	2737	1.45	
11	813.94	1626.31	346	146	130	1880	1.29	
12	898.01	1794.17	28021	374	159	2320	1.62	
13	1173.17	2343.63	23572	330	117	1157	1.85	
14	1325.03	2646.88	755	166	165	1127	3.18	a
15	1332.32	2661.43	21749	310	92	652	1.90	b
16	1835.75	3666.70	17382	270	57	230	2.24	



000130

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0313

Date Analyzed : 10/29/97 19:52

Lab Sample ID: 97-22-101-S3

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	83.8	90.9	92.2	Pass
Cd-109	847	974	86.9	Pass
Co-57	23.7	23.8	99.8	Pass
Cs-137	254	247	103	Pass
Co-60	245	256	96.0	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Data stored in file \gdr\prt\S22101S3.97P

000131

DETECTOR CALIBRATION

Sample ID: 97-22-101-04 CAL0413 CS:462-1284-57

mb
10/30/97

Stds Match Tolerance(keV) 2.00	Spectrum File . C:\GDR\SPC\S2210104.97S
Number of Grams 1.00e+000	Counting Start. 10-29-97 19:53
Current Date. 10-30-97 11:10	Decay Time. 2.89e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
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ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0413.EFF	ID. 500gSAND#462.1284.57
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Detector Number 4	Calibration Date. 10-29-97 19:53
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Eff = 1 / [5.39e-003*En^-3.58e+000 + 1.51e+002*En^7.81e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	6.63e-003	6.83e-003	2.85
2	88.03	1.90e-002	1.83e-002	-3.85
3	122.06	2.47e-002	2.55e-002	3.29
4	165.85	2.47e-002	2.47e-002	0.12
5	279.19	1.81e-002	1.78e-002	-1.76
6	391.69	1.40e-002	1.38e-002	-1.90
7	661.66	9.48e-003	9.15e-003	-3.57
8	898.07	6.97e-003	7.21e-003	3.28
9	1173.24	5.74e-003	5.85e-003	1.91
10	1332.50	5.25e-003	5.30e-003	0.90
11	1836.08	4.07e-003	4.13e-003	1.23

Effic. coefficients stored on DET0413.EFF.

000132

Sample ID : 97-22-101-04 CAL0413 CS:462-1284-57

Sample Size	5.00e+002 GRAM	Spectrum File .	C:\GDR\SPC\S2210104.97S
Sampling Start. . . . .	.07-01-97 10:00	Counting Start.	10-29-97 19:53
Sampling Stop . . . . .	.07-01-97 10:00	Live Time	1800 Sec
Current Date. . . . .	.10-30-97 11:09	Real Time	2064 Sec

Detector #: 4

Energy(keV) = -0.54 + 0.501*Ch +-8.74e-008*Ch^2 + 0.00e+000*Ch^3 10-29-97 03:28

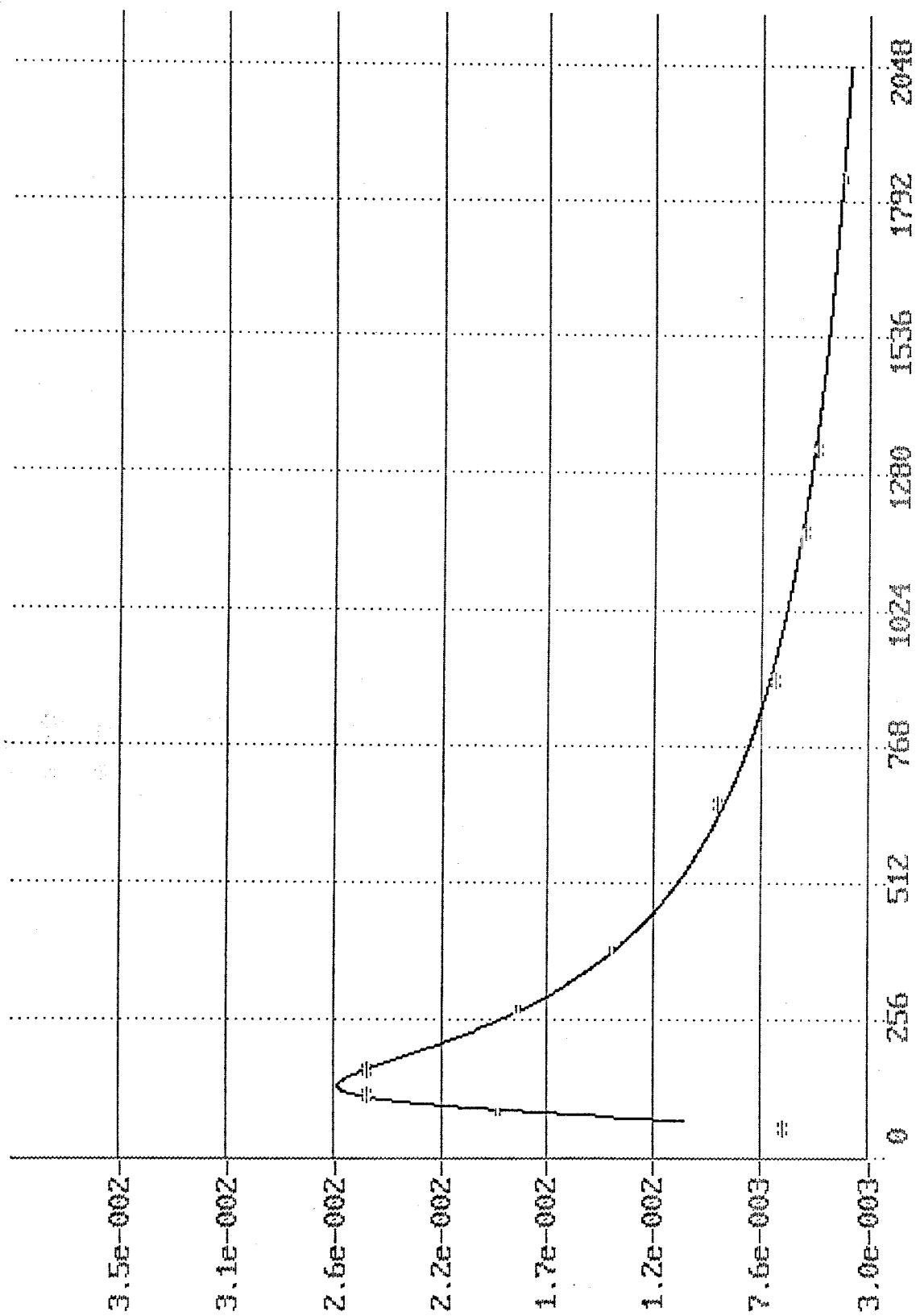
FWHM(keV) = 0.94 + -0.030*En + 2.19e-003*En^2 +-2.03e-005*En^3 10-11-96 11:32

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
=====								
1	59.52	119.80	16157	398	262	10838	0.84	
2	88.01	176.62	55152	599	327	14752	0.95	
3	122.10	244.64	34310	486	277	10631	0.98	
4	136.53	273.42	4289	321	258	9173	1.01	
5	165.89	331.99	38103	473	235	7660	0.92	
6	255.22	510.20	1197	207	167	4386	1.00	
7	279.23	558.10	16455	327	179	4419	1.03	
8	391.77	782.63	25598	370	168	3455	1.22	
9	511.15	1020.84	689	225	210	3766	2.30	
10	661.73	1321.32	23155	351	162	2892	1.39	
11	813.86	1624.93	404	149	133	1943	1.08	
12	898.11	1793.08	30015	382	150	2259	1.51	
13	1173.22	2342.25	25259	340	116	1232	1.74	
14	1325.11	2645.47	669	153	149	1050	2.81	a
15	1332.38	2659.99	23232	318	87	633	1.81	b
16	1835.62	3664.90	18466	277	50	188	2.16	



000134

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0413

Date Analyzed : 10/29/97 20:37

Lab Sample ID: 97-22-101-S4

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	83.7	90.9	92.1	Pass
Cd-109	903	974	92.7	Pass
Co-57	23.7	23.8	99.4	Pass
Cs-137	261	247	106	Pass
Co-60	252	256	98.7	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Data stored in file \gdr\prt\S22101S4.97P

000135

DETECTOR CALIBRATION

=====

Sample ID: 97-22-101-05 CAL0513 CS:PAI #462.1284.57

mb
10/4/97

Stds Match Tolerance(keV) 2.00 Number of Grams 1.00e+000 Current Date. 10-04-97 17:45	Spectrum File . c:\gdr\spc\s2210105.97s Counting Start. 10-04-97 15:37 Decay Time.. 2.29e+003 Hrs
---	---

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0513.EFF	ID. 500gSAND#462.1284.57
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Detector Number 5	Calibration Date. . . . 10-04-97 15:37
-----------------------------	--

Eff = 1 / [3.30e-003*En^-3.84e+000 + 1.54e+002*En^7.32e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	5.23e-003	5.40e-003	3.11
2	88.03	1.65e-002	1.59e-002	-3.67
3	122.06	2.23e-002	2.30e-002	2.83
4	165.85	2.22e-002	2.24e-002	1.10
5	279.19	1.68e-002	1.64e-002	-2.04
6	391.69	1.33e-002	1.29e-002	-2.90
7	661.66	9.13e-003	8.80e-003	-3.81
8	898.07	6.82e-003	7.04e-003	3.09
9	1173.24	5.75e-003	5.79e-003	0.55
10	1332.50	5.13e-003	5.27e-003	2.63
11	1836.08	4.08e-003	4.17e-003	2.10

Effic. coefficients stored on DET0513.EFF.

000136

Sample ID : 97-22-101-05 CAL0513 CS:PAI #462.1284.57

```

-----
Sample Size . . . . . 5.00e+002 Gram | Spectrum File . c:\gdr\spc\s2210105.97s
Sampling Start. . . . .07-01-97 10:00 | Counting Start. . . . . 10-04-97 15:37
Sampling Stop . . . . .07-01-97 10:00 | Live Time . . . . . 1800 Sec
Current Date. . . . .10-04-97 17:41 | Real Time . . . . . 1892 Sec
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-----
Detector #: 5
Energy(keV) = 0.06 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-04-97 14:17
FWHM(keV) = 0.78 + 0.012*En + 6.15e-004*En^2 + 0.00e+000*En^3 12-06-96 19:06
Where En = Sqrt(Energy in keV)
-----

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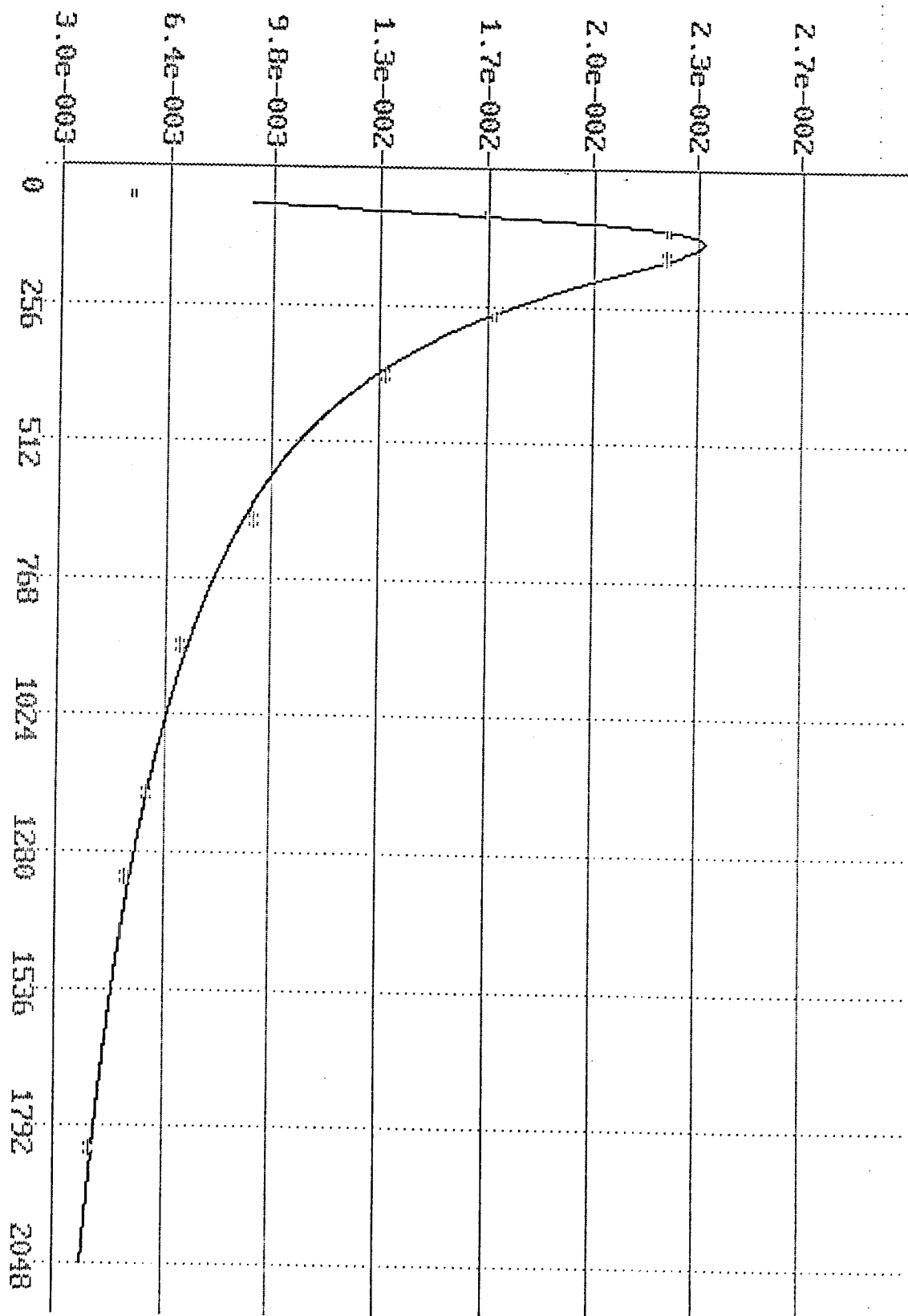
-----
Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.52	118.99	12750	406	297	12172	1.01	
2	88.03	176.05	49679	580	326	14723	1.02	
3	122.03	244.11	33068	483	280	10868	1.07	
4	136.44	272.94	4101	327	265	9688	1.09	
5	165.83	331.75	38861	497	273	9159	1.14	
6	255.11	510.42	1264	271	241	6432	1.32	
7	279.15	558.53	22155	372	202	5010	1.34	
8	391.66	783.71	28200	382	165	3344	1.39	
9	510.91	1022.36	1037	226	209	3716	2.81	
10	661.66	1324.05	22349	354	178	3179	1.64	
11	813.83	1628.58	534	178	166	2338	2.04	
12	898.09	1797.20	34569	410	165	2496	1.95	
13	1173.25	2347.88	25553	346	127	1367	2.23	
14	1325.07	2651.71	724	195	199	1536	3.48	a
15	1332.49	2666.57	22919	326	120	943	2.33	b
16	1836.06	3674.35	21791	308	88	490	2.82	

000137



000138

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0513

Date Analyzed : 10/04/97 17:01

Lab Sample ID: 97-22-101-T5

Sample Matrix : Soil

Client Sample ID: 243.1284.02

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	88.7	90.9	97.6	Pass
Cd-109	895	974	91.9	Pass
Co-57	24.5	23.8	103	Pass
Cs-137	268	247	109	Pass
Co-60	259	256	101	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Remarks:

Calibration verification LCS

000139

DETECTOR CALIBRATION

Sample ID: 97-22-101-06 CAL0613 CS:PAI #462.1284.57

M/L
10/4/97

Std Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\s2210106.97s
Number of Grams 1.00e+000	Counting Start. 10-04-97 18:20
Current Date. 10-04-97 19:56	Decay Time. 2.29e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0613.EFF | ID. 500gSAND#462.1284.57

Detector Number 6 | Calibration Date. 10-04-97 18:20

Eff = 1 / [4.00e-003*En^{-3.73e+000} + 1.87e+002*En^{7.50e-001}]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	5.71e-003	5.83e-003	2.09
2	88.03	1.59e-002	1.54e-002	-2.99
3	122.06	1.99e-002	2.05e-002	2.97
4	165.85	1.93e-002	1.93e-002	0.20
5	279.19	1.40e-002	1.38e-002	-1.53
6	391.69	1.11e-002	1.08e-002	-2.52
7	661.66	7.51e-003	7.29e-003	-3.00
8	898.07	5.60e-003	5.80e-003	3.40
9	1173.24	4.72e-003	4.74e-003	0.56
10	1332.50	4.29e-003	4.31e-003	0.58
11	1836.08	3.30e-003	3.39e-003	2.59

Effic. coefficients stored on DET0613.EFF.

000140

Sample ID : 97-22-101-06 CAL0613 CS:PAI #462.1284.57

Sample Size	5.00e+002 Gram	Spectrum File .	c:\gdr\spc\s2210106.97s
Sampling Start. . . . .	.07-01-97 10:00	Counting Start.	10-04-97 18:20
Sampling Stop . . . . .	.07-01-97 10:00	Live Time	1800 Sec
Current Date. . . . .	.10-04-97 19:56	Real Time	1860 Sec

Detector #: 6

Energy(keV) = 0.39 + 0.502*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-04-97 15:15

FWHM(keV) = 1.02 + -0.022*En + 2.34e-003*En^2 +-2.29e-005*En^3 09-19-97 14:42

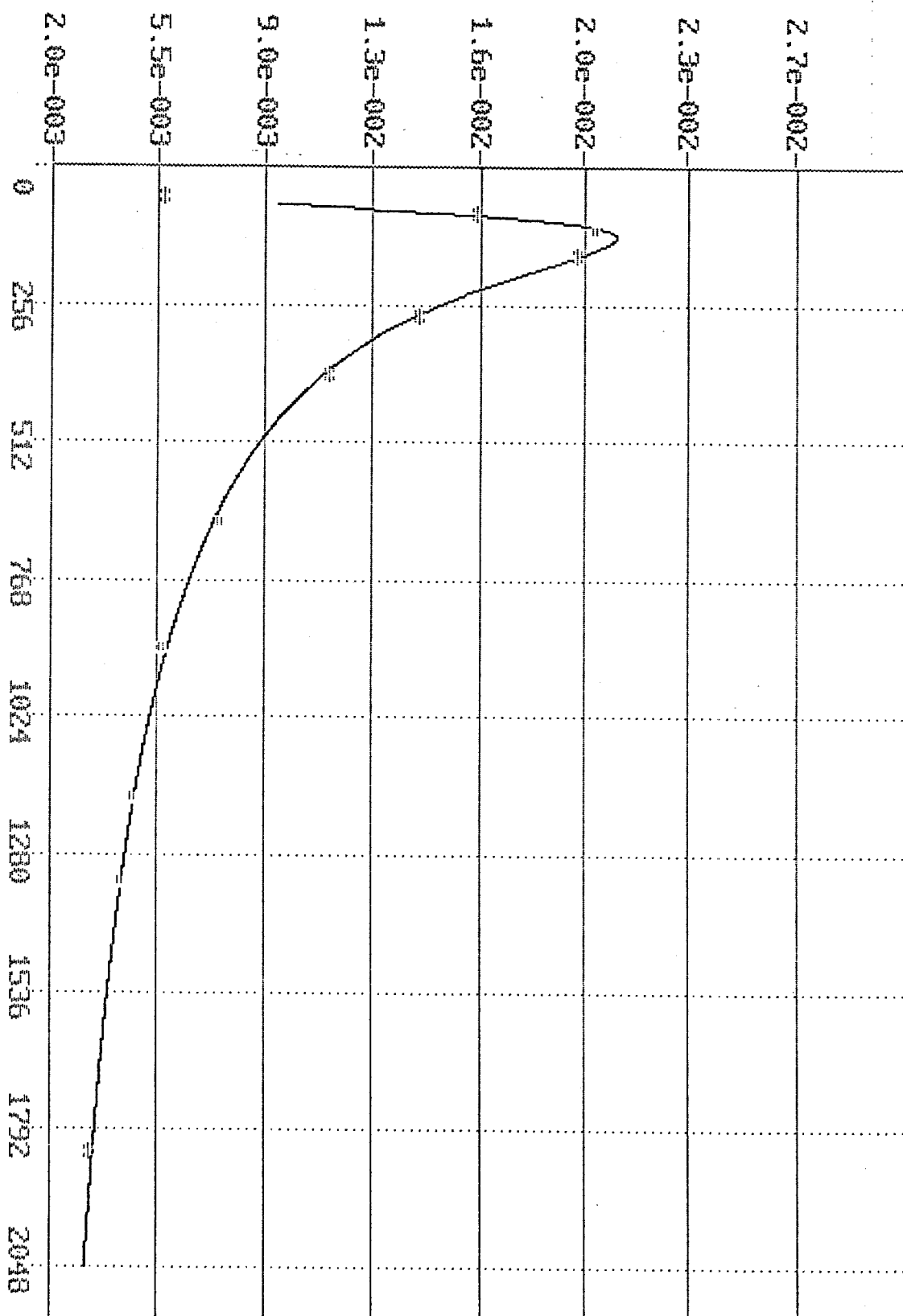
Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.70	118.06	13901	408	293	11845	1.05	
2	88.20	174.80	47871	606	382	17046	1.23	
3	122.23	242.54	29438	499	327	13158	1.21	
4	136.59	271.11	4121	379	328	11915	1.21	
5	166.02	329.70	33686	486	287	10139	1.39	
6	255.10	507.01	867	255	224	6140	1.08	
7	279.36	555.29	18547	372	234	6028	1.34	
8	391.88	779.26	23499	381	208	4793	1.42	
9	511.61	1017.60	695	242	231	4195	2.81	
10	661.90	1316.75	18375	342	196	3865	1.78	
11	814.13	1619.76	541	182	170	2446	1.79	
12	898.34	1787.37	28371	399	207	3640	2.00	
13	1173.50	2335.07	20947	334	163	2088	2.21	
14	1326.82	2640.26	1095	299	315	2978	5.17	a
15	1332.74	2652.04	19140	310	141	1256	2.50	b
16	1836.28	3654.34	17614	292	123	967	2.91	

000141



000142

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0613

Date Analyzed : 10/04/97 19:29

Lab Sample ID: 97-22-101-T6

Sample Matrix : Soil

Client Sample ID: 243.1284.02

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	87.0	90.9	95.7	Pass
Cd-109	879	974	90.3	Pass
Co-57	23.3	23.8	97.9	Pass
Cs-137	275	247	111	Pass
Co-60	263	256	103	Pass

ATI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Remarks:

Calibration Verification LCS

000143

DETECTOR CALIBRATION

=====

Sample ID: 97-22-101-09 CAL0913 CS:462-1284-57

Mb
10/30/97

Std Match Tolerance(keV) . . . 2.00	Spectrum File . C:\GDR\SPC\S2210109.97S
Number of Grams 1.00e+000	Counting Start. 10-29-97 18:56
Current Date. 10-30-97 10:22	Decay Time. 2.89e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====	=====	=====	=====	=====	=====
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET0913.EFF | ID. 500gSAND#462.1284.57

Detector Number 9 | Calibration Date. . . . 10-29-97 18:56

Eff = 1 / [1.89e-002*En^-2.61e+000 + 6.06e+001*En^6.15e-001]

(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====	=====	=====	=====	=====
1	59.50	2.42e-002	2.45e-002	1.40
2	88.03	4.21e-002	4.10e-002	-2.76
3	122.06	4.66e-002	4.71e-002	1.20
4	165.85	4.40e-002	4.52e-002	2.59
5	279.19	3.54e-002	3.55e-002	0.30
6	391.69	3.03e-002	2.92e-002	-3.96
7	661.66	2.27e-002	2.13e-002	-6.74
8	898.07	1.71e-002	1.76e-002	2.80
9	1173.24	1.44e-002	1.50e-002	3.83
10	1332.50	1.40e-002	1.38e-002	-0.85
11	1836.08	1.10e-002	1.14e-002	2.90

Geometry File DET0913.EFF | ID. 500gSAND#462.1284.57

Detector Number 9 | Calibration Date. . . . 10-29-97 18:56

000144

 Eff = 1 / [3.34e-002*En^-2.41e+000 + 5.98e+001*En^6.29e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	2.42e-002	2.48e-002	2.33
2	88.03	4.21e-002	4.04e-002	-4.11
3	122.06	4.66e-002	4.70e-002	0.94
4	165.85	4.40e-002	4.57e-002	3.74
5	279.19	3.54e-002	3.63e-002	2.53
6	391.69	3.03e-002	2.98e-002	-1.64
7	661.66	2.27e-002	2.16e-002	-4.91
8	661.66	2.27e-002	2.16e-002	-4.91
9	661.66	2.27e-002	2.16e-002	-4.91
10	661.66	2.27e-002	2.16e-002	-4.91
11	661.66	2.27e-002	2.16e-002	-4.91
12	898.07	1.71e-002	1.79e-002	4.12
13	1173.24	1.44e-002	1.51e-002	4.75
14	1173.24	1.44e-002	1.51e-002	4.75
15	1173.24	1.44e-002	1.51e-002	4.75
16	1332.50	1.39e-002	1.39e-002	-0.02
17	1836.08	1.10e-002	1.14e-002	3.26

Effic. coefficients stored on DET0913.EFF.

000145

Sample ID : 97-22-101-09 CAL0913 CS:462-1284-57

Sample Size	5.00e+002 GRAM	Spectrum File .	C:\GDR\SPC\S2210109.97S
Sampling Start. . . . .	.07-01-97 10:00	Counting Start.	10-29-97 18:56
Sampling Stop . . . . .	.07-01-97 10:00	Live Time	1800 Sec
Current Date. . . . .	.10-30-97 10:16	Real Time	2007 Sec

Detector #: 9

Energy(keV)= -0.89 + 0.500*Ch + 1.49e-007*Ch^2 + 0.00e+000*Ch^3 10-29-97 16:41

FWHM(keV) = 1.18 + -0.027*En + 2.21e-003*En^2 +-2.09e-005*En^3 11-08-95 10:58

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	80 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.52	120.76	58935	725	485	28934	1.07	
2	88.04	177.77	122178	880	488	27351	1.09	
3	122.02	245.68	64678	667	389	18599	1.17	
4	136.41	274.45	8102	465	395	17223	1.28	
5	165.82	333.24	67889	655	365	14710	1.23	
6	255.07	511.60	2066	339	301	9988	1.20	
7	279.16	559.74	32199	455	252	7794	1.37	
8	391.65	784.53	55446	532	228	5747	1.54	
9	510.90	1022.79	1815	286	263	5887	2.54	
10	661.69	1324.01	55436	531	230	5293	1.84	
11	814.11	1628.43	404	199	183	3368	2.19	
12	898.01	1795.98	73766	598	242	4983	2.10	
13	1173.31	2345.65	63303	561	242	4522	2.36	
14	1326.92	2652.26	2929	366	380	3926	6.29	a
15	1332.45	2663.29	61726	525	174	1685	2.63	b
16	1836.02	3668.07	49992	501	229	3164	3.12	

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER0913

Date Analyzed : 10/29/97 18:20

Lab Sample ID: 97-22-101-S9

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	86.5	90.9	95.2	Pass
Cd-109	879	974	90.2	Pass
Co-57	24.1	23.8	101	Pass
Cs-137	267	247	108	Pass
Co-60	247	256	96.6	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Data stored in file \gdr\prt\S22101S9.97P

000147

DETECTOR CALIBRATION

Sample ID: 97-22-101-10 CAL1013 CS:462-1284-57

MB
10/30/97

Std's Match Tolerance(keV) . . . 2.00	Spectrum File . c:\gdr\spc\s2210110.97s
Number of Grams 1.00e+000	Counting Start. 10-29-97 18:21
Current Date. 10-30-97 11:00	Decay Time. 2.89e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 07-01-97 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 462.1284.57

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	3772
2	Cd-109	88.03	1.114e+004	0.03720	51859
3	Co-57	122.06	6.502e+003	0.85510	1228
4	Ce-139	165.85	3.304e+003	0.80350	1955
5	Hg-203	279.19	1.118e+003	0.77300	3917
6	Sn-113	391.69	2.762e+003	0.64900	3229
7	Cs-137	661.66	2.645e+005	0.85120	1607
8	Y-88	898.07	2.558e+003	0.93400	5601
9	Co-60	1173.24	4.621e+004	1.00000	2553
10	Co-60	1332.50	4.621e+004	1.00000	2567
11	Y-88	1836.08	2.558e+003	0.99380	5542

Geometry File DET1013.EFF | ID. 500gSAND#462.1284.57

Detector Number 10 | Calibration Date. 10-29-97 18:21

Eff = 1 / [1.44e-003*En^-4.22e+000 + 1.41e+002*En^7.21e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	4.15e-003	4.33e-003	4.18
2	59.50	4.15e-003	4.33e-003	4.18
3	59.50	4.15e-003	4.33e-003	4.18
4	88.03	1.59e-002	1.53e-002	-4.06
5	88.03	1.59e-002	1.53e-002	-4.06
6	88.03	1.59e-002	1.53e-002	-4.06
7	122.06	2.31e-002	2.42e-002	4.61
8	122.06	2.31e-002	2.42e-002	4.61
9	165.85	2.36e-002	2.41e-002	1.91
10	279.19	1.83e-002	1.76e-002	-3.74
11	391.69	1.46e-002	1.39e-002	-4.89
12	391.69	1.46e-002	1.39e-002	-4.89
13	661.66	9.98e-003	9.52e-003	-4.80
14	661.66	9.98e-003	9.52e-003	-4.80
15	898.07	7.53e-003	7.64e-003	1.48
16	1173.24	6.21e-003	6.30e-003	1.37

000148

17	1332.50	5.62e-003	5.75e-003	2.31
18	1836.08	4.15e-003	4.56e-003	9.03
19	1836.08	4.35e-003	4.56e-003	4.62
20	1836.08	4.35e-003	4.56e-003	4.62

Effic. coefficients stored on DET1013.EFF.

Sample ID : 97-22-101-10 CAL1013 CS:462-1284-57

```

-----
Sample Size . . . . . 5.00e+002 GRAM | Spectrum File . c:\gdr\spc\s2210110.97s
Sampling Start. . . . . 07-01-97 10:00 | Counting Start. . . . . 10-29-97 18:21
Sampling Stop . . . . . 07-01-97 10:00 | Live Time . . . . . 1800 Sec
Current Date. . . . . 10-30-97 10:51 | Real Time . . . . . 1988 Sec
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Detector #: 10
Energy(keV) = -0.65 + 0.500*Ch + 2.19e-007*Ch^2 + 0.00e+000*Ch^3 10-29-97 16:41
FWHM(keV) = 0.64 + 0.011*En + 7.17e-004*En^2 + 0.00e+000*En^3 10-08-96 12:12
Where En = Sqrt(Energy in keV)
-----

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Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.52	120.30	10100	378	274	11858	0.98	
2	88.06	177.35	46240	568	327	14757	0.95	
3	122.04	245.27	32073	480	281	10924	0.93	
4	136.46	274.11	3863	320	260	9328	0.82	
5	165.84	332.83	36418	470	241	8016	0.94	
6	255.15	511.31	1142	228	192	5075	0.93	
7	279.16	559.29	16658	330	180	4496	1.10	
8	391.65	784.08	26615	378	172	3623	1.17	
9	511.05	1022.61	848	195	174	3056	2.47	
10	661.70	1323.49	24381	365	177	3161	1.59	
11	814.13	1627.85	354	174	164	2279	1.37	
12	898.03	1795.35	32408	397	160	2364	1.76	
13	1173.30	2344.71	27346	355	123	1287	2.01	
14	1325.13	2647.60	760	176	176	1209	3.54	a
15	1332.55	2662.41	24844	331	99	680	2.13	b
16	1836.24	3666.68	19727	289	65	296	2.65	

000150

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/24/96 10:00

Client Name: CALVER1013

Date Analyzed : 10/29/97 18:57

Lab Sample ID: 97-22-101-S0

Sample Matrix : Soil

Client Sample ID: Lab Control

Count Duration: 30 Min.

Nuclide	Reported Activity	Known Value	Percent Recovery	Flag
Am-241	83.2	90.9	91.5	Pass
Cd-109	923	974	94.8	Pass
Co-57	23.5	23.8	98.8	Pass
Cs-137	273	247	111	Pass
Co-60	256	256	100	Pass

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Data stored in file \gdr\prt\S22101S0.97P

000151

ANALYTICS

PAT. # 0485
Sec'd 3-11-981380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

55509-97

5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. 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. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: January 1, 1998 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432 y	3337	5.0
Cd-109	88	462.6 d	4683	4.8
Co-57	122	271.79 d	2519	4.2
Ce-139	166	137.64 d	3705	4.2
Hg-203	279	46.595 d	7185	4.6
Sn-113	392	115.09 d	4718	4.8
Cs-137	662	30.0 y	3000	4.4
Y-88	898	106.63 d	12170	4.2
Co-60	1173	5.2714 y	6223	4.8
Co-60	1332	5.2714 y	6250	4.3
Y-88	1836	106.63 d	12810	4.2

5.28568 grams solution in 4M HCl.

P O NUMBER 21194, Item 1

SOURCE PREPARED BY:

R. J. Haslett, Production Manager

Q A APPROVED:

3-10-98

This standard will expire one year after the calibration date.

000152

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

ANALYSIS OF UNCERTAINTY

BATCH 91 MIXED GAMMA STANDARDS WITH Am-241
CALIBRATION DATE: January 1, 1998 12:00 EST

GAMMA RAY ENERGY (keV)	RANDOM ERROR % (99 % CL)	SYSTEMATIC ERROR %	TOTAL %
59.5	2.0	3.0	5.0
88	1.6	3.2	4.8
122	1.6	2.6	4.2
166	1.4	2.8	4.2
279	1.6	3.0	4.6
392	2.0	2.8	4.8
662	1.6	2.8	4.4
898	1.2	3.0	4.2
1173	2.0	2.8	4.8
1332	1.3	3.0	4.3
1836	1.2	3.0	4.2

The systematic error includes the error in calibration standards, weighing error, and estimated counting corrections. All uncertainties are stated at the 99% confidence level.

No interfering gamma emitting impurities were detected during calibration. Depending on the resolution and energy dispersion (kev/channel) of the measuring system, the following spectral conflicts may occur: (1) between the 88 keV gamma-ray and the X-rays emitted in the decay of Hg-203, (2) between the 1333 keV gamma-ray and the 1325 keV single escape peak from the 1836 keV gamma-ray.

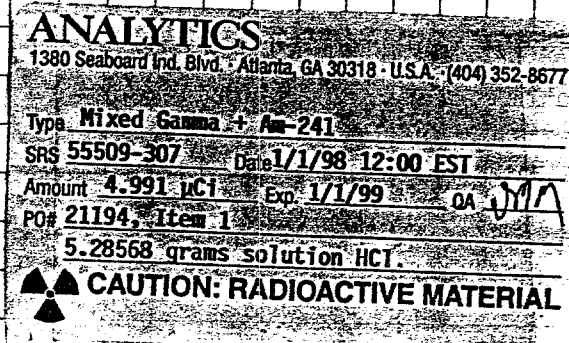
000153

4/10/98

Std #485 was transferred to vial and an aliquot taken.

Tare vial: 28.0833g

Full vial: 33.3177g

 After aliquot: $\frac{32.2333g}{1.0844g}$


KI solution was made from 60g KI in 60ml DI H₂O which yielded 76ml.

56ml went into the geometry. 1.0844g of standard was added to the 56ml.

Density of KI solution is 1.544. 1ml HCl was added. 2.06g sodium sulfite was added.

Ref date: 1/1/98

Continued on Page

Signed

4/10/98

Date

Read and Understood By

000154

Signed

Date

9/2/58

Geometry 13 & Std was prepared as follows:

To a 500 ml lemm jar, 500g clean quartz sand was added.
Std 485.1284.88 was added in small portions from a pipette
(1000ul set at about 500ul) across the top surface of the sand.
The standard is flooded w/ 3M HCl to saturate the sand (around)
and the container sealed and tumbled in the ball mill
dumpling. Measurements are recorded below.

Lemmer Tare	60.4g	60.1g	Vial Start	31.1558
Lemmer + Std	260.3g	559.9g	Vial end	30.5220g

rad label added

Std mass added 0.6339g

Continued on Page _____

Read and Understood By _____

Signed _____

Date _____

Signed _____

Date _____

000155

Preparation of mixed gamma calibration standard for Geo ¹³10 (200g sand in Lermer Jar)

ID #: 485.1572.24
 Cal. Date: 1/1/98 10:00
 Expires: 1/1/99 0:00
 Prep. Date: 9/21/98
 Prep. by: Bob Shannon

0.6338 grams of PAI #485 (485.1284.88) was added to 500g clean quartz sand in a 500 mL Lermer Jar
 The sand was flooded with 3M HCl to saturate the sand.

Dilution factor from original standard #485 = $0.6338 / 5.2857 = 0.1199$

Grams in std (from certificate): 5.28568

Nominal geometry aliquot: 500 g

Final composition:

Nuclide	Line	TOC	T-1/2 (d)	standard gamma/sec	dilution factor	decay fraction	current g/s added	gamma abundance	Bq added	pCi added	final concentration (pCi/g)	for source file
Am-241	59.5	1/1/98 10:00	157861.1	3337	0.11991	1	400.1	0.359	1115	30124	60	60.2
Cd-109	88.0	1/1/98 10:00	464	4683	0.11991	1	561.5	0.0372	15095	407972	816	815.9
Co-57	122.1	1/1/98 10:00	270.9	2519	0.11991	1	302.1	0.8551	353	9547	19	19.1
Ce-139	165.9	1/1/98 10:00	137.66	3705	0.11991	1	444.3	0.8035	553	14943	30	29.9
Hg-203	279.2	1/1/98 10:00	46.6	7185	0.11991	1	861.5	0.773	1115	30123	60	60.2
Sn-113	391.7	1/1/98 10:00	115.1	4718	0.11991	1	565.7	0.649	872	23559	47	47.1
Cs-137	661.7	1/1/98 10:00	11019.59	3000	0.11991	1	359.7	0.8512	423	11422	23	22.8
Y-88	898.1	1/1/98 10:00	106.60	12170	0.11991	1	1459.3	0.934	1562	42227	84	84.0
Co-60	1173.2	1/1/98 10:00	1925.233	6223	0.11991	1	746.2	1	746	20167	40	40.4
Co-60	1332.5	1/1/98 10:00	1925.233	6250	0.11991	1	749.4	1	749	20255	41	
Y-88	1836.1	1/1/98 10:00	106.60	12810	0.11991	1	1536.0	0.9938	1546	41773	84	

000156

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GDR_C	Paragon Analytics, Inc.	Fort Collins, CO	Version 6.2
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DETECTOR CALIBRATION

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Sample ID: 98-22-001-S1 B:485.1572.24

Mb
10/09/98

Stds Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\10001131.spc
Number of Grams 1.00e+000	Counting Start. 10-08-98 11:48
Current Date. 10-09-98 13:10	Decay Time. 6.72e+003 Hrs

Standards File. GDRSTD13.STD | Assay Date 01-01-98 10:00

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0113.EFF | ID. 500gSoil 485.1572.24

Detector Number 1 | Calibration Date. 10-08-98 11:48

Eff = 1 / [1.83e-003*En^-3.67e+000 + 6.17e+001*En^5.43e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	1.39e-002	1.41e-002	1.11
2	88.03	3.38e-002	3.31e-002	-1.92
3	122.06	4.11e-002	4.20e-002	2.19
4	165.85	4.10e-002	4.07e-002	-0.70
5	279.19	3.09e-002	3.22e-002	4.11
6	391.69	2.82e-002	2.69e-002	-4.78
7	661.66	2.20e-002	2.03e-002	-8.20
8	898.07	1.70e-002	1.72e-002	1.34
9	1173.24	1.47e-002	1.49e-002	0.88
10	1332.50	1.35e-002	1.39e-002	2.59
11	1836.08	1.12e-002	1.17e-002	3.78

Geometry File DET0113.EFF | ID. 500gSoil 485.1572.24

Detector Number 1 | Calibration Date. 10-08-98 11:48

000157

 Eff = 1 / [5.69e-003*En^-3.26e+000 + 6.02e+001*En^5.76e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	1.39e-002	1.46e-002	4.60
2	88.03	3.38e-002	3.26e-002	-3.52
3	88.03	3.38e-002	3.26e-002	-3.52
4	122.06	4.11e-002	4.28e-002	3.95
5	165.85	4.10e-002	4.27e-002	4.12
6	391.69	2.82e-002	2.84e-002	0.57
7	661.66	2.20e-002	2.10e-002	-4.28
8	661.66	2.20e-002	2.10e-002	-4.28
9	661.66	2.20e-002	2.10e-002	-4.28
10	661.66	2.20e-002	2.10e-002	-4.28
11	661.66	2.20e-002	2.10e-002	-4.28
12	661.66	2.20e-002	2.10e-002	-4.28
13	661.66	2.20e-002	2.10e-002	-4.28
14	898.07	1.70e-002	1.77e-002	3.97
15	1173.24	1.47e-002	1.51e-002	2.66
16	1332.50	1.35e-002	1.41e-002	3.93
17	1332.50	1.35e-002	1.41e-002	3.93
18	1836.08	1.12e-002	1.17e-002	4.12
19	1836.08	1.12e-002	1.17e-002	4.12
20	1836.08	1.12e-002	1.17e-002	4.12

Effic. coefficients stored on DET0113.EFF.

000158

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=====
GDR_C          Paragon Analytics, Inc.          Fort Collins, CO          Version 6.2
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Sample ID : 98-22-001-S1 B:485.1572.24

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-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . c:\gdr\spc\10001131.spc
Sampling Start. . . . 01-01-98 10:00 | Counting Start. . . . 10-08-98 11:48
Sampling Stop . . . . 01-01-98 10:00 | Live Time . . . . . 4500 Sec
Current Date. . . . 10-09-98 13:13 | Real Time . . . . . 4653 Sec
-----

```

```

-----
Detector #: 1
Energy(keV)= -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-08-98 08:43
FWHM(keV) = 0.97 + 0.019*En + 4.60e-004*En^2 + 0.00e+000*En^3 10-08-98 11:48
Where En = Sqrt(Energy in keV)
-----

```

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-----
Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.52	120.93	25037	446	283	9845	1.26	
2	87.99	177.78	56155	577	302	10395	1.31	
3	122.09	245.86	27257	419	232	6621	1.32	
4	136.50	274.61	3429	263	213	5570	1.41	
5	165.85	333.21	19996	370	220	5357	1.38	
6	255.04	511.26	535	233	214	4607	1.25	
7	279.20	559.50	1861	229	199	3977	1.57	
8	391.68	784.05	13312	299	178	3199	1.56	
9	510.68	1021.61	645	189	173	2764	2.71	
10	661.65	1323.00	34946	415	173	2559	1.76	
11	898.05	1794.94	18026	321	170	2455	2.02	
12	1173.24	2344.33	44727	449	146	1673	2.25	
13	1332.46	2662.18	41185	428	135	1308	2.29	
14	1461.00	2918.80	182	89	84	488	2.11	
15	1835.93	3667.30	12556	240	87	487	2.79	

000159

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Lab Control

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S1

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/08/98 11:48

Count Duration: 75 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.3	19	96	Pass
Co-60	39.1	40	97	Pass
Y-88	81	84	96	Pass
Cd-109	850	820	104	Pass
Sn-113	46.9	47	100	Pass
Cs-137	23.8	23	105	Pass
Ce-139	28.7	30	96	Pass
Am-241	57.4	60	95	Pass

Data stored in file 10001131.SPC

PAI sets control limits for gamma spectroscopy as follows :

Control Limits = Known \pm 15%

Flags:

000160

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geometry 13 efficiency calibration verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SA

Date Collected: 07/01/97 10:00

Sample Matrix: 500

Date Analyzed: 10/08/98 16:47

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	65	66	98	Pass
Co-60	131	140	94	Pass
Y-88	296	300	98	Pass
Cd-109	2950	2800	105	Pass
Sn-113	186	170	106	Pass
Cs-137	92	87	106	Pass
Ce-139	106	110	100	Pass
Am-241	197	200	97	Pass

Data stored in file 10001149.SPC

PAI sets control limits for gamma spectroscopy as follows :

Control Limits = Known \pm 15%

Flags:

000161

Sample ID: 98-22-001-S2 B:485.1572.24 *Mc 10/9/98*

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-----
Stds Match Tolerance(keV) . . . 2.00 | Spectrum File . c:\gdr\spc\10001140.spc
Number of Grams . . . . . 1.00e+000 | Counting Start. . . . . 10-08-98 14:10
Current Date. . . . . 10-09-98 13:57 | Decay Time. . . . . 6.72e+003 Hrs
-----
Standards File. . . . . GDRSTD13.STD | Assay Date . . . . . 01-01-98 10:00
-----
ID.: Geo 13 500 gram sand in poly 485.1274.24
-----

```

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

```

-----
Geometry File . . . . . DET0213.EFF | ID. . . . . .500gSAND#485.1572.24
-----
Detector Number . . . . . 2 | Calibration Date. . . . 10-08-98 14:10
-----
Eff = 1 / [1.41e-003*En^-4.07e+000 + 1.49e+002*En^7.23e-001]
      (Where En = Energy in MeV)
-----

```

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	6.29e-003	6.36e-003	1.14
2	88.03	1.90e-002	1.86e-002	-1.75
3	122.06	2.43e-002	2.50e-002	2.87
4	165.85	2.42e-002	2.34e-002	-3.41
5	279.19	1.57e-002	1.68e-002	6.71
6	391.69	1.42e-002	1.32e-002	-7.33
7	661.66	9.59e-003	9.04e-003	-5.99
8	898.07	7.00e-003	7.25e-003	3.46
9	1173.24	5.94e-003	5.98e-003	0.57
10	1332.50	5.41e-003	5.45e-003	0.68
11	1836.08	4.17e-003	4.32e-003	3.42

```

-----
Geometry File . . . . . DET0213.EFF | ID. . . . . .500gSAND#485.1572.24
-----
Detector Number . . . . . 2 | Calibration Date. . . . 10-08-98 14:10
                                000162

```

 Eff = 1 / [2.79e-003*En^-3.83e+000 + 1.48e+002*En^7.45e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	6.29e-003	6.47e-003	2.77
2	88.03	1.90e-002	1.83e-002	-3.71
3	122.06	2.43e-002	2.52e-002	3.66
4	165.85	2.42e-002	2.41e-002	-0.41
5	391.69	1.42e-002	1.36e-002	-4.45
6	661.66	9.59e-003	9.19e-003	-4.28
7	898.07	7.00e-003	7.32e-003	4.40
8	1173.24	5.94e-003	6.00e-003	0.97
9	1332.50	5.41e-003	5.46e-003	0.80
10	1836.08	4.17e-003	4.30e-003	2.90

Effic. coefficients stored on DET0213.EFF.

000163


```

=====
GDR_C          Paragon Analytics, Inc.          Fort Collins, CO          Version 6.2
=====

```

Sample ID : 98-22-001-S2 B:485.1572.24

```

-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . c:\gdr\spc\10001140.spc
Sampling Start. . . . .01-01-98 10:00 | Counting Start. . . . . 10-08-98 14:10
Sampling Stop . . . . .01-01-98 10:00 | Live Time . . . . . 4500 Sec
Current Date. . . . .10-09-98 13:56 | Real Time . . . . . 4768 Sec
-----

```

```

-----
Detector #: 2
Energy(keV)= 0.32 + 0.499*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-08-98 09:33
FWHM(keV) = 1.21 + -0.050*En + 2.91e-003*En^2 +-2.89e-005*En^3 09-19-97 15:21
Where En = Sqrt(Energy in keV)
-----

```

```

-----
Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

```

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.28	118.04	11316	319	210	6068	1.11	
2	87.99	175.54	31532	433	220	6332	1.20	
3	122.26	244.15	16133	323	176	4256	1.00	
4	136.65	272.96	2002	199	157	3387	0.96	
5	166.02	331.75	11804	286	167	3440	1.06	
6	255.16	510.22	283	160	141	2453	0.99	
7	279.27	558.50	943	175	151	2522	1.23	
8	391.84	783.89	6681	209	117	1692	1.22	
9	661.77	1324.33	15261	271	102	1160	1.51	
10	898.12	1797.53	7436	211	114	1294	1.75	
11	1173.24	2348.36	18034	283	86	674	1.96	
12	1324.49	2651.19	124	77	74	345	1.93	a
13	1332.36	2666.93	16496	265	63	318	2.00	b
14	1835.75	3674.80	4670	142	38	102	2.34	

000164

Paragon Analytics, Inc.
GAMMA SPECTROMETRY QA RESULTS SUMMARY
Method 901.1 (Modified)

Page 1

Client Name: Paragon Analytics, Inc.
Client Project Id: Standard Verification/Efficiency Calibration
Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S2 Date Collected: 01/01/98 10:00
Sample Matrix: Soil Date Analyzed: 10/08/98 14:10
Count Duration: 75 Min. Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.4	19	96	Pass
Co-60	40.0	40	99	Pass
Y-88	81	84	96	Pass
Cd-109	850	820	104	Pass
Sn-113	49.3	47	105	Pass
Cs-137	23.8	23	105	Pass
Ce-139	30.0	30	100	Pass
Hg-203	54	60	90	Pass
Am-241	59.3	60	99	Pass

Data stored in file 10001140.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000165

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Efficiency Calibration Verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SB

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/08/98 18:04

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	64	66	96	Pass
Co-60	140	140	101	Pass
Y-88	303	300	101	Pass
Cd-109	2930	2800	104	Pass
Sn-113	182	170	104	Pass
Cs-137	92	87	106	Pass
Ce-139	106	110	100	Pass
Am-241	199	200	97	Pass

Data stored in file 10001155.SPC

PAI sets control limits for gamma spectroscopy as follows :

Control Limits = Known \pm 15%

Flags:

000166

DETECTOR CALIBRATION

Sample ID: 98-22-001-S3 B:STD 485.1572.24

Mg
10/9/98

Stds Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\10001164.spc
Number of Grams 1.00e+000	Counting Start. 10-09-98 12:17
Current Date. 10-09-98 16:30	Decay Time. 6.75e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 01-01-98 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0313.EFF	ID. 500gSAND#485.1572.24
-------------------------------------	----------------------------------

Detector Number 3	Calibration Date. 10-09-98 12:17
-----------------------------	--

Eff = 1 / [1.60e-003*En^-4.05e+000 + 1.65e+002*En^7.32e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	5.89e-003	5.94e-003	0.99
2	88.03	1.75e-002	1.73e-002	-1.54
3	122.06	2.25e-002	2.31e-002	2.55
4	165.85	2.21e-002	2.15e-002	-2.94
5	279.19	1.46e-002	1.54e-002	4.84
6	391.69	1.26e-002	1.21e-002	-4.67
7	661.66	8.52e-003	8.22e-003	-3.67
8	898.07	6.47e-003	6.57e-003	1.50
9	1173.24	5.41e-003	5.40e-003	-0.18
10	1332.50	4.87e-003	4.92e-003	1.11
11	1836.08	3.78e-003	3.89e-003	2.81

Geometry File DET0313.EFF	ID. 500gSAND#485.1572.24
-------------------------------------	----------------------------------

Detector Number 3	Calibration Date. 10-09-98 12:17
-----------------------------	--

000167

 Eff = 1 / [2.54e-003*En^-3.88e+000 + 1.64e+002*En^7.46e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	5.88e-003	6.01e-003	2.06
2	88.03	1.75e-002	1.70e-002	-2.83
3	122.06	2.25e-002	2.32e-002	3.14
4	165.85	2.21e-002	2.19e-002	-0.86
5	391.69	1.26e-002	1.23e-002	-2.79
6	661.66	8.52e-003	8.31e-003	-2.51
7	898.07	6.47e-003	6.62e-003	2.17
8	1173.24	5.41e-003	5.42e-003	0.14
9	1332.50	4.87e-003	4.93e-003	1.24
10	1836.08	3.78e-003	3.88e-003	2.48

Effic. coefficients stored on DET0313.EFF.

000168

Sample ID : 98-22-001-S3 B:STD 485.1572.24

```

-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . c:\gdr\spc\10001164.spc
Sampling Start. . . . 01-01-98 10:00 | Counting Start. . . . . 10-09-98 12:17
Sampling Stop . . . . 01-01-98 10:00 | Live Time . . . . . 4500 Sec
Current Date. . . . . 10-09-98 16:29 | Real Time . . . . . 4643 Sec
-----

```

```

-----
Detector #: 3
Energy(keV)= -0.50 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-09-98 10:48
FWHM(keV) = 0.83 + 0.010*En + 5.64e-004*En^2 + 0.00e+000*En^3 11-15-97 20:25
Where En = Sqrt(Energy in keV)
-----

```

```

-----
Sensitivity . . . . . 0.20 | Search Start / End. . . . . 30 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

```

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.50	119.92	10588	319	215	6392	0.96	
2	87.99	176.85	29096	420	221	5981	1.01	
3	122.08	244.99	14881	325	194	4635	1.02	
4	136.54	273.89	1843	210	173	3687	0.96	
5	165.87	332.52	10749	274	162	3219	1.21	
6	255.19	511.02	332	183	168	2829	1.47	
7	279.28	559.16	869	169	146	2348	1.11	
8	391.73	783.92	5914	199	114	1599	1.29	
9	511.13	1022.54	391	140	127	1492	2.87	
10	661.70	1323.47	13563	262	111	1249	1.64	
11	898.07	1795.89	6835	204	111	1247	1.73	
12	1173.28	2345.92	16427	271	83	592	2.01	
13	1325.05	2649.25	202	91	90	381	2.77	a
14	1332.45	2664.04	14832	250	58	235	2.10	b
15	1836.01	3670.44	4209	136	41	116	2.52	

000169

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo. 13 efficiency calibration

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S3

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 12:17

Count Duration: 75 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.5	19	97	Pass
Co-60	40.1	40	99	Pass
Y-88	82	84	98	Pass
Cd-109	840	820	103	Pass
Sn-113	48.4	47	103	Pass
Cs-137	23.4	23	103	Pass
Ce-139	30.2	30	101	Pass
Am-241	59.0	60	98	Pass

Data stored in file 10001164.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000170

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo 13 efficiency calibration verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SC

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/08/98 19:12

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	66	66	100	Pass
Co-60	141	140	102	Pass
Y-88	295	300	98	Pass
Cd-109	2910	2800	104	Pass
Sn-113	195	170	112	Pass
Cs-137	92	87	106	Pass
Ce-139	109	110	103	Pass
Am-241	202	200	99	Pass

Data stored in file 10001157.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000171

DETECTOR CALIBRATION

=====

Sample ID: 98-22-001-S4 B:STD #485.1572.24

MC
10/09/98

Stds Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\10001170.spc
Number of Grams 1.00e+000	Counting Start. 10-09-98 15:03
Current Date. 10-09-98 16:53	Decay Time. 6.75e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 01-01-98 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0413.EFF | ID. 500gSAND#485.1572.24

Detector Number 4 | Calibration Date. 10-09-98 15:03

Eff = 1 / [3.62e-003*En^-3.72e+000 + 1.50e+002*En^7.74e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	6.62e-003	6.77e-003	2.20
2	88.03	1.92e-002	1.87e-002	-2.65
3	122.06	2.54e-002	2.59e-002	1.87
4	165.85	2.44e-002	2.48e-002	1.60
5	279.19	1.79e-002	1.77e-002	-1.13
6	391.69	1.44e-002	1.37e-002	-5.24
7	661.66	9.29e-003	9.15e-003	-1.60
8	898.07	7.04e-003	7.22e-003	2.48
9	1173.24	5.80e-003	5.87e-003	1.28
10	1332.50	5.17e-003	5.32e-003	2.84
11	1836.08	4.11e-003	4.15e-003	1.05

Geometry File DET0413.EFF | ID. 500gSAND#485.1572.24

Detector Number 4 | Calibration Date. 10-09-98 15:03

000172

 Eff = 1 / [3.25e-003*En^-3.76e+000 + 1.51e+002*En^7.70e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	6.62e-003	6.75e-003	1.91
2	88.03	1.92e-002	1.88e-002	-2.33
3	122.06	2.54e-002	2.59e-002	1.77
4	165.85	2.44e-002	2.47e-002	1.15
5	391.69	1.44e-002	1.36e-002	-5.75
6	661.66	9.29e-003	9.12e-003	-1.87
7	898.07	7.04e-003	7.21e-003	2.34
8	1173.24	5.80e-003	5.87e-003	1.23
9	1332.50	5.17e-003	5.32e-003	2.84
10	1836.08	4.11e-003	4.16e-003	1.17

 Geometry File DET0413.EFF | ID. 500gSAND#485.1572.24

Detector Number 4 | Calibration Date. . . . 10-09-98 15:03

Eff = 1 / [4.17e-003*En^-3.67e+000 + 1.50e+002*En^7.77e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	6.62e-003	6.80e-003	2.63
2	88.03	1.92e-002	1.86e-002	-3.12
3	122.06	2.54e-002	2.59e-002	1.91
4	165.85	2.44e-002	2.49e-002	2.20
5	391.69	1.44e-002	1.38e-002	-4.45
6	391.69	1.44e-002	1.38e-002	-4.45
7	661.66	9.29e-003	9.21e-003	-0.94
8	898.07	7.04e-003	7.26e-003	3.04
9	1173.24	5.80e-003	5.90e-003	1.77
10	1332.50	5.17e-003	5.35e-003	3.29
11	1836.08	4.11e-003	4.17e-003	1.42

Effic. coefficients stored on DET0413.EFF.

000173

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=====
GDR_C          Paragon Analytics, Inc.          Fort Collins, CO          Version 6.2
=====

```

Sample ID : 98-22-001-S4 B:STD #485.1572.24

```

-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . c:\gdr\spc\10001170.spc
Sampling Start. . . . .01-01-98 10:00 | Counting Start. . . . . 10-09-98 15:03
Sampling Stop . . . . .01-01-98 10:00 | Live Time . . . . . 4500 Sec
Current Date. . . . .10-09-98 16:52 | Real Time . . . . . 4622 Sec
-----

```

```

-----
Detector #: 4
Energy(keV)= -0.55 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-09-98 08:29
FWHM(keV) = 0.59 + 0.018*En + 4.22e-004*En^2 + 0.00e+000*En^3 11-15-97 21:13
Where En = Sqrt(Energy in keV)
-----

```

```

-----
Sensitivity . . . . . 0.30 | Search Start / End. . . . . 30 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

```

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.48	120.02	11911	309	187	5541	0.88	
2	87.94	176.92	31913	435	223	6145	0.90	
3	122.02	245.06	16831	325	173	4137	0.93	
4	136.46	273.91	2063	198	155	3325	0.99	
5	165.79	332.56	11840	276	150	3112	1.10	
6	279.16	559.22	1061	149	118	1937	1.10	
7	391.60	784.01	6758	208	116	1640	1.18	
8	661.56	1323.70	14796	265	95	1116	1.43	
9	897.93	1796.26	7431	214	121	1346	1.66	
10	1173.14	2346.45	17589	279	81	608	1.90	
11	1332.35	2664.77	15750	259	62	325	1.90	
12	1835.95	3671.56	4565	139	30	63	2.46	

000174

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geometry 13 efficiency calibration

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S4

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 15:03

Count Duration: 75 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.7	19	98	Pass
Co-60	39.4	40	97	Pass
Y-88	82	84	98	Pass
Cd-109	840	820	103	Pass
Sn-113	49.2	47	104	Pass
Cs-137	23.1	23	101	Pass
Ce-139	29.2	30	98	Pass
Am-241	58.7	60	98	Pass

Data stored in file 10001170.SPC

PAI sets control limits for gamma spectroscopy as follows :

Control Limits = Known \pm 15%

Flags:

000175

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo. 13 efficiency calibration verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SD

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 12:18

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	64	66	96	Pass
Co-60	137	140	99	Pass
Y-88	286	300	95	Pass
Cd-109	2920	2800	104	Pass
Sn-113	184	170	105	Pass
Cs-137	89	87	103	Pass
Ce-139	103	110	97	Pass
Am-241	199	200	98	Pass

Data stored in file 10001165.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000176

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GDR_C	Paragon Analytics, Inc.	Fort Collins, CO	Version 6.2
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DETECTOR CALIBRATION

=====

Sample ID: 98-22-001-S5 B:STD #485.1572.24

Mo
10/16/98

Stds Match Tolerance(keV) 2.00	Spectrum File . C:\GDR\SPC\10001182.SPC
Number of Grams 1.00e+000	Counting Start. 10-09-98 18:29
Current Date. 10-16-98 11:18	Decay Time. 6.75e+003 Hrs

Standards File. GDRSTD13.STD | Assay Date 01-01-98 10:00

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0513.EFF | ID. 500gSAND#485.1572.24

Detector Number 5 | Calibration Date. 10-09-98 18:29

Eff = 1 / [3.28e-003*En^-3.81e+000 + 1.50e+002*En^7.36e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	5.58e-003	5.80e-003	3.76
2	88.03	1.76e-002	1.68e-002	-4.88
3	122.06	2.28e-002	2.39e-002	4.33
4	165.85	2.32e-002	2.32e-002	-0.10
5	279.19	1.72e-002	1.69e-002	-1.76
6	391.69	1.37e-002	1.32e-002	-3.16
7	661.66	9.28e-003	9.01e-003	-2.93
8	898.07	7.07e-003	7.20e-003	1.81
9	1173.24	5.83e-003	5.91e-003	1.35
10	1332.50	5.27e-003	5.39e-003	2.10
11	1836.08	4.13e-003	4.25e-003	2.84

Effic. coefficients stored on DET0513.EFF.

000177

Sample ID : 98-22-001-S5 B:STD #485.1572.24

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-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . C:\GDR\SPC\10001182.SPC
Sampling Start. . . . .01-01-98 10:00 | Counting Start. . . . . 10-09-98 18:29
Sampling Stop . . . . .01-01-98 10:00 | Live Time . . . . . 3600 Sec
Current Date. . . . .10-16-98 11:18 | Real Time . . . . . 3649 Sec
-----

```

```

-----
Detector #: 5
Energy(keV)= 1.11 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-09-98 08:33
FWHM(keV) = 0.78 + 0.010*En + 7.19e-004*En^2 + 0.00e+000*En^3 11-15-97 19:27
Where En = Sqrt(Energy in keV)
-----

```

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Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
-----

```

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.53	116.86	8031	260	161	4114	1.01	
2	88.00	173.82	23343	376	197	4752	1.03	
3	122.06	241.96	12075	281	154	3283	1.04	
4	136.47	270.78	1573	190	156	2972	1.18	
5	165.85	329.56	8999	248	144	2549	1.24	
6	279.15	556.22	812	154	132	1912	1.33	
7	391.69	781.36	5113	189	114	1440	1.47	
8	510.84	1019.71	276	131	120	1336	2.17	
9	661.56	1321.22	11814	245	106	1135	1.72	
10	898.01	1794.24	5961	192	109	1088	2.00	
11	1173.13	2344.61	14160	255	88	654	2.22	
12	1332.43	2663.28	12847	240	76	457	2.54	
13	1525.53	3049.57	9	46	43	174	0.64	NET < CL
14	1835.85	3670.36	3670	131	51	165	2.67	

000178

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo 13 efficiency calibrations

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S5

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 18:29

Count Duration: 60 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.3	19	96	Pass
Co-60	39.7	40	98	Pass
Y-88	82	84	98	Pass
Cd-109	860	820	105	Pass
Sn-113	48.6	47	103	Pass
Cs-137	23.5	23	103	Pass
Ce-139	29.9	30	100	Pass
Hg-203	61	60	102	Pass
Am-241	57.9	60	96	Pass

Data stored in file 10001182.SPC

PAI sets control limits for gamma spectroscopy as follows :

Control Limits = Known \pm 15%

Flags:

000179

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo 13 efficiency calibration verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SE

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 15:09

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	64	66	97	Pass
Co-60	138	140	100	Pass
Y-88	286	300	95	Pass
Cd-109	2950	2800	105	Pass
Sn-113	179	170	103	Pass
Cs-137	91	87	104	Pass
Ce-139	104	110	98	Pass
Am-241	193	200	94	Pass

Data stored in file 10001171.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000180

DETECTOR CALIBRATION

Sample ID: 98-22-001-07 B:STD #485.1572.24

Mb
10/21/94

Std Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\20000541.spc
Number of Grams 1.00e+000	Counting Start. 10-19-98 15:22
Current Date. 10-21-98 10:59	Decay Time. 6.99e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 01-01-98 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
=====					
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0713.EFF	ID. 500gSAND#485.1572.24
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Detector Number 7	Calibration Date. 10-19-98 15:22
-----------------------------	--

Eff = 1 / [3.35e-001*En^-1.60e+000 + 2.13e+002*En^8.79e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
=====				
1	59.50	2.07e-002	2.07e-002	-0.34
2	88.03	2.38e-002	2.41e-002	1.12
3	122.06	2.34e-002	2.31e-002	-1.29
4	165.85	2.00e-002	2.00e-002	0.02
5	279.19	1.37e-002	1.39e-002	1.06
6	391.69	1.07e-002	1.05e-002	-1.61
7	661.66	6.59e-003	6.70e-003	1.65
8	898.07	5.01e-003	5.14e-003	2.39
9	1173.24	4.08e-003	4.07e-003	-0.36
10	1332.50	3.68e-003	3.64e-003	-1.27
11	1836.08	2.82e-003	2.75e-003	-2.63

Effic. coefficients stored on DET0713.EFF.

000181

Sample ID : 98-22-001-07 B:STD #485.1572.24

Sample Size	1.00e+000	Sample	Spectrum File . c:\gdr\spc\20000541.spc
Sampling Start.	01-01-98 10:00	Counting Start.	10-19-98 15:22
Sampling Stop	01-01-98 10:00	Live Time	5400 Sec
Current Date.	10-21-98 10:58	Real Time	5451 Sec

Detector #: 7

Energy(keV) = -1.34 + 0.500*Ch + 2.21e-007*Ch^2 + 0.00e+000*Ch^3 10-19-98 11:07

FWHM(keV) = 0.60 + 0.012*En + 6.43e-004*En^2 + 0.00e+000*En^3 10-20-96 13:05

Where En = Sqrt(Energy in keV)

Sensitivity	0.20	Search Start / End.	30 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	33.18	69.05	4109	200	132	2696	0.76	a
2	37.84	78.36	1145	191	157	3405	0.90	b
3	59.54	121.77	44752	508	246	8645	0.77	
4	88.05	178.78	46700	493	208	6191	0.79	
5	122.02	246.72	18094	319	147	3394	0.86	
6	136.44	275.56	2100	194	151	3132	1.03	
7	165.83	334.32	11081	263	138	2635	0.94	
8	255.02	512.66	128	127	107	1803	0.61	
9	279.10	560.79	839	137	110	1663	1.11	
10	391.62	785.73	5649	192	107	1409	1.15	
11	661.67	1325.39	12585	250	102	1152	1.44	
12	814.20	1630.07	28	101	93	947	0.38	NET < CL
13	897.99	1797.42	5949	198	118	1292	1.66	
14	1173.28	2347.05	14804	258	81	561	1.77	
15	1325.49	2650.83	228	122	129	440	5.60	a
16	1332.54	2664.89	13415	237	47	162	1.93	b
17	1836.29	3669.68	3520	123	32	74	2.24	

Paragon Analytics, Inc.
GAMMA SPECTROMETRY QA RESULTS SUMMARY
Method 901.1 (Modified)

Page 1

Client Name: Paragon Analytics, Inc.
Client Project Id: Geometry 13 efficiency calibrations
Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S7 Date Collected: 01/01/98 10:00
Sample Matrix: Soil Date Analyzed: 10/19/98 15:22
Count Duration: 90 Min. Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	19.3	19	101	Pass
Co-60	40.7	40	101	Pass
Y-88	84	84	100	Pass
Cd-109	810	820	99	Pass
Sn-113	47.9	47	102	Pass
Cs-137	22.5	23	99	Pass
Ce-139	29.9	30	100	Pass
Hg-203	60	60	99	Pass
Am-241	60.4	60	100	Pass

Data stored in file 20000541.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000183

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geometry 13 efficiency calibration verification

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SG

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/21/98 09:41

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	67	66	101	Pass
Co-60	142	140	103	Pass
Y-88	312	300	103	Pass
Cd-109	2770	2800	99	Pass
Sn-113	176	170	101	Pass
Cs-137	88	87	101	Pass
Ce-139	105	110	100	Pass
Am-241	205	200	101	Pass

Data stored in file 20000556.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000184

DETECTOR CALIBRATION

Sample ID: 98-22-001-S9 B:STD #485.1572.24

MP
10/17/98

Std Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\20000502.spc
Number of Grams 1.00e+000	Counting Start. 10-09-98 16:20
Current Date. 10-17-98 11:17	Decay Time. 6.75e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 01-01-98 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET0913.EFF	ID. 500gSAND#485.1572.24
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Detector Number 9	Calibration Date. 10-09-98 16:20
-----------------------------	--

Eff = 1 / [2.43e-002*En^-2.52e+000 + 6.21e+001*En^6.29e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	2.46e-002	2.50e-002	1.52
2	88.03	4.20e-002	4.08e-002	-2.77
3	122.06	4.65e-002	4.68e-002	0.51
4	165.85	4.32e-002	4.49e-002	3.65
5	279.19	3.51e-002	3.52e-002	0.32
6	391.69	3.02e-002	2.88e-002	-4.79
7	661.66	2.23e-002	2.09e-002	-6.88
8	898.07	1.68e-002	1.72e-002	2.66
9	1173.24	1.45e-002	1.46e-002	0.73
10	1332.50	1.31e-002	1.34e-002	2.75
11	1836.08	1.06e-002	1.10e-002	3.29

Geometry File DET0913.EFF	ID. 500gSAND#485.1572.24
-------------------------------------	----------------------------------

Detector Number 9	Calibration Date. 10-09-98 16:20
-----------------------------	--

000185

 Eff = 1 / [3.97e-002*En^-2.34e+000 + 6.09e+001*En^6.37e-001]
 (Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	2.46e-002	2.52e-002	2.39
2	88.03	4.20e-002	4.04e-002	-4.00
3	122.06	4.65e-002	4.66e-002	0.19
4	165.85	4.32e-002	4.53e-002	4.63
5	279.19	3.51e-002	3.60e-002	2.52
6	391.69	3.02e-002	2.95e-002	-2.31
7	661.66	2.23e-002	2.13e-002	-4.55
8	661.66	2.23e-002	2.13e-002	-4.55
9	661.66	2.23e-002	2.13e-002	-4.55
10	661.66	2.23e-002	2.13e-002	-4.55
11	661.66	2.23e-002	2.13e-002	-4.55
12	898.07	1.68e-002	1.76e-002	4.63
13	1173.24	1.44e-002	1.48e-002	2.55
14	1332.50	1.31e-002	1.37e-002	4.42
15	1332.50	1.31e-002	1.37e-002	4.42
16	1836.08	1.06e-002	1.12e-002	4.67

Effic. coefficients stored on DET0913.EFF.

000136

Sample ID : 98-22-001-S9 B:STD #485.1572.24

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\20000502.spc
Sampling Start.01-01-98 10:00	Counting Start. 10-09-98 16:20
Sampling Stop01-01-98 10:00	Live Time 3600 Sec
Current Date.10-17-98 11:15	Real Time 3720 Sec

Detector #: 9

Energy(keV)= -1.10 + 0.500*Ch + 1.29e-007*Ch^2 + 0.00e+000*Ch^3 10-09-98 07:43

FWHM(keV) = 0.90 + 0.007*En + 8.40e-004*En^2 + 0.00e+000*En^3 11-15-97 17:56

Where En = Sqrt(Energy in keV)

Sensitivity 0.20	Search Start / End. 80 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.48	121.19	35365	495	288	10523	1.09	
2	65.90	134.03	25	233	192	6788	0.16	NET < CL
3	87.99	178.22	55744	579	304	10925	1.13	
4	121.97	246.18	24632	410	243	6503	1.15	
5	136.37	274.97	3016	243	196	4703	1.13	
6	165.77	333.78	16783	332	187	4295	1.26	
7	255.09	512.40	507	197	177	3450	1.69	
8	279.06	560.33	1660	196	164	2980	1.63	
9	351.82	705.85	205	165	150	2475	1.28	
10	391.63	785.44	11318	273	161	2589	1.65	
11	511.25	1024.61	847	186	173	2352	3.09	
12	609.93	1221.88	59	136	125	1720	0.61	NET < CL
13	661.67	1325.31	28384	374	154	2194	2.03	
14	898.01	1797.70	14146	291	161	2197	2.27	
15	1173.23	2347.64	35081	416	180	2200	2.64	
16	1313.65	2628.17	14	84	83	505	0.49	NET < CL
17	1332.49	2665.81	31855	394	167	1843	2.81	
18	1459.99	2920.48	77	74	70	383	1.15	
19	1835.95	3671.24	9442	230	126	875	3.62	

000187

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geometry 13 efficiency calibration

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S9

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 16:20

Count Duration: 60 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	19.0	19	100	Pass
Co-60	39.0	40	97	Pass
Y-88	80	84	95	Pass
Cd-109	850	820	104	Pass
Sn-113	48.2	47	102	Pass
Cs-137	23.9	23	105	Pass
Ce-139	28.5	30	95	Pass
Am-241	58.9	60	98	Pass

Data stored in file 20000502.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000188

Paragon Analytics, Inc.
GAMMA SPECTROMETRY QA RESULTS SUMMARY
Method 901.1 (Modified)

Page 1

Client Name: Paragon Analytics, Inc.
Client Project Id: Geometry 13 efficiency calibration verification
Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SI

Date Collected: 07/01/97 10:00

Sample Matrix: Soil

Date Analyzed: 10/09/98 17:36

Count Duration: 30 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	67	66	101	Pass
Co-60	137	140	99	Pass
Y-88	300	300	100	Pass
Cd-109	2920	2800	104	Pass
Sn-113	175	170	100	Pass
Cs-137	93	87	107	Pass
Ce-139	102	110	97	Pass
Am-241	188	200	92	Pass

Data stored in file 20000505.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000189

DETECTOR CALIBRATION

Sample ID: 98-22-001-S0 B:STD #485.1572.24

MB
10/17/98

Std Match Tolerance(keV) 2.00	Spectrum File . c:\gdr\spc\20000530.spc
Number of Grams 1.00e+000	Counting Start. 10-17-98 11:25
Current Date. 10-17-98 15:03	Decay Time. 6.94e+003 Hrs

Standards File. GDRSTD13.STD	Assay Date 01-01-98 10:00
--------------------------------------	-------------------------------------

ID.: Geo 13 500 gram sand in poly 485.1274.24

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.789e+006	0.35900	1115
2	Cd-109	88.03	1.114e+004	0.03720	15095
3	Co-57	122.06	6.502e+003	0.85510	353
4	Ce-139	165.85	3.304e+003	0.80350	553
5	Hg-203	279.19	1.118e+003	0.77300	1115
6	Sn-113	391.69	2.762e+003	0.64900	872
7	Cs-137	661.66	2.645e+005	0.85120	423
8	Y-88	898.07	2.558e+003	0.93400	1562
9	Co-60	1173.24	4.621e+004	1.00000	746
10	Co-60	1332.50	4.621e+004	1.00000	749
11	Y-88	1836.08	2.558e+003	0.99380	1546

Geometry File DET1013.EFF | ID. 500gSAND#485.1572.24

Detector Number 10 | Calibration Date. 10-17-98 11:25

Eff = 1 / [1.57e-003*En^-4.19e+000 + 1.41e+002*En^7.29e-001]
(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	4.00e-003	4.31e-003	7.07
2	88.03	1.63e-002	1.53e-002	-7.06
3	122.06	2.33e-002	2.44e-002	4.58
4	165.85	2.38e-002	2.44e-002	2.35
5	279.19	1.86e-002	1.78e-002	-4.00
6	391.69	1.49e-002	1.40e-002	-6.21
7	661.66	9.96e-003	9.57e-003	-4.06
8	898.07	7.43e-003	7.66e-003	2.93
9	1173.24	6.12e-003	6.30e-003	2.84
10	1332.50	5.59e-003	5.74e-003	2.61
11	1836.08	4.33e-003	4.55e-003	4.88

Geometry File DET1013.EFF | ID. 500gSAND#485.1572.24

Detector Number 10 | Calibration Date. 10-17-98 11:25

000190

$$\text{Eff} = 1 / [1.17\text{e-}003 \cdot \text{En}^{-4.30\text{e+}000} + 1.40\text{e+}002 \cdot \text{En}^{7.25\text{e-}001}]$$

(Where En = Energy in MeV)

Pk. #	Energy (kev)	Measured Efficiency	Calculated Efficiency	% Difference
1	59.50	4.00e-003	4.24e-003	5.70
2	59.50	4.00e-003	4.24e-003	5.70
3	59.50	4.00e-003	4.24e-003	5.70
4	88.03	1.63e-002	1.55e-002	-5.35
5	88.03	1.63e-002	1.55e-002	-5.35
6	88.03	1.63e-002	1.55e-002	-5.35
7	122.06	2.33e-002	2.47e-002	5.99
8	122.06	2.33e-002	2.47e-002	5.99
9	165.85	2.38e-002	2.45e-002	2.98
10	279.19	1.86e-002	1.79e-002	-3.73
11	391.69	1.49e-002	1.41e-002	-5.87
12	391.69	1.49e-002	1.41e-002	-5.87
*13	392.00	1.55e-002	1.40e-002	-10.35
14	661.66	9.96e-003	9.62e-003	-3.53
15	898.07	7.44e-003	7.71e-003	3.52
16	1173.24	6.12e-003	6.35e-003	3.52
17	1332.50	5.59e-003	5.79e-003	3.34
*18	1836.00	4.28e-003	4.59e-003	6.71
19	1836.08	4.33e-003	4.59e-003	5.70
20	1836.08	4.33e-003	4.59e-003	5.70

Effic. coefficients stored on DET1013.EFF.

* Those points added to improve overall fit of the curve
to measured data. MB 10/17/98

000191

Sample ID : 98-22-001-S0 B:STD #485.1572.24

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-----
Sample Size . . . . 1.00e+000 Sample | Spectrum File . c:\gdr\spc\20000530.spc
Sampling Start. . . . .01-01-98 10:00 | Counting Start. . . . . 10-17-98 11:25
Sampling Stop . . . . .01-01-98 10:00 | Live Time . . . . . 7200 Sec
Current Date. . . . .10-17-98 15:03 | Real Time . . . . . 7316 Sec
-----

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-----
Detector #: 10
Energy(keV)= -0.82 + 0.500*Ch + 1.97e-007*Ch^2 + 0.00e+000*Ch^3 10-16-98 16:18
FWHM(keV) = 0.66 + 0.009*En + 7.42e-004*En^2 + 0.00e+000*En^3 11-15-97 17:40
Where En = Sqrt(Energy in keV)
-----

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Sensitivity . . . . . 0.20 | Search Start / End. . . . . 60 / 4000
Sigma Multiplier. . . . . 2.00 |
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PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.54	120.78	11524	355	241	9195	0.80	
2	88.05	177.84	42922	501	246	8775	0.84	
3	122.03	245.81	24131	384	193	5906	0.88	
4	136.44	274.65	3177	232	173	4748	1.00	
5	165.83	333.44	17767	342	188	4903	1.11	
6	255.18	512.19	345	186	160	3544	0.71	
7	279.15	560.14	1565	218	187	3853	1.13	
8	391.66	785.15	10637	273	164	2975	1.20	
9	661.70	1325.08	25348	354	146	2132	1.55	
10	898.03	1797.42	11927	272	155	2200	1.88	
11	1173.29	2347.35	29646	364	113	1092	2.21	
12	1325.73	2651.81	441	174	183	1028	4.87	a
13	1332.51	2665.33	27190	340	84	459	2.30	b
14	1836.11	3670.58	7308	177	44	135	2.86	

GAMMA SPECTROMETRY QA RESULTS SUMMARY

Method 901.1 (Modified)

Client Name: Paragon Analytics, Inc.

Client Project Id: Geo 13 efficiency calibration

Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-S0

Date Collected: 01/01/98 10:00

Sample Matrix: Soil

Date Analyzed: 10/17/98 11:25

Count Duration: 120 Min.

Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	18.0	19	94	Pass
Co-60	39.0	40	97	Pass
Y-88	80	84	95	Pass
Cd-109	860	820	105	Pass
Sn-113	49.9	47	106	Pass
Cs-137	23.7	23	104	Pass
Ce-139	29.0	30	97	Pass
Am-241	56.7	60	94	Pass

Data stored in file 20000530.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000193

Paragon Analytics, Inc.
GAMMA SPECTROMETRY QA RESULTS SUMMARY
Method 901.1 (Modified)

Page 1

Client Name: Paragon Analytics, Inc.
Client Project Id: Geometry 13 efficiency calibration verification
Client Sample ID: Lab Control

Lab Sample ID: 98-22-001-SJ Date Collected: 07/01/97 10:00
Sample Matrix: Soil Date Analyzed: 10/17/98 13:58
Count Duration: 30 Min. Aliquot: 500.000

Nuclide	Reported (pCi/Gram)	Known Value	Percent Recovery	Flag
Co-57	61	66	91	Pass
Co-60	134	140	97	Pass
Y-88	282	300	94	Pass
Cd-109	2910	2800	104	Pass
Sn-113	187	170	107	Pass
Cs-137	89	87	103	Pass
Ce-139	100	110	94	Pass
Am-241	188	200	92	Pass

Data stored in file 20000535.SPC

PAI sets control limits for gamma spectroscopy as follows :
Control Limits = Known \pm 15%

Flags:

000194

Gamma Spectroscopy
Instrument Calibration
Background Calibration

000195

Gamma Spectrometer Calibration Log

Date: 10/10/98Reviewed By: 107110

Det. No.	Out of Service	Background				Source Check			Repeat Source Check			
		Started	OK	Cal	Chk	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corr. action taken (see below)	Removed from service
1		MB	RG	✓	✓	JH	MB					
2		|	RG	✓	✓	JH	|					
3		|	RG	✓	✓	JH	|					
4		|	RG	✓	✓	JH	|					
5		↓	RG	✓	✓	JH	↓					
6	X											
7												
8												
9		MB	RG	✓	✓	JH	MB					
10		↓	RG	✓	✓	JH		662 keV Centroid 60 1332 ↓ ↓		662 keV Centroid 60 1332 ↓ ↓		
11	X											
12	X											

Corrective Action:

Daily checks were repeated after LN₂ fills until gain appeared stable on all systems. All parameters passed for det. 10. Det 5 gain stabilized in a different location than before - bkg calibration count will be done and examined for signs of instability during the count. MB 10/10/98

Gamma Spectrometer Run Log

Date:

10/10/98

Reviewed By:

167442

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
9809137-C5	MB	7	FESS	4000 pol counts	1946	MB	FESS cal dt 98160205 / F09137C5
↓ C6	↓	8	↓	↓	↓	↓	↓ ↓ ↓ of C6
9809137-D3		7	FESS	120 min	2044	MB	FESS / F09137D3
↓ -D4		8	↓	↓	↓	↓	↓ ↓ D4
98-22-006-01	RG	1	N/A	2000 min	2139	MB	Monthly bkg calibrating / 1000/1197
↓ 02	↓	2	↓	↓	2140	↓	66011010 1198
↓ 03	↓	3	↓	↓	2141	↓	66031010 1199
↓ 04	↓	4	↓	↓	2142	↓	66041010 1200
↓ 05	↓	5	↓	↓	2148	↓	66051010 1201
↓ 09	↓	9	↓	↓	2148	↓	66091010 20000513
↓ 10	↓	10	↓	↓	2140	↓	66101010 512
<div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto; transform: rotate(45deg); display: flex; align-items: center; justify-content: center;"> <div style="transform: rotate(-45deg);">MB</div> <div style="transform: rotate(-45deg);">10-10-98</div> </div>							

000197

Sample ID : 98-22-006-01 B:GS01BG 10/10/98 ¹¹⁶
 10/14/98

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\10001197.spc
Sampling Start. 10-10-98 12:00	Counting Start. 10-10-98 21:31
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. 10-14-98 12:10	Real Time 120538 Sec

Detector #: 1

Energy(keV) = -1.05 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-10-98 19:47

FWHM(keV) = 0.95 + 0.021*En + 4.19e-004*En^2 + 0.00e+000*En^3 10-08-98 11:48

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.59	129.01	1370	316	295	7490	1.82	a
2	66.21	134.23	1536	235	199	5041	1.08	b
3	92.64	186.99	2888	260	218	5267	1.49	
4	139.91	281.32	1072	233	210	4358	1.20	a
5	143.93	289.35	394	202	179	3918	1.05	b
6	185.83	372.98	2479	248	209	4822	1.54	
7	198.42	398.11	1619	243	211	4917	1.23	
8	238.66	478.42	1639	242	210	4877	1.20	
9	295.31	591.48	414	212	191	4040	1.06	
10	338.31	677.31	226	212	197	3903	0.81	
11	351.85	704.32	1028	202	176	3437	1.43	
12	511.09	1022.15	9422	289	206	3605	2.71	
13	558.45	1116.67	1057	179	156	2444	1.39	
14	569.97	1139.66	483	184	168	2825	1.17	
15	583.49	1166.65	998	200	183	2849	1.90	
16	597.68	1194.97	847	251	238	4423	2.78	
17	609.46	1218.48	1172	244	223	4564	1.59	
18	652.01	1303.41	245	181	171	2500	1.33	
19	669.78	1338.88	240	163	152	2138	1.39	
20	692.99	1385.19	104	172	160	2560	1.34	NET < CL
21	727.82	1454.71	109	140	127	1795	0.69	NET < CL
22	803.16	1605.07	857	158	140	1798	1.85	
23	861.08	1720.67	246	150	140	1794	1.81	
24	898.55	1795.45	426	146	135	1558	2.44	
25	911.48	1821.26	844	160	145	1668	1.91	
26	962.69	1923.48	596	241	250	2452	3.57	a
27	969.21	1936.50	369	119	107	1088	1.35	b
28	1001.44	2000.82	177	144	138	1493	1.56	
29	1014.25	2026.39	164	139	133	1402	2.59	
30	1063.82	2125.31	172	149	143	1615	2.65	
31	1120.51	2238.47	235	140	132	1478	1.53	
32	1238.59	2474.12	205	131	125	1232	3.22	
33	1327.18	2650.94	68	107	101	875	1.04	NET < CL

000198

34	1377.56	2751.50	73	102	97	795	1.64	NET < CL
35	1461.17	2918.37	3337	162	113	880	2.14	
36	1509.35	3014.53	37	88	83	636	0.60	NET < CL
37	1764.82	3524.40	462	102	92	587	2.38	

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-01 B:GS01BG 10/10/98

Bkg File: det01.bkg	Counting Start. 10-10-98 21:31
ID.: 98-21-006-21 B:GS01BG 9/18/98	Current Date 10-14-98 12:10

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.59	1.82	1370	316	254	612	NET < CL
2	66.21	1.08	1536	235	-298	609	NET < CL
3	92.64	1.49	2888	260	-55	585	NET < CL
4	139.91	1.20	1072	233	94	479	NET < CL
5	143.93	1.05	394	202	-54	422	NET < CL
6	185.83	1.54	2479	248	190	554	NET < CL
7	198.42	1.23	1619	243	-155	585	NET < CL
8	238.66	1.20	1639	242	-347	550	NET < CL
9	295.31	1.06	414	212	-120	499	NET < CL
11	351.85	1.43	1028	202	-44	450	NET < CL
12	511.09	2.71	9422	289	-73	648	NET < CL
13	558.45	1.39	1057	179	-242	414	NET < CL
14	569.97	1.17	483	184	-183	439	NET < CL
15	583.49	1.90	998	200	1	454	NET < CL
17	609.46	1.59	1172	244	173	583	NET < CL
18	652.01	1.33	245	181	188	202	
19	669.78	1.39	240	163	9	395	NET < CL
21	727.82	0.69	109	140	76	146	NET < CL
22	803.16	1.85	857	158	-14	371	NET < CL
24	898.55	2.44	426	146	93	345	NET < CL
25	911.48	1.91	844	160	-34	345	NET < CL
26	962.69	3.57	596	241	102	450	NET < CL
27	969.21	1.35	369	119	-5	268	NET < CL
28	1001.44	1.56	177	144	-31	324	NET < CL
29	1014.25	2.59	164	139	10	334	NET < CL
31	1120.51	1.53	235	140	-6	319	NET < CL
32	1238.59	3.22	205	131	38	297	NET < CL
35	1461.17	2.14	3337	162	-496	373	NET < CL
36	1509.35	0.60	37	88	-92	226	NET < CL
37	1764.82	2.38	462	102	-161	235	NET < CL

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-01 B:GS01BG 10/10/98

Bkg File: det01.bkg	Counting Start. 10-10-98 21:31
ID.: 98-22-006-01 B:GS01BG 10/10/98	Current Date 10-14-98 12:11

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.59	1.82	1370	316	-0	706	NET < CL
2	66.21	1.08	1536	235	-0	526	NET < CL
3	92.64	1.49	2888	260	0	581	NET < CL
4	139.91	1.20	1072	233	-0	521	NET < CL
5	143.93	1.05	394	202	-0	452	NET < CL
6	185.83	1.54	2479	248	0	554	NET < CL
7	198.42	1.23	1619	243	0	543	NET < CL
8	238.66	1.20	1639	242	0	541	NET < CL
9	295.31	1.06	414	212	0	474	NET < CL
10	338.31	0.81	226	212	-0	474	NET < CL
11	351.85	1.43	1028	202	0	452	NET < CL
12	511.09	2.71	9422	289	-0	646	NET < CL
13	558.45	1.39	1057	179	0	400	NET < CL
14	569.97	1.17	483	184	-0	412	NET < CL
15	583.49	1.90	998	200	-0	447	NET < CL
16	597.68	2.78	847	251	0	561	NET < CL
17	609.46	1.59	1172	244	0	546	NET < CL
18	652.01	1.33	245	181	-0	405	NET < CL
19	669.78	1.39	240	163	0	365	NET < CL
22	803.16	1.85	857	158	0	353	NET < CL
23	861.08	1.81	246	150	0	335	NET < CL
24	898.55	2.44	426	146	0	327	NET < CL
25	911.48	1.91	844	160	-0	358	NET < CL
26	962.69	3.57	596	241	-0	539	NET < CL
27	969.21	1.35	369	119	-0	266	NET < CL
28	1001.44	1.56	177	144	-0	322	NET < CL
29	1014.25	2.59	164	139	-0	311	NET < CL
30	1063.82	2.65	172	149	0	333	NET < CL
31	1120.51	1.53	235	140	0	313	NET < CL
32	1238.59	3.22	205	131	0	293	NET < CL
35	1461.17	2.14	3337	162	0	362	NET < CL
37	1764.82	2.38	462	102	0	228	NET < CL

000201

Sample ID : 98-22-006-02 B:GS02BG 10/10/98 ^{M6}_{10/14/98}

Sample Size	1.00e+000	Sample	Spectrum File . c:\gdr\spc\10001198.spc
Sampling Start.	10-10-98 12:00		Counting Start. 10-10-98 21:34
Sampling Stop	10-10-98 12:00		Live Time 120000 Sec
Current Date.	10-14-98 12:24		Real Time 120538 Sec

Detector #: 2

Energy(keV)= 0.35 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-10-98 19:47

FWHM(keV) = 1.03 + -0.011*En + 1.01e-003*En^2 + 0.00e+000*En^3 10-08-98 14:10

Where En = Sqrt(Energy in keV)

Sensitivity	0.15	Search Start / End.	50 / 4000
Sigma Multiplier.	2.00		

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.13	125.62	344	135	115	1802	0.91	a
2	66.15	131.67	390	136	113	1845	0.97	b
3	92.65	184.69	912	156	130	2063	1.12	
4	140.07	279.59	278	139	121	1812	0.85	
5	185.83	371.16	577	154	135	2005	1.18	
6	198.61	396.73	466	147	129	1838	1.20	
7	238.88	477.33	381	135	117	1670	1.06	
8	295.63	590.89	264	108	90	1125	1.13	
9	352.21	704.11	454	107	89	974	1.43	
10	511.49	1022.84	3047	159	107	1148	2.50	
11	558.88	1117.68	376	89	72	638	1.42	
12	570.19	1140.30	164	87	75	692	1.30	
13	584.08	1168.10	160	100	90	818	1.13	
14	597.28	1194.52	45	104	95	1007	1.16	NET < CL
15	609.77	1219.51	336	114	101	1034	1.33	
16	651.99	1303.99	59	80	72	580	1.11	NET < CL
17	670.57	1341.18	-25	93	89	722	0.69	NET < CL
18	803.52	1607.24	276	82	70	493	1.37	
19	899.43	1799.17	99	75	68	462	2.09	
20	912.16	1824.63	174	72	64	378	1.84	
21	962.20	1924.78	37	64	58	367	0.56	NET < CL
22	969.91	1940.21	71	78	73	453	0.81	NET < CL
23	1014.60	2029.62	28	62	57	325	0.63	NET < CL
24	1120.86	2242.27	60	67	62	358	1.13	NET < CL
25	1378.41	2757.66	37	57	54	229	1.12	NET < CL
26	1461.42	2923.77	420	66	50	210	1.62	
27	1765.40	3532.07	120	56	50	188	2.29	

000202

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-02 B:GS02BG 10/10/98

Bkg File: det02.bkg	Counting Start.	10-10-98 21:34
ID.: 98-21-006-2A B:GS02BG 9/7/98	Current Date	10-14-98 12:24

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.13	0.91	344	135	81	261	NET < CL
2	66.15	0.97	390	136	-57	309	NET < CL
3	92.65	1.12	912	156	-80	333	NET < CL
4	140.07	0.85	278	139	3	295	NET < CL
5	185.83	1.18	577	154	-113	306	NET < CL
6	198.61	1.20	466	147	82	298	NET < CL
7	238.88	1.06	381	135	2	284	NET < CL
8	295.63	1.13	264	108	108	245	
9	352.21	1.43	454	107	-37	252	NET < CL
10	511.49	2.50	3047	159	45	354	NET < CL
11	558.88	1.42	376	89	7	201	NET < CL
12	570.19	1.30	164	87	21	198	NET < CL
13	584.08	1.13	160	100	-133	213	NET < CL
14	597.28	1.16	45	104	-132	236	NET < CL
15	609.77	1.33	336	114	-59	255	NET < CL
18	803.52	1.37	276	82	40	185	NET < CL
19	899.43	2.09	99	75	21	164	NET < CL
20	912.16	1.84	174	72	15	167	NET < CL
21	962.20	0.56	37	64	-67	148	NET < CL
24	1120.86	1.13	60	67	54	68	NET < CL
26	1461.42	1.62	420	66	-93	155	NET < CL
27	1765.40	2.29	120	56	71	69	

000203

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-02 B:GS02BG 10/10/98

Bkg File: det02.bkg	Counting Start.	10-10-98 21:34
ID.: 98-22-006-02 B:GS02BG 10/10/98	Current Date	10-14-98 12:25

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.13	0.91	344	135	0	302	NET < CL
2	66.15	0.97	390	136	-0	304	NET < CL
3	92.65	1.12	912	156	-1	349	NET < CL
4	140.07	0.85	278	139	0	311	NET < CL
5	185.83	1.18	577	154	0	344	NET < CL
6	198.61	1.20	466	147	-0	328	NET < CL
7	238.88	1.06	381	135	-1	302	NET < CL
8	295.63	1.13	264	108	-0	241	NET < CL
9	352.21	1.43	454	107	-1	239	NET < CL
10	511.49	2.50	3047	159	0	355	NET < CL
11	558.88	1.42	376	89	-1	199	NET < CL
12	570.19	1.30	164	87	-1	195	NET < CL
13	584.08	1.13	160	100	0	223	NET < CL
15	609.77	1.33	336	114	0	255	NET < CL
18	803.52	1.37	276	82	-0	183	NET < CL
19	899.43	2.09	99	75	0	168	NET < CL
20	912.16	1.84	174	72	0	161	NET < CL
26	1461.42	1.62	420	66	-0	148	NET < CL
27	1765.40	2.29	120	56	-1	125	NET < CL

000204

Sample ID : 98-22-008-03 B:GS03BG 10/10/98 ^{Mb} 10/14/98

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\10001199.spc
Sampling Start. 10-10-98 12:00	Counting Start. 10-10-98 21:35
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. 10-14-98 12:25	Real Time 120538 Sec

Detector #: 3

Energy(keV) = -0.51 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-10-98 19:47

FWHM(keV) = 0.83 + 0.010*En + 5.64e-004*En^2 + 0.00e+000*En^3 11-15-97 20:25

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.29	127.48	364	138	119	1802	0.97	a
2	66.48	133.86	311	137	116	1926	0.85	b
3	84.35	169.58	26	142	125	2155	0.27	NET < CL
4	92.66	186.19	1011	145	115	1832	1.15	
5	139.96	280.71	165	144	128	2013	0.68	
6	185.75	372.21	738	146	122	1833	1.25	
7	198.35	397.38	393	149	132	1940	1.36	
8	238.67	477.96	421	124	103	1479	0.94	
9	295.23	590.99	137	118	105	1343	0.66	
10	351.99	704.41	284	113	97	1167	1.30	
11	511.18	1022.52	2993	158	107	1146	2.54	
12	558.38	1116.84	306	102	90	812	1.34	
13	570.02	1140.11	169	112	104	988	1.10	
14	583.41	1166.86	357	103	91	764	1.97	
15	596.02	1192.06	-48	77	67	716	1.75	NET < CL
16	609.31	1218.62	251	117	106	1124	1.13	
17	670.37	1340.63	89	105	101	803	1.69	NET < CL
18	692.33	1384.53	45	83	72	714	0.67	NET < CL
19	803.21	1606.11	250	80	67	500	1.58	
20	898.47	1796.47	135	76	69	438	2.02	
21	911.21	1821.92	67	71	64	447	1.30	
22	962.54	1924.50	97	89	87	495	1.90	a
23	969.38	1938.17	83	86	83	481	2.06	b
24	1001.05	2001.45	79	73	68	399	1.68	
25	1014.36	2028.04	49	73	69	401	1.21	NET < CL
26	1460.90	2920.39	468	71	55	238	2.22	
27	1765.46	3529.00	63	52	48	173	1.51	

000205

Sample ID : 98-22-008-03 B:GS03BG 10/10/98

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Bkg File: . . . . . det03.bkg | Counting Start. . . . . 10-10-98 21:35
ID.: 98-22-008-03 B:GS03BG 10/10/98 | Current Date . . . . . 10-14-98 12:27
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PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.29	0.97	364	138	0	309	NET < CL
2	66.48	0.85	311	137	-0	307	NET < CL
4	92.66	1.15	1011	145	0	324	NET < CL
5	139.96	0.68	165	144	0	322	NET < CL
6	185.75	1.25	738	146	0	326	NET < CL
7	198.35	1.36	393	149	0	333	NET < CL
8	238.67	0.94	421	124	0	277	NET < CL
9	295.23	0.66	137	118	-1	264	NET < CL
10	351.99	1.30	284	113	0	253	NET < CL
11	511.18	2.54	2993	158	0	353	NET < CL
12	558.38	1.34	306	102	-0	228	NET < CL
13	570.02	1.10	169	112	0	250	NET < CL
14	583.41	1.97	357	103	0	230	NET < CL
16	609.31	1.13	251	117	0	262	NET < CL
19	803.21	1.58	250	80	0	179	NET < CL
20	898.47	2.02	135	76	0	170	NET < CL
21	911.21	1.30	67	71	0	159	NET < CL
22	962.54	1.90	97	89	0	199	NET < CL
23	969.38	2.06	83	86	0	192	NET < CL
24	1001.05	1.68	79	73	0	163	NET < CL
26	1460.90	2.22	468	71	0	159	NET < CL
27	1765.46	1.51	63	52	-1	116	NET < CL

Sample ID : 98-22-006-04 B:GS04BG 10/10/98

Mo
10/14/98

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\10001200.spc
Sampling Start. . . . 10-10-98 12:00	Counting Start. . . . 10-10-98 21:36
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. 10-14-98 12:45	Real Time 120538 Sec

Detector #: 4

Energy(keV) = -0.49 + 0.500*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3 10-10-98 19:47

FWHM(keV) = 0.59 + 0.018*En + 4.22e-004*En^2 + 0.00e+000*En^3 11-15-97 21:13

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.40	127.68	190	105	83	1310	0.65	a
2	66.49	133.87	337	121	97	1614	0.83	b
3	84.78	170.41	139	134	116	1873	0.86	
4	92.58	186.00	754	138	111	1703	1.04	
5	143.89	288.55	173	123	106	1556	1.07	
6	185.81	372.34	503	129	107	1569	1.18	
7	198.52	397.74	396	123	102	1439	1.26	
8	238.79	478.22	223	110	90	1285	0.64	
9	295.55	591.67	129	104	89	1095	0.99	
10	351.87	704.23	255	104	90	990	1.30	
11	511.28	1022.83	2841	153	103	1058	2.33	
12	537.68	1075.59	64	84	76	635	1.33	NET < CL
13	558.94	1118.07	301	92	78	677	1.18	
14	569.92	1140.03	247	113	104	925	2.01	
15	583.34	1166.85	212	97	86	752	1.27	
16	609.66	1219.45	227	105	93	955	1.61	
17	651.50	1303.08	64	73	65	515	1.37	NET < CL
18	670.09	1340.23	22	73	65	521	0.33	NET < CL
19	803.37	1606.61	268	86	76	534	1.46	
20	898.89	1797.52	73	85	82	525	2.25	NET < CL
21	911.99	1823.69	111	74	67	416	1.90	
22	962.37	1924.39	83	73	70	356	1.62	a
23	969.44	1938.52	47	60	56	293	1.26	b NET < CL
24	1461.42	2921.80	378	60	43	160	2.10	
25	1765.43	3529.39	43	44	41	141	0.96	

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-04 B:GS04BG 10/10/98

Bkg File:	det04.bkg	Counting Start.	10-10-98 21:36
ID.:	98-21-006-24 B:GS04BG 9/17/98	Current Date	10-14-98 12:45

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
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1	63.40	0.65	190	105	13	251	NET < CL
2	66.49	0.83	337	121	-28	322	NET < CL
4	92.58	1.04	754	138	114	291	
5	143.89	1.07	173	123	43	259	NET < CL
6	185.81	1.18	503	129	48	288	NET < CL
7	198.52	1.26	396	123	-57	280	NET < CL
8	238.79	0.64	223	110	-192	257	NET < CL
9	295.55	0.99	129	104	-159	269	NET < CL
10	351.87	1.30	255	104	-100	244	NET < CL
11	511.28	2.33	2841	153	47	338	NET < CL
13	558.94	1.18	301	92	-11	207	NET < CL
14	569.92	2.01	247	113	139	212	
15	583.34	1.27	212	97	36	197	NET < CL
16	609.66	1.61	227	105	-214	253	NET < CL
19	803.37	1.46	268	86	-45	191	NET < CL
20	898.89	2.25	73	85	-92	183	NET < CL
21	911.99	1.90	111	74	-15	155	NET < CL
22	962.37	1.62	83	73	-6	157	NET < CL
23	969.44	1.26	47	60	3	120	NET < CL
24	1461.42	2.10	378	60	-55	139	NET < CL
25	1765.43	0.96	43	44	-3	102	NET < CL

000208

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-04 B:GS04BG 10/10/98

Bkg File: det04.bkg	Counting Start.	10-10-98 21:36
ID.: 98-22-006-04 B:GS04BG 10/10/98	Current Date	10-14-98 12:45

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.40	0.65	190	105	0	235	NET < CL
2	66.49	0.83	337	121	-0	271	NET < CL
3	84.78	0.86	139	134	-0	300	NET < CL
4	92.58	1.04	754	138	0	308	NET < CL
5	143.89	1.07	173	123	0	275	NET < CL
6	185.81	1.18	503	129	-0	288	NET < CL
7	198.52	1.26	396	123	0	275	NET < CL
8	238.79	0.64	223	110	-1	246	NET < CL
9	295.55	0.99	129	104	0	232	NET < CL
10	351.87	1.30	255	104	0	233	NET < CL
11	511.28	2.33	2841	153	0	342	NET < CL
13	558.94	1.18	301	92	0	206	NET < CL
14	569.92	2.01	247	113	-0	253	NET < CL
15	583.34	1.27	212	97	0	217	NET < CL
16	609.66	1.61	227	105	0	235	NET < CL
19	803.37	1.46	268	86	0	193	NET < CL
21	911.99	1.90	111	74	0	165	NET < CL
22	962.37	1.62	83	73	-0	163	NET < CL
23	969.44	1.26	47	60	-0	134	NET < CL
24	1461.42	2.10	378	60	-0	134	NET < CL
25	1765.43	0.96	43	44	0	98	NET < CL

000209

Sample ID : 98-22-006-05 B:GS05BG 10/10/98 *Mb 10/14/98*

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\10001201.spc
Sampling Start. . . . 10-10-98 12:00	Counting Start. . . . 10-10-98 21:46
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. . . . 10-14-98 12:44	Real Time 120675 Sec

Detector #: 5

Energy(keV) = 1.04 + 0.502*Ch + -3.18e-007*Ch^2 + 0.00e+000*Ch^3 10-10-98 21:34

FWHM(keV) = 0.78 + 0.010*En + 7.19e-004*En^2 + 0.00e+000*En^3 11-15-97 19:27

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. . . . 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	63.31	124.13	290	146	127	2051	0.86	a
2	66.47	130.41	235	161	141	2558	1.02	b
3	92.69	182.69	944	164	137	2309	1.22	
4	139.92	276.85	252	123	102	1637	0.93	
5	185.87	368.46	785	152	128	2000	1.34	
6	198.39	393.43	508	160	141	2200	1.32	
7	238.65	473.71	499	158	139	2142	0.92	
8	295.74	587.57	198	136	123	1662	1.06	
9	338.60	673.04	87	118	105	1347	0.85	NET < CL
10	352.31	700.41	431	128	112	1375	1.28	
11	511.22	1017.47	3608	172	117	1260	2.65	
12	558.57	1111.96	365	109	95	911	1.25	
13	569.95	1134.66	191	124	117	1159	1.48	
14	583.37	1161.46	221	98	86	825	1.29	
15	596.91	1188.48	52	135	130	1430	0.87	NET < CL
16	609.35	1213.31	388	134	121	1356	1.58	
17	803.18	1600.31	328	88	75	567	1.78	
18	898.18	1790.06	74	81	76	528	1.25	NET < CL
19	911.53	1816.72	155	86	79	568	1.53	
20	961.86	1917.27	82	73	68	394	1.26	a
21	969.17	1931.88	85	71	64	413	1.44	b
22	1015.06	2023.55	123	80	75	446	1.80	
23	1120.25	2233.78	50	75	70	454	0.75	NET < CL
24	1460.11	2913.33	585	77	59	271	2.01	
25	1762.84	3519.16	96	60	57	221	2.23	

000210

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-05 B:GS05BG 10/10/98

Bkg File:	det05.bkg	Counting Start.	10-10-98 21:46
ID.:	98-21-006-05 B:GS05BG 9/5/98	Current Date	10-14-98 12:44

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.31	0.86	290	146	22	280	NET < CL
2	66.47	1.02	235	161	-68	337	NET < CL
3	92.69	1.22	944	164	96	342	NET < CL
4	139.92	0.93	252	123	-153	341	NET < CL
5	185.87	1.34	785	152	262	320	
6	198.39	1.32	508	160	85	335	NET < CL
7	238.65	0.92	499	158	59	311	NET < CL
8	295.74	1.06	198	136	-153	286	NET < CL
10	352.31	1.28	431	128	-8	261	NET < CL
11	511.22	2.65	3608	172	174	394	
12	558.57	1.25	365	109	-51	242	NET < CL
13	569.95	1.48	191	124	-54	263	NET < CL
14	583.37	1.29	221	98	-80	250	NET < CL
15	596.91	0.87	52	135	8	146	NET < CL
16	609.35	1.58	388	134	-89	273	NET < CL
17	803.18	1.78	328	88	15	209	NET < CL
19	911.53	1.53	155	86	0	191	NET < CL
20	961.86	1.26	82	73	6	128	NET < CL
21	969.17	1.44	85	71	-33	180	NET < CL
23	1120.25	0.75	50	75	-32	168	NET < CL
24	1460.11	2.01	585	77	-6	172	NET < CL
25	1762.84	2.23	96	60	72	66	

000211

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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-05 B:GS05BG 10/10/98

Bkg File: det05.bkg	Counting Start. 10-10-98 21:46
ID.: 98-22-006-05 B:GS05BG 10/10/98	Current Date 10-14-98 12:44

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.31	0.86	290	146	-0	326	NET < CL
2	66.47	1.02	235	161	-0	360	NET < CL
3	92.69	1.22	944	164	-1	367	NET < CL
4	139.92	0.93	252	123	0	275	NET < CL
5	185.87	1.34	785	152	-1	340	NET < CL
6	198.39	1.32	508	160	0	358	NET < CL
7	238.65	0.92	499	158	0	353	NET < CL
8	295.74	1.06	198	136	0	304	NET < CL
10	352.31	1.28	431	128	0	286	NET < CL
11	511.22	2.65	3608	172	0	385	NET < CL
12	558.57	1.25	365	109	-0	244	NET < CL
13	569.95	1.48	191	124	-0	277	NET < CL
14	583.37	1.29	221	98	0	219	NET < CL
16	609.35	1.58	388	134	0	299	NET < CL
17	803.18	1.78	328	88	-1	197	NET < CL
19	911.53	1.53	155	86	0	192	NET < CL
20	961.86	1.26	82	73	-0	163	NET < CL
21	969.17	1.44	85	71	-0	159	NET < CL
22	1015.06	1.80	123	80	0	179	NET < CL
24	1460.11	2.01	585	77	0	172	NET < CL
25	1762.84	2.23	96	60	-0	134	NET < CL

000212

Sample ID : 98-22-006-09 B:GS09BG 10/10/98 Mo 10/14

Sample Size 1.00e+000 Sample	Spectrum File . c:\gdr\spc\20000513.spc
Sampling Start. 10-10-98 12:00	Counting Start. 10-10-98 20:56
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. 10-14-98 12:29	Real Time 120559 Sec

Detector #: 9

Energy(keV) = -1.05 + 0.500*Ch + 1.37e-007*Ch^2 + 0.00e+000*Ch^3 10-10-98 20:44

FWHM(keV) = 0.90 + 0.007*En + 8.40e-004*En^2 + 0.00e+000*En^3 11-15-97 17:56

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.47	95.06	2629	259	209	6041	1.10	
2	53.66	109.44	592	227	195	5272	1.18	
3	63.26	128.64	1781	278	246	6306	1.25	a
4	66.25	134.62	1291	225	184	5062	0.98	b
5	74.88	151.89	1750	258	220	5894	0.90	a
6	77.10	156.32	2199	238	187	5495	0.93	b
7	84.44	171.01	494	262	239	6136	1.18	a
8	87.24	176.60	640	195	158	4283	0.79	b
9	92.66	187.44	2971	265	218	5837	1.20	
10	139.87	281.87	1018	202	171	3787	1.00	a
11	143.63	289.38	410	190	161	3814	0.88	b
12	185.88	373.88	2709	242	197	4767	1.27	
13	198.42	398.96	1668	230	194	4641	1.15	
14	238.71	479.53	1855	226	193	4036	1.22	a
15	241.89	485.90	1526	221	189	4078	1.17	b
16	295.22	592.55	3594	226	173	3684	1.29	
17	338.52	679.14	298	215	199	3989	1.09	
18	351.99	706.07	6457	248	174	3338	1.37	
19	511.15	1024.29	9258	281	195	3500	2.68	
20	558.58	1119.11	1343	186	163	2446	1.49	
21	569.67	1141.27	600	196	181	3004	1.76	
22	583.39	1168.71	841	178	158	2508	1.66	
23	597.56	1197.02	26	188	174	3306	0.40	NET < CL
24	609.49	1220.87	5039	255	198	3951	1.61	
25	651.97	1305.79	263	209	205	2896	1.84	
26	669.84	1341.51	113	154	143	2046	0.90	NET < CL
27	693.56	1388.93	346	198	187	2979	2.61	
28	726.92	1455.60	213	161	151	2090	1.45	
29	768.22	1538.16	597	174	162	2079	2.22	
30	803.31	1608.29	1177	176	157	1958	2.39	
31	898.76	1799.04	354	160	152	1822	1.73	
32	911.45	1824.39	710	142	125	1440	1.89	
33	933.98	1869.41	242	133	123	1402	2.57	

000213

34	962.23	1925.86	289	128	120	1142	1.42	a
35	969.08	1939.56	381	146	138	1435	1.86	b
36	987.35	1976.06	76	127	120	1316	0.91	NET < CL
37	1001.23	2003.79	199	145	138	1510	1.44	
38	1064.20	2129.62	150	146	141	1563	2.07	
39	1120.74	2242.57	1046	159	142	1584	2.06	
40	1155.82	2312.65	144	145	142	1387	2.61	
41	1238.45	2477.73	510	133	122	1167	2.77	
42	1378.05	2756.57	317	124	118	963	2.38	
43	1461.08	2922.40	2758	161	121	1005	2.49	
44	1509.37	3018.84	122	106	101	812	1.65	
45	1661.32	3322.27	226	107	104	630	3.06	
46	1729.95	3459.29	341	106	99	677	2.49	
47	1764.61	3528.49	1310	117	91	576	2.68	
48	1846.70	3692.37	154	96	93	564	2.80	

000214

Sample ID : 98-22-006-09 B:GS09BG 10/10/98

Bkg File: Det09.bkg Counting Start. 10-10-98 20:56

ID.: 98-21-006-9A B:GS09BG 9/20/98 Current Date 10-14-98 12:29

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	46.47	1.10	2629	259	177	542	NET < CL
2	53.66	1.18	592	227	94	547	NET < CL
3	63.26	1.25	1781	278	69	574	NET < CL
4	66.25	0.98	1291	225	-214	589	NET < CL
5	74.88	0.90	1750	258	-93	540	NET < CL
6	77.10	0.93	2199	238	-27	521	NET < CL
7	84.44	1.18	494	262	140	504	NET < CL
8	87.24	0.79	640	195	21	472	NET < CL
9	92.66	1.20	2971	265	121	589	NET < CL
10	139.87	1.00	1018	202	36	442	NET < CL
11	143.63	0.88	410	190	-32	461	NET < CL
12	185.88	1.27	2709	242	-134	548	NET < CL
13	198.42	1.15	1668	230	179	518	NET < CL
14	238.71	1.22	1855	226	211	466	
15	241.89	1.17	1526	221	-39	469	NET < CL
16	295.22	1.29	3594	226	13	529	NET < CL
17	338.52	1.09	298	215	14	428	NET < CL
18	351.99	1.37	6457	248	30	558	NET < CL
19	511.15	2.68	9258	281	-61	639	NET < CL
20	558.58	1.49	1343	186	22	421	NET < CL
21	569.67	1.76	600	196	-96	442	NET < CL
22	583.39	1.66	841	178	-99	400	NET < CL
23	597.56	0.40	26	188	-286	475	NET < CL
24	609.49	1.61	5039	255	105	575	NET < CL
26	669.84	0.90	113	154	-186	384	NET < CL
28	726.91	1.45	213	161	-20	378	NET < CL
29	768.22	2.22	597	174	62	392	NET < CL
30	803.31	2.39	1177	176	57	401	NET < CL
31	898.76	1.73	354	160	-52	380	NET < CL
32	911.45	1.89	710	142	24	341	NET < CL
33	933.98	2.57	242	133	-68	294	NET < CL
34	962.23	1.42	289	128	39	266	NET < CL
35	969.08	1.86	381	146	-41	337	NET < CL
37	1001.23	1.44	199	145	16	312	NET < CL
38	1064.20	2.07	150	146	14	318	NET < CL
39	1120.74	2.06	1046	159	128	347	NET < CL
40	1155.82	2.61	144	145	-11	296	NET < CL
41	1238.45	2.77	510	133	14	301	NET < CL
42	1378.05	2.38	317	124	-75	260	NET < CL
43	1461.08	2.49	2758	161	-885	371	NET < CL
44	1509.37	1.65	122	106	0	255	NET < CL
46	1729.95	2.49	341	106	152	234	

000215

47	1764.61	2.68	1310	117	-32	265 NET < CL
48	1846.70	2.80	154	96	-109	218 NET < CL

000216

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

Sample ID : 98-22-006-09 B:GS09BG 10/10/98

Bkg File: Det09.bkg	Counting Start. 10-10-98 20:56
ID.: 98-22-006-09 B:GS09BG 10/10/98	Current Date 10-14-98 12:30

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	46.47	1.10	2629	259	-0	579	NET < CL
2	53.66	1.18	592	227	0	508	NET < CL
3	63.26	1.25	1781	278	0	621	NET < CL
4	66.25	0.98	1291	225	-0	503	NET < CL
5	74.88	0.90	1750	258	0	577	NET < CL
6	77.10	0.93	2199	238	-0	532	NET < CL
7	84.44	1.18	494	262	0	586	NET < CL
8	87.24	0.79	640	195	-0	436	NET < CL
9	92.66	1.20	2971	265	-1	593	NET < CL
10	139.87	1.00	1018	202	-0	452	NET < CL
11	143.63	0.88	410	190	0	425	NET < CL
12	185.88	1.27	2709	242	0	541	NET < CL
13	198.42	1.15	1668	230	0	514	NET < CL
14	238.71	1.22	1855	226	-0	505	NET < CL
15	241.89	1.17	1526	221	-0	494	NET < CL
16	295.22	1.29	3594	226	0	505	NET < CL
17	338.52	1.09	298	215	-0	481	NET < CL
18	351.99	1.37	6457	248	-0	554	NET < CL
19	511.15	2.68	9258	281	0	628	NET < CL
20	558.58	1.49	1343	186	0	416	NET < CL
21	569.67	1.76	600	196	0	438	NET < CL
22	583.39	1.66	841	178	0	398	NET < CL
24	609.49	1.61	5039	255	0	570	NET < CL
25	651.97	1.84	263	209	0	467	NET < CL
27	693.56	2.61	346	198	-0	443	NET < CL
28	726.91	1.45	213	161	0	360	NET < CL
29	768.22	2.22	597	174	0	389	NET < CL
30	803.31	2.39	1177	176	0	393	NET < CL
31	898.76	1.73	354	160	-0	358	NET < CL
32	911.45	1.89	710	142	0	317	NET < CL
33	933.98	2.57	242	133	0	298	NET < CL
34	962.23	1.42	289	128	0	286	NET < CL
35	969.08	1.86	381	146	0	327	NET < CL
37	1001.23	1.44	199	145	0	324	NET < CL
38	1064.20	2.07	150	146	-0	327	NET < CL
39	1120.74	2.06	1046	159	-0	356	NET < CL
40	1155.82	2.61	144	145	0	324	NET < CL
41	1238.45	2.77	510	133	0	297	NET < CL
42	1378.05	2.38	317	124	0	277	NET < CL
43	1461.08	2.49	2758	161	-0	360	NET < CL
44	1509.37	1.65	122	106	0	237	NET < CL
45	1661.32	3.06	226	107	-0	239	NET < CL

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46	1729.95	2.49	341	106	-0	237 NET < CL
47	1764.61	2.68	1310	117	0	262 NET < CL
48	1846.70	2.80	154	96	0	215 NET < CL

000218

Sample ID : 98-22-006-10 B:GS09BG 10/10/98 *Mb 10/14/98*

Sample Size 1.00e+000	Sample Spectrum File . c:\gdr\spc\20000512.spc
Sampling Start. 10-10-98 12:00	Counting Start. 10-10-98 20:45
Sampling Stop 10-10-98 12:00	Live Time 120000 Sec
Current Date. 10-14-98 12:42	Real Time 120567 Sec

Detector #: 10

Energy(keV)= -0.76 + 0.500*Ch + 1.92e-007*Ch^2 + 0.00e+000*Ch^3 10-10-98 19:46

FWHM(keV) = 0.66 + 0.009*En + 7.42e-004*En^2 + 0.00e+000*En^3 11-15-97 17:40

Where En = Sqrt(Energy in keV)

Sensitivity 0.15	Search Start / End. 50 / 4000
Sigma Multiplier. 2.00	

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
=====								
1	63.42	128.42	239	100	76	1225	0.43	a
2	66.49	134.56	351	101	70	1285	0.45	b
3	92.70	186.99	1044	153	122	2061	1.12	
4	139.94	281.51	362	131	110	1689	0.97	a
5	143.73	289.09	176	115	95	1432	0.82	b
6	185.78	373.20	809	141	114	1796	1.00	
7	198.49	398.63	494	136	114	1781	1.31	
8	238.66	478.99	611	121	95	1415	0.87	
9	295.68	593.03	292	125	109	1446	1.27	
10	352.14	705.94	276	128	114	1437	0.84	
11	511.12	1023.84	3351	166	111	1247	2.56	
12	558.67	1118.91	434	99	82	750	1.41	
13	569.74	1141.05	143	94	82	834	1.09	
14	583.31	1168.17	249	98	85	803	1.25	
15	596.30	1194.15	-11	72	59	663	0.78	NET < CL
16	609.58	1220.69	456	122	107	1159	1.89	
17	669.87	1341.20	95	85	76	647	0.89	
18	693.71	1388.87	254	114	104	994	3.36	
19	803.26	1607.82	294	93	82	622	1.28	
20	898.70	1798.53	168	91	85	569	3.57	
21	911.15	1823.40	144	80	73	486	1.39	
22	962.24	1925.50	155	94	91	497	2.04	a
23	969.20	1939.39	125	76	71	405	1.76	b
24	1063.87	2128.54	120	89	86	512	2.17	
25	1116.27	2233.21	-17	66	62	392	0.47	NET < CL
26	1461.07	2921.76	631	79	59	278	2.39	
27	1765.03	3528.46	114	51	45	159	3.68	

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

Sample ID : 98-22-006-10 B:GS09BG 10/10/98

Bkg File: Det10.bkg	Counting Start. 10-10-98 20:45
ID.: 98-21-006-10 B:GS10BG 9/5/98	Current Date 10-14-98 12:42

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.42	0.43	239	100	71	192	NET < CL
2	66.49	0.45	351	101	-6	279	NET < CL
3	92.70	1.12	1044	153	-42	340	NET < CL
4	139.94	0.97	362	131	86	248	NET < CL
5	143.73	0.82	176	115	60	231	NET < CL
6	185.78	1.00	809	141	76	319	NET < CL
7	198.49	1.31	494	136	-83	324	NET < CL
8	238.66	0.87	611	121	-33	280	NET < CL
9	295.68	1.27	292	125	136	280	
10	352.14	0.84	276	128	0	274	NET < CL
11	511.12	2.56	3351	166	-117	371	NET < CL
12	558.67	1.41	434	99	12	225	NET < CL
13	569.74	1.09	143	94	2	212	NET < CL
14	583.31	1.25	249	98	-34	219	NET < CL
16	609.58	1.89	456	122	61	282	NET < CL
18	693.71	3.36	254	114	-95	293	NET < CL
19	803.26	1.28	294	93	9	197	NET < CL
20	898.70	3.57	168	91	45	179	NET < CL
21	911.15	1.39	144	80	-49	179	NET < CL
22	962.24	2.04	155	94	-6	203	NET < CL
23	969.20	1.76	125	76	21	147	NET < CL
24	1063.87	2.17	120	89	20	180	NET < CL
26	1461.07	2.39	631	79	-128	177	NET < CL
27	1765.03	3.68	114	51	16	127	NET < CL

000220

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GDR/PC	Paragon Analytics, Inc.	Fort Collins, CO	Ver. 6.02a
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BACKGROUND SUBTRACT RESULTS

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Sample ID : 98-22-006-10 B:GS09BG 10/10/98

Bkg File: Det10.bkg	Counting Start.	10-10-98 20:45
ID.: 98-22-006-10 B:GS09BG 10/10/98	Current Date	10-14-98 12:43

PK#	ENERGY (keV)	FWHM (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	NEW NET COUNTS	NEW UN- CERTAINTY	FLAG
1	63.42	0.43	239	100	0	224	NET < CL
2	66.49	0.45	351	101	-0	226	NET < CL
3	92.70	1.12	1044	153	-0	342	NET < CL
4	139.94	0.97	362	131	0	293	NET < CL
5	143.73	0.82	176	115	-0	257	NET < CL
6	185.78	1.00	809	141	0	315	NET < CL
7	198.49	1.31	494	136	-0	304	NET < CL
8	238.66	0.87	611	121	-0	271	NET < CL
9	295.68	1.27	292	125	0	280	NET < CL
10	352.14	0.84	276	128	0	286	NET < CL
11	511.12	2.56	3351	166	0	371	NET < CL
12	558.67	1.41	434	99	0	221	NET < CL
13	569.74	1.09	143	94	0	210	NET < CL
14	583.31	1.25	249	98	-0	219	NET < CL
16	609.58	1.89	456	122	0	273	NET < CL
17	669.87	0.89	95	85	0	190	NET < CL
18	693.71	3.36	254	114	0	255	NET < CL
19	803.26	1.28	294	93	0	208	NET < CL
20	898.70	3.57	168	91	-0	203	NET < CL
21	911.15	1.39	144	80	0	179	NET < CL
22	962.24	2.04	155	94	-0	210	NET < CL
23	969.20	1.76	125	76	-0	170	NET < CL
24	1063.87	2.17	120	89	0	199	NET < CL
26	1461.07	2.39	631	79	0	177	NET < CL
27	1765.03	3.68	114	51	0	114	NET < CL

000221

Gamma Spectroscopy
Quality Control Data
Weekly Background Checks

000222

Gamma Spectrometer Calibration Log

Date: 10/10/98

Reviewed By: 107110

Det. No.	Out of Service	Background				Source Check			Repeat Source Check			
		Started	OK	Cal	Chk	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corr. action taken (see below)	Removed from service
1		MB	RG	✓	✓	JH	MB					
2			RG	✓	✓	JH						
3			RG	✓	✓	JH						
4			RG	✓	✓	JH						
5			RG	✓	✓	JH						
6	X											
7												
8												
9		MB	RG	✓	✓	JH	MB					
10		J	RG	✓	✓	JH		662 keV Centroid 60 1332		662 keV Centroid 662 1332		
11	X											
12	X											

Corrective Action: Daily checks were repeated after LN₂ fills until gain appeared stable on all systems. All parameters passed for det. 10. Det 5 gain stabilized in a different location than before - by calibration count will be done and examined for signs of instability during the count. MB 10/10/98

Gamma Spectrometer Run Log

Date: 10/10/98

Reviewed By: 167442

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
9809137-C5	MB	7	FESS	4000 pol counts	1946	MB	FESS cal dt 98160205 / F09137C5
↓ C6	↓	8	↓	↓	↓	↓	↓ ↓ ↓ 04 C6
9809137-D3		7	FESS	120 min	2044	MB	FESS / F09137D3
↓ -D4		8	↓	↓	↓	↓	↓ ↓ ↓ D4
98-22-006-01	MB	1	N/A	2000 min	2139	MB	Monthly bkg calibrating / 10001197
↓ 02	↓	2	↓	↓	2140	↓	66021010 1198
↓ 03	↓	3	↓	↓	2141	↓	66031010 1199
↓ 04	↓	4	↓	↓	2142	↓	66041010 1200
↓ 05	↓	5	↓	↓	2148	↓	66051010 1201
↓ 09	↓	9	↓	↓	2148	↓	66091010 20000513
↓ 10	↓	10	↓	↓	2140	↓	66101010 512
<div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto; transform: rotate(45deg); display: flex; align-items: center; justify-content: center;"> <div style="transform: rotate(-45deg);">MB</div> <div style="transform: rotate(45deg);">10-10-98</div> </div>							

000224

Detector # 1 Background Q.C. Data for 10-10-98 21:31 CM 10/13/98

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	6.12e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	5.12e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	8.07e+001	Pass	Pass	Pass
4	500->1000 keV CPM	1.00e+002	Pass	Pass	Pass
5	1000->2000 keV CPM	6.08e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC01.98D.

000225

Detector # 2 Background Q.C. Data for 10-10-98 21:34 *CM 10/13/98*

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.39e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	1.95e+001	Fail	Pass	Fail
3	250-> 500 keV CPM	2.89e+001	Fail	Pass	Fail
4	500->1000 keV CPM	3.04e+001	Fail	Pass	Fail
5	1000->2000 keV CPM	1.73e+001	Fail	Pass	Fail

Q.C. values stored on GDRBQC02.98D.

000226

Detector # 3 Background Q.C. Data for 10-10-98 21:35 *CM*
10/13/98

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.54e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	2.04e+001	Fail	Pass	Fail
3	250-> 500 keV CPM	2.99e+001	Fail	Pass	Fail
4	500->1000 keV CPM	3.15e+001	Fail	Pass	Fail
5	1000->2000 keV CPM	1.80e+001	Fail	Pass	Fail

Q.C. values stored on GDRBQC03.98D.

000227

Detector # 4 Background Q.C. Data for 10-10-98 21:36 CM 10/13/98

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.36e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	1.89e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	2.76e+001	Pass	Pass	Pass
4	500->1000 keV CPM	2.91e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	1.65e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC04.98D.

000228

Detector # 5 Background Q.C. Data for 10-10-98 21:46 CPM
10/13/98

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.81e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	2.25e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	3.34e+001	Pass	Pass	Pass
4	500->1000 keV CPM	3.54e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	2.04e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC05.98D.

000229

Detector # 9 Background Q.C. Data for 10-10-98 20:56 *CM 10/13/98*

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	8.96e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	5.43e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	8.57e+001	Pass	Pass	Pass
4	500->1000 keV CPM	1.02e+002	Pass	Pass	Pass
5	1000->2000 keV CPM	6.31e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC09.98D.

000230

Detector # 10 Background Q.C. Data for 10-10-98 20:45 CM 10/13/98

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	3.63e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	2.29e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	3.34e+001	Pass	Pass	Pass
4	500->1000 keV CPM	3.44e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	1.90e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC10.98D.

000231

Gamma Spectrometer Calibration Log

Date: 10/16/98

Reviewed By: 167418

Det. No.	Out of Service	Background				Source Check			Repeat Source Check			
		Started	OK	Cal	Chk	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corr. action taken (see below)	Removed from service
1		Mb	*		✓	Mb	Mb					
2		↓	↓		✓	↓	MG					
3		↓	↓		✓	↓	MG					
4		↓	↓		✓	↓		1332 keV Fw br	Mb			
5		↓	↓		✓	↓		Blocked/Controlled 1332 keV ↓				
6												
7												
8												
9		Mb	*		✓	Mb	Mb					
10		↓	↓		✓	↓	↓					
11												
12												

Corrective Action: * Daily QC check standards left on detectors Mb 10/17/98

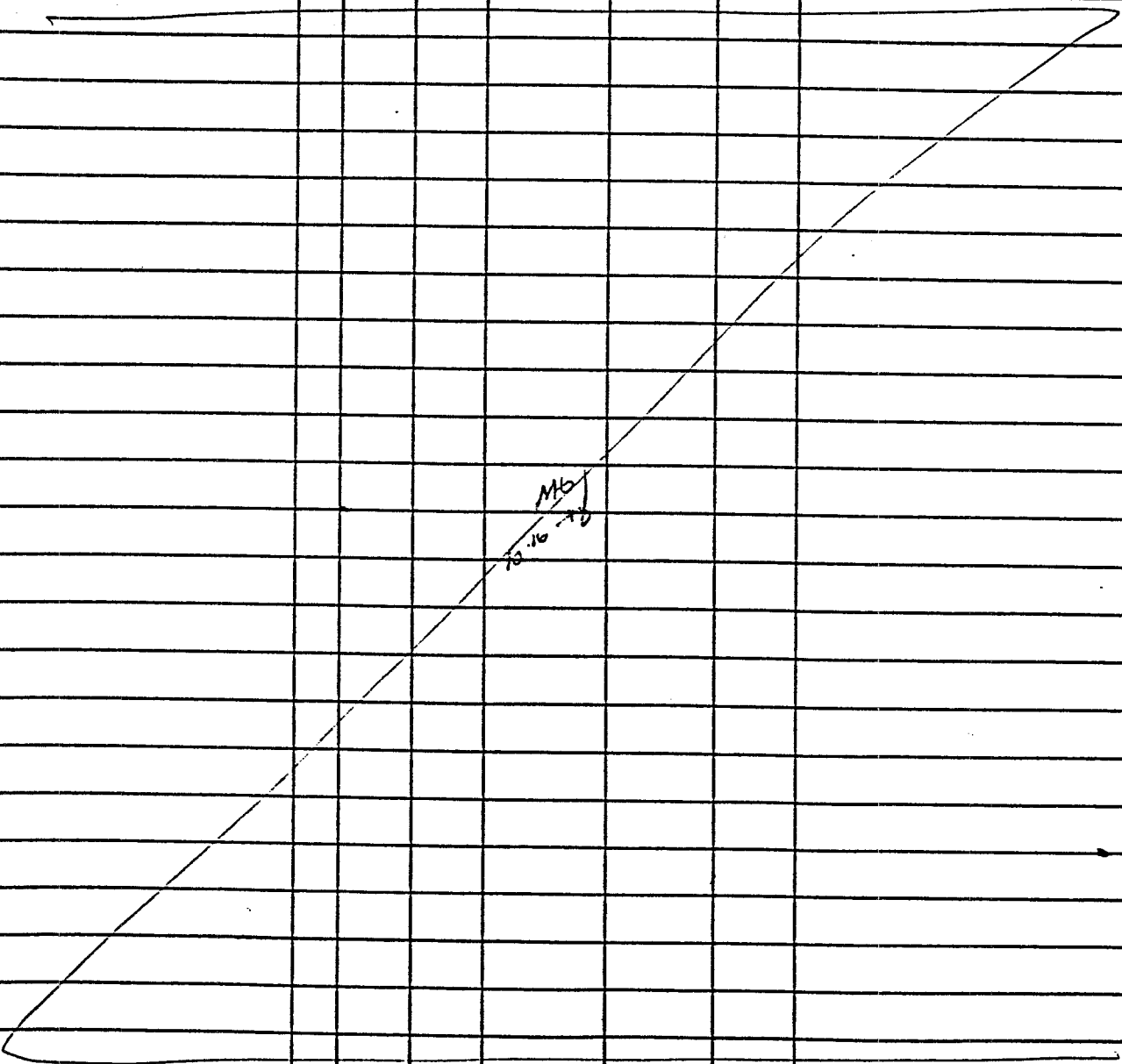
Gamma Spectrometer Run Log

Date:

10/16/28

Reviewed By:

167448

Sample ID	Ver.	Det. #	Geo.	Count Dur.	Start Time	Analyst	Comments/Library
9822006-11	*	1	N/A	1000 min	1711	MB	Weekly checks
12		2					
13		3					
14		4					
15		5					
19		9					
20		10					
F07B1016	MB	7	FSS				F-55 bkg / F07B1016
F08B1016		8					F08B1016
							

* Daily QC check stds left on detectors.

000233

Detector # 1 Background Q.C. Data for 10-17-98 14:40

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	6.16e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	5.16e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	8.11e+001	Pass	Pass	Pass
4	500->1000 keV CPM	1.01e+002	Pass	Pass	Pass
5	1000->2000 keV CPM	6.18e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC01.98D.

M6

000234

Detector # 2 Background Q.C. Data for 10-17-98 14:42

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.39e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	1.95e+001	Fail	Pass	Fail
3	250-> 500 keV CPM	2.89e+001	Fail	Pass	Fail
4	500->1000 keV CPM	3.04e+001	Fail	Pass	Fail
5	1000->2000 keV CPM	1.73e+001	Fail	Pass	Fail

Q.C. values stored on GDRBQC02.98D.

000235

Detector # 3 Background Q.C. Data for 10-17-98 14:47

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.57e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	2.05e+001	Fail	Pass	Fail
3	250-> 500 keV CPM	3.03e+001	Fail	Pass	Fail
4	500->1000 keV CPM	3.18e+001	Fail	Pass	Fail
5	1000->2000 keV CPM	1.79e+001	Fail	Pass	Fail

Q.C. values stored on GDRBQC03.98D.

000236

Detector # 4 Background Q.C. Data for 10-17-98 14:48

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.38e+001	Fail	Pass	Fail
2	150-> 250 keV CPM	1.90e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	2.84e+001	Pass	Pass	Pass
4	500->1000 keV CPM	2.89e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	1.65e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC04.98D.

000237

Detector # 5 Background Q.C. Data for 10-17-98 14:53

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	2.81e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	2.26e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	3.35e+001	Pass	Pass	Pass
4	500->1000 keV CPM	3.56e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	2.06e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC05.98D.

000238

Detector # 9 Background Q.C. Data for 10-17-98 14:00

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	9.01e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	5.50e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	8.66e+001	Pass	Pass	Pass
4	500->1000 keV CPM	1.03e+002	Pass	Pass	Pass
5	1000->2000 keV CPM	6.48e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC09.98D.

000239

Detector # 10 Background Q.C. Data for 10-17-98 14:33

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	30-> 150 keV CPM	3.64e+001	Pass	Pass	Pass
2	150-> 250 keV CPM	2.35e+001	Pass	Pass	Pass
3	250-> 500 keV CPM	3.34e+001	Pass	Pass	Pass
4	500->1000 keV CPM	3.49e+001	Pass	Pass	Pass
5	1000->2000 keV CPM	1.91e+001	Pass	Pass	Pass

Q.C. values stored on GDRBQC10.98D.

MB

000240

Gamma Spectroscopy
Quality Control Data
Daily Instrument Performance
Checks

000241

Gamma Spectrometer Calibration Log

Date: 10/14/98

Reviewed By: 167445

Det. No.	Out of Service	Background				Source Check			Repeat Source Check			
		Started	OK	Cal	Chk	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corr. action taken (see below)	Removed from service
1						JH	JH					
2						JH	JH					
3						JH	JH					
4						JH	JH					
5						JH	X	1062 KeV Centroid 1332 KeV Centroid	X	1062 KeV Centroid 1332 KeV Centroid	Do Not Use	
6	X											
7												
8												
9						JH	JH					
10						JH	JH					
11	X											
12	X											

Corrective Action:

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum File ECAL01.SPC
Number of Grams 1.00e+000 | Counting Start. 10-14-98 06:55
Current Date. 10-14-98 07:24 | Decay Time. 3.54e+004 Hrs

Standards File. GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 1 | Calibration Date. 10-14-98 06:55

Energy(keV) = -1.07 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.93	59.52	59.50	0.03
2	177.78	87.99	88.03	-0.04
3	245.80	122.08	122.06	0.01
4	1322.75	661.65	661.65	-0.00
5	2343.85	1173.24	1173.22	0.00
6	2661.68	1332.48	1332.49	-0.00

Energy coefficients stored on GDRDET01.DET.

Detector # 1 Q.C. Data for 10-14-98 06:55

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Pass	Pass	Pass
3	60 keV FWHM	1.25e+000	Pass	Pass	Pass
4	60 keV Efficiency	4.00e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Fail	Pass	Fail

000243

6	662 keV FWHM	1.81e+000	Pass	Pass	Pass
7	662 keV Efficiency	4.60e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.66e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.25e+000	Pass	Pass	Pass
10	1332 keV Efficiency	2.62e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC01.98D.

000244

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL02.SPC
Number of Grams1.00e+000 | Counting Start. 10-14-98 06:55
Current Date.10-14-98 07:24 | Decay Time. 3.54e+004 Hrs

Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 2 | Calibration Date. 10-14-98 06:55

Energy(keV) = 0.34 + 0.499*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	118.01	59.29	59.50	-0.36
2	175.46	87.98	88.03	-0.05
3	244.07	122.25	122.06	0.16
4	1324.24	661.78	661.65	0.02
5	2348.29	1173.28	1173.22	0.00
6	2666.81	1332.37	1332.49	-0.01

Energy coefficients stored on GDRDET02.DET.

Detector # 2 Q.C. Data for 10-14-98 06:55

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.18e+002	Fail	Pass	Fail
3	60 keV FWHM	1.16e+000	Fail	Pass	Fail
4	60 keV Efficiency	1.90e-002	Fail	Pass	Fail
5	662 keV Centroid	1.32e+003	Fail	Pass	Fail

000245

6	662 keV FWHM	1.47e+000	Fail	Pass	Fail
7	662 keV Efficiency	1.99e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.67e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.02e+000	Pass	Pass	Pass
10	1332 keV Efficiency	1.06e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC02.98D.

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) 2.00 | Spectrum FileECAL03.SPC
Number of Grams1.00e+000 | Counting Start. 10-14-98 06:55
Current Date.10-14-98 07:24 | Decay Time. 3.54e+004 Hrs
Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 3 | Calibration Date. 10-14-98 06:55
Energy(keV) = -0.51 + 0.500*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	119.97	59.52	59.50	0.03
2	176.80	87.95	88.03	-0.09
3	245.06	122.11	122.06	0.04
4	1323.39	661.68	661.65	0.00
5	2345.76	1173.25	1173.22	0.00
6	2663.94	1332.45	1332.49	-0.00

Energy coefficients stored on GDRDET03.DET.

Detector # 3 Q.C. Data for 10-14-98 06:55

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.20e+002	Pass	Pass	Pass
3	60 keV FWHM	9.41e-001	Fail	Pass	Fail
4	60 keV Efficiency	1.75e-002	Fail	Pass	Fail
5	662 keV Centroid	1.32e+003	Pass	Pass	Pass

000247

6	662 keV FWHM	1.68e+000	Fail	Pass	Fail
7	662 keV Efficiency	1.85e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.66e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.21e+000	Pass	Pass	Pass
10	1332 keV Efficiency	9.58e-003	Fail	Pass	Fail

Q.C. values stored on GDRDQC03.98D.

000248

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) 2.00 | Spectrum File ECAL04.SPC
Number of Grams 1.00e+000 | Counting Start. 10-14-98 06:55
Current Date. 10-14-98 07:24 | Decay Time. 3.54e+004 Hrs

Standards File. GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 4 | Calibration Date. 10-14-98 06:55

Energy(keV) = -0.54 + 0.500*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.04	59.50	59.50	0.01
2	177.01	88.00	88.03	-0.04
3	245.16	122.09	122.06	0.02
4	1323.85	661.64	661.65	-0.00
5	2346.70	1173.26	1173.22	0.00
6	2664.99	1332.46	1332.49	-0.00

Energy coefficients stored on GDRDET04.DET.

Detector # 4 Q.C. Data for 10-14-98 06:55

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.20e+002	Pass	Pass	Pass
3	60 keV FWHM	8.76e-001	Pass	Pass	Pass
4	60 keV Efficiency	1.99e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Pass	Pass	Pass

000249

6	662 keV FWHM	1.38e+000
7	662 keV Efficiency	2.02e-002
8	1332 keV Centroid	2.66e+003
9	1332 keV FWHM	1.81e+000
10	1332 keV Efficiency	1.02e-002

Pass
Pass
Fail
Pass
Pass

Pass
Pass
Pass
Pass
Pass

Pass
Pass
Fail
Pass
Pass

Q.C. values stored on GDRDQC04.98D.

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

 Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL05.SPC
 Number of Grams1.00e+000 | Counting Start.10-14-98 06:59
 Current Date.10-14-98 07:23 | Decay Time.3.54e+004 Hrs

 Standards File.GDRSTD98.STD | Assay Date10-01-94 10:00

 Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

 Detector Number5 | Calibration Date.10-14-98 06:59

Energy(keV) = 1.12 + 0.501*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	116.56	59.54	59.50	0.07
2	173.31	87.98	88.03	-0.05
3	241.37	122.10	122.06	0.03
4	1317.76	661.59	661.65	-0.01
5	2338.58	1173.23	1173.22	0.00
6	2656.38	1332.51	1332.49	0.00

Energy coefficients stored on GDRDET05.DET.

 Detector # 5 Q.C. Data for 10-14-98 06:59

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.17e+002	Fail	Pass	Fail
3	60 keV FWHM	1.13e+000	Pass	Pass	Pass
4	60 keV Efficiency	1.60e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Fail	Fail	Fail

000251

6	662 keV FWHM	1.68e+000	Pass	Pass	Pass
7	662 keV Efficiency	1.94e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.66e+003	Fail	Fail	Fail
9	1332 keV FWHM	2.53e+000	Pass	Pass	Pass
10	1332 keV Efficiency	1.00e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC05.98D.

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

 Stds Match Tolerance(keV) . . . 2.00 | Spectrum File ECAL05.SPC
 Number of Grams 1.00e+000 | Counting Start. 10-14-98 07:51
 Current Date. 10-14-98 09:08 | Decay Time. 3.54e+004 Hrs

 Standards File. GDRSTD98.STD | Assay Date 10-01-94 10:00

 Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

 Detector Number 5 | Calibration Date. 10-14-98 07:51

 Energy(keV) = 1.11 + 0.501*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	116.53	59.52	59.50	0.04
2	173.42	88.03	88.03	0.00
3	241.30	122.06	122.06	-0.00
4	1317.78	661.60	661.65	-0.01
5	2338.60	1173.24	1173.22	0.00
6	2656.34	1332.50	1332.49	0.00

Energy coefficients stored on GDRDET05.DET.

2nd Count

 Detector # 5 Q.C. Data for 10-14-98 07:51

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A	N.A
2	60 keV Centroid	1.17e+002	Fail	Pass	Fail
3	60 keV FWHM	1.15e+000	Pass	Pass	Pass
4	60 keV Efficiency	1.62e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Fail	Fail	Fail

000253

6	662 keV FWHM	1.69e+000	Pass	Pass	Pass
7	662 keV Efficiency	1.95e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.66e+003	Fail	Fail	Fail
9	1332 keV FWHM	2.42e+000	Pass	Pass	Pass
10	1332 keV Efficiency	1.05e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC05.98D.

000254

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL09.SPC
 Number of Grams1.00e+000 | Counting Start. 10-14-98 06:09
 Current Date.10-14-98 07:25 | Decay Time. 3.54e+004 Hrs
 Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
 Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 9 | Calibration Date. 10-14-98 06:09
 Energy(keV) = -1.12 + 0.500*Ch +1.30e-007*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	121.28	59.52	59.50	0.03
2	178.27	88.01	88.03	-0.02
3	246.38	122.06	122.06	0.00
4	1325.30	661.65	661.65	0.00
5	2347.63	1173.22	1173.22	-0.00
6	2665.82	1332.49	1332.49	0.00

Energy coefficients stored on GDRDET09.DET.

Detector # 9 Q.C. Data for 10-14-98 06:09

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Fail	Pass	Fail
3	60 keV FWHM	1.13e+000	Fail	Pass	Fail
4	60 keV Efficiency	7.45e-002	Fail	Pass	Fail
5	662 keV Centroid	1.33e+003	Fail	Pass	Fail

000255

6	662 keV FWHM	2.09e+000	Fail	Pass	Fail
7	662 keV Efficiency	4.86e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.67e+003	Pass	Pass	Pass
9	1332 keV FWHM	2.81e+000	Fail	Pass	Fail
10	1332 keV Efficiency	2.49e-002	Fail	Pass	Fail

Q.C. values stored on GDRDQC09.98D.

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) 2.00 | Spectrum FileECAL10.SPC
 Number of Grams1.00e+000 | Counting Start. 10-14-98 06:09
 Current Date.10-14-98 07:25 | Decay Time. 3.54e+004 Hrs
 Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
 Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number10 | Calibration Date. 10-14-98 06:09
 Energy(keV) = -0.81 + 0.500*Ch +1.91e-007*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.80	59.56	59.50	0.09
2	177.85	88.07	88.03	0.04
3	245.66	121.96	122.06	-0.09
4	1325.11	661.66	661.65	0.00
5	2347.49	1173.24	1173.22	0.00
6	2665.56	1332.48	1332.49	-0.00

Energy coefficients stored on GDRDET10.DET.

Detector # 10 Q.C. Data for 10-14-98 06:09

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Pass	Pass	Pass
3	60 keV FWHM	7.88e-001	Pass	Pass	Pass
4	60 keV Efficiency	1.20e-002	Pass	Pass	Pass
5	662 keV Centroid	1.33e+003	Pass	Pass	Pass

000257

6	662 keV FWHM	1.58e+000	Fail	Pass	Fail
7	662 keV Efficiency	2.20e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.67e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.54e+000	Fail	Pass	Fail
10	1332 keV Efficiency	1.14e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC10.98D.

000258

170402

Paragon Analytics Inc.
Gamma Spectrometer Calibration Log

Date: 10/20/98

Reviewed By: _____

Det. No.	Out of Service	Background				Source Check			Repeat Source Check			
		Started	OK	Cal	Chk	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corr. action taken (see below)	Removed from service
1						JH	JH					
2						↓	↓					
3						↓	↓					
4						↓	↓					
5						↓	X	1062 KeV Centroid 1337 KeV Cent				
6	X											
7												
8												
9						JH	JH					
10						↓	↓					
11	X											
12	X											

Corrective Action:

000259

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) 2.00 | Spectrum File ECAL01.SPC
Number of Grams 1.00e+000 | Counting Start. 10-20-98 12:26
Current Date. 10-20-98 12:59 | Decay Time. 3.55e+004 Hrs

Standards File. GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 1 | Calibration Date. 10-20-98 12:26

Energy(keV) = -1.06 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.93	59.54	59.50	0.06
2	177.72	87.99	88.03	-0.05
3	245.70	122.05	122.06	-0.00
4	1322.63	661.66	661.65	0.00
5	2343.67	1173.26	1173.22	0.00
6	2661.40	1332.46	1332.49	-0.00

Energy coefficients stored on GDRDET01.DET.

Detector # 1 Q.C. Data for 10-20-98 12:26

#	Parameter	Value	Sigma Test	Bounds Test	q&T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Pass	Pass	Pass
3	60 keV FWHM	1.24e+000	Pass	Pass	Pass
4	60 keV Efficiency	4.11e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Pass	Pass	Pass

000260

6	662 keV FWHM	1.82e+000	Pass	Pass	Pass
7	662 keV Efficiency	4.54e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.66e+003	Pass	Pass	Pass
9	1332 keV FWHM	2.38e+000	Pass	Pass	Pass
10	1332 keV Efficiency	2.64e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC01.98D.

000261

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL02.SPC
Number of Grams1.00e+000 | Counting Start. 10-20-98 12:26
Current Date.10-20-98 12:59 | Decay Time. 3.55e+004 Hrs

Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 2 | Calibration Date. 10-20-98 12:26

Energy(keV) = 0.26 + 0.500*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	118.01	59.20	59.50	-0.50
2	175.57	87.96	88.03	-0.08
3	244.50	122.39	122.06	0.27
4	1324.26	661.76	661.65	0.02
5	2348.22	1173.25	1173.22	0.00
6	2666.83	1332.40	1332.49	-0.01

Energy coefficients stored on GDRDET02.DET.

Detector # 2 Q.C. Data for 10-20-98 12:26

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.18e+002	Fail	Pass	Fail
3	60 keV FWHM	1.15e+000	Fail	Pass	Fail
4	60 keV Efficiency	1.87e-002	Fail	Pass	Fail
5	662 keV Centroid	1.32e+003	Fail	Pass	Fail

000262

6	662 keV FWHM	1.52e+000	Fail	Pass	Fail
7	662 keV Efficiency	2.03e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.67e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.05e+000	Fail	Pass	Fail
10	1332 keV Efficiency	1.03e-002	Fail	Pass	Fail

Q.C. values stored on GDRDQC02.98D.

000263

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL03.SPC
Number of Grams1.00e+000 | Counting Start. 10-20-98 12:26
Current Date.10-20-98 13:00 | Decay Time. 3.55e+004 Hrs
Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 3 | Calibration Date. 10-20-98 12:26
Energy(keV) = -0.48 + 0.500*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	119.91	59.51	59.50	0.02
2	176.81	87.98	88.03	-0.05
3	244.93	122.07	122.06	0.01
4	1323.40	661.68	661.65	0.01
5	2345.81	1173.25	1173.22	0.00
6	2663.97	1332.44	1332.49	-0.00

Energy coefficients stored on GDRDET03.DET.

Detector # 3 Q.C. Data for 10-20-98 12:26

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.20e+002	Pass	Pass	Pass
3	60 keV FWHM	9.84e-001	Fail	Pass	Fail
4	60 keV Efficiency	1.78e-002	Fail	Pass	Fail
5	662 keV Centroid	1.32e+003	Pass	Pass	Pass

000264

6	662 keV FWHM	1.67e+000	Fail	Pass	Fail
7	662 keV Efficiency	1.81e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.66e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.23e+000	Pass	Pass	Pass
10	1332 keV Efficiency	9.57e-003	Fail	Pass	Fail

Q.C. values stored on GDRDQC03.98D.

000205

Paragon Analytics, Inc.

Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

=====
 Stds Match Tolerance(keV) 2.00 | Spectrum FileECAL04.SPC
 Number of Grams 1.00e+000 | Counting Start. 10-20-98 12:26
 Current Date. 10-20-98 13:03 | Decay Time. 3.55e+004 Hrs

 Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00

 Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

 Detector Number 4 | Calibration Date. 10-20-98 12:26

 Energy(keV) = -0.54 + 0.500*Ch +0.00e+000*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.04	59.50	59.50	-0.00
2	176.94	87.96	88.03	-0.08
3	245.30	122.15	122.06	0.07
4	1323.85	661.61	661.65	-0.01
5	2346.76	1173.25	1173.22	0.00
6	2665.12	1332.48	1332.49	-0.00

Energy coefficients stored on GDRDET04.DET.

 Detector # 4 Q.C. Data for 10-20-98 12:26

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.20e+002	Pass	Pass	Pass
3	60 keV FWHM	8.99e-001	Pass	Pass	Pass
4	60 keV Efficiency	1.88e-002	Pass	Pass	Pass
5	662 keV Centroid	1.32e+003	Fail	Pass	Fail

000266

6	662 keV FWHM	1.45e+000	Fail	Pass	Fail
7	662 keV Efficiency	1.95e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.67e+003	Pass	Pass	Pass
9	1332 keV FWHM	1.95e+000	Fail	Pass	Fail
10	1332 keV Efficiency	1.04e-002	Fail	Pass	Fail

Q.C. values stored on GDRDQC04.98D.

000267

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum File ECAL05.SPC
Number of Grams 1.00e+000 | Counting Start. 10-20-98 12:30
Current Date. 10-20-98 13:10 | Decay Time. 3.55e+004 Hrs

Standards File. GDRSTD98.STD | Assay Date 10-01-94 10:00

Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 5 | Calibration Date. 10-20-98 12:30

Energy(keV) = 1.13 + 0.501*Ch + 0.00e+000*Ch^2 + 0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	116.54	59.55	59.50	0.08
2	173.36	88.03	88.03	-0.00
3	241.21	122.04	122.06	-0.02
4	1317.67	661.61	661.65	-0.01
5	2338.36	1173.22	1173.22	-0.00
6	2656.16	1332.51	1332.49	0.00

Energy coefficients stored on GDRDET05.DET.

Detector # 5 Q.C. Data for 10-20-98 12:30

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A	N.A
2	60 keV Centroid	1.17e+002	Fail	Pass	Fail
3	60 keV FWHM	1.12e+000	Fail	Pass	Fail
4	60 keV Efficiency	1.63e-002	Fail	Pass	Fail
5	662 keV Centroid	1.32e+003	Fail	Fail	Fail

000268

6	662 keV FWHM	1.74e+000	Fail	Pass	Fail
7	662 keV Efficiency	1.92e-002	Fail	Pass	Fail
8	1332 keV Centroid	2.66e+003	Fail	Fail	Fail
9	1332 keV FWHM	2.36e+000	Pass	Pass	Pass
10	1332 keV Efficiency	1.03e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC05.98D.

000269

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) 2.00 | Spectrum FileECAL09.SPC
Number of Grams1.00e+000 | Counting Start. 10-20-98 11:40
Current Date.10-20-98 13:14 | Decay Time. 3.55e+004 Hrs
Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number 9 | Calibration Date. 10-20-98 11:40
Energy(keV) = -1.10 + 0.500*Ch +1.38e-007*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	121.25	59.51	59.50	0.02
2	178.27	88.02	88.03	-0.01
3	246.35	122.06	122.06	-0.00
4	1325.32	661.66	661.65	0.00
5	2347.62	1173.21	1173.22	-0.00
6	2665.82	1332.50	1332.49	0.00

Energy coefficients stored on GDRDET09.DET.

Detector # 9 Q.C. Data for 10-20-98 11:40

#	Parameter	Value	Sigma Test	Bounds Test	10/20/98 Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Fail	Pass	Fail
3	60 keV FWHM	1.12e+000	Fail	Pass	Fail
4	60 keV Efficiency	7.41e-002	Pass	Pass	Pass
5	662 keV Centroid	1.33e+003	Pass	Pass	Pass

000270

6	662 keV FWHM	2.09e+000
7	662 keV Efficiency	4.79e-002
8	1332 keV Centroid	2.67e+003
9	1332 keV FWHM	2.89e+000
10	1332 keV Efficiency	2.52e-002

Fail
Pass
Pass
Pass
Fail
Pass

Pass	Fail
Pass	Pass
Pass	Pass
Pass	Fail
Pass	Pass

Q.C. values stored on GDRDQC09.98D.

000271

Paragon Analytics, Inc. Fort Collins, CO

Quantum Technology
GDR_C Detector Q. C. Check

Stds Match Tolerance(keV) . . . 2.00 | Spectrum FileECAL10.SPC
Number of Grams1.00e+000 | Counting Start. 10-20-98 11:40
Current Date.10-20-98 13:05 | Decay Time. 3.55e+004 Hrs
Standards File.GDRSTD98.STD | Assay Date 10-01-94 10:00
Stds. File ID.: Analytics 49500-307 4 ml in 100 ml

Pk #	Name	Energy	Halflife (hrs)	Br.Ratio	dps/gm
1	Am-241	59.50	3.787e+006	0.35900	392
2	Cd-109	88.03	1.114e+004	0.03720	5639
3	Co-57	122.06	6.502e+003	0.85510	138
4	Ce-139	165.85	3.304e+003	0.80350	203
5	Hg-203	279.00	1.118e+003	0.77300	412
6	Sn-113	391.69	2.762e+003	0.64900	353
7	Cs-137	661.65	2.645e+005	0.85120	163
8	Y-88	898.02	2.558e+003	0.93400	614
9	Co-60	1173.22	4.621e+004	1.00000	268
10	Co-60	1332.49	4.621e+004	1.00000	268
11	Y-88	1836.01	2.558e+003	0.99380	614

Detector Number10 | Calibration Date. 10-20-98 11:40
Energy(keV) = -0.80 + 0.500*Ch +1.97e-007*Ch^2 +0.00e+000*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.80	59.56	59.50	0.10
2	177.86	88.07	88.03	0.05
3	245.64	121.95	122.06	-0.09
4	1325.08	661.65	661.65	0.00
5	2347.46	1173.25	1173.22	0.00
6	2665.46	1332.46	1332.49	-0.00

Energy coefficients stored on GDRDET10.DET.

Detector # 10 Q.C. Data for 10-20-98 11:40

#	Parameter	Value	Sigma Test	Bounds Test	T Test
1	LN2 Bleedoff Rate	N.A.	N.A.	N.A.	N.A.
2	60 keV Centroid	1.21e+002	Pass	Pass	Pass
3	60 keV FWHM	8.23e-001	Fail	Pass	Fail
4	60 keV Efficiency	1.26e-002	Pass	Pass	Pass
5	662 keV Centroid	1.33e+003	Pass	Pass	Pass

000272

6	662 keV FWHM	1.53e+000	Fail	Pass	Fail
7	662 keV Efficiency	2.20e-002	Pass	Pass	Pass
8	1332 keV Centroid	2.67e+003	Fail	Pass	Fail
9	1332 keV FWHM	2.46e+000	Fail	Pass	Fail
10	1332 keV Efficiency	1.09e-002	Pass	Pass	Pass

Q.C. values stored on GDRDQC10.98D.

000273



Paragon Analytics, Inc.

Case Narrative File

Subcontract Number: 7794L0014-9S

Request Number: 4662R

Date File Saved: 10/22/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

9809192-1
9809192-2
9809192-3
9809192-4
9809192-5
9809192-6
9809192-7
9809192-8
9809192-9

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: ISOU

The samples under Request Number 4662R (Work Order 9809192) were received on 09/26/98 and scheduled for isotopic uranium analyses.

These samples were prepared according to Paragon Analytics, Inc. PAI SOP773R3 and PAI SOP778R3.

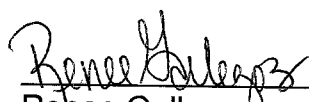
These samples were analyzed by alpha spectrometry according to Paragon Analytics, Inc. procedure PAI SOP714R4. The analyses were completed on 10/14/98. The analysis results for these samples are reported in units of pCi/g.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

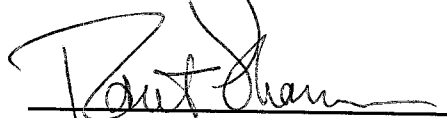
No problems were observed in the preparation and analyses of the samples listed above. All method required quality control parameters were met.

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.


Renee Gallegos
Radiochemistry Instrument Technician


10/22/98
Date


Radiochemistry Final Review

10/26/98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.


Don Gipple
Laboratory Manager

11/10/98
Date

000275

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section I

SAMPLE RESULTS
SUMMARY

000276

Sample Results Summary

Client Name: Los Alamos National Laboratory
Client Project Name:
Client Project Number: 4662R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 9809192

Page: 1 of 2
Reported on: Thursday, October 22, 1998
15:28:56

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 1 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
9809192-1	RE15-98-0029	ISO U	U-234	0.618 +/- 0.052	0.018	pCi/g	Soil	AS01679	10/14/98	
9809192-1	RE15-98-0029	ISO U	U-235	0.0349 +/- 0.0095	0.020	pCi/g	Soil	AS01679	10/14/98	LT
9809192-1	RE15-98-0029	ISO U	U-238	0.879 +/- 0.067	0.018	pCi/g	Soil	AS01679	10/14/98	
9809192-2	RE15-98-0030	ISO U	U-234	0.793 +/- 0.063	0.019	pCi/g	Soil	AS01679	10/14/98	
9809192-2	RE15-98-0030	ISO U	U-235	0.053 +/- 0.011	0.014	pCi/g	Soil	AS01679	10/14/98	LT
9809192-2	RE15-98-0030	ISO U	U-238	1.103 +/- 0.081	0.017	pCi/g	Soil	AS01679	10/14/98	
9809192-3	RE15-98-0031	ISO U	U-234	0.911 +/- 0.069	0.018	pCi/g	Soil	AS01679	10/14/98	
9809192-3	RE15-98-0031	ISO U	U-235	0.036 +/- 0.010	0.026	pCi/g	Soil	AS01679	10/14/98	LT
9809192-3	RE15-98-0031	ISO U	U-238	1.78 +/- 0.12	0.022	pCi/g	Soil	AS01679	10/14/98	
9809192-4	RE15-98-0032	ISO U	U-234	0.742 +/- 0.060	0.021	pCi/g	Soil	AS01679	10/14/98	
9809192-4	RE15-98-0032	ISO U	U-235	0.078 +/- 0.015	0.028	pCi/g	Soil	AS01679	10/14/98	LT
9809192-4	RE15-98-0032	ISO U	U-238	1.077 +/- 0.080	0.017	pCi/g	Soil	AS01679	10/14/98	
9809192-5	RE15-98-0033	ISO U	U-234	0.569 +/- 0.049	0.017	pCi/g	Soil	AS01679	10/14/98	
9809192-5	RE15-98-0033	ISO U	U-235	0.0317 +/- 0.0094	0.021	pCi/g	Soil	AS01679	10/14/98	LT
9809192-5	RE15-98-0033	ISO U	U-238	0.971 +/- 0.074	0.0071	pCi/g	Soil	AS01679	10/14/98	

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y2 - Chemical Yield outside default limits.

Sample Results Summary

Client Name: Los Alamos National Laboratory
Client Project Name:
Client Project Number: 4662R

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 9809192

Page: 2 of 2
Reported on: Thursday, October 22, 1998
15:28:56

Lab Sample ID	Client Sample ID	Test	Nuclide	Result +/- 1 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
9809192-6	RE15-98-0034	ISO U	U-234	0.783 +/- 0.062	0.0071	pCi/g	Soil	AS01679	10/14/98	
9809192-6	RE15-98-0034	ISO U	U-235	0.047 +/- 0.011	0.019	pCi/g	Soil	AS01679	10/14/98	LT
9809192-6	RE15-98-0034	ISO U	U-238	1.222 +/- 0.089	0.017	pCi/g	Soil	AS01679	10/14/98	
9809192-7	RE15-98-0035	ISO U	U-234	0.495 +/- 0.044	0.0069	pCi/g	Soil	AS01679	10/14/98	
9809192-7	RE15-98-0035	ISO U	U-235	0.048 +/- 0.011	0.024	pCi/g	Soil	AS01679	10/14/98	LT
9809192-7	RE15-98-0035	ISO U	U-238	1.62 +/- 0.11	0.022	pCi/g	Soil	AS01679	10/14/98	
9809192-8	RE15-98-0036	ISO U	U-234	0.591 +/- 0.051	0.015	pCi/g	Soil	AS01679	10/14/98	
9809192-8	RE15-98-0036	ISO U	U-235	0.039 +/- 0.010	0.015	pCi/g	Soil	AS01679	10/14/98	LT
9809192-8	RE15-98-0036	ISO U	U-238	0.734 +/- 0.060	0.018	pCi/g	Soil	AS01679	10/14/98	
9809192-9	RE15-98-0037	ISO U	U-234	1.83 +/- 0.12	0.017	pCi/g	Soil	AS01679	10/14/98	
9809192-9	RE15-98-0037	ISO U	U-235	0.063 +/- 0.013	0.017	pCi/g	Soil	AS01679	10/14/98	LT
9809192-9	RE15-98-0037	ISO U	U-238	1.99 +/- 0.13	0.019	pCi/g	Soil	AS01679	10/14/98	

000273

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.
LT - Result is less than Requested MDC, greater than sample specific MDC.
Y2 - Chemical Yield outside default limits.

PARACON ANALYTICS, INC.
Radiochemistry Data Package

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Section 2

**QC RESULTS
SUMMARY**

000279

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Method Blank Results

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:	
Lab ID:	AS01679BLK1

Sample Matrix: Soil

Date Collected: 06-Oct-98

Final Aliquot: 2

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	Result +/- 1 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.0110 +/- 0.0066	0.024	pCi/g	U
U-235	0.0024 +/- 0.0046	0.023	pCi/g	U
U-238	0.0010 +/- 0.0039	0.021	pCi/g	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

000280

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Decision Level Report

Page: 1 of 1

Client Name: Los Alamos National Laboratory

Reported on: Thursday, October 22, 1998
15:28:56

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:	
Lab ID:	AS01679BLK1

Sample Matrix: Soil

Date Collected: 06-Oct-98

Final Aliquot: 2

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Target Nuclide	Decision Level	Reporting Units
U-234	0.019	pCi/g
U-235	0.017	pCi/g
U-238	0.016	pCi/g

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

000281

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

LCS Results

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID:
Lab ID: AS01679LCS1

Sample Matrix: Soil

Date Collected: 06-Oct-98

Final Aliquot: 2

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	LCS Results +/- 1s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	2.49 +/- 0.16	0.017	2.41	pCi/g	104%	+/- 25%	Pass
U-235	0.103 +/- 0.017	0.017	N/A	pCi/g	N/A	N/A	
U-238	2.42 +/- 0.16	0.022	2.41	pCi/g	100%	+/- 25%	Pass

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.73	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000282

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Duplicate Sample Results (DER)

Page: 1 of 1

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0037	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: 9809192-9	10/6/98	10/14/98	AS01679	2
DUP ID: 9809192-9-D1	10/6/98	10/14/98	AS01679	2

Sample Matrix: Soil
Date Collected: 23-Sep-98
Analytical SOP: PAI SOP 714R4
Prep SOP: PAI SOP 778R3
Aliquot Units: g
Report Basis: Dry

Analyte	Sample Result +/- 1s TPU	Duplicate Result +/- 1s TPU	Units	DER	Control Limit	Lab Qualifiers
U-234	1.833 +/- 0.062	2.05 +/- 0.14	pCi/g	0.71	< 1.42	
U-235	0.0631 +/- 0.0063	0.093 +/- 0.015	pCi/g	0.91	< 1.42	LT
U-238	1.990 +/- 0.067	2.12 +/- 0.14	pCi/g	0.42	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.88	pCi/g	89%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000283

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

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Section 3

**INDIVIDUAL
SAMPLE RESULTS**

1000284

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 1 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0029

Lab ID: 9809192-1

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.618 +/- 0.052	0.018	pCi/g	
U-235	0.0349 +/- 0.0095	0.020	pCi/g	LT
U-238	0.879 +/- 0.067	0.018	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.75	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000285

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 2 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0030

Lab ID: 9809192-2

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.793 +/- 0.063	0.019	pCi/g	
U-235	0.053 +/- 0.011	0.014	pCi/g	LT
U-238	1.103 +/- 0.081	0.017	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.77	pCi/g	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000286

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 3 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0031

Lab ID: 9809192-3

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.911 +/- 0.069	0.018	pCi/g	
U-235	0.036 +/- 0.010	0.026	pCi/g	LT
U-238	1.78 +/- 0.12	0.022	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.84	pCi/g	88%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000287

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 4 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0032

Lab ID: 9809192-4

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.742 +/- 0.060	0.021	pCi/g	
U-235	0.078 +/- 0.015	0.028	pCi/g	LT
U-238	1.077 +/- 0.080	0.017	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.71	pCi/g	81%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000288

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 5 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0033

Lab ID: 9809192-5

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.569 +/- 0.049	0.017	pCi/g	
U-235	0.0317 +/- 0.0094	0.021	pCi/g	LT
U-238	0.971 +/- 0.074	0.0071	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.74	pCi/g	83%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000289

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 6 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0034

Lab ID: 9809192-6

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.783 +/- 0.062	0.0071	pCi/g	
U-235	0.047 +/- 0.011	0.019	pCi/g	LT
U-238	1.222 +/- 0.089	0.017	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.73	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000290

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 7 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0035

Lab ID: 9809192-7

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.495 +/- 0.044	0.0069	pCi/g	
U-235	0.048 +/- 0.011	0.024	pCi/g	LT
U-238	1.62 +/- 0.11	0.022	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.74	pCi/g	82%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000291

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 8 of 9

Reported on: Thursday, October 22, 1998
15:28:56

Client Name: Los Alamos National Laboratory

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0036

Lab ID: 9809192-8

Sample Matrix: Soil

Date Prepared: 06-Oct-98

Prep SOP: PAI SOP 778R3

Prep Batch: AS01679

Date Collected: 23-Sep-98

Date Analyzed: 14-Oct-98

Analytical SOP: PAI SOP 714R4

Final Aliquot: 2.000

Aliquot Units: g

Report Basis: Dry

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.591 +/- 0.051	0.015	pCi/g	
U-235	0.039 +/- 0.010	0.015	pCi/g	LT
U-238	0.734 +/- 0.060	0.018	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.53	pCi/g	73%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000292

Isotopic Uranium By Alpha Spectroscopy

Method PAI714R4

Sample Results

Page: 9 of 9

Client Name: Los Alamos National Laboratory

Reported on: Thursday, October 22, 1998
15:28:56

Client Project Name:

Laboratory Name: Paragon Analytics, Inc.

Client Project Number: 4662R

PAI Work Order: 9809192

Field ID: RE15-98-0037

Lab ID: 9809192-9

Sample Matrix: Soil

Date Collected: 23-Sep-98

Final Aliquot: 2.000

Date Prepared: 06-Oct-98

Date Analyzed: 14-Oct-98

Aliquot Units: g

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Report Basis: Dry

Prep Batch: AS01679

Count Time (min.): 400

Target Nuclide	Result +/- 1s TPU	MDC	Reporting Units	Lab Qualifier
U-234	1.83 +/- 0.12	0.017	pCi/g	
U-235	0.063 +/- 0.013	0.017	pCi/g	LT
U-238	1.99 +/- 0.13	0.019	pCi/g	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits
U-232	2.11	1.77	pCi/g	84%	30-110%

Comments:

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable activity.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

000293

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 4

RAW DATA

4

000294

Raw Data Report

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9809192

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Page: 1 of 4

Reported on: Thursday, October 22, 1998
15:28:56

Sample ID	Batch ID	Count Start	File Name	Det	T/ A	Nuclide	NetCounts SampTime	BkgCnts BkgTime	Det Eff	Chem Yield	DPM/ Aliquot	Aliquot Used	Activity +/- 1 s TPU	MDC	Report Units	Matrix	Flags	Notes
AS01679BLK1	AS01679	10/14/98 09:50:16	U01679B1.RPT	19	T	U-232	881.80 400	28 1000	0.2841	82.89%	9.36121	2	2.11 0.14	0.044	pCi/g Dry	Soil		
AS01679BLK1	AS01679	10/14/98 09:50:16	U01679B1.RPT	19	A	U-234	4.60 400	6 1000	0.2841	82.89%	0.04883	2	0.0110 0.0066	0.024	pCi/g Dry	Soil	U	
AS01679BLK1	AS01679	10/14/98 09:50:16	U01679B1.RPT	19	A	U-235	1.00 400	5 1000	0.2841	82.89%	0.01062	2	0.0024 0.0046	0.023	pCi/g Dry	Soil	U	
AS01679BLK1	AS01679	10/14/98 09:50:16	U01679B1.RPT	19	A	U-238	0.40 400	4 1000	0.2841	82.89%	0.00425	2	0.0010 0.0039	0.021	pCi/g Dry	Soil	U	
AS01679LCS1	AS01679	10/14/98 09:50:52	U01679S1.RPT	20	T	U-232	865.00 400	20 1000	0.2808	82.27%	9.36121	2	2.11 0.14	0.039	pCi/g Dry	Soil		
AS01679LCS1	AS01679	10/14/98 09:50:52	U01679S1.RPT	20	A	U-234	1023.20 400	2 1000	0.2808	82.27%	11.0733	2	2.49 0.16	0.017	pCi/g Dry	Soil	Pass	LCS RECOV=104%
AS01679LCS1	AS01679	10/14/98 09:50:52	U01679S1.RPT	20	A	U-235	42.20 400	2 1000	0.2808	82.27%	0.4567	2	0.103 0.017	0.017	pCi/g Dry	Soil		
AS01679LCS1	AS01679	10/14/98 09:50:52	U01679S1.RPT	20	A	U-238	992.40 400	4 1000	0.2808	82.27%	10.74	2	2.42 0.16	0.022	pCi/g Dry	Soil	Pass	LCS RECOV=100%
9809192-1	AS01679	10/14/98 09:41:42	U919201.RPT	9	A	U-234	272.80 400	3 1000	0.2986	83.21%	2.74478	2	0.618 0.052	0.018	pCi/g Dry	Soil		
9809192-1	AS01679	10/14/98 09:41:42	U919201.RPT	9	A	U-235	15.40 400	4 1000	0.2986	83.21%	0.15495	2	0.0349 0.0095	0.020	pCi/g Dry	Soil	LT	
9809192-1	AS01679	10/14/98 09:41:42	U919201.RPT	9	A	U-238	387.80 400	3 1000	0.2986	83.21%	3.90185	2	0.879 0.067	0.018	pCi/g Dry	Soil		
9809192-1	AS01679	10/14/98 09:41:42	U919201.RPT	9	T	U-232	930.40 400	9 1000	0.2986	83.21%	9.36121	2	2.11 0.14	0.027	pCi/g Dry	Soil		
9809192-2	AS01679	10/14/98 09:44:41	U919202.RPT	10	A	U-234	338.80 400	3 1000	0.2869	83.85%	3.52085	2	0.793 0.063	0.019	pCi/g Dry	Soil		

Comments:

000295

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable concentration.

Y2 - Chemical Yield outside default limits.

* - Duplicate DER not within control limits.

+ - Duplicate RPD not within limits.

Abbreviations:

T - Tracer A - Analyte

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

DER - Duplicate Error Ratio

LT - Result is less than Requested MDC, greater than sample specific MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

B - Analyte concentration greater than MDC.

M - Requested MDC not met.

Raw Data Report

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9809192

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Page: 2 of 4

Reported on: Thursday, October 22, 1998
15:28:56

Sample ID	Batch ID	Count Start	File Name	Det	T/ A	Nuclide	NetCounts SampTime	BkgCnts BkgTime	Det Eff	Chem Yield	DPM/ Aliquot	Aliquot Used	Activity +/- 1 s TPU	MDC	Report Units	Matrix	Flags	Notes
9809192-2	AS01679	10/14/98 09:44:41	U919202.RPT	10	A	U-235	22.60 400	1 1000	0.2869	83.85%	0.23486	2	0.053 0.011	0.014	pCi/g Dry	Soil	LT	
9809192-2	AS01679	10/14/98 09:44:41	U919202.RPT	10	A	U-238	471.20 400	2 1000	0.2869	83.85%	4.89676	2	1.103 0.081	0.017	pCi/g Dry	Soil		
9809192-2	AS01679	10/14/98 09:44:41	U919202.RPT	10	T	U-232	900.80 400	23 1000	0.2869	83.85%	9.36121	2	2.11 0.14	0.040	pCi/g Dry	Soil		
9809192-3	AS01679	10/14/98 09:45:13	U919203.RPT	11	A	U-234	401.80 400	3 1000	0.2839	87.50%	4.04358	2	0.911 0.069	0.018	pCi/g Dry	Soil		
9809192-3	AS01679	10/14/98 09:45:13	U919203.RPT	11	A	U-235	15.80 400	8 1000	0.2839	87.50%	0.15901	2	0.036 0.010	0.026	pCi/g Dry	Soil	LT	
9809192-3	AS01679	10/14/98 09:45:13	U919203.RPT	11	A	U-238	786.00 400	5 1000	0.2839	87.50%	7.91004	2	1.78 0.12	0.022	pCi/g Dry	Soil		
9809192-3	AS01679	10/14/98 09:45:13	U919203.RPT	11	T	U-232	930.20 400	22 1000	0.2839	87.50%	9.36121	2	2.11 0.14	0.038	pCi/g Dry	Soil		
9809192-4	AS01679	10/14/98 09:45:38	U919204.RPT	12	A	U-234	309.40 400	4 1000	0.2894	81.17%	3.29282	2	0.742 0.060	0.021	pCi/g Dry	Soil		
9809192-4	AS01679	10/14/98 09:45:38	U919204.RPT	12	A	U-235	32.40 400	9 1000	0.2894	81.17%	0.34482	2	0.078 0.015	0.028	pCi/g Dry	Soil	LT	
9809192-4	AS01679	10/14/98 09:45:38	U919204.RPT	12	A	U-238	449.20 400	2 1000	0.2894	81.17%	4.78065	2	1.077 0.080	0.017	pCi/g Dry	Soil		
9809192-4	AS01679	10/14/98 09:45:38	U919204.RPT	12	T	U-232	879.60 400	11 1000	0.2894	81.17%	9.36121	2	2.11 0.14	0.031	pCi/g Dry	Soil		
9809192-5	AS01679	10/14/98 09:46:15	U919205.RPT	13	A	U-234	240.20 400	2 1000	0.2882	82.53%	2.52477	2	0.569 0.049	0.017	pCi/g Dry	Soil		
9809192-5	AS01679	10/14/98 09:46:15	U919205.RPT	13	A	U-235	13.40 400	4 1000	0.2882	82.53%	0.14085	2	0.0317 0.0094	0.021	pCi/g Dry	Soil	LT	

00296

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific minimum detectable concentration.
- Y2 - Chemical Yield outside default limits.
- * - Duplicate DER not within control limits.
- + - Duplicate RPD not within limits.

Abbreviations:

- T - Tracer
- A - Analyte
- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- DER - Duplicate Error Ratio

- LT - Result is less than Requested MDC, greater than sample specific MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.
- B - Analyte concentration greater than MDC.
- M - Requested MDC not met.

Raw Data Report

Laboratory Name: Paragon Analytics, Inc.
PAI Work Order: 9809192

Prep SOP: PAI SOP 778R3
Analytical SOP: PAI SOP 714R4

Page: 3 of 4
Reported on: Thursday, October 22, 1998
15:28:56

Sample ID	Batch ID	Count Start	File Name	Det	T/A	Nuclide	NetCounts SampTime	BkgCnts BkgTime	Det Eff	Chem Yield	DPM/ Aliquot	Aliquot Used	Activity +/- 1s TPU	MDC	Report Units	Matrix	Flags	Notes
9809192-5	AS01679	10/14/98 09:46:15	U919205.RPT	13	A	U-238	410.00 400	0 1000	0.2882	82.53%	4.30956	2	0.971 0.074	0.0071	pCi/g Dry	Soil		
9809192-5	AS01679	10/14/98 09:46:15	U919205.RPT	13	T	U-232	890.60 400	21 1000	0.2882	82.53%	9.36121	2	2.11 0.14	0.039	pCi/g Dry	Soil		
9809192-6	AS01679	10/14/98 09:46:42	U919206.RPT	14	A	U-234	329.00 400	0 1000	0.2880	82.14%	3.47690	2	0.783 0.062	0.0071	pCi/g Dry	Soil		
9809192-6	AS01679	10/14/98 09:46:42	U919206.RPT	14	A	U-235	19.80 400	3 1000	0.2880	82.14%	0.20925	2	0.047 0.011	0.019	pCi/g Dry	Soil	LT	
9809192-6	AS01679	10/14/98 09:46:42	U919206.RPT	14	A	U-238	513.20 400	2 1000	0.2880	82.14%	5.42354	2	1.222 0.089	0.017	pCi/g Dry	Soil		
9809192-6	AS01679	10/14/98 09:46:42	U919206.RPT	14	T	U-232	885.80 400	13 1000	0.2880	82.14%	9.36121	2	2.11 0.14	0.032	pCi/g Dry	Soil		
9809192-7	AS01679	10/14/98 09:47:17	U919207.RPT	15	A	U-234	214.00 400	0 1000	0.2953	82.44%	2.19757	2	0.495 0.044	0.0069	pCi/g Dry	Soil		
9809192-7	AS01679	10/14/98 09:47:17	U919207.RPT	15	A	U-235	20.60 400	6 1000	0.2953	82.44%	0.21154	2	0.048 0.011	0.024	pCi/g Dry	Soil	LT	
9809192-7	AS01679	10/14/98 09:47:17	U919207.RPT	15	A	U-238	701.00 400	5 1000	0.2953	82.44%	7.19856	2	1.62 0.11	0.022	pCi/g Dry	Soil		
9809192-7	AS01679	10/14/98 09:47:17	U919207.RPT	15	T	U-232	911.60 400	16 1000	0.2953	82.44%	9.36121	2	2.11 0.14	0.034	pCi/g Dry	Soil		
9809192-8	AS01679	10/14/98 09:48:00	U919208.RPT	16	A	U-234	237.60 400	1 1000	0.3121	72.51%	2.62476	2	0.591 0.051	0.015	pCi/g Dry	Soil		
9809192-8	AS01679	10/14/98 09:48:00	U919208.RPT	16	A	U-235	15.60 400	1 1000	0.3121	72.51%	0.17233	2	0.039 0.010	0.015	pCi/g Dry	Soil	LT	
9809192-8	AS01679	10/14/98 09:48:00	U919208.RPT	16	A	U-238	296.20 400	2 1000	0.3121	72.51%	3.26107	2	0.734 0.060	0.018	pCi/g Dry	Soil		

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific minimum detectable concentration.
Y2 - Chemical Yield outside default limits.
* - Duplicate DER not within control limits.
+ - Duplicate RPD not within limits.

Abbreviations:

T - Tracer A - Analyte
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
DER - Duplicate Error Ratio

LT - Result is less than Requested MDC; greater than sample specific MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.
B - Analyte concentration greater than MDC.
M - Requested MDC not met.

Raw Data Report

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 9809192

Prep SOP: PAI SOP 778R3

Analytical SOP: PAI SOP 714R4

Page: 4 of 4

Reported on: Thursday, October 22, 1998

15:28:56

Sample ID	Batch ID	Count Start	File Name	Det	T/ A	Nuclide	NetCounts SampTime	BkgCnts BkgTime	Det Eff	Chem Yield	DPM/ Aliquot	Aliquot Used	Activity +/- 1s TPU	MDC	Report Units	Matrix	Flags	Notes
9809192-8	AS01679	10/14/98 09:48:00	U919208.RPT	16	T	U-232	847.40 400	24 1000	0.3121	72.51%	9.36121	2	2.11 0.14	0.043	pCi/g Dry	Soil		
9809192-9	AS01679	10/14/98 09:48:05	U919209.RPT	17	A	U-234	790.20 400	2 1000	0.2892	83.92%	8.13956	2	1.83 0.12	0.017	pCi/g Dry	Soil		
9809192-9	AS01679	10/14/98 09:48:05	U919209.RPT	17	A	U-235	27.20 400	2 1000	0.2892	83.92%	0.28018	2	0.063 0.013	0.017	pCi/g Dry	Soil	LT	
9809192-9	AS01679	10/14/98 09:48:05	U919209.RPT	17	A	U-238	857.80 400	3 1000	0.2892	83.92%	8.83588	2	1.99 0.13	0.019	pCi/g Dry	Soil		
9809192-9	AS01679	10/14/98 09:48:05	U919209.RPT	17	T	U-232	908.80 400	13 1000	0.2892	83.92%	9.36121	2	2.11 0.14	0.032	pCi/g Dry	Soil		
9809192-9-D1	AS01679	10/14/98 09:49:29	U919209D.RPT	18	A	U-234	929.20 400	7 1000	0.2863	89.31%	9.08548	2	2.05 0.14	0.024	pCi/g Dry	Soil		DER=0.71
9809192-9-D1	AS01679	10/14/98 09:49:29	U919209D.RPT	18	A	U-235	42.20 400	2 1000	0.2863	89.31%	0.41262	2	0.083 0.015	0.016	pCi/g Dry	Soil	LT	DER=0.91
9809192-9-D1	AS01679	10/14/98 09:49:29	U919209D.RPT	18	A	U-238	963.40 400	4 1000	0.2863	89.31%	9.41988	2	2.12 0.14	0.020	pCi/g Dry	Soil		DER=0.42
9809192-9-D1	AS01679	10/14/98 09:49:29	U919209D.RPT	18	T	U-232	957.40 400	39 1000	0.2863	89.31%	9.36121	2	2.11 0.14	0.047	pCi/g Dry	Soil		

000098

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific minimum detectable concentration.
- Y2 - Chemical Yield outside default limits.
- * - Duplicate DER not within control limits.
- + - Duplicate RPD not within limits.

Abbreviations:

- T - Tracer
- A - Analyte
- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- DER - Duplicate Error Ratio

- LT - Result is less than Requested MDC, greater than sample specific MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.
- B - Analyte concentration greater than MDC.
- M - Requested MDC not met.

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: AS01679BLK1 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 3 Input 3

Efficiency: 28.41% Chem. Recovery: 82.90%

Total Eff.: 23.55% Manual: 100.00%

CALIBRATION: 3072.62 + 9.74847 * Chn keV

Original: 3072.62 + 9.6921 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101219.CHN

ACQUISITION: 512 Channels Spectrum Acquired: 14-Oct-98 09:50:16

Live Time: 24000.00 Real Time: 24000.50 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U01679B1.CHN

Background File: C:\USER\ALPHA\BKGND\B8101119.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U01679B1

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	174.71	156	182	4.00	1.00	2.40	4.60	0.01
2.	135.75	120	155	2.00	1.00	2.00	1.00	0.00
3.	115.24	93	119	2.00	1.00	1.60	0.40	0.00
Tracer	230.57	207	235	6.00	114.00	11.20	881.80	2.20

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	38.994	2.0000	0.05	0.09	115.78
2.	U-235	0.55	4396.00	19.497	1.0000	0.01	0.08	357.13
3.	U-238	0.77	4196.00	19.497	1.0000	0.00	0.08	735.98
Tracer	U-232	0.69	5320.30	58.491	3.0000	9.36	0.14	6.56

T O T A L S			% Recovery
Gross Count	1014.0000	100.00	
Net Area	894.4000	88.21	
Background	119.6000	11.79	
Composite Fit	905.0000	89.25	
Residuals	10.6000	1.05	

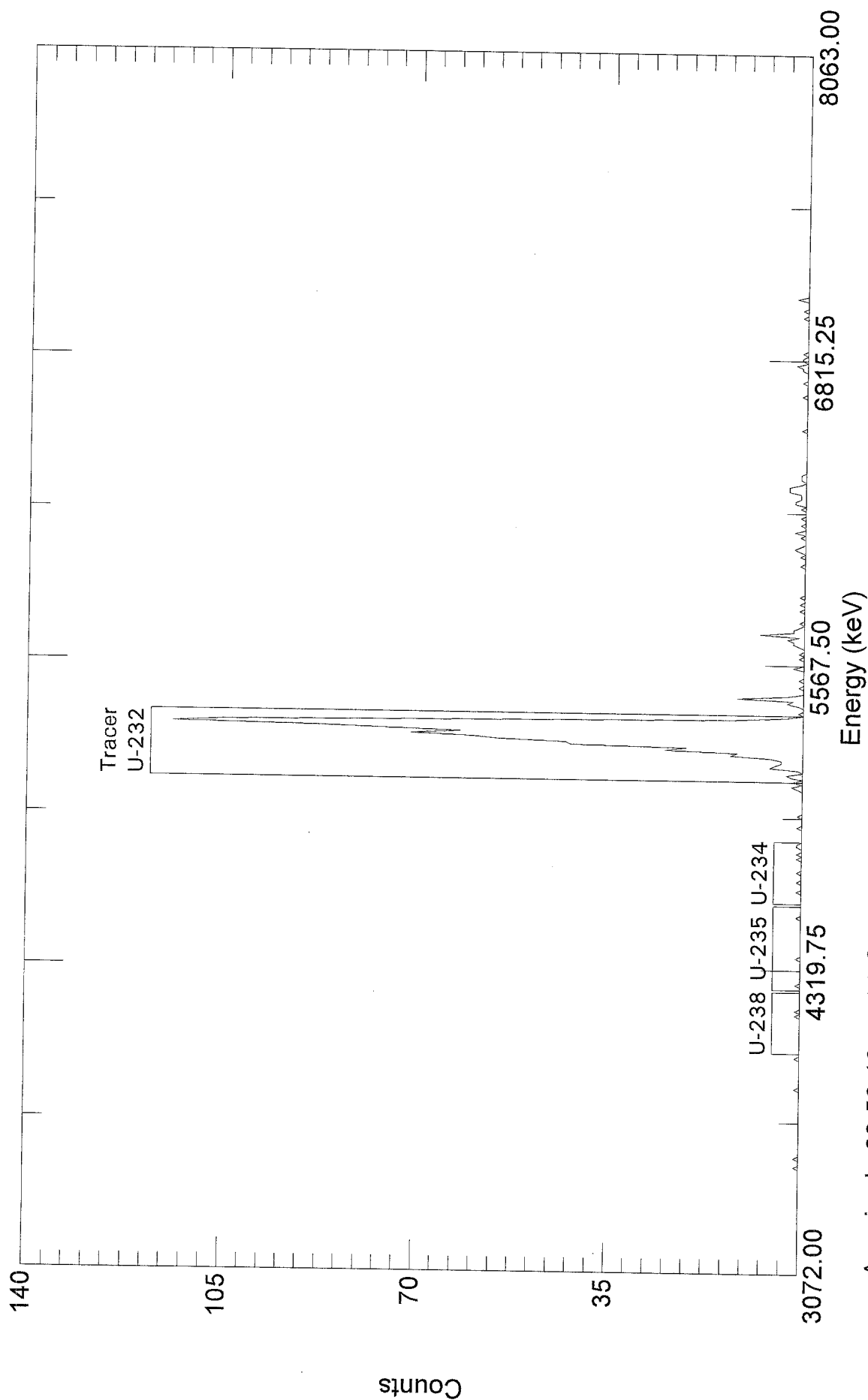
Analyzed By: GH ()

Checked By: RG ()

000299

U01679B1

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:50:16 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U01679B1.CHN

Sample: AS01679BLK1 AS01679

Real Time: 24000.50 s. Live Time: 24000.00 s.

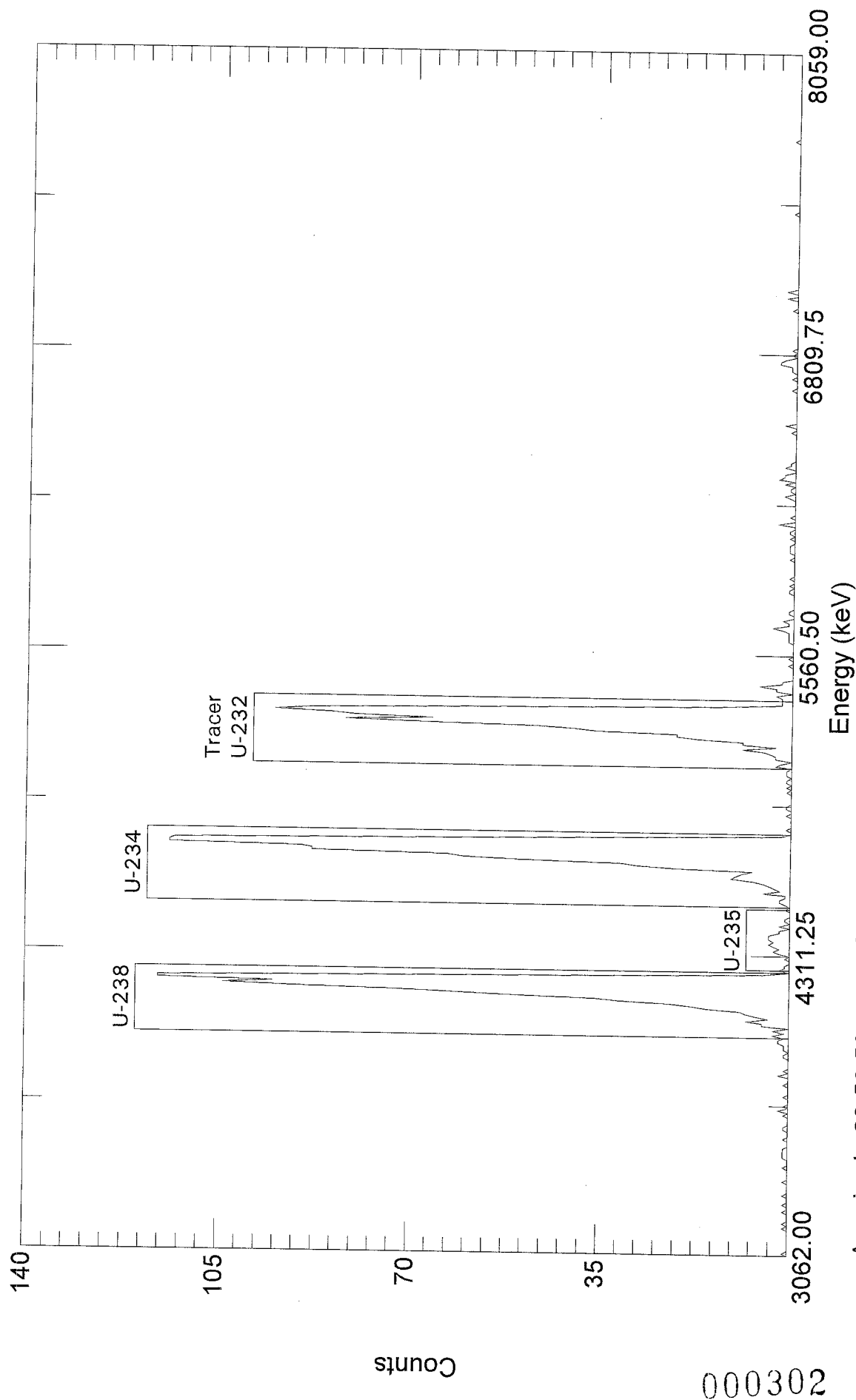
Detector: #19 MCB 3 Input 3

Type: Uranium

000301

U01679S1

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:50:52 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U01679S1.CHN

Sample: AS01679LCS1 AS01679

Real Time: 24000.48 s. Live Time: 24000.00 s.

Detector: #20 MCB 3 Input 4

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091921 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 1

Efficiency: 29.86% Chem. Recovery: 83.22%

Total Eff.: 24.85% Manual: 100.00%

CALIBRATION: 3049.98 + 9.76205 * Chn keV

Original: 3049.98 + 9.6925 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101209.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:41:42

Live Time: 24000.00

Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919201.CHN

Background File: C:\USER\ALPHA\BKGND\B8101109.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest
Slope Recalibration

Results: U919201

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	176.79	156	180	6.00	37.00	1.20	272.80	0.68
2.	137.88	124	155	4.00	2.00	1.60	15.40	0.04
3.	117.40	96	123	8.00	48.00	1.20	387.80	0.97
Tracer	232.57	210	238	4.00	133.00	3.60	930.40	2.33

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.572	3.0000	2.74	0.07	11.90
2.	U-235	0.55	4396.00	39.048	2.0000	0.15	0.08	52.87
3.	U-238	0.77	4196.00	78.096	4.0000	3.90	0.07	9.97
Tracer	U-232	0.69	5320.30	39.048	2.0000	9.36	0.09	6.41

T O T A L S		% Recovery
Gross Count	1704.0000	100.00
Net Area	1635.6000	95.99
Background	68.4000	4.01
Composite Fit	1614.0000	94.72
Residuals	21.6000	1.27

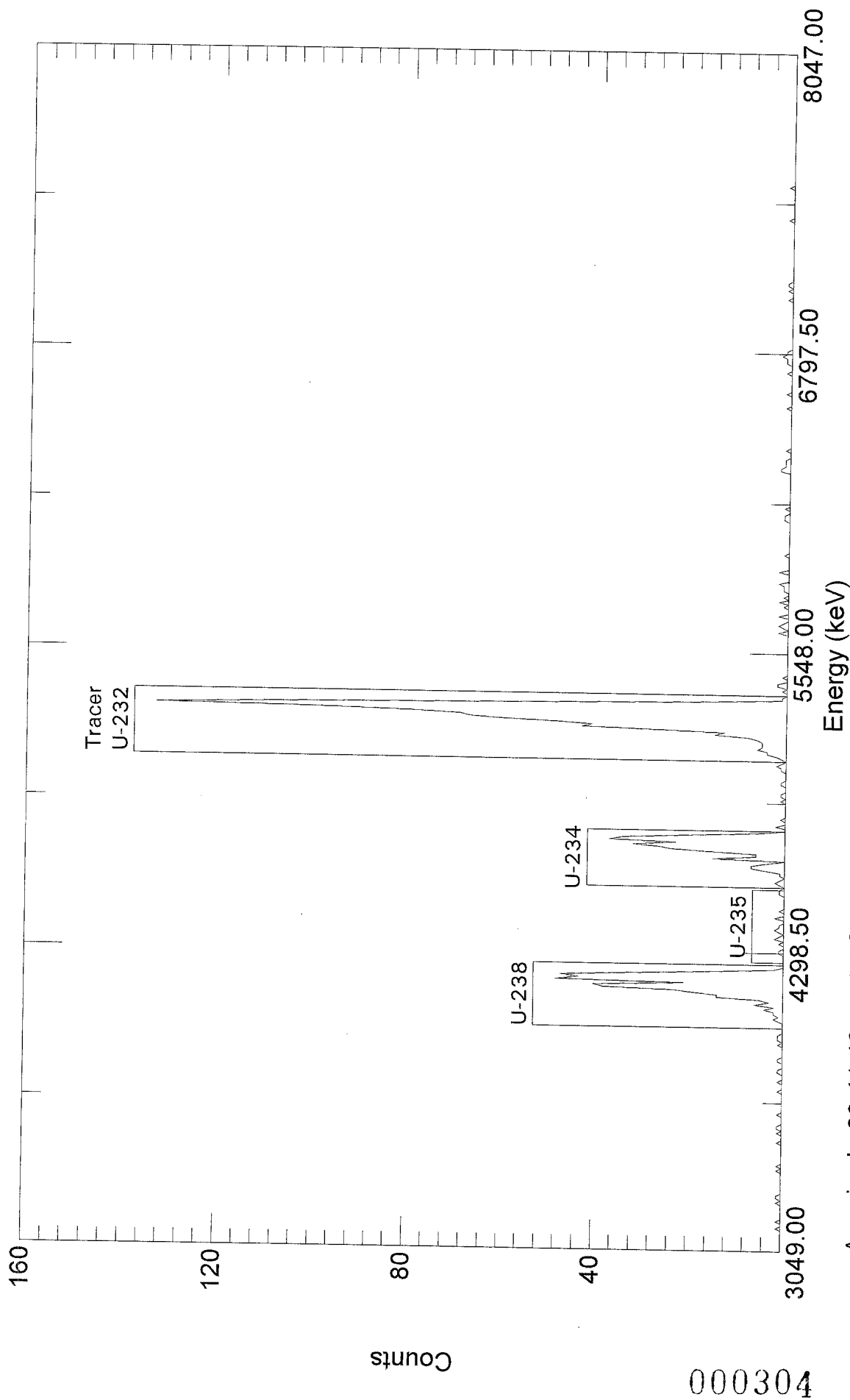
Analyzed By: JH ()

Checked By: RG ()

000303

U919201

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:41:42 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U919201.CHN

Sample: 98091921 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #9 MCB 2 Input 1

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091922 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 2

Efficiency: 28.69% Chem. Recovery: 83.86%

Total Eff.: 24.06% Manual: 100.00%

CALIBRATION: 3044.98 + 9.75262 * Chn keV

Original: 3044.98 + 9.6948 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101210.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:44:41

Live Time: 24000.00

Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919202.CHN

Background File: C:\USER\ALPHA\BKGND\B8101110.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest
Slope Recalibration

Results: U919202

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	177.47	156	182	6.00	53.00	1.20	338.80	0.85
2.	138.53	124	155	2.00	3.00	0.40	22.60	0.06
3.	118.02	96	123	8.00	73.00	0.80	471.20	1.18
Tracer	233.30	210	238	6.00	113.00	9.20	900.80	2.25

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.516	3.0000	3.52	0.07	10.67
2.	U-235	0.55	4396.00	19.505	1.0000	0.23	0.06	41.65
3.	U-238	0.77	4196.00	78.021	4.0000	4.90	0.07	9.04
Tracer	U-232	0.69	5320.30	58.516	3.0000	9.36	0.13	6.50

T O T A L S			% Recovery
Gross Count	1869.0000		100.00
Net Area	1760.2000		94.18
Background	108.8000		5.82
Composite Fit	1745.0000		93.37
Residuals	15.2000		0.81

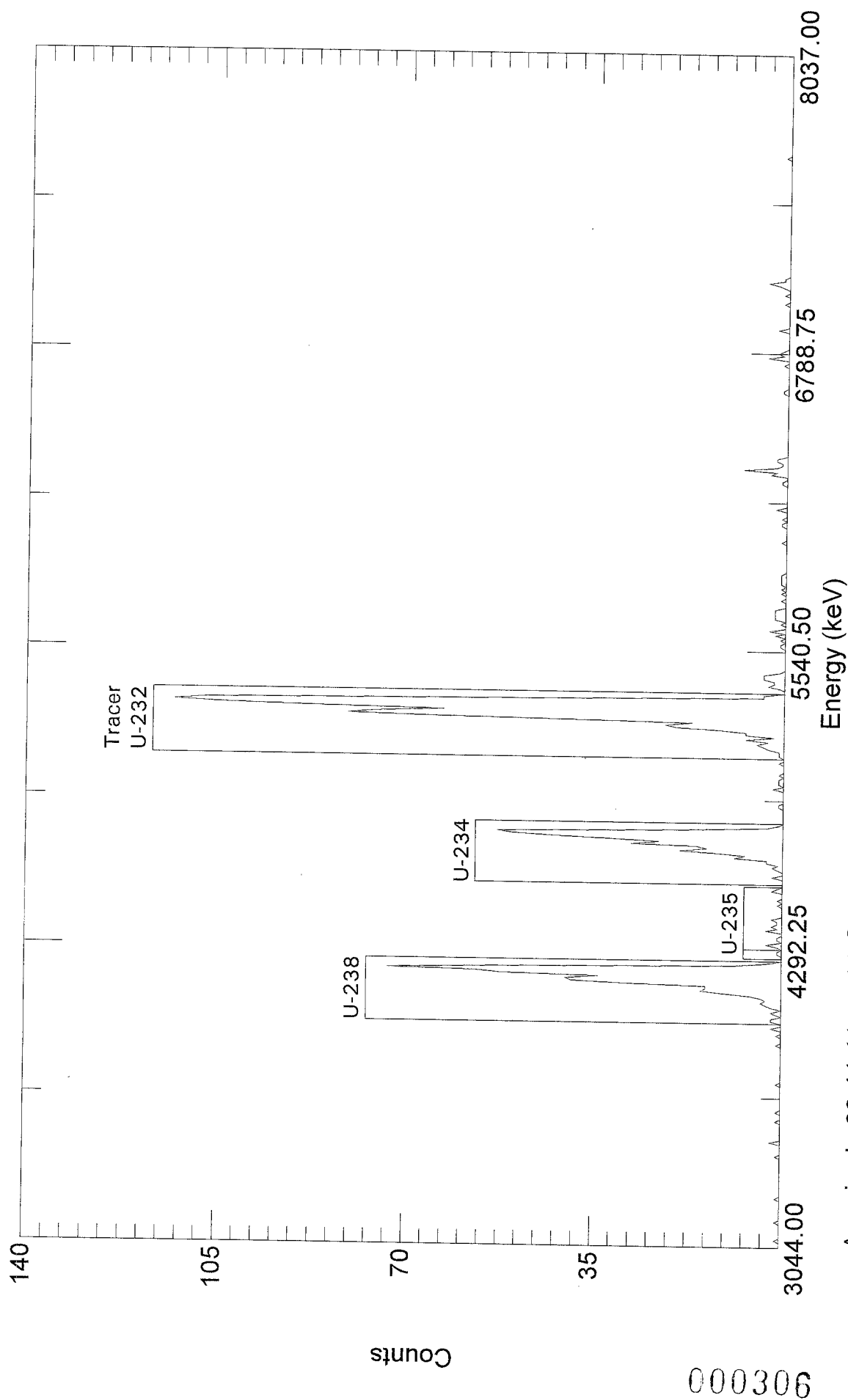
Analyzed By: GH ()

Checked By: RG ()

000305

U919202

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:44:41 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U919202.CHN

Sample: 98091922 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #10 MCB 2 Input 2

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091923 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 3

Efficiency: 28.39% Chem. Recovery: 87.51%

Total Eff.: 24.85% Manual: 100.00%

CALIBRATION: 3047.96 + 9.8015 * Chn keV

Original: 3047.96 + 9.7294 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101211.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:45:13

Live Time: 24000.00

Real Time: 24000.36 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919203.CHN

Background File: C:\USER\ALPHA\BKGND\B8101111.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919203

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	176.28	157	180	6.00	58.00	1.20	401.80	1.00
2.	137.53	126	156	2.00	3.00	3.20	15.80	0.04
3.	117.13	97	125	8.00	103.00	2.00	786.00	1.97
Tracer	231.84	209	239	6.00	124.00	8.80	930.20	2.33

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.809	3.0000	4.04	0.07	9.79
2.	U-235	0.55	4396.00	19.603	1.0000	0.16	0.09	54.80
3.	U-238	0.77	4196.00	78.412	4.0000	7.91	0.08	7.00
Tracer	U-232	0.69	5320.30	58.809	3.0000	9.36	0.13	6.40

T O T A L S			% Recovery
Gross Count	2249.0000	100.00	
Net Area	2157.4000	95.93	
Background	91.6000	4.07	
Composite Fit	2149.0000	95.55	
Residuals	8.4000	0.37	

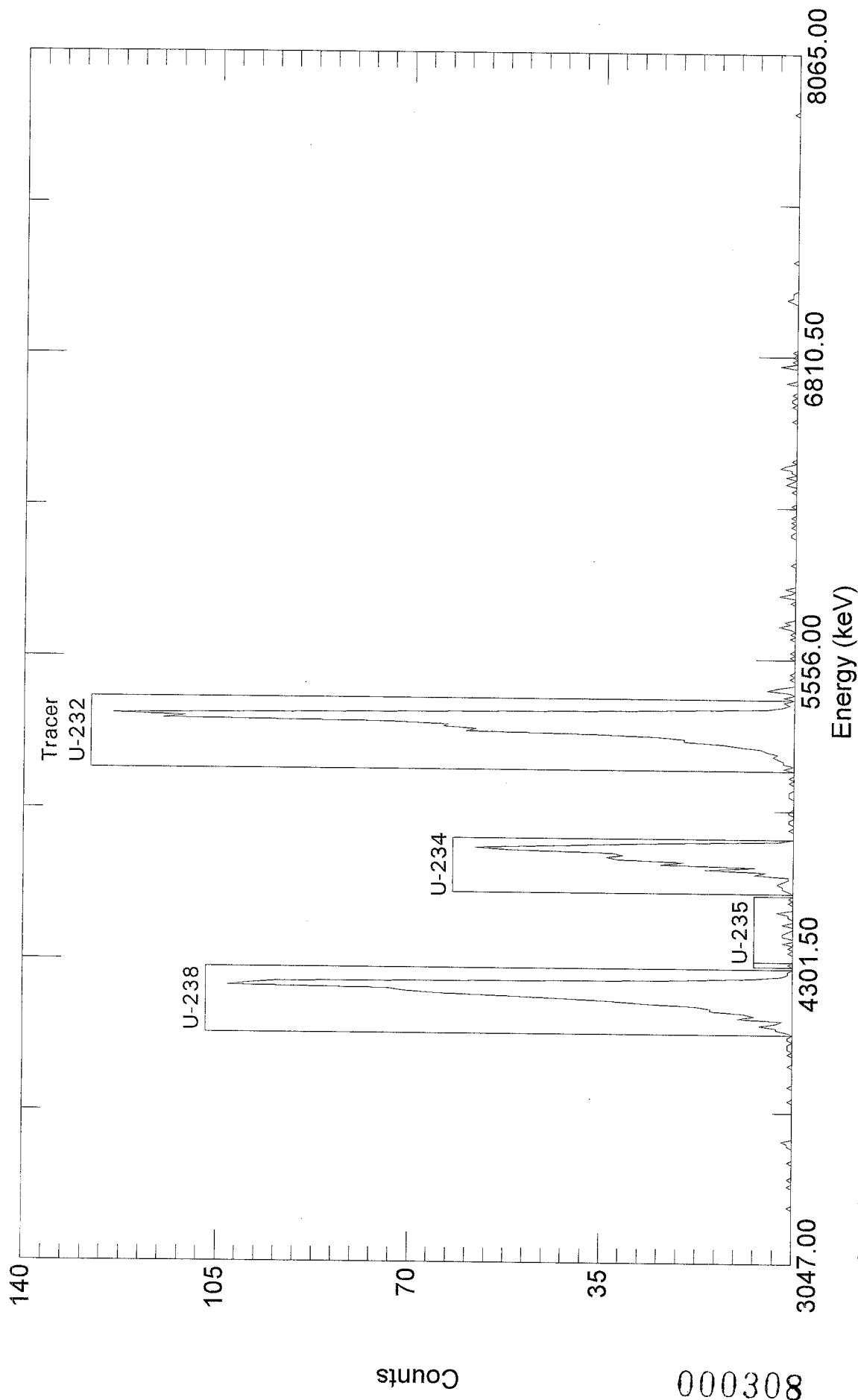
Analyzed By: GH ()

Checked By: RG ()

000307

U919203

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:45:13 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U919203.CHN

Sample: 98091923 AS01679

Real Time: 24000.36 s. Live Time: 24000.00 s.

Detector: #11 MCB 2 Input 3

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091924 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 4

Efficiency: 28.94% Chem. Recovery: 81.18%

Total Eff.: 23.49% Manual: 100.00%

CALIBRATION: 3055.28 + 9.72495 * Chn keV

Original: 3055.28 + 9.6562 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101212.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:45:38

Live Time: 24000.00

Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919204.CHN

Background File: C:\USER\ALPHA\BKGND\B8101112.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919204

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	176.92	158	180	8.00	40.00	1.60	309.40	0.77
2.	137.86	124	157	2.00	4.00	3.60	32.40	0.08
3.	117.30	92	123	10.00	54.00	0.80	449.20	1.12
Tracer	232.91	209	238	6.00	100.00	4.40	879.60	2.20

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	77.800	4.0000	3.29	0.08	11.18
2.	U-235	0.55	4396.00	19.450	1.0000	0.34	0.10	36.59
3.	U-238	0.77	4196.00	97.250	5.0000	4.78	0.07	9.26
Tracer	U-232	0.69	5320.30	58.350	3.0000	9.36	0.11	6.59

T O T A L S			% Recovery
Gross Count	1766.0000		100.00
Net Area	1686.4000		95.49
Background	79.6000		4.51
Composite Fit	1681.0000		95.19
Residuals	5.4000		0.31

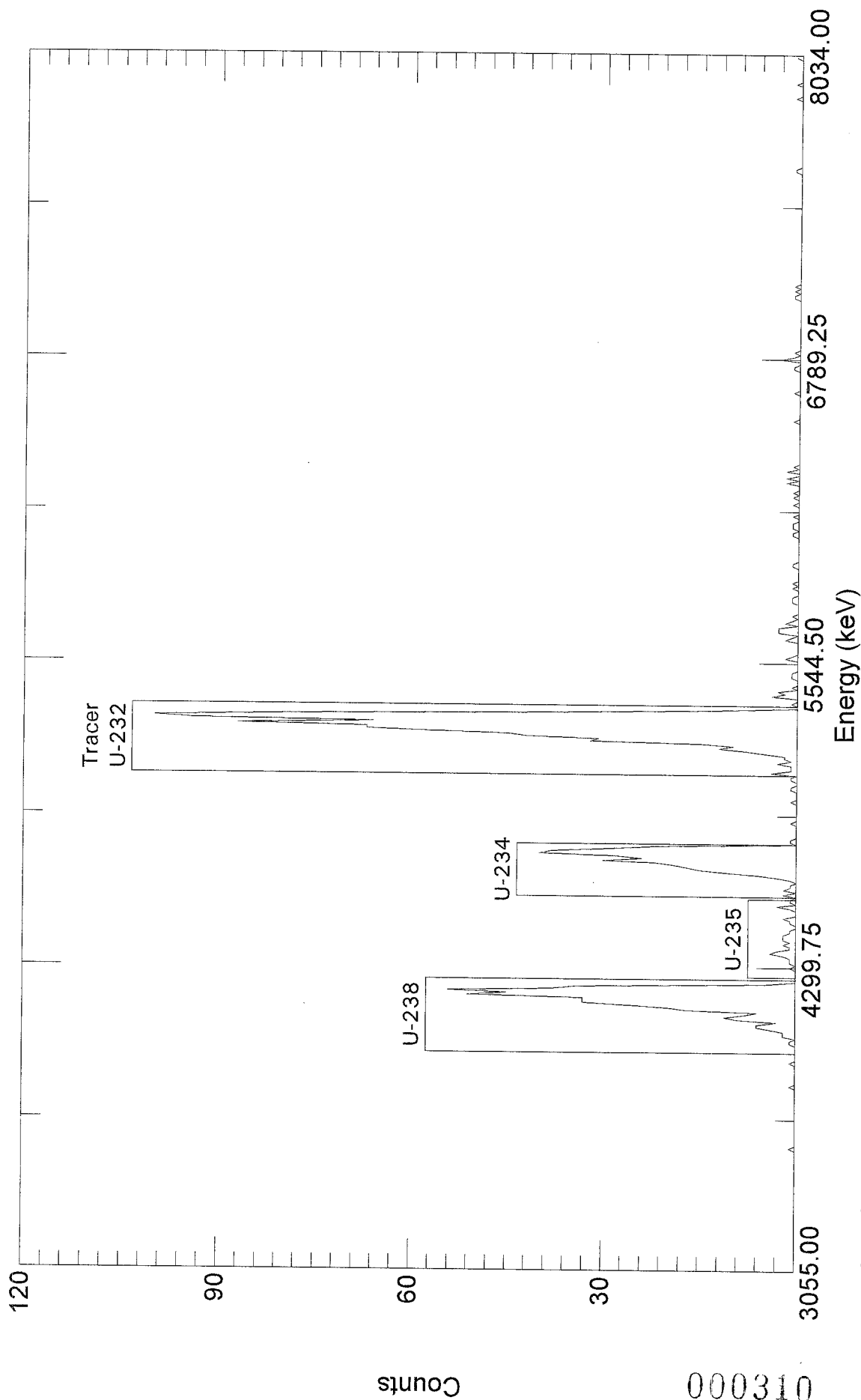
Analyzed By: GH ()

Checked By: RG ()

000309

U919204

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:45:38 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U919204.CHN

Sample: 98091924 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #12 MCB 2 Input 4

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091925 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 5

Efficiency: 28.82% Chem. Recovery: 82.54%

Total Eff.: 23.79% Manual: 100.00%

CALIBRATION: 3058.38 + 9.81256 * Chn keV

Original: 3058.38 + 9.7212 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101213.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:46:15

Live Time: 24000.00

Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919205.CHN

Background File: C:\USER\ALPHA\BKGND\B8101113.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919205

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	175.02	160	180	6.00	35.00	0.80	240.20	0.60
2.	136.32	123	159	2.00	2.00	1.60	13.40	0.03
3.	115.94	95	122	6.00	61.00	0.00	410.00	1.03
Tracer	230.51	211	236	6.00	112.00	8.40	890.60	2.23

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.875	3.0000	2.52	0.07	12.67
2.	U-235	0.55	4396.00	19.625	1.0000	0.14	0.08	57.13
3.	U-238	0.77	4196.00	58.875	3.0000	4.31	0.04	9.68
Tracer	U-232	0.69	5320.30	58.875	3.0000	9.36	0.13	6.54

T O T A L S			% Recovery
Gross Count	1673.0000	100.00	
Net Area	1574.6000	94.12	
Background	98.4000	5.88	
Composite Fit	1565.0000	93.54	
Residuals	9.6000	0.57	

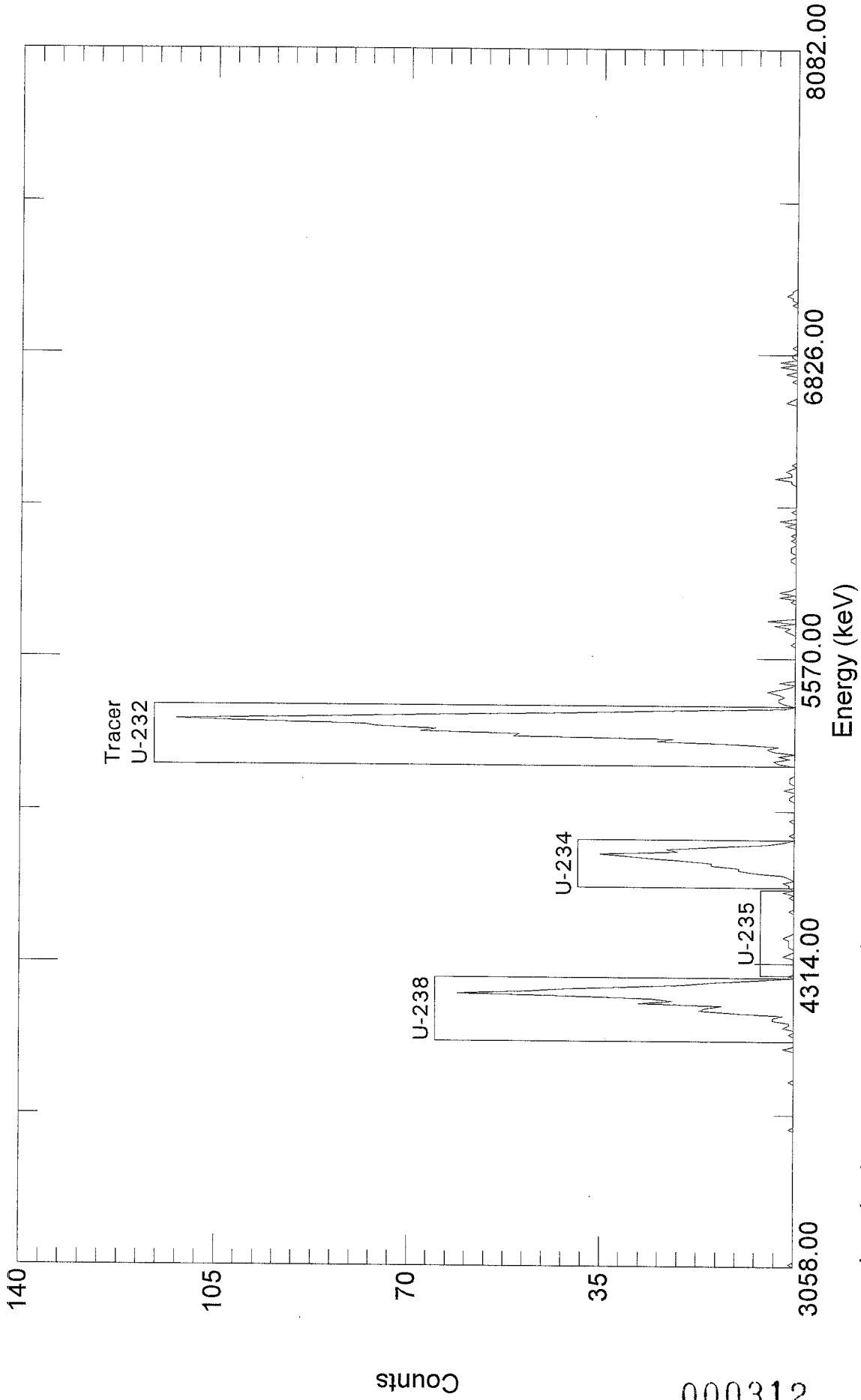
Analyzed By: GH ()

Checked By: RG ()

000311

U919205

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



000312

Acquired: 09:46:15 on 14-Oct-98

File: C:\USER\ALPHA\U919205.CHN

Sample: 98091925 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #13 MCB 2 Input 5

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091926 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 6

Efficiency: 28.80% Chem. Recovery: 82.15%

Total Eff.: 23.66% Manual: 100.00%

CALIBRATION: 3057.6 + 9.76563 * Chn keV

Original: 3057.6 + 9.6944 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101214.CHN

ACQUISITION: 512 Channels Spectrum Acquired: 14-Oct-98 09:46:42

Live Time: 24000.00 Real Time: 24000.36 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919206.CHN

Background File: C:\USER\ALPHA\BKGND\B8101114.CHN

Nuclide Library: C:\USER\ALPHA\ALPHA\ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919206

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	175.94	156	182	6.00	45.00	0.00	329.00	0.82
2.	137.05	123	155	2.00	3.00	1.20	19.80	0.05
3.	116.57	96	122	8.00	72.00	0.80	513.20	1.28
Tracer	231.70	211	239	6.00	117.00	5.20	885.80	2.21

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.594	3.0000	3.48	0.04	10.81
2.	U-235	0.55	4396.00	19.531	1.0000	0.21	0.07	45.57
3.	U-238	0.77	4196.00	78.125	4.0000	5.42	0.07	8.66
Tracer	U-232	0.69	5320.30	58.594	3.0000	9.36	0.11	6.57

T O T A L S			% Recovery
Gross Count	1865.0000	100.00	
Net Area	1775.4000	95.20	
Background	89.6000	4.80	
Composite Fit	1755.0000	94.10	
Residuals	20.4000	1.09	

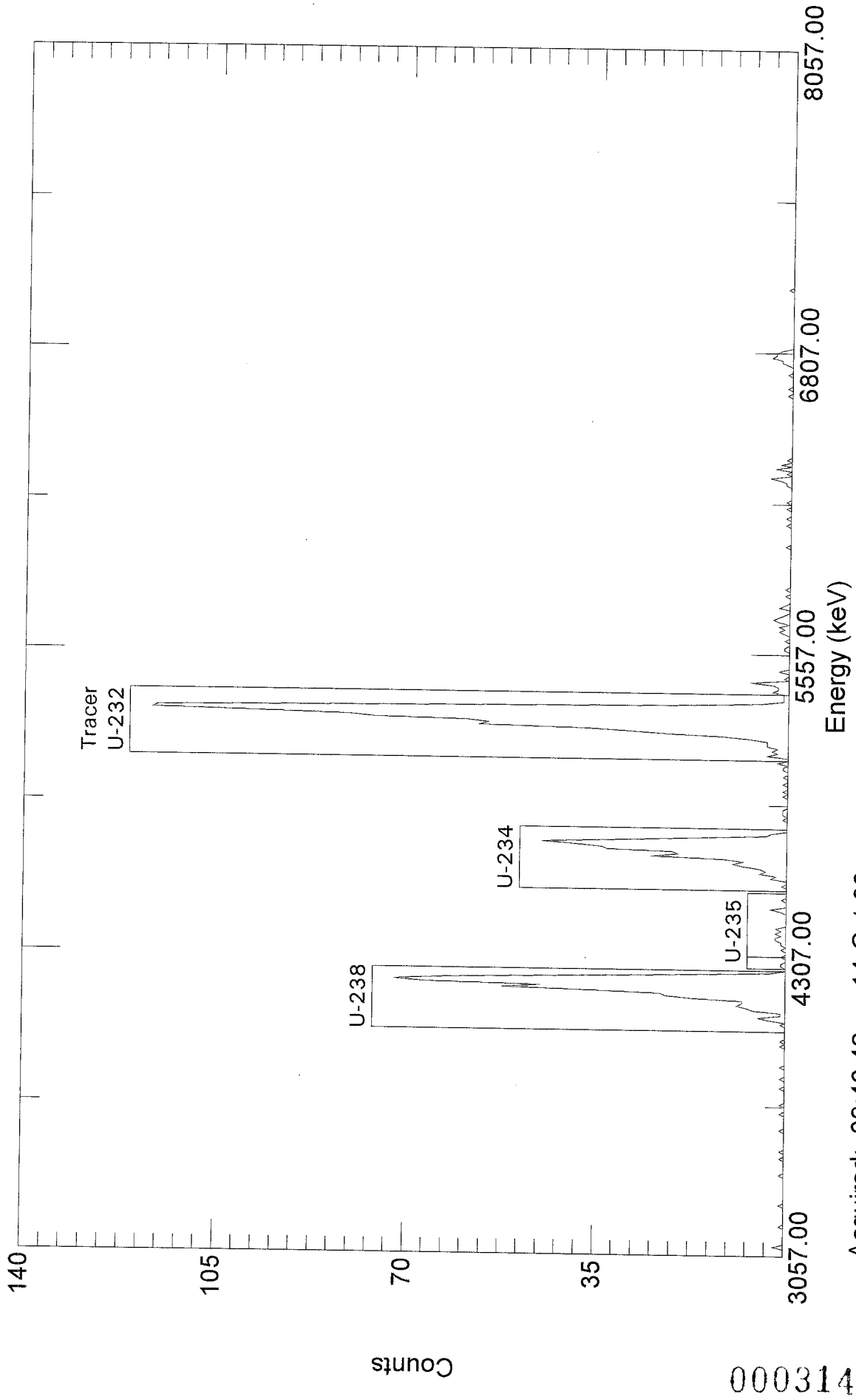
Analyzed By: JH ()

Checked By: RG ()

000313

U919206

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:46:42 on 14-Oct-98

File: C:\USER\ALPHA\U919206.CHN

Sample: 98091926 AS01679

Real Time: 24000.36 s. Live Time: 24000.00 s.

Detector: #14 MCB 2 Input 6

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091927 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 7

Efficiency: 29.53% Chem. Recovery: 82.45%

Total Eff.: 24.35% Manual: 100.00%

CALIBRATION: 3049.47 + 9.7687 * Chn keV

Original: 3049.47 + 9.6913 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101215.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:47:17

Live Time: 24000.00

Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919207.CHN

Background File: C:\USER\ALPHA\BKGND\B8101115.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919207

		P E A K S						
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	176.72	156	183	6.00	27.00	0.00	214.00	0.54
2.	137.84	124	155	4.00	5.00	2.40	20.60	0.05
3.	117.37	96	123	8.00	94.00	2.00	701.00	1.75
Tracer	232.46	210	237	6.00	136.00	6.40	911.60	2.28

		D E C A Y		C O R R E C T E D		R E S U L T S		
		Br.	Energy	Width	Tau	Aliquot		
Nuclide	Ratio		(keV)	(keV)		DPM	MDA	% Error
1.	U-234	0.72	4775.80	58.612	3.0000	2.20	0.04	13.40
2.	U-235	0.55	4396.00	39.075	2.0000	0.21	0.09	46.01
3.	U-238	0.77	4196.00	78.150	4.0000	7.20	0.08	7.42
Tracer	U-232	0.69	5320.30	58.612	3.0000	9.36	0.12	6.47

T O T A L S		% Recovery
Gross Count	1965.0000	100.00
Net Area	1898.2000	96.60
Background	66.8000	3.40
Composite Fit	1858.0000	94.55
Residuals	40.2000	2.05

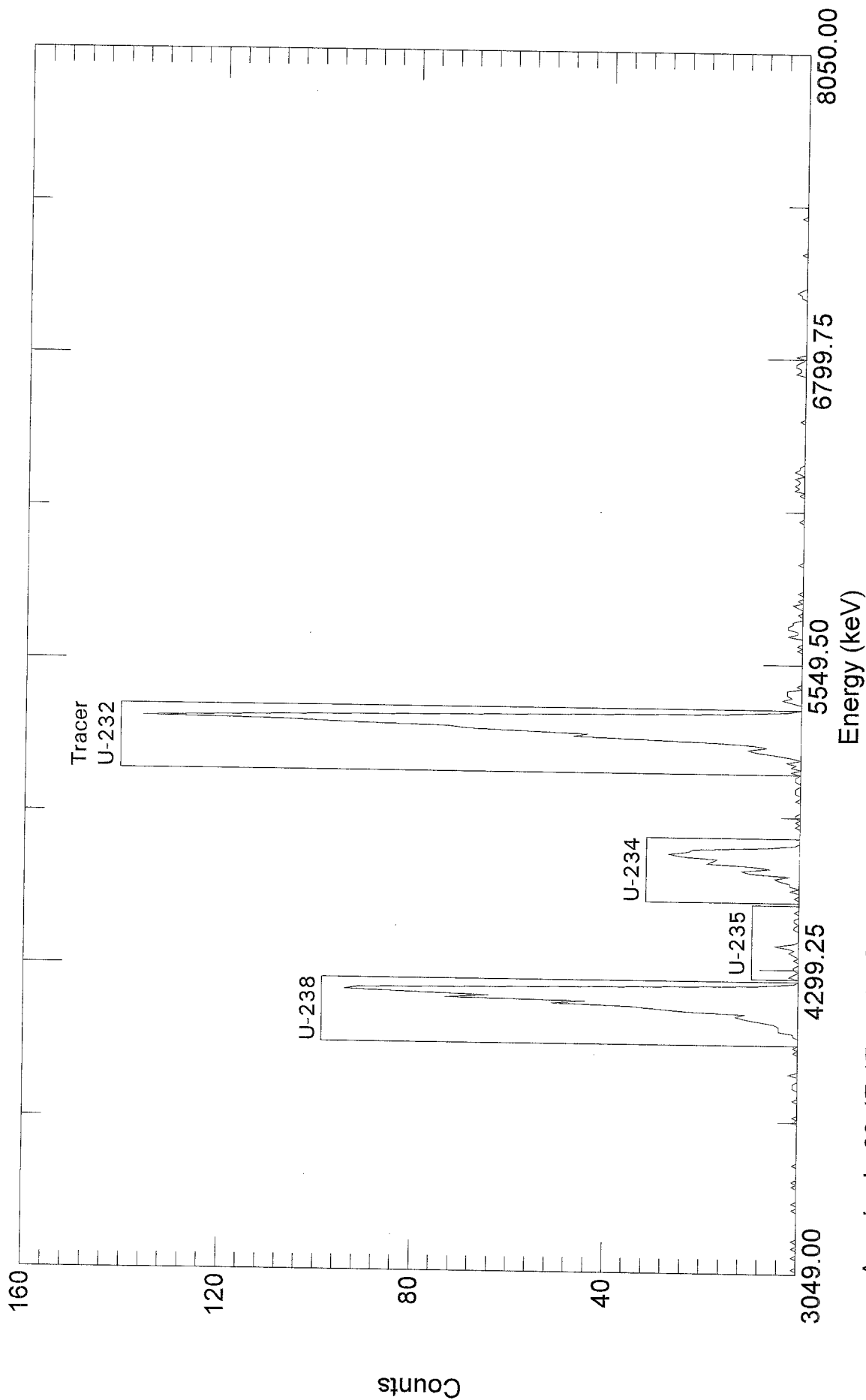
Analyzed By: SH ()

Checked By: RG ()

000315

U919207

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



000316

Acquired: 09:47:17 on 14-Oct-98

File: C:\USER\ALPHA\ALPHA\U919207.CHN

Sample: 98091927 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #15 MCB 2 Input 7

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091928 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 2 Input 8

Efficiency: 31.21% Chem. Recovery: 72.52%

Total Eff.: 22.63% Manual: 100.00%

CALIBRATION: 3064.69 + 9.81262 * Chn keV

Original: 3064.69 + 9.7453 * Chn keV

File: C:\USER\ALPHA\ALPHA\C8101216.CHN

ACQUISITION: 512 Channels Spectrum Acquired: 14-Oct-98 09:48:00

Live Time: 24000.00 Real Time: 24000.38 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919208.CHN

Background File: C:\USER\ALPHA\BKGND\B8101116.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest
Slope Recalibration

Results: U919208

P E A K S								
	Channel	Start	End	FWHM	Height	Background	Net Area	CPM
1.	174.38	156	181	8.00	33.00	0.40	237.60	0.59
2.	135.67	123	155	2.00	3.00	0.40	15.60	0.04
3.	115.29	96	122	10.00	39.00	0.80	295.20	0.74
Tracer	229.87	207	238	6.00	105.00	9.60	847.40	2.12

D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	U-234	0.72	4775.80	78.501	4.0000	2.62	0.06	12.73
2.	U-235	0.55	4396.00	19.625	1.0000	0.17	0.06	50.36
3.	U-238	0.77	4196.00	98.126	5.0000	3.26	0.07	11.43
Tracer	U-232	0.69	5320.30	58.876	3.0000	9.36	0.14	6.70

T O T A L S			% Recovery
Gross Count	1500.0000		100.00
Net Area	1418.8000		94.59
Background	81.2000		5.41
Composite Fit	1407.0000		93.80
Residuals	11.8000		0.79

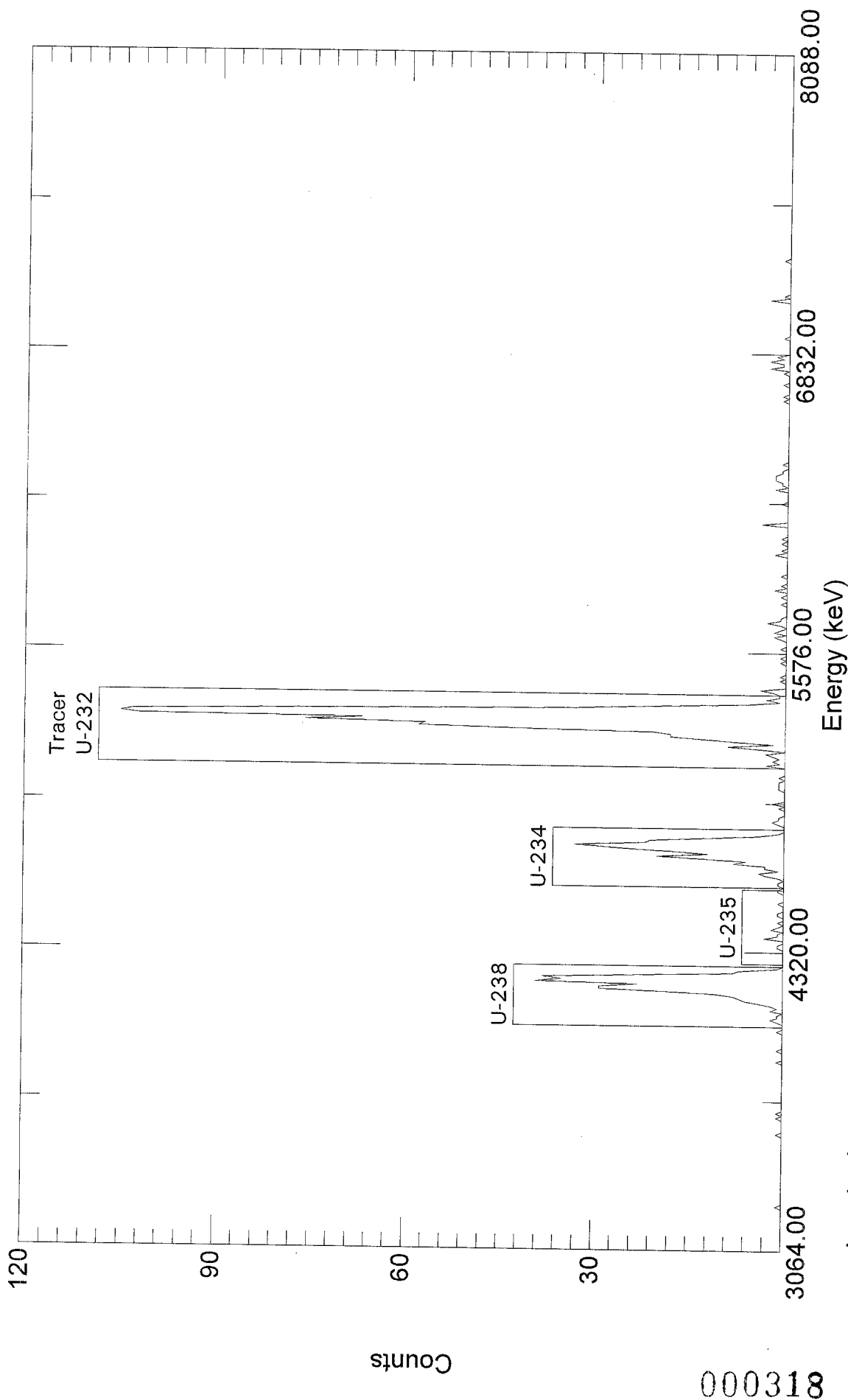
Analyzed By: GH ()

Checked By: BG ()

000317

U919208

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:48:00 on 14-Oct-98

File: C:\USER\ALPHA\U919208.CHN

Sample: 98091928 AS01679

Real Time: 24000.38 s. Live Time: 24000.00 s.

Detector: #16 MCB 2 Input 8

Type: Uranium

ALPHA VISION SPECTRAL ANALYSIS
Paragon Analytics, Inc.

SAMPLE: 98091929 AS01679

Type: Uranium

Sample Collected: 16-Feb-96 08:26:33

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 3 Input 1

Efficiency: 28.92% Chem. Recovery: 83.93%

Total Eff.: 24.27% Manual: 100.00%

CALIBRATION: 3058.16 + 9.7641 * Chn keV

Original: 3058.16 + 9.6899 * Chn keV

File: C:\USER\ALPHA\CALIB\C8101217.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 14-Oct-98 09:48:05

Live Time: 24000.00 Real Time: 24000.50 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\U919209.CHN

Background File: C:\USER\ALPHA\BKGND\B8101117.CHN

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919209

			P E A K S					
Channel	Start	End	FWHM	Height	Background	Net Area	CPM	
1.	175.91	153 181	6.00	129.00	0.80	790.20	1.98	
2.	137.02	123 152	2.00	4.00	0.80	27.20	0.07	
3.	116.53	98 122	6.00	119.00	1.20	857.80	2.14	
Tracer	231.68	213 237	6.00	117.00	5.20	908.80	2.27	

			D E C A Y			C O R R E C T E D			R E S U L T S		
			Br.	Energy		Width			Aliquot		
Nuclide	Ratio			(keV)		(keV)	Tau		DPM	MDA	% Error
1.	U-234	0.72		4775.80		58.585	3.0000		8.14	0.07	6.98
2.	U-235	0.55		4396.00		19.528	1.0000		0.28	0.07	38.22
3.	U-238	0.77		4196.00		58.585	3.0000		8.83	0.07	6.70
Tracer	U-232	0.69		5320.30		58.585	3.0000		9.36	0.11	6.48

		T O T A L S	% Recovery
Gross Count		2686.0000	100.00
Net Area		2614.4000	97.33
Background		71.6000	2.67
Composite Fit		2592.0000	96.50
Residuals		22.4000	0.83

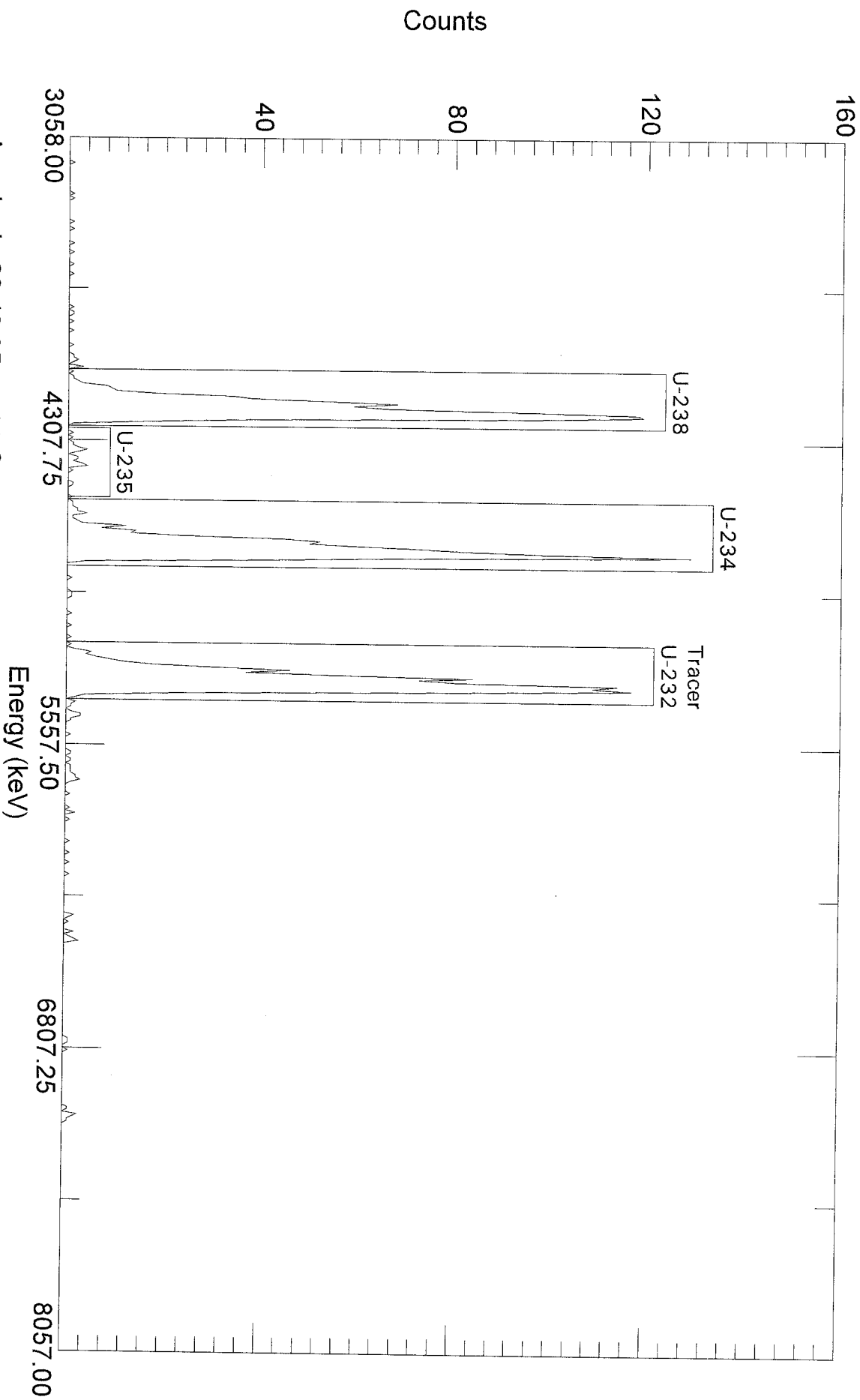
Analyzed By: QH ()

Checked By: RG ()

000319

U919209

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



000320

Acquired: 09:48:05 on 14-Oct-98
File: C:\USER\ALPHA\ALPHA\U919209.CHN
Sample: 98091929 AS01679

Real Time: 24000.50 s. Live Time: 24000.00 s.
Detector: #17 MCB 3 Input 1
Type: Uranium

123000 ANALYSIS

Paragon Analytics, Inc.

SAMPLE: 98091929 (DUP) AS01679

Type: Uranium

Volume: 2 Total, 2 Aliquot

Tracer: 9.36 DPM

DETECTOR: MCB 3 Input 2

Efficiency: 28.63% Chem. Recovery: 89.32%

Total Eff.: 25.57%

CALIBRATION: 3058.74 + 9.71161 * Chn kev

Original: 3058.74 + 9.6557 * Chn kev

File: C:\USER\ALPHA\CALIB\C8101218.CHN

ACQUISITION: 512 Channels

Spectrum File: C:\USER\ALPHA\U919209D.CHN

Background File: C:\USER\ALPHA\BKGD\B8101118.CHN

Nuclide Library: C:\USER\ALPHA\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Relative Region-Of-Interest

Slope Recalibration

Results: U919209D

P E A K S

Channel	Start	End	FWHM	Height	Background	Net Area	CPM
---------	-------	-----	------	--------	------------	----------	-----

1.	176.80	151	183	6.00	101.00	2.80	929.20	2.32
2.	137.70	125	150	6.00	6.00	0.80	42.20	0.11
3.	117.10	92	124	8.00	103.00	1.60	963.40	2.41
Tracer	232.87	205	239	6.00	101.00	15.60	957.40	2.39

D E C A Y C O R R E C T E D R E S U L T S

	Nuclide	Ratio	Br. Energy	Width	Tau	DPM	MDA	% Error
--	---------	-------	------------	-------	-----	-----	-----	---------

1.	U-234	0.72	4775.80	58.270	3.0000	9.08	0.09	6.44
2.	U-235	0.55	4396.00	58.270	3.0000	0.41	0.06	30.50
3.	U-238	0.77	4196.00	77.693	4.0000	9.42	0.07	6.32
Tracer	U-232	0.69	5320.30	58.270	3.0000	9.36	0.15	6.28

T O T A L S % Recovery

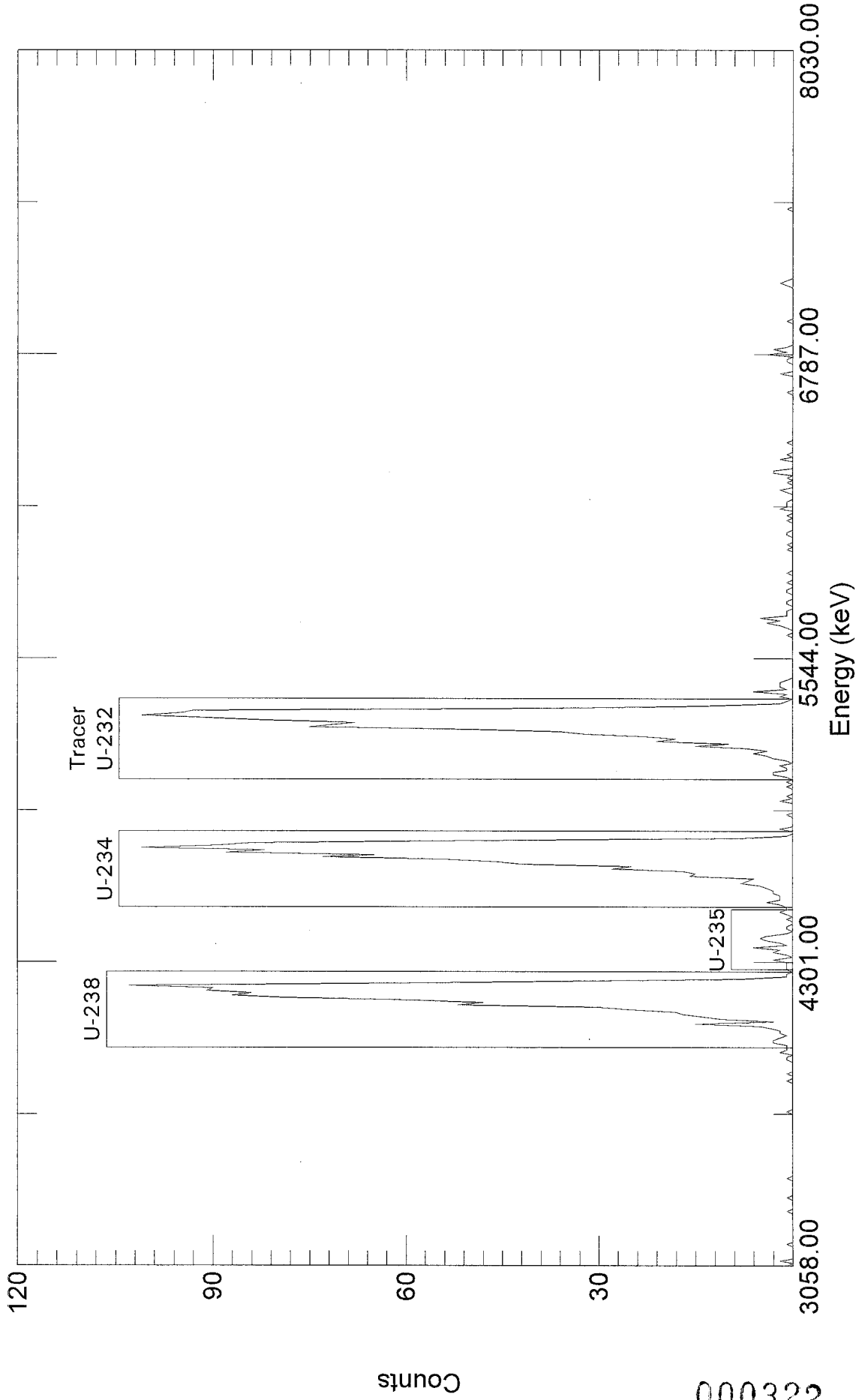
Gross Count	Net Area	Background	Composite Fit	Residuals
3023.0000	2902.2000	120.8000	2913.0000	10.8000
100.00	96.00	4.00	96.36	0.36

Analyzed By:

Checked By:

U919209D

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:49:29 on 14-Oct-98

File: C:\USER\ALPHA\U919209D.CHN

Sample: 98091929 (DUP) AS01679

Real Time: 24000.50 s. Live Time: 24000.00 s.

Detector: #18 MCB 3 Input 2

Type: Uranium

Paragon Analytics, Inc.

Alpha Spectrometer Instrument Run Log

PAI FM 746f4.xls (10/15/97)

Date: 10-14-98

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
9	AS01679	98091921	U/Soil	400min	(KG)	1919201
10		2				02
11		3				03
12		4				04
13		5				05
14		6				06
15		7				07
16		8				08
17		9				09
18		9D				09D
19		AS01679BK				101679B1
20		↓ LCSI				↓ S1
21	AS01688	98092018	U/Soil	400min	(KG)	U920108
22		9				09
23		9D				09D
1	AS01702	980917010	P/Soil	400min	(KG)	PR917010
2	AS01704	980917011		400min	(KG)	PR917011
3		12				12
5		13				13
6		14				14
7		15				15
8		16				16
25		17				17
26		18				18

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
27	AS01704	980917019	P/Soil	400min	(KG)	PR917019
28		20				20
29		20D				20D
30		AS01704BK				PR91704B1
31		↓ LCSI				↓ S1
32	AS01688	98092011	P/Soil	400min	(KG)	PR920101
33		2				02
34		3				03
37		4				04
38		5				05
39		6				06
40		7				07
41		8				08
42		9				09
43		9D				09D
44		AS01688BK				PR91688B1
45		↓ LCSI				↓ S1

Notes: 000323

Reviewed by: RG

Date: 10-14-98

Continued on page 160074

160073

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 5

QUALITY ASSURANCE
SUMMARY REPORTS

5

000324

No *NON-CONFORMANCE REPORTS* or
QUALITY ASSURANCE SUMMARY SHEETS
are included in this data package.

000325

PARACON ANALYTICS, INC.
Radiochemistry Data Package

Section 6

**LABORATORY
BENCH SHEETS**

6

000326

Prep Analyst: AV

Analytical Batch: AS01679

Matrix: SOLID

Preparation Date: 10/06/98

Analyte(s): ISO U

Report Date: 10/22/98

Paragon WorkOrder #	Type	Seq	Test	Sample Size	Sample Volume	Aliquot Volume	Aliq Units	Dish No.	Aliq. Basis	Remarks	Don't Use?	Det. No.	File Name	POS Ckd By
9809192-1	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			9	U919201.RPT	
9809192-2	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			10	U919202.RPT	
9809192-3	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			11	U919203.RPT	
9809192-4	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			12	U919204.RPT	
9809192-5	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			13	U919205.RPT	
9809192-6	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			14	U919206.RPT	
9809192-7	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			15	U919207.RPT	
9809192-8	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			16	U919208.RPT	
9809192-9	N	1	ISO U	2.0000000	2.000000	2.000000	g		AR			17	U919209.RPT	
9809192-9	D	1	ISO U	2.0000000	2.000000	2.000000	g		AR			18	U919209D.RPT	
AS01679-BLK1	B	1	ISO U	2.0000000	2.000000	2.000000	g		AR			19	U01679B1.RPT	
AS01679-LCS1	S	1	ISO U	2.0000000	2.000000	2.000000	g		AR			20	U01679S1.RPT	

Balance #: 21				Spiked By: PSB on 10/06/98				Relinquished By: PSB on 10/10/98				Reviewed By: on 10/22/98											
Spike Witness: LD on 10/06/98								Received By: RG on 10/11/98															
TRACER INFORMATION												SPIKE INFORMATION											
Isotope	Standard	DPM/ml	Volume	Pipet #	Total Activity (dpm)	Isotope	Standard	DPM/ml	Volume	Pipet #	Total Activity (dpm)												
1 U-232	490.1572.19	9.363	1.00	AW007	9.363	1 U-238	470.1284.70	10.690	1.00	AW007	10.690												
2						2																	
3						3																	
4						4																	

Prep Analyst AV

Preparation Date 10/06/98

Re-Extraction Y / (N)

Analyte: ISO U

#1 #2 #3 #4

Matrix: SOLID

Analytical Batch: AS01679

Non-Routine Pretreatment? Y / (N) Batch: NR

Supersedes: NR

Paragon WorkOrder #	Type	Seq#	Samp Size	Samp Vol.	Aliq Vol	Dish No.	Aliq Units	Aliq Basis	ISO Am	ISO Pu	ISO Th	ISO U	ISO Cm	Other Test	Micro Init.	Micro Date	Remarks	Det. No.	File Name	POS Ckd By
98091921	N	1	2.0000	2.0000	2.0000	NA	g	DRY	NA	NA	NA	X	NA	NA	NA	10-10-98		9	919201.RPT	(KC)
98091922	N	1	2.0000	2.0000	2.0000		g	DRY				X						10	919202.RPT	
98091923	N	1	2.0000	2.0000	2.0000		g	DRY				X						11	919203.RPT	
98091924	N	1	2.0000	2.0000	2.0000		g	DRY				X						12	919204.RPT	
98091925	N	1	2.0000	2.0000	2.0000		g	DRY				X						13	919205.RPT	
98091926	N	1	2.0000	2.0000	2.0000		g	DRY				X						14	919206.RPT	
98091927	N	1	2.0000	2.0000	2.0000		g	DRY				X						15	919207.RPT	
98091928	N	1	2.0000	2.0000	2.0000		g	DRY				X						16	919208.RPT	
98091929	N	1	2.0000	2.0000	2.0000		g	DRY				X						17	919209.RPT	
98091929	D	1	2.0000	2.0000	2.0000		g	DRY				X						18	919209D.RPT	
AS01679BLK1	B	1	2.0000	2.0000	2.0000		g	DRY				X						19	01679B1.RPT	
AS01679LCS1	S	1	2.0000	2.0000	2.0000		g	DRY				X						20	01679S1.RPT	

Balance #: 21
Signed By: RB Date: 10-6-98
Scribe Witness: LD Date: 10-16-98

Prep QASS/NCR? Y / N #

Analytical QASS/NCR? Y / N #

#1 Relinquished by RB Date 10-10-98

Decay Corrected SR: 773R3

Received by RG Date 10-11-98

TOTAL ACTIVITY (dpm)

#2 Relinquished by Date

ACT/ml

Received by Date

VOL

#3 Relinquished by Date

PIPET #

Received by Date

ACT/ml

#4 Relinquished by Date

VOL

Received by Date

ACT/ml

#4 Relinquished by Date

VOL

Received by Date

ACT/ml

#4 Relinquished by Date

VOL

Received by Date

ACT/ml

#4 Relinquished by Date

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 7

**STANDARDS
TRACEABILITY
DOCUMENTS**

7

000329

8/31/98

Standard #490 diluted with 1N HNO₃.

VOA initial: 29.9026g

Bottle Tare: 59.6g Balance 12

VOA empty: 27.8749

Bottle full: 563.9g Balance 20

Aliquot: 2.0277g

504.3g

$$\text{Activity} = 2.0277g \times \frac{39.23 \text{ Bq}}{8} \times \frac{60 \text{ DPM}}{\text{Bq}} \times \frac{1.039g/ml}{504.3g} = 9.83 \text{ DPM/ml}$$

Balance 12

Matrix 1N HNO₃ (Lot VWR 38040)

Density: 1.0390 g/ml

Ref date: 11-6-93

Continued on Page

Read and Understood By

Shade Cain

Signed

8/31/98

Date

Signed

000330

Date



National Institute of Standards & Technology

Certificate

PAI 490
recd 4-29-98

THIS IS A PHOTOCOPY OF THE CERTIFICATE
WHICH IS BEING MAILED TO YOU UNDER
SEPARATE COVER.

Standard Reference Material 4324A Uranium-232 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive uranium-232 nitrate and nitric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of alpha-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains uranium-232 with a total activity of approximately 200 Bq. Uranium-232 decays by alpha-particle emission. The progeny of uranium-232 have a total activity of approximately 1400 Bq and decay by alpha- and beta-particle emission. None of the alpha or beta particles escape from the SRM ampoule. During the decay process X-rays and gamma rays with energies from 10 keV to 4.5 MeV are also emitted. Most of these photons escape from the SRM ampoule but their intensities are so small that they do not represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains nitric acid (HNO_3) with a concentration of 2 moles per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least November 2003.

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

Preparation

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

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

Gaithersburg, Maryland 20899
June 1995

Thomas E. Gills, Chief
Standard Reference Materials Program

Recommended Procedure for Opening the SRM Ampoule

- 1) If the SRM solution is to be diluted, it is recommended that the diluting solution have an acid concentration comparable to that of the SRM solution.
- 2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.
- 3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.
- 4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.
- 5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.
- 6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.
- 7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.
- 8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.
- 9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

PROPERTIES OF SRM 4324A
(Certified values are shown in bold type)

Source identification number		NIST SRM 4324A	
Physical Properties:			
Source description		Liquid in flame-sealed NIST borosilicate-glass ampoule	
Ampoule specifications		Body outside diameter	(16.5 ± 0.5) mm
		Wall Thickness	(0.60 ± 0.04) mm
		Barium content	Less than 2.5%
		Lead-oxide content	Less than 0.02%
		Other heavy elements	Trace quantities
Solution density		(1.062 ± 0.002) g·mL ⁻¹ at 22.5 °C [b]*	
Solution mass		Approximately 5.3 g	
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L ⁻¹)	Mass Fraction (g·g ⁻¹)
	H ₂ O	52	0.88
	HNO ₃	2.0	0.12
	UO ₂ (NO ₃) ₂	2 × 10 ⁻¹⁰	8 × 10 ⁻¹¹
Radiological Properties:			
Radionuclide		Uranium-232	
Reference time (Separation time)		1330 EST, 6 November 1993	
Massic activity of the solution [c]		39.23 Bq·g ⁻¹	
Relative expanded uncertainty (k=2)		0.50% [d]	
Alpha-particle-emitting impurities		None detected [e]	
Photon-emitting impurities		None detected [f]	
Half lives used		Uranium-232: (68.9 ± 0.4) a [g] Thorium-228: (1.9131 ± 0.0009) a Radium-224: (3.66 ± 0.04) d Radon-220: (55.6 ± 0.1) s Polonium-216: (0.145 ± 0.002) s Lead-212: (10.64 ± 0.01) h Bismuth-212: (60.55 ± 0.06) m Thallium-208: (3.053 ± 0.004) m	
Measuring instruments		Two 4π(α+β) liquid-scintillation counting systems	

000333

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i , the source of uncertainty	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [h]	Relative Sensitivity Factor, $|\partial y / \partial x_i| \cdot$ (x_i/y) [i]	Relative Uncertainty Of Output Quantity, $u_c(y)/y$, (%) [j]
Uncertainties Evaluated By Statistical Methods				
Massic alpha-particle emission rate	Standard deviation of the mean for 10 sets of $4\pi(\alpha+\beta)$ liquid-scintillation measurements	0.02	1.0	0.02
Background	Standard deviation of the mean for 10 sets of measurements	3.5	[k] 0.002	0.01
Uncertainties Evaluated By Other Means				
Mass calibration of the balance	Estimated from manufacturer's data	0.05	1.0	0.05
Decay correction for uranium-232	Standard uncertainty of the half life	0.58 [m]	0.0006 [n]	0.0004
Decay-scheme data	Standard uncertainty of the probability of decay by alpha-particle emission	0.01	1.0	0.01
Correction for ingrowth of daughter radionuclides	Estimated	0.02	1.0	0.02
Live-time [p]	Estimated	0.10	1.0	0.10
Detection efficiency of the liquid-scintillation counting systems	Estimated	0.20	1.0	0.20
Alpha-particle-emitting impurities	Limit of detection [q]	100.	0.001	0.10
Photon-emitting impurities	Limit of detection [q]	100.	0.0001	0.01
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				
Coverage Factor, k				0.25
Relative Expanded Uncertainty of the Output Quantity, U/y , (%)				$\frac{\times 2}{0.50}$

000334

NOTES

- [a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.
 Distance from Ampoule (cm): 1 30 100
 Approximate Dose Rate ($\mu\text{Sv/h}$): <0.1 - -
- [b] The stated uncertainty is two times the standard uncertainty.
- [c] Massic activity is the preferred name for the quantity activity per unit mass. See reference [1].
- [d] The reported value, y , of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \dots, x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.
- The value, x_i , used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y , $u_i(y) \equiv |\partial y / \partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y .
- The **combined standard uncertainty** of y , $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.
- The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U , the **expanded uncertainty** of y .
- Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.
- For further information on the expression of uncertainties, see references [2] and [3].
- [e] Estimated limits of detection for alpha-particle-emitting impurities are:
 0.04 $\alpha \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies less than 3.9 MeV,
 0.4 $\alpha \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 3.9 and 4.9 MeV, and
 0.04 $\alpha \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies greater than 5.6 MeV.
- [f] Estimated limits of detection for photon-emitting impurities are:
 0.013 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 9 and 125 keV,
 0.009 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 135 and 234 keV,
 0.004 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 243 and 579 keV,
 0.002 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 588 and 1616 keV, and
 0.001 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 1624 and 1900 keV,
 provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of uranium-232 and progeny.
- [g] Evaluated Nuclear Structure Data File (ENSDF), June 1995. The stated uncertainty is the standard uncertainty.
- [h] Relative standard uncertainty of the input quantity x_i .

- [i] The relative change in the output quantity y divided by the relative change in the input quantity x_i . If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y . If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y .
- [j] Relative component of combined standard uncertainty of output quantity, rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \approx |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.
- [k] $|\partial y/\partial x_i| \cdot (x_i/y) = (\text{average background count rate})/(\text{average net sample count rate})$.
- [m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.
- [n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$
- [p] The live time is determined by counting the pulses from a gated oscillator.
- [q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of U-232})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of U-232})\}$. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

- [1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.
- [2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)
- [3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1993. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

12/17/97 Prep date

Vial tare: 20.8915g

Vial full: 25.8255g

Vial after aliquot: 23.7850g

Aliquot 2.0405g

Solution density: 1 ml = 1.0070g (0.5 M HNO₃)

$$2.0405g \times 2.38 \text{ nCi/g} \times \frac{1}{1002 \text{ mg/g}} = 4.847 \text{ pCi/g}$$

5M HNO₃

Matrix: 0.5 M HNO₃

Std ID: 470.1284.70

Description: Uranium-238 (U-Nat) Working Level Dilution

Activity: 10.69 dpm/mL

Uncertainty: +/- 0.43 dpm/mL

Ref. Date: 8/1/93

Ref Time: 12:00 PM

Prep Date 12/17/97 Prep by: WC

Expiration 12/16/02

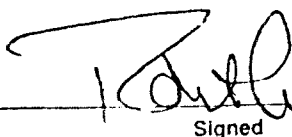
Matrix/Comp. 0.5 M HNO₃

Short-lived - Decay correct with each use

Checked by Wade Currier on 12/17/97 Verified eff. 1/1/97

Continued on Page

Read and Understood By



Signed

1/1/97
Date

Signed

000337

Date

Paragon ID 0470
rec'd 12-12-97

U.S. Environmental Protection Agency
Environmental Monitoring Systems Laboratory-Las Vegas
Nuclear Radiation Assessment Division

Calibration Certificate

Description

Principal radionuclide Uranium-238 Half-life 4.47×10^9 years
Nominal activity 11.9 nano curies
Nominal volume 5.0 ml in ampoule/bottle number 1843-2

Measurement Activity of principal radionuclide

Activity per gram of this solution

2.38 nano curies of Uranium-238
October 1993

*Accompanied by
0.11 nanoCuries
of Uranium-235 per
gram of solution.

Activity of daughter radionuclide

The principal activity was accompanied at the quoted time by

2.38 nano curies Per gram

of the daughter nuclides Th-234, Pa-234, U-234 assuming secular equilibrium.

Total mass of this solution

Approximately 1.0 grams

Method of measurement

The solution was prepared gravimetrically by dissolving a weighed quantity of the National Bureau of Standards' SRM 950b (99.97±0.01 percent Uranium Oxide (U_3O_8)) in nitric acid and diluting to a known weight. Natural uranium was assumed to consist of 99.28 percent U-238 and 0.711 percent U-235 by weight with specific activities of 3.36×10^2 and 2.16×10^3 nanoCuries per gram respectively. The solution was compared to an earlier preparation (1843-1), which was traced to the National Institute of Standards and Technology (NIST), using liquid scintillation counting.

Useful Life

This radionuclide has decayed through ☐ half lives since it was obtained by EMSL-LV

We recommend that this solution should not be used after

INDEFINITE

000338

Purity

The manufacturer states that activities other than that of the principal nuclide and of its daughter nuclides, if any, were estimated/known to be:

(1) Radium-226	less than	0.6 %	of the principal activity
(2)	less than equal to	%	of the principal activity
(3)	less than equal to	%	of the principal activity

The activity of impurity (1) is not (2) is not (3) is not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than $\pm 0.5\%$ (The 99.7% confidence limits are given by $t(sm)$ where t is obtained from the student t factor for the degree of freedom ($n-1$)).

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\delta - \delta'$). These have been estimated not to exceed

$+2.5\%$ or -2.5%

the overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error $[t(sm)]$ at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\delta, -\delta'$)

The overall uncertainty is therefore calculated on the basis of $+[t(sm) + \delta], -[t(sm) + \delta']$ and is $+4.0\%$, -4.0% of the quoted radioactive concentration

Decay Scheme

This standardization is based on the following assumptions of the principle nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Uranium-238 decays by alpha emission to Thorium-234 which decays by two successive beta emissions to Uranium-234. Uranium-234 is assumed to be in secular equilibrium with Uranium-238.

**Chemical
Composition
of Solution**

Carrier content per gram of solution:

Other components:
0.5M nitric acid

Preservative:

Remarks

The uranium concentration of the solution is 7.12 milligrams/gram.

Date Certificate Prepared

October 27, 1993

000339

Approval Signature

Paul B. Wahn

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

000340

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9809192

Client Name: Los Alamos National Laboratory SMO

Client Project Name:

Client Project Number: 4662R

Client PO Number: 7794L0014-9S

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
RE15-98-0029 ✓	9809192-1	4662RC ✓	Soil ✓	9/23/98	✓
RE15-98-0030 ✓	9809192-2	4662RC	Soil	9/23/98	
RE15-98-0031 ✓	9809192-3	4662RC	Soil	9/23/98	
RE15-98-0032 ✓	9809192-4	4662RC	Soil	9/23/98	
RE15-98-0033 ✓	9809192-5	4662RC	Soil	9/23/98	
RE15-98-0034 ✓	9809192-6	4662RC	Soil	9/23/98	
RE15-98-0035 ✓	9809192-7	4662RC	Soil	9/23/98	
RE15-98-0036 ✓	9809192-8	4662RC	Soil	9/23/98	
RE15-98-0037 ✓	9809192-9	4662RC	Soil	9/23/98	

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

9809192

Please analyze the enclosed samples
according to the schedule indicated:

These samples are on:

SHIP DATE: 9/25/98

REPORT DUE: 10/25/98

TURN AROUND REQ'D: 30 days

LANL Request Number: 4662R

Per Agreement Number: 7794L0014-9S

Project Cost Code: MR3R12082642

RAD SCREENING: Not Required

COMMENTS: 15 - 1086 , GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: 

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
01 GAMMA SPE		RE15-98-0029	01	S	9/23/98	
01 H3		RE15-98-0029	02	S	9/23/98	
01 ISOU		RE15-98-0029	04	S	9/23/98	
02 GAMMA SPE		RE15-98-0030	01	S	9/23/98	
02 H3		RE15-98-0030	02	S	9/23/98	
02 ISOU		RE15-98-0030	04	S	9/23/98	
03 GAMMA SPE		RE15-98-0031	01	S	9/23/98	
03 H3		RE15-98-0031	02	S	9/23/98	
03 ISOU		RE15-98-0031	04	S	9/23/98	
04 GAMMA SPE		RE15-98-0032	01	S	9/23/98	
04 H3		RE15-98-0032	02	S	9/23/98	
04 ISOU		RE15-98-0032	04	S	9/23/98	
05 GAMMA SPE		RE15-98-0033	01	S	9/23/98	
05 H3		RE15-98-0033	02	S	9/23/98	
05 ISOU		RE15-98-0033	04	S	9/23/98	
06 GAMMA SPE		RE15-98-0034	01	S	9/23/98	
06 H3		RE15-98-0034	02	S	9/23/98	
06 ISOU		RE15-98-0034	04	S	9/23/98	
07 GAMMA SPE		RE15-98-0035	01	S	9/23/98	
07 H3		RE15-98-0035	02	S	9/23/98	
07 ISOU		RE15-98-0035	04	S	9/23/98	
08 GAMMA SPE		RE15-98-0036	01	S	9/23/98	
08 H3		RE15-98-0036	02	S	9/23/98	
08 ISOU		RE15-98-0036	04	S	9/23/98	

000342

Friday, September 25, 1998

9809192

REQUEST NUMBER: 4662R

Page 2

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0037	01	S	9/23/98	
H3		RE15-98-0037	02	S	9/23/98	
ISOU		RE15-98-0037	04	S	9/23/98	

Final Page of REQUEST NUMBER 4662R

Page 2

000343

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By:

Date Time

SI Hagelberg 9.25.98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

000344

Friday, September 25, 1998

9809192

COC DOC NUMBER: 4662RC

REQUEST NUMBER: 4662R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE		
RE15-98-0035	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0036	02	500 ml Polyethylene	H3	None	S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0037	02	500 ml Polyethylene	H3	None	S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None	S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4662R

Page 2

Relinquished By:

Date Time

SHagelberg SHag 9/25/98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

000345

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LANU

SHIPPING CONTAINER #: Client Cooler

WORKORDER NO. 980919Z

INITIALS: JH

DATE: 9/26/96

1.	Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature _____ b. Lot No's. _____ c. Airbill Number _____		Yes	<u>No</u>
2.	Are custody seals on the cooler intact? If so, how many <u>1</u>	N/A	<u>Yes</u>	No
3.	Are custody seals on sample containers intact?	N/A	<u>Yes</u>	No
4.	Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?		<u>Yes</u>	No
5.	Is the COC complete? Relinquished: Yes <u>X</u> No Requested Analysis: Yes <u>X</u> No	N/A	<u>Yes</u>	No
6.	Is the COC in agreement with the samples received? No. of Samples: Yes <u>X</u> No Sample ID's: Yes <u>X</u> No Matrix: Yes <u>X</u> No No. of Containers: Yes <u>X</u> No		<u>Yes</u>	No
7.	Are the samples requiring chemical preservation preserved correctly?	<u>N/A</u>	<u>Yes</u>	No
8.	Is there enough sample? If so, are they in the proper containers?		<u>Yes</u>	No
9.	Are all samples within holding times for the requested analyses?		<u>Yes</u>	No
10.	Were the sample(s) shipped on ice?	N/A	<u>Yes</u>	No
11.	Were all sample containers received intact? (not broken or leaking, etc.)		<u>Yes</u>	No
12.	Are samples requiring no headspace, headspace free?	<u>N/A</u>	<u>Yes</u>	No
13.	Do the samples require quarantine?		<u>Yes</u>	No
14.	Do samples require Paragon disposal?		<u>Yes</u>	No
15.	Did the client return any unused bottles?		<u>Yes</u>	<u>No</u>

Describe "NO" items (except No's 1, 13, & 14): _____

Was the client contacted? Yes _____ No _____

If yes, Date: _____ Name of person contacted: _____

Describe actions taken or client instructions: _____

Group Leader's Signature: _____

Date: _____

Cooler Temperature: 60

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 9

ADDITIONAL
SUPPORTING
DOCUMENTATION

9

000347

Alpha Spectroscopy
Quality Control Data
Weekly Background Checks

0000348

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Weekly Background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:13

DETECTOR: MCB 2 Input 1
Efficiency: 29.63% Chem. Recovery: 0.00%
Total Eff.: 29.63% Manual: 100.00%
CALIBRATION: 3052.74 + 9.7071 * Chn keV
Original: 3052.74 + 9.7071 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100509.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:19
Live Time: 60000.00 Real Time: 60000.30 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101109.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101109

			P E A K S					
Channel	Start	End	FWHM	Height	Background	Net Area	CPM	

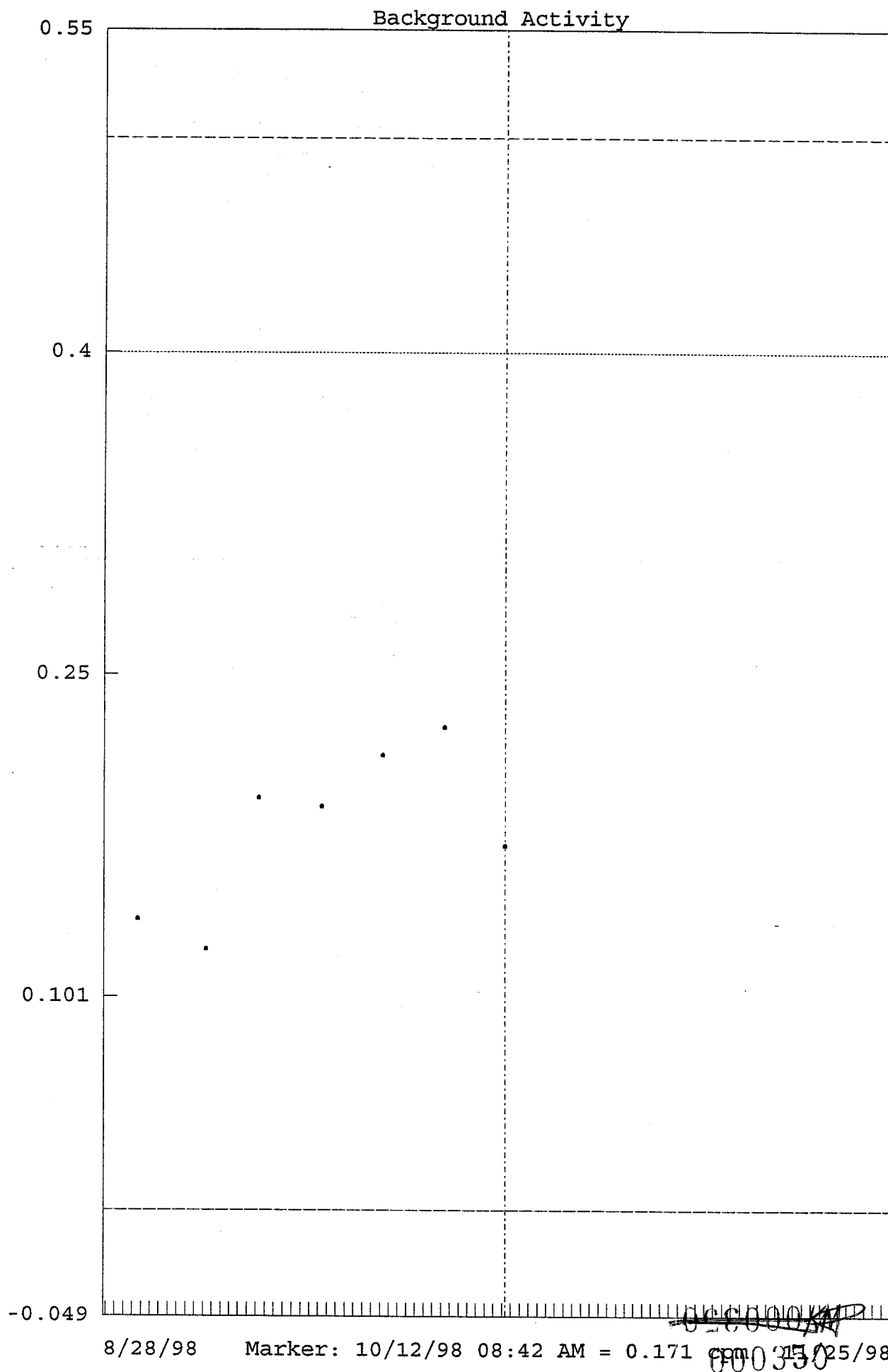
			D E C A Y		C O R R E C T E D		R E S U L T S	
			Br.	Energy	Width		Aliquot	
Nuclide	Ratio	(keV)		(keV)	Tau	DPM	MDA	% Error

		T O T A L S	% Recovery
		-----	-----
Gross Count	171.0000	100.00	
Net Area	171.0000	100.00	
Background	0.0000	0.00	
Composite Fit	0.0000	0.00	
Residuals	171.0000	100.00	

Analyzed By: _____ ()

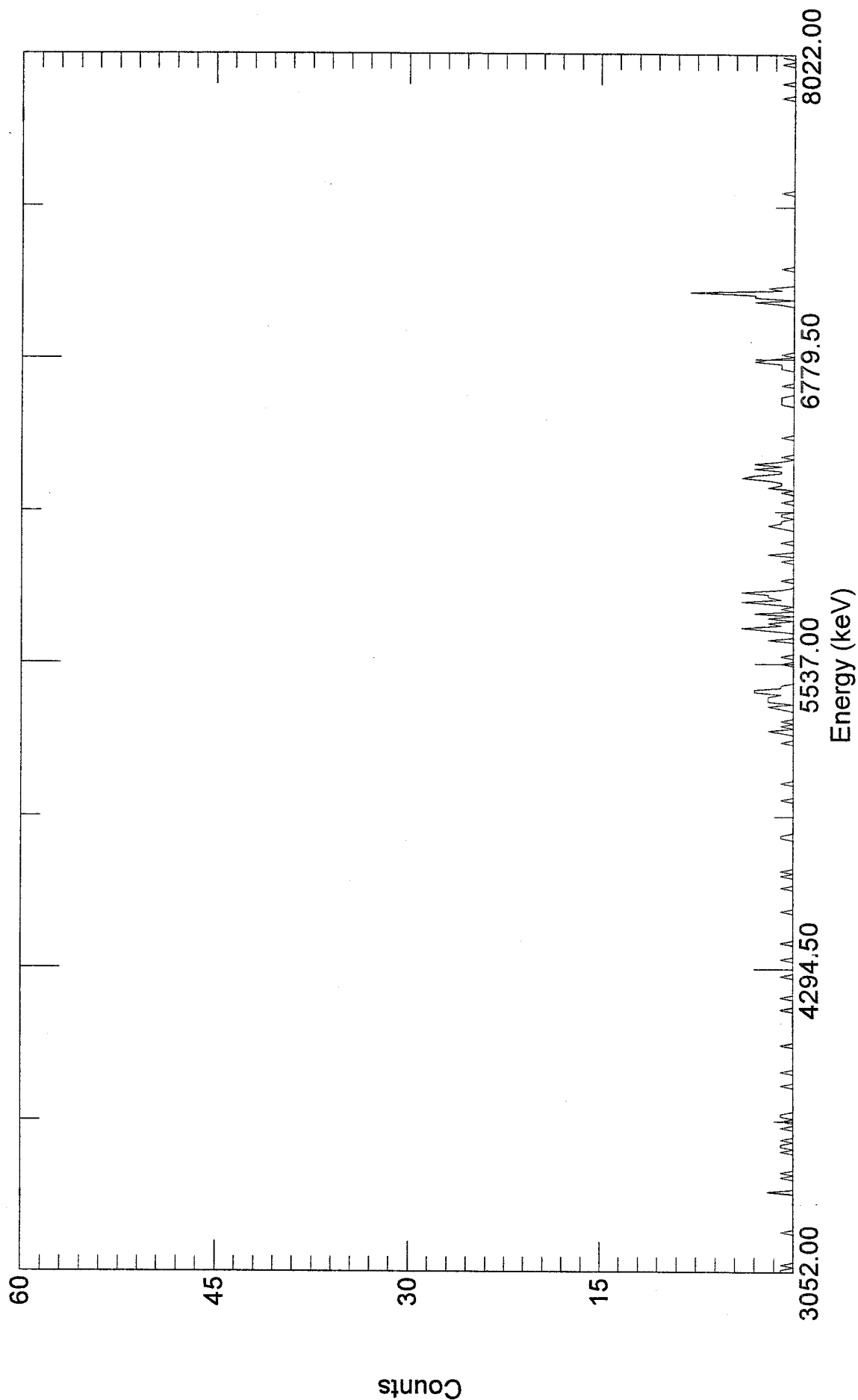
Checked By: RG _____ ()

000319



B8101109

AlphaVision Absolute Region-Of-Interest



000351

Acquired: 15:01:19 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101109.CHN

Sample: Weekly Background

Real Time: 60000.30 s. Live Time: 60000.00 s.

Detector: #9 MCB 2 Input 1

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:19

DETECTOR: MCB 2 Input 2
Efficiency: 28.96% Chem. Recovery: 0.00%
Total Eff.: 28.96% Manual: 100.00%
CALIBRATION: 3045.88 + 9.6926 * Chn keV
Original: 3045.88 + 9.6926 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100510.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:21
Live Time: 60000.00 Real Time: 60000.30 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101110.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101110

			P E A K S						
Channel	Start	End	FWHM	Height	Background	Net Area	CPM		

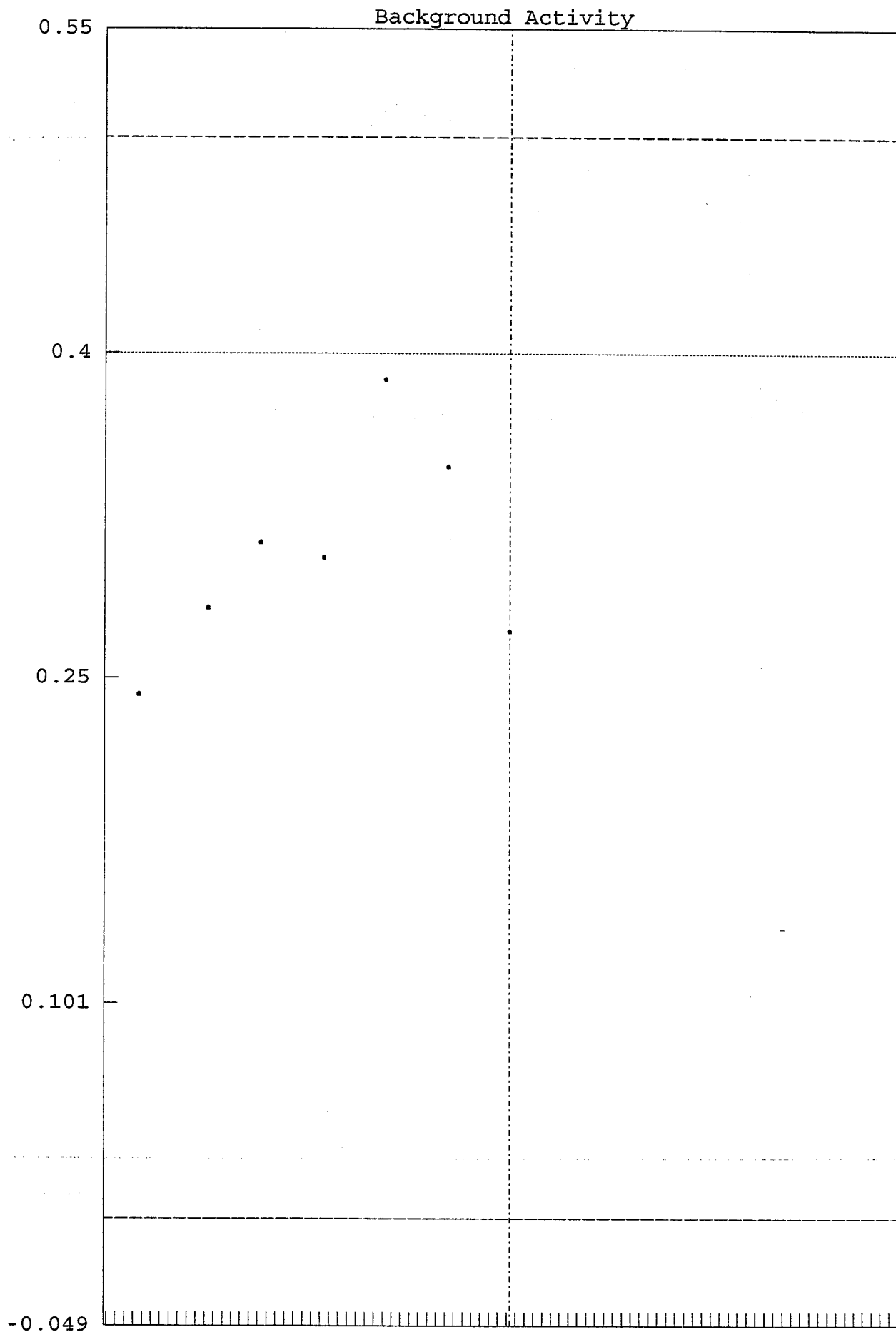
			D E C A Y		C O R R E C T E D		R E S U L T S		
Br.		Energy	Width				Aliquot		
Nuclide	Ratio	(keV)	(keV)	Tau	DPM	MDA	% Error		

T O T A L S		% Recovery
Gross Count		272.0000 100.00
Net Area		272.0000 100.00
Background		0.0000 0.00
Composite Fit		0.0000 0.00
Residuals		272.0000 100.00

Analyzed By: _____ ()

Checked By: PG _____ ()

000352

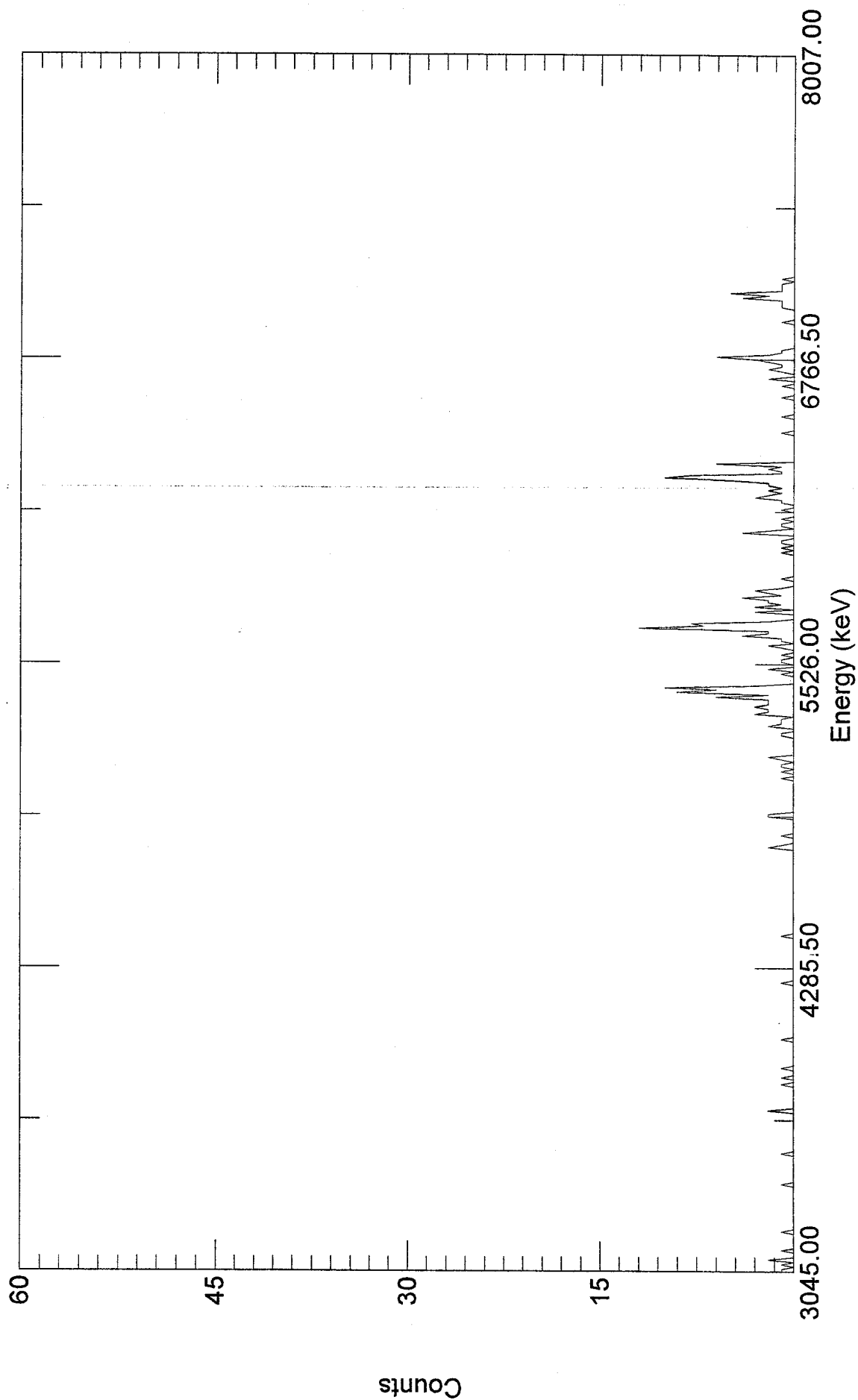


8/28/98 Marker: 10/12/98 08:42 AM = 0.272 cpm 11/25/98

000353

B8101110

AlphaVision Absolute Region-Of-Interest



000354

Acquired: 15:01:21 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101110.CHN

Sample: weekly background

Real Time: 60000.30 s. Live Time: 60000.00 s.

Detector: #10 MCB 2 Input 2

Type: Background

ALPHA VISION BACKGROUND ANALYSIS

Paragon Analytics, Inc.

SAMPLE: weekly background
 Type: Background
 Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:21

DETECTOR: MCB 2 Input 3
 Efficiency: 28.25% Chem. Recovery: 0.00%
 Total Eff.: 28.25% Manual: 100.00%
 CALIBRATION: 3048.03 + 9.731 * Chn keV
 Original: 3048.03 + 9.731 * Chn keV
 File: C:\USER\ALPHA\CALIB\C8100511.CHN
 ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:23
 Live Time: 60000.00 Real Time: 60000.30 Sec.
 Spectrum File: C:\USER\ALPHA\BKGND\B8101111.CHN
 Background File:
 Nuclide Library: C:\USER\ALPHA\ALPHA\VIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
 Results: B8101111

P E A K S							
Channel	Start	End	FWHM	Height	Background	Net Area	CPM

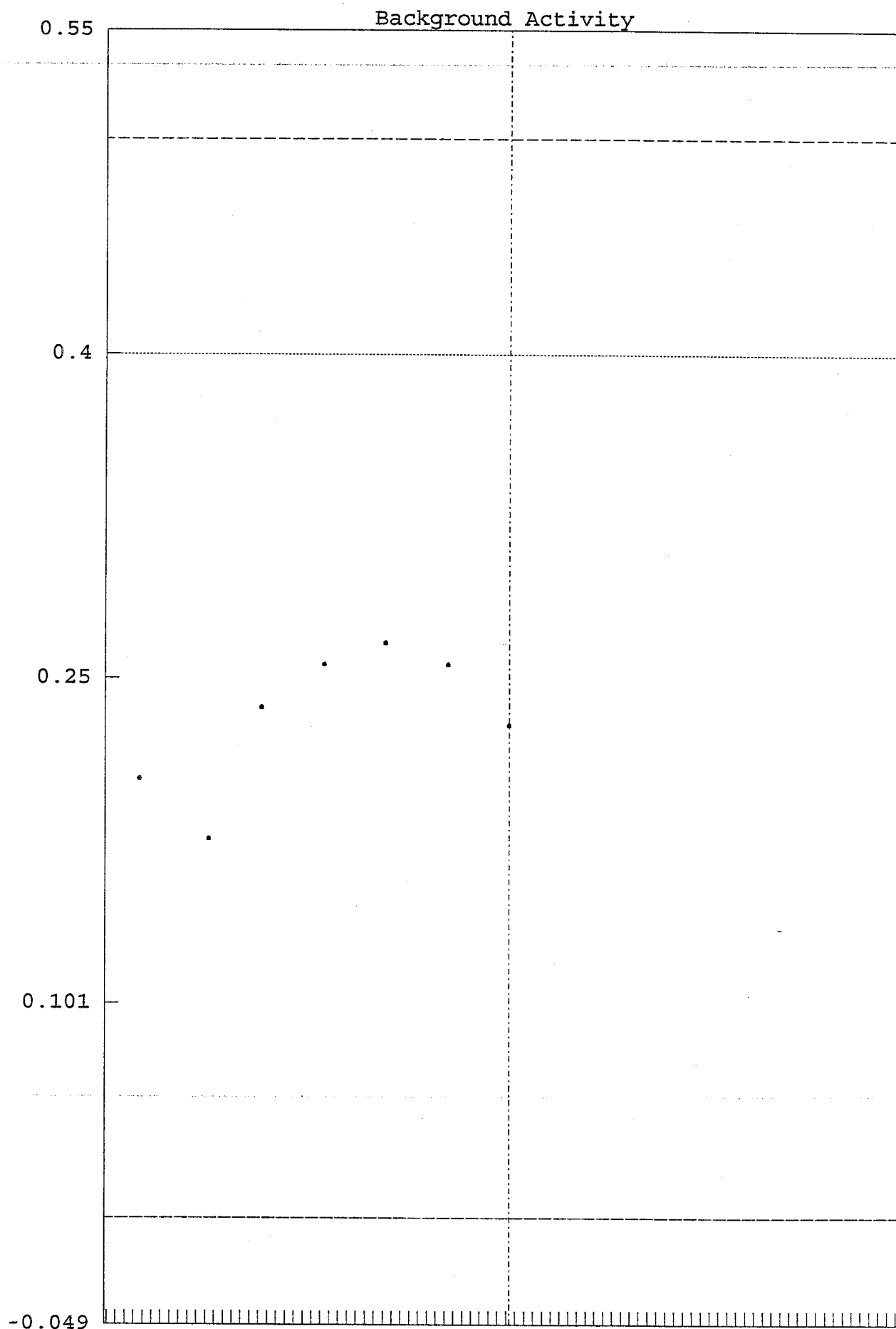
D E C A Y C O R R E C T E D R E S U L T S							
Nuclide	Ratio	Br. Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error

T O T A L S		% Recovery
-----		-----
Gross Count	229.0000	100.00
Net Area	229.0000	100.00
Background	0.0000	0.00
Composite Fit	0.0000	0.00
Residuals	229.0000	100.00

Analyzed By: _____ ()

Checked By: RG _____ ()

000355

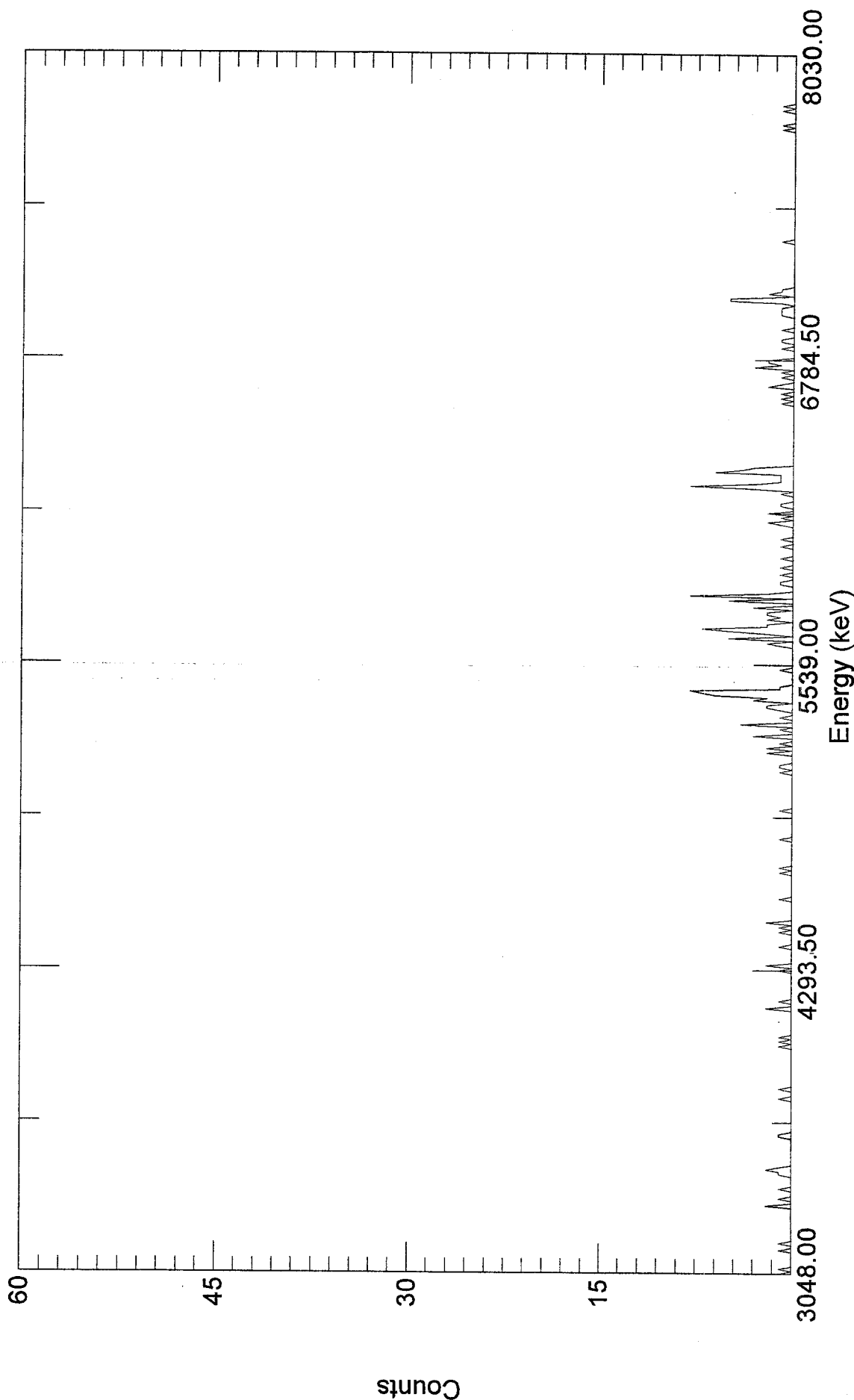


8/28/98 Marker: 10/12/98 08:42 AM = 0.229 cpm 11/25/98

000356

B8101111

AlphaVision Absolute Region-Of-Interest



Acquired: 15:01:23 on 11-Oct-98

Real Time: 60000.30 s. Live Time: 60000.00 s.

File: C:\USER\ALPHA\BKGND\B8101111.CHN

Detector: #11 MCB 2 Input 3

Sample: weekly background

Type: Background

000357

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:23

DETECTOR: MCB 2 Input 4
Efficiency: 28.34% Chem. Recovery: 0.00%
Total Eff.: 28.34% Manual: 100.00%
CALIBRATION: 3054.25 + 9.6489 * Chn keV
Original: 3054.25 + 9.6489 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100512.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:25
Live Time: 60000.00 Real Time: 60000.32 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101112.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101112

P E A K S							
Channel	Start	End	FWHM	Height	Background	Net Area	CPM

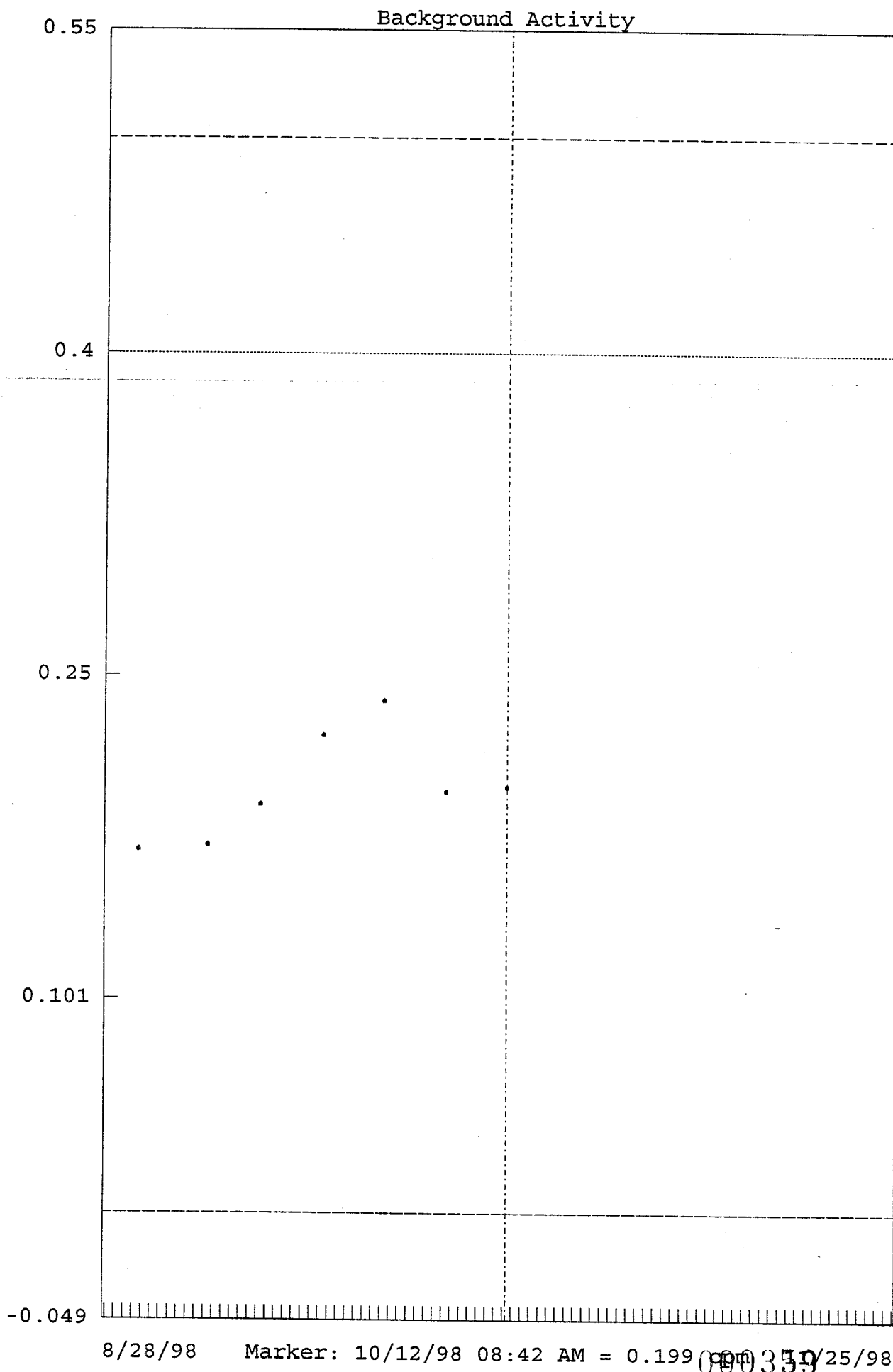
D E C A Y C O R R E C T E D R E S U L T S							
Br. Energy		Width		Aliquot			
Nuclide	Ratio	(keV)	(keV)	Tau	DPM	MDA	% Error

T O T A L S		% Recovery
-----		-----
Gross Count	199.0000	100.00
Net Area	199.0000	100.00
Background	0.0000	0.00
Composite Fit	0.0000	0.00
Residuals	199.0000	100.00

Analyzed By: _____ ()

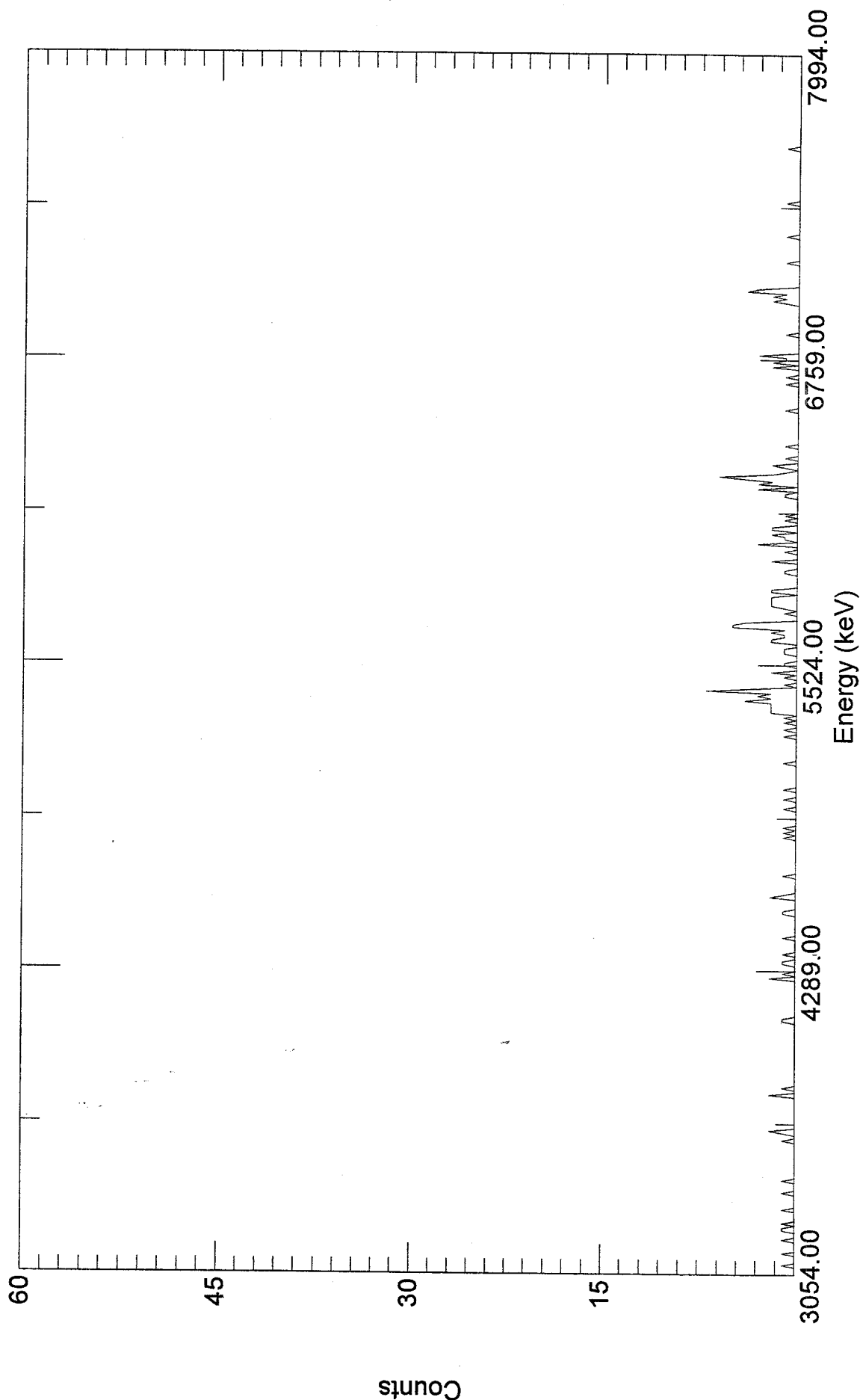
Checked By: RG _____ ()

000358



B8101112

AlphaVision Absolute Region-Of-Interest



Acquired: 15:01:25 on 11-Oct-98

Real Time: 60000.32 s. Live Time: 60000.00 s.

File: C:\USER\ALPHA\BKGND\B8101112.CHN

Detector: #12 MCB 2 Input 4

Sample: weekly background

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:27

DETECTOR: MCB 2 Input 5
Efficiency: 28.79% Chem. Recovery: 0.00%
Total Eff.: 28.79% Manual: 100.00%
CALIBRATION: 3059.01 + 9.7272 * Chn keV
Original: 3059.01 + 9.7272 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100513.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:34
Live Time: 60000.00 Real Time: 60000.28 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101113.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101113

		P E A K S					
Channel	Start End	FWHM	Height	Background	Net Area	CPM	

		D E C A Y			C O R R E C T E D		
		Br.	Energy	Width	R E S U L T S		
		Ratio	(keV)	(keV)	Tau	Aliquot	
Nuclide					DPM	MDA	% Error

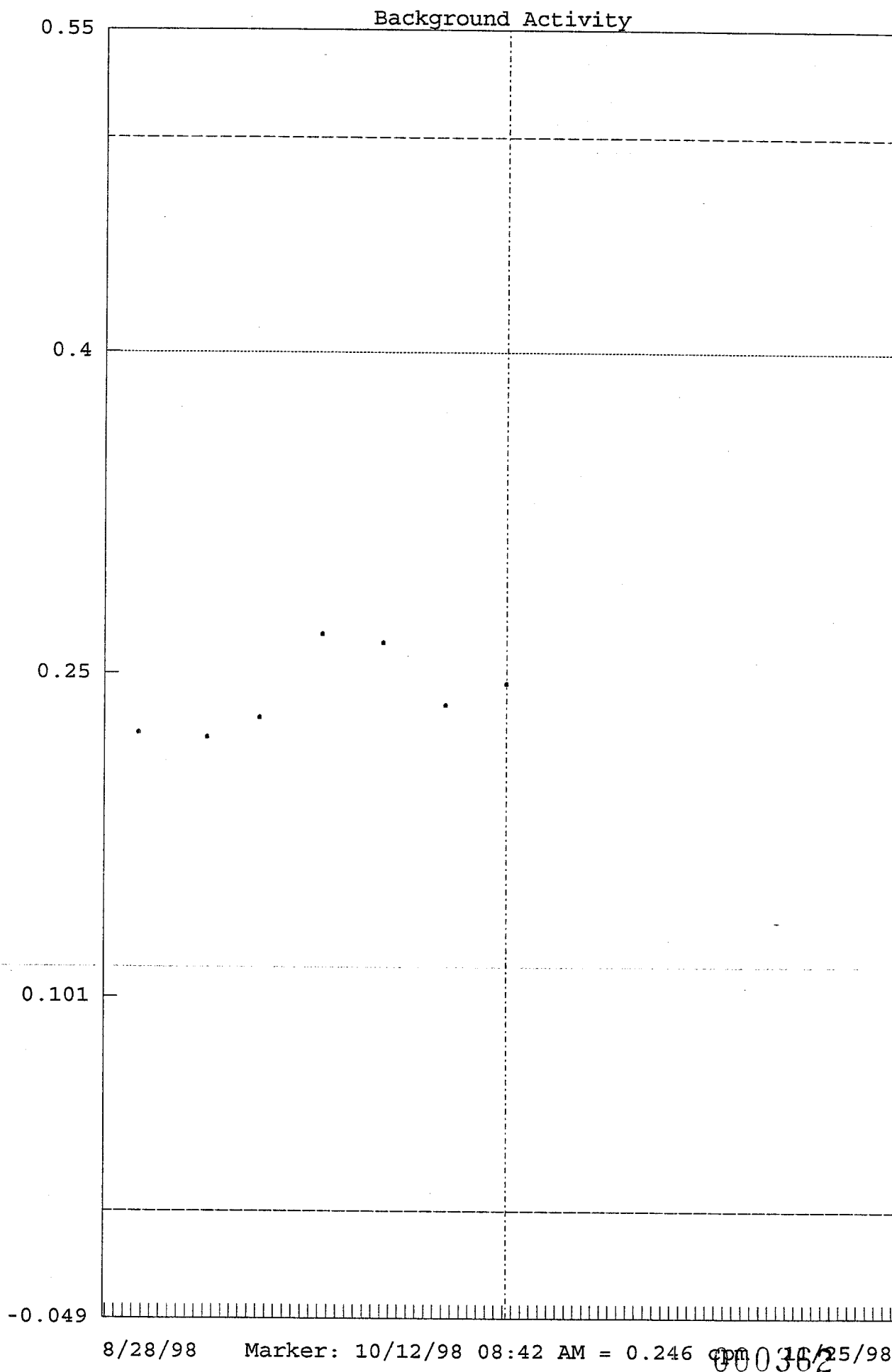
		T O T A L S	% Recovery

Gross Count	246.0000	100.00	
Net Area	246.0000	100.00	
Background	0.0000	0.00	
Composite Fit	0.0000	0.00	
Residuals	246.0000	100.00	

Analyzed By: _____ ()

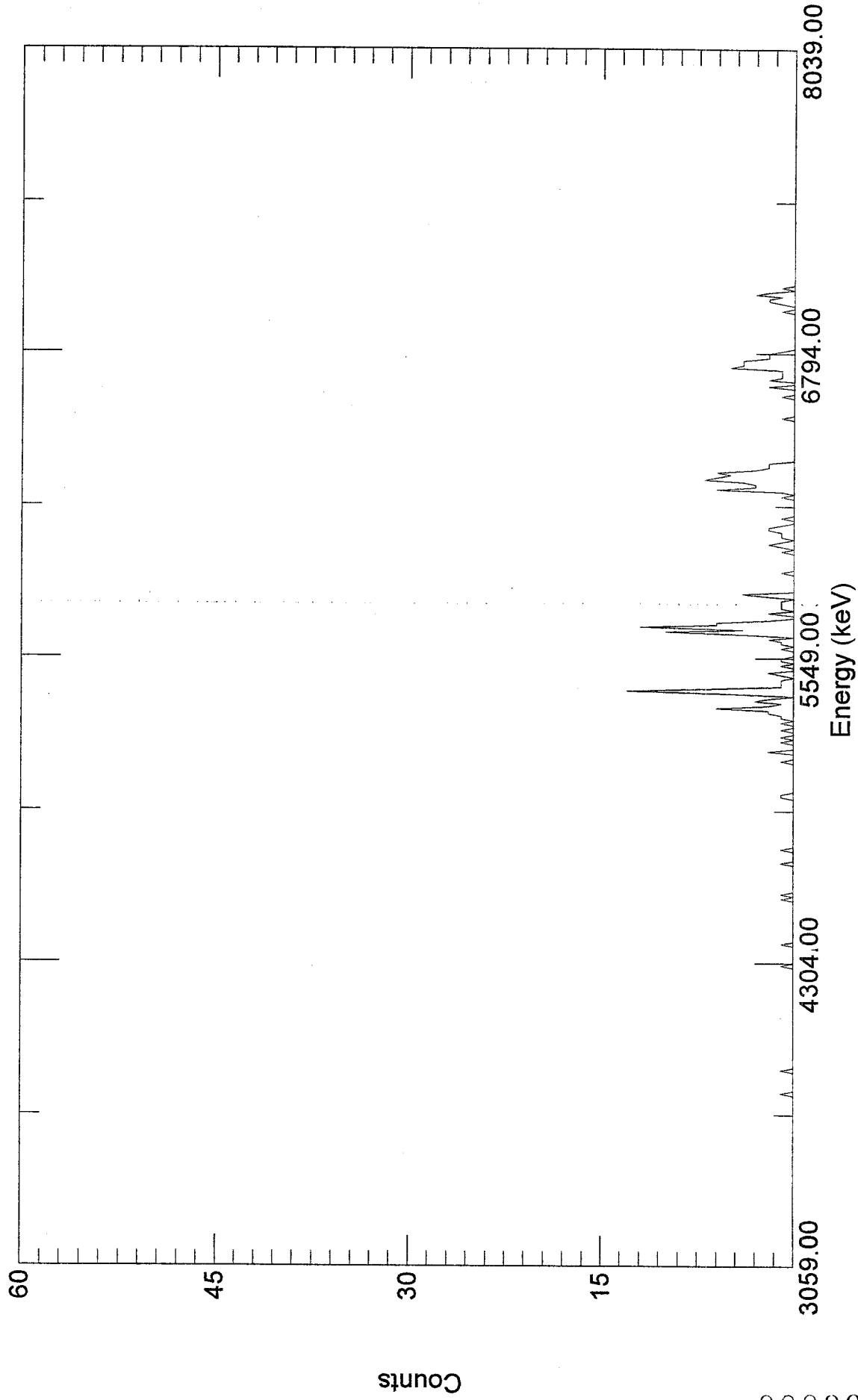
Checked By: PG _____ ()

000361



B8101113

AlphaVision Absolute Region-Of-Interest



000363

Acquired: 15:01:34 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101113.CHN

Sample: weekly background

Real Time: 60000.28 s. Live Time: 60000.00 s.

Detector: #13 MCB 2 Input 5

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:34

DETECTOR: MCB 2 Input 6
Efficiency: 28.90% Chem. Recovery: 0.00%
Total Eff.: 28.90% Manual: 100.00%
CALIBRATION: 3059.07 + 9.6931 * Chn keV
Original: 3059.07 + 9.6931 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100514.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:36
Live Time: 60000.00 Real Time: 60000.30 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101114.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101114

		P E A K S					
Channel	Start	End	FWHM	Height	Background	Net Area	CPM

		D E C A Y			C O R R E C T E D		
		Br.	Energy	Width	R E S U L T S		
		Ratio	(keV)	(keV)	Tau	Aliquot	
Nuclide					DPM	MDA	% Error

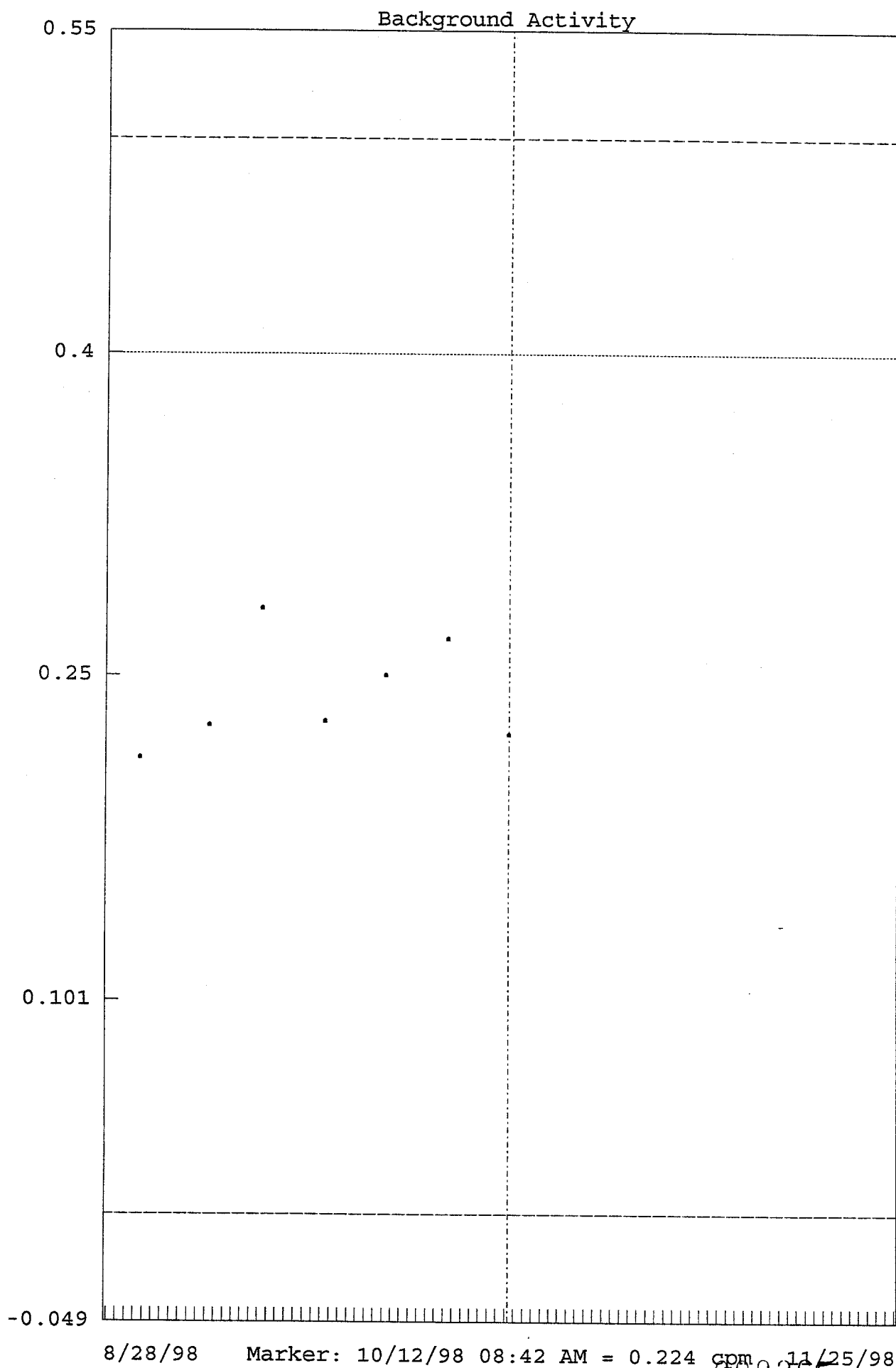
		T O T A L S	% Recovery

Gross Count		224.0000	100.00
Net Area		224.0000	100.00
Background		0.0000	0.00
Composite Fit		0.0000	0.00
Residuals		224.0000	100.00

Analyzed By: _____ ()

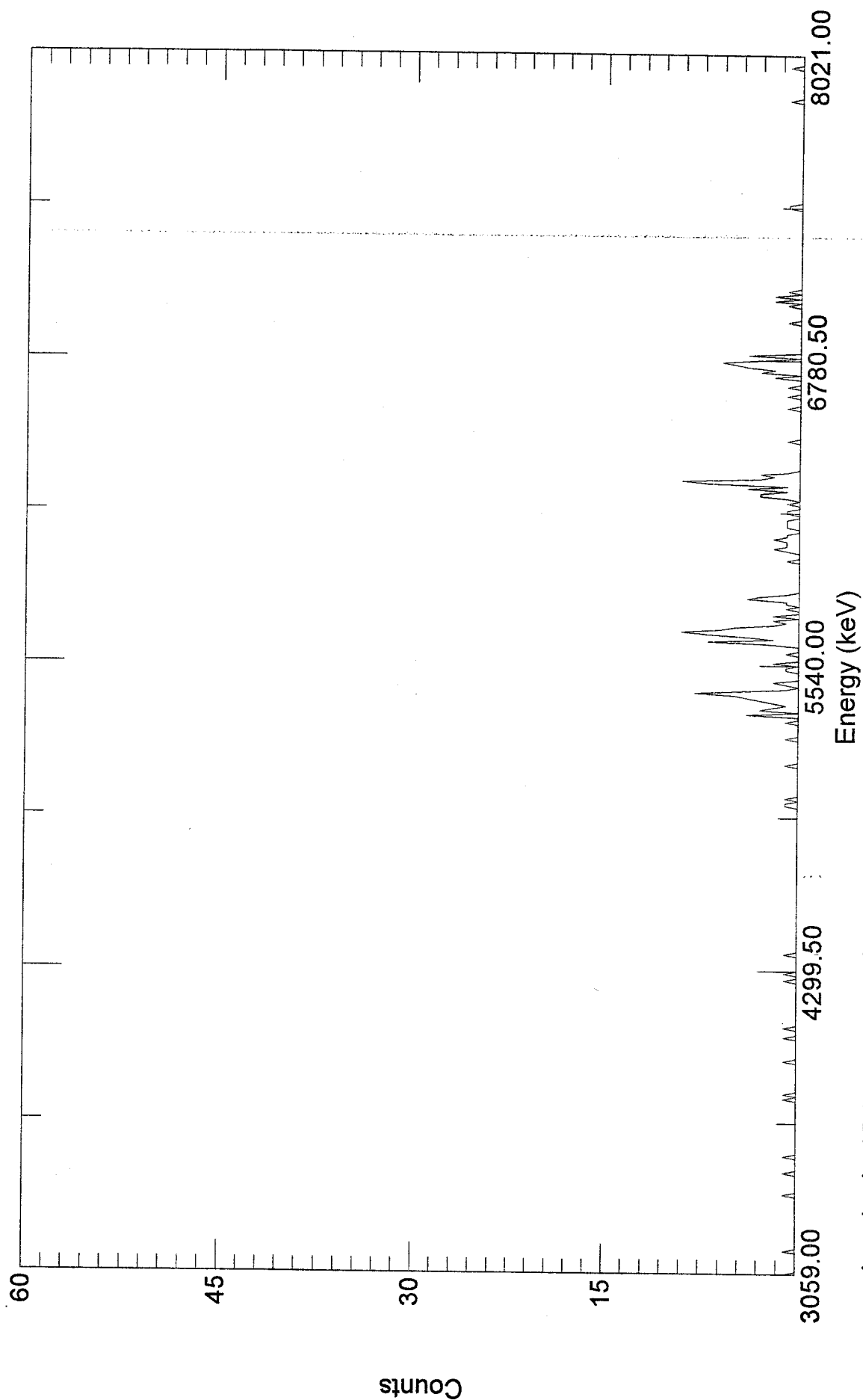
Checked By: RG _____ ()

000364



B8101114

AlphaVision Absolute Region-Of-Interest



Acquired: 15:01:36 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101114.CHN

Sample: weekly background

Real Time: 60000.30 s. Live Time: 60000.00 s.

Detector: #14 MCB 2 Input 6

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background

Type: Background

Sample Collected: 11-Oct-98 15:01:36

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 7

Efficiency: 29.47% Chem. Recovery: 0.00%

Total Eff.: 29.47% Manual: 100.00%

CALIBRATION: 3050.72 + 9.6908 * Chn keV

Original: 3050.72 + 9.6908 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100515.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 11-Oct-98 15:01:37

Live Time: 60000.00

Real Time: 60000.30 Sec.

Spectrum File: C:\USER\ALPHA\BKGND\B8101115.CHN

Background File:

Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest

Results: B8101115

			P E A K S				
Channel	Start	End	FWHM	Height	Background	Net Area	CPM

D E C A Y		C O R R E C T E D		R E S U L T S			
Br.	Energy	Width			Aliquot		
Nuclide	Ratio	(keV)	(keV)	Tau	DPM	MDA	% Error

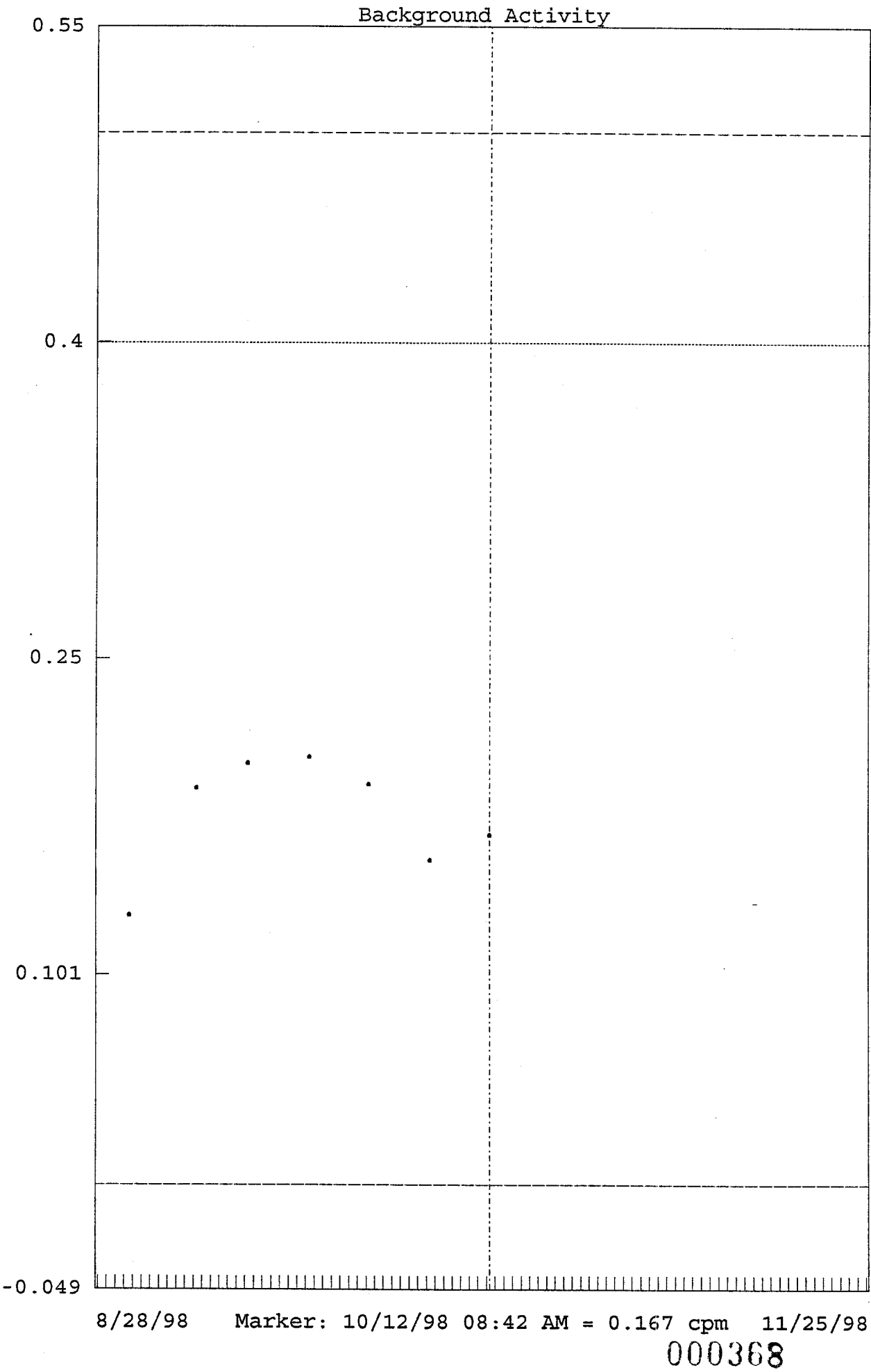
T O T A L S		% Recovery

Gross Count	167.0000	100.00
Net Area	167.0000	100.00
Background	0.0000	0.00
Composite Fit	0.0000	0.00
Residuals	167.0000	100.00

Analyzed By: _____ ()

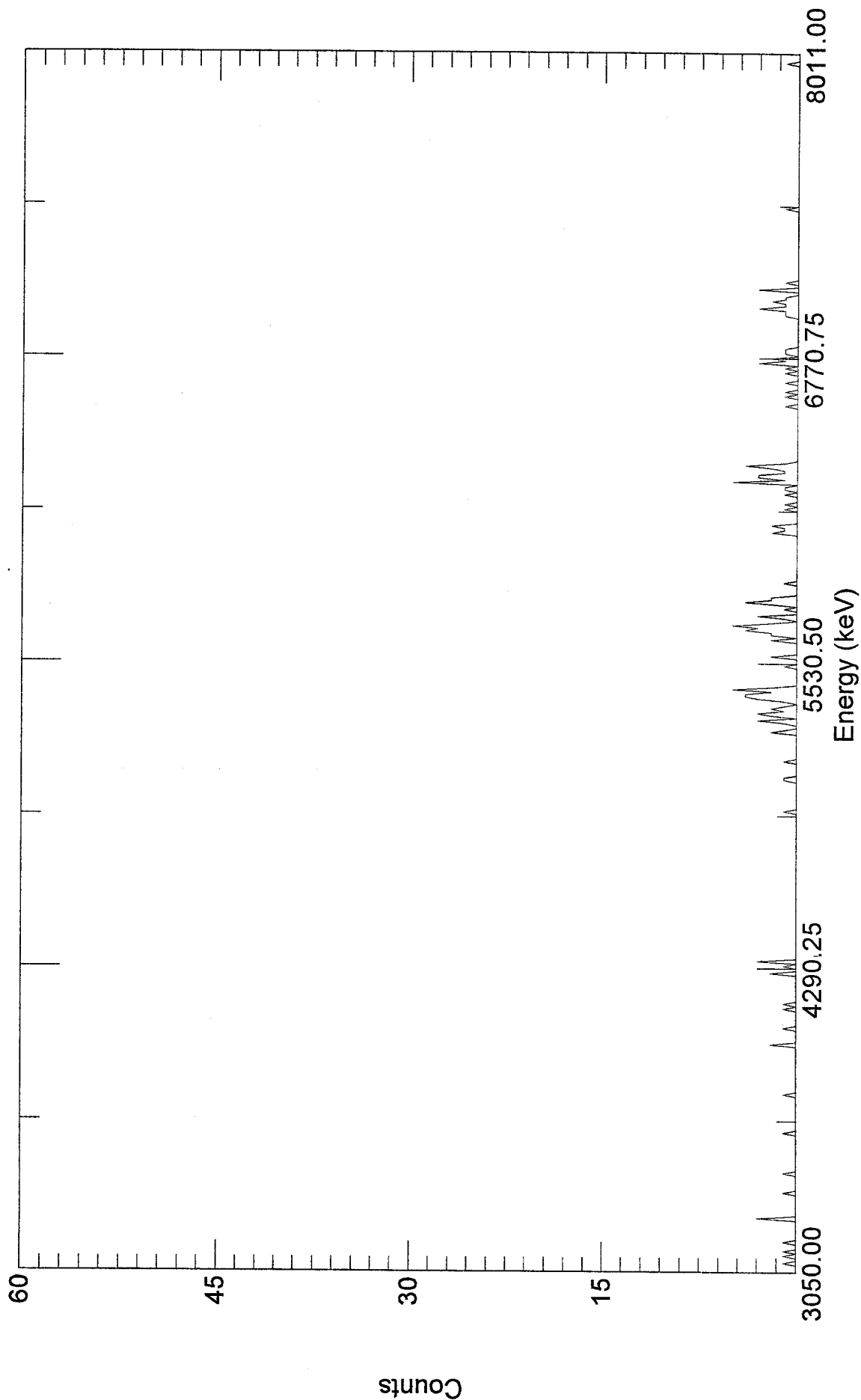
Checked By: PG _____ ()

000367



B8101115

AlphaVision Absolute Region-Of-Interest



000369

Acquired: 15:01:37 on 11-Oct-98

Real Time: 60000.30 s. Live Time: 60000.00 s.

File: C:\USER\ALPHA\BKGND\B8101115.CHN

Detector: #15 MCB 2 Input 7

Sample: weekly background

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:37

DETECTOR: MCB 2 Input 8
Efficiency: 31.53% Chem. Recovery: 0.00%
Total Eff.: 31.53% Manual: 100.00%
CALIBRATION: 3060.55 + 9.738 * Chn keV
Original: 3060.55 + 9.738 * Chn keV
File: C:\USER\ALPHA\ALPHA\C8100516.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:39
Live Time: 60000.00 Real Time: 60000.30 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101116.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101116

P E A K S							
Channel	Start	End	FWHM	Height	Background	Net Area	CPM

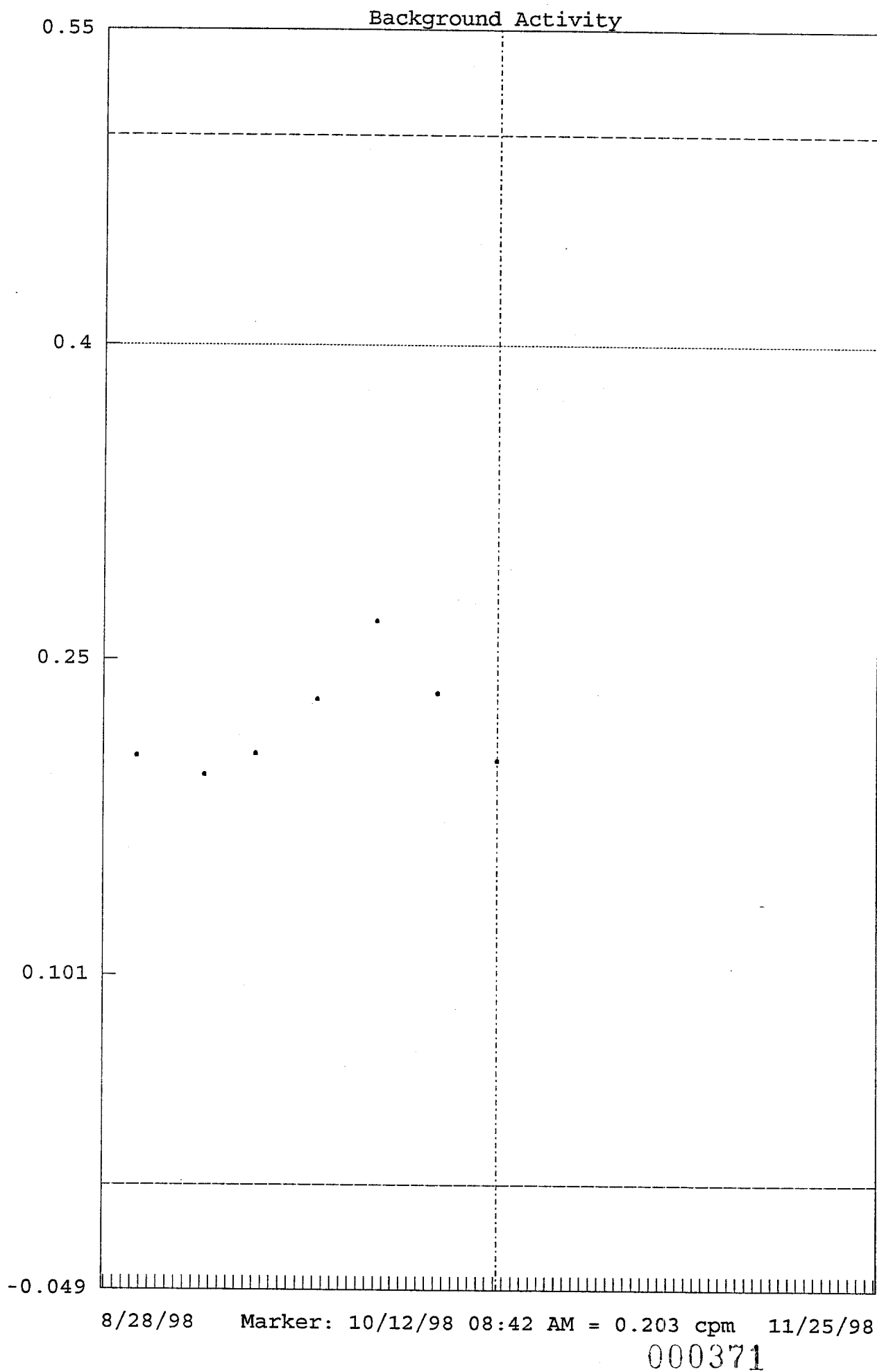
D E C A Y C O R R E C T E D R E S U L T S							
Nuclide	Ratio	Br. Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error

T O T A L S		% Recovery
-----		-----
Gross Count	203.0000	100.00
Net Area	203.0000	100.00
Background	0.0000	0.00
Composite Fit	0.0000	0.00
Residuals	203.0000	100.00

Analyzed By: _____ ()

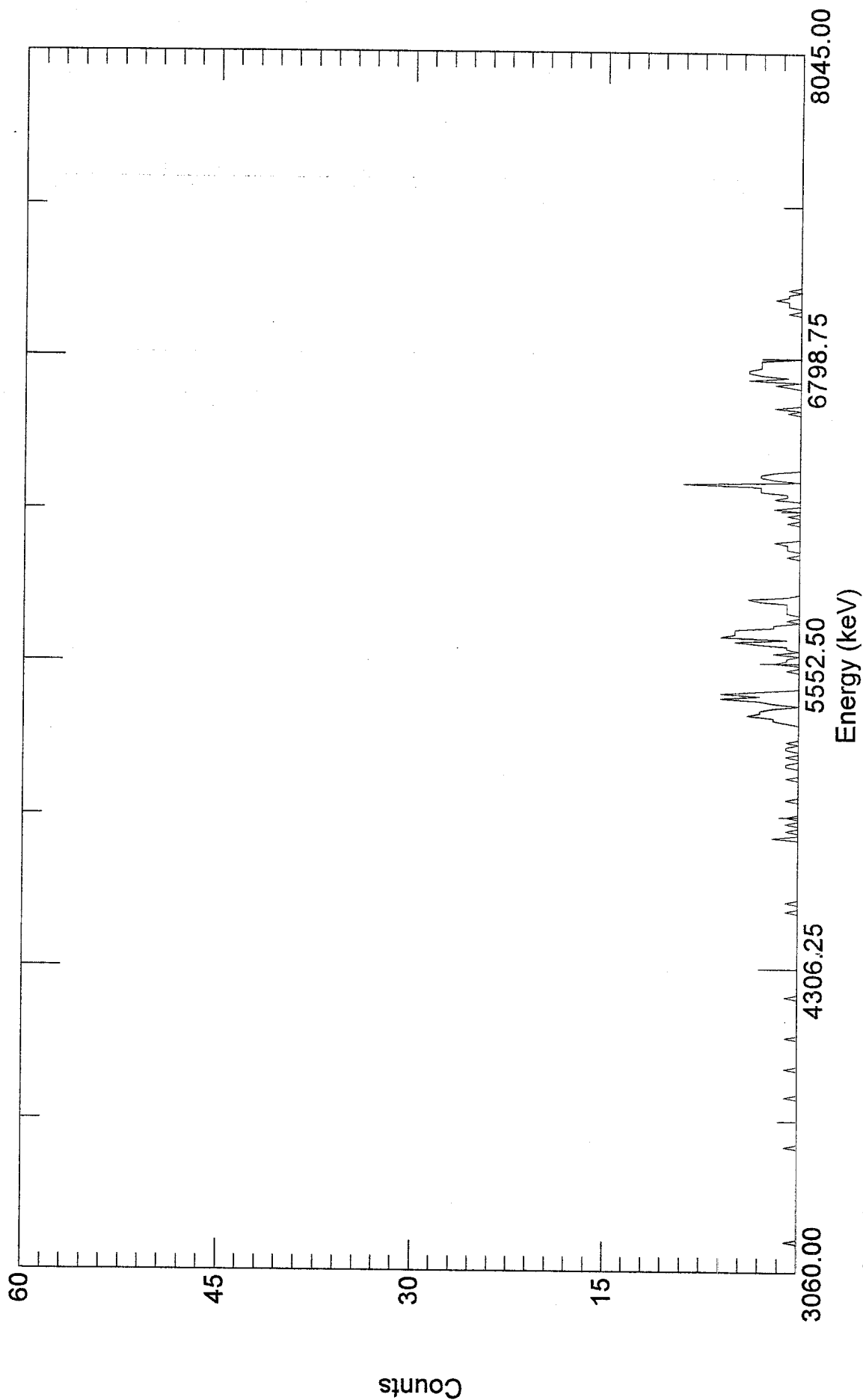
Checked By: RG _____ ()

000370



B8101116

AlphaVision Absolute Region-Of-Interest



000372

Acquired: 15:01:39 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101116.CHN

Sample: weekly background

Real Time: 60000.30 s. Live Time: 60000.00 s.

Detector: #16 MCB 2 Input 8

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:47

DETECTOR: MCB 3 Input 1
Efficiency: 29.08% Chem. Recovery: 0.00%
Total Eff.: 29.08% Manual: 100.00%
CALIBRATION: 3062.85 + 9.6834 * Chn keV
Original: 3062.85 + 9.6834 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100517.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:53
Live Time: 60000.00 Real Time: 60000.88 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101117.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101117

		P E A K S					
Channel	Start End	FWHM	Height	Background	Net Area	CPM	

		D E C A Y			C O R R E C T E D		
		Br.	Energy	Width	R E S U L T S		
		Ratio	(keV)	(keV)	Tau	Aliquot	
Nuclide					DPM	MDA	% Error

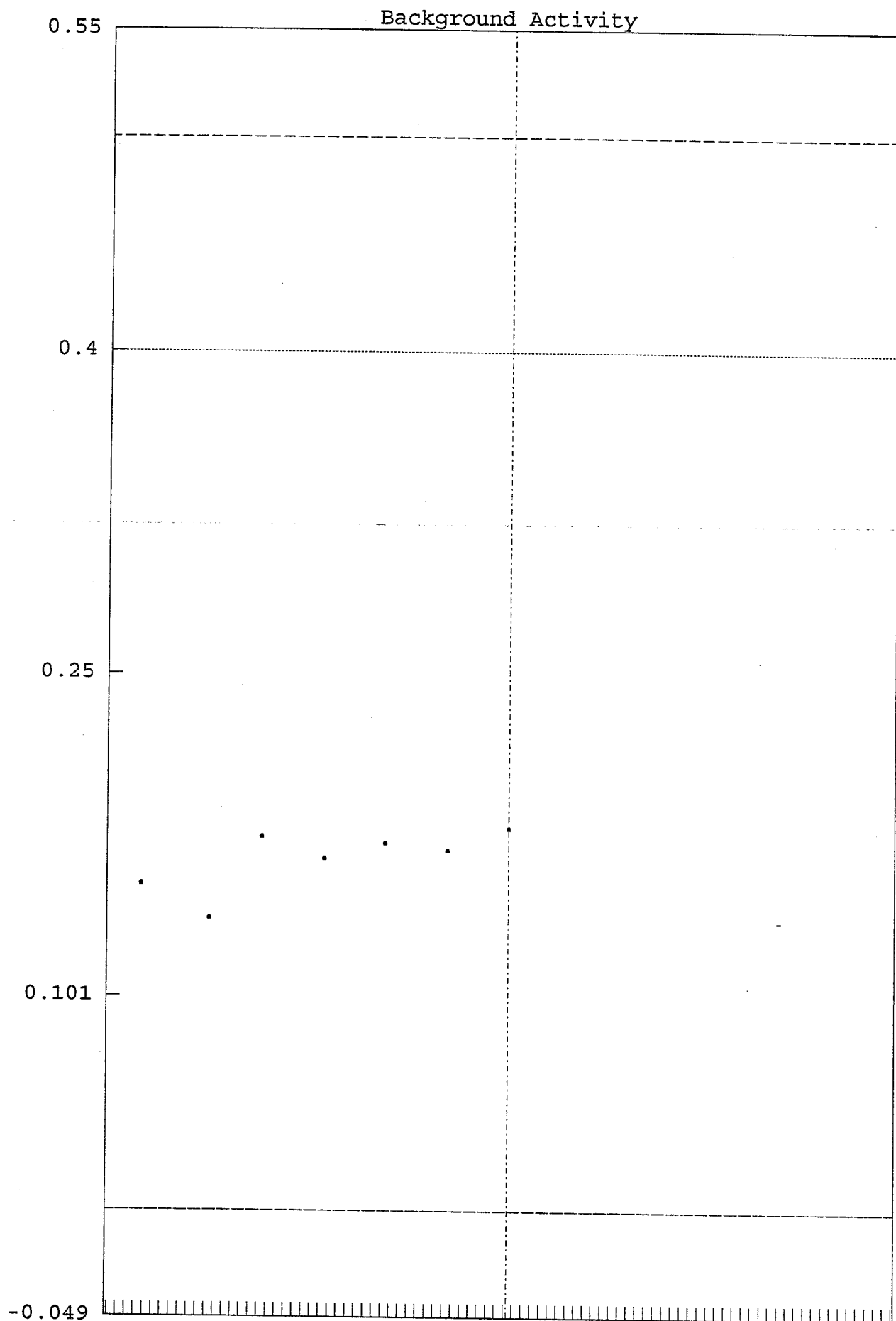
		T O T A L S	% Recovery

Gross Count		179.0000	100.00
Net Area		179.0000	100.00
Background		0.0000	0.00
Composite Fit		0.0000	0.00
Residuals		179.0000	100.00

Analyzed By: _____ ()

Checked By: RG _____ ()

000373

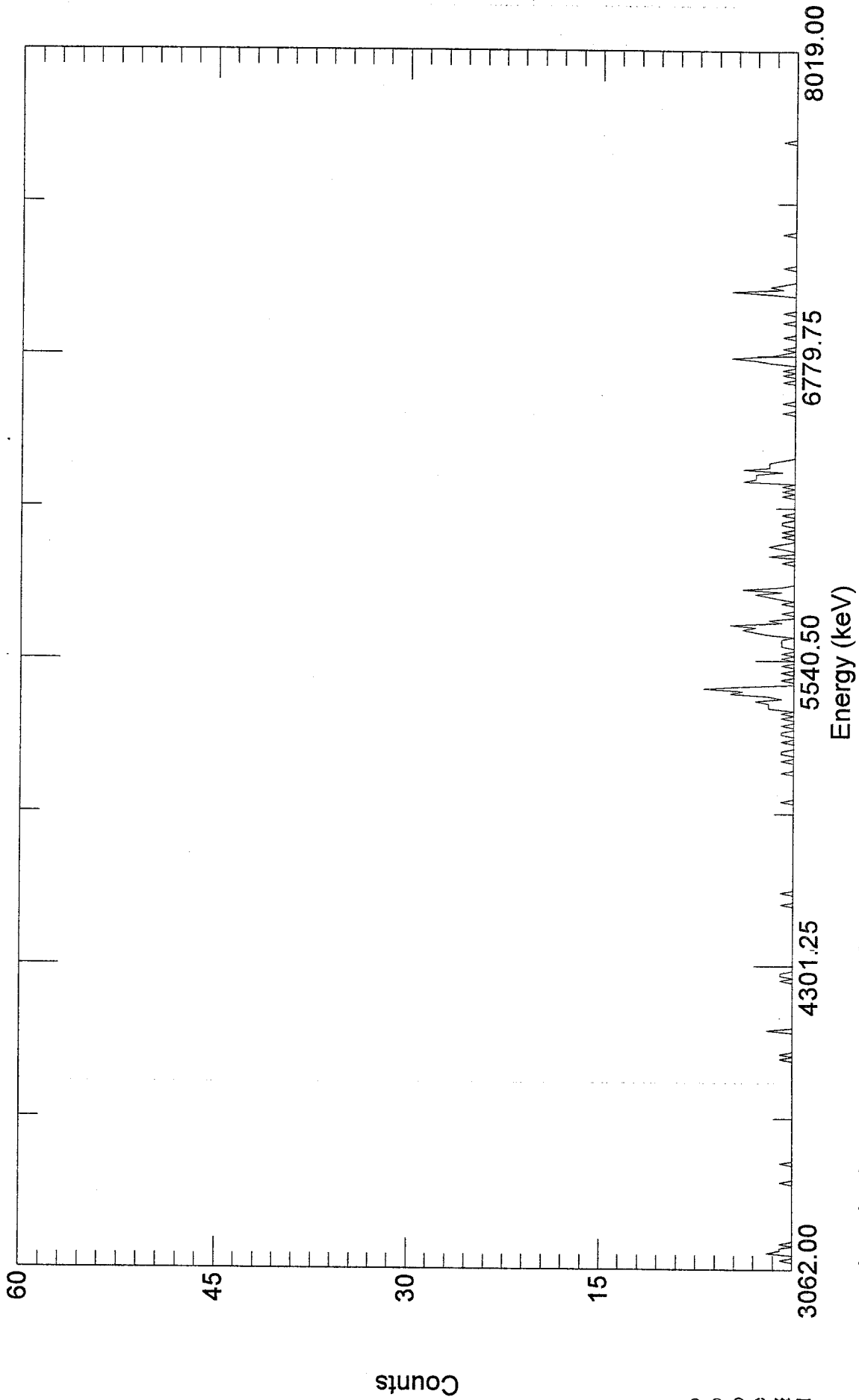


8/28/98 Marker: 10/12/98 08:43 AM = 0.179 cpm 11/25/98

000374

B8101117

AlphaVision Absolute Region-Of-Interest



Acquired: 15:01:53 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101117.CHN

Sample: weekly background

Real Time: 60000.88 s. Live Time: 60000.00 s.

Detector: #17 MCB 3 Input 1

Type: Background

ALPHA VISION BACKGROUND ANALYSIS

Paragon Analytics, Inc.

SAMPLE: weekly background
 Type: Background
 Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:53

DETECTOR: MCB 3 Input 2
 Efficiency: 28.94% Chem. Recovery: 0.00%
 Total Eff.: 28.94% Manual: 100.00%
 CALIBRATION: 3062.11 + 9.6604 * Chn keV
 Original: 3062.11 + 9.6604 * Chn keV
 File: C:\USER\ALPHA\CALIB\C8100518.CHN
 ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:56
 Live Time: 60000.00 Real Time: 60000.90 Sec.
 Spectrum File: C:\USER\ALPHA\BKGND\B8101118.CHN
 Background File:
 Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
 Results: B8101118

P E A K S									
Channel	Start	End	FWHM	Height	Background	Net Area	CPM		

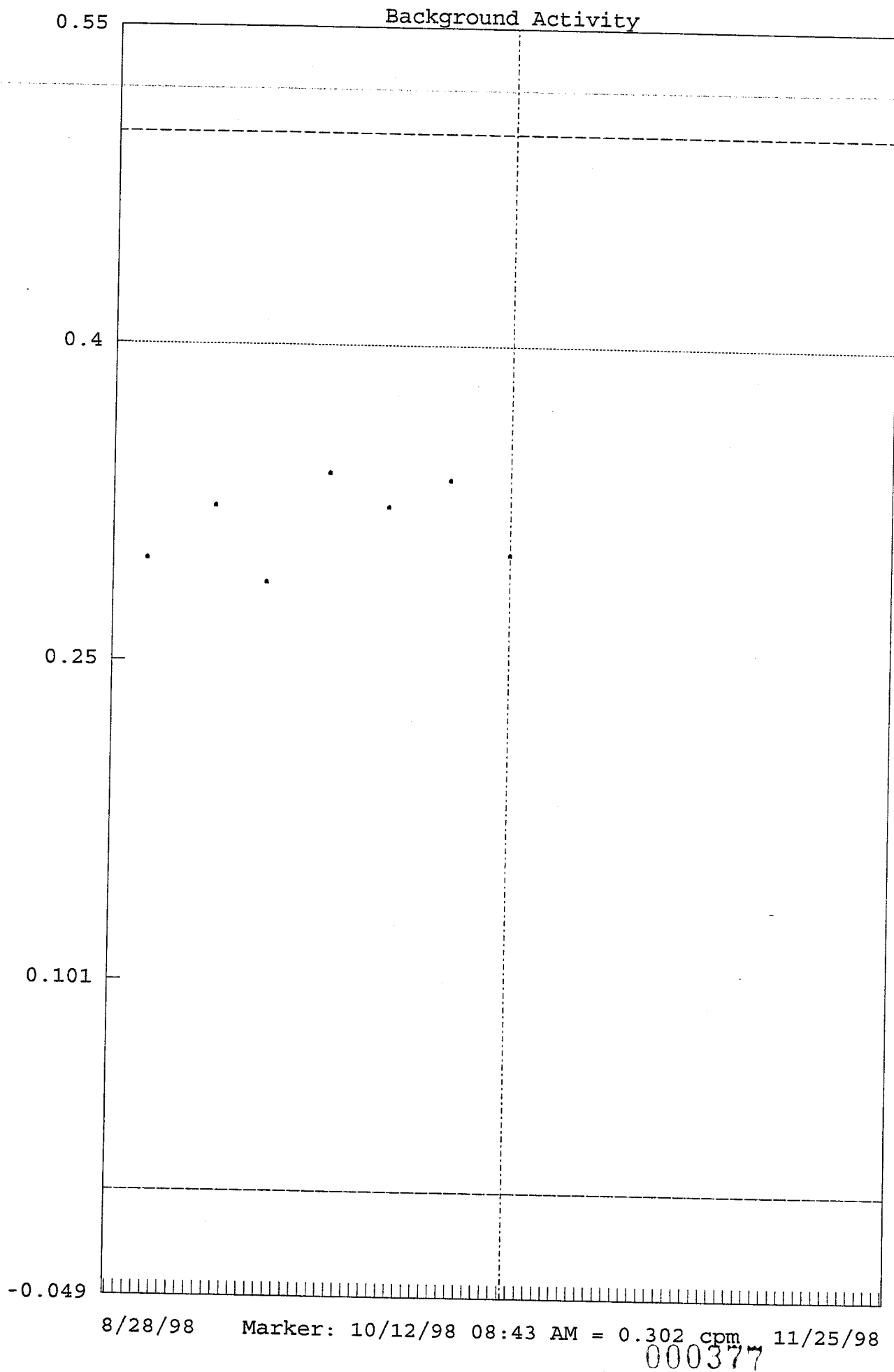
D E C A Y C O R R E C T E D R E S U L T S									
Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	DPM	MDA	% Error		

T O T A L S			% Recovery
Gross Count	302.0000		100.00
Net Area	302.0000		100.00
Background	0.0000		0.00
Composite Fit	0.0000		0.00
Residuals	302.0000		100.00

Analyzed By: _____ ()

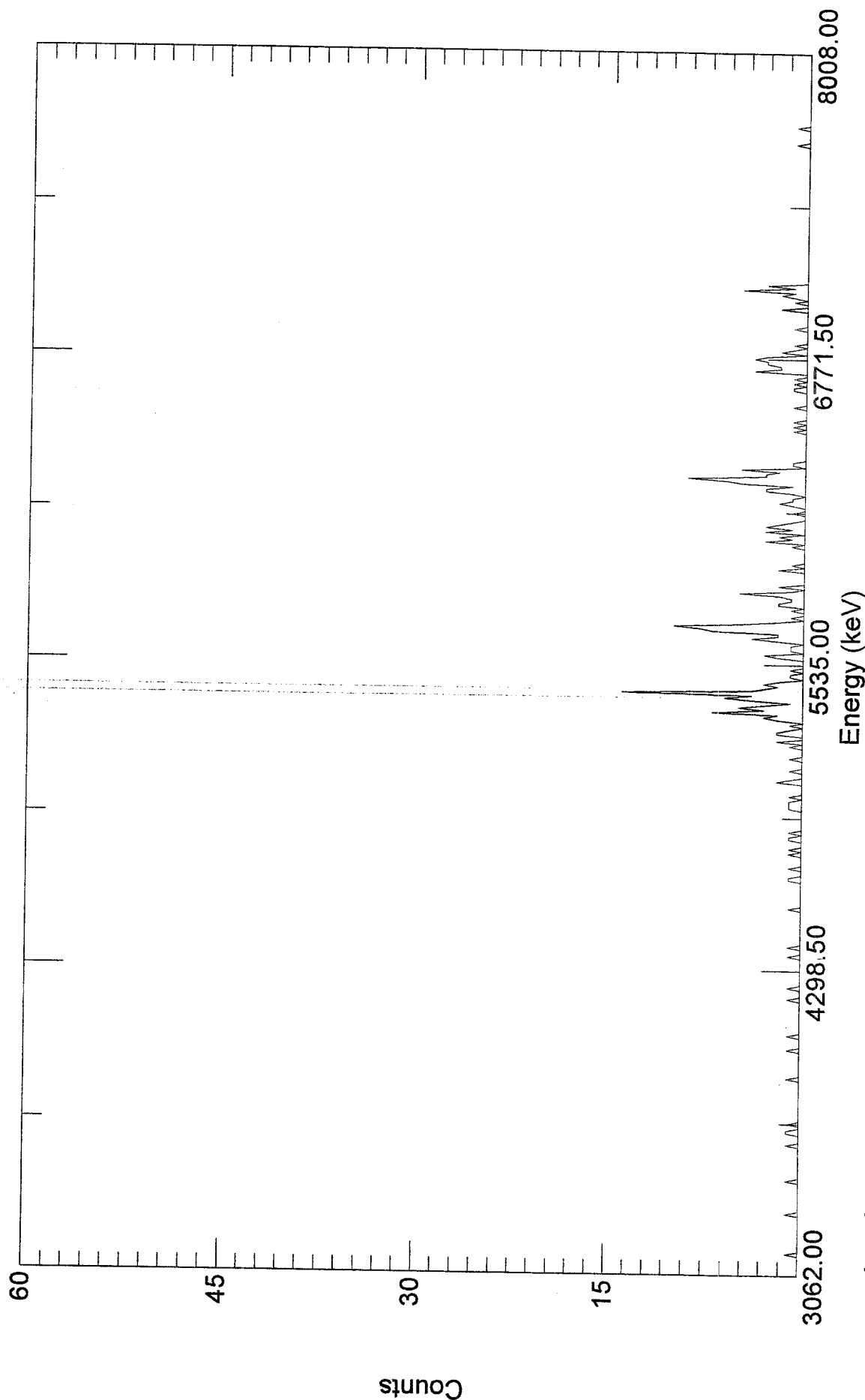
Checked By: RG _____ ()

000376



B8101118

AlphaVision Absolute Region-Of-Interest



000378

Acquired: 15:01:56 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101118.CHN

Sample: weekly background

Real Time: 60000.90 s. Live Time: 60000.00 s.

Detector: #18 MCB 3 Input 2

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:56

DETECTOR: MCB 3 Input 3
Efficiency: 27.61% Chem. Recovery: 0.00%
Total Eff.: 27.61% Manual: 100.00%
CALIBRATION: 3066.48 + 9.6715 * Chn keV
Original: 3066.48 + 9.6715 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100519.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:57
Live Time: 60000.00 Real Time: 60000.90 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101119.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHA VISION.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101119

			P E A K S						
Channel	Start	End	FWHM	Height	Background	Net Area	CPM		

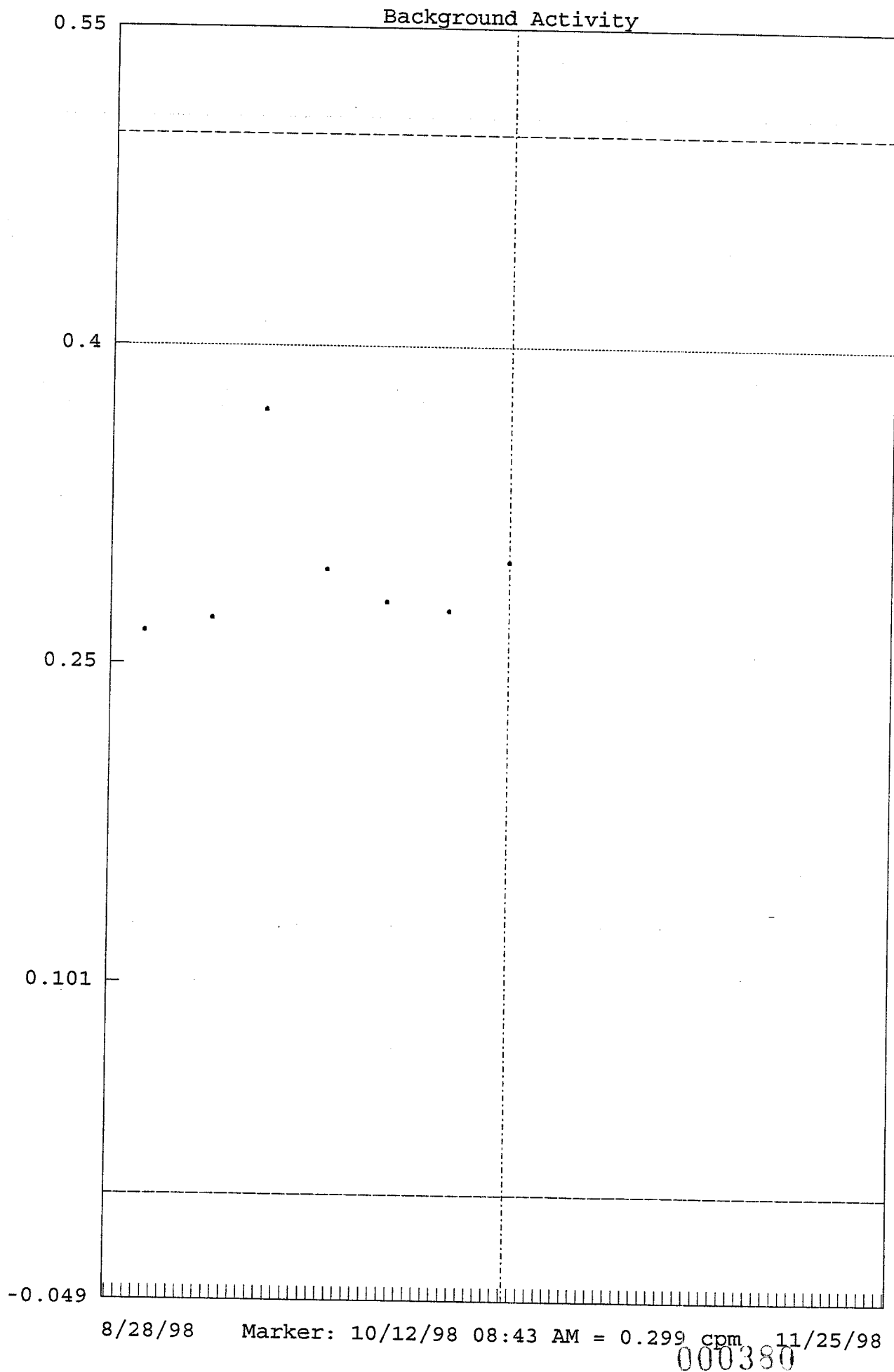
D E C A Y			C O R R E C T E D			R E S U L T S			
Nuclide	Br.	Energy	Width			Aliquot			
	Ratio	(keV)	(keV)	Tau	DPM	MDA	% Error		

T O T A L S		% Recovery
Gross Count	299.0000	100.00
Net Area	299.0000	100.00
Background	0.0000	0.00
Composite Fit	0.0000	0.00
Residuals	299.0000	100.00

Analyzed By: _____ ()

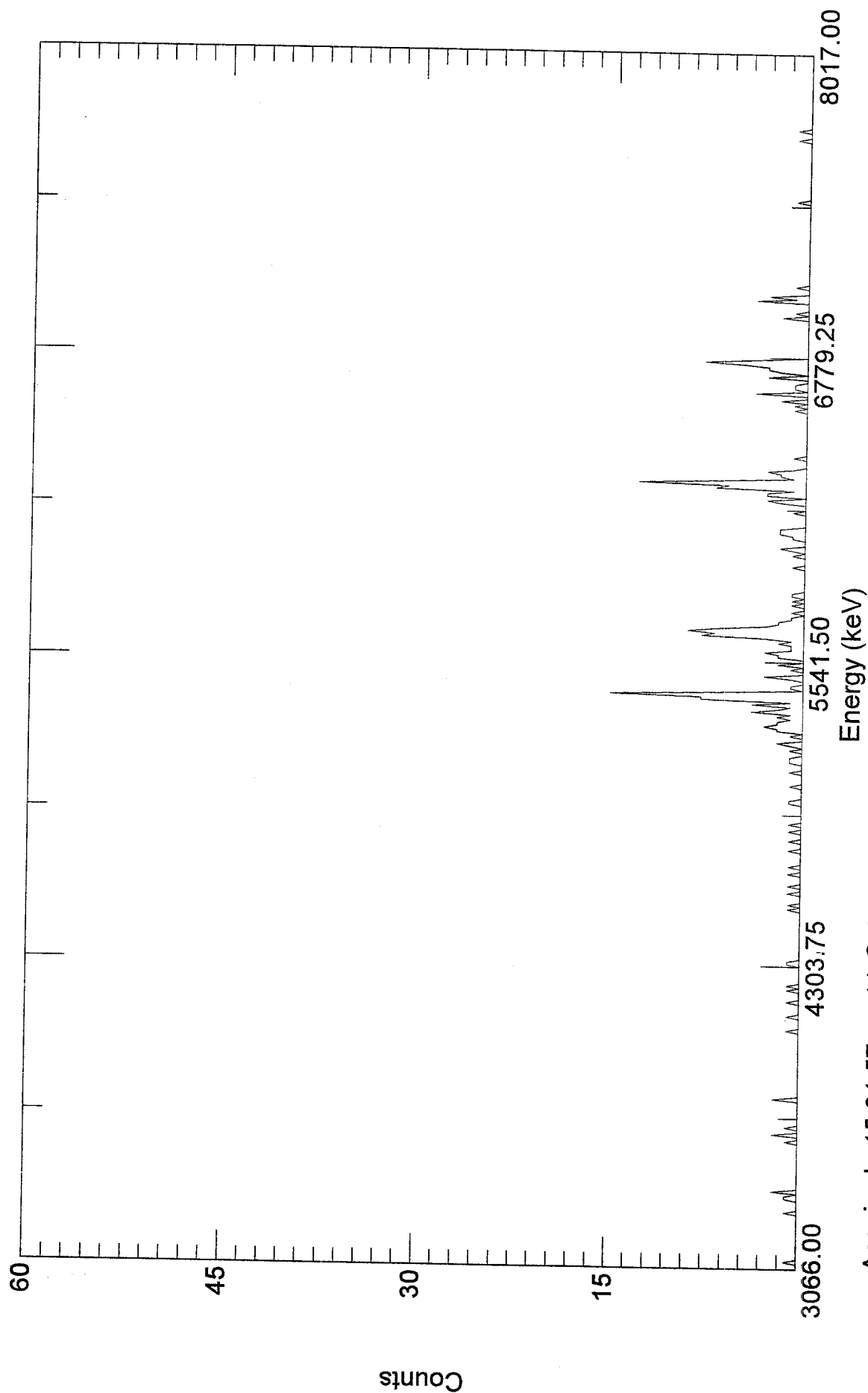
Checked By: RG _____ ()

000370



B8101119

AlphaVision Absolute Region-Of-Interest



000381

Acquired: 15:01:57 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101119.CHN

Sample: weekly background

Real Time: 60000.90 s. Live Time: 60000.00 s.

Detector: #19 MCB 3 Input 3

Type: Background

ALPHA VISION BACKGROUND ANALYSIS
Paragon Analytics, Inc.

SAMPLE: weekly background
Type: Background
Volume: 1 Total, 1 Aliquot

Sample Collected: 11-Oct-98 15:01:57

DETECTOR: MCB 3 Input 4
Efficiency: 27.47% Chem. Recovery: 0.00%
Total Eff.: 27.47% Manual: 100.00%
CALIBRATION: 3065.42 + 9.6851 * Chn keV
Original: 3065.42 + 9.6851 * Chn keV
File: C:\USER\ALPHA\CALIB\C8100520.CHN
ACQUISITION: 512 Channels Spectrum Acquired: 11-Oct-98 15:01:59
Live Time: 60000.00 Real Time: 60000.90 Sec.
Spectrum File: C:\USER\ALPHA\BKGND\B8101120.CHN
Background File:
Nuclide Library: C:\USER\ALPHA\ALPHAVIS.ALB

ANALYSIS Method: Absolute Region-Of-Interest
Results: B8101120

			P E A K S					
Channel	Start	End	FWHM	Height	Background	Net Area	CPM	

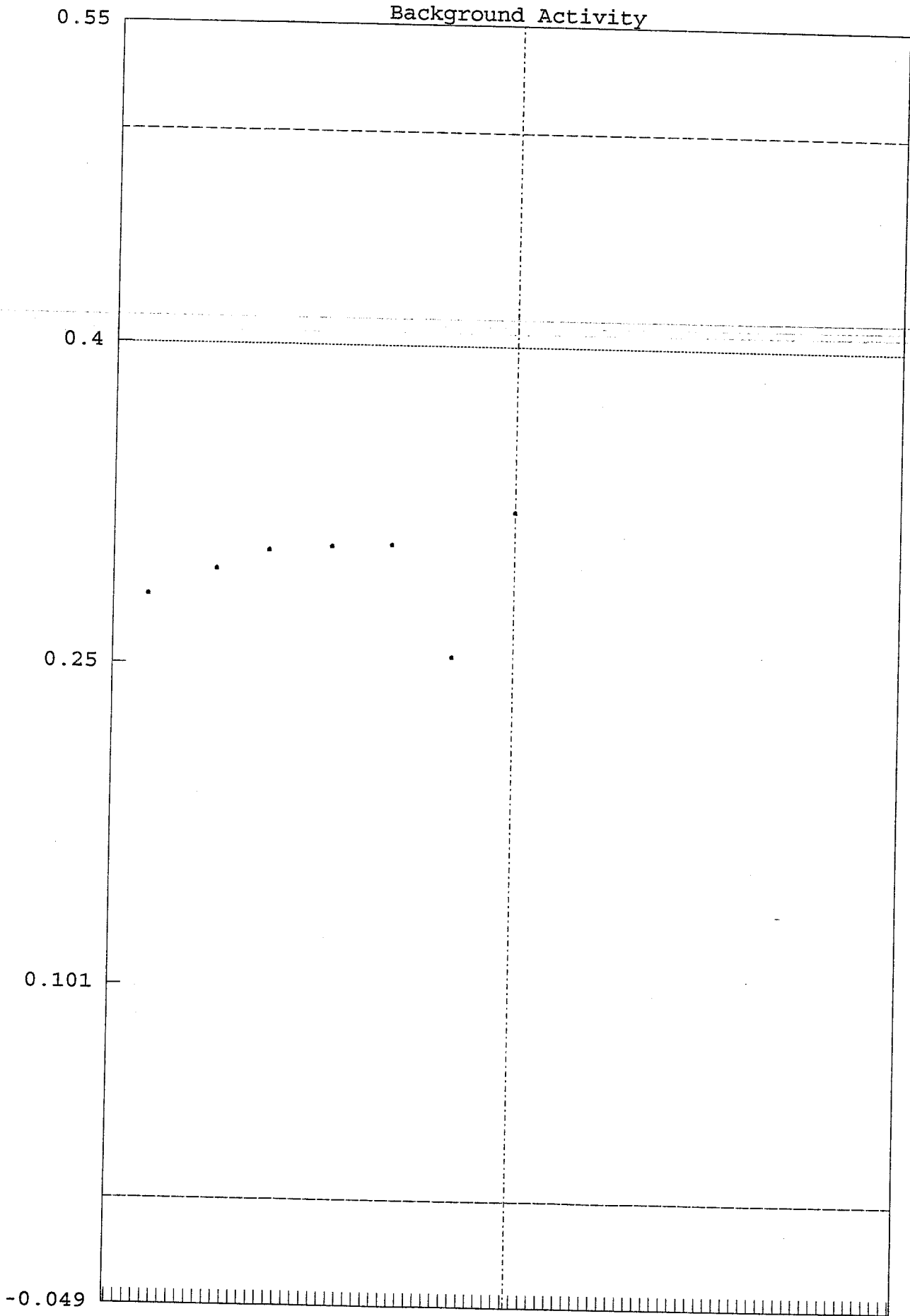
D E C A Y			C O R R E C T E D		R E S U L T S			
	Br.	Energy	Width			Aliquot		
Nuclide	Ratio	(keV)	(keV)	Tau	DPM	MDA	% Error	

T O T A L S		% Recovery
Gross Count		100.00
Net Area		100.00
Background		0.00
Composite Fit		0.00
Residuals		100.00

Analyzed By: _____ ()

Checked By: BG _____ ()

000382

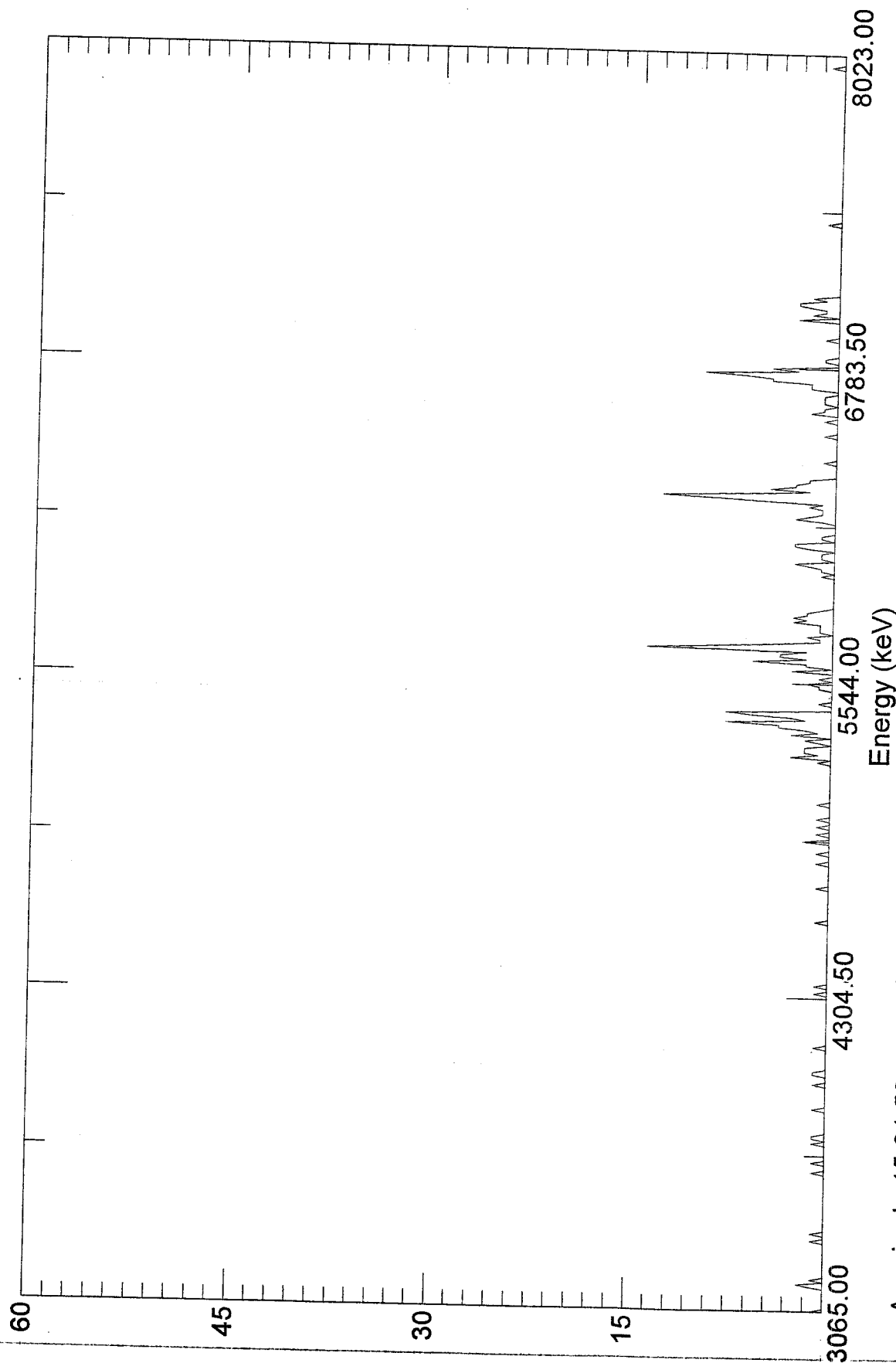


8/28/98 Marker: 10/12/98 08:43 AM = 0.323 cpm 11/25/98

000383

B8101120

AlphaVision Absolute Region-Of-Interest



Acquired: 15:01:59 on 11-Oct-98

File: C:\USER\ALPHA\BKGND\B8101120.CHN

Sample: weekly background

Real Time: 60000.90 s. Live Time: 60000.00 s.

Detector: #20 MCB 3 Input 4

Type: Background

000384

Alpha Spectroscopy
Quality Control Data
Weekly Instrument Performance
Checks

000385

Alpha Spectroscopy Calibration Standard Reverification

Source ID	PAI ID	CAL/VERIF	Old Exp.	DPM	%U234	%AM241	COUNT	New Exp.	U-234 dp	Am-241	day Corrected		U-234	Am-241
		DATE	Exp. Date				DATE	Date	at ref.	at ref.	U dpm	Am dpm	0,000 ct time(s)	
92MIX2203026	97-19-103-01	7/28/97	7/28/98	8680	83.77	14.59	4/10/98	4/10/99	7271.2	1268.4	7271.2	1265.0	330	1895
92MIX2203028	97-19-103-02	7/28/97	7/28/98	16500	89.47	8.98	4/10/98	4/10/99	14762.8	1478.4	14762.5	1476.7	163	1523
92MIX2203024	97-19-103-03	7/28/97	7/28/98	14100	52.09	47.07	4/10/98	4/10/99	7344.7	6636.9	7344.7	6629.4	327	362
92MIX2203021	97-19-103-04	7/28/97	7/28/98	8480	73.54	25.54	4/10/98	4/10/99	6236.2	2165.8	6236.2	2163.4	385	1108
92MIX2203025	97-19-103-05	7/28/97	7/28/98	22100	57.12	41.92	4/10/98	4/10/99	12623.5	9264.3	12623.5	9253.9	190	259
92MIX2203022	97-19-103-06	7/28/97	7/28/98	16100	51.22	47.56	4/10/98	4/10/99	8246.4	7657.2	8246.4	7648.5	291	313
92MIX2203023	97-19-103-07	7/28/97	7/28/98	11100	59.01	40.48	4/10/98	4/10/99	6550.1	4493.3	6550.1	4488.2	366	534
92MIX2203029	97-19-103-08	7/28/97	7/28/98	23400	84.8	13.54	4/10/98	4/10/99	19843.2	3168.4	19843.2	3164.8	121	757
92MIX2203027	97-19-103-09	7/28/97	7/28/98	3980	81.24	17.52	4/10/98	4/10/99	3233.4	697.3	3233.3	696.5	742	3442

Done: 4/10/98
By: DCB

000386



U-235 Source 10 # 126
Recalibrated 3-26-98

2810 Siler Lane
Santa Fe, NM 87501
(505) 473-9538
FAX: (505) 473-5805

Radiation Standards and Check Sources

Certificate of Calibration (Alpha Source)

The U 234/235, Am 241 alpha source was measured in a gas proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2π particle emission rate (i.e. particles per minute). Corrections were applied for background, coincidence loss and backscatter factors when applicable.

Alpha standard 93AM3204191 is our NIST calibrated source used in establishing NIST traceability following ANSI N42.22 participating in the NIST radioactivity measurement assurance program annually.

REF. PO# _____

Model Recalibration

Active Diameter (or area) 19mm Mounting Material SS
Total Diameter (or area) 22mm Thickness 0.79mm

<u>4.400</u>	ppm \pm <u>220</u>	ppm 2π	U-235	1.64%
<u>8.680</u>	dpm \pm <u>434</u>	dpm 4π	U-234	83.77%
<u>0.00391</u>	μ Ci	Bq	Am-241	14.59%
<u>03/02/98</u>	date of measurement			
<u>92MIX2203026</u>	source serial number			
<u>5.0</u>	overall uncertainty (percent)			
<u>1.5</u>	backscatter(percent)			

Michael A. Ortiz Michael A. Ortiz Calibration Manager

Charles L. Gonzales Charles L. Gonzales . . Quality Assurance Manager

<20 dpm leak test results (dpm/100cm²)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactive measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

AC006-97

000387

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505) 473-9538 FAX (505) 473-5805

Certificate of Calibration

(Alpha Sources)

PAT Work order

97-19-103-02

The Uranium234, Americium241 alpha source was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90AM4704625 used in establishing traceability.

Active Diameter (or area) 19mm

Total Diameter (or area) 22mm

8.400 cpm

16.500 dpm

0.00745 microcurie

08/13/97 date of measurement

92MIX2203028 source serial number

Mounting Material SS

Thickness 0.79mm

± 420 cpm 2pi

± 830 dpm 4pi

Activity Percent

U234 89.47%

U235 1.57%

AM241 8.96%

Michael A. Ortiz

Charles L. Gonzales

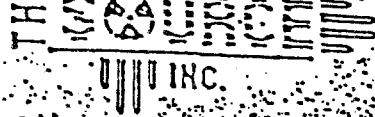
Calibration Manager Michael A. Ortiz

Q.A. Manager Charles L. Gonzales

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000388



03

calibration standards and check sources
1 Silver Lane Santa Fe, NM 87501
(505) 473-9538 FAX (505) 473-5805

REF. PO# 65-1924

Certificate of Calibration

(Alpha Sources)

Pat Workorder 97-19-10303

A Uranium234, Americium241 alpha source was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its test voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90AM4704625 used in establishing traceability.

Source Diameter (or area) 19mm

Counting Diameter (or area) 22mm

7,170 cpm

14,100 dpm

0.00637 microcurie

08/13/92 date of measurement

92MTX2203024 source serial number

Mounting Material SS

Thickness 0.79mm

\pm 360 cpm 2pi

\pm 710 dpm 4pi

Activity Percent

U234 52.09%

U235 0.84%

Am241 47.07%

Michael A. Ortiz

Charles L. Gonzales

Calibration Manager

Q.A. Manager

Michael A. Ortiz
Charles L. Gonzales

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000389

INC.

104

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505)473-9538 FAX(505)473-5805

EFPO# 65-1924

Certificate of Calibration

(Alpha Sources)

Per work order 9719103.04

The Uranium234, Americium241, alpha source was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90446704625 used in establishing traceability.

Active Diameter(or circ) <u>19mm</u>	Mounting Material <u>SS</u>
Total Diameter(or circ) <u>22mm</u>	Thickness <u>0.79mm</u>
<u>4.300</u> cpm	\pm <u>215</u> cpm 2pi
<u>8.480</u> cpm	\pm <u>420</u> cpm 4pi
<u>0.00382</u> microcurie	
<u>08/13/92</u> date of measurement	Activity Percent
<u>92MIX2203021</u> source serial number	U234 73.54%
	U235 0.92%
	AM241 25.54%

Michael A. Ortiz
Charles L. Gonzales

Calibration Manager Michael A. Ortiz
Q.A. Manager Charles L. Gonzales

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000390

INC.

Radiation standards and check sources
2810 Siler Lane Santa Fe, NM 87501
(505) 473-9538 FAX (505) 473-5805

PO# 65-1924

Certificate of Calibration

(Alpha Sources)

Pa1 Work order 97-11-03105

The Uranium234, Americium241 alpha source was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90AM4704525 used in establishing traceability.

Active Diameter(or area) 19mm

Total Diameter(or area) 22mm

11,200 cpm

77,100 dpm

0.00995 microcurie

08/13/92 date of measurement

92MTX220302 source serial number

Mounting Material SS

Thickness 0.79mm

\pm 560 cpm 2pi

\pm 1,100 dpm 4pi

Activity Percent

U234 57.12%

U235 0.96%

AM241 41.92%

Michael A. Ortiz

Charles L. Gonzales

Calibration Manager

Q.A. Manager

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000391

Radiation standards and sources
2810 Silver Lane Santa Fe, NM 87501
(505) 73-9538 FAX (505) 473-5805

REF PO# 65-1924

(26)

Certificate of Calibration

(Alpha Sources)

The Uranium234, Americium241 alpha source was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90AM4704625 used in establishing traceability.

Active Diameter (or area) 19mm

Total Diameter (or area) 22mm

8.190 cpm

16.100 cpm

0.00727 microcurie

06/13/92 date of measurement

97MTX2203022 source serial number

Mounting Material SS

Thickness 0.79mm

± 410 cpm 2pi

± 810 cpm 4pi

Activity Percent

U234 51.22%

U235 1.22%

AM241 47.56%

Michael A. Ortiz

Charles L. Gonzales

Calibration Manager

Q.A. Manager

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000392

Radiation standards and check sources

2810 Silver Lane Santa Fe, NM 87501

(505)473-9538 FAX(505)473-5805

REF. PO# 265-1924

Certificate of Calibration

(Alpha Sources)

Part Used Only 07-11-03.07

The Uranium234, Americium241 alpha source, was measured in a proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2pi cpm rate. Corrections were applied for background, coincidence loss and backscatter factors when applicable. The source is referenced to NIST 90AM4704625 used in establishing traceability.

Active Diameter(or area) 19mm

Total Diameter(or area) 22mm

5.650 cpm

11.100 cpm

0.00502 microcurie

08/13/92 date of measurement

92MTX2203023 source serial number

Mounting Material SS

Thickness 0.79mm

\pm 230 cpm 2pi

\pm 560 cpm 4pi

Activity Percent

U234 59.01%

U235 0.51%

AM241 40.48%

Michael A. Ortiz

Charles L. Gonzales

Calibration Manager

QA Manager

The total uncertainty of the measurement at the 99% confidence interval is 5.0 percent.

AC005

000393



PAI Source 0189
recd recalibrated 3-26-98

2810 Siler Lane
Santa Fe, NM 87501
(505) 473-9538
FAX: (505) 473-5805

Radiation Standards and Check Sources

Certificate of Calibration (Alpha Source)

The U 234/235, Am 241 alpha source was measured in a gas proportional counter using P-10 as counting gas. The alpha emissions from the surface of the source were measured at its plateau voltage to determine its 2π particle emission rate (i.e. particles per minute). Corrections were applied for background, coincidence loss and backscatter factors when applicable.

Alpha standard 93AM3204191 is our NIST calibrated source used in establishing NIST traceability following ANSI N42.22 participating in the NIST radioactivity measurement assurance program annually.

REF.PO# _____

Model Recalibration

Active Diameter (or area) 19mm Mounting Material SS
Total Diameter (or area) 22mm Thickness 0.79mm

<u>11.900</u>	ppm \pm <u>595</u>	ppm 2π	U-235	1.66%
<u>23.400</u>	dpm \pm <u>1,170</u>	dpm 4π	U-234	84.80%
<u>0.0105</u>	uCi	Bq	Am-241	13.54%
<u>03/02/98</u>	date of measurement			
<u>92MIX2203029</u>	source serial number			
<u>5.0</u>	overall uncertainty (percent)			
<u>1.5</u>	backscatter(percent)			

Michael A. Ortiz Michael A. Ortiz Calibration Manager

Charles L. Gonzales Charles L. Gonzales . . Quality Assurance Manager

<20 dpm leak test results (dpm/100cm²)

The overall uncertainty of the measurement is three times the value found from combining quadratically the sum of the overall uncertainty reported by NIST in the radioactive measurements assurance program; the standard deviation of the mean for the NIST standard as measured in the system used for calibration; and the standard deviation of the mean for the source measurements.

AC006-97

000394

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-01 Weekly Cal

Type: ECAL1

Sample Collected: 02-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 1

Efficiency: 29.86% Chem. Recovery: 0.00%

Total Eff.: 29.86% Manual: 100.00%

CALIBRATION: 3049.98 + 9.69252 * Chn keV

Original: 3052.74 + 9.7071 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100509.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:00

Live Time: 2100.00

Real Time: 2124.14 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101209.CHN

Background File: C:\USER\ALPHA\BKGND\B8101109.CHN

Nuclide Library: C:\USER\ALPHA\ECAL1.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101209

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	251.33	5.78	1522.35	12928.17	0.12	12928.05	369.37
2.	177.95	3.92	9429.71	77699.84	0.01	77699.83	2220.00

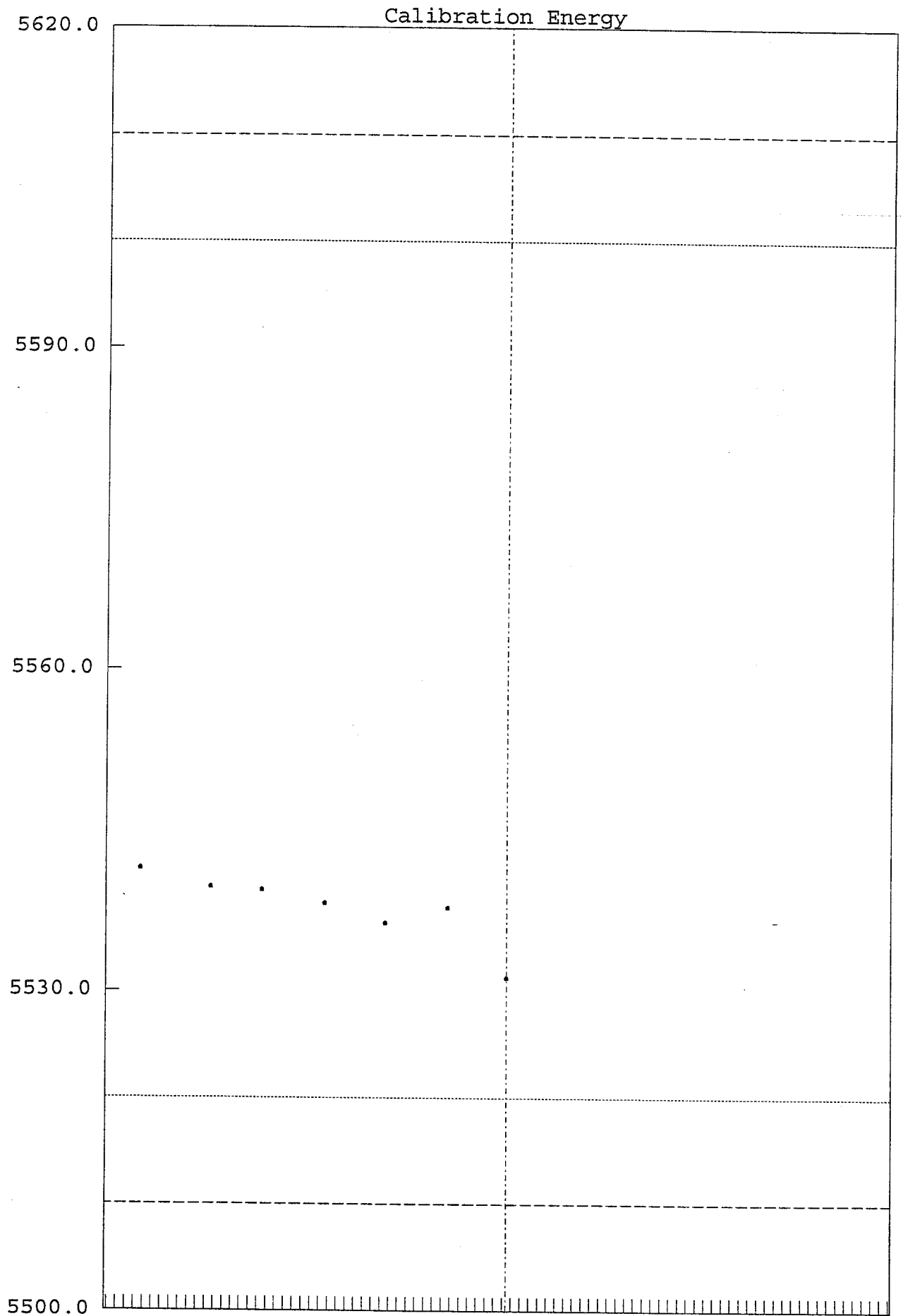
D E C A Y C O R R E C T E D R E S U L T S							
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA % Error
1.	Am-241	0.86	5486.00	56.063	3.8880	1238.08	0.39 1.72
2.	U-234	0.72	4774.80	54.731	1.7511	7433.79	0.38 0.70

T O T A L S			% Recovery
Gross Count	93479.0000		100.00
Net Area	93473.0150		99.99
Background	5.9850		0.01
Composite Fit	92105.3376		98.53
Residuals	1367.6774		1.46

Analyzed By: _____ ()

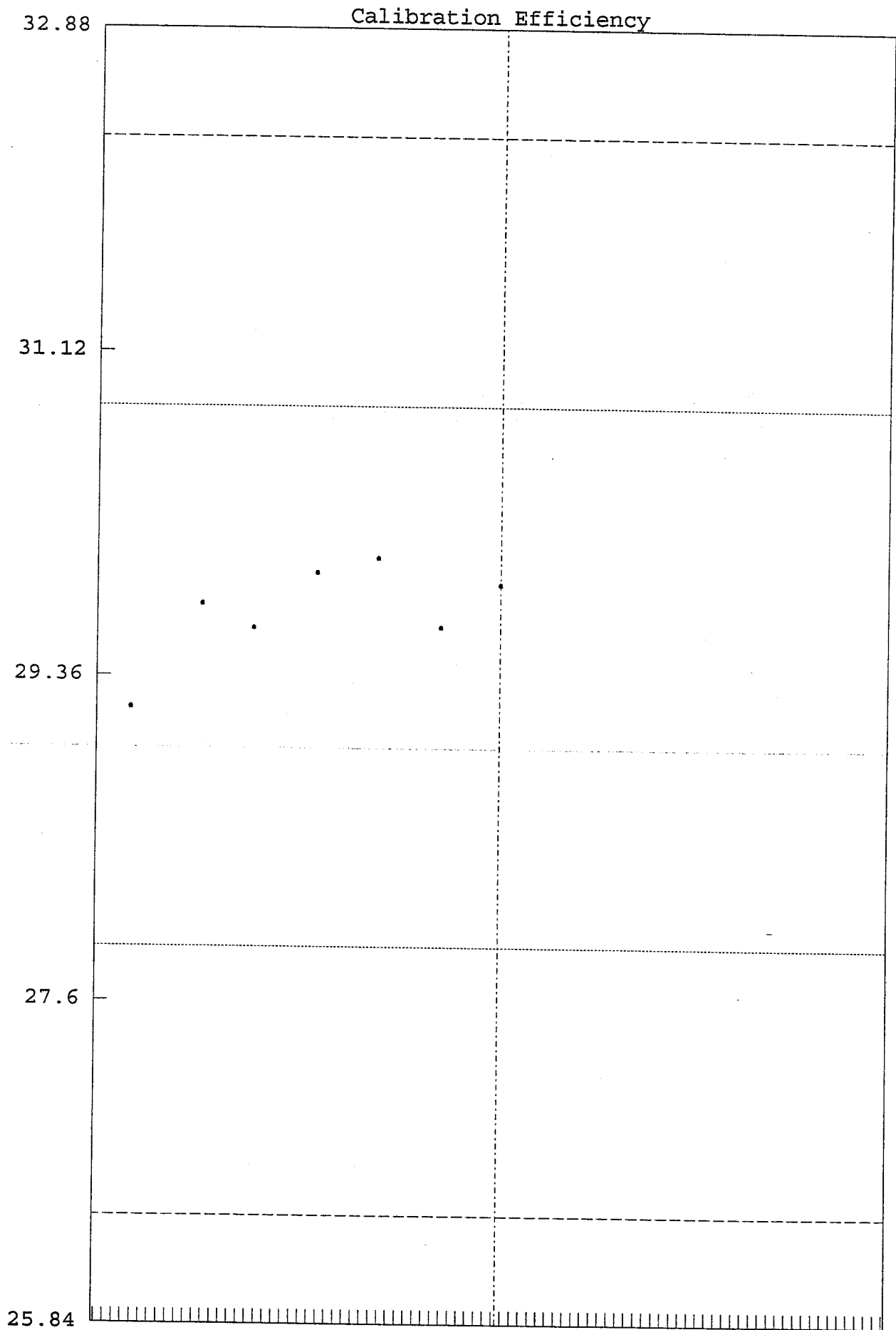
Checked By: RG _____ ()

000395



8/28/98 Marker: 10/12/98 10:20 AM = 5531.3 keV 11/25/98

000396



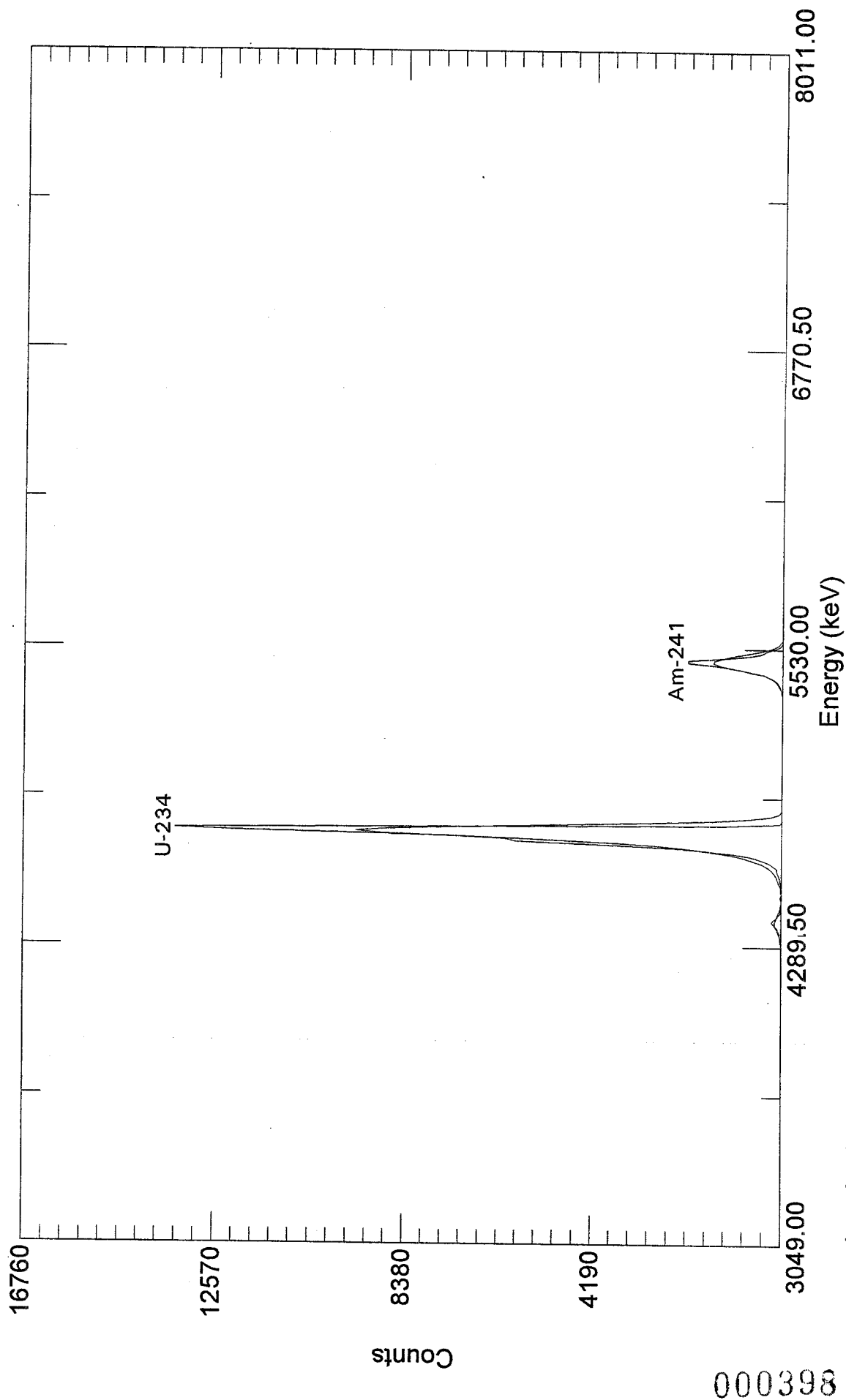
8/28/98

Marker: 10/12/98 10:20 AM = 29.86 % 11/25/98

000397

C8101209

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:00 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101209.CHN

Sample: Source 97-19-103-01 Weekly Cal

Real Time: 2124.14 s. Live Time: 2100.00 s.

Detector: #9 MCB 2 Input 1

Type: ECAL1

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-02 Weekly Cal

Type: ECAL2

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 2

Efficiency: 28.69% Chem. Recovery: 0.00%

Total Eff.: 28.69% Manual: 100.00%

CALIBRATION: 3044.98 + 9.69484 * Chn keV

Original: 3045.88 + 9.6926 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100510.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:02

Live Time: 2100.00

Real Time: 2124.14 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101210.CHN

Background File: C:\USER\ALPHA\BKGND\B8101110.CHN

Nuclide Library: C:\USER\ALPHA\ECAL2.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101210

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	251.79	5.66	1798.35	14874.70	0.37	14874.33	424.98
2.	178.43	3.86	18666.95	146432.83	0.08	146432.75	4183.79

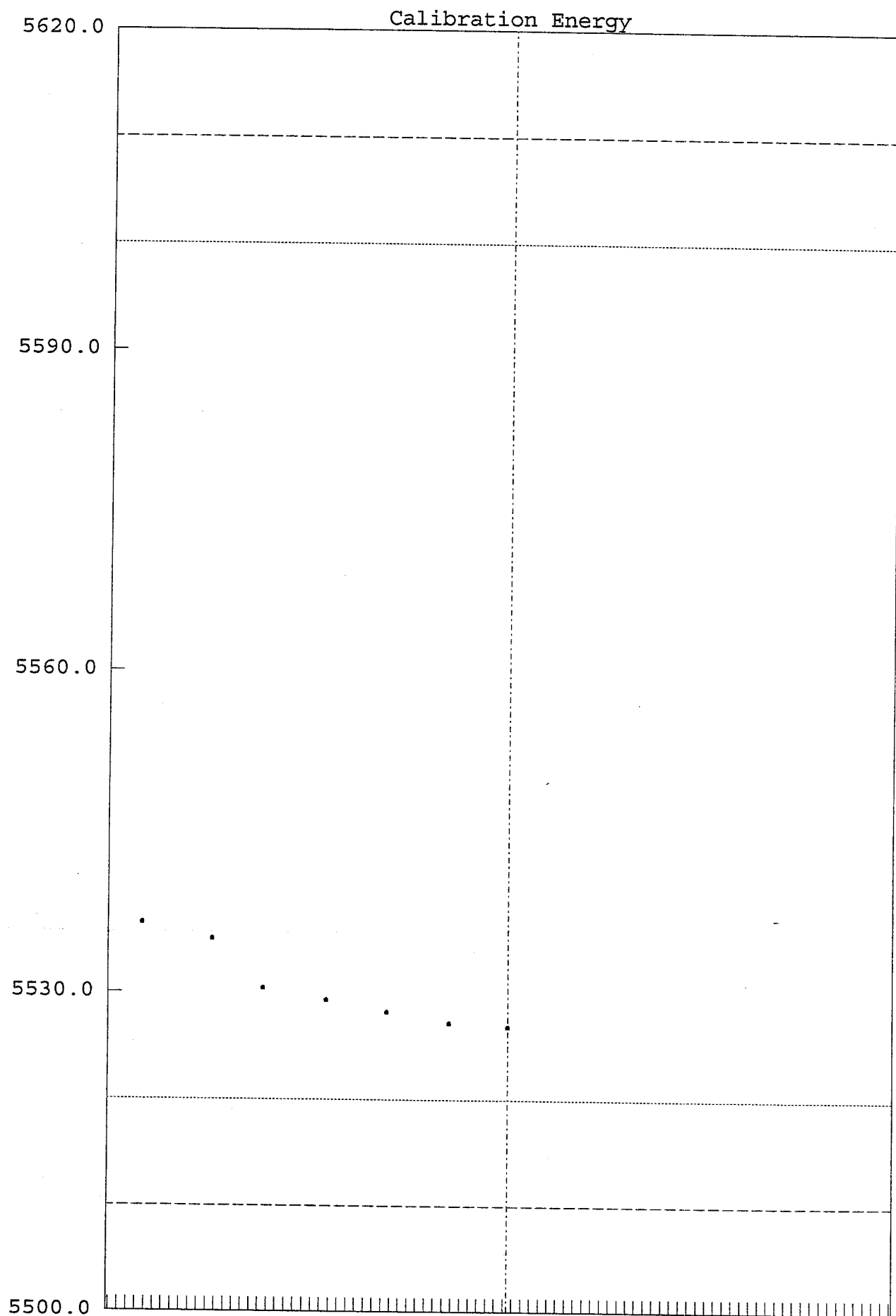
D E C A Y C O R R E C T E D R E S U L T S							
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA % Error
1.	Am-241	0.86	5486.00	54.858	4.3103	1482.93	0.43 1.61
2.	U-234	0.72	4774.80	37.417	1.9416	14584.69	0.40 0.51

T O T A L S			% Recovery
Gross Count	167988.0000		100.00
Net Area	167978.4800		99.99
Background	9.5200		0.01
Composite Fit	164245.9141		97.77
Residuals	3732.5659		2.22

Analyzed By: _____ ()

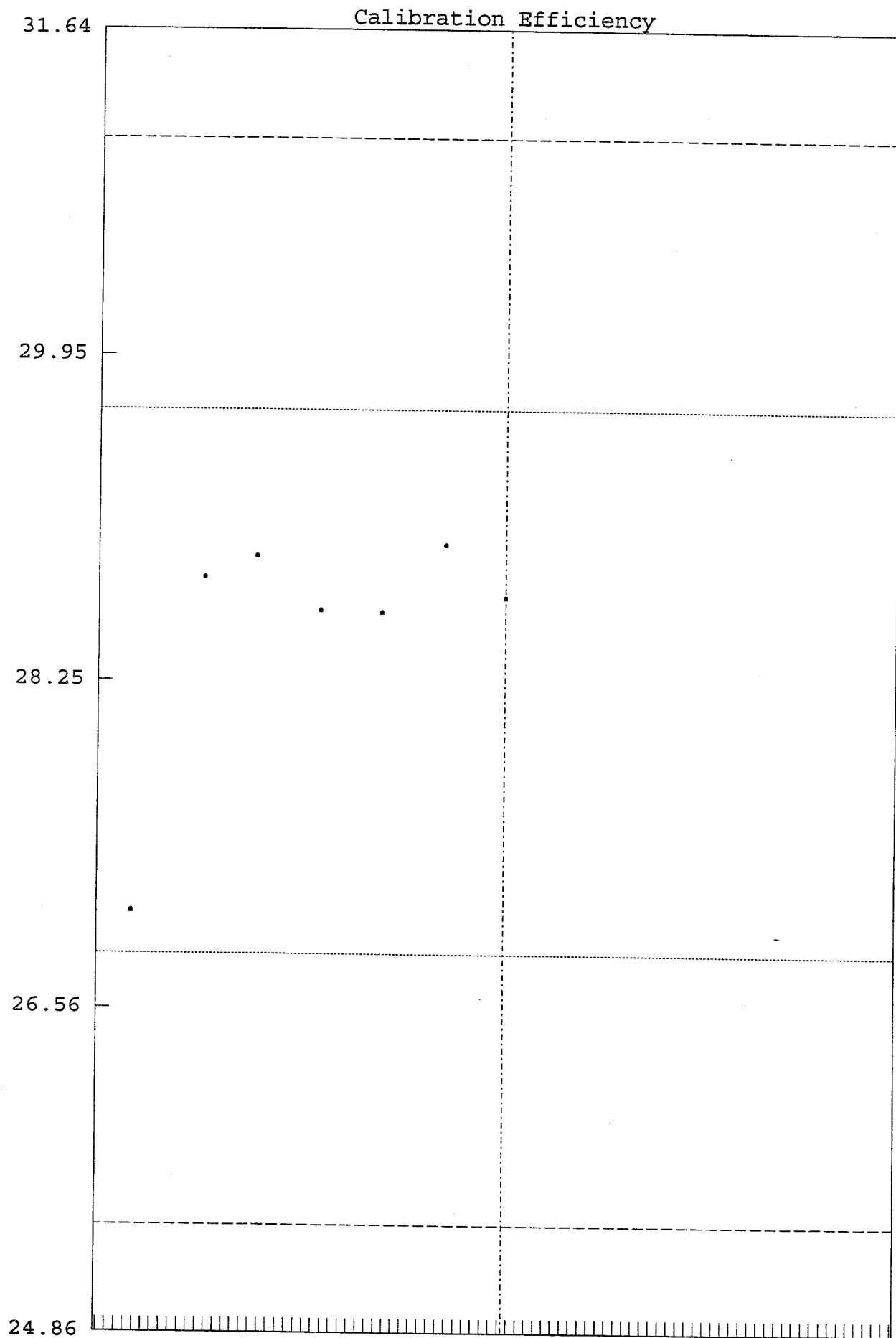
Checked By: BG _____ ()

000399



8/28/98 Marker: 10/12/98 10:20 AM = 5526.8 keV 11/25/98

000400



8/28/98

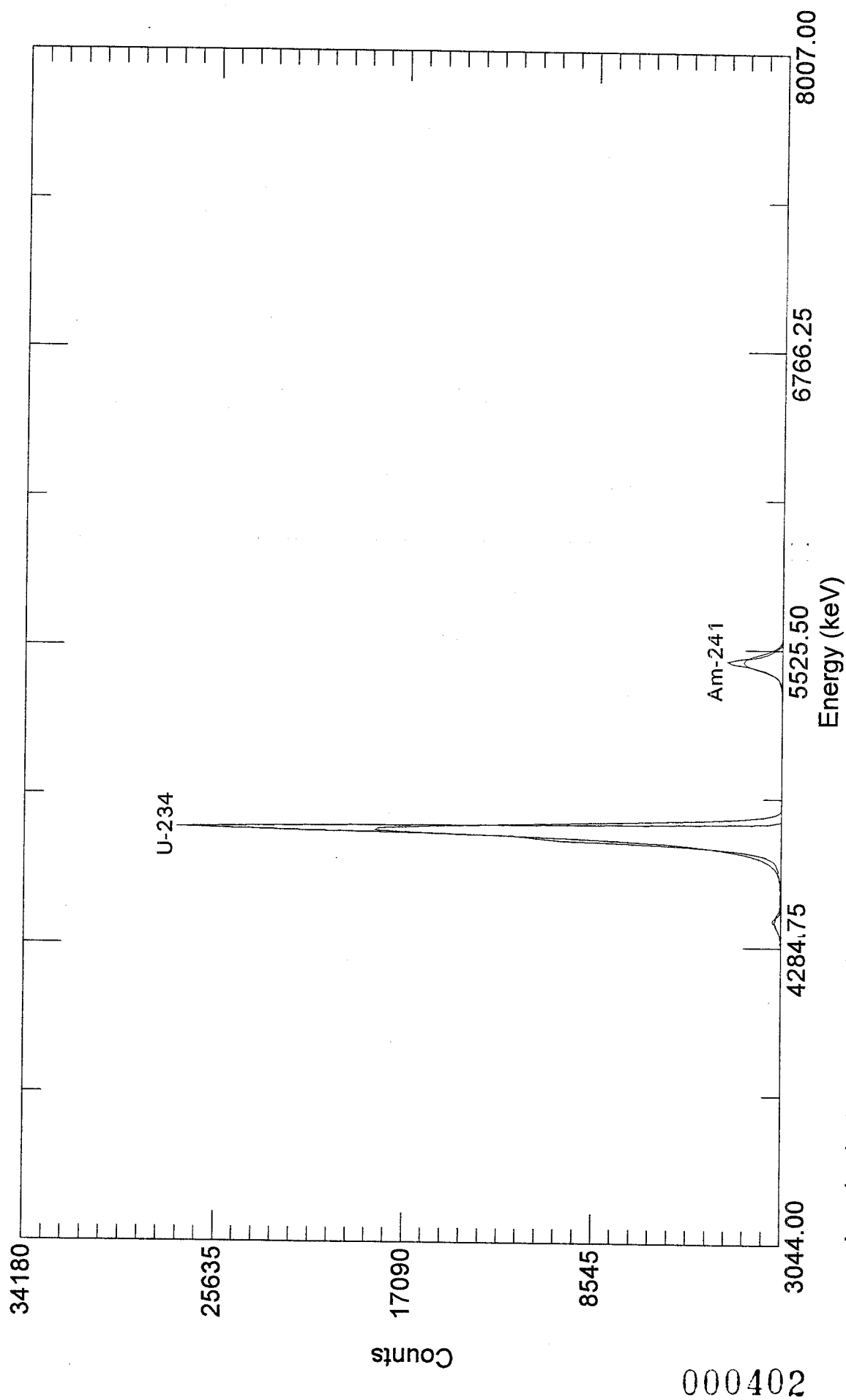
Marker: 10/12/98 10:20 AM = 28.69 %

11/25/98

000401

C8101210

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:02 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101210.CHN

Sample: Source 97-19-103-02 Weekly Cal

Real Time: 2124.14 s. Live Time: 2100.00 s.

Detector: #10 MCB 2 Input 2

Type: ECAL2

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-03 Weekly Cal

Type: ECAL3

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 3

Efficiency: 28.39% Chem. Recovery: 0.00%

Total Eff.: 28.39% Manual: 100.00%

CALIBRATION: 3047.96 + 9.72944 * Chn keV

Original: 3048.03 + 9.731 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100511.CHN

ACQUISITION: 512 Channels Spectrum Acquired: 12-Oct-98 09:30:06

Live Time: 2100.00 Real Time: 2124.18 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101211.CHN

Background File: C:\USER\ALPHA\BKGND\B8101111.CHN

Nuclide Library: C:\USER\ALPHA\ECAL3.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101211

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	250.58	5.65	8251.96	68020.67	0.26	68020.40	1943.44
2.	177.49	3.65	9007.52	69929.90	0.02	69929.89	1998.00

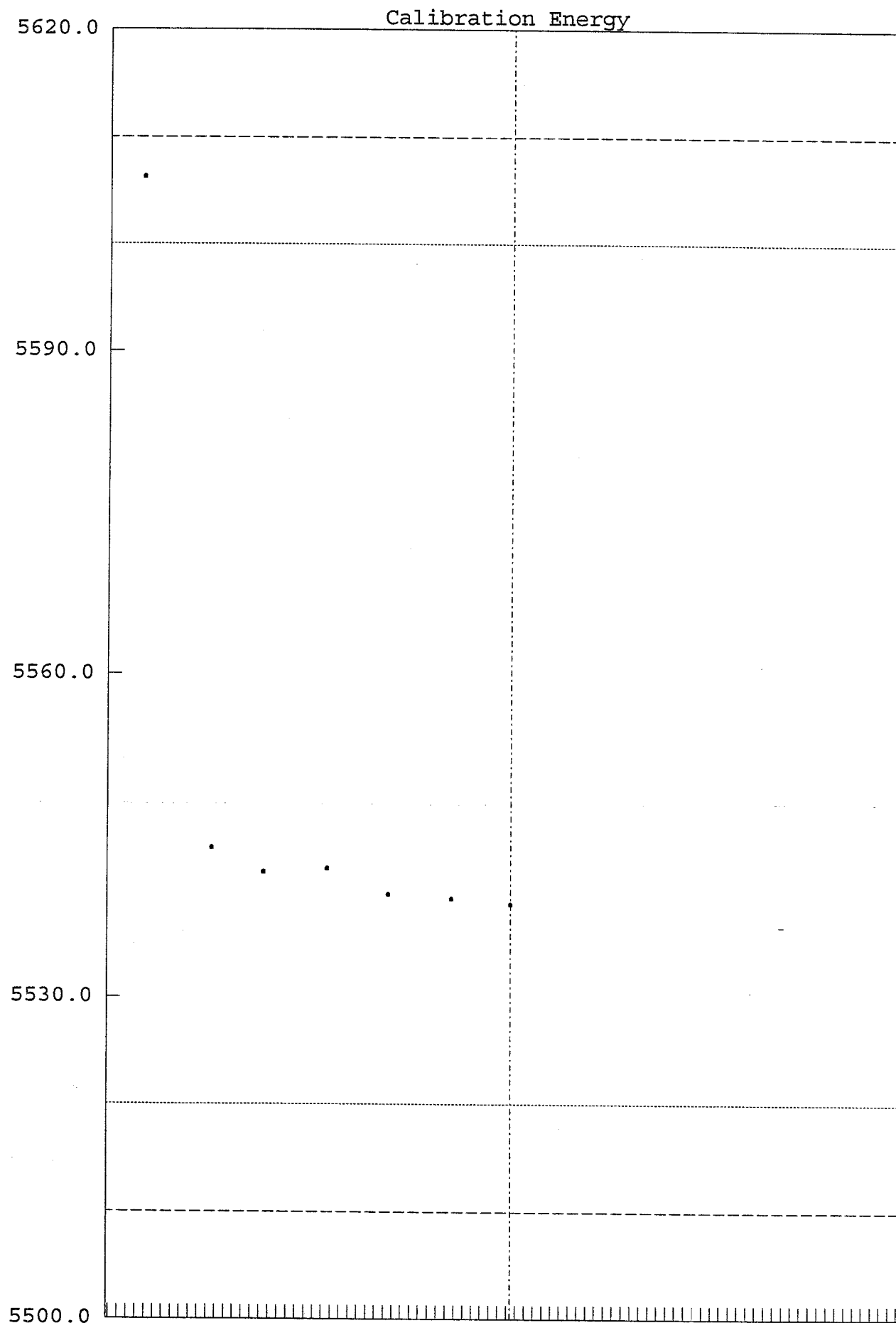
D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	Am-241	0.86	5486.00	54.927	4.3911	6852.61	0.43	0.75
2.	U-234	0.72	4774.80	51.299	1.8005	7038.10	14.32	0.74

T O T A L S			% Recovery
Gross Count	143307.0000		100.00
Net Area	143298.9850		99.99
Background	8.0150		0.01
Composite Fit	139620.0039		97.43
Residuals	3678.9812		2.57

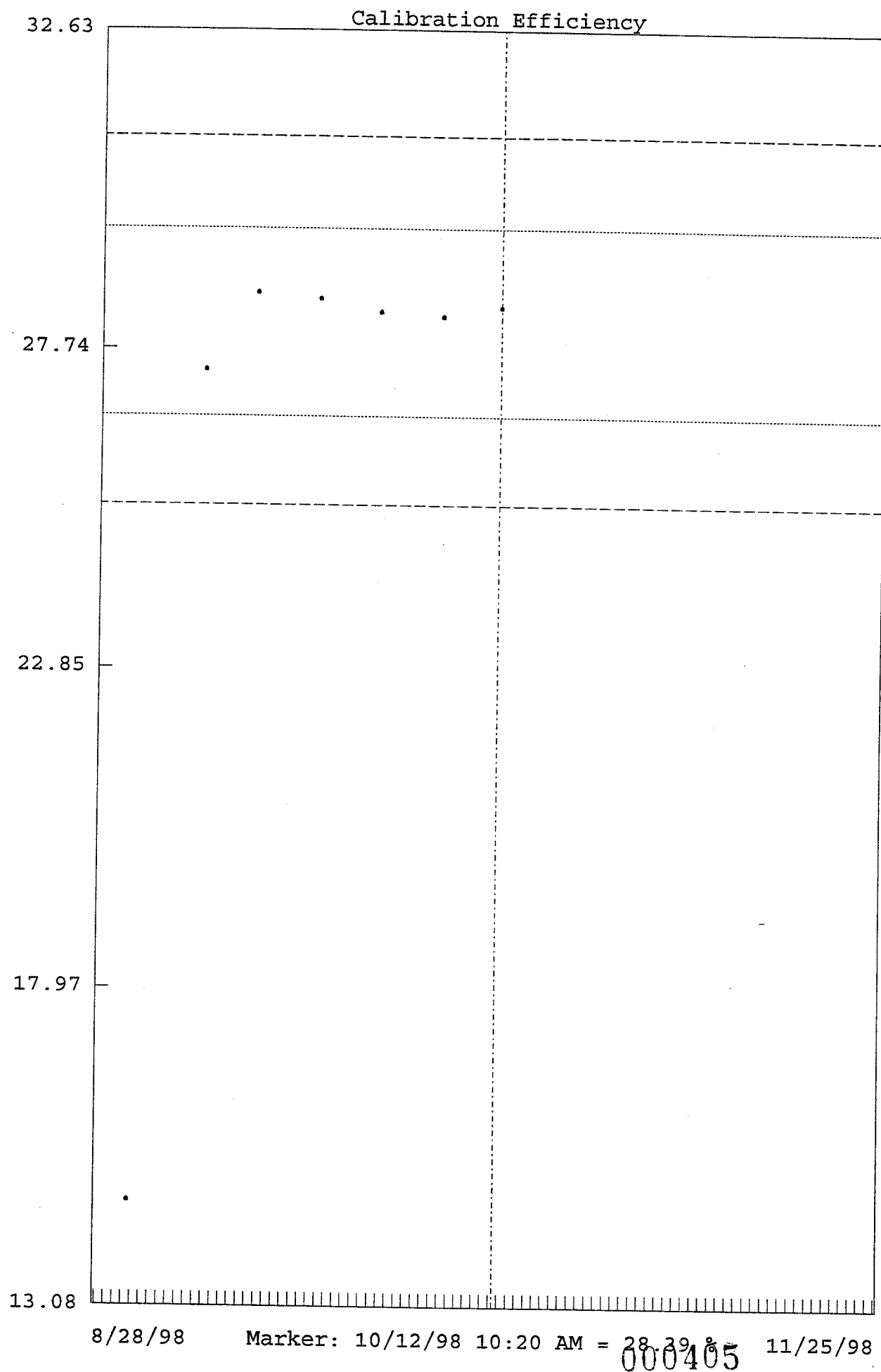
Analyzed By: _____ ()

Checked By: RG _____ ()

000403

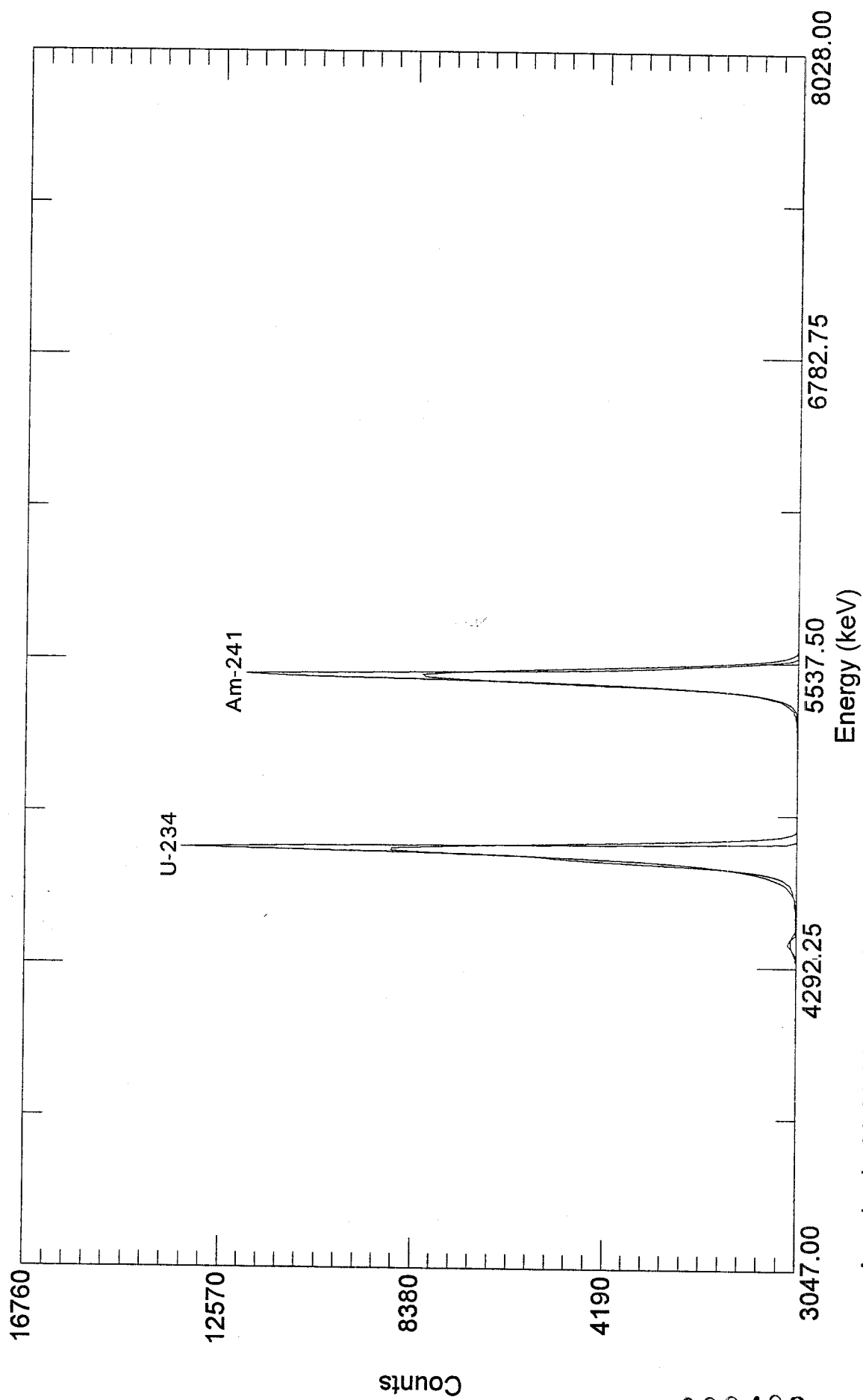


8/28/98 Marker: 10/12/98 10:20 AM = 5538.7 keV 11/25/98
000404



C8101211

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:06 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101211.CHN

Sample: Source 97-19-103-03 Weekly Cal

Real Time: 2124.18 s. Live Time: 2100.00 s.

Detector: #11 MCB 2 Input 3

Type: ECAL3

000406

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-04 Weekly Cal

Type: ECAL4

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 4

Efficiency: 28.94% Chem. Recovery: 0.00%

Total Eff.: 28.94% Manual: 100.00%

CALIBRATION: 3055.28 + 9.65625 * Chn keV

Original: 3054.25 + 9.6489 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100512.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:08

Live Time: 2100.00

Real Time: 2124.18 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101212.CHN

Background File: C:\USER\ALPHA\BKGND\B8101112.CHN

Nuclide Library: C:\USER\ALPHA\ECAL4.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101212

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	251.72	6.48	2473.54	22665.99	0.33	22665.66	647.59
2.	178.07	4.48	6673.94	61293.51	0.01	61293.49	1751.24

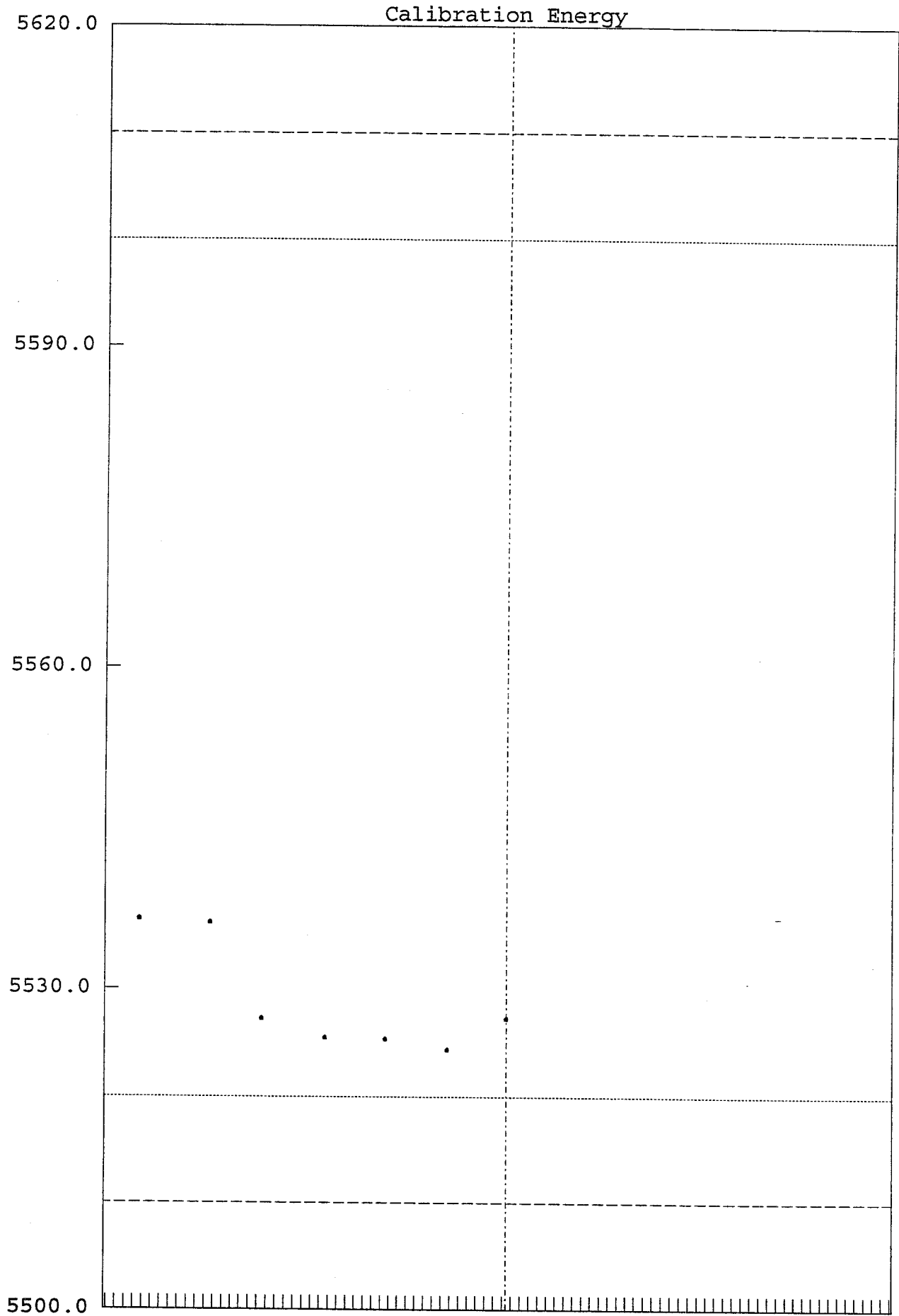
D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	Am-241	0.86	5486.00	62.561	3.6824	2239.87	0.42	1.30
2.	U-234	0.72	4774.80	61.865	1.6918	6051.24	0.64	0.79

T O T A L S			% Recovery
Gross Count	86359.0000		100.00
Net Area	86352.0350		99.99
Background	6.9650		0.01
Composite Fit	85189.9021		98.65
Residuals	1162.1329		1.35

Analyzed By: _____ ()

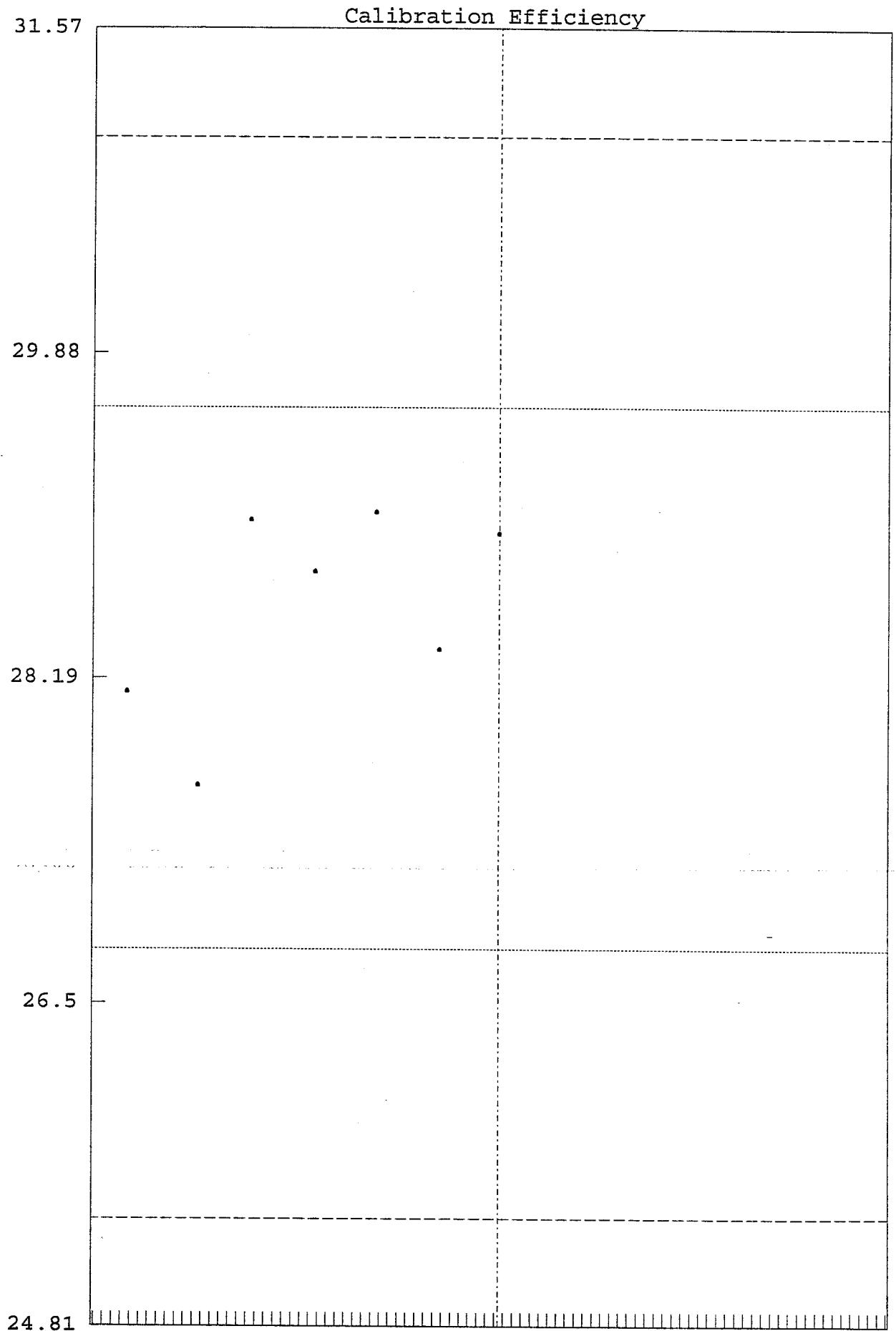
Checked By: RG _____ ()

000407



8/28/98 Marker: 10/12/98 10:20 AM = 5527.3 keV 11/25/98

000408



8/28/98

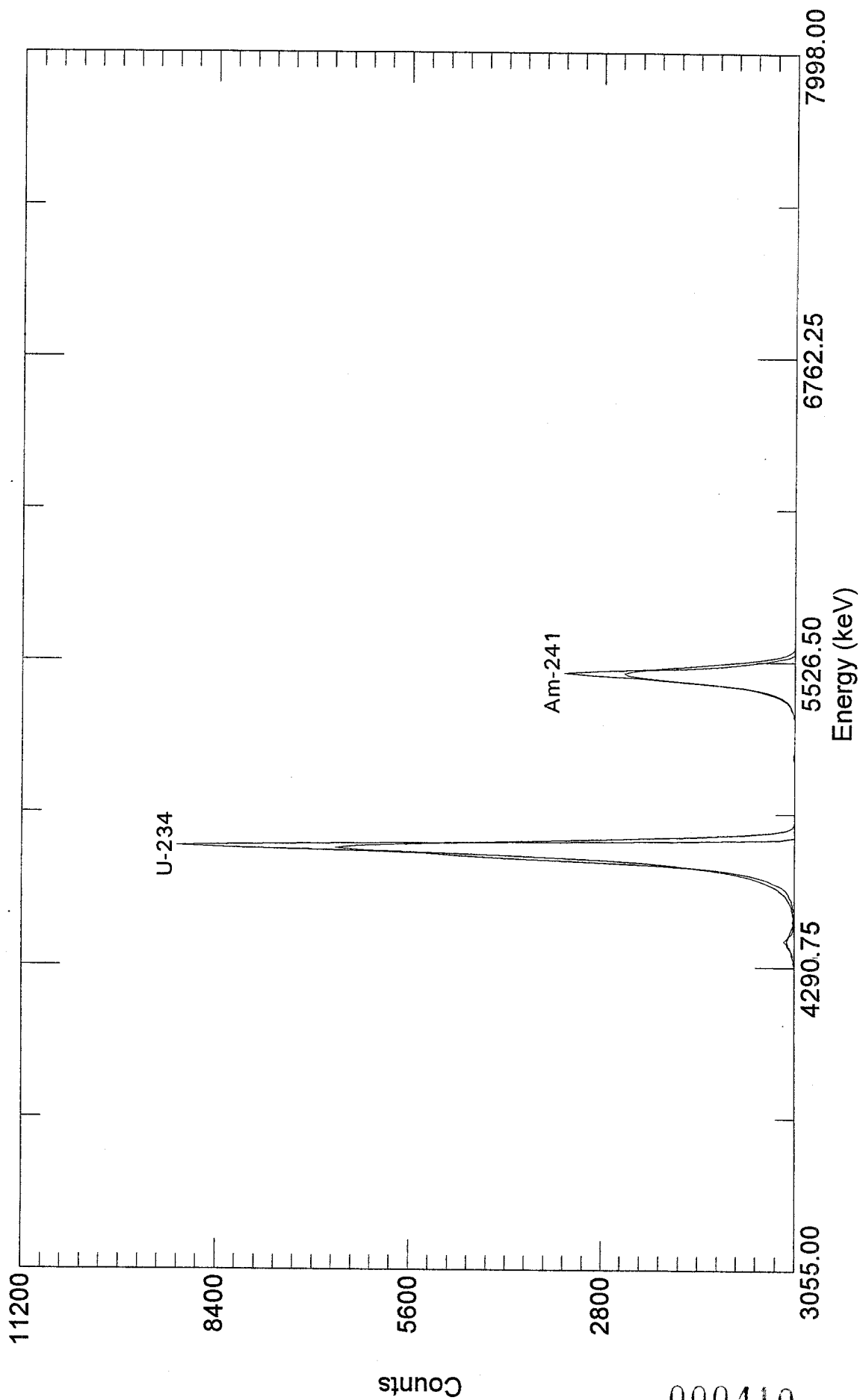
Marker: 10/12/98 10:20 AM = 28.94 %

11/25/98

000409

C8101212

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:08 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101212.CHN

Sample: Source 97-19-103-04 Weekly Cal

Real Time: 2124.18 s. Live Time: 2100.00 s.

Detector: #12 MCB 2 Input 4

Type: ECAL4

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-05 Weekly Cal

Type: ECAL5

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 5

Efficiency: 28.82% Chem. Recovery: 0.00%

Total Eff.: 28.82% Manual: 100.00%

CALIBRATION: 3058.38 + 9.72124 * Chn keV

Original: 3059.01 + 9.7272 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100513.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:19

Live Time: 2100.00

Real Time: 2124.20 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101213.CHN

Background File: C:\USER\ALPHA\BKGND\B8101113.CHN

Nuclide Library: C:\USER\ALPHA\ECAL5.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101213

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	249.72	7.89	10125.43	97443.36	0.44	97442.91	2784.08
2.	176.56	6.72	12704.61	120533.24	0.05	120533.19	3443.81

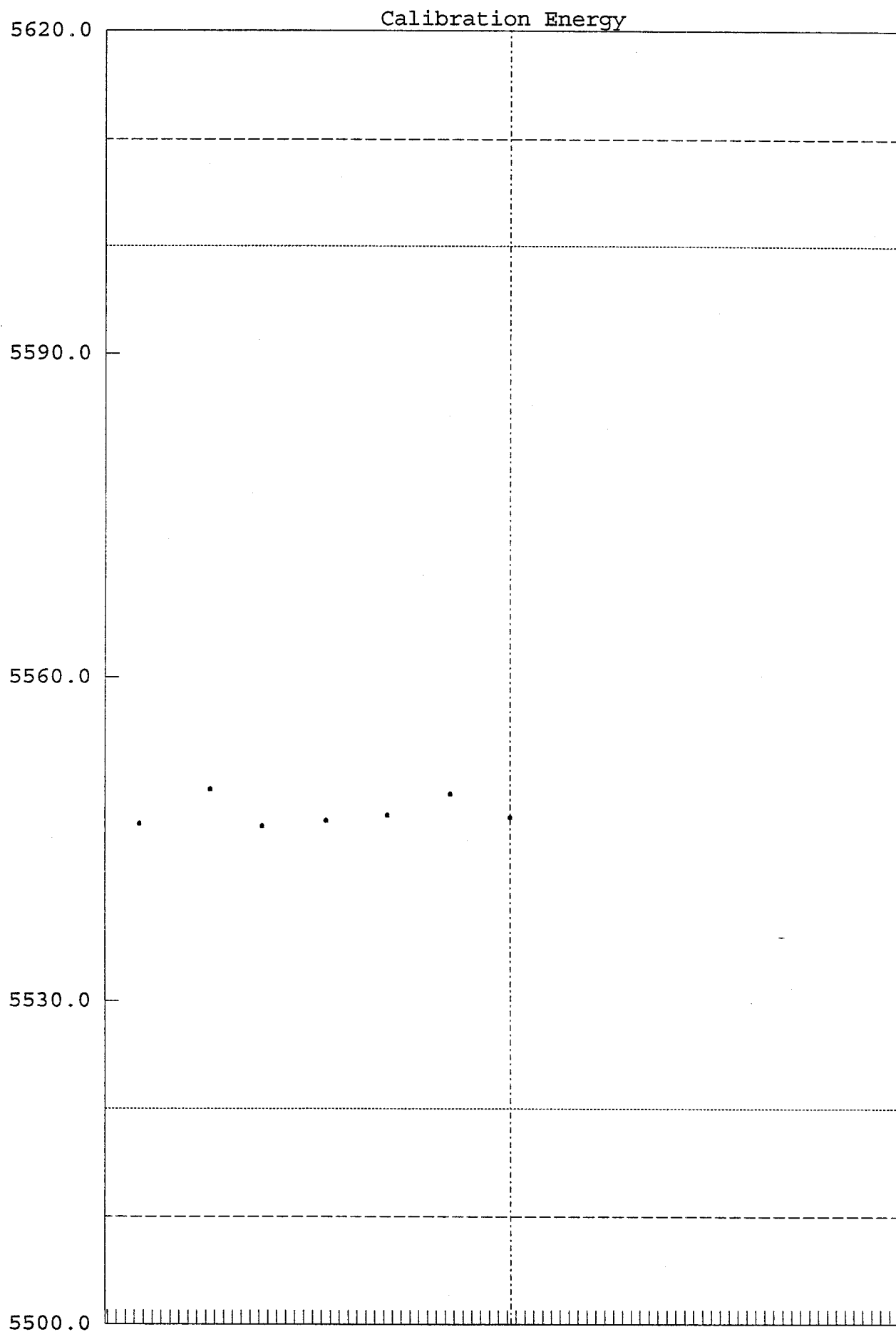
D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	Am-241	0.86	5486.00	76.704	5.9701	9671.13	0.43	0.63
2.	U-234	0.72	4774.80	65.295	3.4631	11951.14	13.69	0.56

T O T A L S			% Recovery
Gross Count	223864.0000		100.00
Net Area	223855.3900		100.00
Background	8.6100		0.00
Composite Fit	220744.2592		98.61
Residuals	3111.1309		1.39

Analyzed By: _____ ()

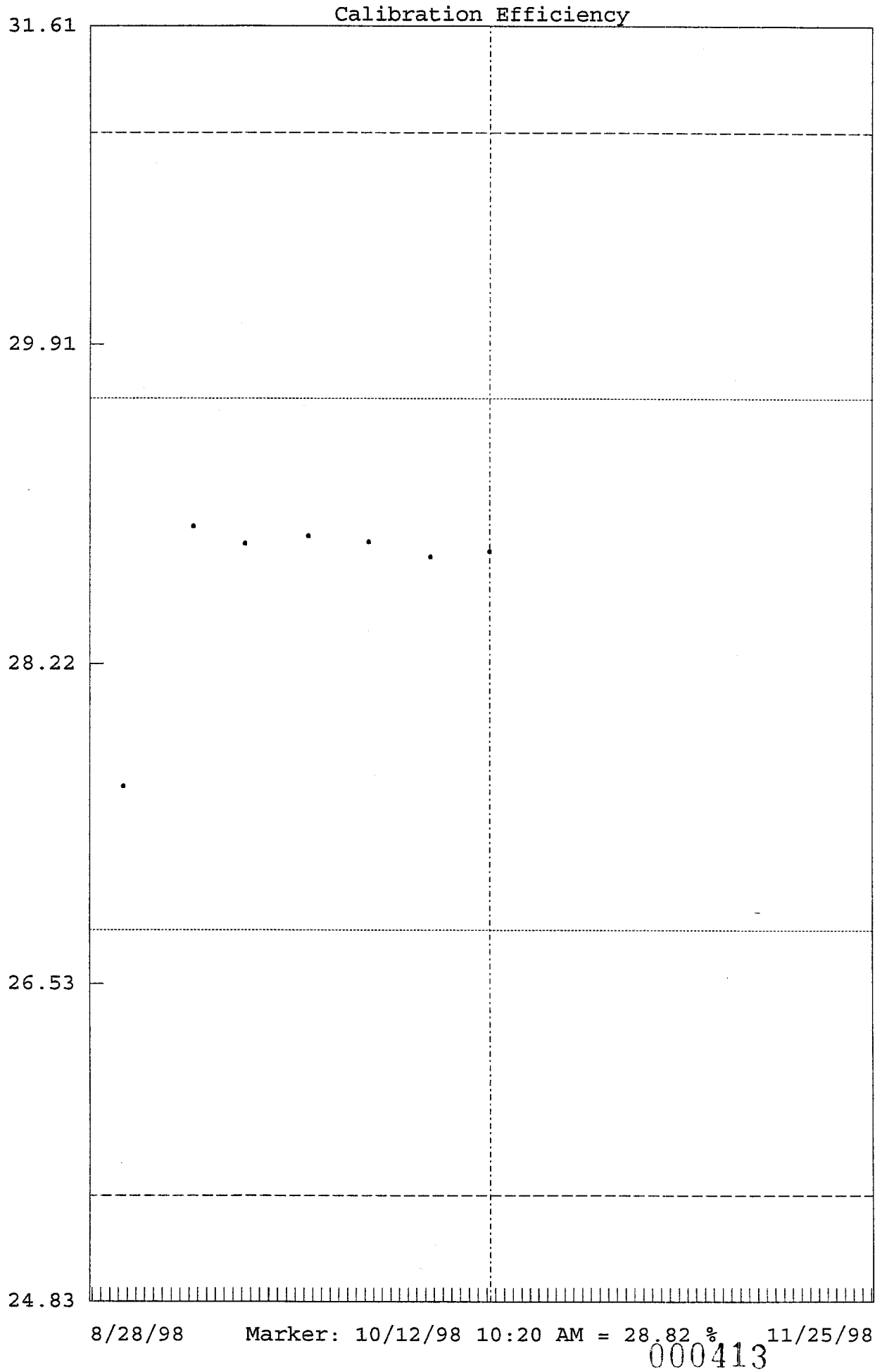
Checked By: RG _____ ()

000411



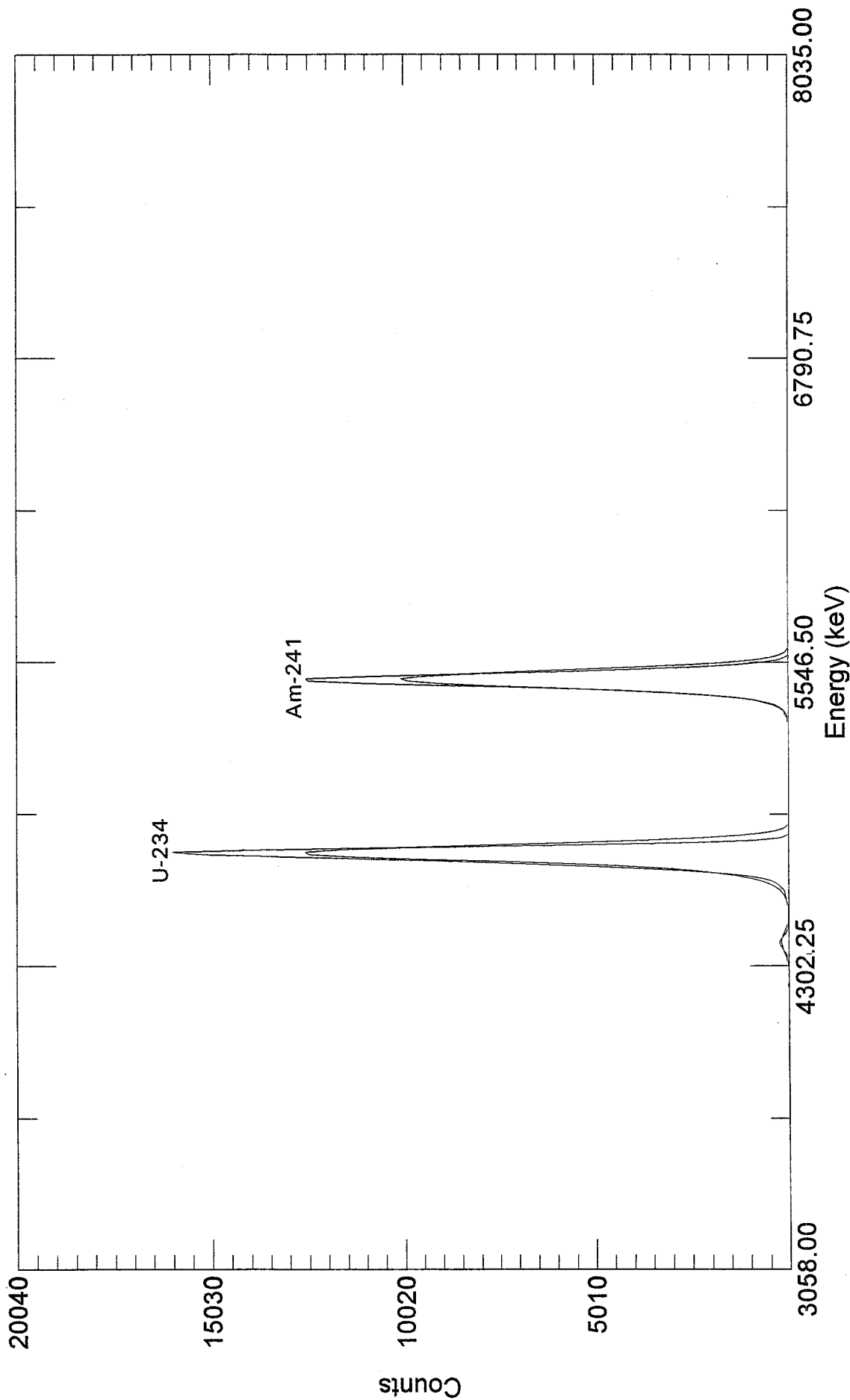
8/28/98 Marker: 10/12/98 10:20 AM = 5547.0 keV 11/25/98

000412



C8101213

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:19 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101213.CHN

Sample: Source 97-19-103-05 Weekly Cal

Real Time: 2124.20 s. Live Time: 2100.00 s.

Detector: #13 MCB 2 Input 5

Type: ECAL5

000414

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-06 Weekly Cal

Type: ECAL6

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 6

Efficiency: 28.80% Chem. Recovery: 0.00%

Total Eff.: 28.80% Manual: 100.00%

CALIBRATION: 3057.6 + 9.69442 * Chn keV

Original: 3059.07 + 9.6931 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100514.CHN

ACQUISITION: 512 Channels Spectrum Acquired: 12-Oct-98 09:30:20

Live Time: 2100.00 Real Time: 2124.22 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101214.CHN

Background File: C:\USER\ALPHA\BKGND\B8101114.CHN

Nuclide Library: C:\USER\ALPHA\ECAL6.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101214

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	250.50	5.70	9341.07	77203.28	0.32	77202.96	2205.80
2.	177.13	4.05	10266.44	82283.56	0.00	82283.56	2350.96

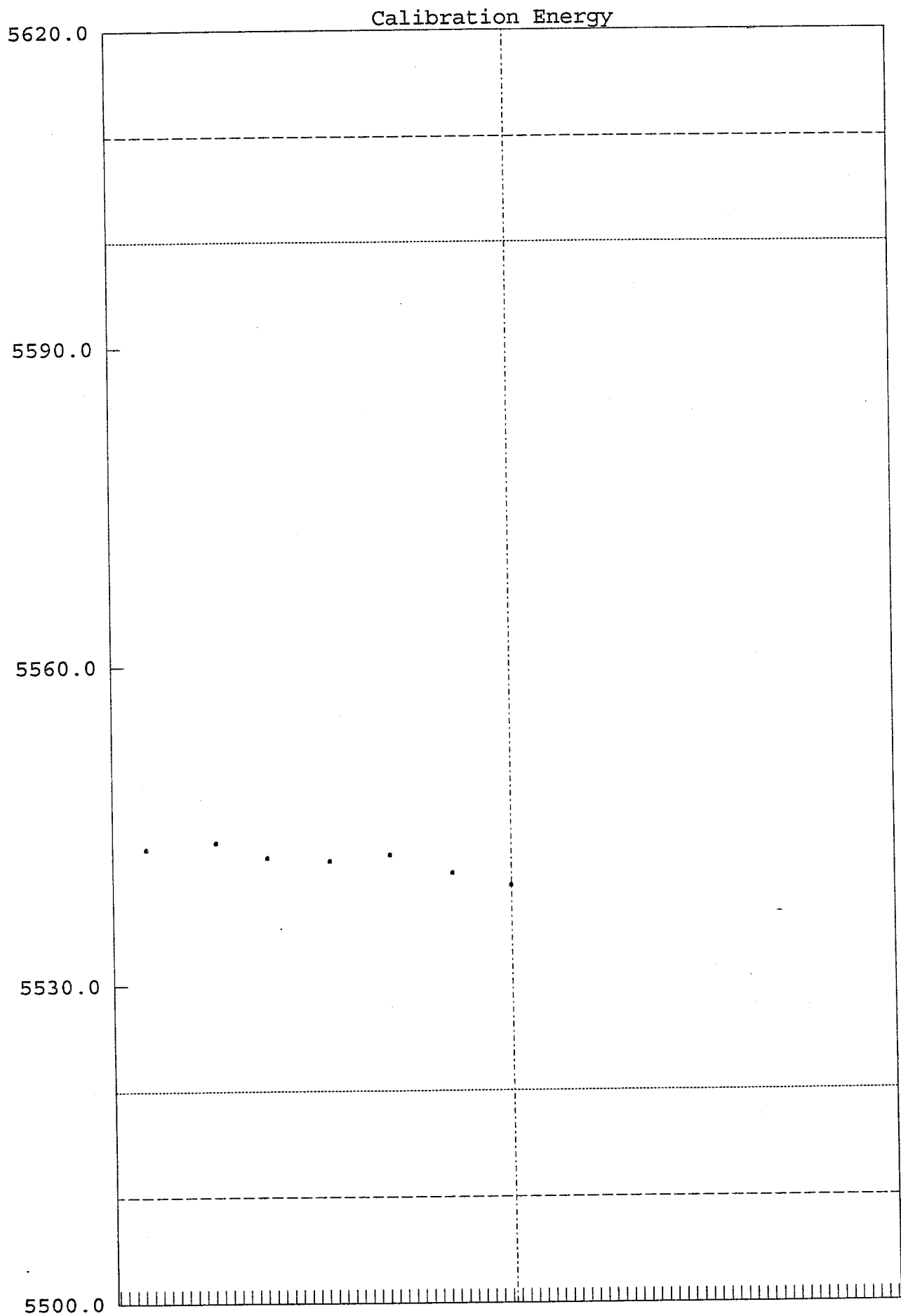
D E C A Y C O R R E C T E D R E S U L T S							
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA % Error
1.	Am-241	0.86	5486.00	55.222	4.4876	7666.21	0.42 0.70
2.	U-234	0.72	4774.80	53.946	2.0019	8162.73	1.82 0.68

T O T A L S			% Recovery
Gross Count	165301.0000		100.00
Net Area	165293.1600		100.00
Background	7.8400		0.00
Composite Fit	161564.2244		97.74
Residuals	3728.9355		2.26

Analyzed By: _____ ()

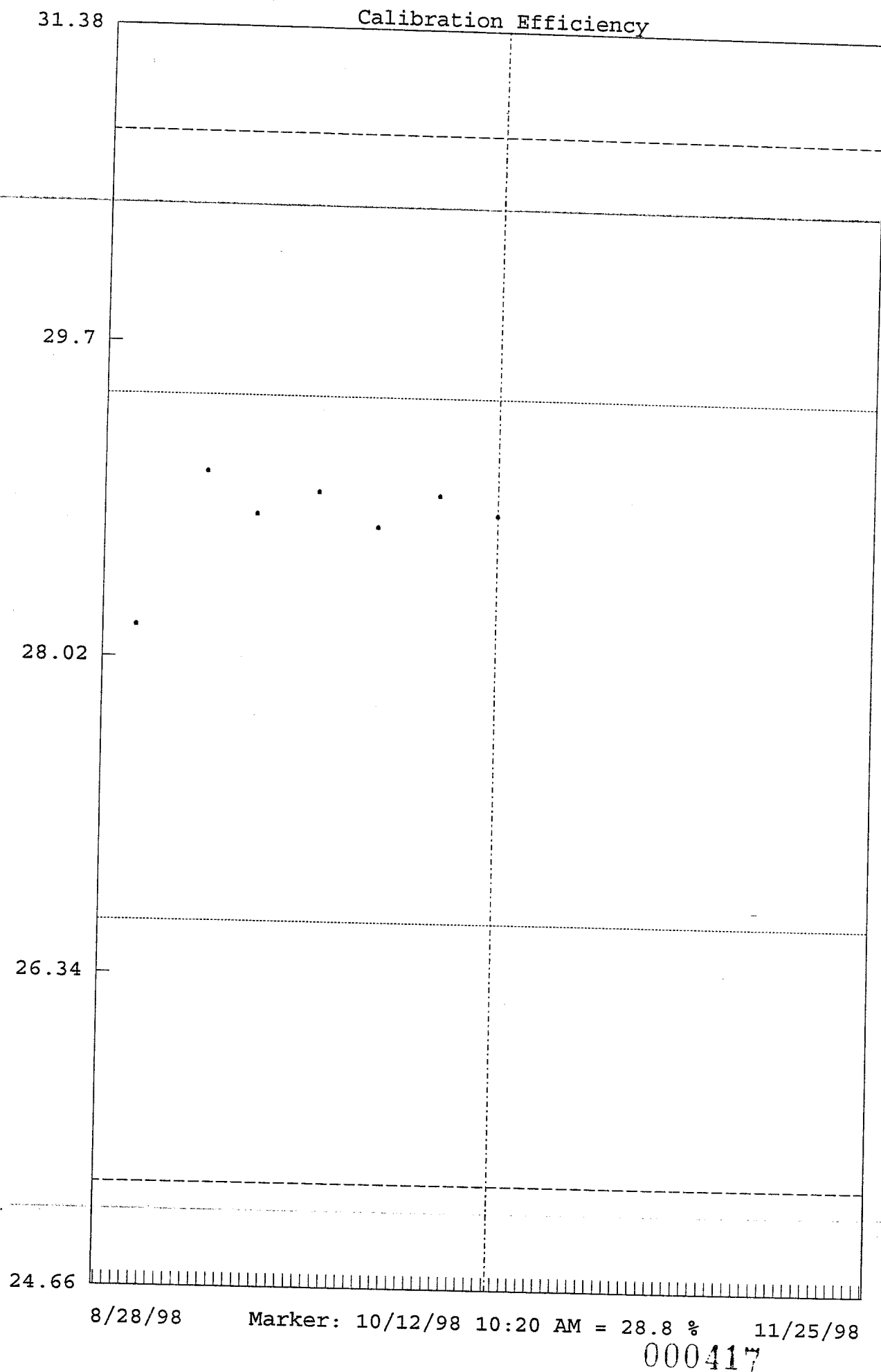
Checked By: RG _____ ()

000415



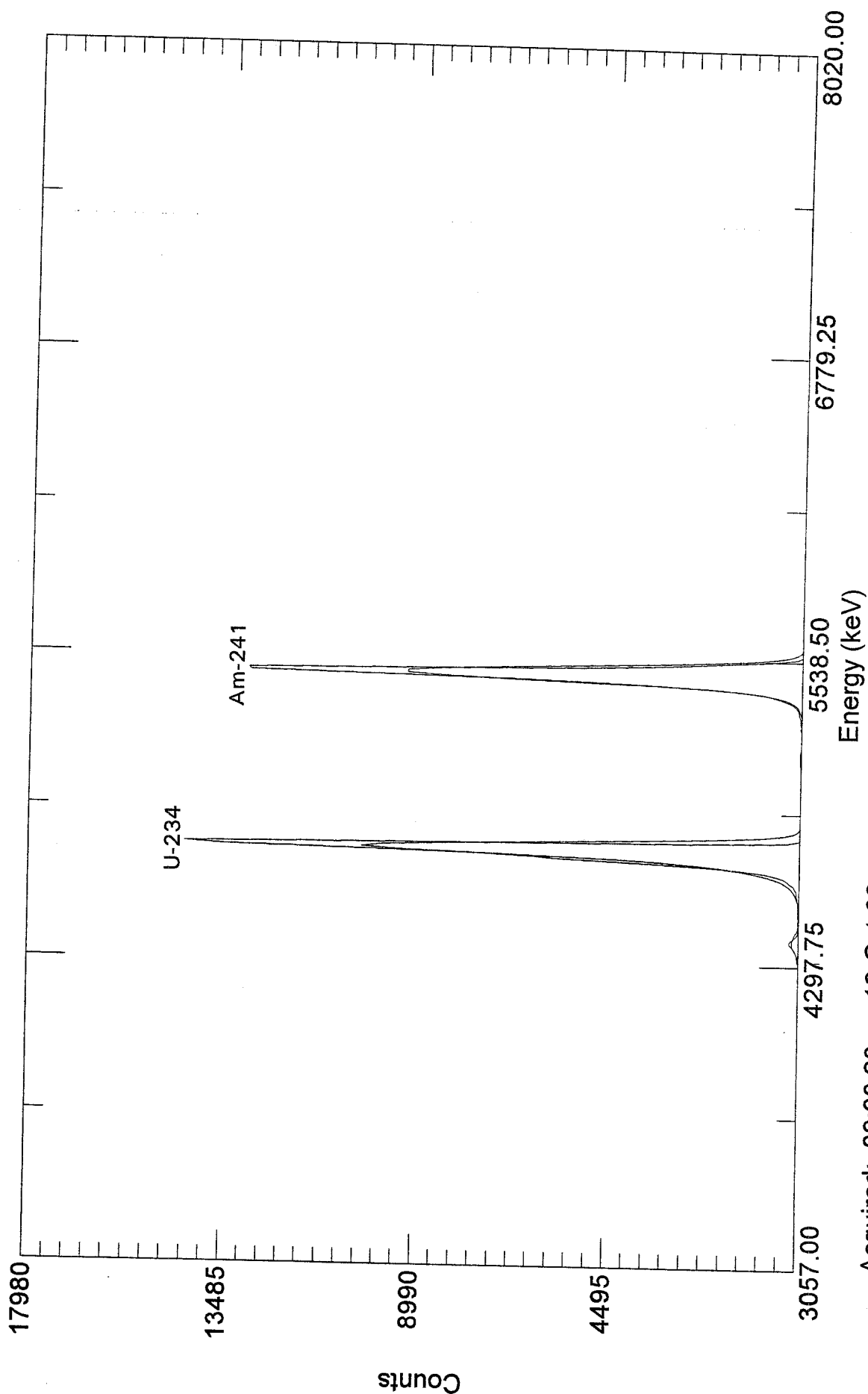
8/28/98 Marker: 10/12/98 10:20 AM = 5539.4 keV 11/25/98

000416



C8101214

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:20 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101214.CHN

Sample: Source 97-19-103-06 Weekly Cal

Real Time: 2124.22 s. Live Time: 2100.00 s.

Detector: #14 MCB 2 Input 6

Type: ECAL6

000418

ALPHA VISION CALIBRATION ANALYSIS

Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-07 Weekly Cal

Type: ECAL7

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 7

Efficiency: 29.53% Chem. Recovery: 0.00%

Total Eff.: 29.53% Manual: 100.00%

CALIBRATION: 3049.47 + 9.69128 * Chn keV

Original: 3050.72 + 9.6908 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100515.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:21

Live Time: 2100.00

Real Time: 2124.20 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101215.CHN

Background File: C:\USER\ALPHA\BKGND\B8101115.CHN

Nuclide Library: C:\USER\ALPHA\ECAL7.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101215

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	251.41	5.78	5391.75	45240.59	0.14	45240.45	1292.58
2.	178.03	3.94	8432.68	68803.58	0.00	68803.58	1965.82

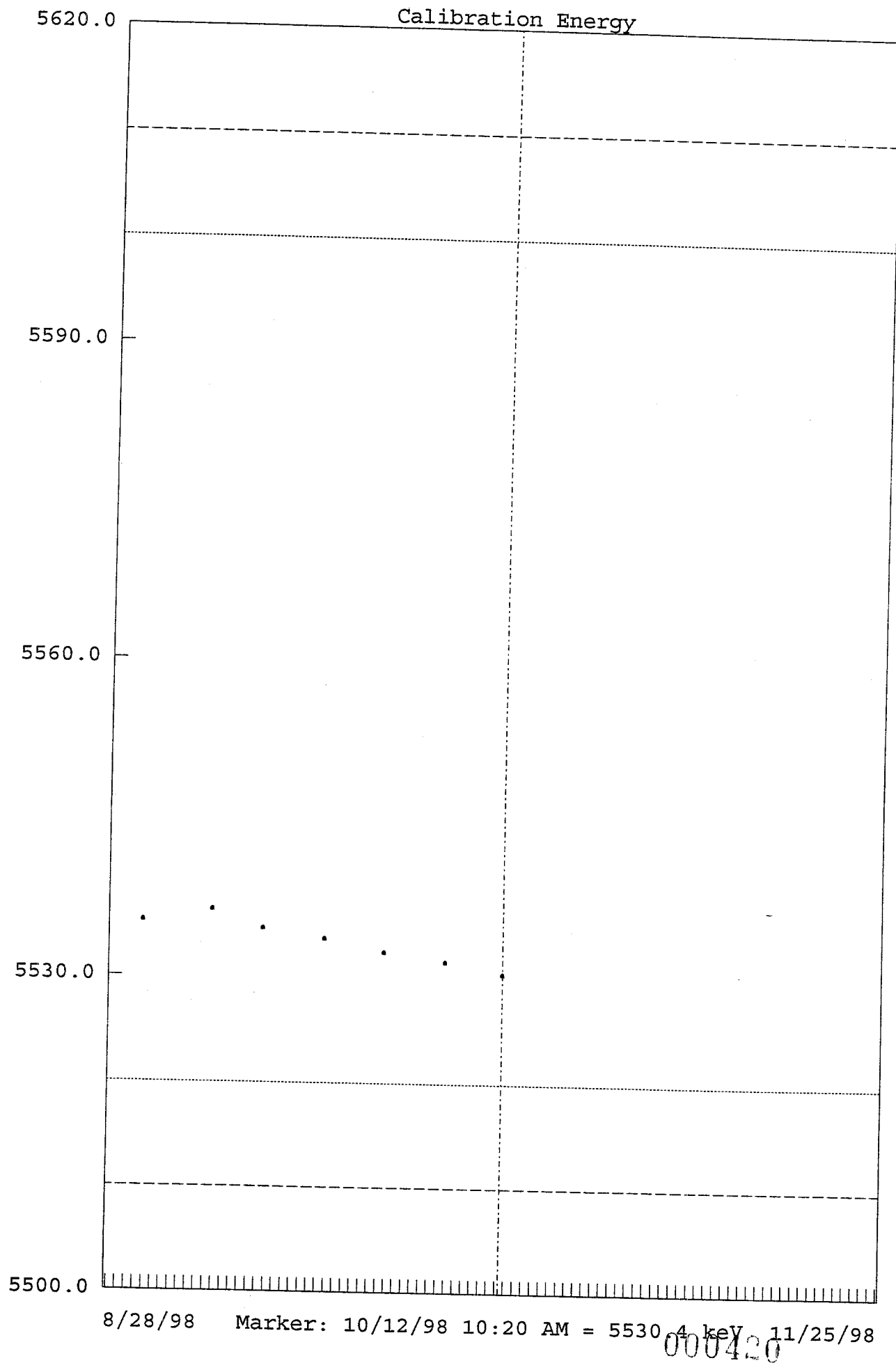
D E C A Y C O R R E C T E D R E S U L T S							
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA % Error
1.	Am-241	0.86	5486.00	56.037	4.2307	4381.11	0.40 0.92
2.	U-234	0.72	4774.80	54.315	1.8082	6656.47	10.75 0.75

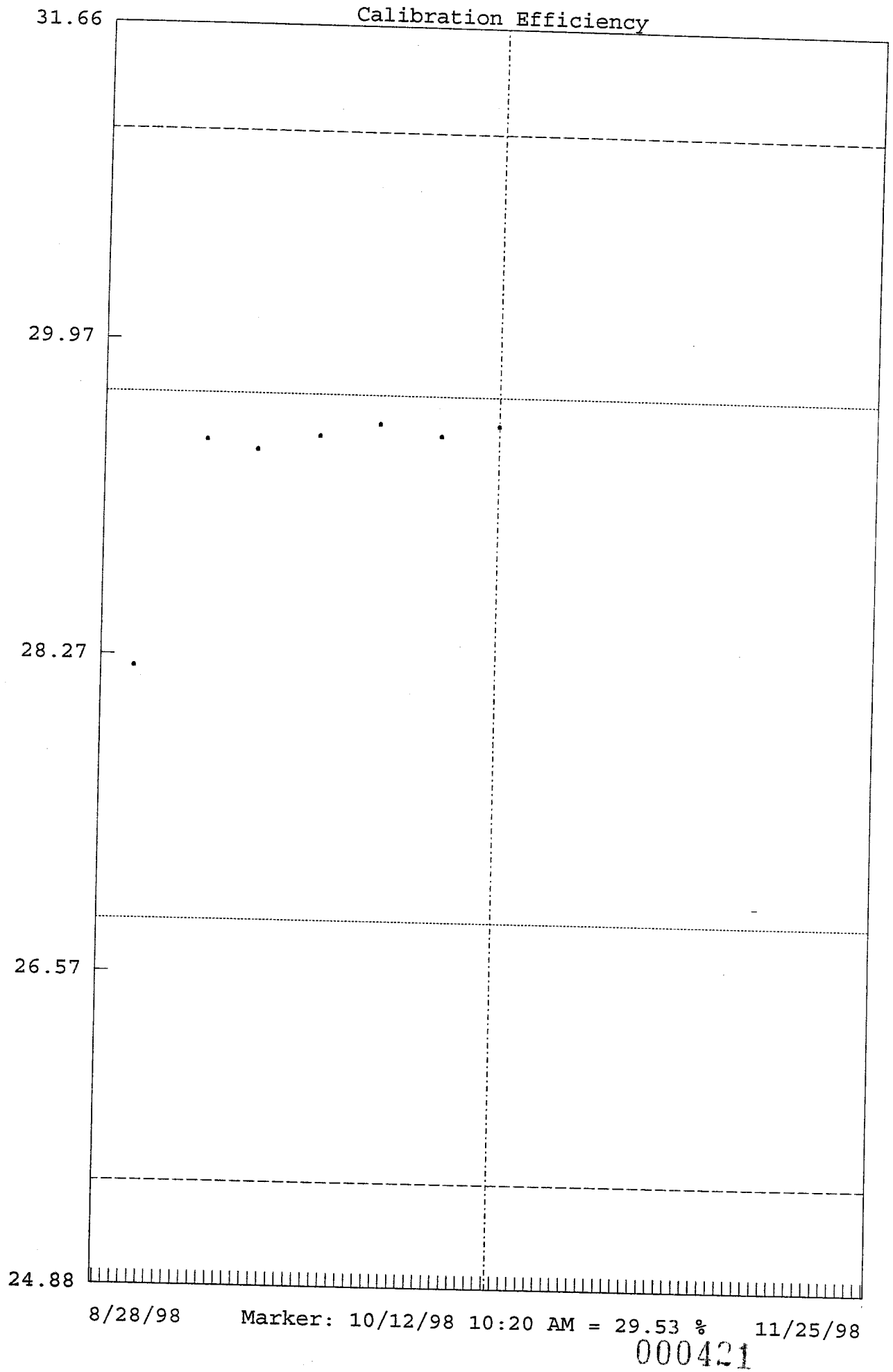
T O T A L S			% Recovery
Gross Count	117786.0000		100.00
Net Area	117780.1550		100.00
Background	5.8450		0.00
Composite Fit	115773.8863		98.29
Residuals	2006.2687		1.70

Analyzed By: _____ ()

Checked By: RG _____ ()

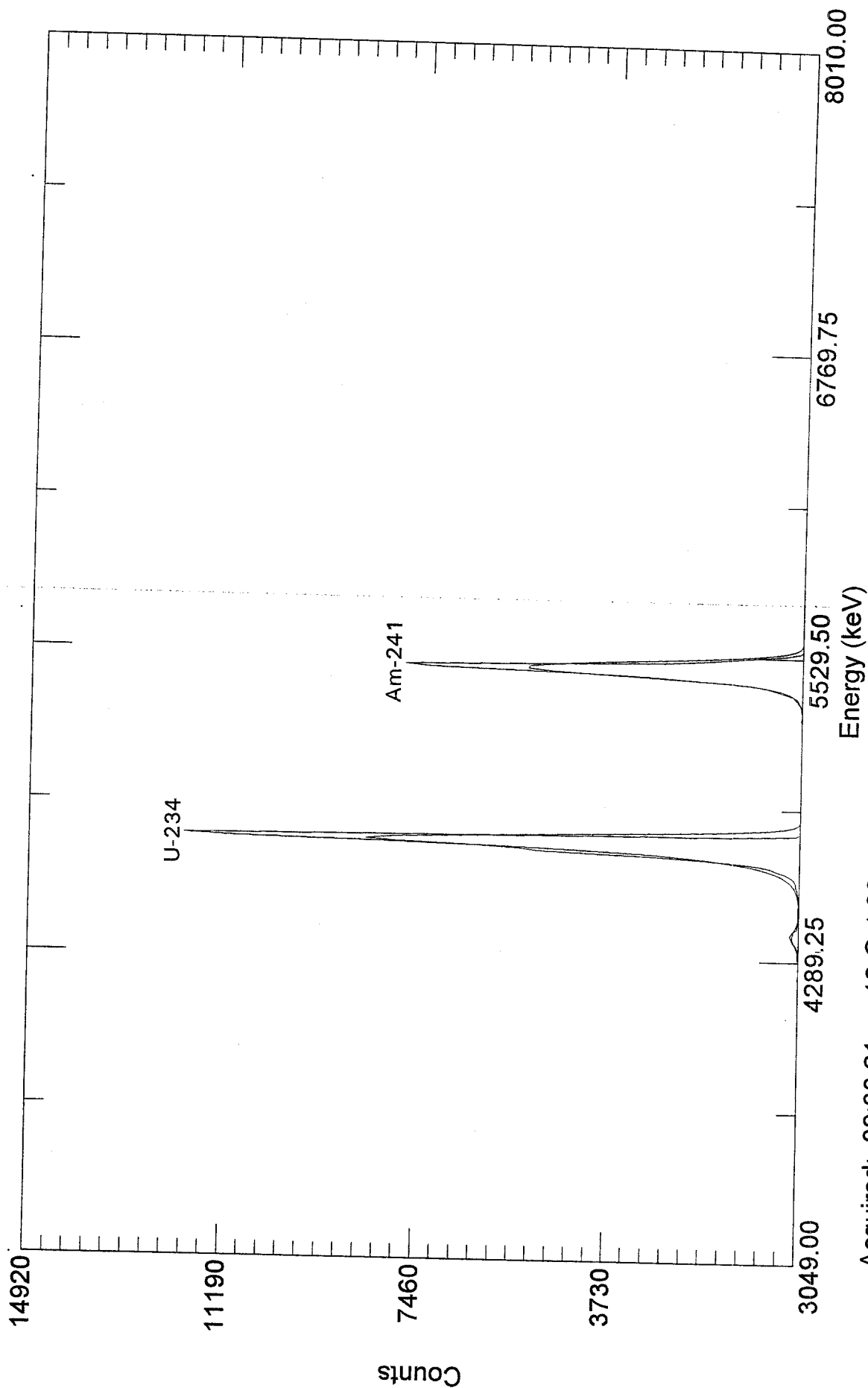
000413





C8101215

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:21 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101215.CHN

Sample: Source 97-19-103-07 Weekly Cal

Real Time: 2124.20 s. Live Time: 2100.00 s.

Detector: #15 MCB 2 Input 7

Type: ECAL7

000422

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-08 Weekly Cal

Type: ECAL8

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 2 Input 8

Efficiency: 31.21% Chem. Recovery: 0.00%

Total Eff.: 31.21% Manual: 100.00%

CALIBRATION: 3064.69 + 9.74528 * Chn keV

Original: 3060.55 + 9.738 * Chn keV

File: C:\USER\ALPHA\ALPHA\C8100516.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 09:30:22

Live Time: 2100.00

Real Time: 2124.20 Sec.

Spectrum File: C:\USER\ALPHA\ALPHA\C8101216.CHN

Background File: C:\USER\ALPHA\BKGND\B8101116.CHN

Nuclide Library: C:\USER\ALPHA\ECAL8.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101216

P E A K S							
Channel	FWHM	Height	Gross	Background	Net Area	CPM	
1. 248.46	6.56	3855.07	34324.37	0.27	34324.10	980.69	
2. 175.48	4.98	25168.21	218267.61	0.00	218267.60	6236.22	

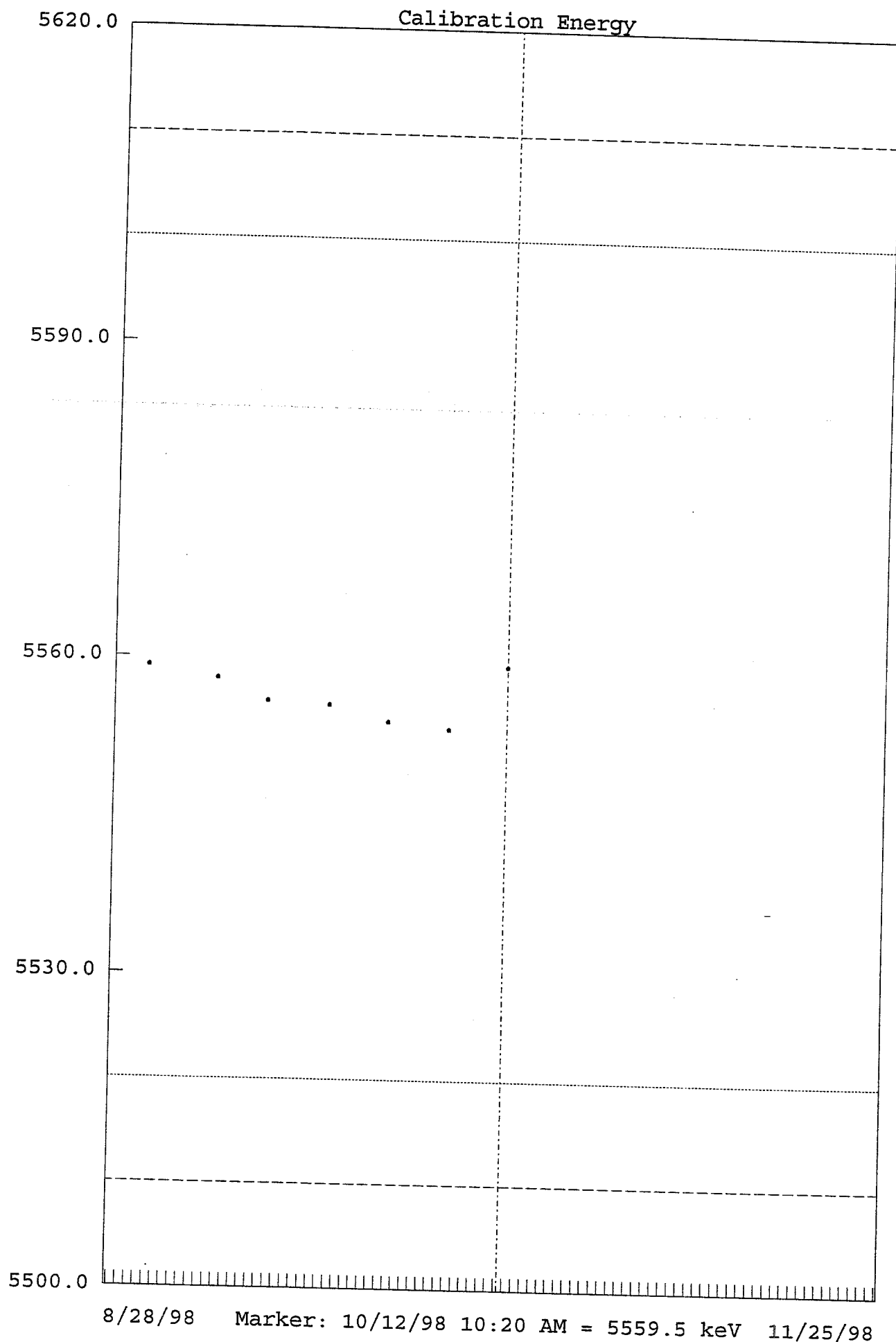
D E C A Y C O R R E C T E D R E S U L T S								
Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error	
1. Am-241	0.86	5486.00	63.963	4.6638	3145.81	0.39	1.06	
2. U-234	0.72	4774.80	61.406	2.3935	19984.70	0.35	0.42	

T O T A L S			% Recovery
Gross Count	260967.0000		100.00
Net Area	260959.8950		100.00
Background	7.1050		0.00
Composite Fit	256614.7016		98.33
Residuals	4345.1934		1.67

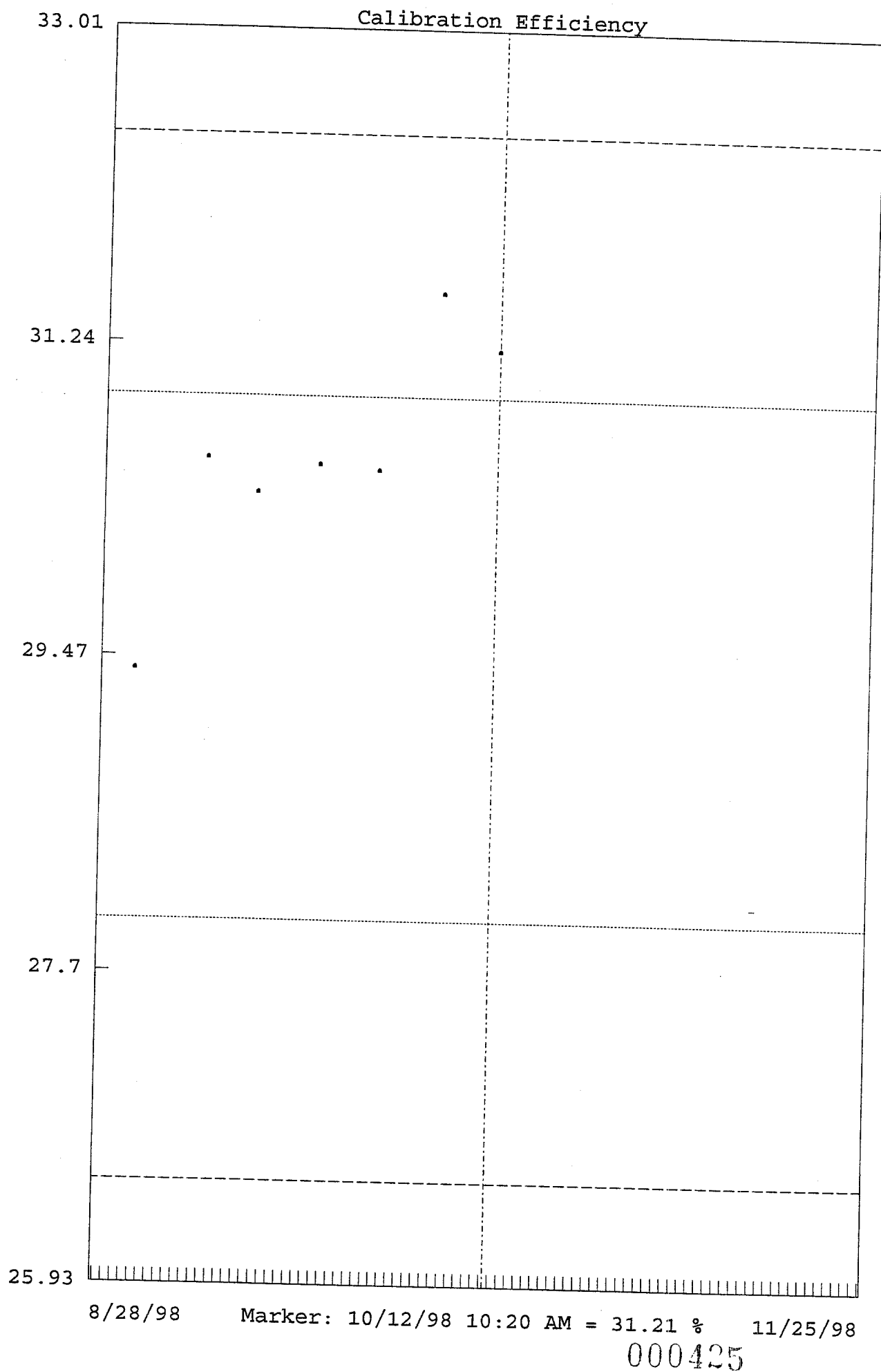
Analyzed By: _____ ()

Checked By: RG _____ ()

000423

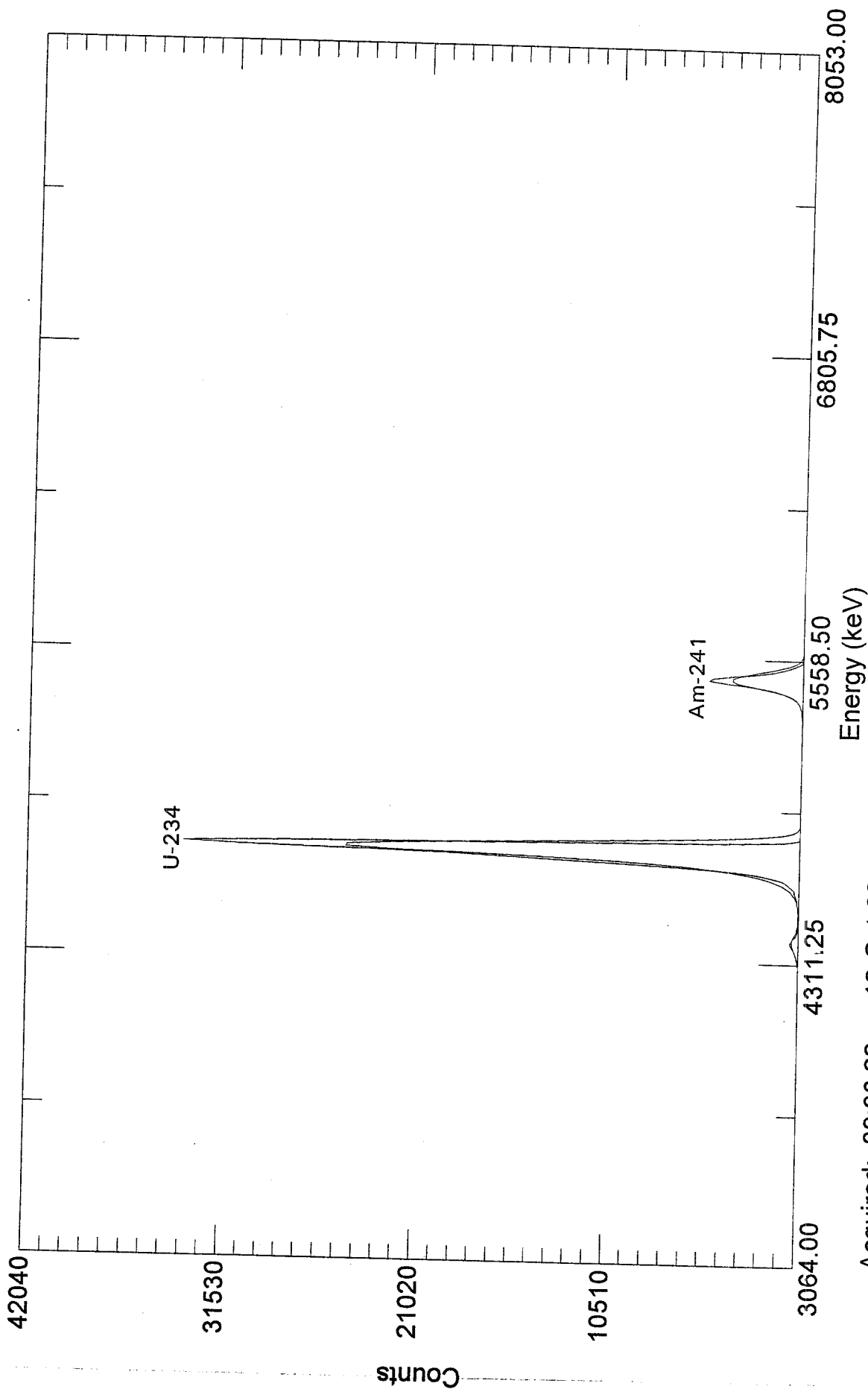


000424



C8101216

AlphaVision Absolute Peak Search And Fit



Acquired: 09:30:22 on 12-Oct-98

File: C:\USER\ALPHA\ALPHA\C8101216.CHN

Sample: Source 97-19-103-08 Weekly Cal

Real Time: 2124.20 s. Live Time: 2100.00 s.

Detector: #16 MCB 2 Input 8

Type: ECAL8

000426

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-01 Weekly Cal

Type: ECAL1

Sample Collected: 02-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 3 Input 1

Efficiency: 28.92% Chem. Recovery: 0.00%

Total Eff.: 28.92% Manual: 100.00%

CALIBRATION: 3058.16 + 9.68988 * Chn keV

Original: 3062.85 + 9.6834 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100517.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 10:39:44

Live Time: 2100.00

Real Time: 2117.44 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101217.CHN

Background File: C:\USER\ALPHA\BKGND\B8101117.CHN

Nuclide Library: C:\USER\ALPHA\ECAL1.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101217

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	250.55	5.45	1557.28	12580.77	0.23	12580.55	359.44
2.	177.16	3.83	9526.68	74902.19	0.00	74902.19	2140.06

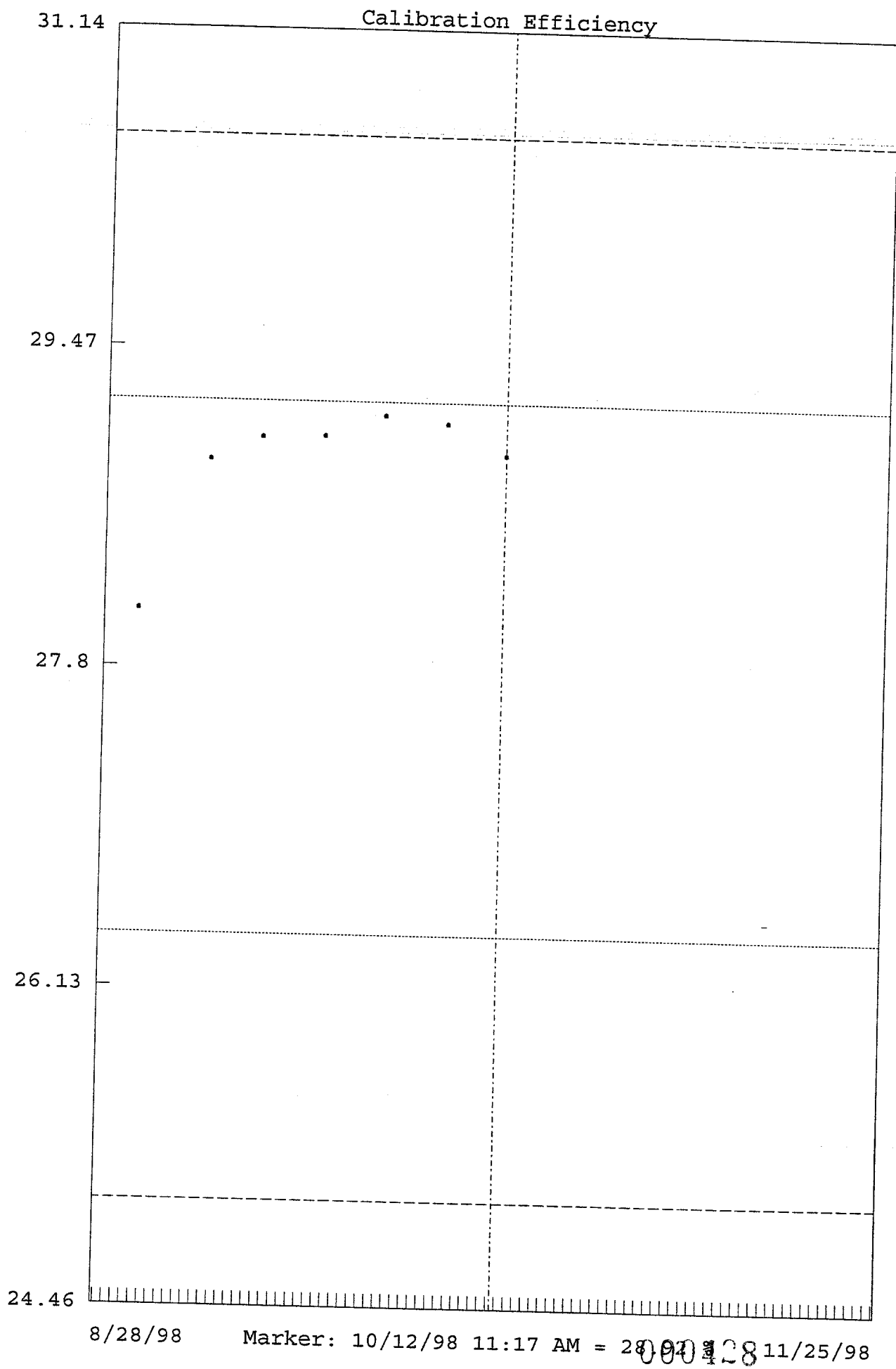
D E C A Y C O R R E C T E D R E S U L T S							
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA % Error
1.	Am-241	0.86	5486.00	52.788	4.4076	1244.05	0.41 1.75
2.	U-234	0.72	4774.80	52.299	1.9041	7399.55	0.38 0.72

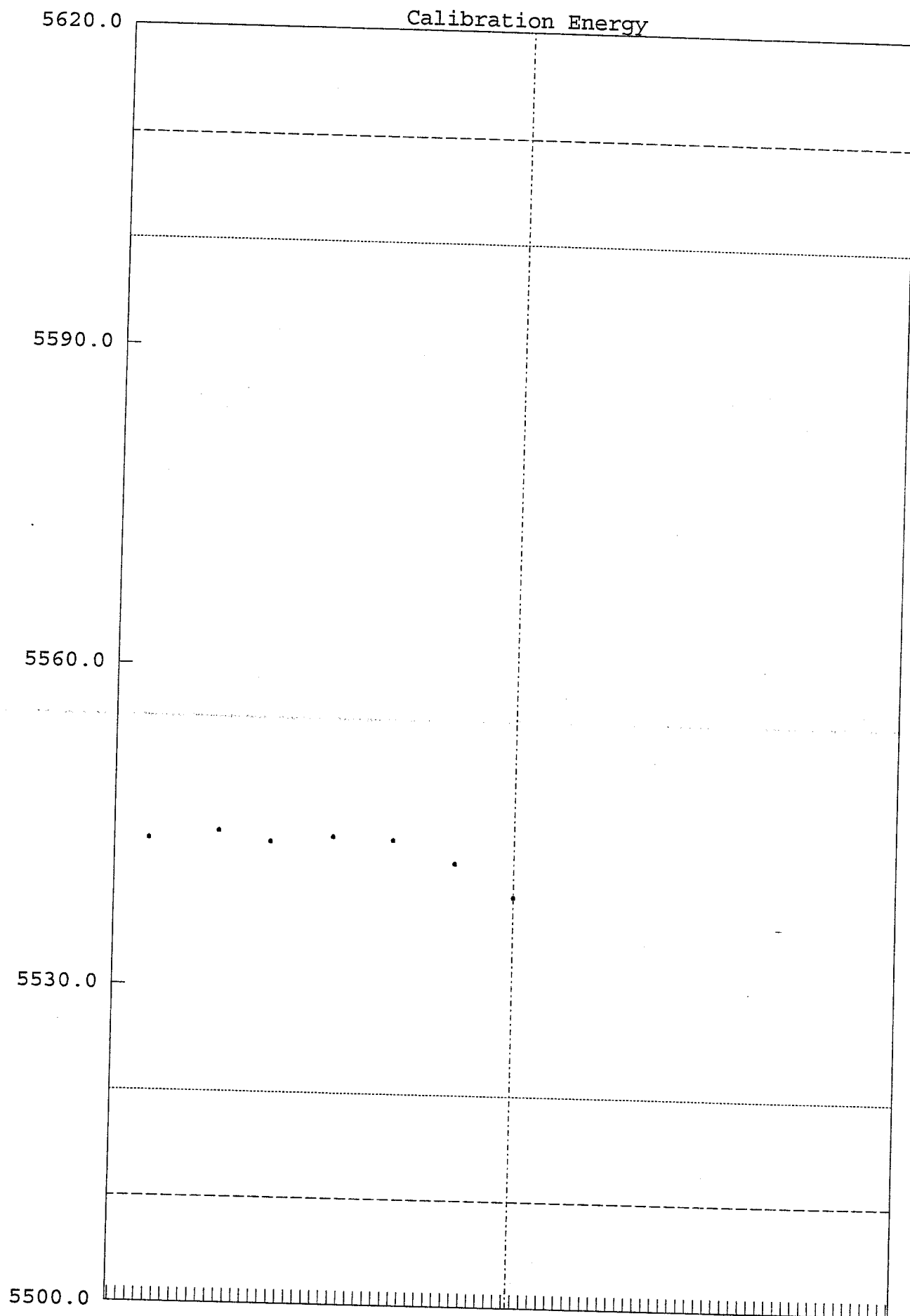
T O T A L S			% Recovery
Gross Count	90718.0000		100.00
Net Area	90711.7350		99.99
Background	6.2650		0.01
Composite Fit	88832.1092		97.92
Residuals	1879.6259		2.07

Analyzed By: _____ ()

Checked By: RG _____ ()

000427



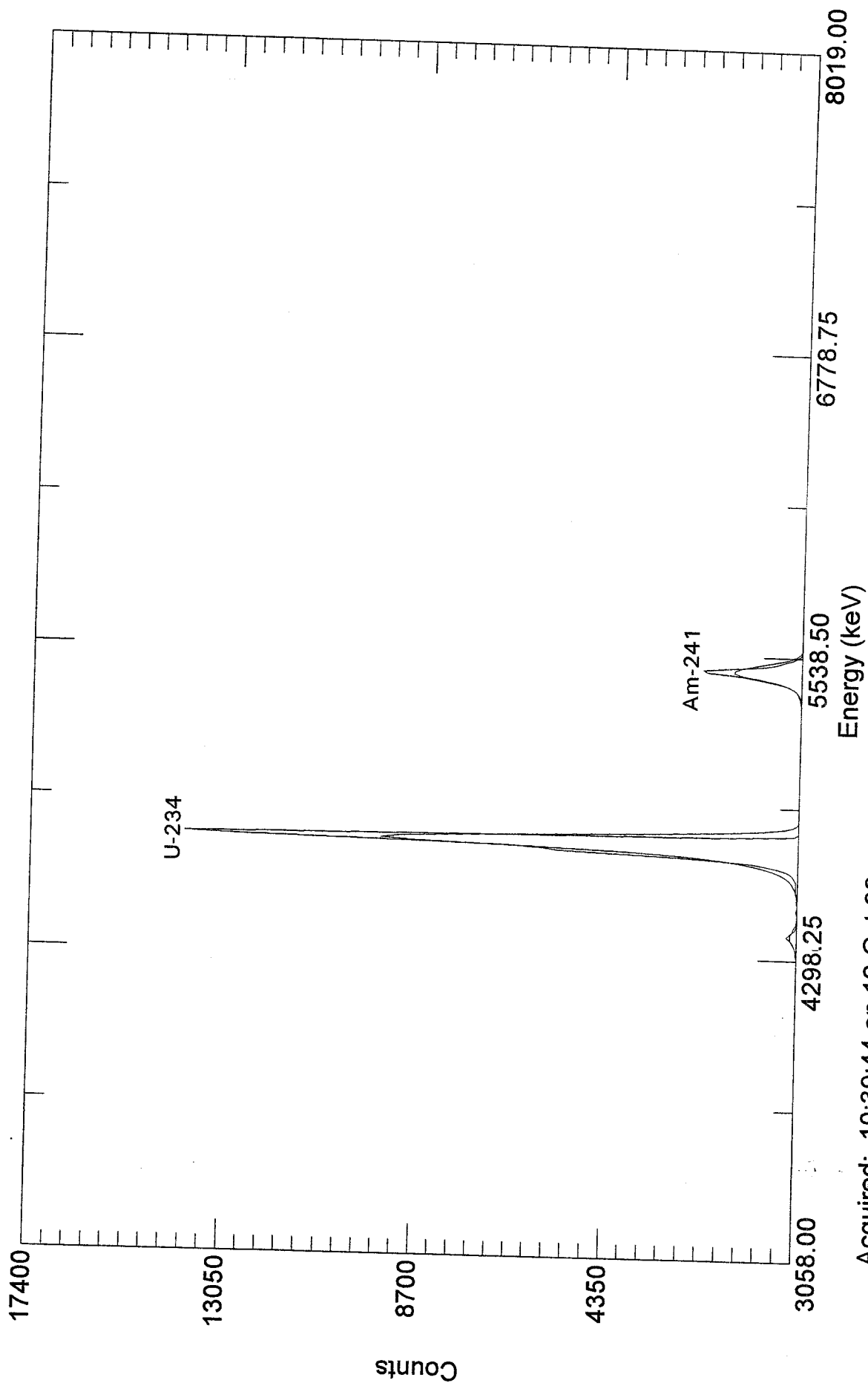


8/28/98 Marker: 10/12/98 11:17 AM = 5538.8 keV 11/25/98

000420

C8101217

AlphaVision Absolute Peak Search And Fit



Acquired: 10:39:44 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101217.CHN

Sample: Source 97-19-103-01 Weekly Cal

Real Time: 2117.44 s. Live Time: 2100.00 s.

Detector: #17 MCB 3 Input 1

Type: ECAL1

000430

ALPHA VISION CALIBRATION ANALYSIS

Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-02 Weekly Cal

Type: ECAL2

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 3 Input 2

Efficiency: 28.63% Chem. Recovery: 0.00%

Total Eff.: 28.63% Manual: 100.00%

CALIBRATION: 3058.74 + 9.65574 * Chn keV

Original: 3062.11 + 9.6604 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100518.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 10:39:46

Live Time: 2100.00

Real Time: 2117.46 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101218.CHN

Background File: C:\USER\ALPHA\BKGND\B8101118.CHN

Nuclide Library: C:\USER\ALPHA\ECAL2.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101218

P E A K S							
Channel	FWHM	Height	Gross	Background	Net Area	CPM	
1. 251.38	6.29	1636.59	14788.27	0.57	14787.70	422.51	
2. 177.72	4.51	16616.99	146679.39	0.09	146679.30	4190.84	

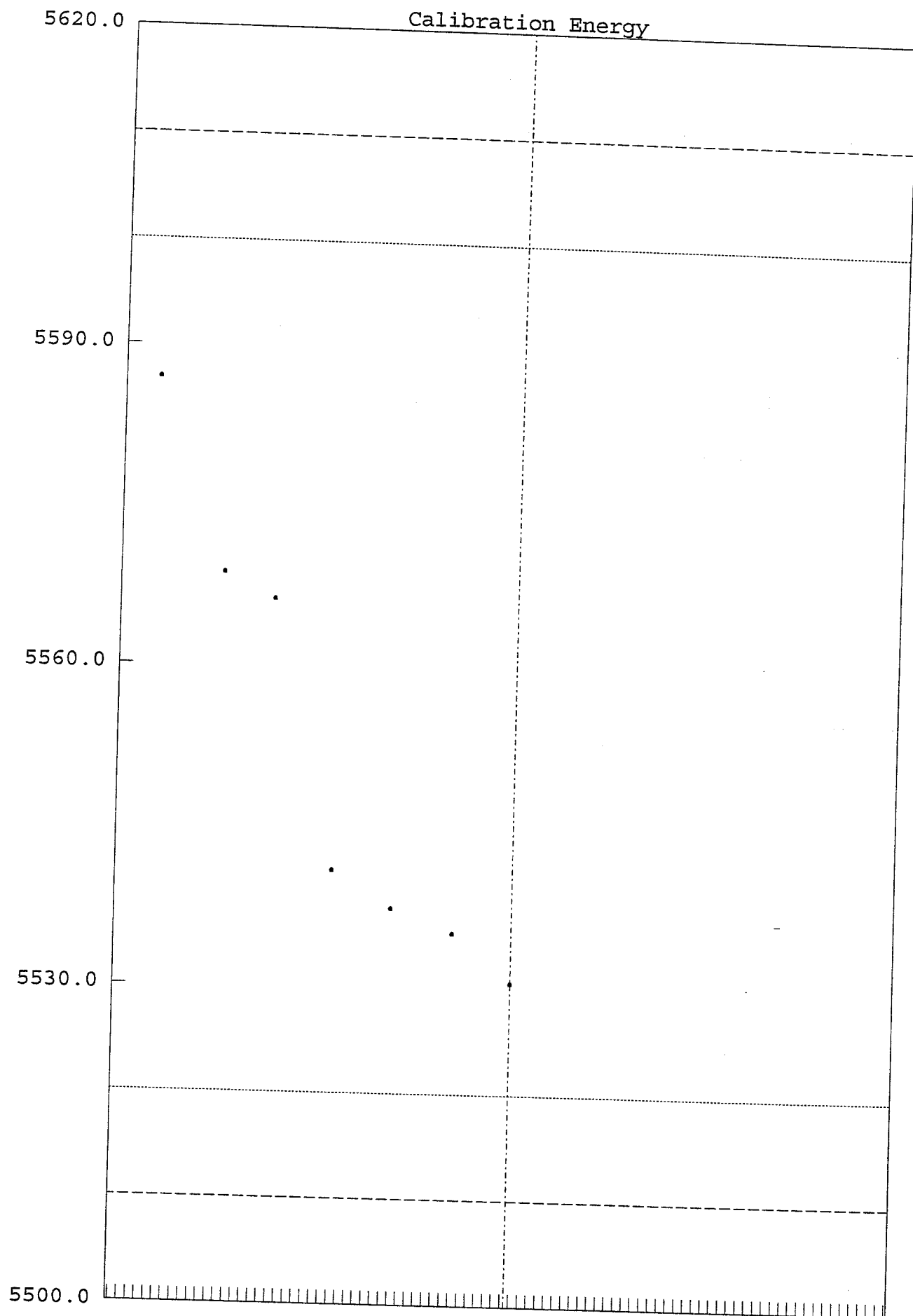
D E C A Y C O R R E C T E D R E S U L T S								
Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot			
					DPM	MDA	% Error	
1. Am-241	0.86	5486.00	60.712	3.6108	1477.42	0.44	1.61	
2. U-234	0.72	4774.80	59.880	1.8846	14640.21	0.41	0.51	

T O T A L S			% Recovery
Gross Count	165873.0000		100.00
Net Area	165862.4300		99.99
Background	10.5700		0.01
Composite Fit	164216.4280		99.00
Residuals	1646.0020		0.99

Analyzed By: _____ ()

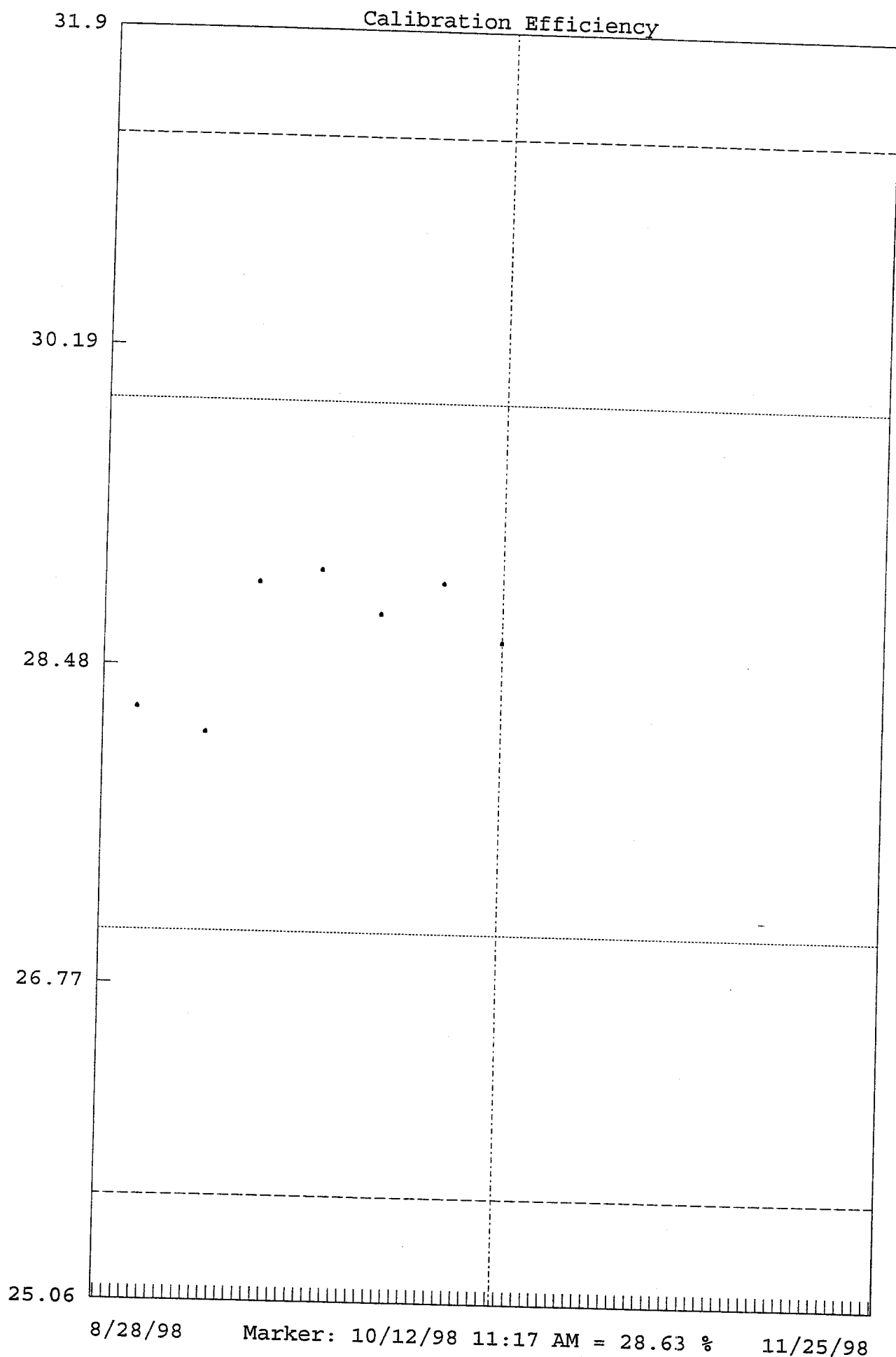
Checked By: RG _____ ()

000431



8/28/98 Marker: 10/12/98 11:17 AM = 5530.6 keV 11/25/98

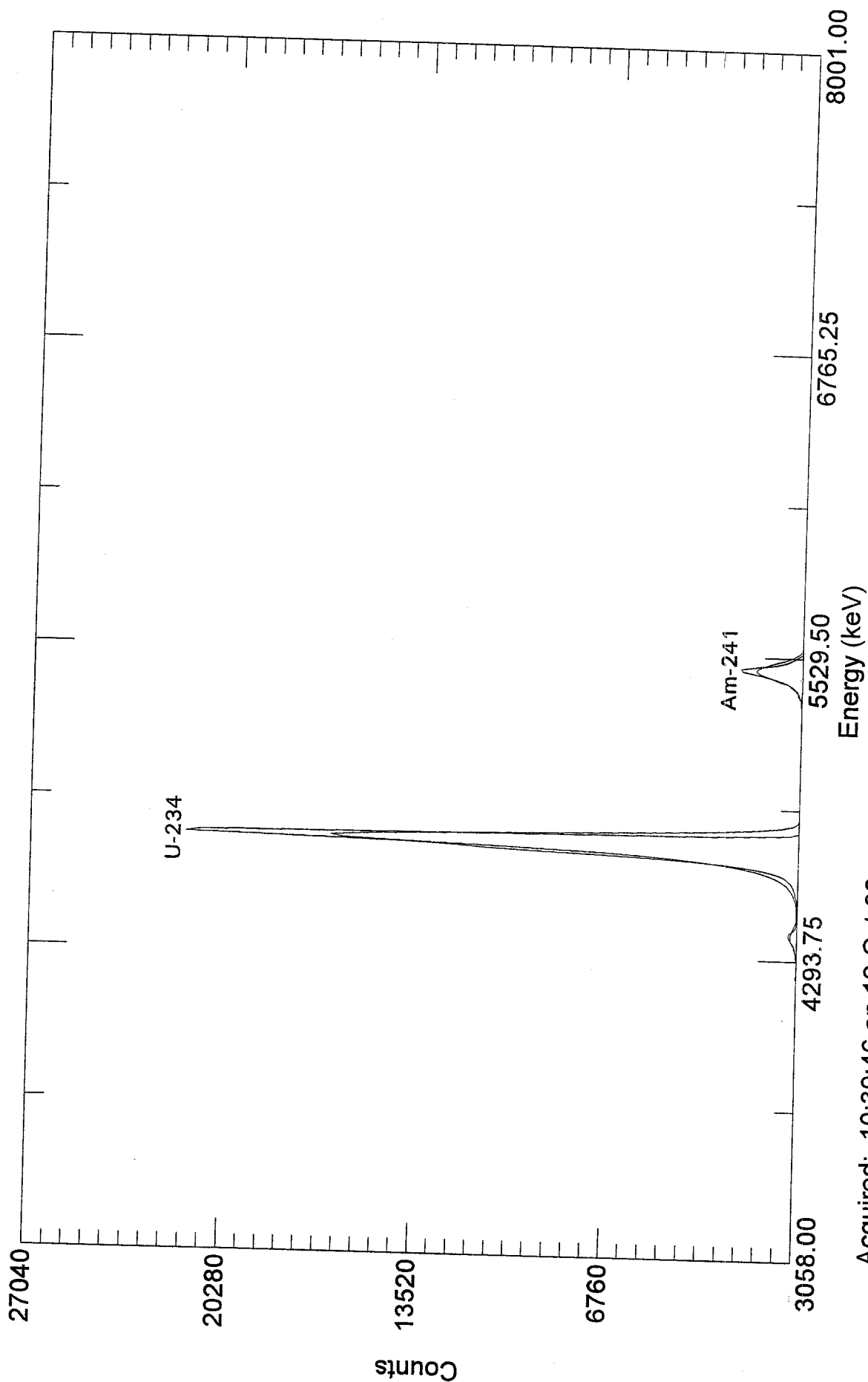
000432



000433

C8101218

AlphaVision Absolute Peak Search And Fit



Acquired: 10:39:46 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101218.CHN

Sample: Source 97-19-103-02 Weekly Cal

Real Time: 2117.46 s. Live Time: 2100.00 s.

Detector: #18 MCB 3 Input 2

Type: ECAL2

000434

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-03 Weekly Cal

Type: ECAL3

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 3 Input 3

Efficiency: 28.41% Chem. Recovery: 0.00%

Total Eff.: 28.41% Manual: 100.00%

CALIBRATION: 3072.62 + 9.6921 * Chn keV

Original: 3066.48 + 9.6715 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100519.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 10:39:48

Live Time: 2100.00

Real Time: 2117.46 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101219.CHN

Background File: C:\USER\ALPHA\BKGND\B8101119.CHN

Nuclide Library: C:\USER\ALPHA\ECAL3.ALB

ANALYSIS Method: Absolute Peak Search And Fit
Results: C8101219

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	249.01	5.58	8197.37	68154.83	0.45	68154.37	1947.27
2.	175.63	4.01	8513.17	69904.20	0.05	69904.15	1997.26

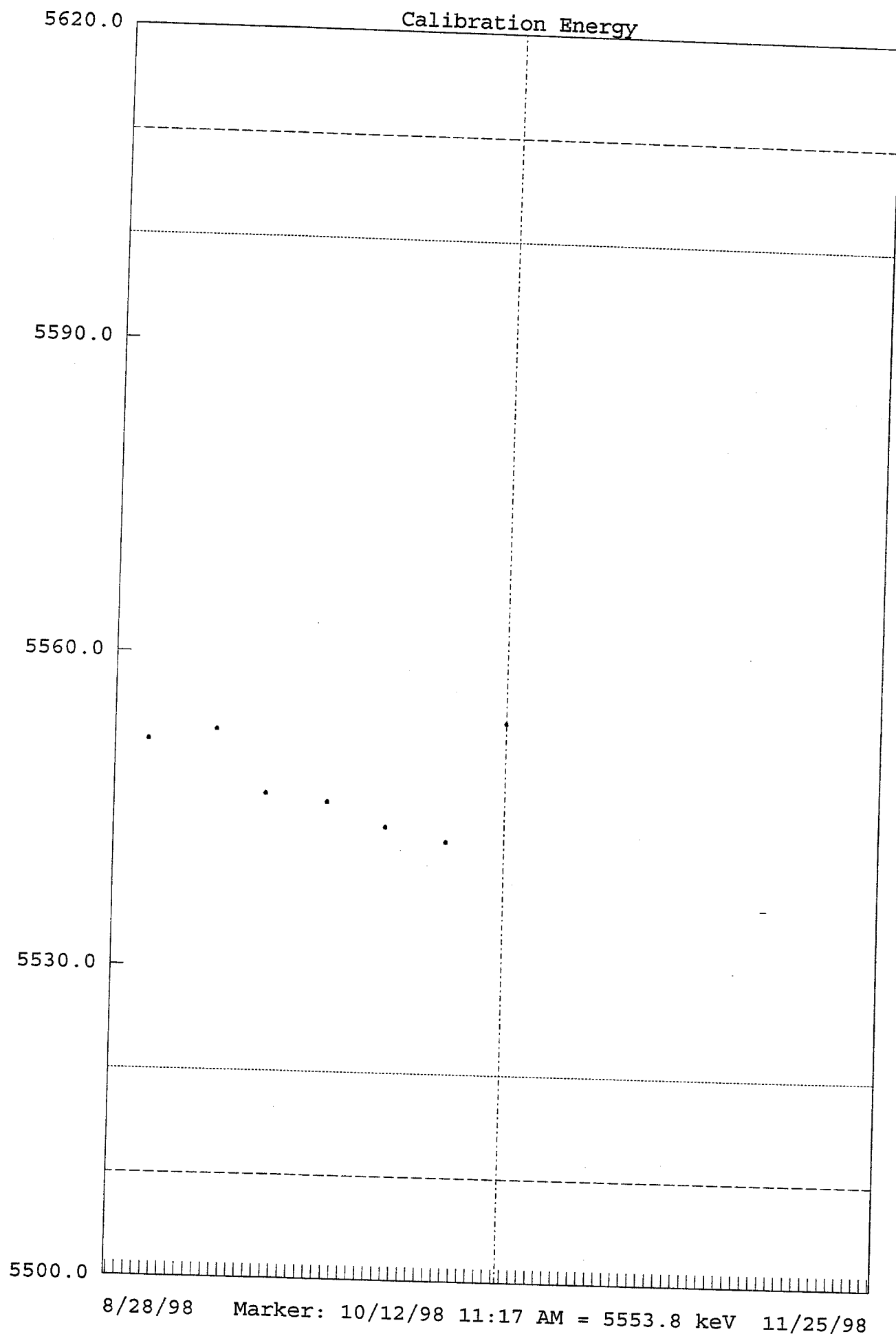
D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	Am-241	0.86	5486.00	54.119	3.9107	6860.28	0.44	0.75
2.	U-234	0.72	4774.80	54.860	1.8399	7029.54	14.31	0.74

T O T A L S			% Recovery
Gross Count	142286.0000		100.00
Net Area	142275.5350		99.99
Background	10.4650		0.01
Composite Fit	139706.6061		98.19
Residuals	2568.9290		1.81

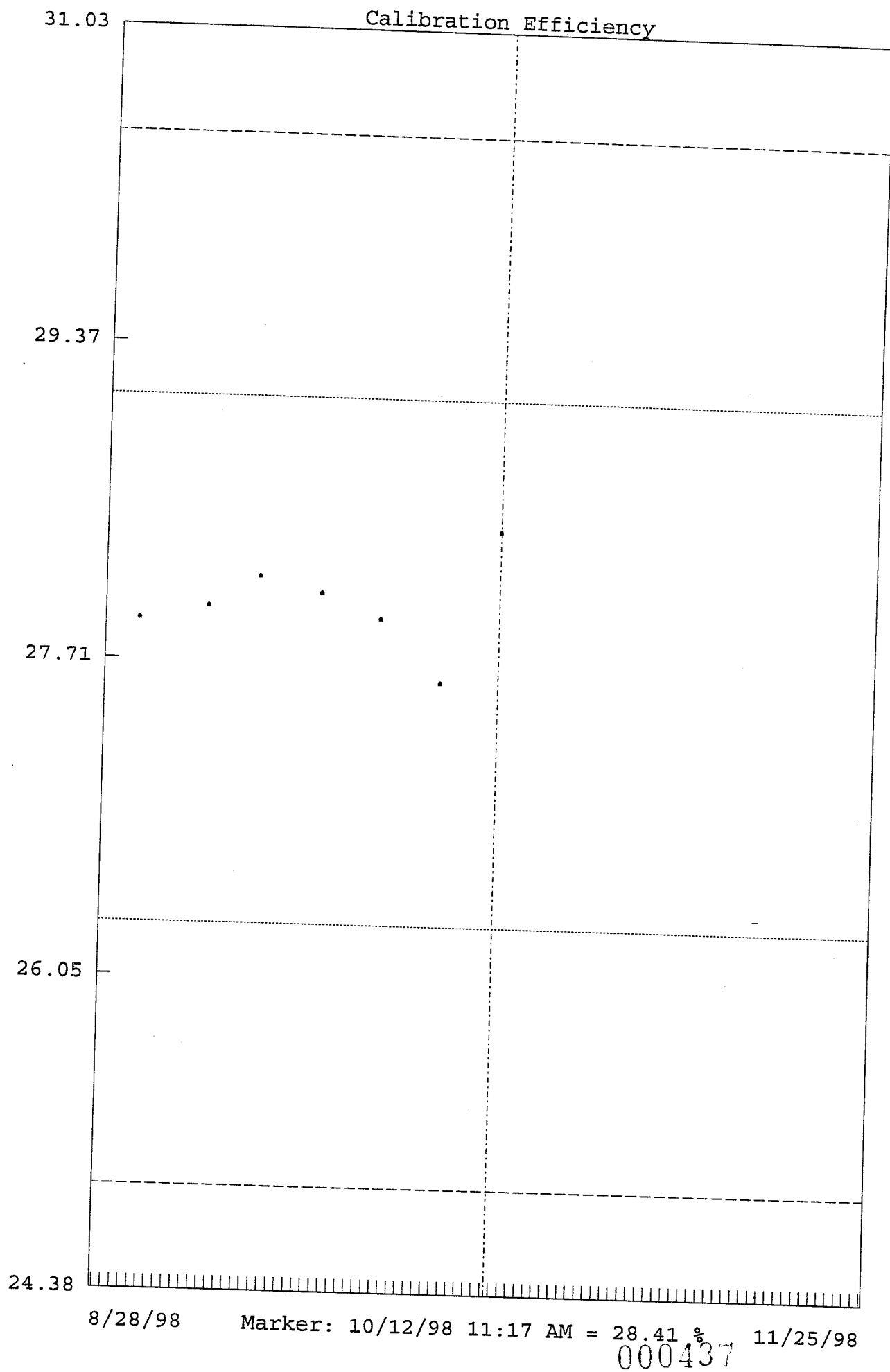
Analyzed By: _____ ()

Checked By: BG _____ ()

000435

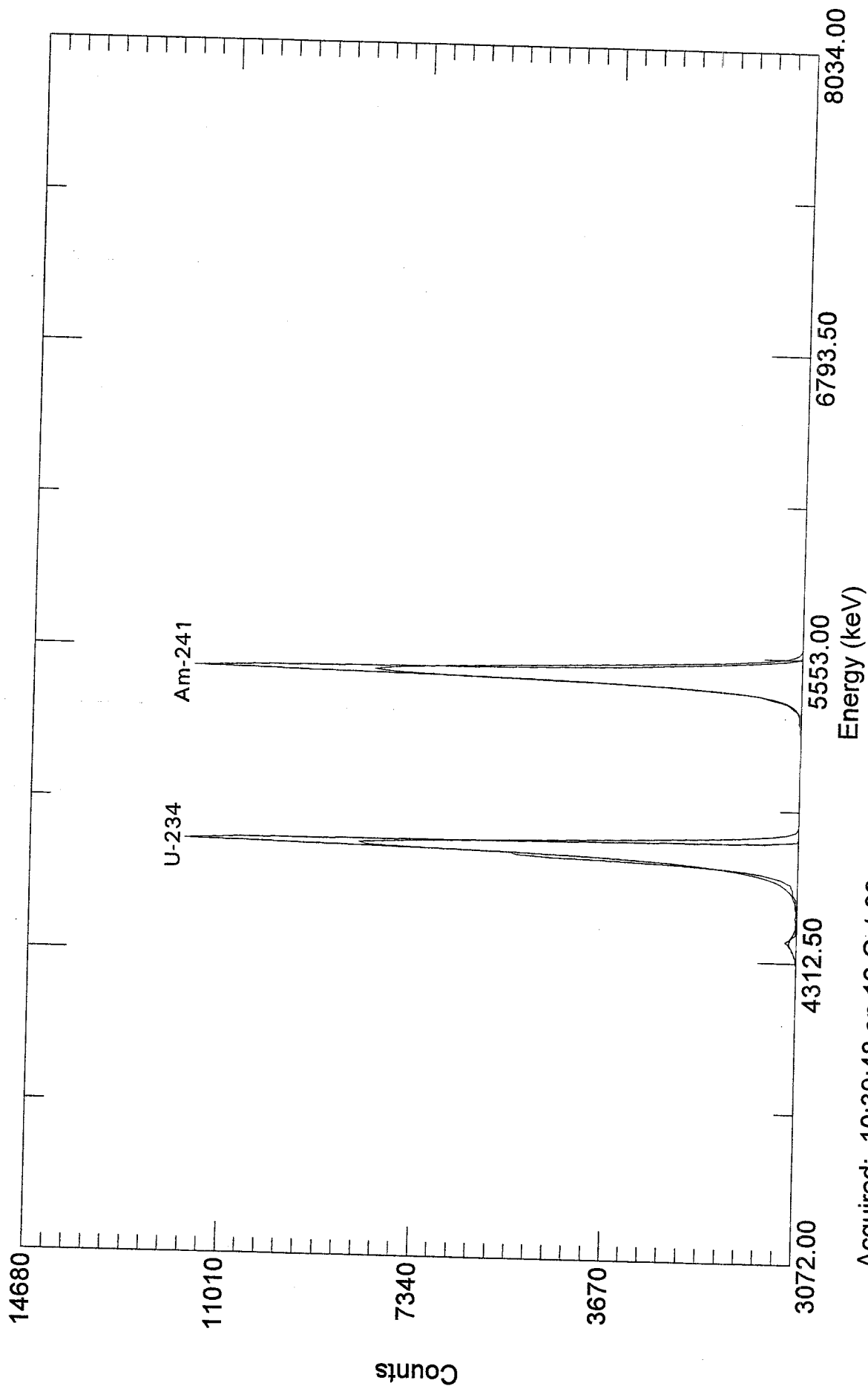


000436



C8101219

AlphaVision Absolute Peak Search And Fit



Acquired: 10:39:48 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101219.CHN

Sample: Source 97-19-103-03 Weekly Cal

Real Time: 2117.46 s. Live Time: 2100.00 s.

Detector: #19 MCB 3 Input 3

Type: ECAL3

000433

ALPHA VISION CALIBRATION ANALYSIS
Paragon Analytics, Inc.

SAMPLE: Source 97-19-103-04 Weekly Cal

Type: ECAL4

Sample Collected: 03-Mar-98 12:00:00

Volume: 1 Total, 1 Aliquot

DETECTOR: MCB 3 Input 4

Efficiency: 28.08% Chem. Recovery: 0.00%

Total Eff.: 28.08% Manual: 100.00%

CALIBRATION: 3062.89 + 9.694 * Chn keV

Original: 3065.42 + 9.6851 * Chn keV

File: C:\USER\ALPHA\CALIB\C8100520.CHN

ACQUISITION: 512 Channels

Spectrum Acquired: 12-Oct-98 10:39:51

Live Time: 2100.00

Real Time: 2117.48 Sec.

Spectrum File: C:\USER\ALPHA\CALIB\C8101220.CHN

Background File: C:\USER\ALPHA\BKGND\B8101120.CHN

Nuclide Library: C:\USER\ALPHA\ECAL4.ALB

ANALYSIS Method: Absolute Peak Search And Fit

Results: C8101220

P E A K S							
	Channel	FWHM	Height	Gross	Background	Net Area	CPM
1.	249.96	5.65	2610.34	21931.83	0.25	21931.58	626.62
2.	176.59	4.09	7066.08	59664.48	0.02	59664.45	1704.70

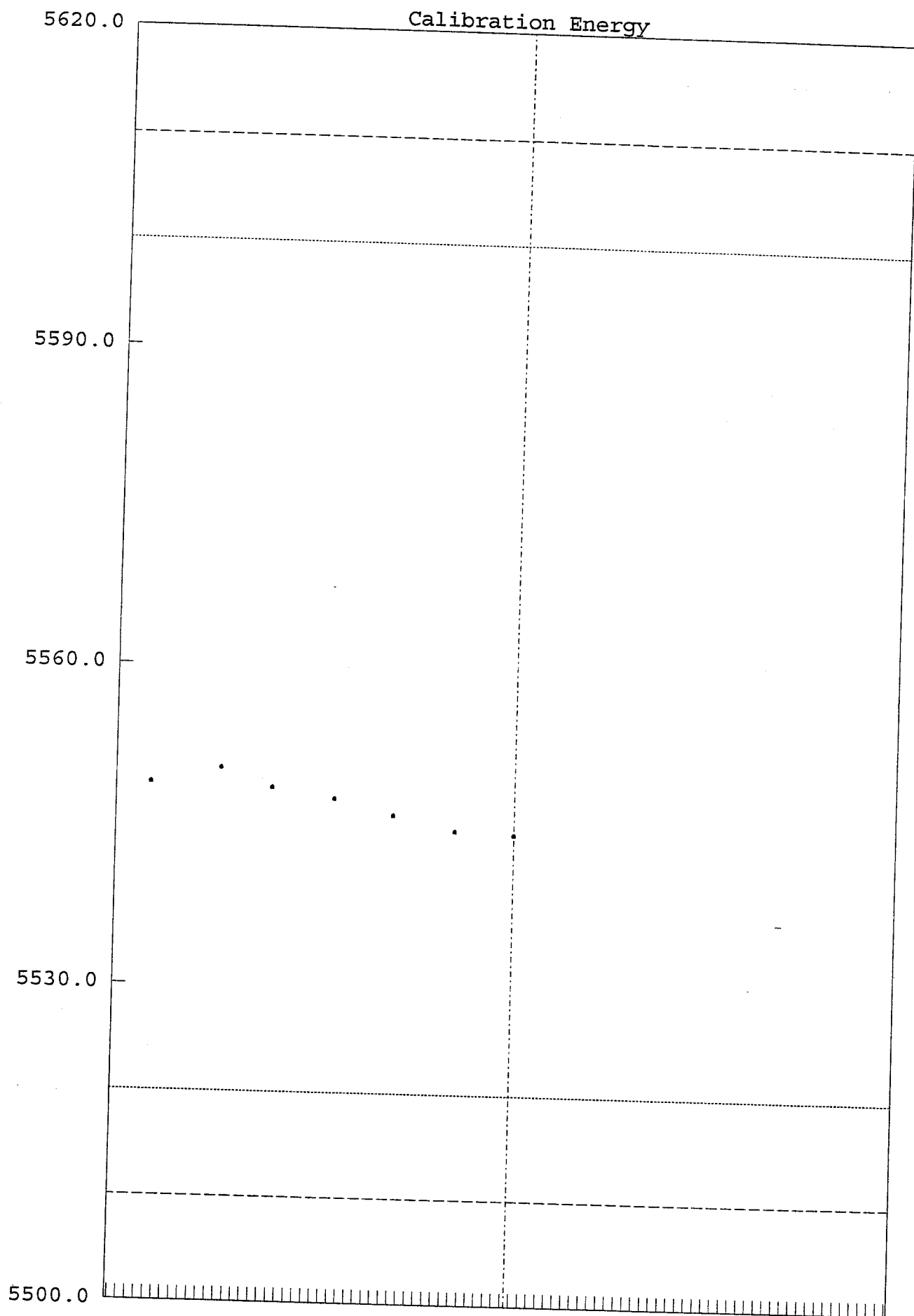
D E C A Y C O R R E C T E D R E S U L T S								
	Nuclide	Br. Ratio	Energy (keV)	Width (keV)	Tau	Aliquot DPM	MDA	% Error
1.	Am-241	0.86	5486.00	54.793	3.8217	2233.45	0.43	1.32
2.	U-234	0.72	4774.80	56.469	1.7739	6070.14	3.10	0.80

T O T A L S			% Recovery
Gross Count	84137.0000		100.00
Net Area	84125.6950		99.99
Background	11.3050		0.01
Composite Fit	82826.5779		98.44
Residuals	1299.1172		1.54

Analyzed By: _____ ()

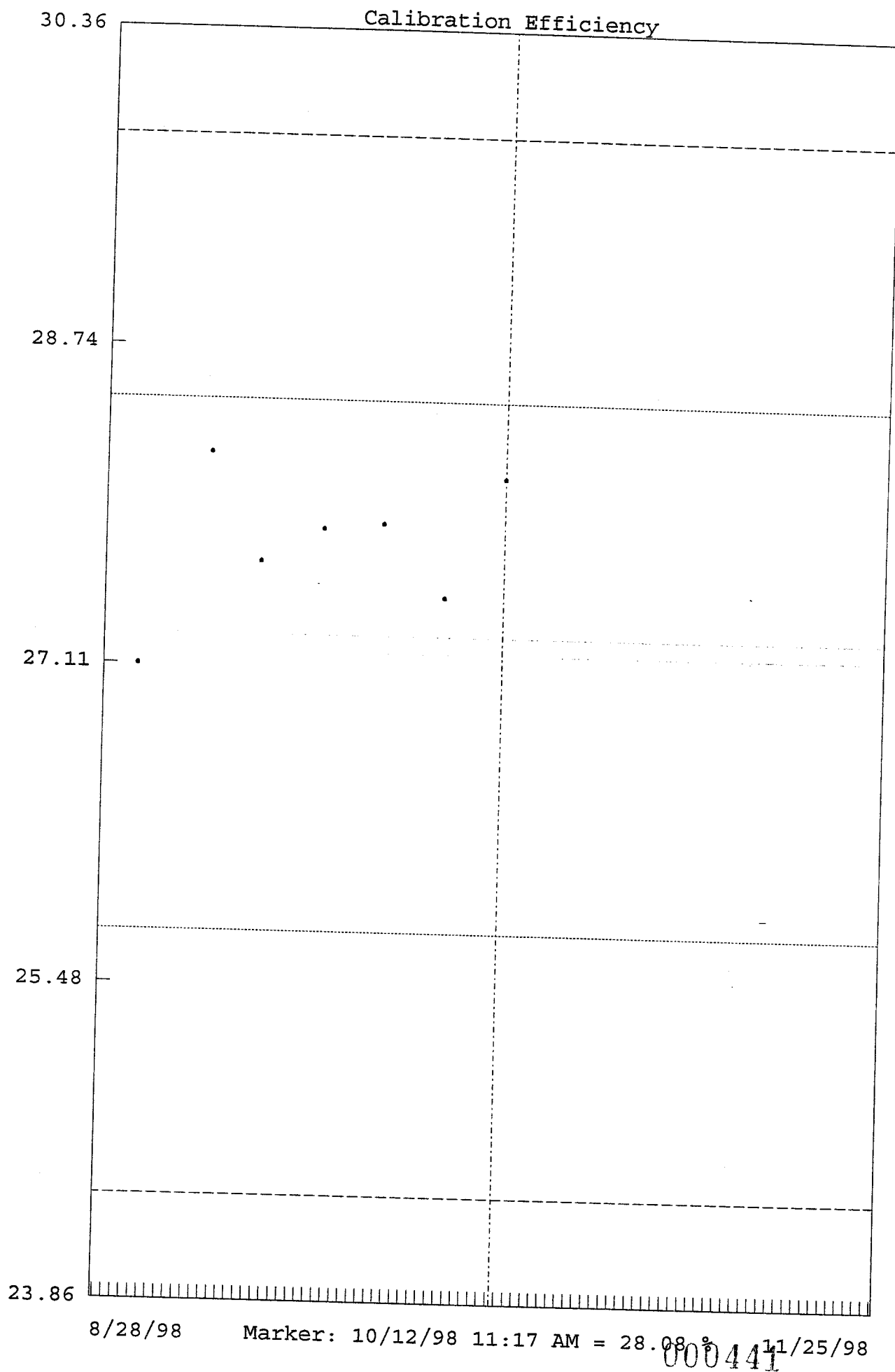
Checked By: RG _____ ()

000439



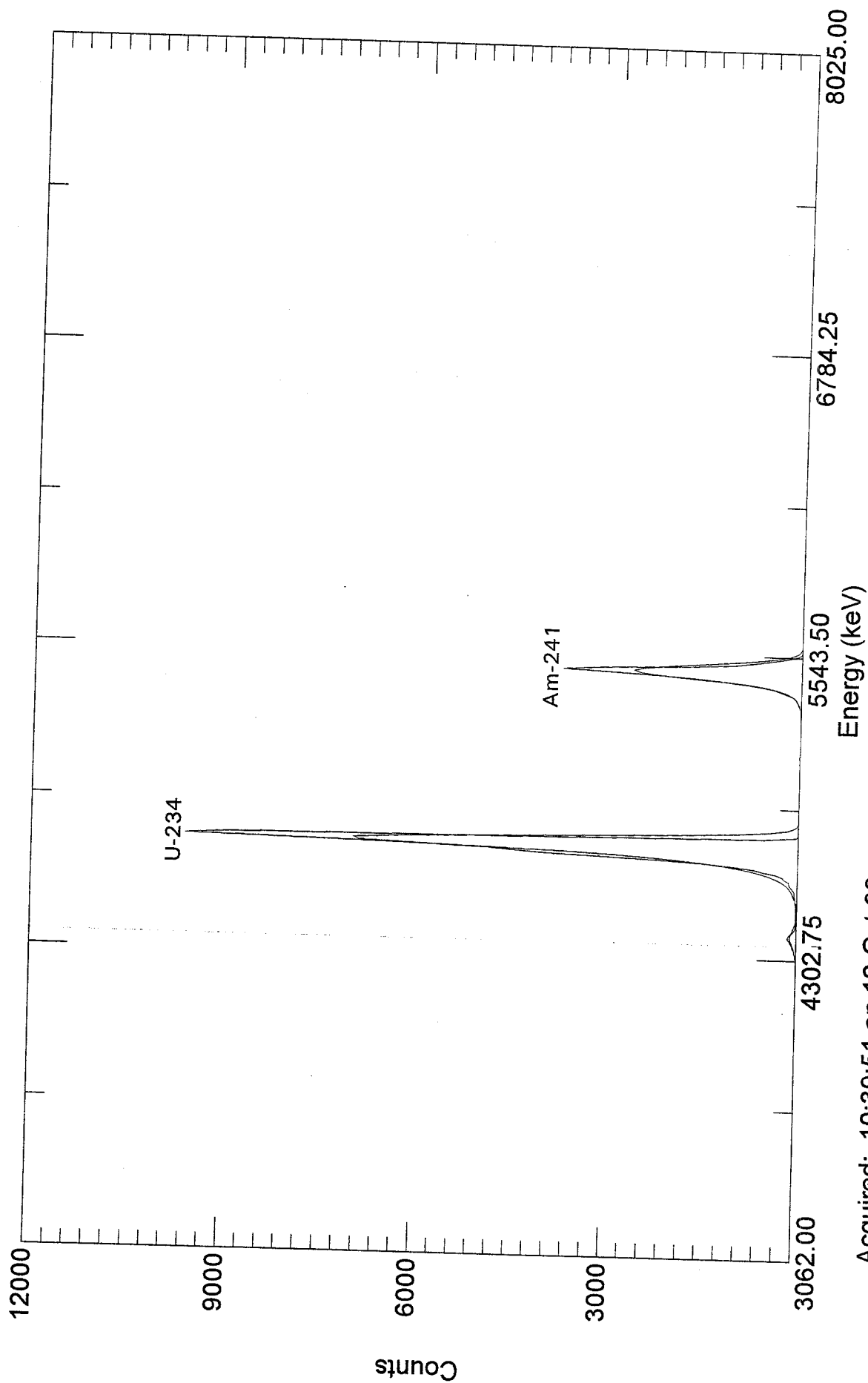
8/28/98 Marker: 10/12/98 11:17 AM = 5544.6 keV 11/25/98

000410



C8101220

AlphaVision Absolute Peak Search And Fit



Acquired: 10:39:51 on 12-Oct-98

File: C:\USER\ALPHA\CALIB\C8101220.CHN

Sample: Source 97-19-103-04 Weekly Cal

Real Time: 2117.48 s. Live Time: 2100.00 s.

Detector: #20 MCB 3 Input 4

Type: ECAL4

000442



Paragon Analytics, Inc.
Case Narrative File

Request Number: 4662R
Date File Saved: 10/16/98

Section 1. Sample Identification Numbers

LANL Sample IDs

RE15-98-0029
RE15-98-0030
RE15-98-0031
RE15-98-0032
RE15-98-0033
RE15-98-0034
RE15-98-0035
RE15-98-0036
RE15-98-0037

PAI Sample IDs

98-09-192-01
98-09-192-02
98-09-192-03
98-09-192-04
98-09-192-05
98-09-192-06
98-09-192-07
98-09-192-08
98-09-192-09

Section 2. Case Narrative

Section 2.1 Sample Shipping and Receipt Logistics

The samples were received intact. No problems were observed.

Section 2.2 Sample Preparation, Analysis, and QC Narrative

Section 2.2.1 Analysis Method: H3

Samples under Request Number 4662R (PAI Work Order 98-09-192) were received on 9/26/98 and scheduled for tritium analysis, which was completed on 10/9/98.

These samples were analysed in batch 09129h3s. The matrix spike analyzed with this batch were prepared from samples in LANL request number 4602R.

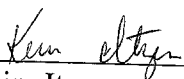
The analysis results for these samples are reported in units of pCi/gram.

This work order was prepared using PAI SOP754R0, and analyzed using PAI SOP704R4.

Reported sample activities are NET activities; that is, they have not been truncated or censored based on an *a priori* detection limit. Rather, as recommended by ANSI N42.2, the actual values for each measurement have been reported, and Decision Level values for each analyte are reported with the process blank. Each result should be compared to the appropriate decision level for determination of the validity of that measurement.

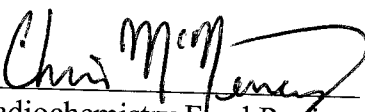
Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hard copy report.



Kim Itzen
Radiochemistry Instrument Technician

10-16-98
Date

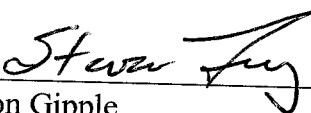


Radiochemistry Final Review

10/16/98
Date

Section 3 Certification Statement

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, except as detailed in this case narrative. This certification is verified by the Laboratory Manager's or designee's signature in the hardcopy report.


for Don Gipple
Laboratory Manager

11-10-98
Date

000444

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 1

**SAMPLE RESULTS
SUMMARY**

000445

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 09/23/98

Client Name: Los Alamos National Lab

Date Analyzed: 10/09/98

Lab Sample ID Series: 98-09-192

Count Duration: 100 Min.

Client Project ID: 4662R

Analyzed By : KI

Client ID	PAI ID	Matrix	H-3 (pCi/g)	MDC
RE15-98-0029	09-192-01	SOIL	0.00 ± 0.02	0.03
RE15-98-0030	09-192-02	SOIL	0.00 ± 0.02	0.03
RE15-98-0031	09-192-03	SOIL	0.02 ± 0.02	0.03
RE15-98-0032	09-192-04	SOIL	0.01 ± 0.02	0.03
RE15-98-0033	09-192-05	SOIL	0.02 ± 0.02	0.04
RE15-98-0034	09-192-06	SOIL	0.01 ± 0.02	0.04
RE15-98-0035	09-192-07	SOIL	-0.01 ± 0.02	0.03
RE15-98-0036	09-192-08	SOIL	0.02 ± 0.02	0.03
RE15-98-0037	09-192-09	SOIL	0.01 ± 0.02	0.03
RE15-98-0032	09-192-D1	SOIL	0.00 ± 0.02	0.03

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2 σ). See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP754 and analyzed using PAI SOP704.

Remarks:

98-09-192-D1 is a duplicate of 98-09-192-04.

000446

2

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 2

**QC RESULTS
SUMMARY**

000447

TRITIUM ANALYSIS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 100 Min.

Client Project ID: Blank

Analyzed By : KI

Client ID	PAI ID	Matrix	H-3 (pCi/g)	MDC
Blank	09-129-B1	SOIL	0.00 ± 0.04	0.07

Reported Uncertainty is the Estimated Total Propagated Uncertainty (2σ). See PAI SOP 743 for details of the TPU determination.

Reported activities are the calculated net activities, not truncated or censored by an *a priori* detection limit estimate. Sample results should be compared to the decision level calculated from the appropriate blank.

These samples were prepared using PAI SOP754 and analyzed using PAI SOP704.

Remarks:

QC shared between work orders 98-09-129 and 98-09-192.

000448

TRITIUM DECISION LEVEL REPORT
Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 100 Min.

Client Project ID: Blank

Analyzed By : KI

Client ID	PAI ID	Matrix	Decision Level
Blank	09-129-B1	SOIL	0.04

Decision Level Values calculated as recommended by ANSI N42.23
Reported sample activities should be compared to these Decision Levels

000413

TRITIUM LCS RESULTS SUMMARY

Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 10/06/98

Client Name: Shared QC

Date Analyzed: 10/08/98

Lab Sample ID Series: 98-09-129

Count Duration: 62 Min.

Client Project ID: LCS

Units : pCi/g

Client ID	PAI ID	Matrix	Known Activity	Reported Activity	MDC	Percent Recovery
LCS	09-129-S1	SOIL	1.851	1.727 ± 0.236	0.089	93

PAI sets control limits for tritium measurements as follows :
Control Limits = Known ± 15% for Water, Known ± 25% for other matrices

Remarks:

QC shared by work orders 98-09-129 and 98-09-192.

000450

TRITIUM MATRIX SPIKE ANALYSIS RESULTS SUMMARY
Method 906.0 (Modified)

Lab Name: Paragon Analytics, Inc.

Date Collected: 09/14/98

Client Name: Los Alamos National Lab

Date Analyzed : 10/08/98

Client Project ID: 4602R

Sample Matrix : SOIL

Lab Sample ID Series: 98-09-129

Count Duration: 32 Min.

Lab Sample ID	Spike Added	Native Activity	Reported Activity	Percent Recovery
98-09-129-M1	2.030	< 0.036	1.893	93.3

PAI sets control limits for Tritium measurements as follows :
Recovery Limits = 75 % to 125 % of Known, where Known =
(Known Spike Value + Native Activity Value)

Remarks:

Sample 98-09-129-M1 is a matrix spike of sample 98-09-129-04.

000451

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

3

Section 3

**INDIVIDUAL
SAMPLE RESULTS**

000452

Due to reporting software limitations, individual sample results are not available for this test.

Please refer to *Sample Results Summary* for sample results.

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 4

RAW DATA

4

000454

TRITIUM RAW DATA RESULTS SUMMARY

10/16/98

Batch ID	Sample ID	Rack- Pos	Anal. Volume Units	Count Eff.	Count Dur.	Sample CPM	Blank CPM	Count Date	Percent Moisture	Sample Mass	Water Added	Matrix
09129h3s	98-09-129-S1	17- 2	10.0000 gram	0.204	62.40	38.7	7.4	10/08/98	0.0000	200.00	50.00	SOIL
09129h3s	98-09-129-B1	17- 3	10.0000 gram	0.204	100.00	7.5	7.4	10/08/98	0.0000	200.00	50.00	SOIL
09129h3s	98-09-129-D1	17- 4	10.0000 gram	0.204	100.00	7.7	7.4	10/08/98	0.0493	200.50	10.00	SOIL
09129h3s	98-09-129-M1	17- 5	10.0000 gram	0.204	32.40	74.3	7.4	10/08/98	0.0679	195.60	10.00	SOIL
09129h3s	98-09-129-01	17- 6	10.0000 gram	0.204	100.00	7.3	7.4	10/08/98	0.0493	200.10	10.00	SOIL
09129h3s	98-09-129-02	17- 7	10.0000 gram	0.204	100.00	7.7	7.4	10/08/98	0.0611	200.70	10.00	SOIL
09129h3s	98-09-129-03	17- 8	10.0000 gram	0.204	100.00	7.7	7.4	10/08/98	0.0668	200.80	10.00	SOIL
09129h3s	98-09-129-04	17- 9	10.0000 gram	0.204	100.00	8.3	7.4	10/09/98	0.0679	200.00	10.00	SOIL
09129h3s	98-09-192-D1	17-10	10.0000 gram	0.204	100.00	7.3	7.4	10/09/98	0.0171	200.20	20.00	SOIL
09129h3s	98-09-192-01	17-11	10.0000 gram	0.204	100.00	7.2	7.4	10/09/98	0.0215	200.30	20.00	SOIL
09129h3s	98-09-192-02	17-12	10.0000 gram	0.204	100.00	7.2	7.4	10/09/98	0.0578	200.70	10.00	SOIL
09129h3s	98-09-192-03	19- 1	10.0000 gram	0.204	100.00	8.3	7.4	10/09/98	0.0645	200.40	10.00	SOIL
09129h3s	98-09-192-04	19- 2	10.0000 gram	0.204	100.00	7.8	7.4	10/09/98	0.0171	200.20	20.00	SOIL
09129h3s	98-09-192-05	19- 3	10.0000 gram	0.204	100.00	8.1	7.4	10/09/98	0.0240	200.10	20.00	SOIL
09129h3s	98-09-192-06	19- 4	10.0000 gram	0.204	100.00	7.7	7.4	10/09/98	0.0341	200.00	20.00	SOIL
09129h3s	98-09-192-07	19- 5	10.0000 gram	0.204	100.00	7.2	7.4	10/09/98	0.0082	200.20	20.00	SOIL
09129h3s	98-09-192-08	19- 6	10.0000 gram	0.204	100.00	8.1	7.4	10/09/98	0.0501	200.40	10.00	SOIL
09129h3s	98-09-192-09	19- 7	10.0000 gram	0.204	100.00	7.8	7.4	10/09/98	0.0027	200.20	20.00	SOIL

000455

ID: TRITIUM-LS6000 *UN06-009*

8 OCT 1998 13:57

USER: 6 COMMENT: WITH LUMEX CORRECTION
 PRESET TIME : 100.00
 DATA CALC : CPM H# : YES SAMPLE REPEATS: 1
 COUNT BLANK : NO IC# : NO REPLICATES : 1
 TWO PHASE : NO ADC : NO CYCLE REPEATS : 1
 SCINTILLATOR: LIQUID LUMEX: YES LOW SAMPLE REJ: 0
 LOW LEVEL : YES HALF LIFE CORRECTION DATE: none

PRINTER : STD
 RS232 : STD

CHAN: 25.0 - 270.0 %ERROR: 4.08 FACTOR: 1.000000 BKG. SUB: 0
 CHAN: 350.0 - 1000.0 %ERROR: 20.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO *X 98-09-129 = RB = 7.42*

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME
				CPM	%ERROR	CPM	%ERROR		
1	17-1	100.00	126.1	7.30	7.59	42.82	3.06	0.75	102.89
2	17-2	62.40	137.3	38.69	4.08	44.82	3.78	0.24	167.25
3	17-3	100.00	137.1	7.51	7.40	44.26	3.01	0.43	270.06
4	17-4	100.00	138.6	7.70	7.28	41.52	3.10	0.37	372.89
5	17-5	32.40	138.7	74.32	4.08	42.59	5.38	0.13	406.60
6	17-6	100.00	137.5	7.25	7.51	43.89	3.02	0.33	509.39
7	17-7	100.00	137.7	7.72	7.26	43.13	3.05	0.28	612.18
8	17-8	100.00	138.1	7.67	7.27	44.05	3.01	0.25	714.93
9	17-9	100.00	137.1	8.28	6.99	43.60	3.03	0.22	817.67
10	17-10	100.00	137.0	7.30	7.44	42.37	3.07	0.18	920.38
11	17-11	100.00	137.8	7.24	7.47	44.22	3.01	0.17	1023.10
12	17-12	100.00	136.9	7.23	7.47	43.81	3.02	0.17	1125.75

000456

13	19-1	100.00	136.9	8.27	6.97	43.04	3.05	0.12	1443.34
14	19-2	100.00	137.1	7.79	7.19	44.15	3.01	0.12	1546.00
15	19-3	100.00	136.5	8.14	7.02	42.80	3.06	0.10	1648.64
16	19-4	100.00	137.4	7.67	7.24	43.63	3.03	0.08	1751.26
17	19-5	100.00	137.5	7.21	7.46	43.95	3.02	0.08	1853.86
18	19-6	100.00	137.1	8.14	7.02	43.14	3.05	0.08	1956.46
19	19-7	100.00	137.4	7.84	7.15	43.55	3.03	0.08	2059.06

LSC Run Log

Instrument ID: LS 6000

Date	Sample ID	Count Duration	Rack & Position	Test	User #	Batch ID	Initials/Comments
10/7/98	9809137-RB	100min	4 - 1	C-14	12	09137C14	ChA
	-S1		- 2				
	-B1		- 3				
	-O1		- 4				
	-O3		- 5				
	-O4		- 6				
	-O6		- 7				
	-D1(O6)		- 8				
10/8/98	Down OC						
10/8/98	9809137-RB	100min	62 - 1-3	-	1	-	ChA
	-S1		4 - 1	C-14	12	09137C14	ChA
	-B1		- 2				
	-O1		- 3				
	-O3		- 4				
	-O4		- 5				
	-O6		- 6				
	-D1(O6)		- 7				
	-D1(O6)		- 8				
10/8/98	9809129-RB	100min	17 - 1	H3	6	09129H35	ChA
	-S1		- 2				
	-B1		- 3				
	-D1(O1)		- 4				
	-M1(O4)		- 5				
	-O1		- 6				
	-O2		- 7				
	-O3		- 8				
	-O4		- 9				
	9809192 - D1(O4)		- 10				
	-O1		- 11				
	-O2		- 12				
	-O3		9 - 1				

000458

LSC Run Log

Instrument ID: LS6000

Date	Sample ID	Count Duration	Rack & Position	Test	User #	Batch ID	Initials/Comments
10/8/98	9809192-04	100min	19 - 2	H3	6	08121135	gpa
	-05		- 3				
	-06		- 4				
	-07		- 5				
	-08		- 6				
	-09		- 7				
10/10/98	Daily QC	10min	62 - 1-3		1	-	gpa
10/10/98	9822004-03	100min	61 - 6	R-241	18	193196	gpa
	-02		- 7				
	-01		- 8				
	-03		- 10				
	-02		- 11				
	-01		- 12				
10/11/98	Daily QC	10min	62 - 1-3		1	-	gpa
10/12/98	Daily QC	10min	62 - 1-3		1	-	gpa
10/12/98	9809027-RB	75min	44 - 1	C-14	3	0902704	gpa
	-S1		- 2				
	-B1		- 3				
	-01(04)		- 4				
	-04		- 5				
	-07		- 6				
	-10		- 7				
	-13		- 8				
	-16		- 9				
	-19		- 10				
	-22		- 11				
	-25		- 12				
	-26		45 - 1				
	-32		- 2				
10/13/98	Daily QC	10min	62 - 1-3		1	-	gpa

Paragon Analytics, Inc.

FRM 762FC1.XLS (10/22/97)

147494

000453

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 5

**QUALITY ASSURANCE
SUMMARY REPORTS**

5

000400

No *NON-CONFORMANCE REPORTS* or
QUALITY ASSURANCE SUMMARY SHEETS
are included in this data package.

000461

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 6

**LABORATORY
BENCH SHEETS**

6

000462

R/BENCH-SH/09129H3S.XLS

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: *BP*

ANALYSIS DATE: *10-7-98*

METHOD: *H³S*

WORK ORDER	SAMPLE ID	SAMPLE CONDITION			Remarks
		DRY/WET	TEXTURE		
<i>98-09-129</i>	<i>01</i>	<i>wet</i>	<i>sandy</i>	<i>gray color</i>	
	<i>02</i>				
	<i>03</i>				
<i>✓</i>	<i>04</i>	<i>↓</i>	<i>↓</i>	<i>↓</i>	
<i>98-09-192</i>	<i>01</i>	<i>wet</i>	<i>sandy clay</i>	<i>Brown color</i>	
	<i>02</i>				
	<i>03</i>				
	<i>04</i>				
	<i>05</i>				
	<i>-06</i>				
	<i>-07</i>				
	<i>-08</i>				
<i>↓</i>	<i>-09</i>	<i>↓</i>	<i>↓</i>	<i>↓</i>	

000464

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 7

**STANDARDS
TRACEABILITY
DOCUMENTS**

7

000465

A working level solution was prepared from 469.1284.61.
The solution was performed in a amber glass bottle by w/w dilution

Bottle tare 493.1g

Vial start 23.5070 g

Bottle final 1055.5g

Vial finish 20.0717 g

Total 80m mass. 562.4g

grams 469.1284.61 added. 3.4353g

$$\text{Activity} = 3.4353g \times 32200 \text{ pCi/g} / 562.4g(\text{ml}) = 196.6868 \text{ pCi/ml}$$

Uncert = 3.7%

Matrix = DI H₂O

To = 7/23/97

Prep on 10/29/97

By Robert Shannon

Exp. 10/29/02

Std ID: 469.1284.62

Description: Tritium Working Level Solution

Activity: 196.7 pCi/g

Uncertainty: +/- 7.3 pCi/g

Ref. Date: ~~7/27/97~~ 7/23/97 ^{cm} 12/22/97

Ref Time: 5:00 AM

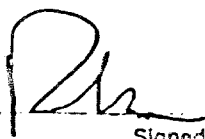
Prep Date 10/29/97 Prep by: RTS

Expiration ~~10/29/97~~ 10/29/02 ^{cm} 10/16/97Matrix/Comp. DI H₂O

Short-lived - Decay correct with each use

Transfer per LRS 11/3/97
DJS

Continued on Page



Signed

10/29/97

Date

Read and Understood By

000466

Signed

EPA Soln # 94032-1 (PA115046) was transferred to a 40, 20 mL
UDA vial.

Vial tare 18.5647g

Vial full 23.5020

Inventory 4.9423g

Activity 32.2 nCi/g

+/- 3.7%

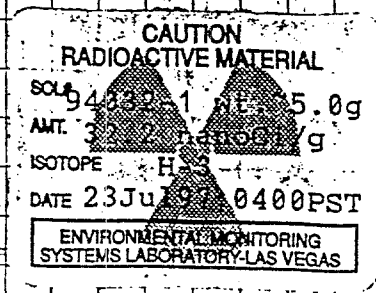
T₀ = 7/23/97

Matrix = H₂O.

Prep 10/29/97

By Robert Shannon

Expires: 10/29/02



Std ID: 469.1284.61

Description: Tritium Stock Solution

Activity: 32.2 nCi/g

Uncertainty: +/- 3.7% (3 sigma)

Ref. Date: ~~7/21/97~~ 7/23/97 c/m 7/22/97

Ref Time: 5:00

Prep Date 10/29/97 Prep by: RTS

Expiration ~~10/29/97~~ 10/29/02 c/m 10/10/02

Matrix/Comp. DI H₂O

Short-lived - Decay correct with each use

Continued on Page

[Signature]

Signed

10/24/97

Date

Read and Understood By

000467

Signed

Date



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
P.O. BOX 93478 • LAS VEGAS, NV 89193-3478

PAF ED 0469
REC'D 10-27-97

OFFICE OF
RESEARCH AND DEVELOPMENT

Calibration Certificate

Description

Principal radionuclide	Tritium (H-3)
Half-life	12.43 years
Nominal activity	160 nanocuries (approx.)
Nominal mass of solution	5 grams (approx.)
Solution number	94032-1

Measurement

Activity of principal radionuclide	32.2 nanocuries/gram
Date and time of standardization	July 23, 1997 0400 hours PST

Method of measurement

The activity of the primary solution and this dilution were measured by liquid scintillation counting.

Counting efficiencies for both standardizations were determined by counting solutions directly traceable to the National Institute of Standards and Technology (NIST).

Activity of daughter radionuclide

-NA-

Useful Life

We recommend that this solution should not be used after **October 30, 2004**

000468

Purity

Activities other than that of the principal nuclide and of its daughter nuclides were estimated to be:

1) -NA- \leq of the principal activity

The activities of the impurities are not included in the quoted figures of the principal activity.

Random Errors

The precision of this standard was such that the certified value of the radioactive concentration of the principal activity had a standard error (sm) not greater than \pm 0.25%.

The 99.7% confidence limits are given by $t(sm)$, where t is obtained from the Student t factor for the degree of freedom ($n-1$), and are calculated to be \pm 0.82%.

The maximum uncertainty due to the assessable systematic errors (dilution, counting, and known uncertainty of the standard) is obtained by the separate arithmetic summation of the positive and negative systematic error ($+\sigma$, $-\sigma'$). These have been estimated not to exceed \pm 2.9%.

The overall uncertainty (often called accuracy) is an estimate of the possible divergence of the quoted result from the true value. It is a combination of random error [$t(sm)$] at the 99.7% confidence limits and the worst case estimate of the systematic errors ($+\sigma$, $-\sigma'$). The overall uncertainty is therefore calculated on the basis of $+ [t(sm) + \sigma]$, $- [t(sm) + \sigma']$ and is \pm 3.7% of the quoted radioactive concentration.

Decay Schemes

This standardization is based on the following assumptions of the principal nuclide, its daughter nuclides and impurities (no allowance for error in these assumptions or the assumption of quoted half-life have been included in the statement of accuracy above).

Tritium decays 100 percent by beta particle emission. The maximum energy is 18.6 Kev, the average is 5.68 Kev.

Chemical Composition of Solution

Carrier content per gram of solution:	100% water
Other components:	Barium less than 0.004% Lead less than $3 \times 10^{-5}\%$
Preservative:	none

Remarks

Revised 8/97

Approval Signature

Stephen H. Pa

Date August 4, 1997

000469

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

000470

Paragon Analytics, Incorporated

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 9809192

Client Name: Los Alamos National Laboratory SMO

Client Project Name:

Client Project Number: 4662R

Client PO Number: 7794L0014-9S

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
RE15-98-0029 ✓	9809192-1	4662RC ✓	Soil ✓	9/23/98	✓
RE15-98-0030 ✓	9809192-2	4662RC	Soil	9/23/98	
RE15-98-0031 ✓	9809192-3	4662RC	Soil	9/23/98	
RE15-98-0032 ✓	9809192-4	4662RC	Soil	9/23/98	
RE15-98-0033 ✓	9809192-5	4662RC	Soil	9/23/98	
RE15-98-0034 ✓	9809192-6	4662RC	Soil	9/23/98	
RE15-98-0035 ✓	9809192-7	4662RC	Soil	9/23/98	
RE15-98-0036 ✓	9809192-8	4662RC	Soil	9/23/98	
RE15-98-0037 ✓	9809192-9	4662RC	Soil	9/23/98	

Friday, September 25, 1998

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

Los Alamos
NATIONAL LABORATORY

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

Please analyze the enclosed samples
according to the schedule indicated:

These samples are on:

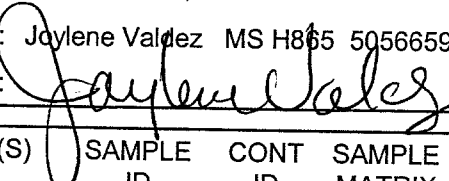
SHIP DATE: 9/25/98
REPORT DUE: 10/25/98
TURN AROUND REQ'D: 30 days

LANL Request Number: 4662R
Per Agreement Number: 7794L0014-9S
Project Cost Code: MR3R12082642

RAD SCREENING: Not Required

COMMENTS: 15 - 1086 , GG;

LANL ER SMO CONTACT: Joylene Valdez MS H865 5056659968

Signature: 

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
------------------------	------------	--------------	------------	------------------	-----------------	----------

01	GAMMA SPE	RE15-98-0029	01	S	9/23/98	
	H3	RE15-98-0029	02	S	9/23/98	
	ISOU	RE15-98-0029	04	S	9/23/98	
02	GAMMA SPE	RE15-98-0030	01	S	9/23/98	
	H3	RE15-98-0030	02	S	9/23/98	
	ISOU	RE15-98-0030	04	S	9/23/98	
03	GAMMA SPE	RE15-98-0031	01	S	9/23/98	
	H3	RE15-98-0031	02	S	9/23/98	
	ISOU	RE15-98-0031	04	S	9/23/98	
04	GAMMA SPE	RE15-98-0032	01	S	9/23/98	
	H3	RE15-98-0032	02	S	9/23/98	
	ISOU	RE15-98-0032	04	S	9/23/98	
05	GAMMA SPE	RE15-98-0033	01	S	9/23/98	
	H3	RE15-98-0033	02	S	9/23/98	
	ISOU	RE15-98-0033	04	S	9/23/98	
06	GAMMA SPE	RE15-98-0034	01	S	9/23/98	
	H3	RE15-98-0034	02	S	9/23/98	
	ISOU	RE15-98-0034	04	S	9/23/98	
07	GAMMA SPE	RE15-98-0035	01	S	9/23/98	
	H3	RE15-98-0035	02	S	9/23/98	
	ISOU	RE15-98-0035	04	S	9/23/98	
08	GAMMA SPE	RE15-98-0036	01	S	9/23/98	
	H3	RE15-98-0036	02	S	9/23/98	
	ISOU	RE15-98-0036	04	S	9/23/98	

000472

Friday, September 25, 1998

9809192

REQUEST NUMBER: 4662R

Page 2

ANALYSIS ORDER CODE	ANALYTE(S)	SAMPLE ID	CONT ID	SAMPLE MATRIX	DATE SAMPLED	COMMENTS
GAMMA SPE		RE15-98-0037	01	S	9/23/98	
H3		RE15-98-0037	02	S	9/23/98	
ISOU		RE15-98-0037	04	S	9/23/98	

Final Page of REQUEST NUMBER 4662R

Page 2

000473

Friday, September 25, 1998

Los Alamos
NATIONAL LABORATORY

CHAIN OF CUSTODY DOCUMENT NUMBER: 4662RC

REQUEST NUMBER: 4662R

ANALYSIS TYPE: RAD

ATTN: Steve Fry
Paragon/ATI
225 COMMERCE
FT. COLLINS, CO 80524

9809192

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE	PRESERVATIVE	MATRIX
RE15-98-0029	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0029	02	500 ml Polyethylene	H3	None	S
RE15-98-0029	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0030	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0030	02	500 ml Polyethylene	H3	None	S
RE15-98-0030	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0031	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0031	02	500 ml Polyethylene	H3	None	S
RE15-98-0031	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0032	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0032	02	500 ml Polyethylene	H3	None	S
RE15-98-0032	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0033	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0033	02	500 ml Polyethylene	H3	None	S
RE15-98-0033	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0034	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0034	02	500 ml Polyethylene	H3	None	S
RE15-98-0034	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0035	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0035	02	500 ml Polyethylene	H3	None	S

Relinquished By: _____ Date _____ Time _____

SI Hagelberg *SI Hagelberg* 9.25.98 1319

PRINTED NAME SIGNATURE

PRINTED NAME SIGNATURE

PRINTED NAME SIGNATURE

Received for DISPOSAL By: _____ Date _____ Time _____

PRINTED NAME SIGNATURE

Received By: _____ Date _____ Time _____

PRINTED NAME SIGNATURE

PRINTED NAME SIGNATURE

PRINTED NAME SIGNATURE

Remarks:

000474

Friday, September 25, 1998

9809192

COC DOC NUMBER: 4662RC

REQUEST NUMBER: 4662R

Page 2

SAMPLE ID	CONT ID	CONTAINER DESCRIPTION	ANALYSIS ORDER CODE		
RE15-98-0035	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0036	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0036	02	500 ml Polyethylene	H3	None	S
RE15-98-0036	04	125 ml Polyethylene	ISOU	None	S
RE15-98-0037	01	500 ml Polyethylene	GAMMA SPEC	None	S
RE15-98-0037	02	500 ml Polyethylene	H3	None	S
RE15-98-0037	04	125 ml Polyethylene	ISOU	None	S

Final Page of CHAIN OF CUSTODY DOCUMENT FOR REQUEST NUMBER 4662R

Page 2

Relinquished By:

Date Time

SHagelberg SHag 9/25/98 1319

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Received for DISPOSAL By:

Date Time

PRINTED NAME

SIGNATURE

Received By:

Date Time

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

PRINTED NAME

SIGNATURE

Remarks:

000475

CONDITION OF SAMPLE UPON RECEIPT

CLIENT: LANUSHIPPING CONTAINER #: Client CoolerWORKORDER NO. 980919ZINITIALS: JHDATE: 9/26/97

1. Does this project require special handling according to NEESA, Level 3, or CLP protocols? If yes, complete a. and b. a. Cooler Temperature _____ b. Lot No's. _____ c. Airbill Number _____	Yes	<u>No</u>
2. Are custody seals on the cooler intact? If so, how many <u>4</u>	N/A	<u>Yes</u>
3. Are custody seals on sample containers intact?	N/A	<u>Yes</u>
4. Is there a Chain of Custody (COC) or other representative documents, letters or shipping memos?	<u>Yes</u>	<u>No</u>
5. Is the COC complete? Relinquished: Yes <u>X</u> No Requested Analysis: Yes <u>X</u> No	N/A	<u>Yes</u>
6. Is the COC in agreement with the samples received? No. of Samples: Yes <u>X</u> No Sample ID's: Yes <u>X</u> No Matrix: Yes <u>X</u> No No. of Containers: Yes <u>X</u> No	<u>Yes</u>	<u>No</u>
7. Are the samples requiring chemical preservation preserved correctly?	<u>N/A</u>	<u>Yes</u>
8. Is there enough sample? If so, are they in the proper containers?	<u>Yes</u>	<u>No</u>
9. Are all samples within holding times for the requested analyses?	<u>Yes</u>	<u>No</u>
10. Were the sample(s) shipped on ice?	N/A	<u>Yes</u>
11. Were all sample containers received intact? (not broken or leaking, etc.)	<u>Yes</u>	<u>No</u>
12. Are samples requiring no headspace, headspace free?	<u>N/A</u>	<u>Yes</u>
13. Do the samples require quarantine?	<u>Yes</u>	<u>No</u>
14. Do samples require Paragon disposal?	<u>Yes</u>	<u>No</u>
15. Did the client return any unused bottles?	<u>Yes</u>	<u>No</u>

Describe "NO" items (except No's 1, 13, & 14): _____

Was the client contacted? Yes _____ No _____

If yes, Date: _____

Name of person contacted: _____

Describe actions taken or client instructions: _____

Group Leader's Signature: _____

Date: _____

Cooler Temperature: 6°

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 9

**ADDITIONAL
SUPPORTING
DOCUMENTATION**

9

000477

PERCENT MOISTURE

Batch ID: 09189MOI.XLS

Analyst: KVG

Oven in, Date/ Time: 10/2/98 10:00

Oven out, Date/ Time: 10/5/98 15:00

Balance No: 13

Sample Number	Dish Weight	Dish + Wet Wt.	Net Wet Wt.	Dry Wt. +Dish Wt.	NET Dry Wt.	% Moisture	% Solids
98-09-189-RB	1.0709	1.0709	0	1.0711	0.0002	#DIV/0!	#DIV/0!
98-09-189-01	1.0776	11.331	10.2534	10.8806	9.803	4.39	95.61
98-09-189-02	1.092	11.4434	10.3514	11.1823	10.0903	2.52	97.48
98-09-189-03	1.0894	11.3873	10.2979	10.9165	9.8271	4.57	95.43
98-09-189-04	1.0785	11.1514	10.0729	10.8404	9.7619	3.09	96.91
98-09-189-05	1.0765	11.1607	10.0842	10.8521	9.7756	3.06	96.94
98-09-189-06	1.0825	11.1952	10.1127	10.873	9.7905	3.19	96.81
98-09-189-07	1.0658	11.2101	10.1443	10.9093	9.8435	2.97	97.03
98-09-192-01	1.0769	11.2384	10.1615	11.0198	9.9429	2.15	97.85
98-09-192-02	1.0901	11.4249	10.3348	10.8279	9.7378	5.78	94.22
98-09-192-03	1.0848	11.2326	10.1478	10.5781	9.4933	6.45	93.55
DUP OF 98-09-189-07	1.0888	11.2355	10.1467	10.937	9.8482	2.94	97.06
98-09-192-04	1.0771	11.475	10.3979	11.2972	10.2201	1.71	98.29
98-09-192-05	1.0996	11.1795	10.0799	10.9376	9.838	2.40	97.60
98-09-192-06	1.0969	11.2066	10.1097	10.862	9.7651	3.41	96.59
98-09-192-07	1.0942	11.3397	10.2455	11.2557	10.1615	0.82	99.18
98-09-192-08	1.1077	11.1874	10.0797	10.6823	9.5746	5.01	94.99
98-09-192-09	1.0946	11.4419	10.3473	11.4142	10.3196	0.27	99.73
					0	#VALUE!	#VALUE!
					0	#VALUE!	#VALUE!
					0	#VALUE!	#VALUE!
					0	#VALUE!	#VALUE!
DUP OF 98-09-192-09	1.0809	11.4162	10.3353	11.3874	10.3065	0.28	99.72

Sample #	Sample	DUP	RPD
98-09-189-07	2.97	2.94	0.95
98-09-192-09	0.27	0.28	3.16

IF SAMPLE % MOISTURE IS < %10, ACCEPTABLE RPD IS <67

IF SAMPLE % MOISTURE IS > %10, ACCEPTABLE RPD IS <20

Verified by: BP 10/5/98

Liquid Scintillation Counter
Instrument Calibration
Initial Efficiency Calibration
Standards Traceability

000473

REAGENT BLANK; New Cocktail; Water Added

Reagent Blanks consist of 10ml Ultima Gold Cocktail and "dead" water.

Instrument background for reporting purposes is determined by the average of the most recent 7 reagent blank counts.

Control limits (3 sigma) are derived from the first 30 data points.

Interim control limits are from 7/17/97-7/22/97 data until 30 pts. are acquired.

Date	ID	CPM	In Control?	Running Mean
9/17/98	98-08-156-RB	7.75	OK	7.49
9/22/98	98-09-017-RB	7.28	OK	7.49
9/25/98	98-09-078-RB	7.63	OK	7.59
9/30/98	98-09-200-RB	7.29	OK	7.48
10/5/98	98-09-230-RB	7.44	OK	7.48
10/8/98	98-09-129-RB	7.30	OK	7.42

000480

Tritium Efficiency Calibration (10ml geometry)

10ml Sample + 10ml Ultima Gold LLT (Lot # 97-7121)

Beckman LS 6000

8/12/98

LUMEX Correction = ON

Known Activity of Std. 486.1572.03

45490.40 dpm/ml as of 3/23/98
 1/2 life = 12.28 yrs.
 current activity = 44503.01 dpm/ml
 ml per vial = 0.2016
 Average Spike Activity = 8970.32 dpm

Sample ID	WIND1 cpm	WIND2 cpm	%LUMEX	H#
98-20-004-B11	6.70	43.07	0.14	137.50
98-20-004-B12	7.40	42.37	0.12	136.20
98-20-004-B13	7.03	42.37	0.11	136.10
98-20-004-S11	1809.19	44.14	0.01	136.30
98-20-004-S12	1873.83	41.12	0.01	135.90
98-20-004-S13	1829.09	42.55	0.01	136.90
		42.60	0.07	136.48

averages

average LCS= 1837.37

average BKG= 7.04

net cpm= 1830.33

/known dpm= 8970.32

efficiency= 0.2040

WIND2 cpm	%LUMEX	H#
45.57	5.00	151.48
39.64	0.00	121.48
See Tech. Mgr.	See Tech. Mgr.	Std. Addition

UCL

LCL

Corrective Action

Instrument Technician:

Chad McHenry 8/18/98
 Signature & Date

Supervisory Review:

Dan Brun 8/18/98
 Signature & Date

000481

TRITIUM IN WATER

Analyst: BP
 Prep. Date: 8/12/98
 Prep. Date: 8/12/98
 SOP Used: 700Rev4

Analytical Balance No: 13
 Pipet for Scintillation Cocktail: T-002
 5 mL Pipet: RS-97

Type of Cocktail: Ultima Gold-LLT, Lot#: 97-7121

Data File Name
 Count Date/Time

PAI - W.O.#	sld	wt.	gr	Final Aliquot (ml)	Rack Number	Rack Position	Remarks
98-20-004 B1	NA			5.0	51	1	BLANK
98-20-004 B2	NA			5.0	51	2	BLANK
98-20-004 B3	NA			5.0	51	3	BLANK
98-20-004 S1	0.2000			5.0	51	4	LCS
98-20-004 S2	0.1999			5.0	51	5	LCS
98-20-004 S3	0.2013			5.0	51	6	LCS
98-20-004 B11	NA			10.0	51	7	BLANK
98-20-004 B12	NA			10.0	51	8	BLANK
98-20-004 B13	NA			10.0	51	9	BLANK
98-20-004 S11	0.1999			10.0	51	10	LCS
98-20-004 S12	0.2028			10.0	51	11	LCS
98-20-004 S13	0.2020			10.0	51	12	LCS

Spike Witness:

Relinquished by:

Received by:

Reviewed by:

Spike Std ID	Vol. ML	Pipet ID
486.1572.03	45490 dpm/g	

effective 3/22/98

$$\text{current act.} = 45490.4 \text{ c} \times \frac{0.38}{12.5} = 44576.8 \text{ dpm/g.}$$

000482

ID: TRITIUM-LS6000

12 AUG 1998 15:19

USER:10

COMMENT:WIH LUMEX CORRECTION

PRESET TIME : 60.00

DATA CALC : CPM H# :YES SAMPLE REPEATS: 1 PRINTER : STD
 COUNT BLANK : NO IC# : NO REPLICATES : 1 RS232 : STD
 TWO PHASE : NO AGC : NO CYCLE REPEATS : 1
 SCINTILLATOR: LIQUID LUMEX:YES LOW SAMPLE REJ: 0
 LOW LEVEL : YES HALF LIFE CORRECTION DATE: none

CHAN: 25.0 - 270.0 %ERROR: 2.00 FACTOR: 1.000000 BKG. SUB: 0
 CHAN: 350.0 - 1000.0 %ERROR:20.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1		WIND2		LUMEX %	ELAPSED TIME	
				CPM	%ERROR	CPM	%ERROR			
81	1	51-1	60.00	103.9	7.23	9.72	46.00	3.81	0.38	61.85
82	2	51-2	60.00	104.7	7.67	9.41	45.02	3.85	0.28	123.71
83	3	51-3	60.00	104.6	7.27	9.64	44.13	3.89	0.25	185.58
51	4	51-4	4.40	104.7	2275.68	2.00	49.55	13.55	0.01	190.66
52	5	51-5	4.50	104.0	2235.78	1.99	56.89	12.50	0.01	195.84
53	6	51-6	4.35	104.0	2311.26	1.99	53.33	13.13	0.01	200.86
811	7	51-7	60.00	137.5	6.70	10.00	43.07	3.93	0.14	262.71
82	8	51-8	60.00	136.2	7.40	9.51	42.37	3.97	0.12	324.53
83	9	51-9	60.00	136.1	7.03	9.76	42.37	3.97	0.11	386.32
54	10	51-10	5.55	136.3	1809.19	2.00	44.14	12.78	0.01	392.58
511	11	51-11	5.35	135.9	1873.83	2.00	41.12	13.48	0.01	398.64
531	12	51-12	5.50	136.9	1829.09	1.99	42.55	13.07	0.01	404.85

000483

5/21/98

Prepare a working level solution for "Method of Standard Additions" using std 486.1284.85
(act of .85 = 427029.4 pL/g)

$$\begin{array}{rcl}
 20 \text{ mL LSC vial} & \text{true} = & 17.1922 \text{ g} \\
 + \approx .5 \text{ mL } 486.1284.85 & = & 17.6968 \text{ g} \\
 \text{net} = & & 0.5046 \text{ g STD.}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Dilute to total (-vial) of} & 27.7079 \text{ g} & \\
 - 17.1922 \text{ g vial} & & \\
 \hline
 10.5157 \text{ g new STD} & &
 \end{array}$$

$$\begin{array}{rcl}
 427029.4 \text{ pL/g} & & \\
 \times .5046 & & \\
 \hline
 215479.0 \text{ pL} & & \\
 \div 10.5157 \text{ g} & & \\
 \hline
 20,491.2 \text{ pL/g} & & \\
 \times 2.22 \text{ dpm/pL} & & \\
 \hline
 45490.4 \text{ dpm/g} & &
 \end{array}$$

Ref Date: 3/23/98
Inc: 5%

Verified 5/27/98 PER

Continued on Page

Daniel C. Burn

Signed

5/20/98

Date

Read and Understood By

Chris M. M...

Signed

000484

5/22/98

Date

Soln # 486 1284.84 was diluted to from a soln approx
100000 dpm/mL as follows:

Wgt tars 27.9711g

Wgt + HS (486 1284.84) 42.6011g

Final (dil w/ DI H₂O) 62.7170g

dil factor

$$\begin{array}{r} 42.6011 \text{ g} \\ - 27.9711 \text{ g} \\ \hline 14.63 \text{ g STD} \\ \times 1014184.6 \text{ pCi/g} \\ \hline 14837521 \text{ pCi} \\ \div (62.7170 \text{ g} - 27.9711 \text{ g}) \\ \hline 427,029.4 \text{ pCi/g} \end{array}$$

Std ID: 486.1284.85

Description: Tritium in Water Stock Solution

Activity: 427029 pCi/g or mL

Uncertainty: pCi/g or mL

Ref. Date: 3/30/98

Ref Time: 10:00 AM

Prep Date 3/30/98 Prep by: RTS

Expiration 3/29/03

Matrix/Comp. DI Water

Short Lived - Decay Correct with each use

Verified 5/27/98 RTS

Continued on Page _____

Read and Understood By

RTS 5/27/98

000485

Signed _____

Date _____

Signed _____

Date _____

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

55543-307

H-3 in Water 50 mL in Flame Sealed Vial

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a master radionuclide solution standard. The master radionuclide solution standard was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 24057. The calibration was checked by liquid scintillation counting after source preparation.

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

ISOTOPE:	H-3
ACTIVITY (dps):	1.889 E+06
CALIBRATION DATE:	March 23, 1998 12:00 EST
HALF-LIFE:	12.43 years
TOTAL UNCERTAINTY:	5.0%

50.34 grams of water.

P O NUMBER 21143, Item 1

PREPARED BY:

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

Q A APPROVED:

LC 21143 3/23/98

000486

Liquid Scintillation Counter
Quality Control Data
Daily Instrument Performance
Checks

000487

DAILY INSTRUMENT PERFORMANCE CHECKS - LS6000

Daily IPCs consist of the following standards;

Efficiency Check -

Beckman Tritium Standard		Beckman C-14 Standard		PAI Reagent Blank	
Lot HHZ0506		Lot CHZ1302		9803105-RB	
97700.00	dpm	100500.00	dpm		
05/10/97	REF	5/10/97	REF		
05/10/02	EXP	5/10/02	EXP		

Obs	Date	H-3 CPM		C-14 CPM		REAGENT	Decay Corrected					
		H-3	C-14	H-3	C-14		H-CPM	H-UCL	H-LCL	C-UCL	C-LCL	B-LCL
366	10/6/98	40486.40	OK	63472.20	OK	13.30	43827.13	44578.02	41024.32	65758.27	59747.35	19.84
367	10/7/98	40054.80	OK	63888.40	OK	15.30	43366.60	44578.02	41024.32	65758.27	59747.35	19.84
368	10/8/98	40857.80	OK	63775.10	OK	14.50	44242.82	44578.02	41024.32	65758.27	59747.35	19.84
369	10/10/98	38492.40	OK	63506.70	OK	13.20	41694.31	44578.02	41024.32	65758.27	59747.35	19.84
370	10/11/98	39102.30	OK	63841.50	OK	12.30	42361.48	44578.02	41024.32	65758.27	59747.35	19.84
371	10/12/98	38483.40	OK	63088.60	OK	15.40	41697.42	44578.02	41024.32	65758.27	59747.35	19.84

000488